

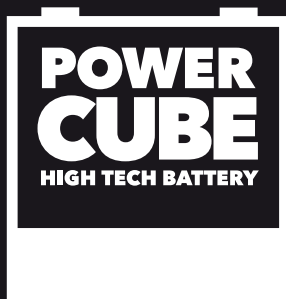
HIGH TECH BATTERY



FIAMM
+ -

Starter & Mobility
Power Solutions





FIAMM's experience has led to **POWERCUBE** and **ENERGYCUBE**, the two new series of High Technology batteries for commercial vehicles, created to meet the various energy needs of today's automotive industry.

Operation, long life and reliability. These are the concepts that guided us during the study, design and making of this new, rich range of batteries.

THE NEW
POWERCUBE & ENERGYCUBE
BATTERIES FOR LATEST GENERATION
COMMERCIAL VEHICLES



The new application needs generated by the technological development of the latest commercial vehicles, in particular the medium- and long-range heavy vehicles, has given rise to increased demand for energy that has gained strength over recent years.

As far as the **starter batteries** are concerned, this means a significant increase in product operation, long life and reliability requirements.

In detail, adapting the product to new vehicles and the often critical conditions of use in the field have generated a heavy demand for improving the following technical and functional characteristics:

- > ENERGY AVAILABLE FOR THE ELECTRIC/ELECTRONIC SYSTEM
- > STARTING POWER IN CRITICAL CONDITIONS: LOW TEMPERATURES AND PARTIAL CHARGE
- > LIFE IN TERMS OF DISCHARGE/CHARGE CYCLES
- > RESISTANCE TO INTENSE DISCHARGE CYCLES
- > CHARGE ACCEPTANCE
- > RESISTANCE TO VIBRATIONS

The new range of FIAMM POWERCUBE and ENERGYCUBE batteries for commercial vehicles, agricultural machinery and earth-moving equipment, developed to achieve a line of batteries better designed for their specific requirements, is today offered more complete and geared to the specific application (vehicle/use) to ensure proper coverage of all vehicles in use.

The new line of batteries is the expertly executed synthesis of technological innovation in terms of design, development and production combined with almost a century of direct experience in the field. All this is expressed in a simple concept:

 THE RIGHT BATTERY
FOR EVERY APPLICATION.

TECHNOLOGICAL INNOVATIONS

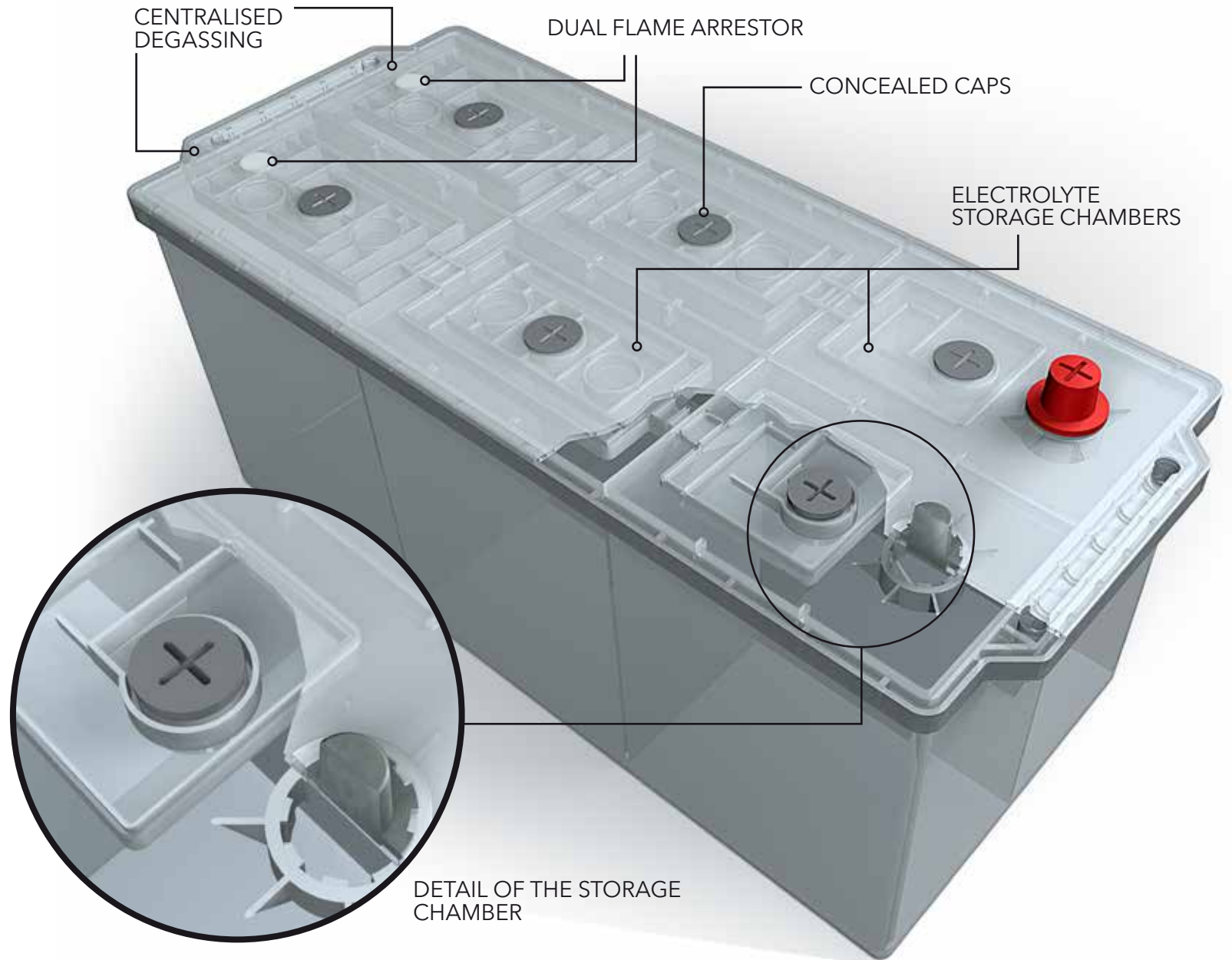


The technology of the new flat cover with internal labyrinth

In line with the new requirements of preventing the electrolyte from escaping, FIAMM has developed a new flat cover with internal labyrinth, storage chambers and recondensation of the gases produced when the battery is being charged.

It is a centralised degassing cover with dual gas venting channel and explosion-proof dual flame arrestor pad.

The caps are fitted with O-rings (**OR**) to guarantee maximum seal if the battery is handled incorrectly.



The innovative dual plate blocking system inside the cells

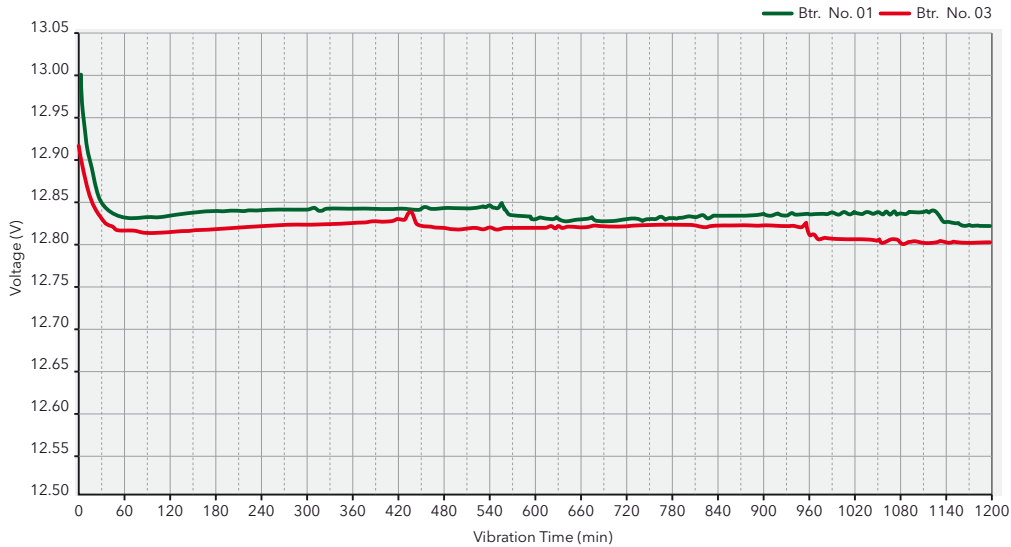
A new plate blocking system has been introduced to increase resistance to vibrations. A special resin blocks the plates to the bottom of the cell so they become integral with the block. Applying the same resin to the top of the element as well ensures they remain totally blocked.

The new blocking system ensures vibration-resistance more than double that of the traditional systems, and exceeds the strictest requirement (V3) laid down by technical standard EN 50342-1, which requires 20 h of vibrations at 6G and 30 Hz at $T = +25^{\circ}\text{C}$.

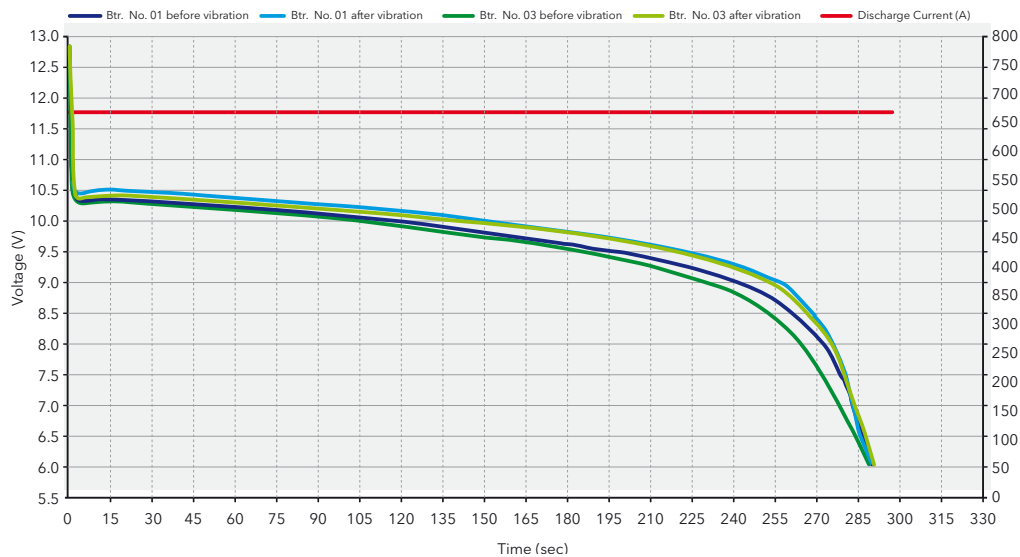


The following charts show voltage performance at the battery terminals during the test, and the performance during rapid starting discharge before and after the vibration resistance test. As the charts demonstrate, the vibrations caused no change in performance.

Vibration Resistance Test EN 50342-1 (30Hz 6G 20h at + 25°C)



Vibration Resistance Test EN 50342-1 (30Hz 6G 20h at + 25°C)



New polyethylene envelope separator

The new and thicker polyethylene separator, made with materials having a higher resistance to breakage and/or perforation, guarantee better resistance and longer life of the battery when its use is the most critical: heavy cycling, intense discharges, overload and vibrations. It also reduces dangerous metallisation phenomena.

Improved negative electrode

The negative plate was improved to increase the thickness of the grill and the density and formulation of the active negative matter. This leads to greater efficiency of the negative electrode, with improved electrical and mechanical performance of the battery.

Process of active matter adhering to the grill

Improvement in the industrial process of 'adhering' (**coupling**) the active matter to the grill, and in particular that of the positive plates, offers several benefits such as maintaining performance over time, increasing resistance to the charge/discharge cycles, improving resistance to intense discharge, increasing vibration-resistance, reducing the shedding phenomenon (when the positive active matter detaches from the grill and falls onto the bottom of the cell).

OUR RANGE



THE MODELS

The new **FIAMM TRUCK line** is divided into two product ranges that are subdivided into 5 levels that ensue from the combination of technology and type of cover and the specific **Product Names** that distinguish the more technologically advanced products from the more traditional ones so as to get a range better oriented toward specific requirements.

POWERCUBE APC

- > Low-maintenance free acid battery requiring no top-ups, but the caps will allow it to be topped up if necessary
- > Flat cover with internal labyrinth, gas recondensation chambers, caps with special O-ring preventing leaks, dual-channel centralised degassing with dual flame arrestor pad
- > Innovative dual plate blocking system inside the cell that provides high resistance to vibrations and that complies with the highest automotive industry standards
- > High starting power
- > Excellent charge acceptance
- > High endurance to charge/discharge cycles
- > Good resistance to intense discharges
- > Excellent vibration resistance



POWERCUBE EHD

- > Low-maintenance free acid battery requiring no top-ups, but the caps will allow it to be topped up if necessary
- > Flat cover with internal labyrinth, gas recondensation chambers, caps with special O-ring preventing leaks, dual-channel centralised degassing with dual flame arrestor pad
- > Innovative dual plate blocking system inside the cell that provides high resistance to vibrations and that complies with the highest automotive industry standards
- > Great starting power
- > Good charge acceptance
- > Good endurance to charge/discharge cycles
- > Good vibration resistance



POWERCUBE AGM

- > VRLA AGM battery with gas recombination
- > Absolutely maintenance-free
- > Cover **sealed**
- > Greater starting power than traditional batteries
- > Better endurance to charge/discharge cycles, more than double that of the best traditional batteries
- > Better charge acceptance, particularly in dynamic conditions
- > High resistance to intense discharges
- > High vibration resistance



ENERGYCUBE APC

- > Low-maintenance free acid battery with sealed anti-leakage caps
- > Innovative dual plate blocking system inside the cell that provides high resistance to vibrations and that complies with the highest automotive industry standards
- > Good starting power
- > High charge acceptance
- > Good resistance to intense discharges
- > Extreme endurance to charge/discharge cycles
- > High vibration resistance



ENERGYCUBE RST

- > Low-maintenance free acid battery requiring no top-ups, but the caps will allow it to be topped up if necessary
- > Standard cover
- > Great starting power
- > Good charge acceptance
- > Good endurance to charge/discharge cycles
- > Resistant to vibrations



Performance of the new truck range - OVERVIEW

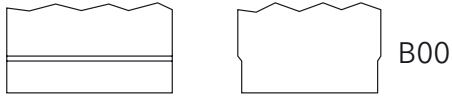
● low ●● medium ●●● good ●●●● high ●●●●● very good ●●●●●● excellent

| | STARTING POWER | CHARGE ACCEPTANCE | CYCLING RESISTANCE | RESISTANCE TO VIBRATIONS |
|-----------------------|----------------|-------------------|--------------------|--------------------------|
| POWERCUBE AGM | ●●●●● | ●●●●● | ●●●●● | ●●●●● |
| POWERCUBE APC | ●●●●● | ●●●●● | ●●●● | ●●●●● |
| POWERCUBE EHD | ●●●●● | ●●●● | ●●● | ●●●●● |
| ENERGYCUBE APC | ●●●● | ●●●●● | ●●●●● | ●●●●● |
| ENERGYCUBE RST | ●●●●● | ●●●● | ●● | ●●● |

✓ = maximum performance

| | | APPLICATIONS | | | | | | | | | |
|-------|-----------------------|--------------|-----------|---------------|------------------|-------|----------|---------------|-------------|------------------|--------------------------|
| Level | Product Name | Technology | Overnight | Long Distance | Express Delivery | Coach | City Bus | Small Tractor | Big Tractor | Heavy Industrial | DIN size |
| 1 | POWERCUBE AGM | AGM | ✓ | | | ✓ | ✓ | | ✓ | ✓ | D7 |
| 2 | POWERCUBE APC | APC | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | A-B-C |
| 3 | POWERCUBE EHD | EHD | | ✓ | ✓ | | | ✓ | | | A-B-C & other formats |
| 4 | ENERGYCUBE APC | APC | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | B-C |
| 5 | ENERGYCUBE RST | RST | | | ✓ | | | ✓ | | | other formats |

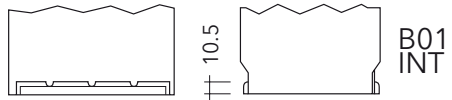
Base fasteners



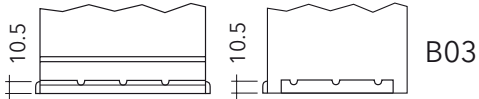
B00



B01

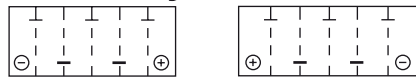


B01
INT



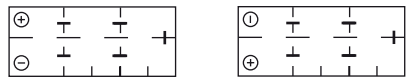
B03

Polarity



0(RH)

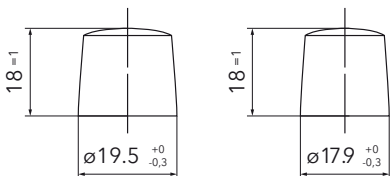
1(LH)



3(LH)

4(RH)


Terminal



| TRUCK - TRACTOR BATTERIES / NEW RANGE | | | | | | | | | |
|--|-------------|------------|------------------|-------------|-------------------|------------|-----------------------|------------------|---------------|
| Code | Size format | Technology | ID code | ETN | Capacity (C20) Ah | CCA (A) EN | Dimensions LxWxH (mm) | Terminals Layout | Base fastener |
| POWERCUBE - AGM - ABSORBENT GLASS MAT | | | | | | | | | |
| 7904567 | D7 | AGM | D7 125 AGM | - | 125 | 1000 | 266x280x230 | 2/1 | B00 |
| POWERCUBE - APC - ADVANCED POWER CYCLING | | | | | | | | | |
| 7904568 | A | APC | A 135 APC | 635 105 085 | 135 | 850 | 513x189x223 | 3/1 | B01 (Int.) |
| 7904569 | B | APC | B 180 APC | 680 032 100 | 180 | 1000 | 513x223x223 | 3/1 | B00 |
| 7904570 | C | APC | CX 225 APC | 725 012 115 | 225 | 1150 | 518x273x242 | 3/1 | B00 |
| POWERCUBE - EHD - ENHANCED HEAVY DUTY | | | | | | | | | |
| 7904571 | MCD110 | EHD | D11 110 EHD | 610 107 080 | 110 | 800 | 514x175x210 | 3/1 | B03 |
| 7904572 | A | EHD | A 120 EHD | 620 108 085 | 120 | 850 | 513x189x223 | 3/1 | B01 (Int.) |
| 7904573 | MAC120 | EHD | MC12 120 EHD | 620 107 085 | 120 | 850 | 510x175x228 | 4/1 | B03 |
| 7904574 | MAT132 | EHD | MT 132 EHD | 632 101 095 | 132 | 950 | 508x175x205 | 0/1 | B01 |
| 7904575 | MCD110 | EHD | D11 135 EHD | 635 106 095 | 135 | 950 | 514x175x210 | 3/1 | B03 |
| 7904576 | A | EHD | A 140 EHD | 640 102 095 | 140 | 950 | 513x189x223 | 3/1 | B01 (Int.) |
| 7904577 | MCD143 | EHD | D14 148 EHD | 648 101 100 | 148 | 1000 | 514x218x210 | 3/1 | B03 |
| 7904578 | B | EHD | B 160 EHD | 660 104 105 | 160 | 1050 | 513x223x223 | 3/1 | B00 |
| 7904579 | MAC154 | EHD | MC15 160 EHD | 660 103 105 | 160 | 1050 | 510x218x228 | 4/1 | B03 |
| 7904580 | B | EHD | B 180 EHD | 680 104 110 | 180 | 1100 | 513x223x223 | 3/1 | B00 |
| 7904581 | B | EHD | B 180 EHD (B03) | - | 180 | 1100 | 513x223x223 | 3/1 | B03 |
| 7904582 | MAC154 | EHD | MC15 185 EHD | 685 101 120 | 185 | 1200 | 510x218x228 | 4/1 | B03 |
| 7904583 | C | EHD | CX 200 EHD | 700 108 115 | 200 | 1150 | 518x273x242 | 3/1 | B00 |
| 7904584 | C | EHD | C 200 EHD | 700 109 115 | 200 | 1150 | 518x273x242 | 4/1 | B00 |
| ENERGYCUBE - APC - ADVANCED POWER CYCLING | | | | | | | | | |
| 7904585 | B | APC | B 185 APC | - | 185 | 1000 | 513x223x223 | 3/1 | B00 |
| 7904586 | C | APC | CX 220 APC | - | 220 | 1100 | 518x273x242 | 3/1 | B00 |
| ENERGYCUBE - RST - RELIABLE STARTER (DRY) | | | | | | | | | |
| 7904587 | A DRY | RST | A 120 RSTd | 620 108 085 | 120 | 850 | 513x189x223 | 3/1 | B01 (Int.) |
| 7904588 | B DRY | RST | B 160 RSTd | 660 104 105 | 160 | 1050 | 513x223x223 | 3/1 | B00 |
| 7904589 | B DRY | RST | B 180 RSTd | 680 104 110 | 180 | 1100 | 513x223x223 | 3/1 | B00 |
| 7904590 | C DRY | RST | CX 200 RSTd | 700 108 115 | 200 | 1150 | 518x273x242 | 3/1 | B00 |
| ENERGYCUBE - RST - RELIABLE STARTER | | | | | | | | | |
| 7904591 | GR28 | RST | G28 100 RST | - | 100 | 720 | 333x175x215 | 0/1 | B03 |
| 7904592 | GR28 | RST | G28X 100 RST | - | 100 | 720 | 333x175x215 | 1/1 | B01 |
| 7904593 | COM100 | RST | CB 110 RST | - | 110 | 850 | 349x175x239 | 0/1 | B00 |
| 7904594 | COM100 | RST | CBX 110 RST | - | 110 | 850 | 349x175x239 | 1/1 | B00 |
| 7904595 | COM100 | RST | CB 110 RST (B01) | - | 110 | 850 | 349x175x239 | 0/1 | B01 |
| 7904596 | COM125 | RST | CH 125 RST | 625 103 076 | 125 | 760 | 349x175x290 | 0/1 | B00 |
| 7904597 | COM125 | RST | CHX 125 RST | 625 104 076 | 125 | 760 | 349x175x290 | 1/1 | B00 |
| 7904598 | MC 130 | RST | MC 130 RST | 630 104 095 | 130 | 950 | 514x218x210 | 3/1 | B00 |
| ENERGYCUBE - RST - RELIABLE STARTER (DRY) | | | | | | | | | |
| 7904599 | AT 100 | RST | AT 100 RSTd | 600 026 060 | 100 | 600 | 413x175x220 | 0/1 | B00 |
| 7904600 | AT 100 | RST | ATX 100 RSTd | 600 035 060 | 100 | 600 | 413x175x220 | 1/1 | B00 |



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