



LAYERZERO
POWER SYSTEMS, INC.

Series 70 1200A-4000A eSTS

**Static Transfer Switch
Technical Specifications**





Basic Purpose

The Series 70 eSTS is a solid-state transfer switch that automatically or manually provides static transfers between two three-phase AC sources in less than a quarter cycle.

The eSTS protects against utility power failure for critical industries by providing switching functions between redundant sources very quickly, so that there will be no temporary loss of power availability. In addition, the eSTS provides operators with the capability to comprehensively monitor their power system and analyze source side and load side faults.

The eSTS performs open-transition transfer in such a manner that the connected load disruption is minimized without ever cross-connecting the power sources. One power source is selected to be the preferred source. If the preferred source fails the load is automatically and seamlessly connected to the alternate source by means of an open-transition static transfer.

Power sources are not required to be synchronized with our patented dynamic phase compensation technique. The electrical and mechanical design is highly maintainable. Critical components can be replaced without the need to de-energize the load.



Section Contains:

- Power electronics
- Control Electronics
- System Control & Data Boards
- I/O system; VPN Router

Section Contains:

- SCR Gate Drives
- SCRs & Snubber circuits
- Heat-sinks
- Redundant Power Supply System

Section Contains:

- Input isolation switches
- Bypass isolation Switches
- Output isolation switches
- Source connection terminals
- Load connection terminals

Section Contains:

- Output Terminals



Reliability

- Triple modular redundancy option
- Voice guided bypass procedure
- Mechanical bypass interlock*
- Silver plated terminals
- Machined cap screws & disc springs
- Screw thread inserts to retain torque
- Staggered heat sink arrangement
- Fanless operation*
- Optical fiber based controls

* 1200A eSTS

Safety

- InSight™ IR portholes
- Sectionalized Components
- Clear Translucent Polycarbonate window to view LEDs
- Front-only access
- Dead-front hinged doors
- NFPA 70E friendly

Connectivity

- Ethernet
- Modbus/TCP
- NTP time clock synchronization

Information Centricity

- Waveform capture
- “Black box” forensic diagnostics
- Touch screen interface

Agency Certification



The Series 70 1200A eSTS is ETL listed to UL 1008

Vast Depth Of Experience

LayerZero has a wealth of experience, knowledge, and understanding of data center infrastructure operation and development. We routinely guide and council our customers through the planning process to help ensure that the reliability of the power will be secure. LayerZero places an emphasis on providing the best product support in the industry, and our dedicated team of certified engineers are available to assist with a variety of complex data center planning issues.



Applications

LayerZero products are trusted by industries where power systems are required to be 100% reliable:

- 911 emergency response centers
- Banks
- Credit card companies
- Data centers
- Process industries
- Transportation facilities
- Critical infrastructure

Power distribution issues in the data center industry include:

Opportunity to Enhance Operator Safety

Our Series 70 product line was developed to provide a safe environment for the operator; and to assist critical sites with staying in compliance with the stringent safety requirements of NFPA 70E.

Lack of True System Redundancy

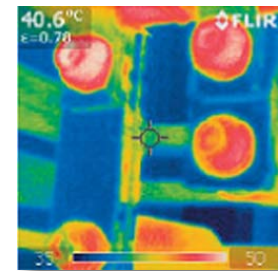
All of our equipment is truly redundant, so that if individual components were to fail the systems will remain fully operational. LayerZero equipment does not contain any single points of failure.

Need for Open Connectivity and Monitoring

Coordinating information is difficult when clusters of connected equipment are based on proprietary protocols, and LayerZero solves this by basing the equipment off of open technologies.

Lack of Comprehensive Diagnostics Tools

To prevent future problems in facilities our systems provide easy to read alarms with clear indications on the sources of offending conditions, so that root-cause analysis can be performed.



IR Portholes Allow The Operator To Keep The Deadfront Closed During The IR Scan Operation

Triple Modular Redundancy

The Series 70: eSTS occupies a unique architectural location in mission critical infrastructure systems.

The units are available in SMR (Single Modular Redundancy) or TMR (Triple Modular Redundancy) configurations, both of which are architectures that eliminate single points of failure.

The TMR configuration will continue its mission of being a static transfer switch even if any one control element were to fail. As such, it is known to improve reliability by an order of magnitude.

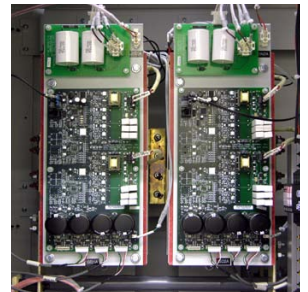
Triple Modular Redundant products serve the needs of elite, mission-critical infrastructure requirements. With our Triple Modular Redundant STS topology we can provide products that are at least ten times more reliable than alternative solutions.



Serialized circuit boards

We serialize and track all critical circuit boards and memory cards through our eBOSS portal, which allows customers to reference which components their machines are made from, who tested the components, as well as the ability to view notes generated from testing.

Serialized components offer the ability to drill-down on prospective component failure utilizing predictive modeling techniques, so if part fails, the instance can be cross-referenced with similar parts. This preventative maintenance helps ensure maximum uptime.



Fail-safe mechanics

The bypass procedure employs a fail-safe measure to improve system reliability in that the procedure can only be physically completed in the correct sequence.

On the 1200A eSTS, a mechanical “double goalpost” interlock bar constrains the operators behavior so that breakers can only be manipulated in an order maintain continuity of power to the load. The restraint rotates downward for manual transfer testing purposes.

The 4000A eSTS utilize Kirk Keys.

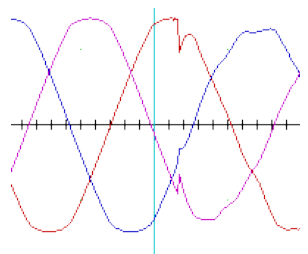


Waveform capture

Each transfer event and overload transfer-inhibit event is captured and stored in non-volatile memory. The Waveform Capture tool is standard in all eSTS products. It provides 3-phase current and 3-phase voltage waveform analysis of Source 1, Source 2, (Source 3 in a 3-source system) and Output

Precise voltage and current data is necessary to understand why a transfer was made. Detailed records of transfers help operators better understand the root cause of events, helping engineers properly eradicate problems. Without waveform capture, this is not possible in a live environment.

The 6-cycle capture is displayed on the control panel or can be viewed remotely on a standard web-browser.



“Black box” forensic diagnostics

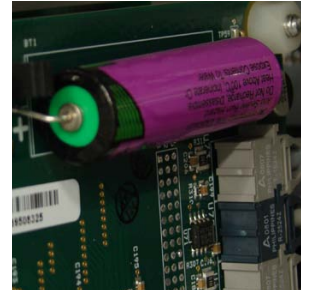
The black box capabilities of LayerZero equipment are extremely useful for analyzing root cause analysis, enabling operators to pinpoint exactly where a fault occurred. “Black box” forensics provide successive event information with ten microsecond resolution, supplies a brief snapshot of the event with a lead-in for further inquiry, and furnishes a real-time status indicator of all machine parameters at the time of the event.

The technology in our “black box” event history is one of the most useful recording schemes in the mission critical power machine industry.

Voice guided bypass

To help prevent operators from completing the bypass procedure out-of-sequence, our products feature a voice prompted bypass procedure. This instructs the operator in a step-by-step course of action of the process, with only one operation per screen. Voice guided bypass slows down operators and compels them to think about the process, significantly reducing the probability of operator error.

Visual and audio cues provide clear instructions on the bypassing sequence.



Silver Plated Terminals

LayerZero utilizes silver plating on all bus joints to be able to provide the highest performance. Silver has high conductivity and low resistance - which makes for a great contact.



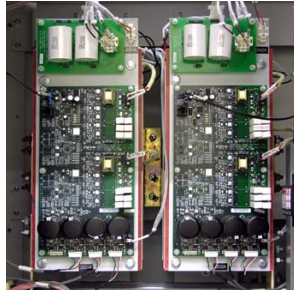
Machined cap screws & disc springs

Our systems utilize machined cap screws and engineered disc springs with a flat pressure vs deflection profile to ensure that all bolted connections maintain constant torque through the life of the product.



Optical fiber controls

Fiber optic based controls eliminate noise and interference, while isolating components from high voltage. Optical fiber allows service to be reliably connected, while protecting the equipment.



PEM inserts

Helicoil inserts

LayerZero utilizes Heli-Coil inserts for prevailing torques and long-term reliability.



Quality Built

LayerZero products are designed to run error-free by our team of skillful engineers, and built to last beyond the expected life of the product with our quality-focused manufacturing ideology.

Our employees devote themselves to cultivating a personal commitment to quality, and a philosophy of genuine, organization-wide dedication to continuous quality improvement.



LayerZero has a manufacturing alliance with Russelectric, the leading supplier of power control systems & equipment, custom designed to meet the stringent performance and reliability requirements of computer, communications, health care and other critical facilities.

LayerZero products are manufactured with the same dedication, attention and care at Russelectric's Broken Arrow, Oklahoma facility. Russelectric is a ISO9001:2000 certified, vertically integrated manufacturer.

InSight™ IR Portholes

Strategically positioned IR-scan portholes to enable safe thermal scanning of all bolted connections with the deadfront closed, without exposing the operator to power circuit voltage.

The IR window swivels upward and unlocks with key-hole access to reveal a mesh, allowing the operator to point-and-shoot thermal cameras to obtain accurate readings.

LayerZero provides documentation for proper thermal scanning procedures.



Sectionalized Components

Operators are well-protected from exposed connections. Normal operator sections (breakers/switches) are physically separated from the power electronics and control electronics sections, so that maintenance on a section can be safely performed.

If maintenance is required on a particular section, power can be bypassed to another section to allow for safe repairs to be made. All connections are optically isolated to minimize risk.

Energized parts are all insulated, covered, recessed, &/or internally mounted for safer operation of the unit. In addition, sections that isolate machine components are insulated.



Insulated Parts

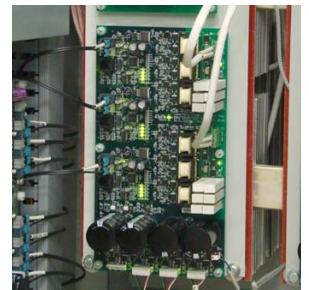
Operators are well-protected from exposed connections.

Energized parts are all insulated, covered, recessed, &/or internally mounted for safer operation of the unit.

In addition, sections that isolate machine components are insulated.

Polycarbonate window to view diagnostic LEDs

Our Series 70 product line was inspired by NFPA-70E, to help data centers drastically reduce the risks of their energy distribution systems. Operators can view the status of diagnostic LEDs without exposure to the energized power electronics section.



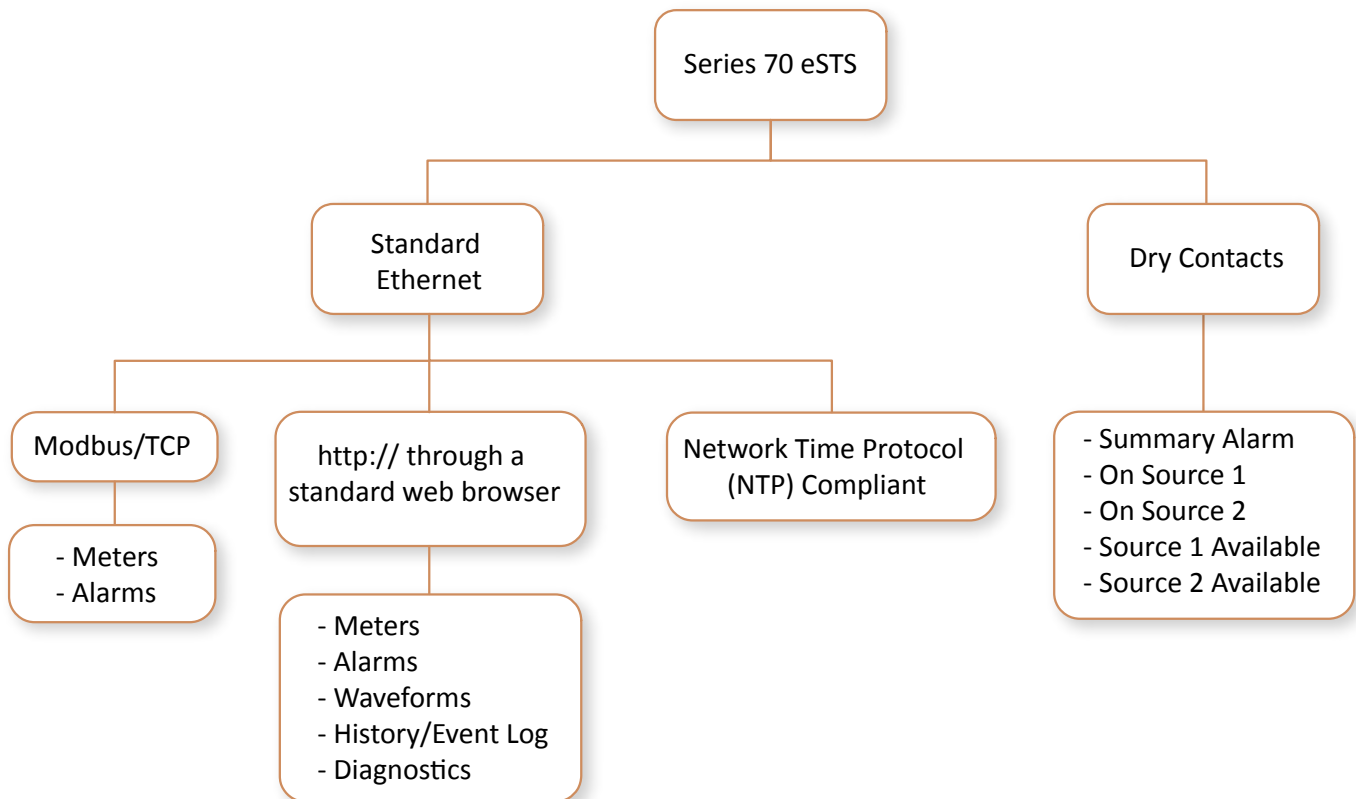
Open protocols

LayerZero utilizes open source protocols for its communications, which allows for:

- An enhanced ability to customize software
- Flexible software development options
- Lower total cost of ownership (no per copy fees)
- Elimination of vendor lock-in
- No proprietary limitations
- Provides a stable, well developed foundation

The control path for the communications system gathers information from all aspects of the machine, isolated by fiber optics.

Connectivity to a WAN allows for the information to be accessible from any location, offering a variety of monitoring options.



A Flexible Approach

A variety of connectivity options provide operators with the ability to adapt LayerZero systems to fit existing networks without the complications of working with closed, proprietary systems.

The eSTS is designed to make it easy to transfer and exchange power usage data, which is very useful towards making smart corporate decisions and policies.

Touch screen interface

The Dynamic Mimic Panel is presented on a 15" color touch screen Graphical User Interface, which was carefully designed to be user-friendly, intuitive, and consistent.

A well creative and well organized "page" based navigation helps operators quickly get to the information they need, without having to search around.

The GUI is "Read-Only" unless a user has logged on. A walk-up user may examine the state of the switch, but can not change that state. This is "USER" level access. If a user has logged on by providing a valid password, then he or she is allowed to view additional pages (Page-Level Security) and to make changes to controls on pages (In-Page Security).

Access expires in 10 minutes. The 10 minute period is renewed if any Page navigation (ROOT or PAGE) button is selected.

Operators have instant access to real-time power usage information, which is valuable for making power-related decisions.

A mimic panel graphically show that current state of the switch and power flow, while health meters provide operators with the capability to know the status of a TMR instantly.

Alarms are visible on every screen. Alarms clear themselves when the offending condition is fixed. Until such time, Alarms persist. There is no "alarm clearing" button/capability. In a TMR system, when an alarm is posted by only one SCB the system continues to operate as a fully functional STS. Such an alarm points to a problem in only one of the three independent control systems.

Each transfer event and overload transfer-inhibit event is captured and stored as part of the history of the machine. The transfer history can only be cleared by authenticated users.



Options

- Current
- Voltage
- Number of Sources
- Number of Output CBs
- Redundancy
- Number of Wires
- Number of Poles
- Frequency
- Withstand



Specification Tables

The Series 70 1200A-4000A eSTS line offers the following configurations:

Current	Voltage	Heat Dissipation	Weight	Dimensions
1200A	208V, 4-wire, 60Hz 480V, 3-wire, 60Hz 600V, 3-wire, 60Hz	24,000 BTU/Hr	5,500 lbs	96" W x 48" D x 90" H
2000A	380V, 4-wire, 50Hz 400V, 4-wire, 50Hz	Please Contact Us	7,600 lbs	152" W x 57.5" D x 85" H
4000A	415V, 4-wire, 50Hz	Please Contact Us	11,000 lbs	240" W x 58" D x 90" H

Front-Only Access

Number of CBs: 1, 2

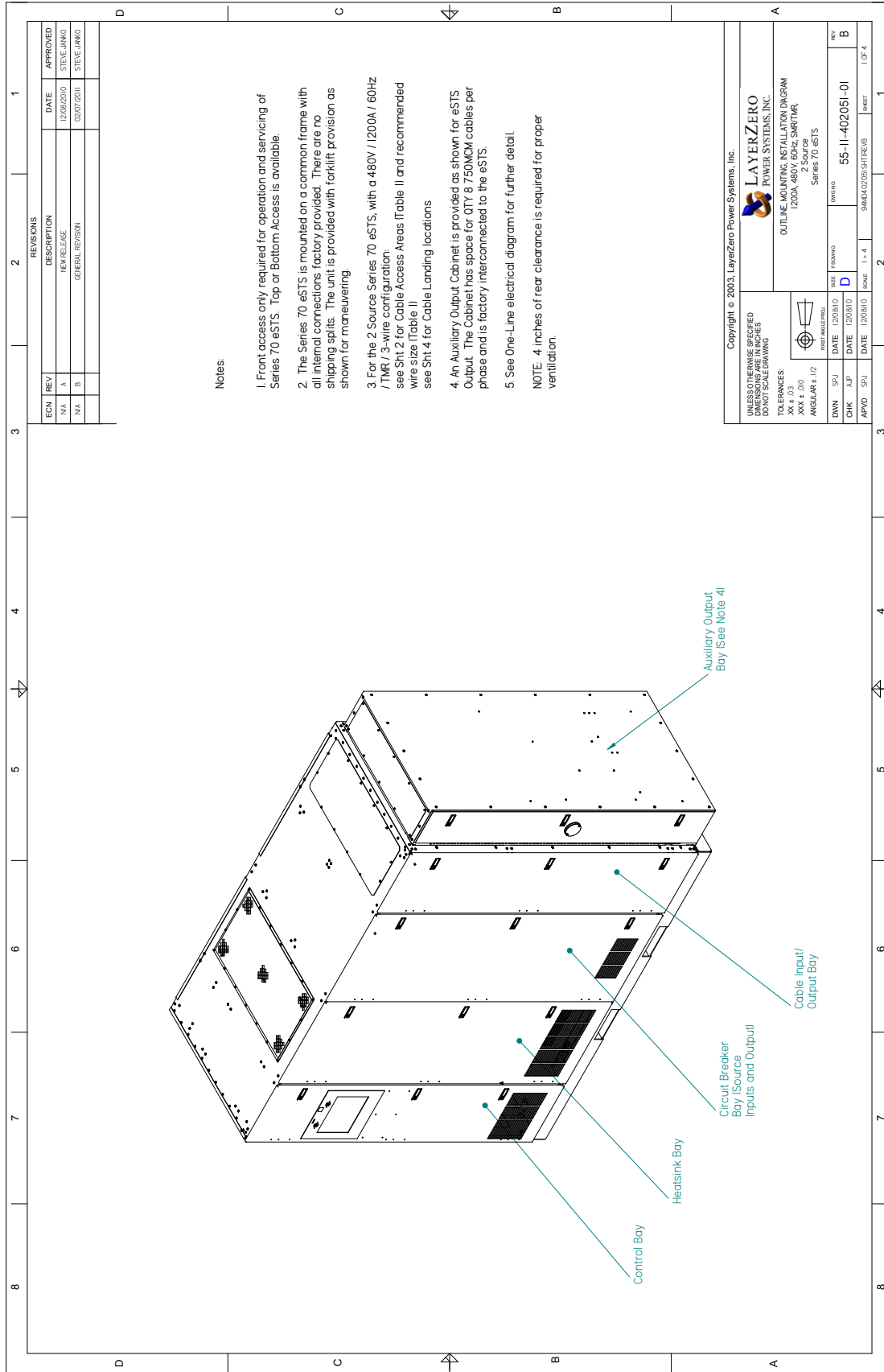
Redundancy: SMR, TMR

Color: Black, White

Contact LayerZero for custom sizes and designs.



Series 70 1200A eSTS Drawings



Notes:

1. Front access only required for operation and servicing of Series 70 eSTS. Top or Bottom Access is available.
 2. The Series 70 eSTS is mounted on a common frame with all internal connections factory provided. There are no shipping spalls. The unit is provided with forklift provision as shown for maneuvering.
 3. For the 2 Source Series 70 eSTS, with a 480V / 1200A / 60Hz / TMR / 3-wire configuration, see Sht.2 for Cable Access Areas (Table II) and recommended wire size (Table II) see Sht.4 for Cable Landing locations
 4. An Auxiliary Output Cabinet is provided as shown for eSTS Output. The Cabinet has space for QTY 8 750MCM cables per phase and is factory interconnected to the eSTS.
 5. See One-Line electrical diagram for further detail.
- NOTE: 4 inches of rear clearance is required for proper ventilation.

REVISIONS				
ECN	REV	DESCRIPTION	DATE	APPROVED
NA	A	NEW RELEASE	12/05/2010	STEVE JANKO
NA	B	GENERAL REVISION	02/07/2011	STEVE JANKO

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OUTLINE MOUNTING INSTALLATION DIAGRAM
1200A, 480V, 60Hz, TMR, 3PH, 3W, 2 Sources
Series 70 eSTS

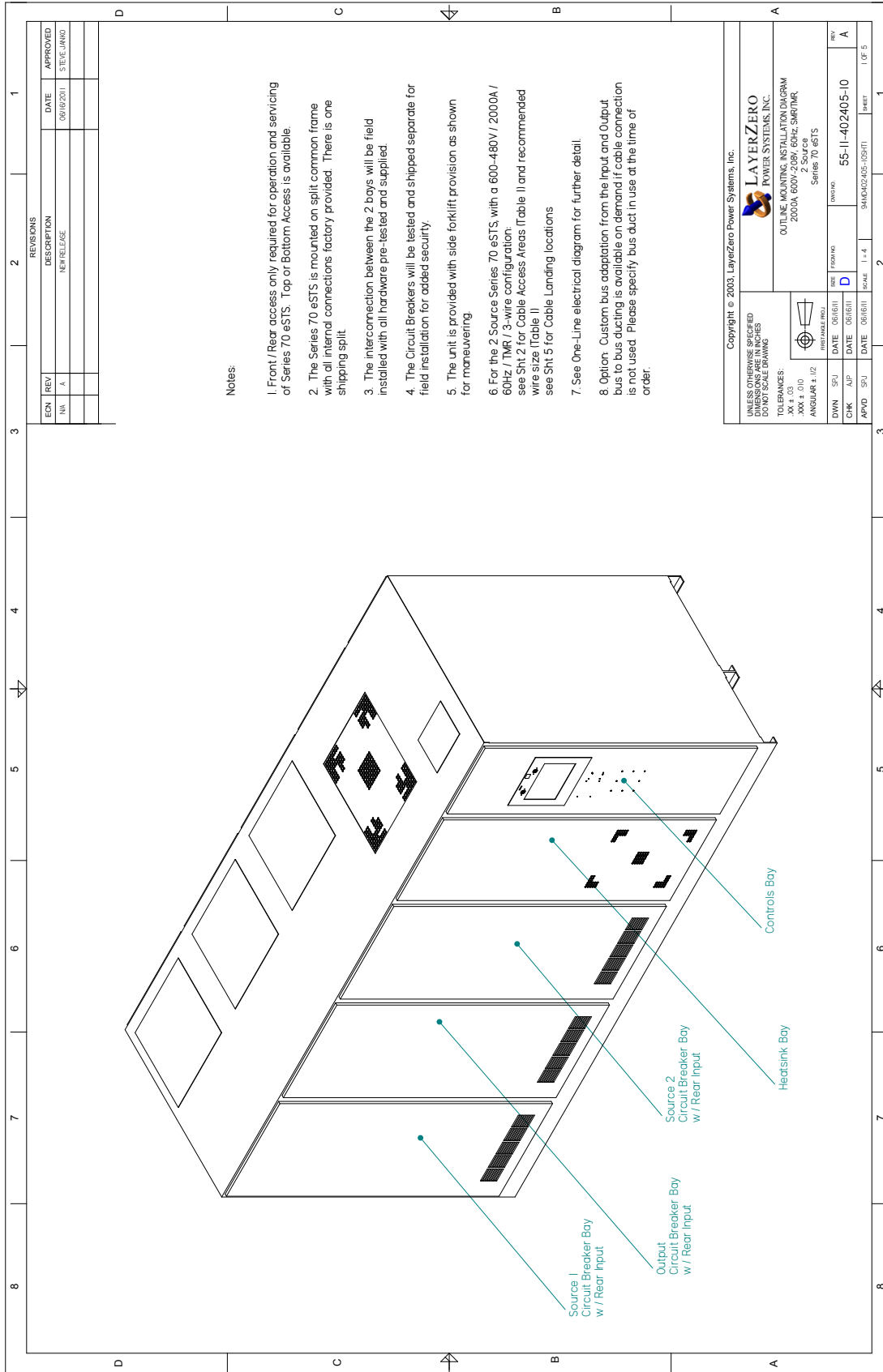
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DO NOT SCALE DRAWING

TOLERANCES
XX ± 0.3
XXX ± 0.10
ANGULAR ± 1/2

DWN SPU DATE 12/05/10 REV 1
CHK ALP DATE 12/05/10 REV D

APVD SPU DATE 12/05/10 REV 1

55-11-402051-01
SHEET 1 OF 4



Notes:

1. Front / Rear access only required for operation and servicing of Series 70 eSTS. Top or Bottom Access is available.
2. The Series 70 eSTS is mounted on split common frame with all internal connections factory provided. There is one shipping split.
3. The interconnection between the 2 bays will be field installed with all hardware pre-tested and supplied.
4. The Circuit Breakers will be tested and shipped separate for field installation for added security.
5. The unit is provided with side forklift provision as shown for maneuvering.
6. For the 2 Source Series 70 eSTS, with a 600-480V / 2000A / 60Hz / TMR / 3-wire configuration, see SHT 2 for Cable Access Areas (Table II) and recommended wire size (Table II) see SHT 5 for Cable Landing locations
7. See One-Line electrical diagram for further detail.
8. Option: Custom bus adaptation from the Input and Output bus to bus ducting is available on demand if cable connection is not used. Please specify bus duct in use at the time of order.

EDN		REV	REVISIONS		DATE	APPROVED
101	A		NEW RELEASE		06/16/2011	STEVE JANNO

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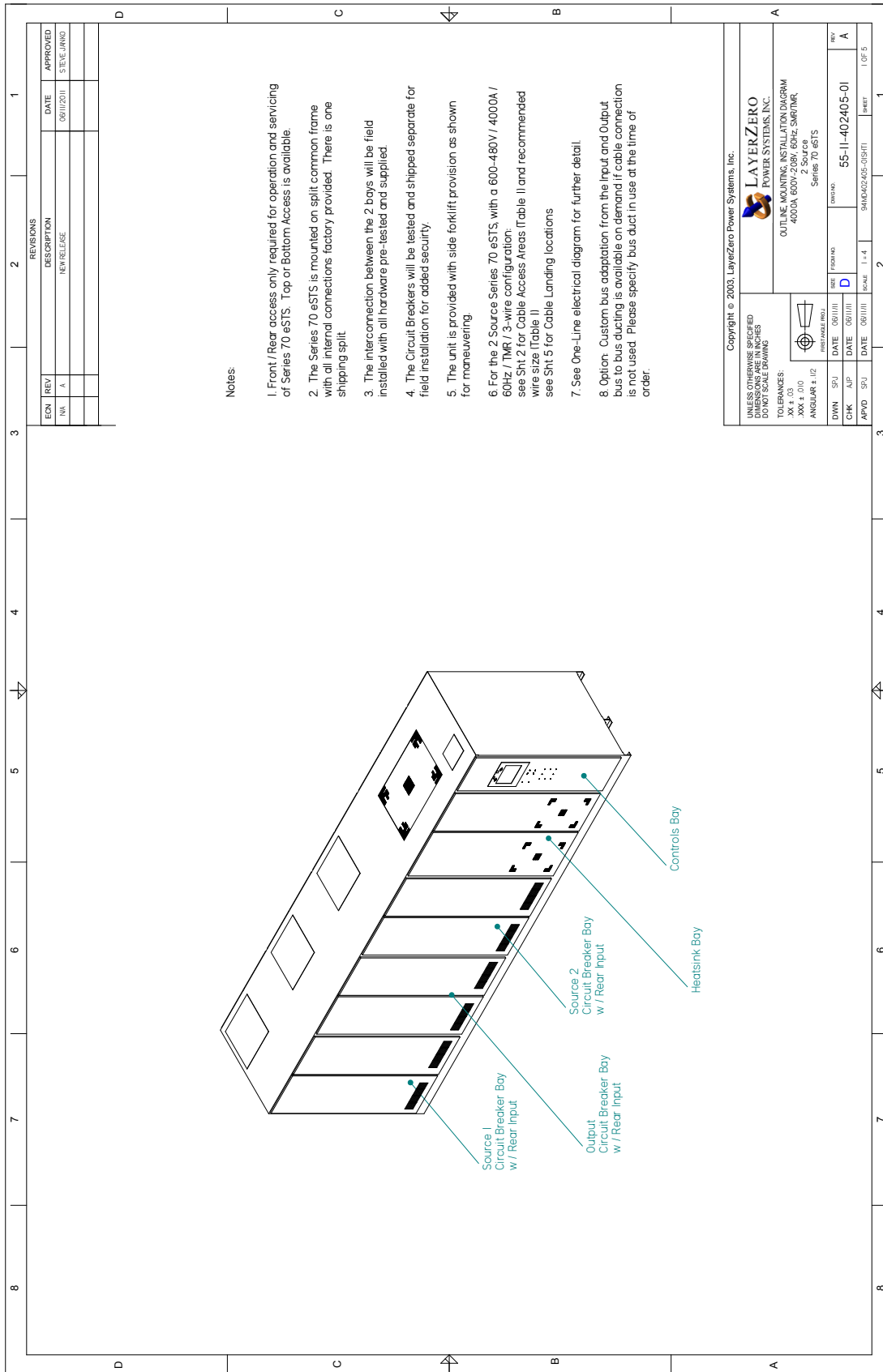
OUTLINE MOUNTING INSTALLATION DIAGRAM
2000A 600V-208Y/60Hz SARTMR,
2 Source
Series 70 eSTS

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DO NOT SCALE DRAWING

TOLERANCES:
XX ± .03
XXX ± .010
ANGULAR ± .1/2

DWN	SPJ	DATE	08/16/11	REV	
CHK	ASP	DATE	08/16/11	REV	A
APPD	SPJ	DATE	08/16/11	REV	

FORM NO: 55-11-402405-10
SHEET 1 OF 5



Notes:

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3. The interconnection between the 2 bays will be field installed with all hardware pre-tested and supplied.
4. The Circuit Breakers will be tested and shipped separate for field installation for added security.
5. The unit is provided with side forklift provision as shown for maneuvering.
6. For the 2 Source Series 70 eSTS, with a 600-480V / 4000A / 60Hz / TMR / 3-wire configuration, see SHT 2 for Cable Access Areas (Table II) and recommended wire size (Table II) see SHT 5 for Cable Landing locations
7. See One-Line electrical diagram for further detail.
8. Option: Custom bus adaptation from the Input and Output bus to bus ducting is available on demand if cable connection is not used. Please specify bus duct in use at the time of order.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES DO NOT SCALE DRAWING		TOLERANCES: XX ± .03 XXX ± .010 ANGULAR ± .1/2	
DWN	SPJ	DATE	08/11/11
CHK	ASP	DATE	08/11/11
APP'D	SFU	DATE	08/11/11
		REV	DESCRIPTION
		D	NEW RELEASE
		DATE	08/11/2011
		APPROVED	STEVIE JANKO

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OUTLINE MOUNTING INSTALLATION DIAGRAM
4000A, 600V-208V, 60Hz, SARTMR,
2 Source
Series 70 eSTS

FORM NO: 55-11-402405-01
REV: A

94160422405-01SHT1

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