

SkelStart

ENGINE START MODULE

Beat winter.

Never boost batteries again!

Full power even at -40°C

Reliable power at extremes. Eliminates boosting and no starts.

6 YEARS + 1 Million Cycle
WARRANTY

Extremely long 15+ year life

Durable, dependable. Maintenance free.

Highest power density in the market

4X more than second place Tesla. Tested to the most rugged standards. Used in satellites by the European Space Agency.



SKELE+ON
TECHNOLOGIES

SkelStart ESM Promise

The Engine Start Module (ESM) is an ultracapacitor that replaces traditional batteries, offering superior starting power.

Unlike batteries, which can lose up to 50% capacity in cold temperatures and require frequent boosting and replacements, ESMs deliver 95% power even at -40°C.

Enjoy uninterrupted starting power with the most advanced ultracapacitor technology available.

Say goodbye to dead batteries and hello to reliable engine starts every time.

More Features

- Charges automatically, even from dead batteries
- Increases battery, starter, and alternator life
- 2x faster at starting than batteries and safer
- Restores balance to the 24VDC system, preventing high/low voltage or charging issues due to starting loads
- Weight reduction: Shed the weight of traditional batteries and increase vehicle efficiency
- Prolong the lifespan of your starter and alternator
- Comprehensive protection: Keep accessories running off-engine without depleting starting power

No more engine start failures.
No more costly downtime.

Applications



Trucks



Loaders



Excavators



Dozers





SKELSTART ESM BENEFITS

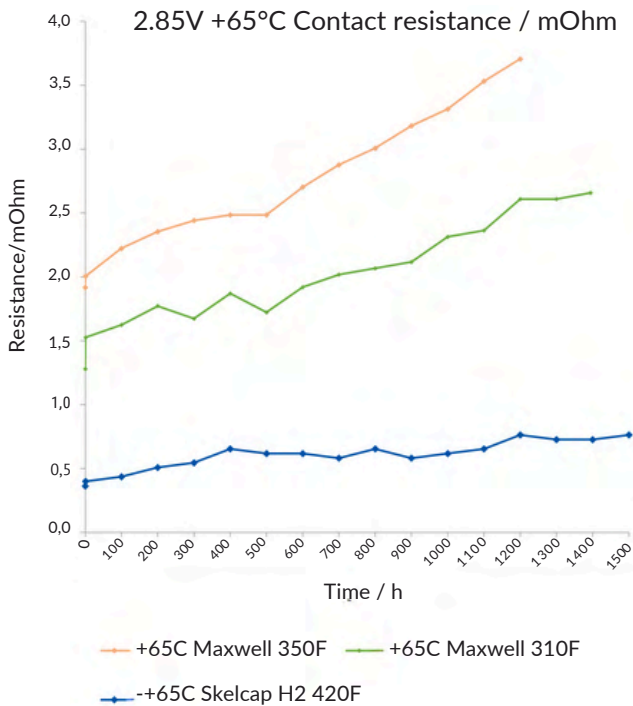
Annual Savings

Equipment: Komatsu 980
Fuel Efficiency: 5%
Emissions Reductions: 2%



\$19,556 Electric start savings	\$55,312 Total savings per year
\$28,256 Air start savings	12.2 ROI in months
\$7,500 Air system maintenance savings	99 Tonnes GHG Saved
	4.0 Batteries
	7.2 Starters

Reliability: Superior Life-time Compared to Competitors



- Industry standard used to measure life-time is the holding test at maximum working temperature +65°C
- Skeleton cells have been benchmarked to the market leader Maxwell's cells
- In terms of capacitance Skeleton's cells show higher stability and retain the capacitance longer than reference Maxwell's cells
- 20% decrease in capacitance is considered as the end-of-life
- In terms of internal resistance Skeleton's cells show also significantly higher stability during the life-time of an ultracapacitor (100% increase in internal resistance is considered as the end-of-life) meaning that the cell could handle higher currents and will not heat as much as the Maxwell cells





SKELSTART ESM SPECIFICATIONS

Selection Guide



ESM243

- 3 X 24VDC ESM Modules
- 3600 CCA
- 30L to 45L Engines



ESM244

- 4 X 24VDC ESM Modules
- 4800 CCA
- 45L to 65L Engines



ESM245

- 5 X 24VDC ESM Modules
- 6000 CCA
- 65L to 85L Engines



ESM246

- 6 X 24VDC ESM Modules
- 7200 CCA
- 85L to 105L Engines

SkelStart is installed between the batteries and the starter, which means the batteries are disconnected from the starter.

SkelStart will always provide the starting power for the engine, and the batteries will only need to provide energy for lights, air conditioning, heating, etc.

Specifications

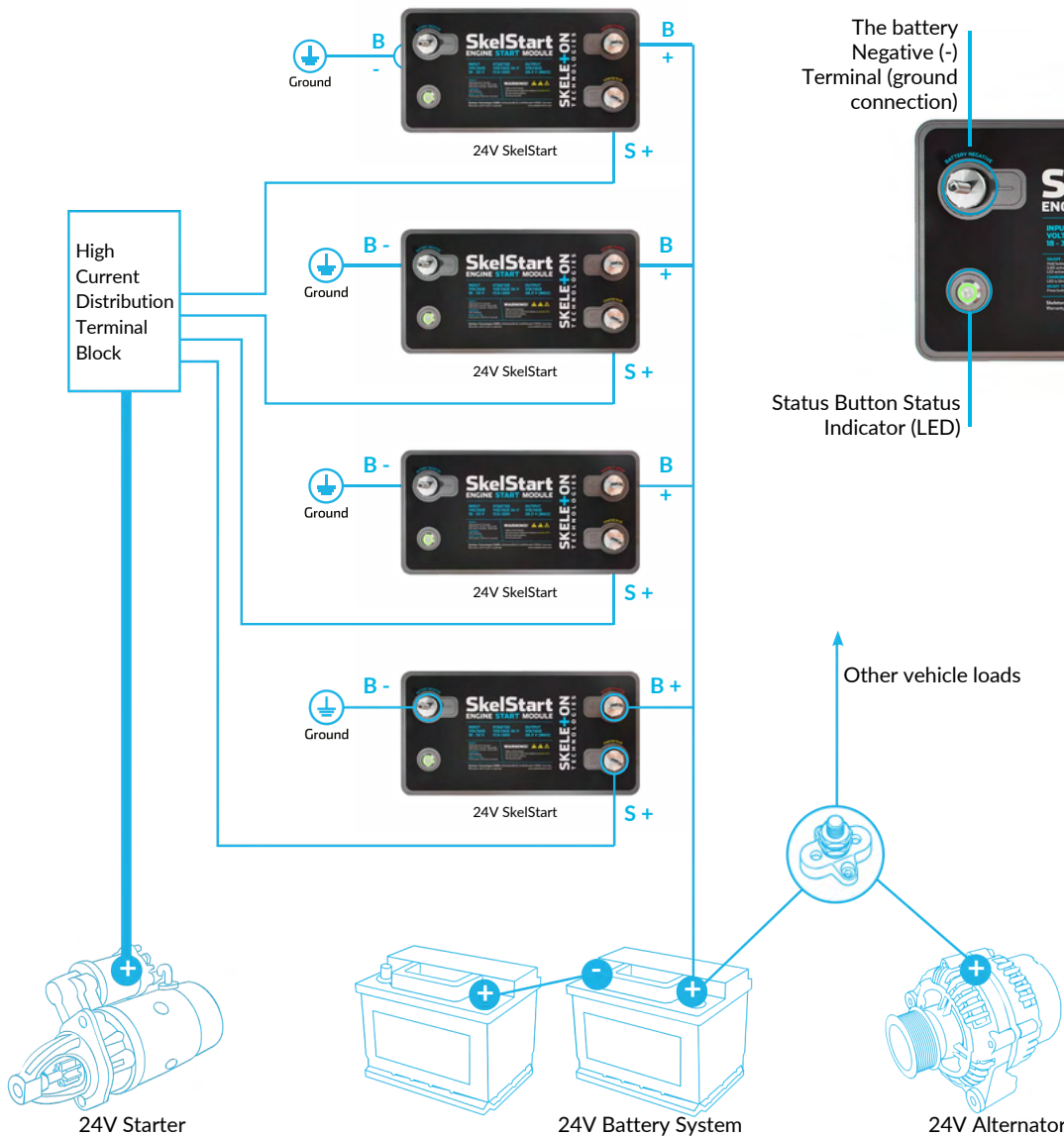
SkelStart 24V	Unit	
Cold Cranking Amps (CCA)	A	1218
Maximum Peak Current (0,4 sec current)	A	4460
Peak Power	kW	109.6
Charged Full Voltage	V	28.2
Energy	Wh	35
Rated Capacitance	F	320
Individual Cell Capacitance	F	3200
Charging Current	A	16 (max)
Continuous Input Voltage Range	V	18-30
Continuous Input Voltage Range with Specified Charge Time	V	23-30
Recharge Time (from 0 V)	min	8.5
Operating Temperature	Deg °C	-40 ÷ +65
ESR IEC	mOhm	1.79
Standby Current Draw	mA	<10
Dimensions	mm	328 L x 171 W x 241 H
Weight	kg	8



SKELSTART ESM INSTALLATION



Basic Configuration - ESM 244



- Certificates**
- Automotive E-mark test for ESA (Electronic Sub-Assembly, safety-critical application) / UNECE R10 regulation passed
 - RoHS certified
 - Aligned with ISO standards. ISO-26262 and FMEA for SkelStart Gen 2.0 adapted
 - IP-65 implemented
 - Vibration: ISO 16750-3 Table 14 test passed (Table 12 currently testing)
 - Casing: Non-flammable casing (VALOX 457)

MORE FROM
GREEN FLEET
SOLUTIONS

*More fuel savings
Cut more emissions*



ThermaStart Idle Management System
Eliminate idling and boosting.



FuelActive Floating Fuel Pickups
Up to 5% fuel efficiency.



EPURA Self-Cleaning Filters
The last air filters you will ever need.



DFM - Precision Fuel Flow Meters
Unlock efficiency and savings.

