

MTC Series For Telecom Tower DG Cranking



Introduction: When starting a diesel engine, it is necessary to overcome the compressed gas resistance in the cylinder, as well as the friction and inertia force generated by the engine. At present, the diesel engine uses lead-acid battery as the startup power source. However, in the condition of severe temperature and humidity changes, the discharge capacity of the battery is reduced, which makes the diesel engine cannot be normally started. In addition, the battery charging time is very long, working life is low, and when it is laid static for a long time affect the reliability of diesel engine.

Supercapacitor based Genset starting system can resolve these problems. SPEL MTC series module provides more cranking cycles in a shorter period than the lead acid battery. Due to the low equivalent series resistance more current can be released instantaneously in a shorter period to ensure the success rate each time you start. It takes only minutes to recharge the SPEL MTC series from the available source.

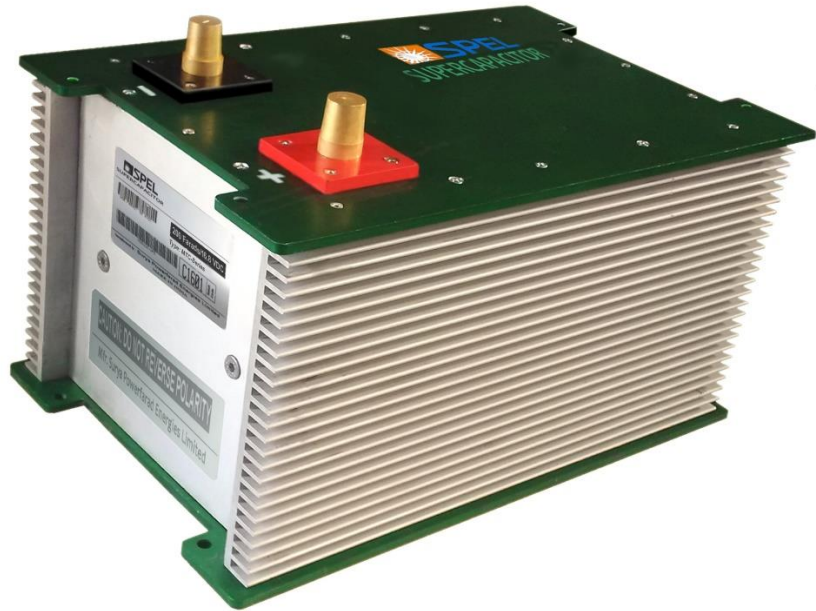
To ensure reliable and safe operation of the Genset starting systems, SPEL-MTC Series provides the necessary power to start the diesel engine

Advantage of using SPEL-MTC series instead of Batteries for Cranking.

Supercapacitors are highly efficient technology reliable and safe. It has large capacitance and excellent charge-discharge performance with higher power density and the longer useful life and more advantages as maintenance free, high reliability. Supercapacitors has unique features like short charge-time, long service life, good temperature characteristics, energy conservation, and green environmental protection as compared to the batteries. The most significant advantage of supercapacitors over batteries is their ability to be charged and discharged continuously without degrading like batteries do. In cold weather the higher power capability of supercapacitors compared to batteries translates to faster response time for similarly designed systems. Moreover, they have almost negligible losses and long lifespan. They can process a large number of charge and discharge cycles (several hundred thousand cycles) compared to only a few thousand cycles for lead-acid batteries, and can supply much higher current than batteries which is highly useful for starting purpose.



SPEL MTC series for Telecom Tower DG Cranking Application



Dimensions: 330mm x 200mm x 110mm (Tol. +/- 0.5mm)

Basic Specifications

Capacitance	Capacitance Tolerance	Working Voltage DC	Surge Voltage DC	Termination	Balancing	Typical Mass	Operating Temperature Range	Typical Cycle Life (25 °C)
200.0 F	0% to 20%	16.8V	18.0V	Brass	Resistor	6.0 Kg	-40~ 65 °C	500,000 cycles



Electrical Specifications

Rated Capacitance [1]	200.0 Farads
Initial Minimum Capacitance	200.0 Farads
Initial Maximum Capacitance	240.0 Farads
Rated Voltage	16.8 VDC
Absolute Maximum Voltage [2]	18.0 VDC
Absolute Maximum Current	940.0 Amps
Initial Maximum ESR (DC) [3]	3.5 milli-ohms
Test Current for Capacitance and ESR (DC) [3]	35.0 Amps
Maximum Leakage Current [4]	40.0 mA
Maximum Continuous Current	35.0 A
Usable Specific Power [5]	2.3 Wh/Kg
Impedance Match Specific Power [5]	4.4 Wh/Kg
Operating Temperature Range	-40°C to 65°C
Storage Temperature Range	-40°C to 70°C

Note: Capacitance, ESR and Leakage current are all measured according to IEC 62391-1

* If required then Leakage current can be altered/changed by Balancing Method.

+ Results may vary. Additional terms & Conditions including limited warranty apply at the time of purchase.

++ Product dimensions are for reference only unless otherwise identified, Product dimensions & Specifications may change without Notice.



Physical Specifications

Physical Dimension (L x B x H) in mm +/- 0.5mm	330 x 200 x 110
Approximate Mass of Module	7.0 Kg.
Connection Terminals	Standard Battery Type
Recommended Torque - Terminal	4 Nm
Environmental Protection	IP54
Insulation Coordination	IEC 61287-1 (Category: OV II) Rated insulation voltage: 1kV DC or 2.8kV AC (at 50Hz, 10 sec) Rated impulse withstand voltage: 6kV DC
Vibration Specification	IEC60068-2-6
Shock Specification	IEC60068-2-2,-29
Cooling	Natural Convection
Package Quantity	Single

Monitoring/Cell Management

Internal Temperature Sensor	N/A
Temperature Interface	Available on request
Cell Voltage Management	Passive/Active
Cell Voltage Monitoring	Available on request
Connector	N/A



Safety

Maximum Current, Non-repetitive (I _{max}) [6]	1800.0 Amps
Short Circuit Current (Typical)	2000 Amps**
High Potential Capability	5600VDC for 60 seconds
Max Stored Energy [5]	9.0 Wh****

CAUTION: Please do not discharge Capacitor directly. Please do not Reverse Polarity

Note:

** Current possible with short circuit from rated voltage. It should not be mistaken for operating current.

**** As per United Nations material classification UN3499 device should have less than 10Wh capacity to meet the Requirement of Special Provisions 361 for transporting without being treated as dangerous goods (hazardous material) Under Transport Regulations.

Life

Endurance (at V _R and 65 °C) [7] [8]	1500 Hrs.
Room Temperature (at V _R and 25 °C) [7]	10 Years
Cycle Life (at 25 °C) [7]	1,000,000 cycles (Estimated value when cycled from V _R to ½ V _R using constant current of 7 Amps with 10 second rest between charge and discharge steps)
Shelf Life	4 Years (Stored Uncharged at 25°C) 2 Years (Stored Uncharged at 70°C & under 40% RH)

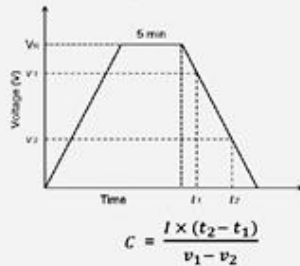
Thermal Characteristics

Typical Thermal Resistance, R _{th} (Housing)	1.7 °C/W
Maximum Continuous Current ΔT = 30 °C [9]	60 A _{RMS}
Maximum Continuous Current ΔT = 45 °C [9]	80 A _{RMS}



1 Rated Capacitance

- > Constant Current charge with 10mA/F to VR
- > Constant Voltage charge at VR for 5 minutes.
- > Constant Current discharge with 10mA/F to 0.1V



Where

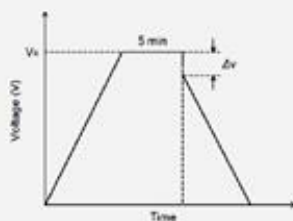
- V₁ is the measurement starting voltage 0.8 x VR (V);
- V₂ is the measurement end voltage 0.4 x VR (V);
- t₁ is the time from discharge start to reach V₁ (s);
- t₂ is the time from discharge start to reach V₂ (s);
- I is the absolute value of the discharging current (A);

2 Surge Voltage / Absolute Maximum Voltage

- > Absolute maximum voltage, not repeated and for no longer than 1 second.

3 ESR (Equivalent Series Resistance)

- > ESR_{DC}
 - Constant current charge to VR
 - Constant voltage charge at VR for 5min
 - Constant current discharge to 0.1V



$$R_d = \frac{\Delta V}{I}$$

Where

- R_d is the ESR_{DC} (Ω);
- ΔV is the voltage drop for 10ms (V);
- I is the discharge current (A).

4 Leakage Current

- > The capacitor is charged to the rated voltage at 25°C.
- > Leakage current is the current at 72 hours that is required to keep the capacitor charged at the rated voltage

5 Energy & Power

- > Max. Stored Energy at V_R = $\frac{1/2 CV_R^2}{3600}$

Where C is the Capacitance (F);
V_R is the rated voltage (V).

- > Usable Specific Power, IEC 62391-2 (W/kg) = $\frac{0.12 \cdot V^2}{ESR_{DC} \cdot Mass}$

- > Impedance Match Specific Power (W/kg) = $\frac{0.25 \cdot V^2}{ESR_{DC} \cdot Mass}$

- > Gravimetric Specific Energy (Wh/kg) = $\frac{E_{Max.}}{Weight}$

6 Max. Current

- > Current for 1sec discharging from rated voltage to half Rated voltage under constant current discharging mode.

$$I_{Max.} (A) = \frac{1/2 V_R}{\Delta t / C + R_d}$$

Where

- Δt is the discharge time (sec) and Δt is 1 sec in this case;
- C is the capacitance (F);
- R_d is the ESR_{DC} (Ω);
- VR is the rated voltage (V)

7 Lifetime

- > End-of-Life Conditions
 - Capacitance: -30% from rated min. value
 - ESR: +100% from max. ESR value

8 Endurance

- > Conditions
 - Temperature: 65 ± 2°C
 - Test duration : 1500 (+48/-0) h
 - Applied voltage: V_R ± 0.02V
 - Capacitance and ESR measurement are made at 25°C

- 9 ΔT = I_{RMS}.I_{RMS}.ESR.R_{th}

Installation/ Mounting Notes/ Instructions

Mounting Recommendations

Use compatible mounting Clamps. Maximum allowable torque on Mounting Clamp Nuts not to exceed 4Nm. Use dual mounting clamp to meet vibration specifications.

Markings

Products are marked with the following information: Capacitance (F), Nominal Working Voltage (V), Series Code (or part No.), Polarity, Serial Number and name of Manufacturer.

Packaging information

Each Module of MTC series is packed individually in a box.



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