

SkelStart 12V

**MORE
STARTING
POWER**

ULTRACAPACITORS HAVE
MULTIPLE BENEFITS OVER
BATTERIES



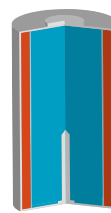
ULTRACAPACITOR-BASED SPACE TECHNOLOGY THAT STARTS YOUR ENGINE

ULTRACAPACITORS USE ELECTRIC FIELD (FAST)



- + ALMOST INSTANT CHARGING AND DISCHARGING
- + HIGH POWER
- + LOW ENERGY
- + NOT TEMPERATURE SENSITIVE
- + LONG LIFETIME

BATTERIES USE A CHEMICAL REACTION (SLOW)

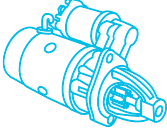






- + SLOW CHARGING AND DISCHARGING
- + LOW POWER
- + HIGH ENERGY
- + TEMPERATURE SENSITIVE
- + SHORT LIFETIME

THE SKELSTART ENGINE START MODULE ALWAYS PROVIDES THE STARTING POWER, WHILE BATTERIES HANDLE ALL THE OTHER LOADS.

ADVANTAGES & DISADVANTAGES



-  **HIGH POWER (FOR STARTING)**
-  **HIGH ENERGY (FOR HOTEL LOADS)**
-  **ZERO TO FULL IN MINUTES**
-  **LONG LIFETIME (1 000 000 CYCLES)**
-  **WORKS IN EXTREME TEMPERATURES**

✓	—
—	✓
✓	—
✓	—
✓	—

WHAT DOES IT MEAN FOR THE USER?

RELIABLE STARTING

- + Much higher peak power than batteries can provide
- + Temperature won't affect starting power
- + Starting power even with „dead“ batteries – If SkelStart energy is used, it needs only 9V to be recharged again. SkelStart will be fully charged in few minutes.

BATTERY LIFETIME INCREASE

- + Starting power doesn't come directly from batteries
- + More energy stored by the end of the work day
- + Battery lifetime will be increased 1.5 – 2x

FUEL CONSUMPTION DECREASE

- + No need for idling to charge the batteries
- + Measured example: Idling fuel consumption from 6% to 2% = 400L/year

NO HASSLE - ONE TIME INVESTMENT

- + Lifetime 1M cycles, no maintenance needed
- + Warranty 6 years

REAL LIFE USE CASE:

“Our truck is often on stand-by mode for a long time. Starting the engine has always been an issue. We liked the idea that the ESM holds full charge for 3 months and even if the ESM energy is used, it needs only 9V and couple of minutes to be fully charged from “dead” batteries. This allows us to start the engine regardless of the status of the batteries, to be more operational and to not worry about jump-start capability if we are on the road”

- Janno Oras, Kalev AS



The same technology is used by the Space Agency, which means it has been tested in the harshest environment possible - SPACE.

SkelStart is based on Skeleton Technologies' industry-leading SkelCap ultracapacitors, which have the highest power and energy density on the market. This advantage carries over to SkelStart, making it the most powerful engine start module on the market.



SKELSTART EASY INSTALLATION

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.

SkelStart

12V



SPECIFICATIONS

SkelStart 12V	Unit	
Cold Cranking Amps (CCA)*	A	2133
Maximum Peak Current (0.4 sec current)	A	7644
Peak Power**	kW	62.9
Charged full voltage	V	14.1
Energy	Wh	35
Rated Capacitance	F	1280
Individual Cell Capacitance	F	3200
Charging current	A	16 (max)
Continuous input voltage range	V	9-16
Continuous input voltage range with specified charge time	V	11.5-16
Recharge time (from 0 V)	min	20.5
Operating temperature	Deg °C	-40 to +65
Standby current draw	mA	<15
Dimensions	mm	328 L x 171 W x 241 H
Weight	kg	8.5

* Based on 1s ESR

** Based on 10ms ESR