

XLHV supercapacitor

High voltage module



Description

Eaton supercapacitors are high reliability, high power, ultra-high capacitance energy storage devices utilizing electric double layer capacitor (EDLC) construction combined with proprietary materials and processes. This combination of advanced technologies allows Eaton to offer a wide variety of capacitor solutions tailored to applications for backup power, pulse power and hybrid power systems.

All products feature low ESR for high power density with environmentally friendly materials for a green power solution. Eaton supercapacitors are maintenance-free with design lifetimes up to 20 years* and operating temperatures down to -40 °C and up to +65 °C.

Features and benefits

- Standard 19" rack mounting
- Systems up to 1500 V
- Large capacitance for high energy density
- UL recognized
- Estimated life up to 20 years*

Applications

- Enhance STATCOM
- Ancillary services
- Fast frequency regulation
- Industrial backup/ridethrough
- Power storage for grid systems
- Solar firming

Environmental compliance



Agency information



*Supercapacitor lifetimes vary based on charge voltage and temperature. See Eaton's application guidelines or contact your local Eaton sales representative for more information on lifetime estimates

Ratings

| | |
|-----------------------------|--|
| Capacitance | 62.5 to 94.4 F |
| Working voltage | 102 to 144 V |
| Surge voltage | 112 to 158 V |
| Capacitance tolerance | -0% to +20% (+20 °C) |
| Operating temperature range | -40 °C to +65 °C (internal cell temperature) |

Specifications

| Part number | Maximum Operating Voltage (V) | Capacitance ¹ (F) minimum | Maximum initial ESR ¹ (mΩ) | Nominal leakage current ² (mA) | Stored energy ³ (Wh) | Peak power ⁴ (kW) | Peak current ⁵ (A) | Continuous current ⁶ (A) | Typical thermal resistance ⁷ Rth (°C/W) | Short circuit current ^{8,9} (A) |
|-------------------|-------------------------------|--------------------------------------|---------------------------------------|---|---------------------------------|------------------------------|-------------------------------|-------------------------------------|--|--|
| XLHVS1020944C0B00 | 102 | 94.4 | 9.7 | 9 | 137 | 270 | 2500 | 64 | 0.38 | 10500 |
| XLHVS1440625C0B00 | 144 | 62.5 | 12.5 | 8 | 180 | 420 | 2500 | 56 | 0.38 | 11500 |

Performance

| Parameter | Capacitance Change (% of initial value) | ESR (% of initial maximum value) |
|--|---|----------------------------------|
| Lifetime: 1500 hours at maximum rated voltage and operating temperature (XLHVS102) | ≤ 20% | ≤ 200% |
| Lifetime: 1000 hours at maximum rated voltage and operating temperature (XLHVS144) | ≤ 20% | ≤ 200% |
| Charge/discharge cycling ⁹ — 1,000,000 at +20 °C | ≤ 20% | ≤ 200% |
| Storage, uncharged, up to +35 °C — 3 years | ≤ 5% | ≤ 10% |

1. Capacitance, Equivalent Series Resistance (ESR) and leakage current are measured according to IEC62391-1.

2. Leakage current at +20 °C after 72 hour charge and hold at 96% of rated voltage

3. Stored Energy (Wh) = $0.5 \times C \times V^2$

4. Peak Power (W) = $\frac{V^2}{4 \times ESR}$

5. Peak current for 1 second from full rate voltage to half voltage. (A) = $0.5 \times V \times C$
 $\frac{1}{1 + ESR \times C}$

6. Continuous current with a 15 °C temperature rise. Continuous current (A) = $\sqrt{\frac{\Delta T}{ESR \times Rth}}$

7. Thermal resistance (Rth) cell body temperature to ambient in open air in degrees C per Watt (°C/W)

8. Short circuit current is for safety information only. Do not use as operating current

9. Cycling between maximum working voltage and half voltage with 3 seconds rest at +20 °C.

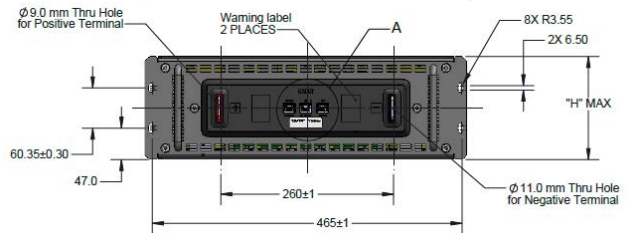
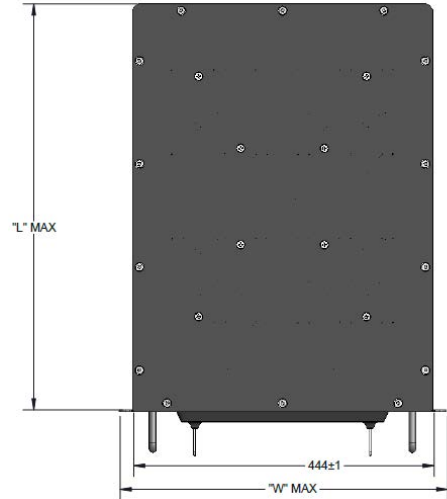
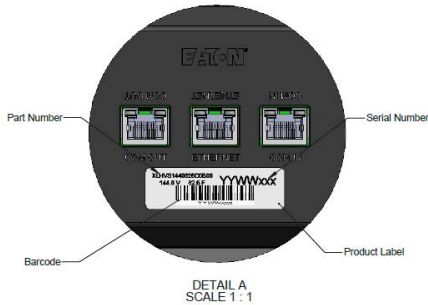
10. Testing and verification of product under end application conditions is recommended

**Short circuit of the module can cause permanent damage. An appropriate fast-acting fuse should be used for protection. A fuse is required to meet UL Conditions of Acceptability

Safety and certifications

| | |
|--------------------|--|
| Agency information | UL810a, File: MH46887; CE, EMC: IEC 61000-6-4, EMI: IEC61000-6-2 |
| Operating voltages | Maximum series connection: 1500 V , High potential test (hipot): 4000 V |
| Seismic Test | IEC 60068-3-3, Zone 4 |
| Environmental | RoHS and REACH compliant, lead free; Ingress protection IP30 |
| Warnings | Do not overvoltage, do not reverse polarity, do not short circuit when charged |
| Shipping | No restrictions, per UN3499 with all cells <10 watt-hours. Shorting wire must be applied across power terminals. |

Dimensions (mm) and mass (kg)



| Part number | L maximum (mm) | W maximum (mm) | H maximum (mm) | Typical mass (kg) |
|-------------------|----------------|----------------|----------------|-------------------|
| XLHVS1020944C0B00 | 480 | 485 | 156 | 27 |
| XLHVS1440625C0B00 | 605 | 485 | 156 | 35 |

Power output connections

| Terminal | Recommended bolt size | Recommended torque |
|----------|-----------------------|--------------------|
| Negative | M10 | 25-30 N-m |
| Positive | M8 | 15-20 N-m |

Connection type Bus bar or ring lug with appropriate sizing for application current
Bolt and nut with lock washer on each side of the terminal
(Reference user manual for details)

Communication and auxiliary power

Connector: RJ-45

Recommended cable: Shielded CAT5 or greater

Minimum module voltage for Cell management system : 44 V

| Pin number | COM IN (CANbus+ power in) | ETH (MODbus) | COM OUT (CANbus+ power out) |
|------------|--|--------------|--|
| 1 | CAN H | Tx + | CAN H |
| 2 | CAN L | Tx - | CAN L |
| 3 | +5 V (CAN Termination detect) | Rx + | DETECT Termination |
| 4 | Power +24 V (12 to 56 Vdc) 4 W maximum, 3 W typical | No connect | Power +24 V (12 to 56 Vdc) 4 W maximum, 3 W typical |
| 5 | Power +24 V (12 to 56 Vdc) 4 W maximum, 3 W typical | No connect | Power +24 V (12 to 56 Vdc) 4 W maximum, 3 W typical |
| 6 | No connect | Rx - | No connect |
| 7 | Power - | No connect | Power - |
| 8 | Power - | No connect | Power - |

See user manual for connection and operation details

Part numbering system

| XLHV | S | 102 | 0944 | C0 | B | 00 |
|-------------|----------------------------|----------------------------------|---|---|----------------------------------|----------------------|
| Family code | Housing type S-standard | Maximum operating voltage (V) | Minimum initial capacitance (F) CCC.C 0944 = 94.4 F | User interface C0: CANbus/MODbus C1: none | Cell management type B: shunt | Options 00 = none |

Packaging information

- Standard packaging: Bulk, 1 piece per box

Part Marking

- Manufacturer
- Capacitance (F)
- Module operating voltage (V)
- Family code or part number

Cleaning/Washing

Avoid cleaning of circuit boards, however if the circuit board must be cleaned use static or ultrasonic immersion in a standard circuit board cleaning fluid for no more than 5 minutes and a maximum temperature of +60 °C. Afterwards thoroughly rinse and dry the circuit boards. In general, treat supercapacitors in the same manner you would an aluminum electrolytic capacitor.

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