THREE-PHASE STANDALONE UPS SYSTEM

# TLE Series UPS 40–150kVA/kW 480VAC

## Highly efficient and scalable

# TLE UPS systems – overview

**Introduction**

The TLE Series UPS is a robust, high performance 480/277VAC UPS system suitable for a broad range of mission-critical applications including data centers, data closets, healthcare/medical, telecommunications, transportation, commercial buildings, and industrial critical processes.

**Design and performance**

The TLE Series UPS uses double conversion technology via a true on-line VFI (voltage frequency independent) design. The IGBT Rectifier provides low input current harmonic distortion and a high input power factor to minimize input feeder sizing. The IGBT Inverter with transformerless output ensures low output voltage distortion and fast transient response to high crest factor loads or step loads.

**Multi-mode efficiency**

The TLE Series UPS can operate up to 98.9% efficiency when utilized in EcoMode operation. EcoMode continuously monitors the output voltage and frequency, and will instantaneously switch to double conversion mode and inverter usage during voltage and/or frequency disturbances to insure compliance with the ITI (CBEMA) curves for operation on sensitive IT server or other critical loads.

**Redundant Parallel Architecture (“RPA")**

Redundant Parallel Architecture can be used on TLE Series UPS for up to six (6) modules, for redundancy or capacity means. The RPA system design eliminates single points of failure by using redundant controls and an integrated bypass static switch in each UPS module. The RPA system allows for flexibility in output paralleling cabinet design and usage, including load growth scaleability/expansion capabilities.

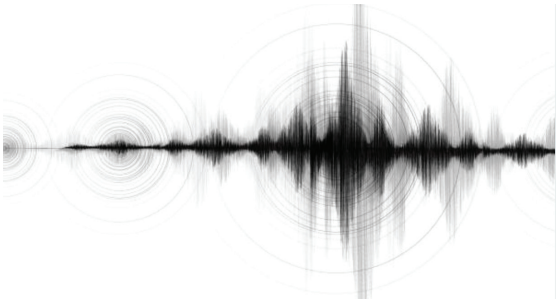
**Site services and remote monitoring**

ABB Critical Power Services offers a wide array of site services, including product startup, preventative maintenance and emergency maintenance. ABB's iUPSguard software allows for remote monitoring of key subsystems within the UPS module and battery, allowing for proactive dispatching and problem resolution when emergency repairs are required.

## TLE UPS systems – overview (cont.)

**Features and benefits**

- Transformerless design at 277/480VAC to reduce footprint and weight, yet increase reliability.
- High input power factor and use of a IGBT Rectifier eliminates the use of oversized input feeders, and maximizes standby generator compatibility.
- High switching frequency IGBT Inverter provides best-in-class transient response and low output voltage distortion. An output voltage waveform that closely resembles utility power!
- Compact footprint and low audible design, allows for use in most commercial and industrial buildings.
- Reliable paralleling of UPS modules via ABB's RPA design, which eliminates any and all common mode failure points.
- Wide band of acceptable AC input voltage and frequency, that eliminates nuisance transfers to the battery plant, thus maximizing battery jar life.
- Internal battery management and monitoring system (SBM) that enhances battery life and reduces cost of operation. Also eliminates need for costly 3rd party bolt-on battery monitoring systems.
- Optional maintenance bypass capabilities, via external wrap-around cabinetry.
- Optional 208VAC output, via matching stepdown transformer cabinetry.
- Optional output distribution cabinet with panelboard or subfeed circuit breakers.
- Seismic rated – IBC and OSHPD listed.
- Two year parts and labor warranty.



# TLE Series ease of installation and improved serviceability

**Front access**

TLE Series is designed to have front access for all the critical components that reduces mean time to repair (MTTR).

**Scalability and slide out construction**

The TLE Series UPS scales vertically to up to 150kW, and all sub-assemblies are designed to easily slide out for fast maintenance and service. Now you can replace fans, caps, etc. as needed without having to replace the entire power block.

**Improved diagnostic**

TLE Series new diagnostic features allows to store different wave forms and also provides fan failure detection as well as warning on capacitor life that improves UPS availability and enhances preventive maintenance capabilities.

**Standard safety and maintenance feature**

To provide enhanced safety and protection the TLE Series UPS has standard built in back-feed protection.

# TLE UPS system – display and control panel features

**Advanced user interface**

The TLE Series UPS is equipped with menu-driven touch screen display panel provides easy to read details on UPS status and metering, parameter settings, UPS configuration. This user-friendly display panel provides:

- Critical measurement of input, output and battery included with mimic diagram.
- Quick operational status.
- Measurement and operational status of RPA system.
- Different access level for user and service.
- Multi-language communication interface supporting: English, German, Italian, Spanish, French, Finnish, Polish, Portuguese, Czech, Slovakian, Chinese, Swedish, Russian and Dutch.


**Measures**
- Battery
- Rectifier
- Bypass
- Inverter
- Load
- Booster

**Events**
- Active alarms
- User log
- Service log

**Setup**
- Identification
- User
- Printer
- Display
- eBoost/IEMi
- Touch screen
- Identification

**Commands**
- Command 1
- Command 2

**RPA**
- RPA parallel system

# Input performance

**Clean input performance**
The TLE Series IGBT based rectifier and innovative control algorithm ensures an input Total Harmonic Distortion (THDi) of less than 3% and draws a pure sinusoidal waveform from the mains. This also provides UPS input power factor of 0.99.

**Advantages**
- Saving in the sizing of upfront equipment e.g. emergency generators, cablings, and circuit breakers
- No disturbances to nearby equipment; eliminate perturbation and outage on upfront electrical equipment, avoiding also any investigation and analysis cost due to malfunction

**Programmable soft start**
The programmable soft start allows the rectifier to ramp up in a programmable time period thus eliminating in-rush current.

This feature reduces the need of oversizing the input power system (gensets, feeder cables, and overcurrent devices).

**Generator compatibility**
User-programmable features such as slew rate, phase angle rate-of-change and voltage rate-of-change allow the UPS to quickly sync to a genset during emergency back-up.

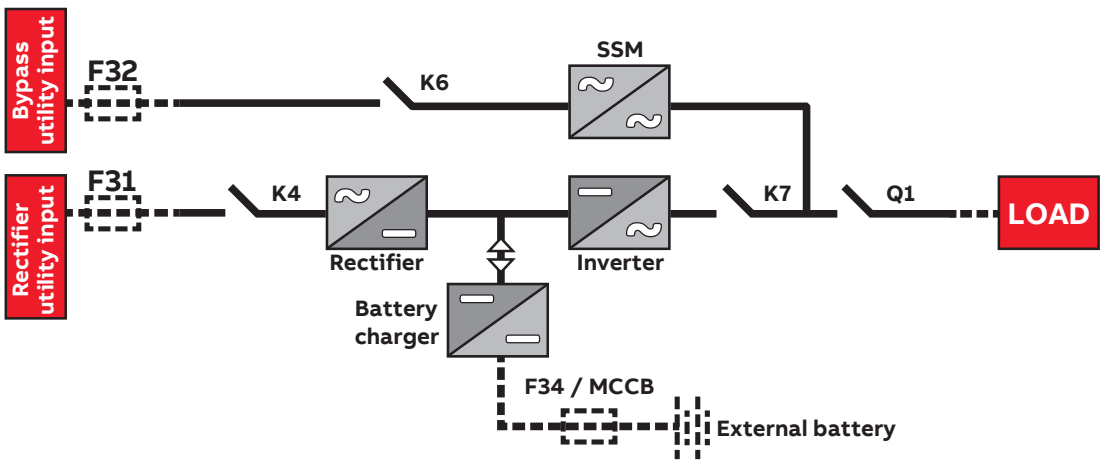
# Output performance

**Total Harmonic Distortion (THD)**
A distorted output voltage waveform affects the proper function of the load's equipment. The TLE Series has very low output voltage THD, even with connected 100% unbalanced or 100% non-linear loads.

**Unity output power factor**
- TLE Series with unity output power factor provides more real power. kVA equals KW – no derating with any load.
- Suitable for modern power supply application with unit or capacitive power factor (e.g. new servers generation), crest factor up to 3:1.

**Transient response**
Transient response is very fast due to control algorithms which ensure very high dynamic stiffness. This reduces the need to oversize the UPS for pulse load applications.

# UPS block diagram



# Redundant Parallel Architecture (RPA) system configurations

ABB provides RPA, a unique technology that can parallel UPS modules with true redundancy by eliminating any single point of failure. RPA provides a scalable paralleling technique that reduces operating footprint and increases system reliability by eliminating the need for external paralleling equipment and cabinets (centralized bypass and master control).

One of the UPS modules in the system intelligently takes the leadership role, while the other UPS modules have access to all control parameters. If one UPS fails to operate, the load is automatically redistributed among the others. If the lead UPS fails to operate, then another UPS automatically takes on the leadership role. ABB's RPA technology is implemented by distributing the control electronics within each UPS module in the system.

## RPA system advantages

**No single points of failure**
The RPA system provides complete redundancy of all critical components, allows paralleling of up to 6 units for increased load capacity or redundancy.

**Scalable**
The system can be easily expanded for higher capacity and redundancy without any interruption to the critical load or transfer to bypass.

**Distributed control logic**
Each module in an RPA system has its own operational controller. Each one continuously communicates with all others in order to manage the entire system like a team.

**Redundant communication**
Redundant high speed bus and control electronics provide higher system reliability.

**Online maintenance**
N+1 configurations allow maintenance on any single module in the system while other modules provide online protection with battery backup.

**Sequential soft start**
Provides sequential soft start of each module to reduce instantaneous load on input feeders during mains recovery. This helps avoid over-rating of generator and overheating of cable and fuses.

**Smaller footprint**
RPA eliminates the centralized control and external static bypass cabinet.

## RPA configuration

**Configurable up to 6 units in parallel**
- Future expansion
- Safe and reliable power supply
- Redundant communication bus
- Easy to install and maintain
- Easy system upgrade/downgrade
- Maintenance operation without load interruption

01


01 Standard RPA™ configuration: True redundancy with distributed control and bypass

# Lithium-ion battery system for ABB UPS solutions

**Product description**

Key features and benefits

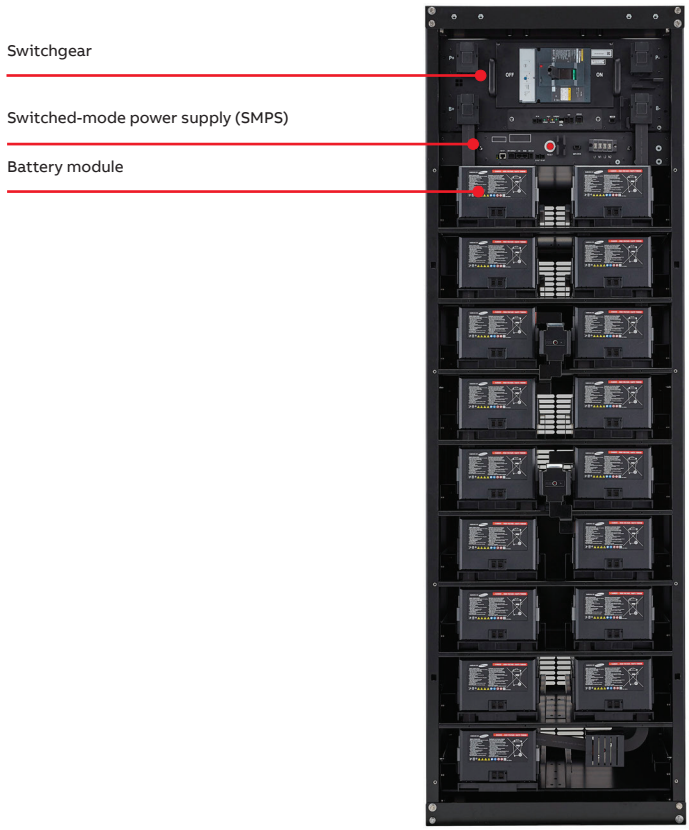
- Up to 50% reduced footprint and volume
- Lower rental fees and more room for UPS' power expansion

- Up to 80% reduced weight
- Reduced civil engineer overhead – more room for UPS's power expansion

- 15 years design life
- 10 years performance warranty – lower total cost of ownership

- Up to 3 times higher in power efficiency
- Buy what you need – less battery modules for same power discharge

- Battery management system
- Higher safety protection. Reduced maintenance costs and risks for unexpected outages




**Lithium-ion battery solutions for standby applications like:**

- Data centers (e.g. co-location, control rooms)
- Healthcare (e.g. hospitals and medical centers)
- Building infrastructures (e.g. financial institutions, education centers)
- Transportation (e.g. railway and airport infrastructure)
- Manufacturing (e.g. food & beverage industry)

**Lithium-ion battery benefits:**

- Low TCO
- Long lifespan
- High reliability
- Lightweight
- Reduced footprint and volume
- Wide operating temperature range
- Short charging time
- High safety level
- Scalable

# TLE Series power capability

| General data | TLE 40 UL S1 | TLE 50 UL S1 | TLE 80 UL S1 | TLE 100 UL S1 | TLE 120 UL S1 | TLE 150 UL S1 |
|---|---|---|---|---|---|---|
| Topology | VFI, double conversion | | | | | |
| Nominal output power | 40kW | 50kW | 80kW | 100kW | 120kW | 150kW |
| Overall efficiency in VFI mode | Up to 96% | | | | | |
| Overall efficiency in SEM mode (Super Eco Mode) | Up to 99% | | | | | |
| Audible noise level | 62 dB(A) | | | | | |
| Operating temperature range | UPS: 32°F to 104°F/ 0°C to 40°C (122°F /50°C subjected to conditions) | | | | | |
| Protection degree | IP 30 (IEC 60529 – ANSI/NEMA 60529) | | | | | |
| Standards | UL 1778, UL marking | | | | | |
| Seismic | All kVA: IBC 2015, ASCE, and OSHPD | | | | | |
| EMC (Electromagnetic Compatibility) | EN/IEC 62040-2 | | | | | |
| Electrostatic discharge immunity | 4kV contact / 8kV air discharge | | | | | |
| Color | RAL 9005 (Black) | | | | | |
| Service access | Front and top access only | | | | | |
| External cable connections | Bottom at the front of the cabinet or top with lateral sidecar | | | | | |
| Paralleling (RPA version) | Up to 6 units for redundancy or capacity in RPA configuration (option) | | | | | |
| **Rectifier** | | | | | | |
| Standard input voltage | Nominal: 3 x 480V + N | | | | | |
| Rectifier accepted ph-ph voltage range | 410V – 550V (wider voltage range subject to de-rated loads) | | | | | |
| Input frequency | 60 Hz +/-10% (54 ÷ 66 Hz) | | | | | |
| Power factor | 0.99 | | | | | |
| Input current THD | <3% at 100% | | | | | |
| **Inverter** | | | | | | |
| Nominal output voltage (on-site programmable) | 3 x 480V + N | | | | | |
| Output frequency | 60 Hz | | | | | |
| Output voltage tolerance: static | +/- 1% | | | | | |
| Output voltage tolerance: dynamic (at load step 0 – 100 – 0%) | +/- 3% | | | | | |
| – output voltage THD for 100% linear load | <3% | | | | | |
| – output voltage THD for 100% non-linear load (EN 62040) | <5% | | | | | |
| Output frequency tolerance: free-running | +/- 0.1% | | | | | |
| Overload capability (at 25°C ambient temperature) | 105% continuous, 110% – 10 minutes, 125% – 1 minute, 150% – 30 seconds | | | | | |
| **Bypass** | | | | | | |
| Voltage limits for inverter/ bypass load transfers | +/- 10% (adjustable) | | | | | |
| Overload on bypass | 198A continuous – 270 for 1 minute – up to 3000A for 10ms, non repetitive | | | | | |
| Primary components | Static switch (SCR) on bypass<br>Electromechanic contactors (backfeed protection) on bypass and inverter | | | | | |
| **Interfacing** | | | | | | |
| Standard interfacing features | RS232 serial port, EPO, Customer Interface board, 3-ph SNMP/MODBUS/WEB plug-in Adapter, Black Box for standard intelligent Diagnostics | | | | | |
| **Physical data** | | | | | | |
| Weights | 849 lbs / 385 Kg | | 992 lbs / 450 Kg | | | 1147 lbs / 520 Kg |
| Floor loading | 152 lbs/sq. ft / 742 Kg/m$^2$ | | 178 lbs/sq. ft / 867 Kg/m$^2$ | | | 205 lbs/sq. ft / 1002 Kg/m$^2$ |
| Dimensions (WxDxH) | 23.62 x 34.06 x 64.17 inches / 600 x 865 x 1630 mm | | | | | |

# TLE UPS – battery systems

| **Battery** | |
|---|---|
| Battery type | Valve regulated lead-acid (VRLA), NiCad, Lithium-ion, Wet Cell |
| DC system | 545VDC float voltage. 2.27VDC/cell., 240 cells |

## Battery cabinet system applications – VRLA batteries

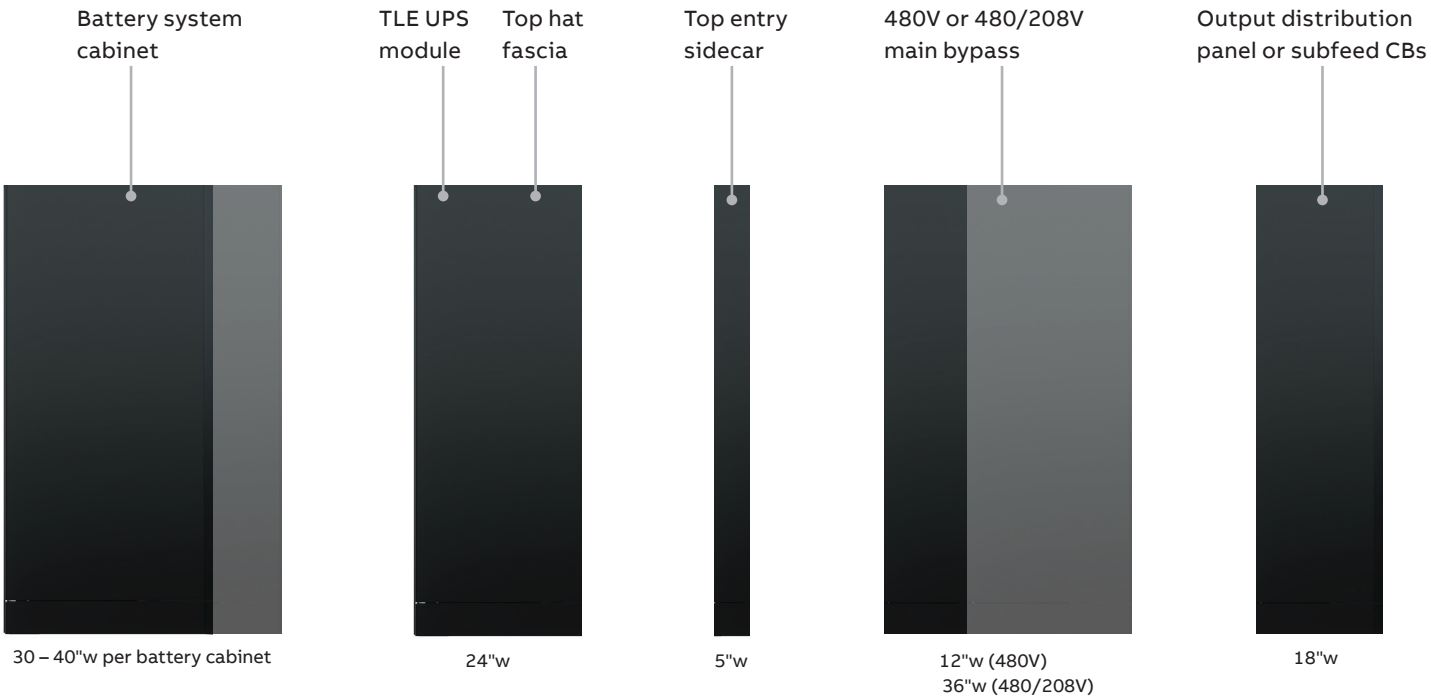
| UPS power rating | Battery runtime | No. of batteries | No. of battery cabinets | Cabinet width (in) | Assembly width (in) | Cabinet depth (in) | Cabinet height (in) | Cabinet weight (lbs) | Assembly weight (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| 40kVA 40kW | 5 | 40 | 1 | 29.8" | 29.8" | 29.5" | 75.0" | 1,180 lbs | 1,180 lbs |
| | 8 | 40 | 1 | 29.8" | 29.8" | 29.5" | 75.0" | 1,500 lbs | 1,500 lbs |
| | 12 | 40 | 1 | 29.8" | 29.8" | 29.5" | 75.0" | 1,620 lbs | 1,620 lbs |
| | 21 | 40 | 1 | 29.8" | 29.8" | 29.5" | 75.0" | 2,140 lbs | 2,140 lbs |
| | 31 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 2,860 lbs | 2,860 lbs |
| | 41 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 3,220 lbs | 3,220 lbs |
| | 50 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 3,500 lbs | 3,500 lbs |
| | 73 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 4,620 lbs | 4,620 lbs |
| 50kVA 50kW | 6 | 40 | 1 | 29.8" | 29.8" | 29.5" | 75.0" | 1,500 lbs | 1,500 lbs |
| | 7 | 40 | 1 | 29.8" | 29.8" | 29.5" | 75.0" | 1,620 lbs | 1,620 lbs |
| | 14 | 40 | 1 | 29.8" | 29.8" | 29.5" | 75.0" | 2,140 lbs | 2,140 lbs |
| | 23 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 2,860 lbs | 2,860 lbs |
| | 29 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 3,220 lbs | 3,220 lbs |
| | 38 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 3,500 lbs | 3,500 lbs |
| | 54 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 4,620 lbs | 4,620 lbs |
| | 58 | 80 | 2 | 40.0" | 40.0" | 29.5" | 75.0" | 2,860 lbs | 5,720 lbs |
| | 77 | 80 | 2 | 40.0" | 40.0" | 29.5" | 75.0" | 3,220 lbs | 6,440 lbs |
| 80kVA 80kW | 6 | 40 | 1 | 29.8" | 29.8" | 29.5" | 75.0" | 2,140 lbs | 2,140 lbs |
| | 10 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 2,860 lbs | 2,860 lbs |
| | 15 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 3,220 lbs | 3,220 lbs |
| | 19 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 3,500 lbs | 3,500 lbs |
| | 28 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 4,620 lbs | 4,620 lbs |
| | 31 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 2,860 lbs | 5,720 lbs |
| | 41 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 3,220 lbs | 6,440 lbs |
| | 50 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 3,500 lbs | 7,000 lbs |
| | 73 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 4,620 lbs | 9,240 lbs |
| 100kVA 100kW | 6 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 2,140 lbs | 2,860 lbs |
| | 10 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 2,860 lbs | 3,220 lbs |
| | 13 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 3,220 lbs | 3,500 lbs |
| | 19 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 3,500 lbs | 4,620 lbs |
| | 22 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 4,620 lbs | 5,720 lbs |
| | 29 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 2,860 lbs | 6,440 lbs |
| | 38 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 3,220 lbs | 7,000 lbs |
| | 54 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 3,500 lbs | 9,240 lbs |
| | 63 | 120 | 3 | 40.0" | 120.0" | 29.5" | 75.0" | 4,620 lbs | 10,500 lbs |

## TLE UPS – battery systems (cont.)

| UPS power rating | Battery runtime | No. of batteries | No. of battery cabinets | Cabinet width (in) | Assembly width (in) | Cabinet depth (in) | Cabinet height (lbs) | Cabinet weight (lbs) | Assembly weight (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| 120kVA 120kW | 7 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 3,220 lbs | 3,220 lbs |
| | 9 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 3,500 lbs | 3,500 lbs |
| | 15 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 4,620 lbs | 4,620 lbs |
| | 17 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 2,860 lbs | 5,720 lbs |
| | 23 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 3,220 lbs | 6,440 lbs |
| | 29 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 3,500 lbs | 7,000 lbs |
| | 42 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 4,620 lbs | 9,240 lbs |
| | 50 | 120 | 3 | 40.0" | 120.0" | 29.5" | 75.0" | 3,500 lbs | 10,500 lbs |
| | 73 | 120 | 3 | 40.0" | 120.0" | 29.5" | 75.0" | 4,620 lbs | 13,860 lbs |
| 150kVA 150kW | 5 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 3,500 lbs | 3,500 lbs |
| | 9 | 40 | 1 | 40.0" | 40.0" | 29.5" | 75.0" | 4,620 lbs | 4,620 lbs |
| | 12 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 2,860 lbs | 5,720 lbs |
| | 17 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 3,220 lbs | 6,440 lbs |
| | 21 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 3,500 lbs | 7,000 lbs |
| | 30 | 80 | 2 | 40.0" | 80.0" | 29.5" | 75.0" | 4,620 lbs | 9,240 lbs |
| | 38 | 120 | 3 | 40.0" | 120.0" | 29.5" | 75.0" | 3,500 lbs | 10,500 lbs |
| | 54 | 120 | 3 | 40.0" | 120.0" | 29.5" | 75.0" | 4,620 lbs | 13,860 lbs |
| | 78 | 160 | 4 | 40.0" | 160.0" | 29.5" | 75.0" | 4,620 lbs | 18,480 lbs |

Changes to the product or to the information contained in this brochure are reserved; so are errors and omissions. Please reference ABB order confirmations and submittal documentation packages for job specific configurations.

# TLE UPS – matching accessories




Notes:

1. Top Hat Fascia used only when matching accessories purchased.
2. Maintenance Bypass cabinet has mechanical or electric interlock option. 480/208V cabinet has K-13 transformer within.
3. Output distribution cabinet – max 1 panelboard or max 6 subfeed CB's.

# TLE UPS system – monitoring and connectivity

**UPS module status/alarm monitoring**
ABB Data Protection software can communicate with the UPS over RS-232, USB or SNMP to receive status information and measurement values of the UPS. In case of a critical condition (time on battery, remaining battery autonomy time or low battery) for the load, the software starts a controlled shutdown. An enhanced alarm management system provides the possibility to start applications and send messages and e-mails for every upcoming or disappearing alarm.

**iUPSGuard diagnostic monitoring**
ABB's iUPSGuard is a cloud based remote monitoring solution for UPS, providing status monitoring and alarm notification that supports all ABB UPS product lines, anytime, anywhere. iUPSGuard notifies personnel of critical alarms and events via email or SMS, allowing a user or ABB technician to make timely decisions on critical conditions. With comprehensive data collection and analysis iUPSGuard is not only a remote monitoring and diagnostics (RM&D) system, but the core of the integrated service offering ABB Power Diagnostics.

- 24x7 monitoring of UPS status and operating parameters, alarms notification through email and SMS.
- Highly secure and efficient data transmission, SSL encrypted with unidirectional communication.
- iUPSGuard can communicate through various channels and monitors single UPS or parallel UPS systems through web/SNMP card.
- Detailed reporting system of iUPSGuard provides valuable information on equipment operating conditions and trends over period of time.
- Predictive algorithm to anticipate issues.

**Battery plant monitoring via ABB SBM system**
SBM is a comprehensive and programmable management and monitoring system that protects the UPS battery string life. Batteries are prevented from overcharging and deep discharging.

- During UPS startup, the SBM is programmed with specific battery information.
- Calculates true battery autonomy and remaining battery backup time during utility outage.
- Measures the volts per cell of the battery system and compensates for temperature and load.
- Programmable features allow the user to select the frequency and type of battery tests that are performed. Frequency range can be from once per week to annually. Test type range can be from deep cycle to 3-min discharges.
- All tests logged in the UPS events menu and any failure is reported.
- All tests done automatically with the UPS on-line. Manual tests can be performed at any time.

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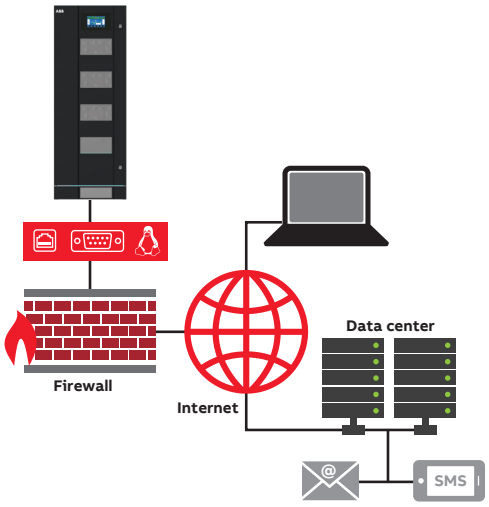


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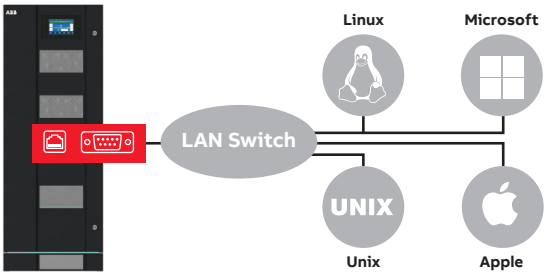



01 SUPS module status/alarm monitoring

02 iUPSGuard diagnostic monitoring

03 Battery plant monitoring via ABB SBM system

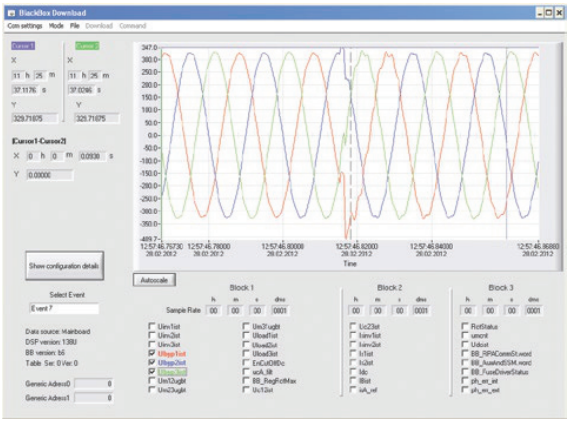
# Our UPS protects your critical load. Our service protects your UPS investment.

ABB's UPS Services offerings range far beyond standard product support: from on-site services for risk-reducing installation and startup, to availability services to help you proactively reduce downtime and meet your service-level commitments. From installation to product retirement, warranty upgrades to remote monitoring, proactive care to 24/7 problem resolution, you can rely on ABB's Weld service organization for all your electrical infrastructure support needs.

- 24/7 emergency service
- Spare part kits
- Product replacement / return
- Equipment rentals
- Battery and capacitor replacements
- Maintenance service contracts
- Remote monitoring and diagnostics
- Technical services
- Training for maintenance staff
- Product training
- Web-based training

# Improved diagnostic capability

- Waveform capture, diagnostic and trend analysis.
- Diagnostic details accessible to service personnel.
- Simultaneous acquisition of 32 channels.
- Sampling frequency up to 10kHz.
- Smart trigger capability with up to 16 independent trigger sources to record only specific events with pre/post trigger data acquisition.
- 8 buffers to record up to 8 events without losing older events.



# Notes

# Notes

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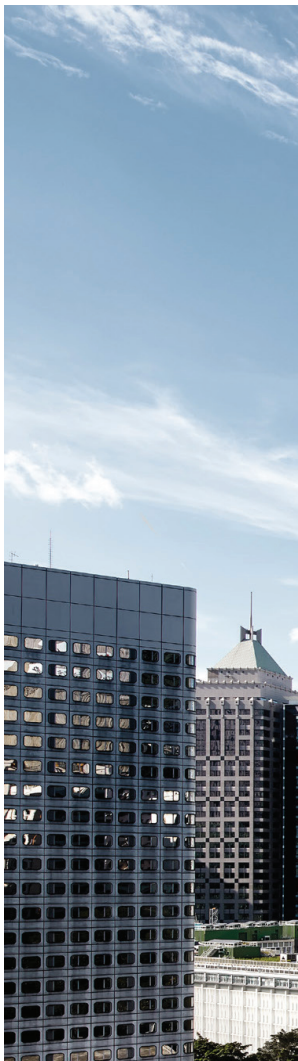

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