

UNINTERRUPTIBLE POWER SYSTEMS

RED3300 UPS system
Technical documentation

30 kVA · 27 kW · 60 minutes autonomy

Complete technical documentation for a RED3330 uninterruptible power system with matched battery and input isolation transformer cabinets, together with the battery sizing calculation confirming 60 minutes of autonomy at the specified load.

SYSTEM	RED3330 · 30 kVA / 30 kW
BATTERY	2 × RED-BT40065 · ± 120 Vdc
TRANSFORMER	RED33-30k480V
ISSUE	August 2026

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System summary

Item	Selection	Description
Uninterruptible power supply	**RED3330H**	30 kVA / 30 kW double-conversion online UPS, 3-phase in / 3-phase out, 208/120 Vac, unity output power factor, long-run configuration
Battery bank	**80 × 12 V 65 Ah VRLA**	Four strings of twenty blocks, ± 120 Vdc, giving 60 minutes at 27 kW
Battery cabinets	**2 × RED-BT40065**	Factory-populated cabinets, 40 blocks each, 800 × 1100 × 1600 mm, 1083 kg each
Input isolation transformer	**RED33-30k480V**	30 kVA dry-type transformer, 480 V delta to 208/120 V wye, 125 A output breaker

Reading this pack. Each document is complete in itself and is numbered separately, so any one of them can be issued on its own. Ratings shown apply at 25 °C and below 1000 m altitude unless stated otherwise.

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UNINTERRUPTIBLE POWER SYSTEMS

RED3300 Series
Three-phase online UPS

25 – 100 kVA · 3:3 phase · unity power factor

True double-conversion online UPS for critical three-phase loads. Unity output power factor delivers full rated kilowatts, and parallel expansion to six units gives capacity or redundancy without changing the installation.

PRODUCT	RED3300 Series
POWER RANGE	25 – 100 kVA
CONFIGURATION	3-phase in / 3-phase out
ISSUE	August 2026

1 Overview

The RED3300 Series is a true double-conversion online UPS rated 25 kVA to 100 kVA, with three-phase input and three-phase four-wire output at 208/120 Vac or 220/127 Vac. A three-level inverter gives up to 94 % efficiency in double-conversion mode, and the unity output power factor means the nameplate kVA is available as kilowatts — a 30 kVA unit supports a 30 kW load with no derating.

Two build variants are offered. **Standard (S)** units carry their batteries internally for short-autonomy applications; **long-run (H)** units are supplied without batteries and are paired with RED-BT series external battery cabinets sized to the autonomy required. Up to six units may be paralleled for added capacity or N+1 redundancy, with the option to share a common battery bank.

2 Key features

- Wide input voltage window: 66–166 Vac per phase (120 Vac nominal); no derating at 100 % load from 96 Vac
- High input power factor — up to 0.99 — and input current distortion ≤ 3 % THDi
- Three-level inverter topology; efficiency up to 94 % in double-conversion mode
- Unity output power factor (kVA = kW), with full rated power into 100 % unbalanced loads
- High load tolerance — fully inductive or fully capacitive loads accepted
- Parallel expandable to six units, with shared-battery operation between paralleled units
- Battery string selectable from 16 to 26 blocks (20 blocks default) to suit the autonomy required
- High charging current on long-run models for extended-autonomy battery banks
- Power Walk-In soft start limits inrush and reduces the standby generator rating required
- LBS (load bus synchronisation) holds two independent UPS systems in step for dual-bus architectures
- Communications: USB, RS-232, RS-485, SNMP and dry-contact interface cards
- Certified to UL 1778 and CSA C22.2 No. 107.3-14

3 Model range

Model code: **RED33** + rating + variant — e.g. **RED3330H** is a 30 kVA long-run unit. **S** = standard unit, batteries fitted internally; **H** = long-run unit, battery not included.

Model	Rating	Configuration	Dimensions W × D × H (mm)	Weight (kg)
RED3325S	25 kVA / 25 kW	Standard — internal batteries	400 × 935 × 1065	375
RED3325H	25 kVA / 25 kW	Long-run — external battery	300 × 800 × 1000	95
RED3330S	30 kVA / 30 kW	Standard — internal batteries	400 × 935 × 1065	380
RED3330H	30 kVA / 30 kW	Long-run — external battery	300 × 800 × 1000	96
RED3340H	40 kVA / 40 kW	Long-run — external battery	400 × 935 × 1065	150
RED3350H	50 kVA / 50 kW	Long-run — external battery	442 × 850 × 1200	160
RED3360H	60 kVA / 60 kW	Long-run — external battery	442 × 850 × 1200	165
RED3380H	80 kVA / 80 kW	Long-run — external battery	600 × 850 × 1600	283
RED33100H	100 kVA / 100 kW	Long-run — external battery	600 × 850 × 1600	321

4 System components

A complete RED3300 installation is normally made up of the UPS cabinet, a matched battery cabinet and — where the site supply is 480 V or 600 V — an input isolation transformer cabinet. Separate datasheets cover each:

Component	Series	Function
UPS cabinet	RED3300	Double-conversion online UPS, 25–100 kVA, 208/120 Vac output
Battery cabinet	RED-BT	Matched VRLA battery cabinets, ± 120 Vdc, 40 / 65 / 100 Ah
Transformer cabinet	RED33	Input isolation transformer, 480 V or 600 V delta to 208/120 V wye

5 Technical specification

MODEL	RED3325S/H	RED3330S/H	RED3340H	RED3350H	RED3360H	RED3380H	RED33100H
Capacity (VA/W)	25k/25k	**30k/30k**	40k/40k	50k/50k	60k/60k	80k/80k	100k/100k
Max. parallel number	**6**						
INPUT							
Nominal voltage (Vac)	**208/120 or 220/127 (3Ph+N+PE)**						
Operating voltage range (Vac)	**66–166 for 40 % load; 96–166 for 100 % load**						
Power factor	**≥ 0.99**						
Harmonic distortion (THDi)	**≤ 3 % non-linear load**						
Bypass voltage range (Vac)	**Max. voltage: +25 % (optional +10 %, +15 %, +20 %) Min. voltage: −40 % (optional −10 %, −15 %, −20 %, −30 %)**						
Bypass frequency range (Hz)	**50/60 ± 10 %**						
OUTPUT							
Nominal voltage (Vac)	**208/120 or 220/127 (3Ph+N+PE)**						
Voltage regulation	**± 1 %**						
Output frequency (Hz)	**Line mode: ±1 % / ±2 % / ±4 % / ±5 % / ±10 % of rated frequency (selectable); battery mode: 50/60 (± 0.1 %)**						
Crest factor	**3 : 1**						
Harmonic distortion (THDv)	**≤ 2 % linear load; ≤ 5 % non-linear load**						
Overload	**≤ 110 % 60 min, ≤ 125 % 10 min, ≤ 150 % 1 min, > 150 % 1.2 s inverter shutdown**						
EFFICIENCY							
AC (double-conversion) mode	**Up to 94 %**						
BATTERY							
Battery type	**VRLA (lead-acid, maintenance-free)**						
Battery voltage (Vdc) — standard unit	**± 120 (4 × 20 pcs 12 V 9 Ah)**		/				
Battery voltage (Vdc) — long-run unit	**± 96 / 108 / 120 / 132 / 144 / 156 (16 / 18 / 20 / 22 / 24 / 26 pcs; 20 pcs default). 20–26 pcs: output power factor 1.0; 18 pcs: 0.9; 16 pcs: 0.8**						
Charging current, max. (A) — standard unit	**5.4**		/				
Charging current, max. (A) — long-run unit	**20**		40			60	80
ENVIRONMENTAL							
Operating temperature (°C)	**0 – 40**						
Storage temperature (°C)	**−25 – 55 (without battery)**						
Humidity range	**0 – 95 % RH @ 0 – 40 °C (non-condensing)**						
Altitude (m)	**< 1000; derating required between 1000 and 3000**						

MODEL	RED3325S/H	RED3330S/H	RED3340H	RED3350H	RED3360H	RED3380H	RED33100H
Noise level (dB)	< 58	**< 60**	< 63		< 65	< 66	< 68
PHYSICAL							
Dimensions W × D × H (mm)	**S: 400 × 935 × 1065 H: 300 × 800 × 1000**		400 × 935 × 1065	442 × 850 × 1200		600 × 850 × 1600	
Weight (kg)	375 / 95	**380 / 96**	150	160	165	283	321
STANDARDS							
Safety	**UL 1778, CSA C22.2 No. 107.3-14**						
EMC	**FCC Part 15 Subpart B, ANSI C63.4-2014**						

RED3330 — unit proposed for this application. H: long-run unit (battery not included). S: standard unit.

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UNINTERRUPTIBLE POWER SYSTEMS

RED-BT Series
Battery cabinets

For RED3300 Series UPS · 25 – 100 kVA · ± 120 Vdc

Matched VRLA battery cabinets for RED3300 long-run UPS systems. Six factory-populated configurations from 20 to 40 blocks and 40 Ah to 100 Ah, all on a ± 120 Vdc bus, so autonomy is set by cabinet selection rather than site assembly.

PRODUCT	RED-BT Series
APPLICATION	RED3300 UPS 25 – 100 kVA
DC BUS	± 120 Vdc nominal
ISSUE	August 2026

1 Overview

RED-BT series cabinets house the VRLA battery bank for RED3300 long-run (H) UPS systems. Each cabinet holds matched blocks wired as one or two strings of twenty 12 V blocks, giving the ± 120 Vdc bus the UPS expects. Autonomy is selected by choosing the block capacity — 40 Ah, 65 Ah or 100 Ah — and the number of strings; cabinets are paralleled where a larger bank is required.

Two cabinet formats are offered for each capacity: a **two-string** cabinet holding 40 blocks and a **single-string** cabinet holding 20. Both present the same ± 120 Vdc terminals, so a bank can be built up in 20-block increments.

2 Key features

- Six configurations — 20 or 40 blocks at 40 Ah, 65 Ah or 100 Ah — all on the same ± 120 Vdc bus
- ± 120 Vdc nominal, matching the RED3300 long-run (H) UPS DC bus
- One or two 20-block strings per cabinet; cabinets parallel for larger banks
- Typical battery life 3 – 5 years, depending on discharge cycles and ambient temperature
- Quiet operation — below 40 dB — for installation alongside the UPS in plant or IT rooms
- Certified to UL 1778 5th Edition and CSA C22.2 No. 107.3-14

3 Model range

Model code: **RED-BT** + block count + block capacity — e.g. **RED-BT40065** holds **40** blocks of **65** Ah. All cabinets are ± 120 Vdc nominal.

Model	Battery complement	Strings	Dimensions W × D × H (mm)	Weight (kg)
RED-BT40040	40 × 12 V 40 Ah	2 × 20	600 × 850 × 1600	676
RED-BT20040	20 × 12 V 40 Ah	1 × 20	442 × 850 × 1200	330
RED-BT40065	40 × 12 V 65 Ah	2 × 20	800 × 1100 × 1600	1083
RED-BT20065	20 × 12 V 65 Ah	1 × 20	600 × 900 × 1200	608
RED-BT400100	40 × 12 V 100 Ah	2 × 20	800 × 1100 × 1600	1637
RED-BT200100	20 × 12 V 100 Ah	1 × 20	800 × 900 × 1200	930

Selection. Battery power is shared across the strings connected in parallel, so autonomy scales with the number of strings as well as with block capacity. For the 30 kVA / 27 kW, 60-minute duty covered by the accompanying runtime confirmation, **2 × RED-BT40065** — 80 blocks in four strings of twenty 65 Ah blocks — is the recommended bank.

4 Technical specification

MODEL	RED-BT40040	RED-BT20040	RED-BT40065	RED-BT20065	RED-BT400100	RED-BT200100
BATTERY SYSTEM						
Battery type	**VRLA (lead-acid, maintenance-free)**					
Typical recharge time (hours)	**4 (to 90 % of full capacity)**					
Typical battery life (years)	**3 – 5, depending on discharge cycles and ambient temperature**					

MODEL	RED-BT40040	RED-BT20040	RED-BT40065	RED-BT20065	RED-BT400100	RED-BT200100
System voltage (Vdc)	± 120					
Battery quantity (pcs)	2 × 20	1 × 20	**2 × 20**	1 × 20	2 × 20	1 × 20
Block capacity (Ah)	40		**65**		100	
PHYSICAL						
Dimensions W × D × H (mm)	600 × 850 × 1600	442 × 850 × 1200	**800 × 1100 × 1600**	600 × 900 × 1200	800 × 1100 × 1600	800 × 900 × 1200
Weight (kg)	676	330	**1083**	608	1637	930
ENVIRONMENTAL						
Operating environment (°C)	0 – 40					
Altitude (m)	< 1000; derating required between 1000 and 3000					
Humidity range	0 – 95 % RH @ 0 – 40 °C (non-condensing)					
Noise level (dB)	< 40					
STANDARDS						
Safety	UL 1778 5th Edition, CSA C22.2 No. 107.3-14					

RED-BT40065 — cabinet proposed for this application (2 off).

5 Installation notes

- Cabinets are heavy — up to 1637 kg. Confirm floor loading and the access route before delivery.
- Leave the ventilation clearance given in the installation documentation around each cabinet, and do not obstruct the ventilation openings.
- Battery capacity falls with temperature. Sizing figures assume 25 °C; operation at lower ambient temperatures reduces the autonomy achieved.
- All strings in a bank must use blocks of the same type, capacity, manufacturer and age. Do not mix new and part-aged blocks on one bus.
- The 4-hour figure in the specification table is the battery's own recharge characteristic. Actual recharge time is set by the charging current the UPS can deliver — a RED3330H provides up to 20 A — so confirm the recharge time for the bank size selected against the UPS charging current.

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RED33 Series
Input isolation transformers

20 – 100 kVA · 480 V or 600 V delta to 208/120 V wye

Dry-type input isolation transformer cabinets for RED3300 Series UPS installations on a 480 V or 600 V supply. Isolation, step-down and output protection in one floor-standing cabinet matched to the UPS.

PRODUCT	RED33 Series
POWER RANGE	20 – 100 kVA
CONFIGURATION	Delta primary / wye secondary
ISSUE	August 2026

1 Overview

RED33 Series input isolation transformers provide step-down and galvanic isolation between a 480 V or 600 V delta supply and the 208/120 V wye input of a RED3300 Series UPS. Isolation on the UPS input attenuates utility line surges and transients, and an integral output circuit breaker protects the downstream connection. Two ball-bearing fans keep the cabinet cool and quiet, and an over-temperature sensing relay, thermal switch and warning light give both indication and protection.

The front panel is styled to match the RED3300 UPS range. Transformers may be ordered with the UPS or separately; cabinet dimensions differ between the transformer, UPS and battery cabinets and are given in the tables below.

> **Typical application.** Four-wire (3Ph + N + PE) IT and process loads in government, manufacturing, healthcare, industrial and corporate sites that have a 480 V or 600 V electrical feed and 208/120 V equipment.

2 Key features

- Galvanic isolation on the UPS input, stepping 480 V (delta) or 600 V (delta) down to 208/120 V (wye)
- Attenuates utility line surges and transients before they reach the UPS
- Output circuit breaker built in — no separate downstream board required
- Over-temperature warning LED, thermal switch and protection relay that opens the output breaker
- Full load efficiency from 95.0 % to 96.7 % depending on rating
- Wide operating window: −20 % to +25 % at 100 % load, 40 – 70 Hz
- 180 °C class insulation; aluminium windings
- Two 120 mm ball-bearing fans for quiet operation — 65 dB maximum at 1 m
- Reliability tested to ISTA-3B for vibration, shock and drop (tip test)
- cTUVus certified to UL 1778 5th Edition and CSA C22.2 No. 107.3-14
- Rugged galvanised steel cabinet, RAL 9011, shipped ready for installation

3 Model range

Model code: **RED33** + rating + primary voltage — e.g. **RED33-30k480V** is a 30 kVA transformer for a 480 V delta supply.

Model	Rating	Primary	Output breaker	W × D × H (mm)	Weight (kg)	Max. constant load
RED33-20k480V	20 kVA	480 V delta	80 A	442 × 850 × 1200	195	20 kW
RED33-30k480V	30 kVA	480 V delta	125 A	442 × 850 × 1200	280	30 kW
RED33-60k480V	60 kVA	480 V delta	250 A	600 × 850 × 1200	358	60 kW
RED33-60k600V	60 kVA	600 V delta	250 A	600 × 850 × 1200	358	60 kW
RED33-100k480V	100 kVA	480 V delta	400 A	600 × 850 × 1200	489	100 kW
RED33-100k600V	100 kVA	600 V delta	400 A	600 × 850 × 1200	476	100 kW

> **Transformer selection.** The RED33-20k480V is rated for a 10 – 20 kW UPS and the RED33-30k480V for a 20 – 30 kW UPS. The RED3300 range starts at 25 kVA, so **RED33-30k480V is the smallest transformer applicable to a RED3325 or RED3330**. For larger systems select a transformer whose rating is at least the UPS output rating; confirm the pairing with RE&D before ordering.

RED33-30k480V — transformer proposed for this application.

4 Technical specification — 20 kVA and 30 kVA

MODEL	RED33-20k480V	RED33-30k480V
Description	3-phase 20 kVA input isolation transformer, delta 480 V / wye 208 V	**3-phase 30 kVA input isolation transformer, delta 480 V / wye 208 V**
Transformer type	**Dry-type**	
INPUT		
Input voltage	**480 V**	
Input voltage operating range and derating	**−45 %, +25 % at 40 % load −20 %, +25 % at 100 % load**	
Input connections	**3-wire (L1, L2, L3 + PE)**	
Input configuration	**Delta**	
Input connection type	**Terminal block**	
Rated AC input frequency	**50 / 60 Hz**	
Frequency range and derating	**40 – 70 Hz**	
Voltage selection	**No**	
Voltage drop, no load to full load	**≤ 3 %**	
Inrush current	≤ 300 A (10 ms)	**≤ 1010 A (10 ms)**
Input isolation	**Yes**	
OUTPUT		
VA rating	20 kVA	**30 kVA**
Output voltage	**208 / 120 V (3-phase, 4-wire)**	
Output configuration	**Wye**	
Output connections	**4-wire (L1, L2, L3 + N + PE)**	
Output connection type	**Terminal block**	
Output breaker rating	80 A	**125 A**
Output power	20 000 W	**30 000 W**
Output isolation	**Yes**	
EFFICIENCY		
Full load efficiency	95.00 %	**95.20 %**
Half load efficiency	96.50 %	**97.50 %**
OVER-TEMPERATURE PROTECTION		
Warning LED (red)	**Turns ON at 160 °C ± 5 °C (155 – 165 °C) Turns OFF at 125 °C ± 5 °C (120 – 130 °C)**	
Protective action	**Transformer output opens at 160 °C ± 5 °C (155 – 165 °C)**	
Reset device	**Output breaker is closed manually once the warning LED has turned OFF**	
Insulation class	**180 °C**	
Temperature rise	**125 °C**	
PHYSICAL		
Height	**1200 mm (47.2 in)**	
Width	**442 mm (17.4 in)**	
Depth	**850 mm (33.5 in)**	
Weight	195 kg (430 lb)	**280 kg (617 lb)**
Floor loading	519 kg/m²	**745 kg/m²**
Shipping carton H × W × D	**1411 × 563 × 970 mm (55.6 × 22.2 × 38.2 in)**	
Shipping weight	220 kg (485 lb)	**323 kg (712 lb)**
Tip-n-Tell label on overpack	**Fitted**	
ENVIRONMENTAL		

MODEL	RED33-20k480V	RED33-30k480V
Audible noise at 1 m	**65 dB max.**	
Relative humidity, non-condensing	**95 %**	
Thermal dissipation at full load	3413 BTU/h	**4915 BTU/h**
Operating temperature	**0 – 40 °C (32 – 104 °F)**	
Storage temperature	**−15 – 60 °C (5 – 140 °F)**	
Operating elevation	**< 1000 m at nominal power; above 1000 m derate 1 % per 100 m**	
MECHANICAL		
Transformer windings	**Aluminium**	
Cabinet material	**Cold-rolled galvanised steel (SGCC)**	
Cabinet colour	**RAL 9011**	
Fans	**2 × ball-bearing, 120 mm (288 CFM total)**	
RELIABILITY		
Vibration / shock / drop	**ISTA-3B (drop test performed as tip test)**	
APPROVALS		
Approving agency	**cTUVus**	
Agency standard tested	**UL 1778 5th Edition**	
Canadian approvals	**CSA C22.2 No. 107.3-14**	
CE approvals	**Not applicable — certified to North American standards**	
EMI approvals	**Not applicable**	
RoHS / REACH	**Compliant**	

5 Technical specification — 60 kVA and 100 kVA

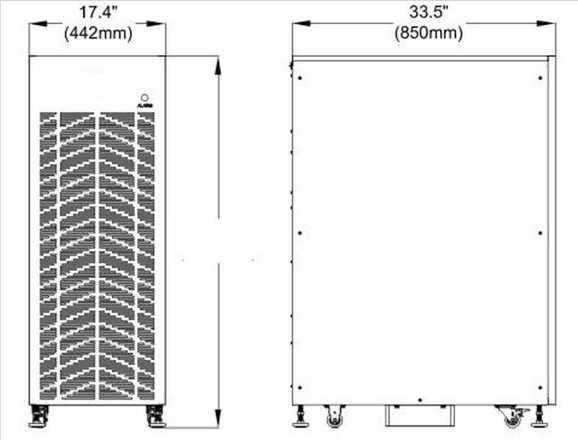
MODEL	RED33-60k480V	RED33-60k600V	RED33-100k480V	RED33-100k600V
Capacity	3-phase 60 kVA input isolation transformer	3-phase 60 kVA input isolation transformer	3-phase 100 kVA input isolation transformer	3-phase 100 kVA input isolation transformer
Input voltage (Vac)	480	600	480	600
Input voltage range (Vac)	−45 %, +25 % @ 40 % load; −20 %, +25 % @ 100 % load			
Input connection	3Ph + PE, copper bar			
Input frequency (Hz)	50 / 60			
Output voltage (Vac)	208 / 120 (3Ph + N + PE), copper bar			
Output breaker rating (A)	250	250	400	400
Output power (VA/W)	60k	60k	100k	100k
Full load efficiency	Up to 96.50 %		Up to 96.70 %	
Half load efficiency	Up to 97.50 %		Up to 97.70 %	
Dimensions W × D × H (mm)	600 × 850 × 1200			
Weight (kg)	358	358	489	476
Operating temperature (°C)	0 – 40			
Storage temperature (°C)	−15 – 60			
Humidity range	0 – 95 % RH @ 0 – 40 °C (non-condensing)			
Altitude (m)	< 1000; derating required between 1000 and 3000			
Noise level (dB)	< 65			
Safety	cTUVus: UL 1778 5th Edition, CSA C22.2 No. 107.3-14			
EMC	FCC Part 15 Subpart B / ANSI C63.4-2014			

6 Electrical installation data

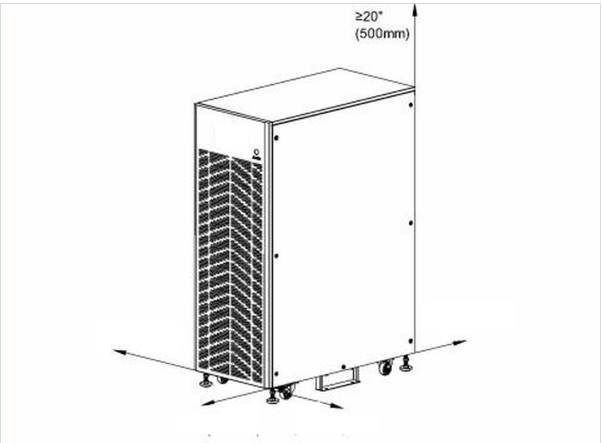
Parameter	RED33-20k480V	RED33-30k480V
Input current at rated load	35 A	**51 A**
Rated output current at 208 V *	55.5 A	**83.3 A**
Output breaker rating	80 A	**125 A**
AC input cable, THHW at 75 °C	10 AWG (max. 4 AWG)	**6 AWG (max. 3 AWG)**
AC output cable	4 AWG (max. 4 AWG)	**3 AWG (max. 3 AWG)**
Neutral cable	4 AWG (max. 4 AWG)	**3 AWG (max. 3 AWG)**
Earth / grounding cable	4 AWG (max. 4 AWG)	**3 AWG (max. 3 AWG)**
Terminal torque, all connections	6.5 N·m	**6.5 N·m**

* Calculated from the VA rating at 208 V, three-phase. Cable sizing is given for guidance and must be confirmed against local wiring regulations and the installed cable route.

7 Dimensions



RED33-20k480V / RED33-30k480V — front and side elevation



Minimum clearance 500 mm (20 in) at the front, rear and both sides

Installation. Hazardous live parts inside the cabinet remain energised from the transformer even when the output breaker is open — isolate the upstream supply before opening the cabinet. The transformer output neutral is not bonded to chassis ground — a bonding connection between the transformer chassis ground and the output neutral must be provided on site, and the chassis ground must be connected to earth. Individual transformers for each UPS are not advised where two UPS operate in parallel. Confirm floor loading before delivery; the cabinet is heavy and must be moved on its castors.

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UNINTERRUPTIBLE POWER SYSTEMS

Battery runtime confirmation

RED3330 UPS · 27 kW load · 60 minutes autonomy

Prepared by	Renewable Energy & Drives / Severn Drives & Energy
Issue	August 2026
Subject	Sizing confirmation for a RED-BT series VRLA battery bank supporting a RED3330 UPS at 27 kW for 60 minutes

1 Basis of calculation

Parameter	Value	Note
UPS model	RED3330	30 kVA / 30 kW, unity output power factor
Load supported	27 kW	90 % of the UPS rating
UPS efficiency in battery mode	92 %	Inverter efficiency, battery to output
UPS output power factor	1.0	kVA = kW
Battery end-of-discharge voltage	1.75 V/cell	Standard EOD for VRLA at this discharge rate
Required backup time	60 minutes	
Blocks per string	20 pcs	12 V blocks — 120 cells per string, ± 120 Vdc nominal
Number of strings	4	80 blocks in total
Reference temperature	25 °C	Battery discharge data basis

2 Method

The power the battery bank must deliver is referred to a single cell. Each 12 V block contains six cells, so a string of 20 blocks presents 120 cells. Dividing the load by the inverter efficiency and by the number of cells in a string gives the constant power each cell must sustain for the required autonomy:

$$W/cell = S \times PF / (\eta \times N \times 6)$$

S = load (W) · PF = output power factor · η = inverter efficiency in battery mode · N = blocks per string · 6 = cells per 12 V block

$$W/cell = 27\,000 \times 1.0 / (0.92 \times 20 \times 6) = 244.57\ W/cell$$

Constant power required at cell level for the whole load

That figure is the demand placed on the bank as a whole, expressed per cell of one string. With four strings connected in parallel the demand is shared, so the capability of the bank is the single-cell capability of the selected block multiplied by the number of strings.

3 Battery performance data

6-FM-65 (12 V, 65 Ah) VRLA block — constant power discharge, watts per cell at 25 °C.

Cut-off voltage (V/cell)	10 min	15 min	30 min	60 min	2 h	3 h	4 h	5 h	8 h	10 h	20 h
1.60	254	194	127	77.2	45.3	31.8	25.0	20.9	14.2	13.4	7.37
1.65	251	192	124	76.4	44.7	31.5	24.8	20.7	14.1	12.9	7.30
1.70	246	187	121	75.0	43.6	31.2	24.5	20.3	13.9	12.7	7.26
1.75	230	182	111	**74.8**	43.1	30.8	24.2	20.1	13.8	12.6	7.11
1.80	214	170	104	74.4	42.4	30.1	23.8	20.0	13.5	12.4	6.80
1.85	177	149	96.0	69.2	41.4	29.7	23.2	19.1	13.0	11.9	6.46

At the 1.75 V/cell end-of-discharge point, a 6-FM-65 block delivers **74.8 W/cell** for 60 minutes.

4 Result

Check	Value
Required, whole load referred to one cell of a string	**244.57 W/cell**
Available — 6-FM-65 at 1.75 V/cell, 60 min × 4 strings	**74.8 × 4 = 299.2 W/cell**
Margin	**+ 22 % over the requirement**

CONCLUSION

Four strings of twenty 12 V 65 Ah (6-FM-65) VRLA blocks — 80 blocks in total — support a 27 kW load on a RED3330 UPS for the required 60 minutes, with approximately 22 % margin at 25 °C. The same bank retains margin at the UPS full rating: at 30 kW the requirement rises to 271.7 W/cell against 299.2 W/cell available.

5 Recommended battery configuration

Item	Selection
Block type	**12 V 65 Ah VRLA (6-FM-65 equivalent)**
Blocks per string	**20**
Strings	**4**
Total blocks	**80**
Nominal DC bus	**± 120 Vdc**
Battery cabinet	**2 × RED-BT40065 (40 blocks per cabinet, two strings each)**
Cabinet dimensions each	**800 × 1100 × 1600 mm**

Item	Selection
Cabinet weight each, populated	**1083 kg**
Matched UPS	**RED3330H — 30 kVA long-run unit**

6 Notes and assumptions

- Battery discharge figures are quoted at 25 °C. Available capacity falls at lower ambient temperatures; where the battery room may run below 25 °C the bank should be re-checked at the design minimum temperature.
- Figures apply to new blocks. Allow an ageing margin — commonly 20 % — where the autonomy must be held to end of battery life. The 22 % margin calculated above covers this at the 27 kW duty.
- The RED3330 is rated 30 kVA / 30 kW at unity power factor. The 27 kW figure used here is the load advised for this application, not a UPS limit.
- Recharge time is set by the UPS charging current, not by the battery alone. A RED3330H long-run unit provides up to 20 A; confirm the recharge time acceptable to the site for the 260 Ah bank selected.
- All blocks in the bank must be of the same type, capacity, manufacturer and age.
- The calculation confirms battery power capability only. Cable sizing, DC protection and battery room ventilation are to be confirmed against the installation design.

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