SECURE POWER FOR ALL TYPES OF CRITICAL APPLICATIONS
ProtectPLUS M600 modular UPS is a unique combination of:

- RELIABILITY
- SCALABILITY
- FLEXIBILITY and EFFICIENCY

ProtectPLUS M600 IS EASY TO USE AND MAINTAIN

… and an ideal solution to secure power for many types of critical applications
SUITABLE FOR A WIDE RANGE OF CRITICAL APPLICATIONS

Public Administration
• Data centers
• Emergency services
• Security lighting and
• Electronic surveillance systems.
Security is fundamental for government, public administration as well as military institutions.

Financial Environments
• Data centers
• Stock exchange
• Cash machines
• Transmission network
• Computer applications
... where even short power failures may result in data loss and significant economic loss.

Medical & Healthcare
• Emergency & surgery rooms
• Nursery
• Special analysis laboratories (X-ray, CT scanning mammography)
• Hospital records
• Pharmacy (laboratory refrigeration, clinical chemistry analyzer, coagulation analyzers)
• Archive rooms
• Data center environment security.
For all healthcare environments where the protection of life is critical, when it comes to securing power, reliability is a must.

Retail applications
• POS for electronic credit card payments
• Speakers and entertainment
• Computer services for warehouses and logistics' management systems
• Information systems
• Lighting
• Remote surveillance and safety (emergency services, fire detection)

PROTECT PLUS M600
FIRST CLASS MODULAR UPS
PROTECTPLUS M600 – MODULAR UPS SOLUTION 30 – 900 KVA

PROTECTPLUS M600

• Double conversion (VFI-SS-111)
• Full IGBT & transformer-less architecture
• Up to 900 kVA total power (30 x 30 kVA)
• ECO mode
• Idle mode
• Nominal output PF = 0.9
• 10.4" color touch screen display
• Double doors for back access and easy maintenance
• Self-aging for full load test with only 5% power
• Many optional features
POWER QUALITY AGAINST ELECTRICAL DISTURBANCES

Black out

Under voltage

Spikes

Voltage variations

Frequency variations

Radio disturbances (high frequency)

Harmonics

ProtectPLUS M600

- VFI-SS-111
- Input voltage 380/400/415 V
- Voltage range 304 – 478 V

- Input frequency 50/60 Hz
- Frequency range 40 – 70 Hz
- Output THDv \( \leq 1.5 \% \)
- Voltage regulation \( = 1 \% \)
VFI-SS-111 – CLASS 1 UPS

Nominal voltage values (V)

Transient over voltage limit

Transient under voltage limit

Transient duration (ms)
EN 62040-3: UPS DYNAMIC PERFORMANCE

Dependency on output on dependent input; only in Normal mode

- **VFI** = UPS output voltage and frequency independent from input and within limits prescribed by standard ENV61000-2-2
- **VFD** = UPS output frequency and voltage dependent on input
- **VI** = UPS output dependent on input frequency variations while voltage is established.

Output Wave Form

- **S** = Sinusoidal wave form with total harmonic distortion $D < 0.08$ within IEC61000-2-2 limits under all linear and non-linear reference load conditions
- **X** = Sinusoidal wave form with linear load as for S. With a non-linear load, the distortion factor $D$ will be greater than 0.08 if loaded greater than the limits defined by the manufacturer
- **Y** = Non-sinusoidal wave form and distortion greater than ENV61000-2-2 limits (refer to manufacturer’s data)

Dynamic Output Performance

- **1** = Output voltage within Class 1 limits (without voltage failure)
- **2** = Output voltage within Class 2 limits (output voltage at 0 for 1 ms max.)
- **3** = Output voltage within Class 3 limits (output voltage at 0 for 10 ms max.)
- **4** = Refer to the performance levels declared by the manufacturer
<table>
<thead>
<tr>
<th>ITEM</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
<td>30 – 900 kVA with 30 kVA Power Module</td>
</tr>
<tr>
<td>IEC 62040-3 Classification</td>
<td>Double conversion (VFI-SS-111) and ECO mode (VFD)</td>
</tr>
<tr>
<td>Input voltage</td>
<td>380/400/415 VAC</td>
</tr>
<tr>
<td></td>
<td>Input voltage range: 304 – 478 VAC (Line-Line) @ full load</td>
</tr>
<tr>
<td>Input frequency</td>
<td>50/60 Hz (can be used as frequency converter)</td>
</tr>
<tr>
<td></td>
<td>Input frequency range: 40 – 70 Hz</td>
</tr>
<tr>
<td>Input THDi / PF</td>
<td>THDi &lt; 3 %; PF &gt;0.99</td>
</tr>
<tr>
<td>Output</td>
<td>THDv &lt;1 % (with linear load); THDv &lt;6 % (with non linear load)</td>
</tr>
<tr>
<td></td>
<td>Dynamic response: ± 5 %; Transient recovery time &lt;30 ms (0 % – 100% – 0% load step)</td>
</tr>
<tr>
<td>Overload through the inverter line</td>
<td>110 % @ 60 min</td>
</tr>
<tr>
<td></td>
<td>125 % @ 10 min</td>
</tr>
<tr>
<td></td>
<td>150 % @ 1 min</td>
</tr>
<tr>
<td></td>
<td>&gt;150 % @ 200 ms</td>
</tr>
<tr>
<td>Overload through the Static Bypass Line</td>
<td>Up to 110 % continuous</td>
</tr>
<tr>
<td></td>
<td>Up to 125 % @ 5 min</td>
</tr>
<tr>
<td></td>
<td>Up to 150 % @ 1 min</td>
</tr>
<tr>
<td></td>
<td>Up to 400 % @ 1 s</td>
</tr>
<tr>
<td></td>
<td>&gt;400 % @ 200 ms</td>
</tr>
<tr>
<td>Battery line</td>
<td>240 cells (40 blocks x 12 V each),</td>
</tr>
<tr>
<td></td>
<td>with central N point (120 + 120 cells)</td>
</tr>
</tbody>
</table>
THE BATTERY LINE

Setting range:
- 40 blocks (12 V each)
- Settable from 36 to 44 blocks
- 3 poles: + / N / -

Setting range:
- 150 blocks (3,2 V each cell)
- Settable from 140 to 180 blocks
- 3 poles: + / N / -

Battery supported

VRLA batteries

Lithium batteries

40 batteries connected in series
INVERTER OUTPUT

Inverter output figures

• Nominal output PF = 0.9 (both inductive or capacitive)
• No derating for inductive loads
• No derating for 0.9 capacitive PF
SCALABILITY & FLEXIBILITY
The purpose of modular UPS is to offer high efficiency values, scalable solutions (just adding or removing Power Modules, in case of growth or decrease of the protected load), redundancy and automatic management of power (kW).

All Power Modules are equipped with decentralized control mechanisms, thus increasing the operational safety and connection to a pre-defined infrastructure.
PROTECTPLUS M600 – THE CONCEPT OF MODULARITY

Highlights
• Scalability
• Hot-swappable
• On-line scale-up
• On-line scale-down
• Flexibility
• Pay as you grow
• Inbuilt N+1 redundancy

Up to 20 Power Modules possible
PROTECT\textsuperscript{PLUS} M600 – THE CONCEPT OF MODULARITY (2)

Main Advantages

- Modular design with N+X inbuilt redundancy
- Hot-swappable modules
- Independent LCD display for each Power Module including a self starting function
- Idle mode, for high efficiency values, even with low percentage of load
- Centralized (static and manual) Bypass module
- Centralized battery connection

<table>
<thead>
<tr>
<th>NUMBER OF POWER MODULES</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabinet for 6 Power Modules</td>
<td>kVA</td>
<td>30</td>
<td>60</td>
<td>90</td>
<td>120</td>
<td>150</td>
<td>180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30</td>
<td>60</td>
<td>90</td>
<td>120</td>
<td>150</td>
<td>180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N+1</td>
<td></td>
</tr>
<tr>
<td>Cabinet for 10 Power Modules</td>
<td>kVA</td>
<td>30</td>
<td>60</td>
<td>90</td>
<td>120</td>
<td>150</td>
<td>180</td>
<td>210</td>
<td>240</td>
<td>270</td>
<td>300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>30</td>
<td>60</td>
<td>90</td>
<td>120</td>
<td>150</td>
<td>180</td>
<td>210</td>
<td>240</td>
<td>270</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N+1</td>
</tr>
<tr>
<td>Cabinet for 20 Power Modules</td>
<td>kVA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

for special configurations only
THE POWER MODULE

- Isolated airflow
- Front panel dismountable
- Redundant fans
- High power density
- Independent start-up
- Independent LCD display
THE POWER MODULE (2)

Electrical figures
- 30 kVA / 27 kW
- Input PF > 0.99
- Nominal output PF = 0.9 (both inductive or capacitive)

Hardware figures
- Transformer-less IGBT technology (both for rectifier and inverter)
- DC/DC converter for the centralized battery line
- Charging current: 5 ÷ 9.4 A per Power Module
- Independent control logic (start-up and shut down of the single module)
EFFICIENCY & MINIMIZED OPERATION COSTS
EFFICIENCY

- Minimized Power Losses
- AC/AC Efficiency in double conversion ≥95.5%
- Transformer-less architecture
- Full IGBT double conversion
**IDLE MODE**

With **Idle mode**, the UPS active Power Module(s) will sleep and wake up in turns, when the load is less than 20% (for each Power Module of the system).

The controller will shut down the module one by one every 5 minutes, until the calculated number of modules remain active in the system.

If a step load is applied, due to an increase of the load protected, the controller will wake up all the modules at once and then will recalculate the number of remaining modules.

After every rotation period, the controller will wake up one module (the one with the shortest running time) and will have one module (the one with the longest running time) go into Idle mode.
EASY TO USE & TO MAINTAIN
USER-FRIENDLY 10.4" TOUCH-SCREEN LCD

25 windows with configuration and information view

User-friendly machine-human operation interaction via the LCD screen

Easy  Comfortable  Fast
The Mean Time to Repair (MTTR) is minimized, thanks to the possibility of replacing the redundant Power Module(s) while the others work on-line supplying the load.
WIDE
POWER RANGE
AVAILABLE
**PROTECTPLUS M600 – DIMENSIONS & WEIGHT**

- Bottom & top cable entry for the 180 kVA cabinet
- Top cable entry (STD) for the 300 and 600 kVA cabinet. Bottom cable entry is optional
- 180 and 300 kVA cabinets do not have input/output/battery switches, only the maintenance Bypass switch is on board
- 600 kVA cabinet has input/output/battery/maintenance Bypass switches on board
PROTECT PLUS M600 – THE FRAMES

Frame(s) parallel-ability:
- Frame 180: from 1 to 3 in parallel
- Frame 300: from 1 to 3 in parallel
- Frame 600: no parallel frames
- Hot-swappable modules for any configuration
- Idle mode, for any configuration
- Centralized battery connection (also in common between two frames in parallel)
PROTECT PLUS M600 – FRAME 180
PROTECTPLUS M600 – FRAME 180 – SCHEMATIC DIAGRAM

• Separated or Common Input Lines
  - Mains Input 3P+N
  - Bypass Input 3P+N
  - Centralized Static Bypass Line
  - Centralized Manual Bypass Line

• Frame 180 (6-Slot)
  - From 30 to 180 kVA
  - 1 to 6 Power Modules (30 kVA) connected
  - Top and bottom cable entry
  - No input/output/battery switches included
  - Manual Bypass switch included
  - Parallel-able up to 3 units (3 x 180 kVA)

• Battery Line
  - 480 VDC / 240 cells (12 Volt each)
  - 120 + 120 cells with central N
  - 3-pole switch: + / N / -
  - Centralized batteries – VRLA and Lithium
PROTECTPLUS M600 – FRAME 300
**PROTECT PLUS M600 – FRAME 300 – SCHEMATIC DIAGRAM**

- **Separated or Common Input Lines**
  - Mains Input 3P+N
  - Bypass Input 3P+N
  - Centralized Static Bypass Line
  - Centralized Manual Bypass Line

- **Frame 300 (10-Slot)**
  - From 30 to 300 kVA
  - 1 to 10 Power Modules (30 kVA) connected
  - Top cable entry (bottom as option)
  - No input/output/battery switches included
  - Manual Bypass switch included
  - Parallel-able up to 3 units (3 x 300 kVA)

- **Battery Line**
  - 480 VDC / 240 cells (12 Volt each)
  - 120 + 120 cells with central N
  - 3-pole switch + / N / -
  - Centralized batteries – VRLA and Lithium
PROTECT PLUS M600 – FRAME 600
• **Frame 600 (20-Slot)**
  - From 30 to 300 kVA

• **Battery Line**
  - 480 VDC / 240 cells (12 Volt each)
  - 120 + 120 cells with central N
  - 3-pole switch + / N / -
  - Centralized batteries – VRLA and Lithium
MANY AVAILABLE OPTIONS
AVAILABLE OPTIONS

1. SNMP Card
2. Battery Temperature Compensation
3. Bottom Cable Entry for Frame 300
4. Parallel Kit
5. Load Bus Synchronization
6. Additional Charging Module (50 A)
7. External Manual Bypass Cubicle
8. Remote Panel Unit
VRLA Batteries are very sensitive to environmental temperature variations, far from the nominal value (typically 20 – 25 °C).

For every single cell (2 V) the difference in voltage may be up to 3 mV when ambient temperature varies ±1 °C from the room temperature.
BATTERY TEMPERATURE COMPENSATION

- Battery temperature sensor will be installed inside the battery cabinet and connected to the UPS dry contact board.
- The setting range is from 0 to 5.0 mV/°C (default value is 0).
- Float charging voltage will be adapted from 2.20 to 2.35 V/cell (default is 2.25 V/cell).

<table>
<thead>
<tr>
<th></th>
<th>MIN</th>
<th>MAX</th>
<th>DEFAULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CellFloat</td>
<td>2.2</td>
<td>2.35</td>
<td>2.25</td>
</tr>
<tr>
<td>CellBoost</td>
<td>2.3</td>
<td>2.45</td>
<td>2.4</td>
</tr>
<tr>
<td>TempComp</td>
<td>0</td>
<td>0.005</td>
<td>0</td>
</tr>
<tr>
<td>TempBatt</td>
<td>--</td>
<td>--</td>
<td>25</td>
</tr>
</tbody>
</table>
BOTTOM CABLE ENTRY (FRAME 300)
PARALLEL KIT

- Distributed control logics (one for each Frame)
- **CAN bus loop**
- Failure of one unit: load OK
- Only redundancy is lost

- Parallel control is distributed, not centralized
  > highly reliable system with each UPS microcontroller and communication loop among units
- **CAN bus** connection loop avoids “single points of failure”
- The parallel control and interconnections allows for easy installation and simple future upgrades by adding new units to the system according to a customer’s consumption needs
- Cable length from 5 to 15 m
ADDITIONAL CHARGING MODULE (50 A)
REMOTE PANEL UNIT

- The Remote Panel Unit gives direct access to information displayed on the UPS system’s LCD screen including current, voltage, temperature as well as other status updates.
- Connection through RS485 or RS232 port.
- One Remote Panel Unit can monitor more than one UPS at the same time.
- Audible and light warning alerts for all faults and failures.
- Long distance communication RS485 communication with a distance of up to 1200 m.
- Wall mounted design.

**Diagram: Remote Panel Unit**

1. RS232 port
2. RS485 port
3. Buzzing On/Off
4. LED
5. LCD display
6. Control button
7. Input power plug
8. Program upgrade port
ANY QUESTIONS? GET IN TOUCH.
FOR FURTHER INFORMATION PLEASE GO TO WWW.AEGPS.COM/EN/CONTACT