



[siemens.com/rail-electrification](https://www.siemens.com/rail-electrification)

Sitras ESM 125

Energy storage module for mobile and stationary applications

The compact energy storage module Sitras® ESM 125 can be used for a variety of energy storage systems. Highly flexible applications are possible thanks to the various operating modes, such as saving energy through regenerative braking, voltage stabilization, use as a temporary energy buffer or operation without any overhead contact line, as well as due to its different cooling modes and ability to adjust current and voltage according to specific requirements.

This storage technology is based on high-performance electric double-layer capacitors (supercaps).

Features

- High inherent safety of the modules due to the integration of a filler material
- Flexible internal voltage balancing
- Integrated monitoring unit for voltage and temperature
- Additional encapsulation with high degree of protection beneficial to the environment in case of failure
- Easy to maintain due to simple interfaces

Technical data*

Theoretical energy content	[Wh]	146...184
Usable energy content at discharge to 40 % SOC (60 % DOD)	[Wh]	105...134
Rated capacitance	[F]	62...71
Usable rated voltage U_N^{**}	[V DC]	120...132
Maximum voltage in operation	[V DC]	129...136
Usable rated current range**	[A]	150...170
Peak current (5 s)	[A]	750
Maximum number of modules connected in series		8
Insulation rating voltage	[V]	1,000
Rated auxiliary voltage	[V DC]	24

* other values on request

** definitions shall be project-specific considering service life

Applications

Sitras ESM 125 is designed for use in railway applications and enables multiple units to be connected in series in order to achieve higher voltages.

Application opportunities in the industrial area include:

- rail vehicles
- trucks, buses, ships
- cranes and other special-duty vehicles with diesel engines
- stationary energy storage units

Technical characteristics

Double-layer capacitors feature a high level of efficiency, an extremely dynamic charge-transfer capacity, very high cycle strength and a long service life. They are maintenance-free and also resistant to exhaustive discharge.

- Balancing for double-layer capacitors for voltages of 1.1 V and up
- Flexible use due to voltage adjustments
- Monitoring unit that provides a Ready (OK) signal during fault-free operation and/or issues a signal when the permissible capacitor voltage or the temperature of 65 °C is exceeded at any single cell
- Implementation of a PT100 temperature sensor (used to trace the temperature model)
- Intrinsically safe module through use of adsorbing filler material
- CAN bus communication interface (CANopen optional)
- Installation in an encapsulated modular aluminum housing according to IP65
- Module is available with air or water cooling, single or both sides
- Optimum thermal connection of cells to heatsinks, even for peak power levels
- Railway-approved module acc. to IEC 61373 (shock and vibration)
- Short-circuit proof and EMC-compliant design
- Internal monitoring unit provides early detection of faults and ensures safe operation of the overall system
- Easy determination of the State of Health (SOH)



Sitras ESM 125 water-cooled

Mechanical design

The Sitras ESM 125 can be installed on its side surfaces in any direction, either horizontally or vertically. The electric interfaces use maintenance-friendly plug connections and permit fast and easy installation and integration.



Sitras ESM 125 air-cooled

Mechanical data*

Cooling (single side or both sides)	air cooling / water cooling	
Ambient temperature		
– Air cooling	[°C]	-40...+40
– Water cooling	[°C]	-40...+65
Maximum dimensions (W x D x H)		
– Air cooling (incl. air guide plate)	[mm ³]	425 x 624 x 225/254
single side/both sides		
– Water cooling single side/both sides	[mm ³]	425 x 655 x 200/205
Weight, depending on cooling type	[kg]	57 ... 67
Degree of protection acc. to IEC 60529		IP65
Service life at 129 V, 25 °C **	[a]	10
Number of cycles 129 V to 62,5 V, 25 °C **		1,000,000

* other values on request

** data provided by capacitor manufacturer

Siemens AG
Sector Infrastructure & Cities
Division Smart Grid
Rail Electrification
Mozartstraße 33b
91052 Erlangen
Germany

electrification.mobility@siemens.com
www.siemens.com/rail-electrification

© Siemens AG 2014

Product Information / Version 1.1.0 / No. A6Z00027099355

The information in this document contains general descriptions of the technical options available, which do not always have to be present in individual cases. If not stated otherwise, we reserve the right to include modifications, especially regarding the stated values and dimensions.