GE Critical Power

Static Transfer Switches for source redundancy

GE Series STS-3
Three Phase
GE Product Portfolio for the Datacenter

...now enhanced with Static Transfer Switches

...thus providing end-to-end customer solutions
Increasing Redundant UPS Reliability using STS devices

**Block Diagrams**

**2-Module Parallel-Redundant UPS with Centralized Static Bypass**

- UPS Module (no St Sw bypass)
- UPS Module (no St Sw bypass)
- Static Switch Bypass

**Common Mode Failure Points:**
- Paralleling Logic and Control
- Electrically-Operated System Output Circuit Breaker

**2-Module Parallel-Redundant UPS with De-Centralized Static Bypass**

- UPS Module (with St Sw bypass)
- UPS Module (with St Sw bypass)

**Common Mode Failure Points:**
- Paralleling Logic and Control

**2-Single Module Redundant UPS with Static Transfer Switch**

- UPS Module (with St Sw bypass)
- UPS Module (with St Sw bypass)
- Static Transfer Switch

**Common Mode Failure Points:**
- Static Transfer Switch

**MTBF Calculation for 2 Assemblies in SERIES:**

\[ MTBF_{\text{total}} = \frac{1}{\left(\frac{1}{MTBF_1} + \frac{1}{MTBF_2}\right)} \]

**MTBF Calculation for 2 Assemblies in PARALLEL:**

\[ MTBF_{\text{total}} = MTBF_1 + MTBF_2 - \frac{1}{\left(\frac{1}{MTBF_1} + \frac{1}{MTBF_2}\right)} \]
Increasing Redundant UPS Reliability using STS devices

Reliability Diagrams & MTBF Calculations

(M = MTBF in hours)

2-Module Parallel-Redundant UPS with Centralized Static Bypass

2-Module Parallel-Redundant UPS with De-Centralized Static Bypass

2-Single Module Redundant UPS with Static Transfer Switch

MTBF\(_A\) = \frac{115,000 + 350,000 - 1}{1/115,000 + 1/350,000} = 377,281\) hours

MTBF\(_{BC}\) = \frac{1}{1/300,000 + 1/500,000} = 188,679\) hours

MTBF\(_{ABC}\) = \frac{1}{1/377,281 + 1/188,679} = 126,582 hours

MTBF\(_A\) = \frac{250,000 + 250,000 - 1}{1/250,000 + 1/250,000} = 375,000\) hours

MTBF\(_{AB}\) = \frac{1}{1/250,000 + 2,000,000} = 222,222 hours

MTBF\(_{total}\) = 222,222 hours

Subassembly stated MTBF figures are generally-accepted values stated from various UPS & STS product vendors
Zenith STS-3 Series
Stand-Alone, Three Phase Static Transfer Switch

CORE RATINGS
- Amps: 150, 250, 400, 600, 800, 1000, 1200, 1600
- Input: 480VAC 3ph 3w, 60Hz
  - 208, 400, 600VAC optional
- Output: 480VAC 3ph 3w, 60Hz
  - 208, 400, 600VAC optional
- Transfer Time: 4-6msec typical
Zenith STS-3 Series
Stand-Alone, Three Phase Static Transfer Switch

FEATURES

• Multi-functional LCD Touch Screen Display
• Compact Footprint
• Front Access for Maintenance
• Front/Side Access for Installation
• Door-in-door construction
• Modular, Drawout Assemblies
• 500% overload for 10 seconds
• 2,000,000 Hrs MTBF
• Multiple Redundancy Assemblies
• Redundant Operator Panel
• SNMP & Modbus RTU Communications
• Rigorous Factory Testing
  o 6000 operations at 150% load
  o 50 operations at 600% load
  o ETL Listed to UL1008 Standards
Zenith STS-3 Series
Stand-Alone, Three Phase Static Transfer Switch

MOLDED CASE SWITCHES
- Front accessible for service and infrared scanning
- 100% rated devices
- 5 or 6 breaker configurations
- 22KAIC (65/100KAIC optional)

SCRs
- Highly reliable puck form factor
- Rated 1200Amp for 100-800Amp STS
- SCR Modules on drawout rails for easy access and repair
Zenith STS-3 Series
Stand-Alone, Three Phase Static Transfer Switch

INTERNAL REDUNDANCY

- Triple Logic Redundancy
- Triple Redundant Power Supplies
- Dual Redundant SCR Gate Drivers
- Four Independent Processors
- Hot Swap PCBs / Optical Bus
Zenith STS-3 Series
Stand-Alone, Three Phase Static Transfer Switch

GRAPHICAL USER INTERFACE

• 262k Color Touch Screen Display
• 640x480 Resolution
• Hot Swap Capability via Redundant Fail-Safe Operator Panel
• Password Log-In
• One-Line color change based on source select
• USB Port for downloading stored event data
• 16MB Memory - Flash SD card for additional memory
Zenith STS-3 Series
Stand-Alone, Three Phase Static Transfer Switch

STS SETTINGS

• Volt-Second Synch Mode (VSS)
  o For 480V STS
  o Downstream PDU
• Power-Or-Gate Mode (POG)
  o For 208V STS
• Transfer Time is adjustable
  o 2-4ms in POG
  o 4-8ms in VSS
  o Longer delay for Ecomode UPS use
• Outage Transfers typically 8-12msec
• Manual Transfers typically 4-8msec
Zenith STS-3 Series
Stand-Alone, Three Phase Static Transfer Switch

WAVEFORM CAPTURE

- Real Time Waveform Capture
- Up to 12 Waveforms
- 16MB Memory
- Displays event +/- 2 cycles
- After power loss, monitoring continues for 10sec to capture alarms and waveforms
Zenith STS-3 / MDU Combo Unit
Three Phase Static Transfer Switch with Output PDU

**CORE RATINGS**

- **KVA:** For MDU-CL Model, 50-300kva
- **Input:** 480VAC 3ph 3w + gnd
  - 208, 400, 600VAC optional
- **Output:** 208/120VAC 3ph 4w + gnd
- **Freq:** 60Hz

*Primary Redundant STS/PDU System*
Zenith STS-3 / MDU Combo Unit
Three Phase Static Transfer Switch with Output PDU

FEATURES

• Matching Cabinetry - size and color
• VSS Feature to limit PDU inrush to 1.5X on STS transfers up to 180° out-of-phase
Zenith STS-3 / MDU Combo Unit
Three Phase Static Transfer Switch with Output PDU

MDU BCMS MONITORING ON STS UNIT

• STS Unit display screen can portray branch circuit information from MDU and RDU Series units
• Can display up to 50 downstream addresses, one panelboard per address
Series STS-3
GE Website Customer Resources

Available Documents

- STS-3 Brochure
- Template Guide Specifications
- Drawings (example configurations)
- O&M Manuals
- Whitepapers
- And much more......

www.gecriticalpower.com
STS Competitive Comparisons
## Zenith STS-3 Series
### Competitive Comparison

<table>
<thead>
<tr>
<th>Products</th>
<th>GE Critical Power</th>
<th>Layer Zero</th>
<th>Cyberex</th>
<th>Liebert</th>
<th>MGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE Zenith STS-3, 150-1600A</td>
<td>Series 70, 150-4000A</td>
<td>SuperSwitch 3, 200-4000A</td>
<td>Liebert STS2, 100-1000A</td>
<td>Epsilon STS, 200/400/600A; Upsilon STS, 30-1200A</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>37x33x75 for &lt; 800A 48x33x75 for 800A 53x36x86 for 1000A 84x43x75 for 1200A 89x43x75 for 1600A</td>
<td>48x36x80 for 800A 96x48x90 for 1200A</td>
<td>46x34x76 for 800-1000A 96x48x77 for 1200-1600A Add 24&quot;W for bottom entry</td>
<td>30x32x77 for 100-250A 38x32x77 for 400-600A 84x32x77 for 800-1000A</td>
<td>25x30x72 for 200A 28x33x75 for 400A 39x30x72 for 600A 28x32x75 for 630A</td>
</tr>
<tr>
<td>Standards</td>
<td>ETL listed to UL 1008</td>
<td>ETL listed to UL 1008</td>
<td>UL-1008</td>
<td>UL-1008</td>
<td>UL-1008</td>
</tr>
<tr>
<td>SCR Fault Rating</td>
<td>22-100kA</td>
<td>Unknown</td>
<td>25-150kA</td>
<td>25-150kA</td>
<td>Unknown</td>
</tr>
<tr>
<td>Monitor and available Outputs</td>
<td>Color touchscreen; available with matching MDU/RDU</td>
<td>Color touchscreen</td>
<td>Monochrome/ Color display</td>
<td>Color touchscreen</td>
<td>320x24 0Monochrome</td>
</tr>
<tr>
<td>Transfer Method</td>
<td>VSS limiting inrush to 1.5X</td>
<td>Unknown</td>
<td>Unknown</td>
<td>inrush limiting feature, not user selectable</td>
<td>inrush limiting feature, not user selectable</td>
</tr>
<tr>
<td>Pole</td>
<td>4-pole available</td>
<td>4-pole available</td>
<td>4-pole available</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Products</td>
<td>GE Critical Power</td>
<td>Layer Zero</td>
<td>Cyberex</td>
<td>Liebert</td>
<td>MGE</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------</td>
<td>------------</td>
<td>---------------</td>
<td>------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td>GE Zenith STS-3, 150-1600A</td>
<td>Series 70, 150-4000A</td>
<td>SuperSwitch 3, 200-4000A</td>
<td>Liebert STS2, 100-1000A</td>
<td>Epsilon STS, 200/400/600A; Upsilon STS, 30-1200A</td>
</tr>
<tr>
<td>Operation Access</td>
<td>Front</td>
<td>Front</td>
<td>Front</td>
<td>Front</td>
<td>Front</td>
</tr>
<tr>
<td>Seismic</td>
<td>Floor Stands and Seismic Anchors available</td>
<td>Floor Stands and Seismic Anchors available</td>
<td>Floor Stands and Seismic Anchors available</td>
<td>Floor Stands and Seismic Anchors available</td>
<td>Floor Stands and Seismic Anchors available</td>
</tr>
<tr>
<td>Overload compacity</td>
<td>125% for 30min, 150% for 2min, 300% for 30s, 500% for 10s</td>
<td>Unknown</td>
<td>125% for 30min, 150% for 1min, 1000% for 3cycles</td>
<td>125% for 10min, 150% for 2min</td>
<td>110% for 15min, 150% for 2min, 600% for 20s, 1000% &lt;6 cycles</td>
</tr>
</tbody>
</table>