

quarelex

Lithium-ion(LiFeP04) Power Battery For Material Handling Equipment



**Drop-in Lithium-ion Battery Solutions for
Replacing Lead-Acid Batteries**

www.quarelex.com

Powered by Enerri Energy Group

About Us

Established in 2017, Enerri Energy Group (parent company of quarelex), is one of the pioneering companies in applying the lithium-ion battery technology into low-speed motive power batteries and also battery energy storage systems (BESS).

Our key solutions include:

- Lithium-ion (LiFePO₄) power batteries for material handling equipment: Forklifts, Narrow Aisle Trucks, Walkie Pallet Jacks, AGVs, etc.
- Lithium-ion (LiFePO₄) power batteries for low-speed vehicles: Golf Carts, E-Bikes, etc.
- Lithium-ion (LiFePO₄) storage batteries for hybrid/off-grid solar system: Residential low&high voltage battery, Commercial battery energy storage systems (BESS).
- Lithium-ion battery charger: 24V-96V, 10A-300A.
- Cloud-based Energy Management System (EMS).



Quality and Environment Certificates

Quality Management System:

ISO9001:2015

Environmental Management System:

ISO14001:2015

Occupational Health and Safety Management System:

ISO45001:2018

Products Certificates

CE

RoHS

IEC 62619

IEC 60730

UN 38.3

MSDS



Lead-acid vs Lithium-ion



FEATURES	LEAD-ACID	LITHIUM-ION (LiFePO4)	COMPARISON
No. of Shifts of One Battery Per Day	1	Up to 3	Lead acid battery charging speed is much slower.
Maintenance Cost	High	Low	Lead acid batteries need distilled water top up frequently.
Charge Time	8 Hours	1-3 Hours	Fast-charging of lead-acid battery will significantly shorten the lifetime, and even cause damage to the battery.
Cool-down Time	Yes	No	Lead-acid batteries have a cool-down period. Need minimum 2 hours to cool down electrolyte after charging.
Opportunity Charging	No	Yes	Opportunity charging of lead-acid battery will significantly reduce the lifetime, while having no effect on the lifetime and performance of lithium-ion battery.
Charge & Discharge Efficiency	70%	95%	Lead acid battery incurs higher electricity cost.
Lifetime	1000 -1500 cycles	3000-4000 cycles	Lead acid battery lasts maximally only about 1000-1500 cycles if maintained well.
Replacement Cost	High	Low	Lithium-ion battery comes with modular design, can be replaced with only new cell modules, saving the cost on casing, counterweight, BMS, PDU, etc.
DoD	50-70%	90%	Deep discharging of lead-acid battery will significantly shorten the lifetime.
Performance in Low Temperature	Low	High	At 0°C, Li Ion battery offers 80% capacity power while Lead Acid battery offers 50% capacity power.
Performance in Low Temperature	Low	High	At 40°C, Li Ion battery offers 85% capacity power while Lead Acid battery offers 60% capacity power.
Warranty Period	2 Years	5 Years	
Upfront Cost	Low	High	
Total Cost Of Ownership	High	Low	In a 5 years period, overall cost of lithium-ion battery is much lower than lead-acid battery.
Eco Friendly	No	Yes	

Rigorous Quality Testing



Charge & Discharge Capacity Test

One of the key metrics for assessing the performance of Lithium Ion batteries is the charge and discharge capacity test.

Constant voltage charge and constant current discharge are common methods used for capacity testing.

The battery's capacity is determined by timing the battery's discharge under various loads.

Vibration Test

During Vibration Test, battery is firmly secured to the platform of the vibration machine without distorting the battery, as well as to faithfully transmit the vibration. The vibration is a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz, and is traversed in 15 minutes. This cycle is repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell.



Hi-Pot Test

A hi-pot (high potential) test is to verify the integrity of battery's electrical insulation. It involves applying a high AC or DC voltage between the battery's terminals (positive and negative) and its external conductive casing. This is to ensure there is no breakdown or excessive leakage current, confirming that the insulation barrier is sufficient to prevent short circuits under high-stress conditions.

Temperature Test

Temperature test to ensure battery safety and performance under extreme thermal conditions.

- Charging temp range: 0°C to 60°C
- Discharging temp range: - 30°C to 60°C

The safety requirement is based on EN ISO 13849-1.

Tests performed: external short circuit, thermal abuse, overcharge test, forced discharge test, overheating control.



Water Test

The battery enclosure must withstand water splashed from all directions without harmful effects, as verified by one of the following methods:

- Using an oscillating fixture: for 10 minutes.
- Using a spray nozzle (unshielded): for at least 5 minutes.
- The battery shall not be submerged.

Grade A Material and Workmanship

Integrated PDU and BMS

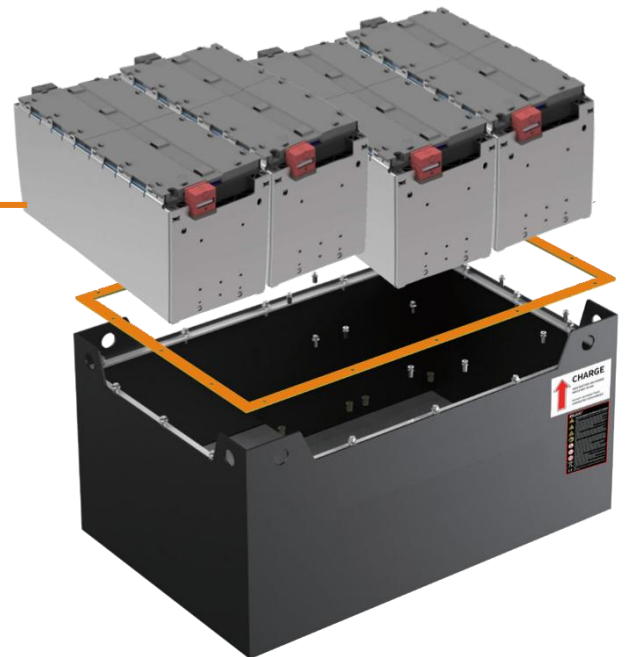
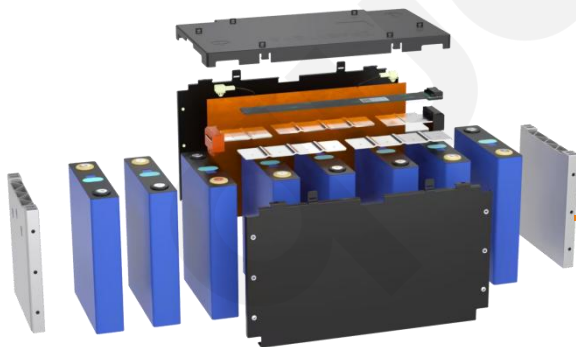
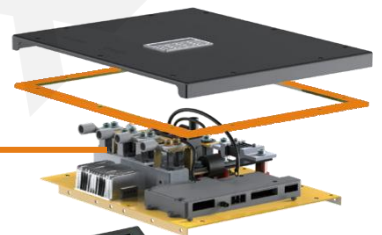


Protection: Overcharge, Over-discharge, Over current, Short Circuit, Temperature.
Monitoring: Voltage, Current, Temperature, SOC, SOH.
Charge-Discharge Control: Regulate charge&discharge process to prevent overuse.
Balancing: Cell balancing through active or passive balancing.
Communication: CAN to charger, 4G or WiFi to cloud platform.
Data Logging: Records historical battery data for analysis and fault diagnosis.
Fault Diagnosis: Detects and diagnoses battery abnormalities.
Current Measurement: Built-in shunt.
Power Switch Type: Relay
Relay Adhesion Detection: Yes
Fuse: Built-in
Supported Voltage: up to 192V

4.3 Inch Touch Screen

Power Control: Switch on/off the battery

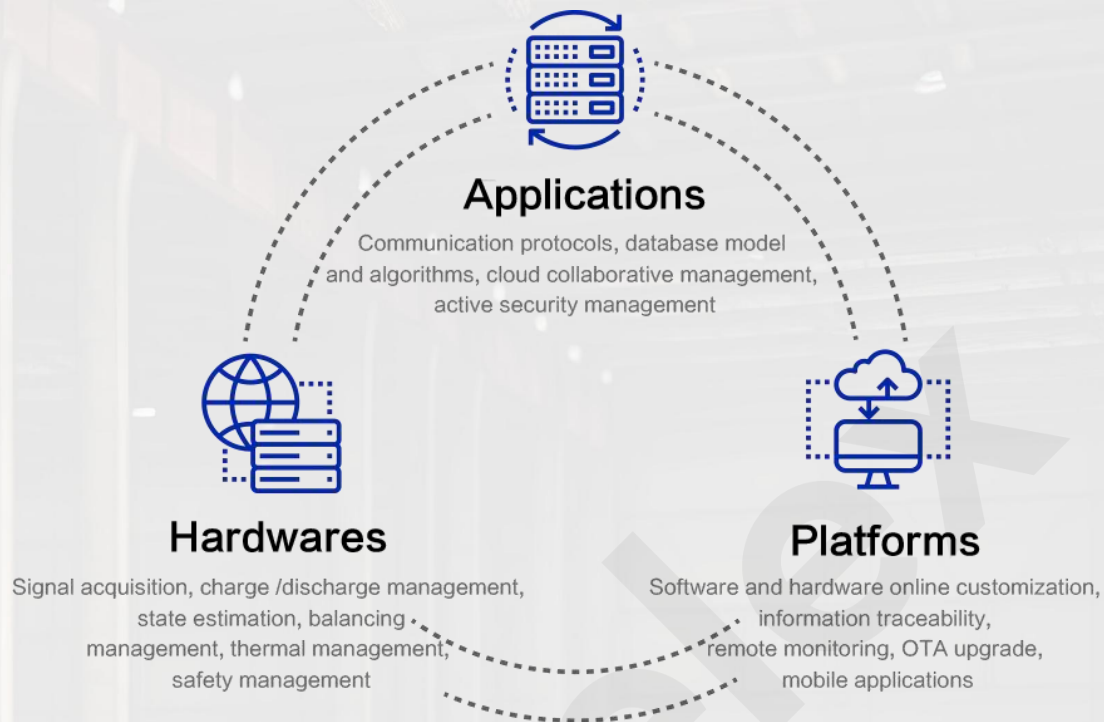
Monitoring: Showing all critical battery information in real-time, such as voltage, current, SOC, and fault alarm.



Modular Cell Packs

Cell type: Prismatic LiFePO4
Cell Grade: A, EV Grade, brand new
Cell Brand: EVE, LiShen, or equivalent.
Compression: Yes
Voltage&Temperature Sensors: CCS
Cells Lifetime: >3500 cycles
Cells Connection: Aluminum bus bar with Laser Welding
Module Connection: Copper bus bar
Heating Panel: Optional

Smart On-line Cloud Platform



4G Module

Every forklift battery comes with a standard 4G module, use can insert a local SIM card to activate the 4G connection to our battery smart platform.



Platform Key Functions

Remote monitoring

All the battery's real time data/fault/alert can be easily monitored on your computer or phone.

OTA Firmware Update

Enabling 80% of remote solutions for after-sales remote faults, greatly reducing your after-sales costs.

Optional GPS Tracking Capability

Secure your forklift and battery asset with GPS location monitoring and geofencing alert.



Flexible Counterweight Options



Option 1

Counterweight block is placed below the battery, and fixed to battery with steel brackets.

Option 2

Counterweight as a whole battery casing outside the battery module.



Tailor-Made Battery Solutions

Class 1

Counterbalance Forklift



36V, 48V, 72V, 80V, 96V
Battery Systems

Class 2

Narrow Aisle Trucks



36V, 48V
Battery Systems

Class 3

Walkie Pallet Jacks



24V
Battery Systems



Battery Specifications

Model	Nominal Voltage	Nominal Capacity	Nominal Energy	Dimensions (L*W*H) all dimensions can be customized	Weight kg(lbs.) (with counterweight in red)	Charge Current	Continuous Discharge Current	Maximum Discharge Current	IP Rating
24V Batteries									
QL24-150	25.6 V	150 Ah	3.84 kWh	620 * 190 * 520 mm (24.41 * 7.48 * 20.47 inch)	60 kg (132.28 lbs)	100 A	100 A	300 A (30 S)	IP65
QL24-173T		173 Ah	4.43 kWh	740 * 170 * 520 mm (29.13 * 6.69 * 20.47 inch)	69 kg (152.12 lbs)	100 A	100 A	300 A (30 S)	
QL24-173S		173 Ah	4.43 kWh	790 * 200 * 460 mm (31.1 * 7.87 * 18.11 inch)	69 kg (152.12 lbs)	100 A	100 A	300 A (30 S)	
QL24-202T		202 Ah	5.17 kWh	740 * 170 * 520 mm (29.13 * 6.69 * 20.47 inch)	77 kg (169.76 lbs)	100 A	200 A	400 A (30 S)	
QL24-202S		202 Ah	5.17 kWh	790 * 200 * 460 mm (31.1 * 7.87 * 18.11 inch)	77 kg (169.76 lbs)	100 A	200 A	400 A (30 S)	
QL24-230		230 Ah	5.89 kWh	620 * 190 * 520 mm (24.41 * 7.48 * 20.47 inch)	79 kg (174.17 lbs)	200 A	200 A	400 A (30 S)	
QL24-304		304 Ah	7.78 kWh	768 * 210 * 630 mm (30.24 * 8.27 * 24.8 inch)	101 kg (222.67 lbs)	200 A	300 A	600 A (30 S)	
QL24-346		346 Ah	8.86 kWh	621 * 281 * 627 mm (24.45 * 11.06 * 24.69 inch)	109 kg (240.3 lbs)	200 A	300 A	600 A (30 S)	
QL24-404		404 Ah	10.34 kWh	786 * 210 * 630 mm (30.94 * 8.27 * 24.8 inch)	147 kg (324.08 lbs)	200 A	400 A	600 A (30 S)	
QL24-460		460 Ah	11.78 kWh	786 * 210 * 630 mm (30.94 * 8.27 * 24.8 inch)	158 kg (348.33 lbs)	200 A	400 A	600 A (30 S)	
QL24-560		560 Ah	14.34 kWh	780 * 425 * 470 mm (30.71 * 16.73 * 18.5 inch)	184 kg (405.65 lbs)	200 A	400 A	600 A (30 S)	
QL24-608		608 Ah	15.56 kWh	780 * 425 * 470 mm (30.71 * 16.73 * 18.5 inch)	196 kg (432.11 lbs)	200 A	400 A	600 A (30 S)	
QL24-840		840 Ah	21.50 kWh	986 * 362 * 787 mm (38.8 * 14.25 * 30.98 inch)	248 kg (546.75 lbs)	200 A	400 A	600 A (30 S)	
QL24-1120	1120 Ah	28.67 kWh	832 * 532 * 784 mm (32.76 * 20.94 * 30.87 inch)	326 kg (718.71 lbs)	200 A	400 A	600 A (30 S)		
36V Batteries									
QL36-205	38.4 V	205 Ah	7.87 kWh	768 * 210 * 630 mm (30.24 * 8.27 * 24.8 inch)	125 kg (275.58 lbs)	200 A	200 A	400 A (30 S)	IP65
QL36-230		230 Ah	8.83 kWh	621 * 281 * 627 mm (24.45 * 11.06 * 24.69 inch)	130 kg (286.6 lbs)	200 A	200 A	400 A (30 S)	
QL36-304		304 Ah	11.67 kWh	786 * 210 * 630 mm (30.94 * 8.27 * 24.8 inch)	157 kg (346.13 lbs)	200 A	300 A	600 A (30 S)	
QL36-346		346 Ah	13.29 kWh	780 * 425 * 470 mm (30.71 * 16.73 * 18.5 inch)	174 kg (383.6 lbs)	200 A	300 A	600 A (30 S)	
QL36-404		404 Ah	15.51 kWh	800 * 350 * 570 mm (31.5 * 13.78 * 22.44 inch)	209 kg (460.77 lbs)	200 A	400 A	600 A (30 S)	
QL36-460		460 Ah	17.66 kWh	750 * 425 * 570 mm (29.53 * 16.73 * 22.44 inch)	228 kg (502.65 lbs)	200 A	400 A	600 A (30 S)	
QL36-560		560 Ah	21.50 kWh	800 * 760 * 350 mm (31.5 * 29.92 * 13.78 inch)	264 kg (582.02 lbs)	200 A	400 A	600 A (30 S)	
QL36-608		608 Ah	23.35 kWh	800 * 625 * 420 mm (31.5 * 24.61 * 16.54 inch)	286 kg (630.52 lbs)	200 A	400 A	600 A (30 S)	
QL36-690		690 Ah	26.50 kWh	900 * 425 * 570 mm (35.43 * 16.73 * 22.44 inch)	303 kg (668 lbs)	200 A	400 A	600 A (30 S)	
QL36-840		840 Ah	32.26 kWh	880 * 760 * 460 mm (34.65 * 29.92 * 18.11 inch)	347 kg (765 lbs)	200 A	400 A	600 A (30 S)	
QL36-920		920 Ah	35.33 kWh	910 * 800 * 470 mm (35.83 * 31.49 * 18.5 inch)	405 kg (892.87 lbs)	200 A	400 A	600 A (30 S)	
QL36-1120		1120 Ah	43.01 kWh	970 * 630 * 720 mm (37.4 * 24.8 * 28.35 inch)	482 kg (1062.63 lbs)	200 A	400 A	600 A (30 S)	
48V Batteries									
QL48-105	51.2 V	105 Ah	5.38 kWh	620 * 190 * 560 mm (24.41 * 7.48 * 22.05 inch)	75 kg (165.35 lbs)	100 A	100 A	200 A (30 S)	IP65
QL48-173		173 Ah	8.86 kWh	621 * 281 * 627 mm (24.45 * 11.06 * 24.69 inch)	109 kg (240.3 lbs)	100 A	100 A	200 A (30 S)	
QL48-205		205 Ah	10.50 kWh	786 * 210 * 630 mm (30.94 * 8.27 * 24.8 inch)	119 kg (262.35 lbs)	200 A	200 A	400 A (30 S)	
QL48-230		230 Ah	11.78 kWh	956 * 375 * 555 mm (37.64 * 14.76 * 21.85 inch)	156 kg (346.13 lbs) 450 kg (992.08 lbs)	200 A	200 A	400 A (30 S)	

Battery Specifications

Model	Nominal Voltage	Nominal Capacity	Nominal Energy	Dimensions (L*W*H) all dimensions can be customized	Weight kg(lbs.) (with counterweight in red)	Charge Current	Continuous Discharge Current	Maximum Discharge Current	IP Rating
48V Batteries									
QL48-304	51.2 V	304 Ah	15.56 kWh	956 * 375 * 555 mm (37.64 * 14.76 * 21.85 inch)	167 kg (368.17 lbs) 450 kg (992.08 lbs)	200 A	300 A	600 A (30 S)	IP65
QL48-346		346 Ah	17.72 kWh	800 * 420 * 405 mm (31.50 * 16.54 * 15.94 inch)	170 kg (374.79 lbs) 650 kg (1433 lbs)	200 A	300 A	600 A (30 S)	
QL48-404S		404 Ah	20.68 kWh	800 * 500 * 405 mm (31.5 * 19.69 * 15.94 inch)	216 kg (476.2 lbs) 720 kg (1587.33 lbs)	200 A	400 A	600 A (30 S)	
QL48-404T		404 Ah	20.68 kWh	800 * 420 * 620 mm (31.5 * 16.54 * 24.41 inch)	228 kg (502.65 lbs) 720 kg (1587.33 lbs)	200 A	400 A	600 A (30 S)	
QL48-460S		460 Ah	23.55 kWh	800 * 500 * 405 mm (31.5 * 19.69 * 15.94 inch)	226 kg (498.25 lbs) 720 kg (1587.33 lbs)	200 A	400 A	600 A (30 S)	
QL48-460T		460 Ah	23.55 kWh	800 * 420 * 620 mm (31.5 * 16.54 * 24.41 inch)	240 kg (529.11 lbs) 720 kg (1587.33 lbs)	200 A	400 A	600 A (30 S)	
QL48-560		560 Ah	28.67 kWh	800 * 450* 670 mm (31.5 * 17.72 * 26.38 inch)	280 kg (617.29 lbs) 830 kg (1829.84 lbs)	200 A	400 A	600 A (30 S)	
QL48-608		608 Ah	31.13 kWh	960 * 532 * 784 mm (37.8 * 20.94 * 30.87 inch)	368 kg (811.3 lbs)	200 A	400 A	600 A (30 S)	
QL48-840		840 Ah	43.01 kWh	880 * 830 * 570 mm (34.65 * 32.68 * 22.44 inch)	482 kg (1062.63 lbs)	200 A	400 A	600 A (30 S)	
QL48-1120		1120 Ah	57.34 kWh	1020 * 800 * 580 mm (40.16* 31.5 * 22.83 inch)	631 kg (1391.12 lbs)	200 A	400 A	600 A (30 S)	
72V Batteries									
QL72-346	76.8 V (*Optional extra 48V output)	346 Ah	26.57 kWh	948 * 815 * 589 mm (37.32 * 32.09 * 23.19 inch)	303 kg (668 lbs)	200 A	300 A	600 A (30 S)	IP65
QL72-410		410 Ah	31.49 kWh	948 * 815 * 589 mm (37.32 * 32.09 * 23.19 inch)	368 kg (811.3 lbs)	200 A	400 A	600 A (30 S)	
QL72-460		460 Ah	35.33 kWh	948 * 815 * 589 mm (37.32 * 32.09 * 23.19 inch)	405 kg (892.87 lbs)	200 A	400 A	600 A (30 S)	
QL72-560		560 Ah	43.01 kWh	880 * 830 * 570 mm (34.65 * 32.68 * 22.44 inch)	482 kg (1062.63 lbs)	200 A	400 A	600 A (30 S)	
QL72-608		608 Ah	46.69 kWh	910 * 830 * 570 mm (35.83 * 32.68 * 22.44 inch)	529 kg (1166.25 lbs)	200 A	400 A	600 A (30 S)	
80V Batteries									
QL80-304	83.2 V (*Optional extra 48V output)	304 Ah	25.29 kWh	980 * 600 * 464 mm (38.58 * 23.62 * 18.27 inch)	225 kg (496.04 lbs) 1010 kg (2226.67 lbs)	200 A	300 A	600 A (30 S)	IP65
QL80-346		346 Ah	28.79 kWh	980 * 600 * 430 mm (38.58 * 23.62 * 16.93 inch)	284 kg (626.11 lbs) 1010 kg (2226.67 lbs)	200 A	300 A	600 A (30 S)	
QL80-404		404 Ah	33.61 kWh	980 * 600 * 550 mm (38.58 * 23.62 * 21.65 inch)	365 kg (804.69 lbs) 1010 kg (2226.67 lbs)	200 A	400 A	600 A (30 S)	
QL80-460		460 Ah	38.27 kWh	980 * 600 * 550 mm (38.58 * 23.62 * 21.65 inch)	386 kg (850.98 lbs) 1010 kg (2226.67 lbs)	200 A	400 A	600 A (30 S)	
QL80-560		560 Ah	46.59 kWh	820 * 690 * 570 mm (32.28 * 27.17 * 22.44 inch)	489 kg (1078.06 lbs)	200 A	400 A	600 A (30 S)	
QL80-608		608 Ah	50.59 kWh	900 * 810 * 570 mm (35.43 * 31.89 * 22.44 inch)	510 kg (1124.36 lbs)	200 A	400 A	600 A (30 S)	
QL80-690		690 Ah	57.41 kWh	810 * 780 * 570 mm (31.89 * 30.71 * 22.44 inch)	535 kg (1179.47 lbs)	200 A	400 A	600 A (30 S)	
QL80-840		840 Ah	69.89 kWh	1015 * 830 * 570 mm (39.96 * 32.68 * 22.44 inch)	648 kg (1428.6 lbs)	200 A	400 A	600 A (30 S)	
QL80-920		920 Ah	76.54 kWh	910 * 830 * 749 mm (35.83 * 32.68 * 29.49 inch)	726 kg (1600.56 lbs)	200 A	400 A	600 A (30 S)	
QL80-1120		1120 Ah	93.18 kWh	1020 * 830 * 880 mm (40.16* 32.68 * 34.65 inch)	983 kg (2167.14 lbs)	200 A	400 A	600 A (30 S)	
96V Batteries									
QL96-920	96V	920 Ah	88.32 kWh	1215 * 715 * 775 mm (47.83 * 28.15 * 30.51 inch)	955 kg (2105.41 lbs)	200 A	400 A	600 A (30 S)	IP65
QL96-1120		1120 Ah	104.16 kWh	1285 * 615 * 785 mm (50.59 * 24.21 * 30.91 inch)	1059 kg (2334.7 lbs)	200 A	400 A	600 A (30 S)	

1. *Optional extra 48V output is for power supply to the forklift control board.

2. All specifications shown above are subject to change during products improving at any time without prior notice.

3. For other batteries not listed above, customization is also available.

Charger Specifications

Charger Model	AC Input Voltage, Hz, Wiring	Rated Output DC Voltage	Output DC Voltage Range	Output DC Current	Connector
24V Series					
QC24-100	90-264 V, 47-63 Hz, L+N+PE	24 V	5-30 V	100 A	REMA/Anderson/Customized
QC24-200	90-264 V, 47-63 Hz, L+N+PE	24 V	18-33 V	200 A	REMA/Anderson/Customized
48V Series					
QC48-50	90-264 V, 47-63 Hz, L+N+PE	48 V	5-60 V	50 A	REMA/Anderson/Customized
QC48-100	90-264 V, 47-63 Hz, L+N+PE	48 V	20-60 V	100 A	REMA/Anderson/Customized
QC48-150	330-530 V, 47-63 Hz, 3L+PE	48 V	20-60 V	150 A	REMA/Anderson/Customized
QC48-200	330-530 V, 47-63 Hz, 3L+PE	48 V	20-60 V	200 A	REMA/Anderson/Customized
QC48-400	330-530 V, 47-63 Hz, 3L+PE	48 V	20-60 V	200+200 A	REMA/Anderson/Customized
80V Series					
QC80-50	90-264 V, 47-63 Hz, L+N+PE	80 V	30-100 V	50 A	REMA/Anderson/Customized
QC80-100	330-530 V, 47-63 Hz, 3L+PE	80 V	30-100 V	100 A	REMA/Anderson/Customized
QC80-150	330-530 V, 47-63 Hz, 3L+PE	80 V	20-110 V	150 A	REMA/Anderson/Customized
QC80-200	330-530 V, 47-63 Hz, 3L+PE	80 V	20-110 V	200 A	REMA/Anderson/Customized
QC80-400	330-530 V, 47-63 Hz, 3L+PE	80 V	20-100 V	200+200 A	REMA/Anderson/Customized
120V Series					
QC120-50	90-264 V, 47-63 Hz, L+N+PE	120 V	30-132 V	50 A	REMA/Anderson/Customized
QC120-100	330-530 V, 47-63 Hz, 3L+PE	120 V	60-200 V	100 A	REMA/Anderson/Customized
QC120-150	330-530 V, 47-63 Hz, 3L+PE	120 V	60-200 V	150 A	REMA/Anderson/Customized
QC120-200	330-530 V, 47-63 Hz, 3L+PE	120 V	60-200 V	200 A	REMA/Anderson/Customized



OVP - Over Voltage Protection
 OCP - Over Current Protection
 OPP - Over Power Protection
 OTP - Over Temperature Protection
 UVP - Under Voltage Protection
 SCP - Short Circuit Protection
 RPP - Reverse Polarity Protection
 Automatic Stop After Fully Charged

1. All specifications shown above are subject to change during products improving at any time without prior notice.
2. For other chargers not listed above, customization is also available.



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