FastLITE Model FST
Centralized Emergency Lighting Inverter

525W- 2.2kW
General Specification

PART 1 – GENERAL

1.1 DESCRIPTION

This specification describes the design and features of the Model FST fast-transfer emergency lighting inverter unit. The Model FST incorporates a high frequency IGBT PWM charger, IGBT PWM inverter, and 90 minutes of battery backup, or other battery runtimes defined in this specification. The Model FST may be field-wired to provide a normally on AC output and a normally off / switched AC output as described in Section 2.5 of this document. A standard self-diagnostic monitoring alarm system continuously advises unit status and battery condition. An optional advanced local monitoring system is available, which can be provided with network communications for remote monitoring. A monitored integral output surge protection device (SPD) is available to protect emergency lighting loads. Wall-mounted and floor-mounted models are available.

1.2 INVERTER OUTPUT RATINGS

(525W) (750W) (1.1kW) (1.44kW) (1.5kW) (1.7kW) (2kW) (2.2kW)

1.3 STANDARDS

The Model FST is designed in accordance with applicable portions of the following standards:

A. American National Standards Institute (ANSI C57.110) (ANSI C62.41 Category B-3)
B. Institute of Electrical and Electronic Engineers (IEEE 519-2014)
C. National Electric Code (NEC 2017 Article 700 – Emergency Systems)
D. National Fire Protection Association (NFPA 70) (NFPA 101) (NFPA 111) (NFPA 99)
E. Underwriters Laboratories (UL 924)
F. Federal Communications Commission (FCC Class A limits, 47 C.F.R. Part 15, Subparts A, B)
G. Listed ANSI/UL 924 Emergency Lighting and Power Equipment rated for 90 minutes, for use in accordance NEC Article 700 (ANSI/NFPA 70), the Life Safety Code (ANSI/NFPA 101), International Building Code (IBC), and International Fire Code (IFC).
H. Listed ANSI/UL 924 Auxiliary Lighting and Power Equipment rated for runtimes other than 90 minutes, including up to 120 minutes.
I. Listed C-UL to CSA C22.2, No. 141-15, Emergency Lighting Equipment with 30, 60, or 90 minutes battery backup time.

PART 2 – PRODUCTS

2.1 MANUFACTURED UNITS

A. Construction: The Model FST is designed and manufactured to assure maximum reliability, serviceability and performance. The unit controls and breakers are accessible through a hinged front door, requiring a hand tool for access. The diagnostic monitor panel display is mounted on the front of the unit for easy observation of unit status and battery condition. The Model FST is furnished with an internally located AC input circuit breaker and AC output circuit breaker or monitored fuse on 347 VAC models. Additional output circuit breakers or monitored fuses are optional. The battery and DC conductors are circuit breaker protected. All conductors and transformer windings are copper.

B. Enclosure: The unit enclosure is constructed of steel; powder-coat painted, and designed to meet NEMA 2 standards.

C. Cabinet Dimensions:

Floor-Mounted Units:	26.3"W x 11"D x 53"H
Wall-Mounted Units:	26.3"W x 11"D x 24"H

D. Output Ratings and Battery Runtimes:

kW	Floor-Mounted Units Runtime (Minutes)	Wall-Mounted Units Runtime (Minutes)
.525*	90/30/60/120	90/30/60
.750*	90/30/60/120	90/30/60
1.1	90/30/60/120	30/60
1.44	90/30/60/120	30
1.5	90/30/60/120	30
1.7	90/30/60/120	30
2	90/30/60/120	N/A
2.2	90/30/60/120	N/A

*525W and 750W wall-mounted units with runtimes up to 90 minutes are available with an optional 24”H stand for floor-mounting. All other models are available in the standard floor-mount cabinet.

E. Weights:

	Floor-Mounted Units			
kW	90 Min.	30 Min.	60 Min.	120 Min.
.525	236*	160*	178*	292
.750	236*	160*	236*	292
1.1	305	210	268	355
1.44	355	268	305	452
1.5	355	268	305	452
1.7	385	268	331	452
2	490	283	355	490
2.2	490	283	355	630

	Wall-Mounted Units		
kW	90 Min.	30 Min.	60 Min.
0.525	216	140	158
0.75	216	140	216
1.1	N/A	158	216
1.44	N/A	216	N/A
1.5	N/A	216	N/A
1.7	N/A	216	N/A

*These 525W and 750W unit weights reflect wall-mounted units with an optional 24”H stand required for floor-mounting. Above weights reflect 120V models. Add 18 lbs. for 277V and 347V models.

F. Input Breaker Rating: The input breaker is sized to accommodate full rated load, low line input, and maximum recharge current simultaneously.

G. Output Breaker Rating: The output breaker is sized to accommodate full rated load and protect output conductors. Note that 347 VAC models are provided with a monitored, fused output switch in lieu of a circuit breaker.

2.2 INPUT SPECIFICATIONS

A. Input Voltage: 120 VAC or 277 VAC or 347 VAC.

B. Input Voltage Operating Range: +10%, -10% (programmable down to -15%) from nominal at full load, without battery usage.

C. Frequency Range: 60 hertz +/-5%.

D. System AIC (Amperes Interrupting Current) Rating: 5k AIC standard, 65k AIC optional.

2.3 OUTPUT SPECIFICATIONS

A. Output Voltage: 120 VAC or 277 VAC or 347 VAC.

B. Voltage Distortion: Maximum 3% THD while on battery, under linear load.

C. Frequency: 60 hertz +/-0.5% under full load while in the battery operation mode.

D. Voltage Regulation: +/-5% from nominal during the full battery discharge, no load to full rated load.

E. Transfer Time (to and from battery): $\leq$ 2 msec under any loading conditions.

F. On AC Overload Rating: Determined by unit's input and output CB ratings and trip curves.

G. On Battery Overload Rating: Up to 110% for 2 minutes, 125% for 30 seconds, 150% for 10 seconds, 400% for 4 cycles.

H. LED Inrush Rating: Peak overload capability of 1500% during a current surge of ¼ cycle, when fed from the AC power source or on battery, to accommodate inrush current from LED fixtures/drivers.

I. Efficiency On AC Power: Up to 98.8%.

J. Output Power Rating: KVA at 1.0 power factor (unity). KVA = KW

2.4 BATTERY SPECIFICATIONS

A. Battery time: 90 minutes runtime (UL 924 listed Emergency Lighting and Power Equipment).
30, 60, and 90 minutes (C-UL listed to CSA C22.2 No. 141-15 Emergency Lighting and Power Equipment).
Runtimes other than 90 minutes, including 120 minutes (UL 924 listed Auxiliary Lighting and Power Equipment).

B. Battery Type: Integral, valve regulated, sealed lead acid, maintenance free.

C. Charger: 3-stage, 3.5 amps, temperature compensated.

D. Recharge Time: 12 hours recharge for runtimes not exceeding 90 minutes. UL 924 and CSA compliant.

E. Battery Voltage: 96VDC or 108VDC, dependent on output wattage rating and runtime.

2.5 PERFORMANCE

A. Compatibility: The Model FST is designed for LED fixtures / drivers, and is compatible with fluorescent ballast fixtures, incandescent lamps, electronic and high power factor fluorescent ballasts, or other approved loads up to the rating of the unit. “Normally On” and “Normally Off / Switched” AC outputs are 100% rated and limited only by the unit’s maximum output power rating.

B. Normally On Output: Lighting fixtures dedicated for emergency egress are supplied with power derived from the normal AC power input. The Normally On output provides power to emergency lighting fixtures during utility present, utility failures, and test modes. The rectifier charger is also fed from the normal AC power input, maintains a charge on the batteries, and is rated to recharge the batteries within 12 hours for runtimes not exceeding 90 minutes.

C. Normally Off / Switched Output: Upon the failure or unacceptable deviation of the normal AC power input, the Normally Off output will become energized and provide emergency power to lighting fixtures which are required to illuminate only in the event of a utility failure and test modes. This output can also be energized by using an external on/off control device (such as a wall switch or occupancy sensor), to apply the nominal AC input voltage source as a signal to energize the Normally Off output. This allows the Normally Off output to be switched on/off when utility power is available. During utility failure and test modes (inverter on battery), this on/off control is overridden and the Normally Off output is energized. In addition, a remote input “command on contact” (normally closed dry contact that opens) may also be used to automatically energize the Normally Off output. Applications include fire alarm, voltage phase loss monitor, and other controls.

D. Emergency Operation: Upon the failure or unacceptable deviation of the normal AC power input, power will be supplied to the emergency lighting load by the battery through the inverter. When the normal AC power input is restored, the emergency lighting load will be reconnected to the Normally On or Normally Off / Switched Output, and the charger will automatically recharge the batteries. The transfer time to and from battery will be $\leq$ 2 msec under any loading conditions.

E. Battery Time Reserve Capacity: All units are designed for 90 minutes at full rated output watts, as well as 30 minutes, 60 minutes, and 120 minutes at full rated output watts.

2.6 ENVIRONMENTAL SPECIFICATIONS

A. Operating Temperature: UL 924, C-UL listed at 20°C to 30°C.

B. Unit (without battery) Storage Temperature: -20°C to 50°C.

C. Battery Storage Temperature: 25°C for 6 months. For each 9°C rise, reduce storage time by half.

D. Relative Humidity: 0 to 95% non-condensing.

E. Elevation: 6,600 feet (2,000 meters) without derating.

F. Audible Noise Level: Not greater than 45 dba at 3 feet.

G. BTU/HR:

	BTU/HR			
	120 VAC		277 VAC & 347 VAC	
kW	Normal Mode	Battery Mode	Normal Mode	Battery Mode

0.525	61	316	85	341
0.75	65	416	92	451
1.1	68	611	92	662
1.44	78	799	92	867
1.5	78	833	92	903
1.7	85	944	92	1023
2	89	970	92	1070
2.2	92	1000	96	1100

Note: Above BTU's / Hour reflect models with the highest heat output.

2.7 STANDARD DISPLAY MONITOR AND DIAGNOSTICS (BASIC MONITOR)

A. Display Panel: Unit includes a local, front mounted, LED display panel to indicate unit status and battery condition. The display includes provisions to automatically monitor the unit's functional status (inverter off, inverter ready, periodic or annual test active), output voltage (power on indication), % load, battery charging / full charge, battery in use, battery low, and check battery. Optional output SPD includes status indication from a separate LED mounted on the unit enclosure. The LED will illuminate green when the SPD is operational and turn red if the SPD has failed.

B. Audible Alarm: Includes an audible alarm with alarm silence for unit on battery, low battery, check battery, over temperature warning, charger failure, unit fault, output overload, weekly self-diagnostic failure, and SPD failure.

C. Control Functions: Includes a push button for unit on and fail-safe dual push buttons for unit off. Also includes a push button for alarm silence, as well as for manually initiating a battery test.

D. Communications Port (USB): Includes a USB communications port for access to electrical measurements, unit set point programming, and unit logs.

1. Electrical Measurements (USB): Electrical measurements include: input voltage, output voltage, output current (amps), output watts, output volt amperes, % load, battery voltage, DC charging current, and output frequency.

2. System Set Points (USB): Includes provision to program the following: Low line switch point, low battery alarm, automatic periodic battery test programmable for 30 day intervals or 90 day intervals, and an annual discharge test. The start date and time of the periodic battery test selected, and of the annual test (365 day intervals) is programmable via the USB connection. The time duration of the automatic periodic battery test is factory-set at 1 minute for a 30 minute runtime, or 5 minutes for a 60 minute, 90 minute, or 120 minute runtime. The factory default for the automatic periodic test is 30 days. Settings includes an annual test enable/disable selection.

E. System Logs (USB): Unit includes provisions to log power outages, unit overloads, and other alarm events (up to 250 alarm events), as well as battery test pass/fail results (up to 25 battery test results), all with a date and time stamp. By plugging in a computer to the unit's USB port, the battery test log and alarm event log are able to be viewed and electronically saved as a report document to comply with NFPA 101, section 7.9.3.1.3.

F. Automatic Self-Testing: Unit provides a factory-set 1 minute periodic battery test for a 30 minute runtime, or a 5 minute test for a 60 minute, 90 minute, or 120 minute runtime. Periodic battery tests may be programmed to occur every 30, or 90 days. Annual test for the rated runtime occurs yearly (365 day intervals). Up to 25 battery tests are sequentially logged with a time / date stamp and a pass or fail indication. Periodic and annual tests are compliant with NFPA 101 and CSA C22.2, No. 141-15.

G. Weekly Self-Diagnostic: In addition to NFPA 101- and CSA-mandated periodic and annual testing, the unit performs a weekly no load test of the inverter, without use of the battery. During this test, no alarm or indication is given unless the inverter test fails. If it fails, the unit will alarm, general alarm contacts will switch state, and the fault will be logged. After a test takes place or the unit goes to battery for any reason, the next test will automatically happen 7 days later.

2.8 OPTIONAL DISPLAY MONITOR AND DIAGNOSTICS (INTELLISTAT MONITOR)

A. Display Monitor: Unit includes a local, front mounted, sealed, touch screen, color LCD display monitor to verify system electrical and temperature measurements, inform/alarm for abnormal system status, allow programming of user specified set points, and inform of periodic system and battery test results. Optional output SPD includes status indication on the display, as well as from a separate LED mounted on the unit enclosure. The LED will illuminate green when the SPD is operational and turn red if the SPD has failed.

B. Electrical Parameters – The monitor displays the following electrical parameters:

Input Voltage
Input Frequency
Output Voltage
Output Frequency
Output Current
Output VA
Output Watts
Output Power Factor
Output Percent Load
Battery Voltage
Battery Charger Current
Minutes On Battery

C. Alarm Conditions – The monitor displays the following status and alarm conditions:

Input Voltage Out of Range
Output Over Voltage
Output Under Voltage
Output VA High (output overload)
Output VA Low On Battery Test
Output Frequency Out of Range
Battery Voltage High
Battery Charger Current High
General Alarm
System On Battery
Low Battery Warning
Low Battery Shutdown
Inverter Over-Temperature Shutdown
DC Charger Failure / DC Open
Output Circuit Breaker Open
Weekly Diagnostic Fail
Output SPD Fail
Battery Test Pass
Battery Test Fail

D. Operational Conditions – The monitor displays the following operational conditions:

System Normal

System Alarm
Power to Load – Battery Backup Not Available
Battery Time Remaining (expressed in hours and minutes)
Battery Test In Process (including a "countdown" of time remaining in test)
Off Bus Connecting
Off Bus Returning

E. User-Programmable Set Points – The monitor allows for the following programmable set points:

Alarm thresholds
Low output VA level referenced during periodic and annual battery testing to verify egress lighting integrity
Off bus transition delays (On delay 0 to 10 seconds; Off delay 0 to 15 minutes)
Date and time of periodic battery test in compliance with NFPA 101 and C22.2, No. 141-15
Date and time of annual battery test in compliance with NFPA 101 and C22.2, No. 141-15

F. Periodic Testing – The monitor incorporates system diagnostics and provides for automatic and manual testing of the system/batteries as follows:

1. Features a factory-set 5 minute battery discharge test every 30 days or 90 days for a 60 minute, 90 minute, or 120 minute runtime, or a 1 minute test for a 30 minute runtime. Features a user-programmable (enable/disable) annual battery discharge test, factory-set for 30, 60, 90, or 120 minutes. Dates and times of tests are user-programmable.

2. Reports the battery test results with a pass/fail indication, time and date stamped, via the local monitor display and via optional network communications (remote monitoring).

3. During the battery test, the monitor performs a user-programmable egress lighting integrity test. The egress lighting integrity test measures the VA load on the output of the system, and if the output load falls below the customer defined value, the inverter will provide an audible and visual alarm to indicate fixture maintenance or component replacement.

4. A manual, proprietary password protected "Push to Test" feature is provided to initiate NFPA 101-compliant system test. An "Abort Test" feature is included.

G. Data-Logging – The monitor provides the following data-logging

1. Maintains a historic log that sequentially records up to 25 battery tests which indicate time, date and pass/fail results. The log is made available through the local monitor display and via optional network communications (remote monitoring).

2. Maintains a historic log that sequentially records 50 of the most recent alarms, indicating the time and date of abnormal occurrences. The log is made available through the local monitor display and via optional network communications (remote monitoring).

3. By plugging in a computer to the unit's USB port, the battery test log (up to 25 battery test results) and alarm event log (up to 250 alarm events) are able to be viewed and electronically saved as a report document to comply with NFPA 101, section 7.9.3.1.3.

H. Weekly Self-Diagnostic – In addition to NFPA 101- and CSA-mandated periodic and annual testing, the unit performs a weekly no load test of the inverter, without use of the battery. During this test, no alarm or indication is given unless the inverter test fails. If it fails, the unit will alarm, general alarm contacts will switch state, and the fault will be logged. After a test takes place or the unit goes to battery for any reason, the next test will automatically happen 7 days later.

I. Optional Network Communications (Remote Monitoring): Unit includes remote monitoring and reporting of electrical parameters, system status, alarms, event logs, and automatic battery pass / fail test results with time and date stamp via the following protocols: (Ethernet TCP/IP or MODBUS TCP or BACnet/IP) (MODBUS RTU or ASCII over RS485, or BACnet MS/TP). The desired protocol is user selectable (password protected) from the Intellistat's display. A serial communication connection and Ethernet connection are included when this option is ordered.

2.9 RELAY COMMUNICATONS INTERFACE

A. Form C "General Alarm" relay contacts are provided for remote monitoring. Contact ratings are 120 VAC @ .5amps. General alarm contacts will switch states given any of the following alarm conditions: on battery, low battery, check battery, over temperature warning, charger failure, unit fault, output overload, SPD failure, and weekly self-diagnostic failure.

B. Form C "Battery Test Active" contacts are provided that switch state during automatic or manual battery testing. The normally closed contact may be used to signal one or more UL924 listed shunt relays to bypass local control devices during periodic and annual NFPA-mandated tests, in order to provide emergency power to designated emergency lighting fixtures.

2.10 ACCESSORIES (OPTIONAL EQUIPMENT)

A. Pre-installed 120 VAC or 277 VAC output circuit breakers that are field changeable to either the Normally On or Normally Off / Switched Output. Output breaker options include 10A, 15A, 20A, and 30A ratings. A total of ten (10) breakers are available, or six (6) monitored breakers.

NOTE: Units are provided standard with one (1) output circuit breaker. Input and output breaker(s) comply with selective coordination.

B. Pre-installed 347 VAC fused output switches that are monitored, and field changeable to either the Normally On or Normally Off / Switched Output. A total of three (3) fused switches are available.

NOTE: Units are provided standard with one (1) fused output switch that is monitored. Units 525W to 1.5kW are fused at 6 amps. Units 1.7kW to 2.2kW are fused at 10 amps. The standard input breaker provided is rated for 15 amps. The selected input breaker and output fuse(s) comply with selective coordination.

C. Optional SPD with a peak surge current capacity rating of 40kA, UL 1449 4th Edition. The SPD provided has a nominal discharge current rating of 20kA, and a short circuit current rating (SCCR) of 100kA. The SPD includes a fault indicator window and remote signaling of disconnection for use with the lighting inverter's SPD failure indicator and audible alarm. An SPD status indicator (LED) is mounted on the unit enclosure. The LED illuminates green when the SPD is operational and turns red if the SPD has failed. An SPD failure is logged as an alarm event. On units with the Intellistat monitor, the SPD failure is also indicated on the touchscreen display, and the logged alarm event can be viewed from the display. An SPD is added when 2 or more output CBs or fused switches are selected.

2.11 SERVICEABILITY

The unit's power section, including all control cards and system electronics, is front-accessible and located behind a secure hinged access door. The inverter cabinet is provided with a protective dead front panel that allows the operation of the AC and DC breakers while preventing physical contact with live electrical connections. The optional SPD module's fault indicator window can be seen without removing the dead front panel. A DC circuit breaker is provided for overcurrent protection, and also serves as a disconnect to facilitate rapid replacement of the batteries via the front of the unit enclosure. No side or rear access is required. To facilitate inverter diagnostics and

programming, a USB communications port is provided for access to electrical measurements, system set points, and system logs. This USB port is located behind the unit's secure hinged front door and is accessible without removing the cabinet's protective dead front panel. If the Intellistat monitor is provided on the unit, the inverter diagnostics and programming can also be accessed via the touchscreen display.

2.12 WARRANTY

A. All power components and system electronics are guaranteed to be free from defects in material and workmanship for a period of 2 years following shipment from the factory.

B. Batteries are warranted for 1 year full replacement, 9 years prorated.

C. Extended warranty and maintenance contracts are available.