



Engine Start Module

FROM HEAT TO COLD

How ESM Ensures Reliable Starts in Any Climate

Equipment operating in harsh environments faces severe battery challenges—from freezing cold to scorching heat and long idle periods. These conditions lead to costly downtime, increased maintenance, and reduced productivity across multiple industry sectors.

PMP Group's **Engine Start Module (ESM)** uses advanced ultracapacitor technology to overcome these issues—delivering consistent, powerful starts in any climate while protecting your battery system.

1. EXTREME HEAT CONDITIONS

THE CHALLENGE

High temperatures accelerate battery degradation. **At 40°C and above**, battery life can be cut in half due to increased plate corrosion and electrolyte evaporation. Heat also raises the risk of thermal runaway during heavy loads, which can cause catastrophic battery failure..

Technical Impact on Batteries:

- **Electrolyte evaporation** reduces fluid levels, leading to sulfation and reduced capacity.
- Accelerated corrosion of lead plates weakens structural integrity.
- Higher self-discharge rates drain batteries even when idle.
- Thermal runaway risk increases under high load, potentially causing battery swelling or rupture

How ESM Solves It:

- Takes over the heavy load of engine cranking, reducing battery stress and heat buildup.
- Prevents deep cycling, keeping batteries cooler and minimizing sulfation risk.
- Maintains consistent cranking performance even when batteries are heat-stressed.
- Extends battery life and reduces maintenance costs in hot environments.



FROM HEAT TO COLD

How ESM Ensures Reliable Starts in Any Climate

2. FREEZING COLD CONDITIONS

THE CHALLENGE

In **sub-zero** temperatures, battery chemistry slows dramatically. Lead-acid batteries can lose cranking power, making it difficult to start heavy equipment.

Thickened engine oil and sluggish starter motors add further strain, often leading to failed starts and costly downtime.

Technical Impact on Batteries:

- Reduced chemical reaction speed lowers voltage output.
- Increased internal resistance limits current flow, reducing cranking amps.
- Deep discharges during repeated start attempts shorten battery life.

Temperature	Loss of Cranking Power
25°C	0%
0°C	20%
-5°C	20% to 30%
-18°C	50%

How ESM Solves It:

- Ultracapacitors maintain high energy output regardless of temperature.
- Delivers instant, powerful cranking current even in extreme cold.
- Reduces battery strain, preventing deep discharges and extending battery life

3. INACTIVE EQUIPMENT IN HARSH CONDITIONS

THE CHALLENGE

Equipment left inactive often faces flat batteries due to natural self-discharge and parasitic loads. Restarting after periods of inactivity typically requires jump-starting or battery replacement—both costly and time consuming.

Technical Impact on Batteries:

- Self-discharge drains stored energy over time.
- Parasitic loads (electronics, sensors) accelerate depletion.
- Repeated deep discharges shorten battery lifespan.

How ESM Solves It:

- Stores energy independently of the battery system, ready for instant starts.
- Eliminates reliance on battery charge for cranking power.
- Ensures reliable restarts after extended idle periods without external assistance.



FROM HEAT TO COLD

How ESM Ensures Reliable Starts in Any Climate

FROM MINES TO MARINE: ESM POWERS IT ALL

- **Mining:** Dump trucks, dozers, excavators, drill rigs, graders
- **Construction:** Excavators, loaders, graders, cranes
- **Agriculture:** Tractors, harvesters, irrigation pumps
- **Oil & Gas:** Drill rigs, compressors, generators
- **Emergency Services:** Fire trucks, ambulances, rescue vehicles
- **Marine:** Tugboats, workboats, offshore support vessels
- **Military & Defense:** Heavy transport, field equipment
- **Power Generation:** Backup generators, remote installations

BOOST PRODUCTIVITY & PROTECT YOUR PROFIT

Extreme weather and harsh conditions don't have to mean downtime. PMP Group's **Engine Start Module (ESM)** ensures **reliable starts**, protects your batteries, and keeps your fleet productive—**whatever the climate, whatever the industry.**



Contact us today!

Learn how ESM delivers reliability that pays off. your operations with **PMP ESM** and boost your fleet's efficiency

- ✓ Maximum Efficiency & Reliability
- ✓ Lower Operating Costs
- ✓ Reliable +1 million cycle duty life
- ✓ Commitment to Sustainability