



CRYSTAL BATTERIES™ CATALOG 2022

SAFE AND POWERFUL PERFORMANCE



TABLE OF CONTENTS

1. CRYSTAL BATTERIES™	3
2. CRYSTAL™ BATTERY FAMILIES.....	4
3. CRYSTAL™ BATTERY COMPARISON.....	5
4. CRYSTAL™ BATTERY APPLICATIONS.....	6
5. ELECTRIC VEHICLE RANGE.....	7
6. GENERAL STORAGE RANGE.....	8
7. FRONT TERMINAL RANGE.....	10
8. LARGE STORAGE RANGE.....	11
9. CRYSTAL™ BATTERY BASICS & KNOWLEDGE.....	12
10. DATA SHEET DIRECTORY.....	13
11. CHARGING AND USAGE.....	14
12. TERMINAL DIRECTORY.....	15
13. COMPARISON EXPLANATION.....	17
14. GLOBAL BATTERY PART NUMBER REFERENCE TABLE.....	20

CRYSTAL BATTERIES™

Crystal Batteries™ are a unique technology that overcomes conventional battery problems by having a nearly solid-state electrolyte. This allows the battery to be discharged deeper, cycle more often, has a longer lifetime and can withstand extreme temperatures.

The patented Crystal technology uses a unique advanced formula, a new type of composite SiO₂ electrolyte developed to completely replace traditional sulphuric acid solutions.



CRYSTAL TECHNOLOGY

Our unique electrolyte crystallizes on the battery plates, giving the batteries their powerful features.



GREENEST BATTERY

Environmentally friendlier than hazardous classified batteries.



CLEAN TECHNOLOGY

Crystal Batteries™ can comply with all international standards of environmental protection.



BETTER USAGE PERFORMANCE

Charges up to three times faster than conventional alternatives. Excellent high-current discharge.



FULL RECOVERY

Crystal Batteries™ can be 100% discharged and restored to full capacity.



EASY TRANSPORT

Classified as a non-hazardous battery. Safe to transport via air, sea and land.



THE SAFEST

No risk of thermal runaway, spontaneous combustion, no leakage, and fewer harmful chemicals.



UP TO 99% RECYCLABLE

A sustainable circular economy, less acid, no antimony or cadmium.



EXTREME TEMPERATURES

Extreme temperature resistance. Operates from -40°C (40°F) to +65°C (149°F).



LONG BATTERY LIFE

A float service life of up to 11 years. Up to 3,100 charge / discharge cycles at 25°C (50% DoD).



LONG SHELF LIFE

Crystal Batteries™ can be stored for 2 years with no refresh charging required, simplifying logistics.



PROVEN TRACK RECORD

Crystal Batteries™ have been successfully used in the telecom, industrial EV and storage markets worldwide.



When charged/discharged the electrolyte transforms into a crystallized semi solid-state. The crystals that form on the plates increase lifetime and performance significantly.

CRYSTAL BATTERY™ FAMILIES

Crystal Batteries™ are grouped into 4 families, where each family addresses a different market and applications.

1



ELECTRIC VEHICLE RANGE

6V, 8V or 12V, rated at 3h discharge
From medium to high capacity
(27Ah to 265Ah)

2



GENERAL STORAGE RANGE

6V or 12V, rated at 10h discharge
From small to high capacity
(7Ah to 200Ah)

3



FRONT TERMINAL RANGE

12V, rated at 10h discharge
Front terminal only
(55Ah to 180Ah)

4



LARGE STORAGE RANGE

Single-cell 2V, rated at 10h discharge
For high capacity banks
(100Ah to 3000Ah)

CRYSTAL BATTERY™ COMPARISON

When compared head-to-head, Crystal Batteries™ excel amongst competitors with notable performance increases over standard AGM batteries and even Lithium. There is no comparison for the quality, price and lifetime of Crystal Batteries™.

	LEAD ACID	LEAD GEL	CRYSTAL BATTERY™	LITHIUM	AGM
1. USABLE TEMPERATURE	-20°C to +45°C -4°F to 113°F	-18°C to +50°C 0°F to 122°F	-40°C to +65°C -40°F to 149°F	-20°C to +65°C -4°F to 149°F	-30°C to +55°C -22°F to 131°F
2. CHARGE TEMPERATURE	-20°C to +45°C -4°F to 113°F	0°C to +40°C 32°F to 104°F	-40°C to +65°C -40°F to 149°F	0°C to +45°C 32°F to 113°F	-30°C to +55°C -22°F to 131°F
3. USAGE LIFE AT 25°C / 77°F	2-3 years	3-4 years	8-11 YEARS	6-8 years	4-6 years
4. CAPACITY LOSS DEGRADATION	High	Medium - High	LOW	Medium - High	Medium
5. CYCLES AT 25°C / 77°F 50% DEPTH OF DISCHARGE	600	1,000	3,100	4,000	2,000
6. CYCLES AT 40°C / 104°F 80% DEPTH OF DISCHARGE	350	400	1,380	1,250	600
7. COST OF OWNERSHIP 10 YEARS	High	Medium - High	LOWEST	Medium - High	Medium
8. HIGH CURRENT ABILITY	Poor	Poor	AVERAGE	Good	Average
9. ENVIRONMENTAL IMPACT	Harmful	Harmful	FRIENDLY	Harmful	Average
10. WEIGHT	Average	Average	AVERAGE	Low	Average
11. FAILURE MODE	Acid spill	Hazardous	SWELLING	Unsafe	Varies
12. FIRE RISK	Average	Low	ZERO	High	Low
13. INDOOR USE	Gassing	Gassing	SAFE	High Risk	Gassing
14. TRANSPORT SAFETY	Restricted	Varies	SAFE	Restricted	Varies
15. DECOMMISSIONING VALUE	Low	Low	HIGH	Negative	Medium

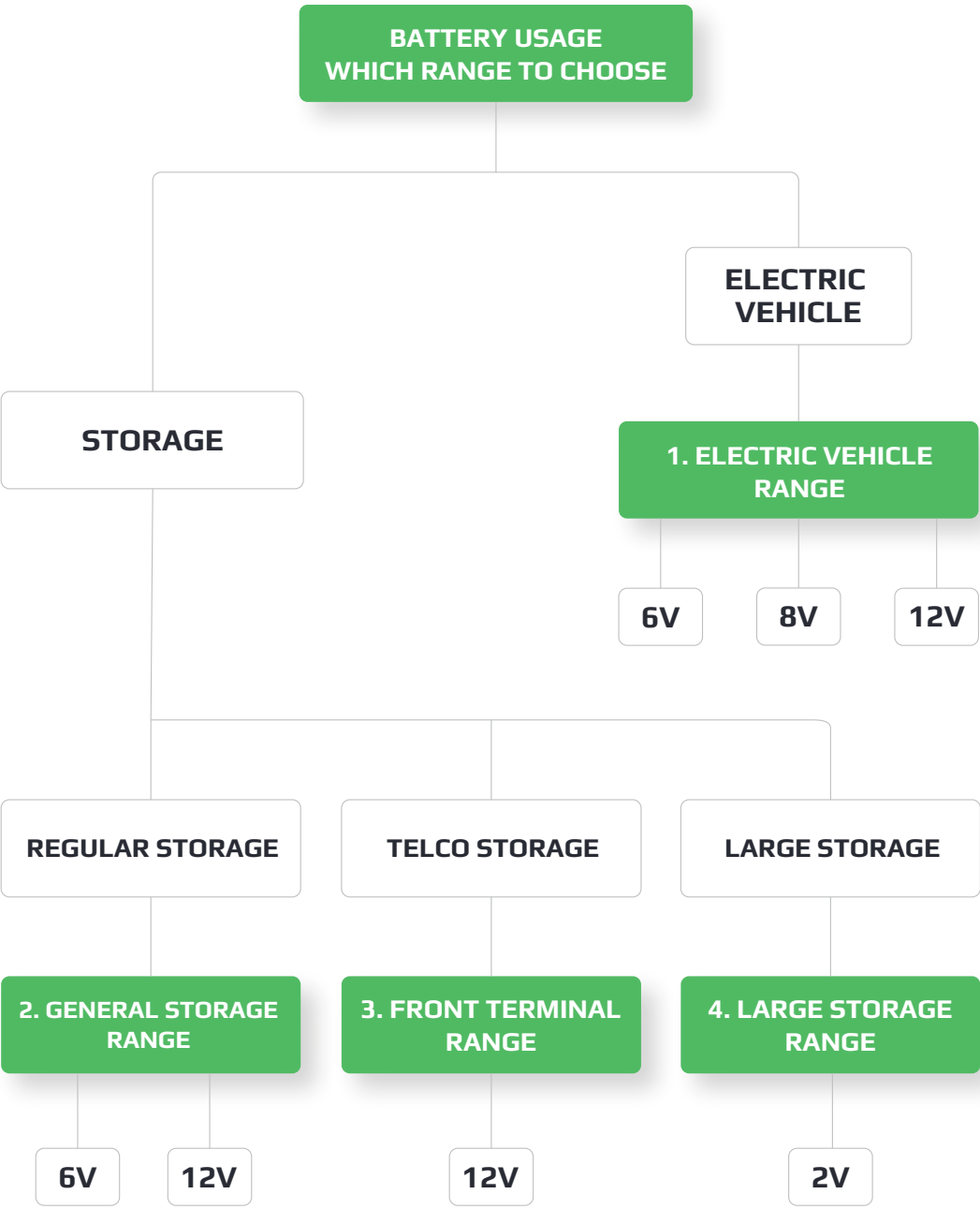
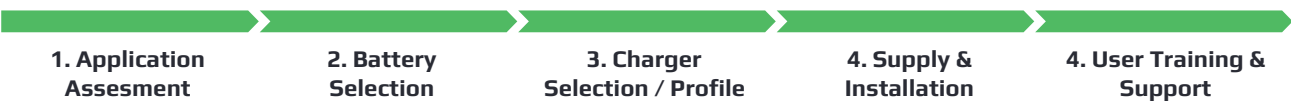
* See page 17 for details.



CRYSTAL BATTERY™ APPLICATIONS

The following flowchart shows the process of selecting the right battery for the intended application. The following pages show all the batteries within a family.

CUSTOMER PURCHASING PROCESS



1. ELECTRIC VEHICLE RANGE

LIGHT TRACTION RANGE APPLICATIONS



Golf carts, marine, e-propulsion drives, AGV's (Automatic Guided Vehicles)

6 VOLT

BATTERY NAME	RATED VOLTAGE	RATED AH 3 HR RATE	RATED AH 20 HR RATE	WEIGHT	DIMENSIONS
1. CB6-180EV	6 V	180	248	33 kg / 72.8 lbs	L 260 mm (10.2") W 180 mm (7.1") H 275 mm (10.8")
2. CB6-210EV	6 V	210	280	36 kg / 79.4 lbs	L 260 mm (10.2") W 180 mm (7.1") H 275 mm (10.8")
3. CB6-265EV	6 V	265	330	46.5 kg / 102.5 lbs	L 295 mm (11.6") W 175 mm (6.9") H 350 mm (13.8")

8 VOLT

BATTERY NAME	RATED VOLTAGE	RATED AH 3 HR RATE	RATED AH 20 HR RATE	WEIGHT	DIMENSIONS
1. CB8-135EV	8 V	135	178	34 kg / 75 lbs	L 261 mm (10.3") W 181 mm (7.1") H 285 mm (11.2")
1. CB8-150EV	8 V	150	183	35 kg / 77 lbs	L 260 mm (10.2") W 182 mm (7.2") H 300 mm (11.8")

12 VOLT

BATTERY NAME	RATED VOLTAGE	RATED AH 3 HR RATE	RATED AH 20 HR RATE	WEIGHT	DIMENSIONS
1. CB12-27EV	12 V	27	34	9.5 kg / 20.9 lbs	L 175 mm (6.9") W 166 mm (6.5") H 125 mm (4.9")
2. CB12-32EV	12 V	32	40	12 kg / 52.9 lbs	L 194 mm (7.6") W 132 mm (5.2") H 176 mm (6.9")
3. CB12-40EV	12 V	40	49	12.5 kg / 27.6 lbs	L 222 mm (8.7") W 120 mm (4.7") H 175 mm (6.9")
4. CB12-60EV	12 V	60	77	22.3 kg / 49.2 lbs	L 260 mm (10.2") W 169 mm (6.7") H 215 mm (8.5")
5. CB12-70EV	12 V	70	86	25.5 kg / 56.2 lbs	L 260 mm (10.2") W 169 mm (6.7") H 215 mm (8.5")
6. CB12-80EV	12 V	80	101	31.5 kg / 69.5 lbs	L 327 mm (12.9") W 172 mm (6.8") H 220 mm (8.7")
7. CB12-100EV	12 V	100	124	34 kg / 75 lbs	L 331 mm (13") W 176 mm (6.9") H 219 mm (8.6")
8. CB12-120EV	12 V	120	151	40 kg / 88.2 lbs	L 330 mm (13") W 172 mm (6.8") H 255 mm (10")
9. CB12-150EV	12 V	150	183	49 kg / 108 lbs	L 484 mm (19.1") W 170 mm (6.7") H 241 mm (9.5")

2. GENERAL STORAGE RANGE

GENERAL STORAGE RANGE APPLICATIONS (Applicable to pages 8 & 9)



Marine: E-propulsion systems, electric outboards, bow thrusters, service batteries.

Industrial: Emergency lighting, alarm back up, electric fencing, CCTV monitoring, mobile lighting systems, tools, cooling, heating, metering.

Renewable Energy: Energy storage for hybrid solutions, home energy storage, onboard wind turbines, UPS systems, offshore, solar-powered streetlights.

Rail and Transport: Reserve for trains, trams, busses, rail crossing switching, barrier control, information systems, portable guiding lights, and traffic services like info boards, lane closure, rush-hour lanes.

Camper / Caravaning: Main service battery, solar storage, winches, fishing equipment.

Medical: Portable CT scanners, UPS systems, mobile equipment, ambulances.

Defense: UPS for power boats / ships, submarines, communication devices, gun mount drives, main power for mobile equipment, extra power for vehicles.

6 VOLT

BATTERY NAME	RATED VOLTAGE	RATED AH 10 HR RATE	RATED AH 20 HR RATE	WEIGHT	DIMENSIONS
1. CB6-4GS	6 V	4	4.5	0.8 kg / 1.8 lbs	L 70 mm (2.8") W 47 mm (1.9") H 105 mm (4.1")
2. CB6-7.2GS	6 V	7.2	7.8	1.2 kg / 2.7 lbs	L 151 mm (5.9") W 35 mm (1.4") H 102 mm (4")
3. CB6-10GS	6 V	10	12	1.75 kg / 3.9 lbs	L 151 mm (5.9") W 50 mm (2") H 100 mm (3.9")
4. CB6-12GS	6 V	12	13.2	2.1 kg / 4.6 lbs	L 151 mm (5.9") W 50 mm (2") H 100 mm (3.9")
5. CB6-160GS	6 V	160	175	25.5 kg / 56.2 lbs	L 298 mm (11.7") W 172 mm (6.8") H 230 mm (9.1")
6. CB6-180GS	6 V	180	194	28.3 kg / 62.4 lbs	L 306 mm (12.1") W 168 mm (6.6") H 225 mm (8.9")
7. CB6-200GS	6 V	200	220	30.5 kg / 67.2 lbs	L 323 mm (12.7") W 178 mm (7") H 230 mm (9.1")

12 VOLT - HIGH RATE

BATTERY NAME	RATED VOLTAGE	RATED AH 10 HR RATE	RATED AH 20 HR RATE	WEIGHT	DIMENSIONS
1. CB12-7.2HGS	12 V (High Rate)	9	9.6	2.54 kg / 5.6 lbs	L 151 mm (5.9") W 65 mm (2.6") H 102 mm (4")

2. GENERAL STORAGE RANGE

12 VOLT					
BATTERY NAME	RATED VOLTAGE	RATED AH 10 HR RATE	RATED AH 20 HR RATE	WEIGHT	DIMENSIONS
1. CB12-7.2GS	12 V	7.2	7.8	2.2 kg / 4.6 lbs	L 151 mm (5.9") W 65 mm (2.6") H 102 mm (4")
2. CB12-10GS	12 V	10	12	3.5 kg / 7.7 lbs	L 151 mm (5.9") W 99 mm (3.9") H 102 mm (4")
3. CB12-12GS	12 V	12	13.2	4.1 kg / 9 lbs	L 151 mm (5.9") W 99 mm (3.9") H 102 mm (4")
4. CB12-14GS	12 V	14	15.5	4.25 kg / 9.4 lbs	L 151 mm (5.9") W 99 mm (3.9") H 105 mm (4.1")
5. CB12-18GS	12 V	18	20	5.9 kg / 13 lbs	L 181 mm (7.1") W 76 mm (3") H 170 mm (6.7")
6. CB12-22GS	12 V	22	24	6.9 kg / 15.2 lbs	L 181 mm (7.1") W 76 mm (3") H 170 mm (6.7")
7. CB12-24GS	12 V	24	27	7.8 kg / 17.2 lbs	L 175 mm (6.9") W 166 mm (6.5") H 125 mm (4.9")
8. CB12-26GS	12 V	26	29	7.8 kg / 17.2 lbs	L 175 mm (6.9") W 166 mm (6.5") H 125 mm (4.9")
9. CB12-28GS	12 V	28	32	8.5 kg / 18.7 lbs	L 175 mm (6.9") W 166 mm (6.5") H 125 mm (4.9")
10. CB12-35GS	12 V	35	40	12 kg / 26.5 lbs	L 194 mm (7.6") W 132 mm (5.2") H 176 mm (6.9")
11. CB12-40GS	12 V	40	44	13 kg / 28.7 lbs	L 196 mm (7.7") W 166 mm (6.5") H 176 mm (6.9")
12. CB12-55GS	12 V	55	60	16.9 kg / 37.3 lbs	L 229 mm (9") W 138 mm (5.4") H 215 mm (8.5")
13. CB12-65GS	12 V	65	72	21 kg / 46.3 lbs	L 350 mm (13.8") W 166 mm (6.5") H 175 mm (6.9")
14. CB12-70GS	12 V	70	78	22.3 kg / 49.2 lbs	L 260 mm (10.2") W 169 mm (6.7") H 215 mm (8.5")
15. CB12-90GS	12 V	90	100	27 kg / 59.5 lbs	L 307 mm (12.1") W 168 mm (6.6") H 216 mm (8.5")
16. CB12-100GS	12 V	100	110	31.5 kg / 69.5 lbs	L 327 mm (12.9") W 172 mm (6.8") H 220 mm (8.7")
17. CB12-120GS	12 V	120	132	36.5 kg / 80.5 lbs	L 407 mm (16") W 174 mm (6.9") H 237 mm (9.3")
18. CB12-150GS	12 V	150	162	46.5 kg / 102.5 lbs	L 484 mm (19.1") W 170 mm (6.7") H 241 mm (9.5")
19. CB12-180GS	12 V	180	190	59 kg / 130.1 lbs	L 522 mm (20.6") W 240 mm (9.5") H 224 mm (8.8")
20. CB12-200GS	12 V	200	220	62 kg / 136.7 lbs	L 522 mm (20.6") W 240 mm (9.5") H 224 mm (8.8")

3. FRONT TERMINAL RANGE

FRONT TERMINAL RANGE APPLICATIONS



Datacenters & Telecom: Mission-critical applications with high stability & performance, UPS systems, frequently used in base stations for mobile communications.

Marine: Back-up power for critical systems like control boards, navigation, and communication.

Rail and transport: Back up power, railroad switches, barrier control, lighting systems, information systems.

12 VOLT

BATTERY NAME	RATED VOLTAGE	RATED AH 10 HR RATE	RATED AH 20 HR RATE	WEIGHT	DIMENSIONS
1. CB12-55FT	12 V	55	60	16.3 kg / 35.9 lbs	L 277 mm (10.9") W 106 mm (4.2") H 228 mm (8.9")
2. CB12-90FT	12 V	90	100	31.5 kg / 69.5 lbs	L 396 mm (15.6") W 110 mm (4.3") H 286 mm (11.3")
3. CB12-100FT	12 V	100	108	34.5 kg / 76.1 lbs	L 560 mm (22.1") W 125 mm (4.9") H 228 mm (9")
4. CB12-155FT	12 V	155	170	48 kg / 105.8 lbs	L 558 mm (22") W 125 mm (4.9") H 283 mm (11.14")
5. CB12-170FT	12 V	170	190	50 kg / 110.2 lbs	L 546 mm (21.5") W 125 mm (4.9") H 320 mm (12.6")
6. CB12-180FT	12 V	180	194	50.5 kg / 111.3 lbs	L 546 mm (21.5") W 125 mm (4.9") H 320 mm (12.6")

4. LARGE STORAGE RANGE

LARGE STORAGE RANGE APPLICATIONS



Datacenters & Telecom: Large-scale reserve power, mission-critical applications with high stability & performance, UPS systems.

Marine: Battery banks with high capacity for autonomous use in ships and boats. Back-up power for critical systems like control boards, navigation, and communication, electric propulsion systems

Industrial: Reserve power for large systems, rental equipment, storage power for grid support and peak-shaving, and large utility storage.

Renewable Energy: Energy storage for solar, wind, and other hybrid solutions, home energy storage.

Rail and Transport: Back-up power for trains, trams, busses, rail crossing switching, barrier control, lighting systems, information systems, portable guiding lights, baggage handling at airports, electric buses.

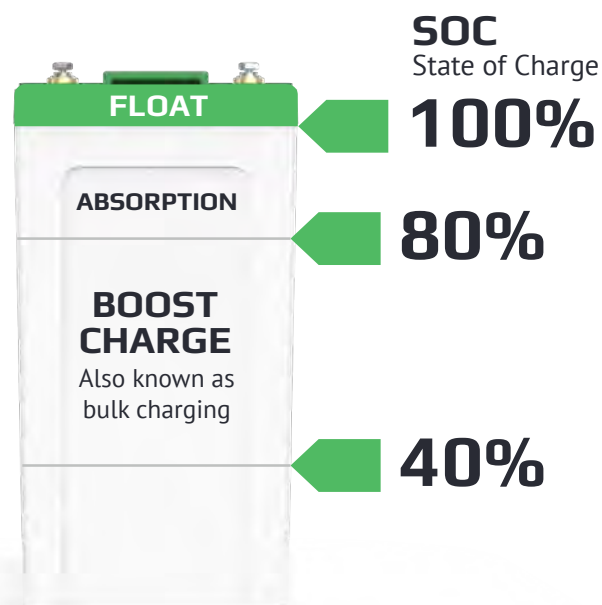
2 VOLT

BATTERY NAME	RATED VOLTAGE	RATED AH 10 HR RATE	RATED AH 20 HR RATE	WEIGHT	DIMENSIONS
1. CB2-100LS	2 V	100	108	5.8 kg / 12.8 lbs	L 172 mm (6.8") W 72 mm (2.8") H 210 mm (8.3")
2. CB2-200LS	2 V	200	220	13.5 kg / 29.8 lbs	L 174 mm (6.9") W 112 mm (4.4") H 343 mm (13.5")
3. CB2-300LS	2 V	300	330	20.5 kg / 45.2 lbs	L 175 mm (6.9") W 155 mm (6.1") H 365 mm (13.4")
4. CB2-400LS	2 V	400	440	26 kg / 57.3 lbs	L 210 mm (8.3") W 175 mm (6.9") H 335 mm (13.2")
5. CB2-500LS	2 V	500	560	31 kg / 68.3 lbs	L 243 mm (9.6") W 175 mm (6.9") H 338 mm (13.3")
6. CB2-600LS	2 V	600	660	37.5 kg / 82.7 lbs	L 301 mm (11.9") W 175 mm (6.9") H 335 mm (13.2")
7. CB2-800LS	2 V	800	880	51 kg / 112.4 lbs	L 412 mm (16.2") W 175 mm (6.9") H 337 mm (13.3")
8. CB2-1000LS	2 V	1000	1100	61 kg / 134.5 lbs	L 480 mm (18.9") W 175 mm (6.9") H 340 mm (13.4")
9. CB2-1500LS	2 V	1500	1650	98.5 kg / 217.2 lbs	L 403 mm (15.9") W 354 mm (13.9") H 350 mm (13.8")
10. CB2-2000LS	2 V	2000	2200	124 kg / 273.4 lbs	L 491 mm (19.3") W 351 mm (13.8") H 364 mm (14.3")
11. CB2-2200LS	2 V	2200	2420	131.5 kg / 289.9 lbs	L 491 mm (19.3") W 351 mm (13.8") H 364 mm (14.3")
12. CB2-2500LS	2 V	2500	2750	141.5 kg / 312 lbs	L 491 mm (19.3") W 351 mm (13.8") H 364 mm (14.3")

CRYSTAL BATTERY™ BASICS

Batteries need to be properly maintained to reach their maximum lifetime and performance. The battery's State of Charge is a percentage of how full the battery is compared to being completely empty. Recharging is done by using a fast-charge boost phase where most energy is recharged in the shortest time, followed by an absorption phase, and a final float phase.

Crystal Batteries™ are recharged quickly during boost charge, but then slow down in the last absorption and float phases. This slow-down is necessary to ensure the battery is not overcharged, shortening the lifetime of the battery.



CRYSTAL BATTERY™ KNOWLEDGE

Depth of Discharge measures in percentage how empty a battery is. A battery that is 100% discharged is completely empty. The usable energy from the battery example below is from 100% SOC to 40% SOC which is the same as a 60% Depth of Discharge cycle.

The C-rating of the battery describes how fast the charging or discharging is. The notation is very important to prevent confusion. For example, Crystal batteries are rated at C10, which means when discharged for 10 hours, the CB12-100GS batteries deliver 100Ah of current, then is recharged at 0.3C, (or 30A), in the boost charge.

C-RATING - 100AH BATTERY

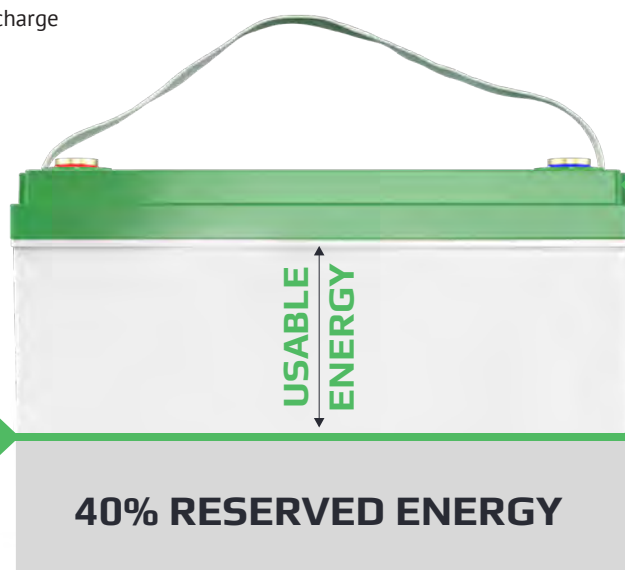


DOD

Depth of Discharge

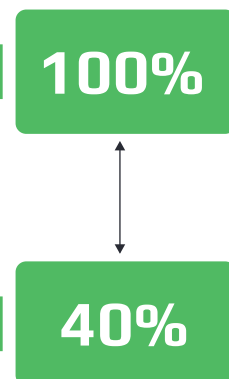


SET



CHARGE WINDOW

Usable Energy





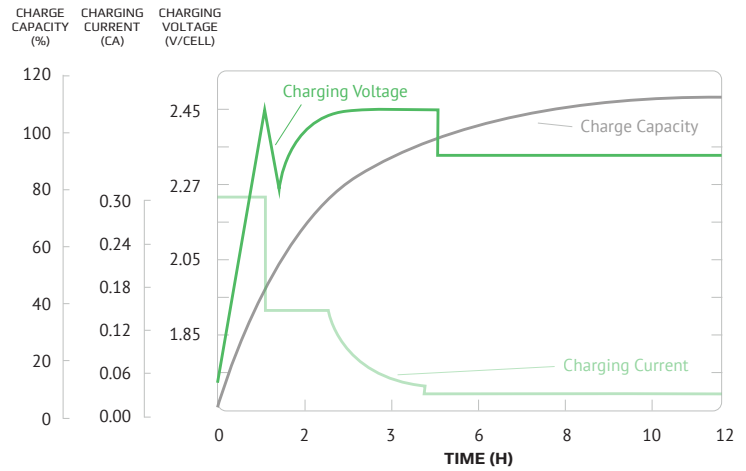
CHARGING AND USAGE

REGULAR CHARGING

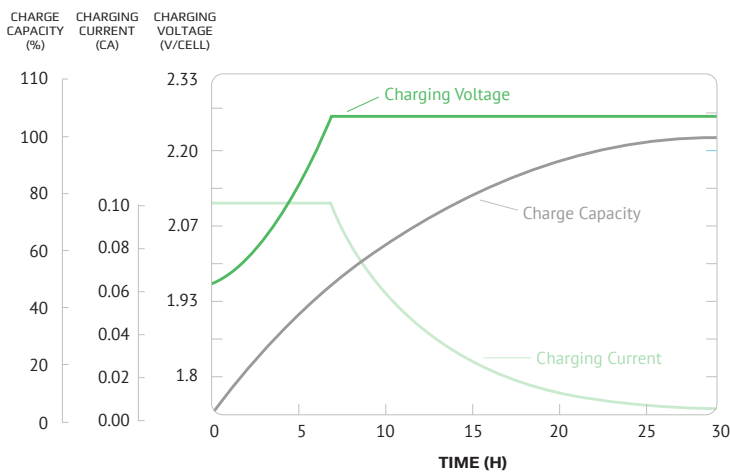
Crystal Batteries™ have a unique charging profile to reduce battery heating. Boost, absorption, and float phase during recharging are crucial for long-term battery operation. All GS, FT and LS battery ranges require a current of 0.25 to 0.3C, a charge profile voltage compensation of $-4 \text{ mV} \cdot ^\circ\text{C}^{-1}$, and a high-quality low-ripple charger.

A charger can reduce or even void the warranty of the battery if unsuitable. Ampowr offers its own custom-designed charger to manage the Crystal Battery™ charge cycle.

Regular cycle charge characteristics 25°C (77°F)



Floating characteristics 25°C (77°F)



FLOAT CHARGING

Floating the battery takes a long time to properly recharge, typically more than 20 hours. Although the battery can be used in these applications, it is recommended that the batteries have a regular cycle from a 50% Depth of Discharge at least twice a month to prevent long-term undercharging.

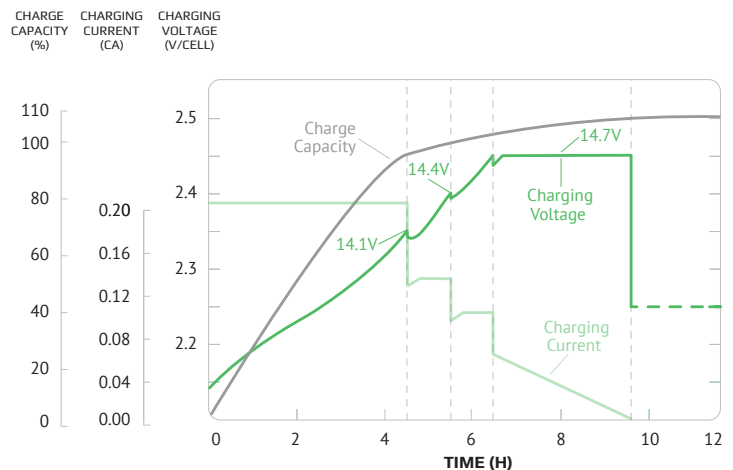
(As is common on many solar street lamps and UPS systems).

REGULAR EV CHARGING

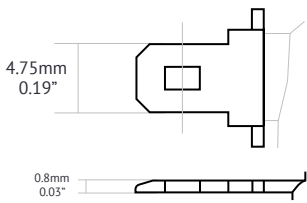
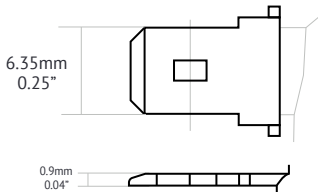
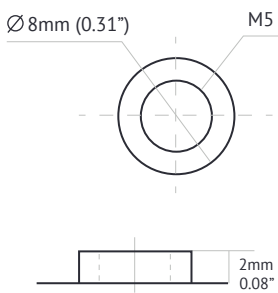
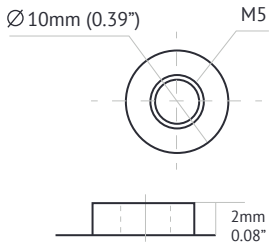
The EV battery range has a unique profile to extend battery life and reduce heating. The current of 0.2C is reduced in stages to keep battery heating to a minimum. The battery is charged up to 14.7V before shutting off and ending the charge profile. Float-charging the EV is not recommended as it will drastically reduce operating life.

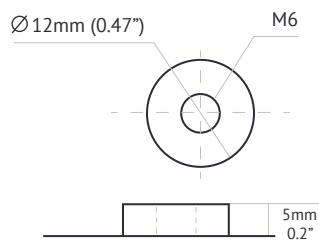
A charger can reduce or even void the warranty of the battery if unsuitable. Ampowr offers its own custom-designed charger to manage the Crystal Battery™ charge cycle.

Regular cycle charge characteristics 25°C (77°F)

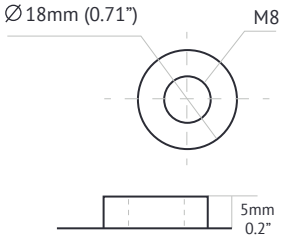
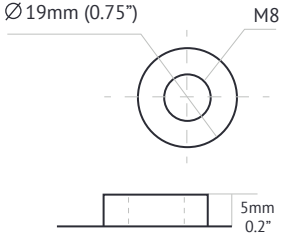


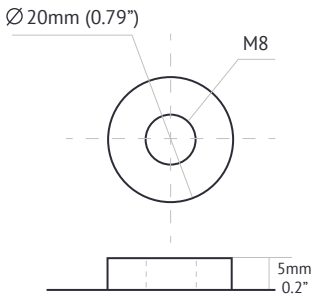
TERMINAL DIRECTORY

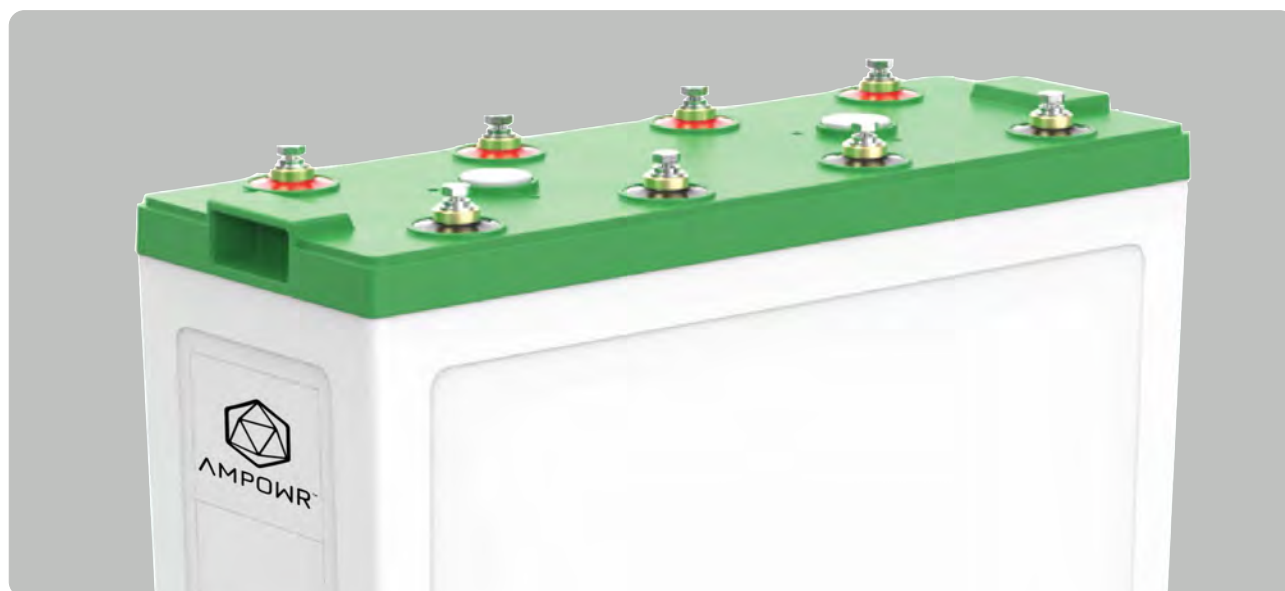
S/N	Terminal number	Application Specifications
1	F1 (187)	
	CB6-4GS	
	CB6-7.2GS	
2	F2 (250)	
	CB6-10GS	
	CB6-12GS	
	CB12-7.2GS	
	CB12-7.2HGS	
	CB12-10GS	
3	M5 (8)	
	CB12-12GS	
	CB12-14GS	
4	M5 (10)	
	CB12-18GS	
	CB12-22GS	
	CB12-24GS	
	CB12-26GS	
	CB12-28GS	
	CB12-27EV	

S/N	Terminal number	Application Specifications
5	M6 (12)	
	CB12-32EV	
	CB12-40EV	
6	M6 (13.5)	
	CB12-55FT	
	CB12-90FT	
	CB12-155FT	
7	M6 (16)	
	CB12-35GS	
	CB12-40GS	
	CB12-55GS	
	CB12-70GS	
	CB12-90GS	
	CB12-100GS	
	CB12-60EV	
	CB12-70EV	
	CB12-80EV	
	CB2-100LS	

TERMINAL DIRECTORY

S/N	Terminal number	Application Specifications
8	M8 (18)	
	CB6-180GS	
	CB6-200GS	
9	M8 (19)	
	CB6-160GS	
	CB6-180EV	
	CB6-210EV	
	CB6-265EV	
	CB8-135EV	
	CB12-100EV	
	CB12-120EV	
	CB12-100FT	
	CB12-170FT	
	CB12-180FT	

S/N	Terminal number	Application Specifications
10	M8 (20)	
	CB8-150EV	
	CB12-65GS	
	CB12-120GS	
	CB12-150GS	
	CB12-180GS	
	CB12-200GS	
	CB12-150EV	
	CB2-200LS	
	CB2-300LS	
	CB2-400LS	
	CB2-500LS	
	CB2-600LS	
	CB2-800LS	
	CB2-1000LS	
	CB2-1500LS	
	CB2-2000LS	
	CB2-2200LS	
	CB2-2500LS	



1. USABLE TEMPERATURE

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
1. USABLE TEMPERATURE	-20°C to +45°C -4°F to 113°F	-18°C to +50°C 0°F to 122°F	-40°C to +65°C -40°F to 149°F	-20°C to +65°C -4°F to 149°F	-30°C to +55°C -22°F to 131°F

The usable temperature is the temperature at which the batteries can be discharged safely and operate in.

2. CHARGE TEMPERATURE

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
2. CHARGE TEMPERATURE	-20°C to +45°C -4°F to 113°F	0°C to +40°C 32°F to 104°F	-40°C to +65°C -40°F to 149°F	0°C to +45°C 32°F to 113°F	-30°C to +55°C -22°F to 131°F

The charge temperature is the temperature range in which the battery can be safely charged. The majority of gel and lithium batteries cannot be charged when below the freezing point.

3. USAGE LIFE

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
3. USAGE LIFE AT 25°C / 77°F	2-3 years	3-4 years	8-11 YEARS	6-8 years	4-6 years

Usage life is the realistically expected use-life of the batteries when used under normal conditions (50% DoD and 25°C / 77°F).

4. CAPACITY LOSS

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
4. CAPACITY LOSS DEGRADATION	High	Medium - High	LOW	Medium - High	Medium

Capacity loss, known as degradation, is a permanent decrease in battery capacity caused by internal chemical reactions. Lithium batteries have a high degradation as can be noticed in laptops and cell-phones.

5. CYCLES AT 25°C / 77°F

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
5. CYCLES AT 25°C / 77°F 50% DEPTH OF DISCHARGE	600	1,000	3,100	4,000	2,000

The number of cycles at 25°C (77°F) and at 50% depth of discharge is a way of measuring battery performance. Lithium is more suitable for multi-cycle charges per day but will experience capacity loss which is not reflected in the number of theoretical cycles. Crystal Batteries™ have the best price and performance when measured on a 10-year total cost of ownership model.

6. CYCLES AT 40°C / 104°F

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
6. CYCLES AT 40°C / 104°F 80% DEPTH OF DISCHARGE	350	400	1,380	1,250	600

The number of cycles at 40°C (104°F) and 80% depth of discharge indicates battery performance in non-ideal conditions. The Crystal Batteries™ is extremely resilient in harsh environments.

7. COST OF OWNERSHIP

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
7. COST OF OWNERSHIP 10 YEARS	High	Medium - High	LOWEST	Medium - High	Medium

The Crystal® Battery™ has the lowest total cost of ownership model because of the long lifetime, high cycle count, and low upfront cost.

8. HIGH CURRENT ABILITY

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
8. HIGH CURRENT ABILITY	Poor	Poor	AVERAGE	Good	Average

The Crystal Battery™ has an average high current ability and is seen in many UPS, backup, and other emergency power systems.

9. ENVIRONMENTAL IMPACT

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
9. ENVIRONMENTAL IMPACT	Harmful	Harmful	FRIENDLY	Harmful	Average

There is no antimony or cadmium in the Crystal Batteries™ and it does not damage the environment through mining operations.

10. WEIGHT

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
10. WEIGHT	Average	Average	AVERAGE	Low	Average

The weight of Crystal Batteries™ is ideal for EV golf carts and forklifts which benefit from more stability and low center of gravity.

11. FAILURE MODE

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
11. FAILURE MODE	Acid spill	Hazardous	SWELLING	Unsafe	Varies

The failure mode describes how the battery fails when punctured, overcharged, or short-circuited. The Crystal Batteries™ will start swelling after extreme abuse, but with no acid leakage, smoke, or fire risk.

12. FIRE RISK

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
12. FIRE RISK	Average	Low	ZERO	High	Low

The Crystal Batteries™ have no thermal run-away or spontaneous combustion risk caused by hydrogen gassing.

13. INDOOR USE

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
13. INDOOR USE	Gassing	Gassing	SAFE	High Risk	Gassing

The lack of serious gassing and safe chemistry means that the Crystal Battery™ is ideal for indoor use and installations.

14. TRANSPORT SAFETY

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
14. TRANSPORT SAFETY	Restricted	Varies	SAFE	Restricted	Varies

The Crystal Batteries™ are non-hazardous and approved for air, sea, and train transport.

15. DECOMMISSIONING VALUE

	LEAD ACID	LEAD GEL	CRYSTAL®	LITHIUM	AGM
15. DECOMMISSIONING VALUE	Low	Low	HIGH	Negative	Medium

The decommissioning value is the cash received when recycling the batteries minus the transportation cost. There are currently no commercially attractive recycling solutions for Lithium.

GLOBAL BATTERY PART NUMBER REFERENCE TABLE

ELECTRIC VEHICLE RANGE

OLD CODE	NEW CODE
3-EVFJ-180 or 6-GREV-180	CB6-180EV
3-EVFJ-210 or 6-GREV-210	CB6-210EV
3-EVFJ-265 or 6-GREV-265	CB6-265EV
4-EVFJ-135 or 8-GREV-135	CB8-135EV
4-EVFJ-150 or 8-GREV-150	CB8-150EV
6-EVFJ-27 or 12-GREV-27	CB12-27EV
6-EVFJ-32 or 12-GREV-32	CB12-32EV
6-EVFJ-40 or 12-GREV-40	CB12-40EV
6-EVFJ-60 or 12-GREV-60	CB12-60EV
6-EVFJ-70 or 12-GREV-70	CB12-70EV
6-EVFJ-80 or 12-GREV-80	CB12-80EV
6-EVFJ-100 or 12-GREV-100	CB12-100EV
6-EVFJ-120 or 12-GREV-120	CB12-120EV
6-EVFJ-150 or 12-GREV-150	CB12-150EV

FRONT TERMINAL RANGE

OLD CODE	NEW CODE
6-CNFT-55 or 12-GRFT-55	CB12-55FT
6-CNFT-90 or 12-GRFT-90	CB12-90FT
6-CNFT-100 or 12-GRFT-100	CB12-100FT
6-CNFT-155 or 12-GRFT-155	CB12-155FT
6-CNFT-170 or 12-GRFT-170	CB12-170FT
6-CNFT-180 or 12-GRFT-180	CB12-180FT

LARGE STORAGE RANGE

OLD CODE	NEW CODE
CNFJ-100 or 2-GRLS-100	CB2-100LS
CNFJ-200 or 2-GRLS-200	CB2-200LS
CNFJ-300 or 2-GRLS-300	CB2-300LS
CNFJ-400 or 2-GRLS-400	CB2-400LS
CNFJ-500 or 2-GRLS-500	CB2-500LS
CNFJ-600 or 2-GRLS-600	CB2-600LS
CNFJ-800 or 2-GRLS-800	CB2-800LS
CNFJ-1000 or 2-GRLS-1000	CB2-1000LS
CNFJ-1500 or 2-GRLS-1500	CB2-1500LS
CNFJ-2000 or 2-GRLS-2000	CB2-2000LS
CNFJ-2200 or 2-GRLS-2200	CB2-2200LS
CNFJ-2500 or 2-GRLS-2500	CB2-2500LS

GLOBAL BATTERY PART NUMBER REFERENCE TABLE

GENERAL STORAGE

OLD CODE	NEW CODE
12 VOLT RANGE	
6-CNFJ-7.2 or 12-GRGS-7.2	CB12-7.2GS
6-HCNFJ-7.2 or 12-HGRGS-7.2	CB12-7.2HGS
6-CNFJ-10 or 12-GRGS-10	CB12-10GS
6-CNFJ-12 or 12-GRGS-12	CB12-12GS
6-CNFJ-14 or 12-GRGS-14	CB12-14GS
6-CNFJ-18 or 12-GRGS-18	CB12-18GS
6-CNFJ-22 or 12-GRGS-22	CB12-22GS
6-CNFJ-24 or 12-GRGS-24	CB12-24GS
6-CNFJ-26 or 12-GRGS-26	CB12-26GS
6-CNFJ-28 or 12-GRGS-28	CB12-28GS
6-CNFJ-35 or 12-GRGS-35	CB12-35GS
6-CNFJ-40 or 12-GRGS-40	CB12-40GS
6-CNFJ-55 or 12-GRGS-55	CB12-55GS
6-CNFJ-65 or 12-GRGS-65	CB12-65GS
6-CNFJ-70 or 12-GRGS-70	CB12-70GS
6-CNFJ-90 or 12-GRGS-90	CB12-90GS
6-CNFJ-100 or 12-GRGS-100	CB12-100GS
6-CNFJ-120 or 12-GRGS-120	CB12-120GS
6-CNFJ-150 or 12-GRGS-150	CB12-150GS
6-CNFJ-180 or 12-GRGS-180	CB12-180GS
6-CNFJ-200 or 12-GRGS-200	CB12-200GS

GENERAL STORAGE

OLD CODE	NEW CODE
6 VOLT RANGE	
3-CNFJ-4 or 6-GRGS-4	CB6-4GS
3-CNFJ-7.2 or 6-GRGS-7.2	CB6-7.2GS
3-CNFJ-10 or 6-GRGS-10	CB6-10GS
3-CNFJ-12 or 6-GRGS-12	CB6-12GS
3-CNFJ-160 or 6-GRGS-160	CB6-160GS
3-CNFJ-180 or 6-GRGS-180	CB6-180GS
3-CNFJ-200 or 6-GRGS-200	CB6-200GS



MAYON
MACHINERY RENTRADE, INC.
www.mayonmachinery.com

MAYON MACHINERY RENTRADE, INC - OFFICIAL DEALER

3rd Floor P & J Building, Lot 32, Blk. 69 M. Roxas Street, Corner Bayani Road AFPOVAL
Phase 4, Fort Bonifacio, Taguig City, in the Philippines

E info@mayonmachinery.com | sales@mayonmachinery.com

T + 63 (2) 776 0254