

Smart Harmo™

Energy saving Device and solutions

PRODUCT OVERVIEW

ESD- Smart IoT-Enabled Power Quality Management for Maximizing Marine Energy Efficiency.



Harmonic Identification Mitigation — Reduces current distortion to 3–8% THDi, protecting all downstream electrical equipment.

Power Factor Correction — Maintains near-unity power factor (0.96–0.99), eliminating reactive power losses.

Load Balancing
Tailored to each vessel's power requirements, configuration, and environment

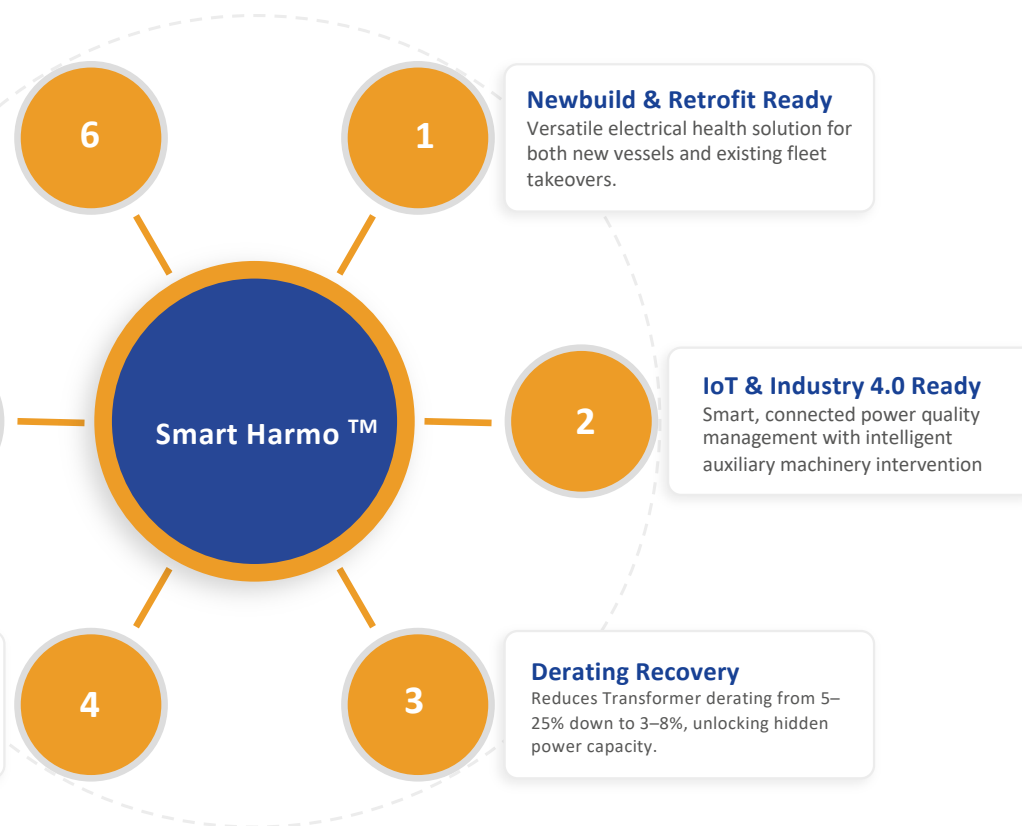
Newbuild & Retrofit Ready
Versatile electrical health solution for both new vessels and existing fleet takeovers.

IoT & Industry 4.0 Ready
Smart, connected power quality management with intelligent auxiliary machinery intervention

Derating Recovery
Reduces Transformer derating from 5–25% down to 3–8%, unlocking hidden power capacity.

Regulatory Framework

- IMO SEEMP — Ship Energy Efficiency Management
- Class Society Power Quality Requirements
- IEC 61000 — Harmonic Distortion Limits
- Industry 4.0 / IoT Vessel Integration Standards



Feature	With PQ measures	Without PQ measures
Harmonic distortion THD levels	Filters (passive/active/hybrid) keep vTHD < 5% and iTHD within IEEE 519-2022 limits. Equipment operates within safe tolerances.	iTHD can reach 40%+, causing overheating in transformers, motors, and cables. Protective devices misfire. Premature equipment failure.
Power factor True PF & efficiency	Dynamic PFC keeps true PF close to 1.0. I ² R losses minimised; generator loading reduced by up to 15%.	True PF drops to ~0.78 or lower. Higher reactive current increases I ² R losses, cable heating, and energy costs.
Generator fuel Efficiency & consumption	K-rated transformers handle non-linear loads safely. Extended equipment lifespan; reduced unplanned maintenance.	Standard transformers overheat and derate. Motors suffer insulation breakdown. Cables carry excess harmonic current leading to fires.
Voltage stability Sags, swells & transients	Staggered motor starts and load sequencing prevent voltage sags. UPS and filters absorb transients. Navigation and safety systems stay stable.	Motor start-up and load switching cause voltage sags and swells. Sensitive navigation, comms, and control electronics malfunction or reset.
Load balance 3-phase system	EMS and load management keep 3-phase loads balanced. Even current distribution reduces neutral conductor stress	Unbalanced 3-phase loads cause negative-sequence currents, motor torque pulsations, increased neutral current, and overheating switchgear.
Safety systems Navigation, comms, control	Clean power supply ensures ECDIS, radar, GMDSS, and automation systems operate reliably without interference or nuisance trips.	Harmonic interference disrupts communication systems. Protective relays misoperate. ECDIS and fire detection panels can give false alarms or fail.
Operational cost Maintenance & downtime	Lower maintenance costs, fewer unplanned outages, and extended equipment life. SCADA-linked PQ dashboards enable predictive maintenance.	Frequent unplanned breakdowns, high repair bills, and costly dry-dock time. Shortened equipment life cycles increase CAPEX replacement costs.

RETURN ON INVESTMENT



SmartHarmo™ — Measurable Savings Through Intelligent Power Control

Payback time: 12 month or less

Payback in 12 months or less

Through Reduction in:

1. Energy loss
2. Equipment failures

5% - 18%

Improvement in main switchboard efficiency

Improvement in Main switchboard service power as an average (it can go up to 18% depending on the vessel specifics, the semiconductor devices, the VFDs, the loading pattern, the consumer and the supplier generator interactions).

0.96–0.99 PF

Minimal wasteful energy Loss

Near-unity PF across broader operating range — minimal reactive losses.

Enhanced service life and reliability

Of sensors and electronic components

Electrical Infrastructure Savings

- Eliminates reactive power losses, enabling generators to operate at a near-unity power factor.
- Active and passive filtering reduce harmonic distortion, extending equipment life.
- Prevents costly damage to sensitive downstream equipment caused by high THDi levels.
- Suitable for newbuild vessels, retrofits, and vessel takeover projects.

Operational & Compliance Value

- Load balancing ensures even phase distribution, optimizing generator efficiency.
- Generator and transformer derating assessment reduces derating levels from 15–25% to as low as 3–8%.
- Class-compliant system that meets all classification society power quality requirements.
- IoT-ready architecture integrates seamlessly with vessel energy management systems.

Project References



Customer References

