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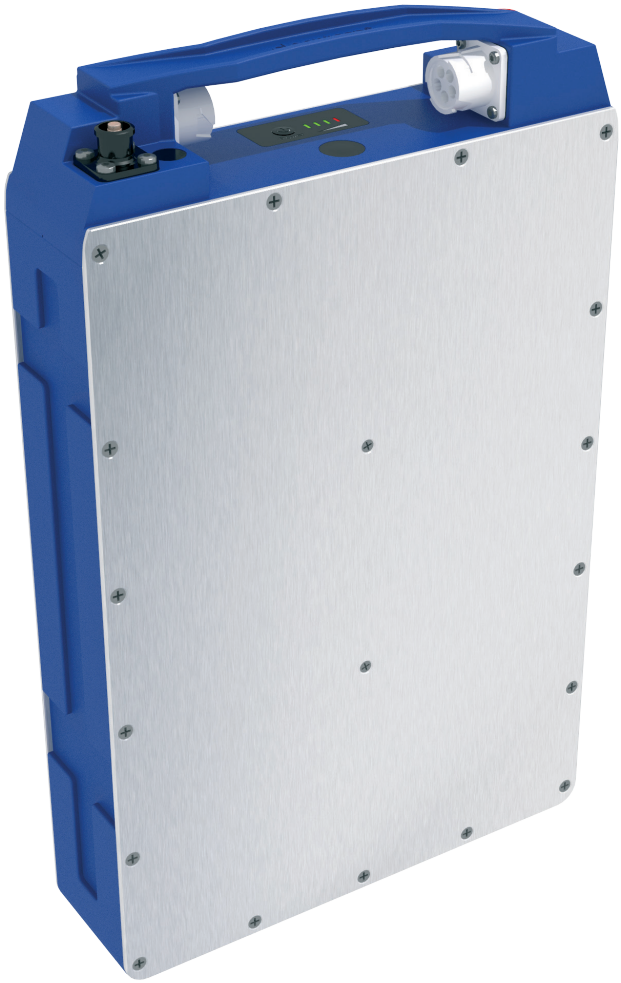
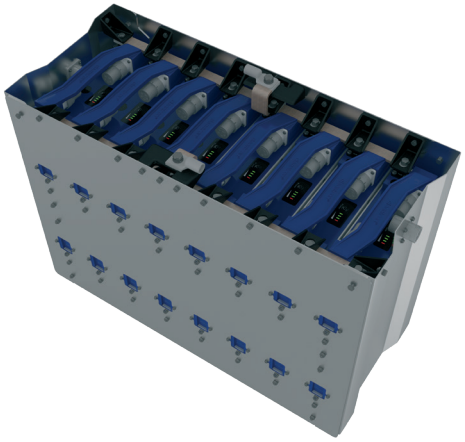
# System Module P4X

## 48V Scalable Battery Module





P4X based Battery System (8P)

### Module

| | |
|---|---|
| Capacity * | 1,9 – 2,3 kWh |
| Weight | 12 kg |
| Power Output | 6 kW Peak Power |
| | 2 kW Continuous Power |

### Typical System (8P)

| | |
|---|---|
| Max Capacity | 18,4 kWh |
| Power Output | 48 kW |
| Messages | SOC, SOH, SOF (max. Power) |

* max. rated Cell Capacity

**The Cleantron P4X is an advanced 48V modular Battery Pack. This Module is designed for applications that have more far-reaching requirements in the area of mechanical integrity, IP rating, C-rates and Parallel and Series (HV) Modularity.**

The Cleantron P4X is most suitable for electric mobility, & industrial applications. The P4X is a portable Battery Pack (suitable for quick battery exchange or “battery swapping”) and is suitable as a building block in a larger Modular Battery System by using up to 26 modules in parallel (for higher Current and Capacity).

P4X Modules are available in 2 different capacities:

- HD (High Energy Density)
- UHD (Ultra-High Density)

P4X Modules are available with Passive and Active Cooling. The P4X passive cooling works through an optimised Thermal Path using advanced heat conductive technologies like thermo-conductive plastics and gap filling technology.

The P4X-HV variant can be applied in a HV System. This P4X-HV variant can also be executed with active cooling, by applying a side cover-plate with integrated cooling channels.

| General Electric Specification : 48V Basic System Module P4X | | | | | |
|---|---|---|---|---|---|
| | **HD** | **UHD** | | | |
| Cells Capacity @ 1 A Discharge | 37 | 45 | Ah | + 1,5 / – 1,5 | @ 0 cycles |
| Nominal Capacity @ 10 A Discharge | 34,5 | 42 | Ah | + 1,5 / – 1,5 | @ 0 cycles |
| Minimal Cycle Life (standard setting) | 1000 | 1000 | # | full cycles | min. 70% rated capacity |
| Minimal Cycle Life (long life setting) | 2000 | 1500 | # | full cycles | min. 70% rated capacity |
| Nominal Voltage | 51,1 | 50,9 | V | | |
| Charge Voltage Limit | 58,8 | 58,8 | V | + 0.0 / – 0.28 | not for long life settings |
| Nominal Charge Current | 10 | 10 | A | | recommended : “CC” and “CV” model |
| End of Charge Current Limit | 0,5 | 0,5 | A | | advised |
| Discharge Voltage Limit | 44 | 44 | V | +/- 1 | drive system should shutdown at this Voltage |
| Nominal Discharge Current | 50 | 50 | A | | |
| Peak Discharge Current | 120 | 120 | A | | @ T =25°C / 10 sec |
| Fast Charging | No | | | | |
| Parallel Switching | Yes (MPC)** | | | | typical up to 26 P |
| Serie Switching (High Voltage) | No | | | | see P4X-HV |
| Certification | UN 38.3; IEC62133 | | | | for at least one Cell type |
| Functional Safety Compliance | IEC61508 - SIL 2 | | | | Certified for at least one cell type |
| Light Electric Vehicle Compliance* | EN50604-1 | | | | design suitable for Certification |
| Electric Vehicle compliance* | R100* | | | | design suitable for Certification |
| Industrial compliance | IEC62619 | | | | design suitable for Certification |
| Compatibility with North America | ANSI/CAN/UL/ULC 2271 | | | | design suitable for Certification |
| Ingress Protection level | IP65 | | | | |
| Dimensions | 429 x 266 x 78 | | mm. | | |
| Weigth | 12,4 | | Kg. | | |
| *) Outer Protective Casing required | | | | | |
| **) Multi Pack Configuration | | | | | |

## Safety

- Short Circuit Protection
- Over & Under Voltage Protection & Recovery
- Over-Current Protection & Recovery (Charging & Discharge Currents)
- Over-Temperature Protection & Recovery
- Warning messages (for PLC/SIL 2 compliance)
- Active blowable Fuse (for PLC/SIL 2)

## Electronic

- Cell Balancing
- CAN-BUS Communication
- Data Storage
- Key Switch Function
- Firmware Customization:
  - » Long Life Settings
  - » Tailored Communication Protocols
  - » Sleep Function Settings

## Modularity

- Parallel Switching up to 26 Modules
- Options:

### Parallel Dis-/Charging

**Safety**
By Redundancy
**Benefit**
Higher Currents *or*
Longer Cycle Life
**Application**
Fixed

Hot Swap
Cycle Intelligent
Charging

### Sequential Dis-/Charging

**Safety**
By Redundancy
**Benefit**
Less Packs Needed
Less Chargers Needed
**Application**
Portable

Hot Swap
Cycle Intelligent
Charging

| Dimensions | | | |
|---|---|---|---|
| **Height** | **Width** | **Thickness** | **Weight** |
| 429 mm. | 266 mm. | 78 mm. | 12 kg |

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