

Technical Catalog

## SCR – Rectifier / Charger Thyristor-Controlled



### Peace of mind in critical missions.

- Rectification controlled by thyristors, with 6-pulse or 12-pulse topology
- Advanced solution for critical industrial applications
- Withstands high levels of input harmonic distortion
- User-friendly Human–Machine Interface (HMI)
- 100% Brazilian technology

# Purpose and Applications

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The TekSea Battery Charger Rectifier is an electronic device based on a static converter, designed primarily to recharge electric accumulators, supplying continuous power to the battery bank connected to the system.

The equipment is also capable of feeding direct current (DC) loads simultaneously with the battery charging process, ensuring uninterrupted operation in critical applications.

When supplied together with a battery bank, the set functions as an Uninterruptible DC Power Supply (DC UPS), maintaining operation even during AC network failures. Still, the main function of the system remains centered on the controlled and efficient recharging of the batteries.

Supplying DC loads is a complementary feature incorporated into the charger, and the design is conceived with a focus on reliability, robustness, and precision in the control of the charging process.

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the QR Code  
to Learn More!**



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# FEATURES

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The Tekpower SCR Rectifier/Charger line combines the robustness and reliability of thyristors with the latest in drive and control techniques, monitoring, and digital communication.

- High level of integration: Reduced number of boards
- Alarms with flexible delays, user-adjustable
- Active limitation of rectified current and battery current, digitally adjustable and closed-loop controlled
- CAN bus communication: Reduces the amount of control and supervision cables/wiring
- Active protection against short circuits at both the load and battery outputs
- Detection and protection against phase loss and excessive voltage imbalance
- Detection and protection against under/overvoltage and under/overfrequency in the grid
- Battery test with adjustable discharge current, measuring autonomy time, capacity in Ah, and energy in kWh of the bank
- Voltage setpoint compensation by battery temperature, with option for up to 8 temperature sensors
- Manual charging modes with programmable timing and timer
- Operating hour meter with preventive maintenance alert and battery recharge cycle counter
- Automatic phase sequence detection and synchronization via PLL (Phase-Locked Loop), with normal automatic operation in both positive and negative sequence
- Thyristor drive based on the fundamental component angle of the grid voltage: Supports high levels of grid distortion (THDv > 20%)
- Compatibility with various communication protocols (DNP3, MODBUS TCP, IEC61850, etc.) via gateway
- Operation without HMI in emergency situations

## FEATURES

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- Current derating by temperature: Continues to operate safely even in case of fan failure
- Sensor redundancy: Protection against voltage feedback loss
- Asymmetric multi-stage UDQ: TekSea-developed technology that reduces the number of contactors and increases the number of regulation stages as needed
- UDQ with hysteresis loop strategy against contactor oscillation and protection against contactor failure(s)
- Soft start and dynamic compensation for frequency oscillations: Compatible with small generators
- Fast dynamic response to load steps
- Detection and protection against cyclic recurrence of AC power failures: Long service life even in highly intermittent grids
- Inrush current limiter device on AC mains and optional AC disconnection contactor
- Available in 12-pulse rectification system version (optional)
- Available in hot-standby redundancy version (optional).

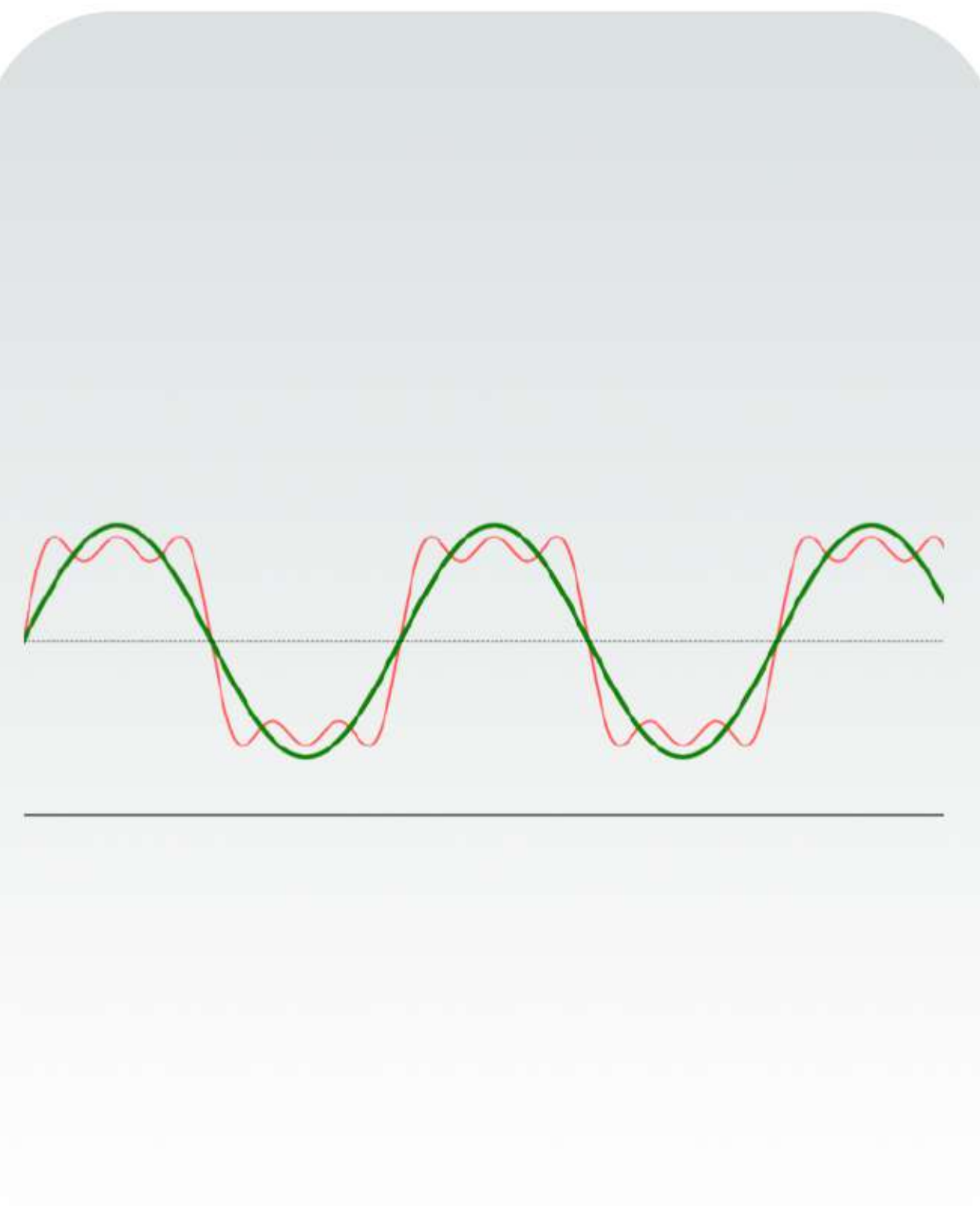


# Technological Differentials



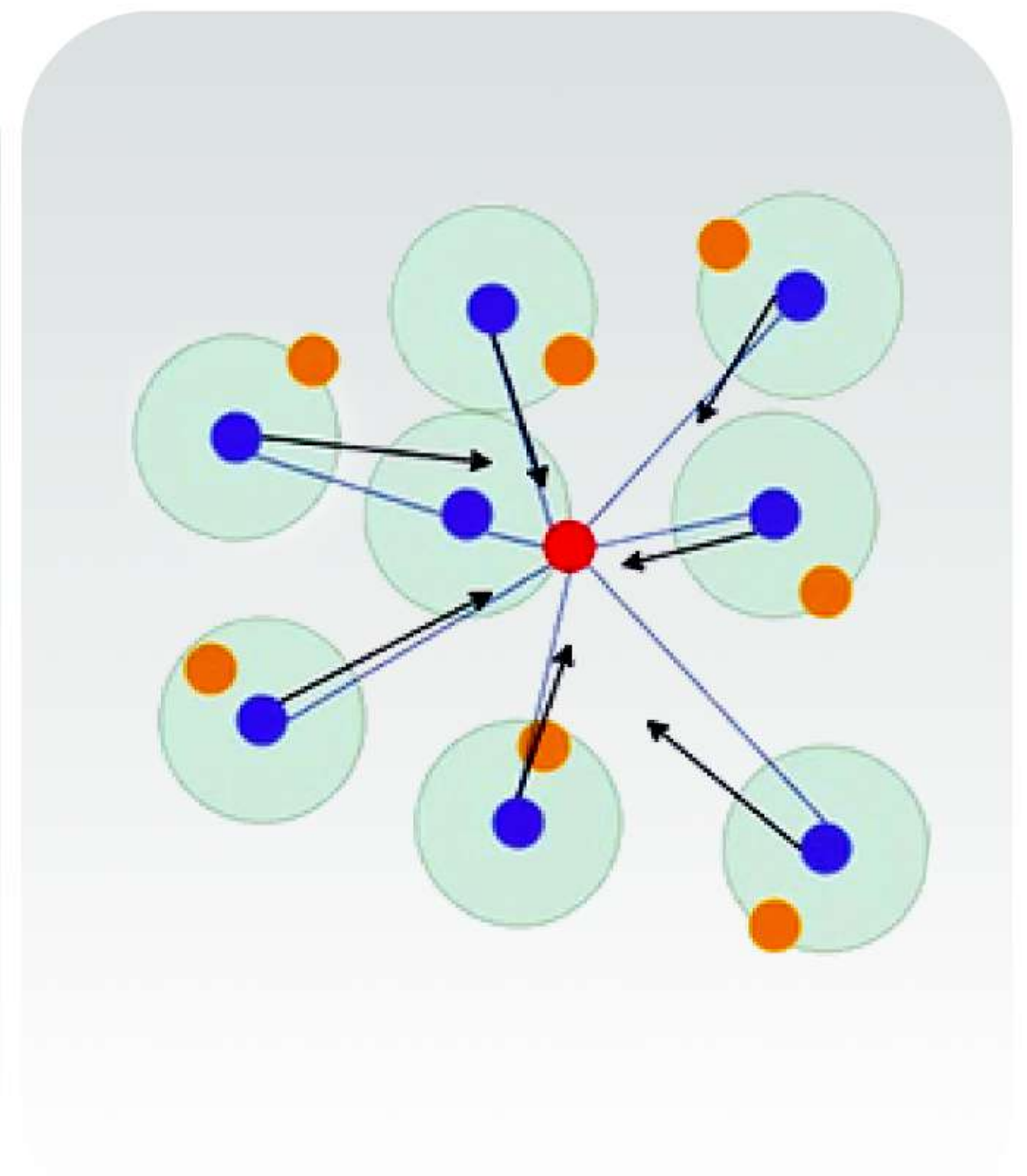
## Robustness and Reliability

- ✓ Thyristorized technology with 6 or 12 fully controlled pulses, ensuring low ripple, excellent static and dynamic regulation, and high durability.
- ✓ Reliable operation even in poor-quality grids, with tolerance to high levels of harmonic distortion and severe voltage and frequency variations (including generator sets).



## Precise Synchronization via PLL (Phase-Locked Loop)

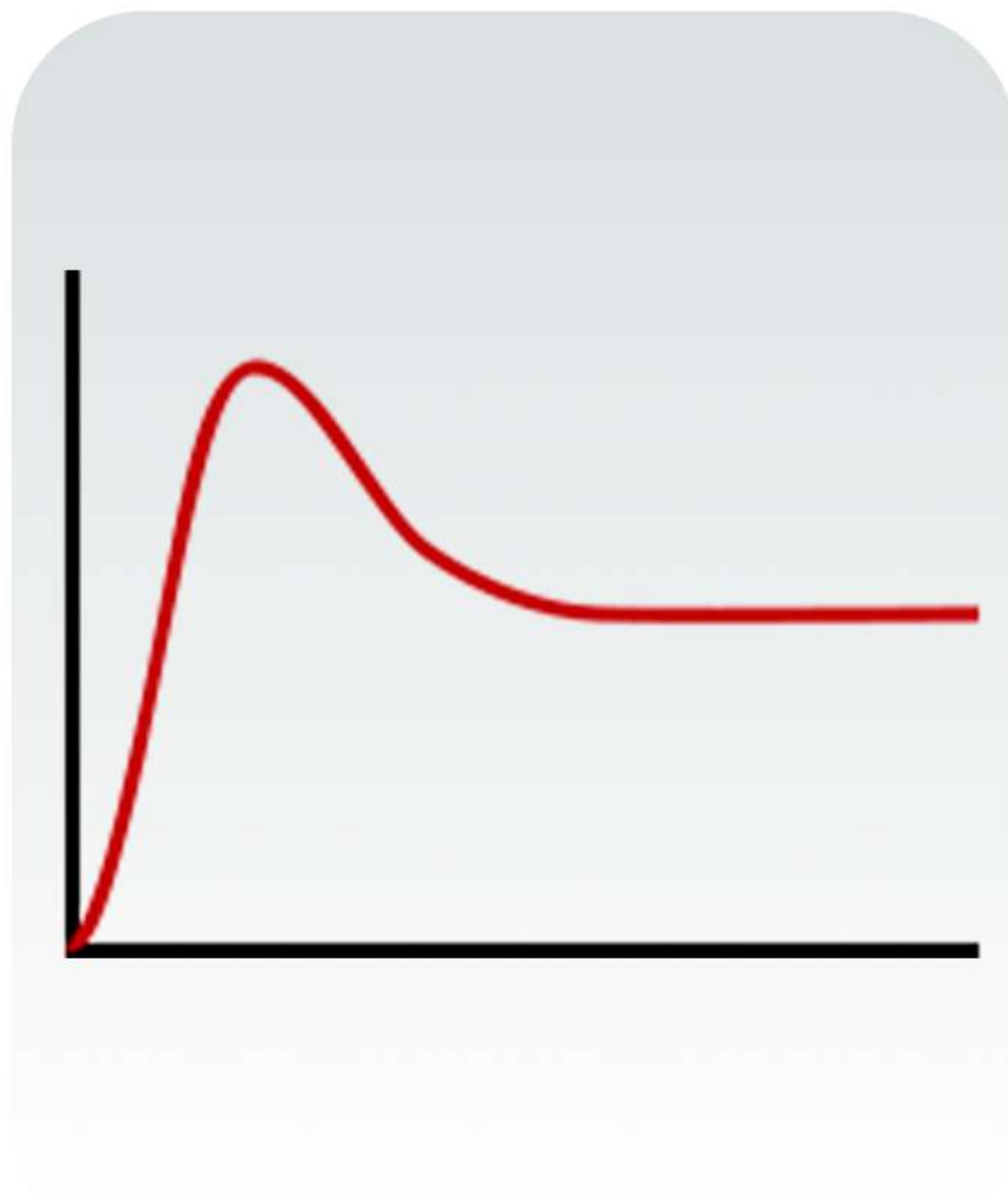
The Tekpower SCR uses an advanced digital PLL, which guarantees synchronization with the fundamental component of the power grid. This ensures stable operation even under severe harmonic distortion or when connected to generators, regardless of phase sequence (positive or negative). A key advantage that simplifies installation and ensures reliability in any scenario.



## Control Algorithms Optimized by PSO

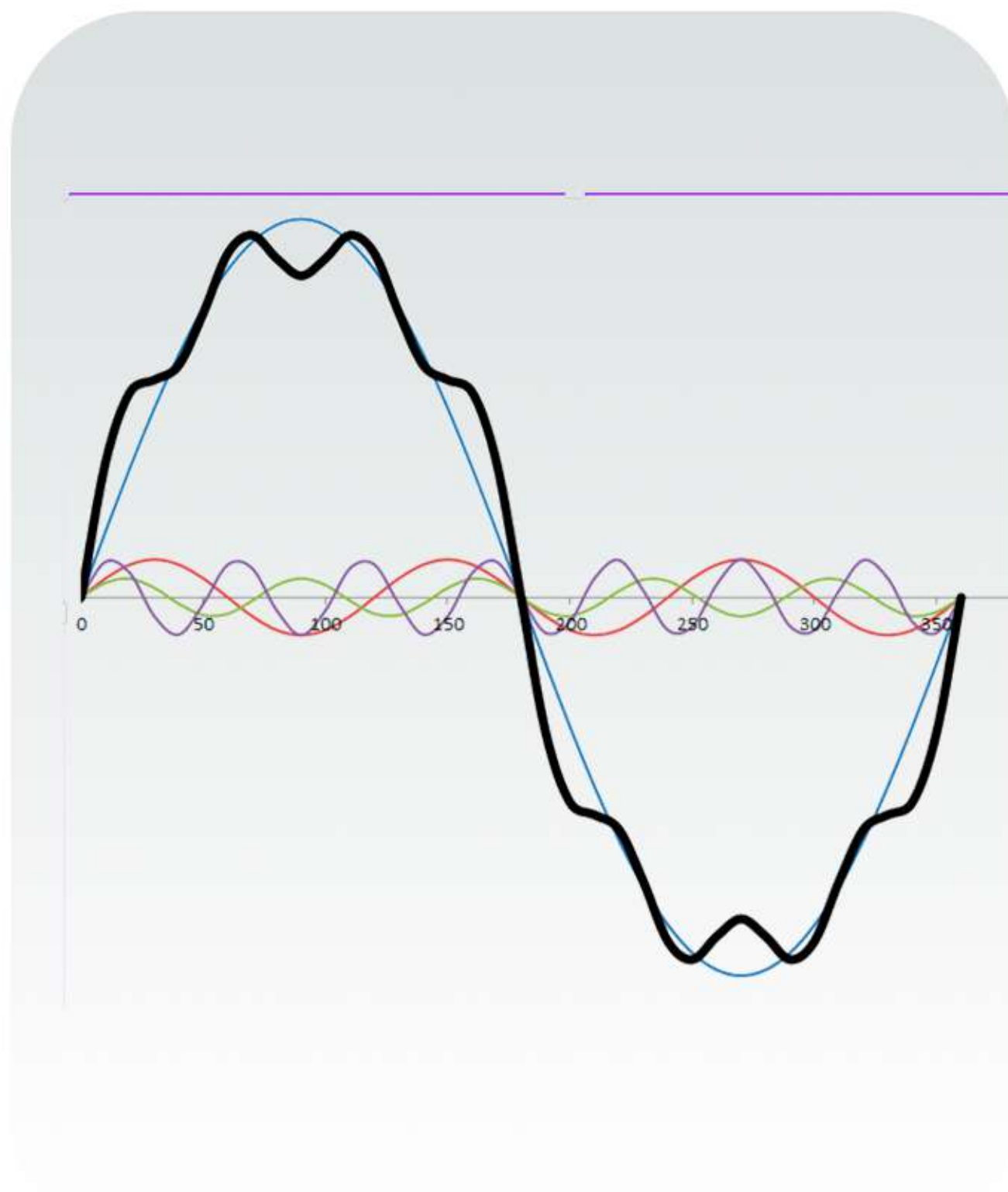
Using evolutionary optimization techniques (Particle Swarm Optimization – PSO), the Tekpower SCR provides dynamic response comparable to high-frequency switched converters. This innovation allows fast static and dynamic regulation, as well as stable operation even with weak sources or critical loads.

# Technological Differentials



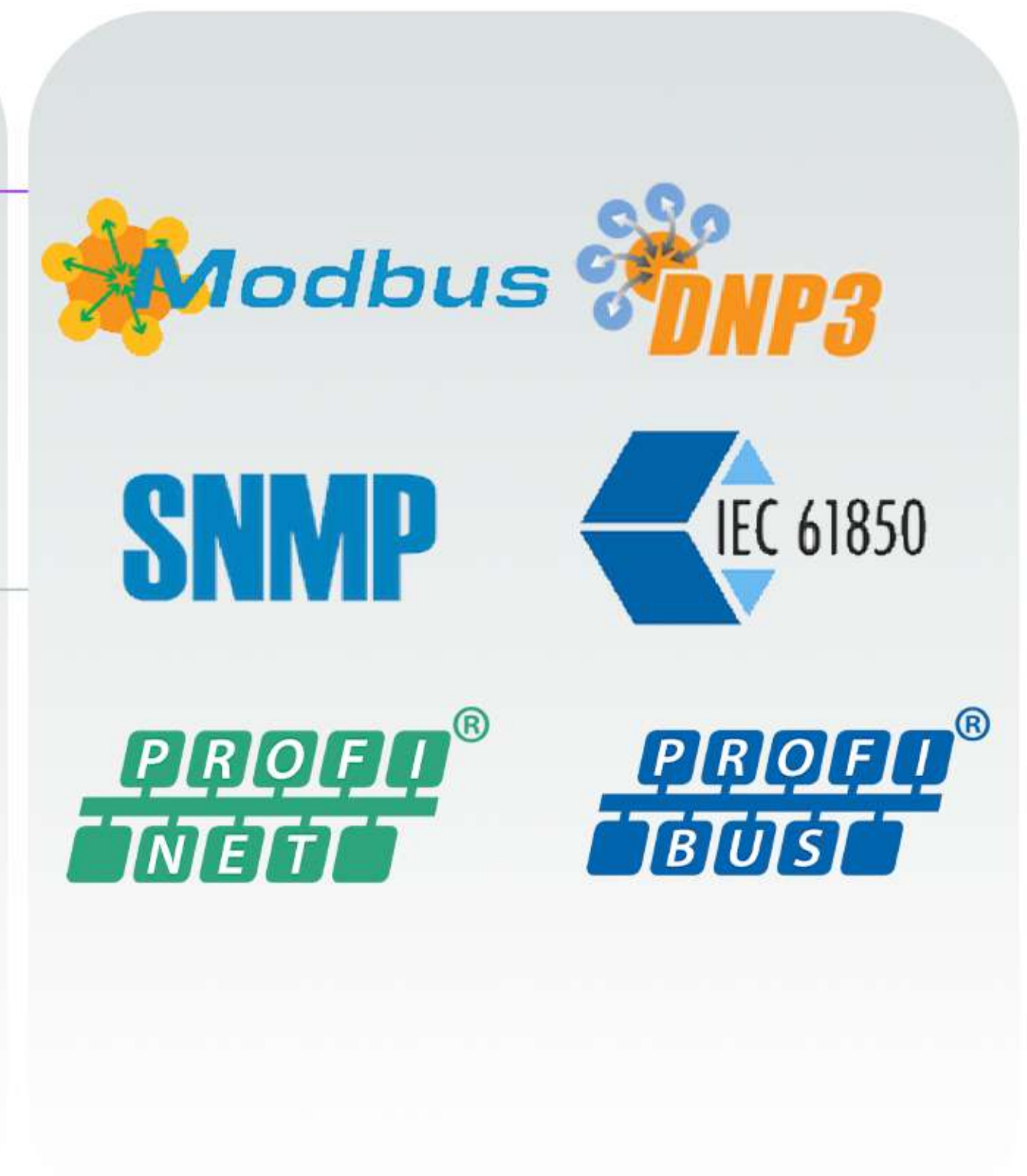
## Short-Circuit Protection

Thanks to the robustness of thyristor technology combined with advanced digital control, the Tekpower SCR withstands short circuits at both the load output and the battery output. This feature ensures operator safety and prevents equipment damage in extreme situations.



## Support for High Levels of Harmonic Distortion

The Tekpower SCR is designed to withstand high levels of input harmonic distortion without compromising stability or service life. This makes the equipment ideal for substations and industrial plants operating in poor-quality grids or environments with a strong presence of harmonics.

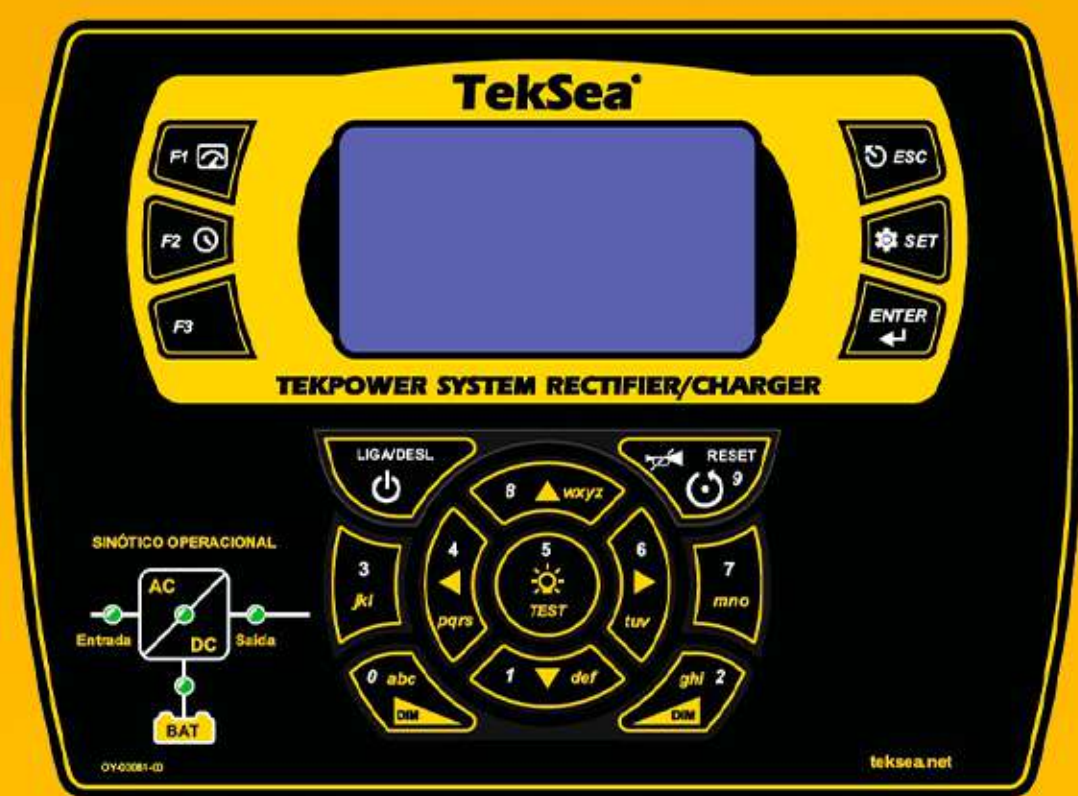


## Integration with Supervisory Systems

### Available in the following protocols:

- ✓ Modbus RTU
- ✓ Modbus TCP
- ✓ DNP3
- ✓ SNMP (v1, v2c, v3)
- ✓ MMS IEC 61850
- ✓ Profibus
- ✓ Profinet, among others

# Technological Differentials



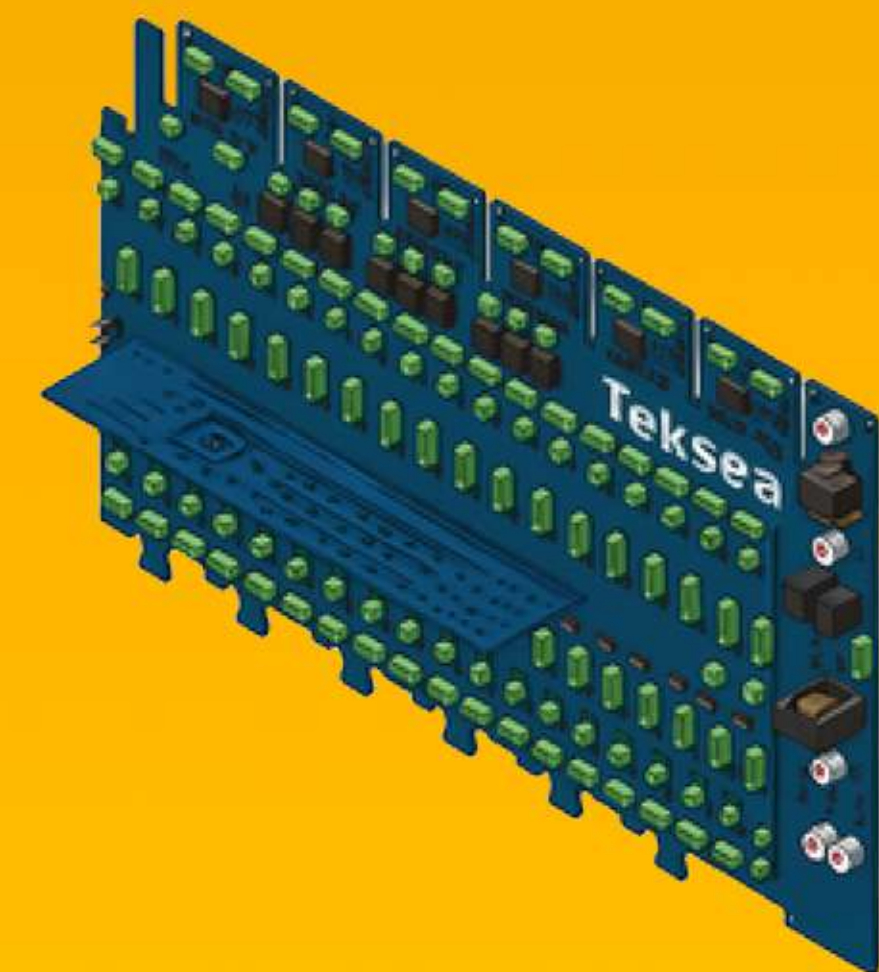
## Graphical Human–Machine Interface (HMI)

Equipped with a 128 x 64 pixel graphical HMI, providing clear visualization of electrical values and operational status. It also features an intuitive operational synoptic and an alarm and event log, ensuring traceability and ease of diagnostics.



## Complete Isolation

Designed with isolation between input and consumer output, ensuring protection against power grid disturbances and contributing to operational continuity and stability.



## Digital Control on Proprietary Platform

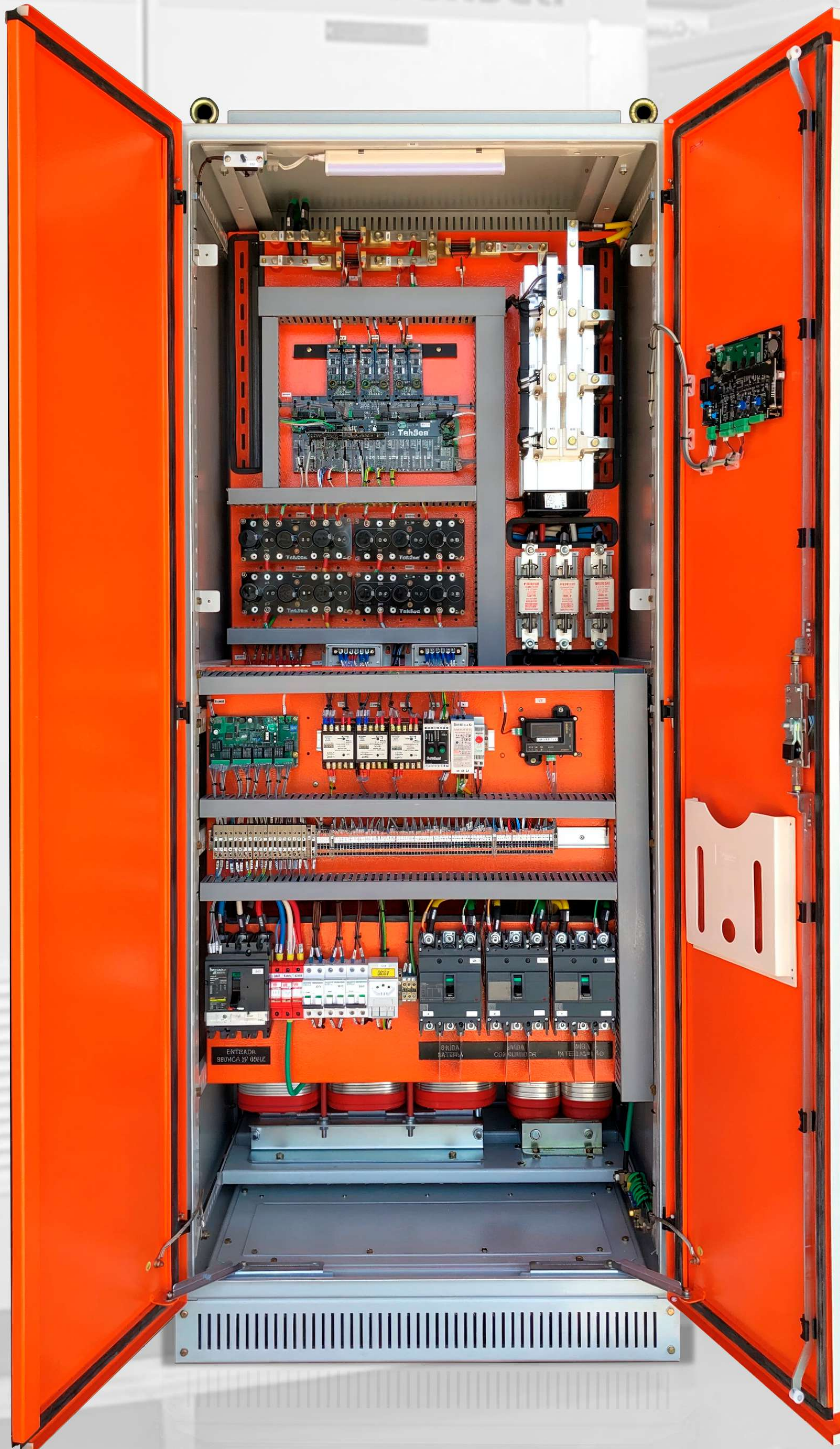
Control is fully implemented in DSP (Digital Signal Processor), using a proprietary platform that allows high precision, flexibility, and future expansions.

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## 100% Brazilian Technology

TekSea invests in national technology as a strategic pillar, with solutions developed by a technical team of engineers, masters, and doctors. This commitment strengthens innovation and drives the technological development of Brazilian industry.



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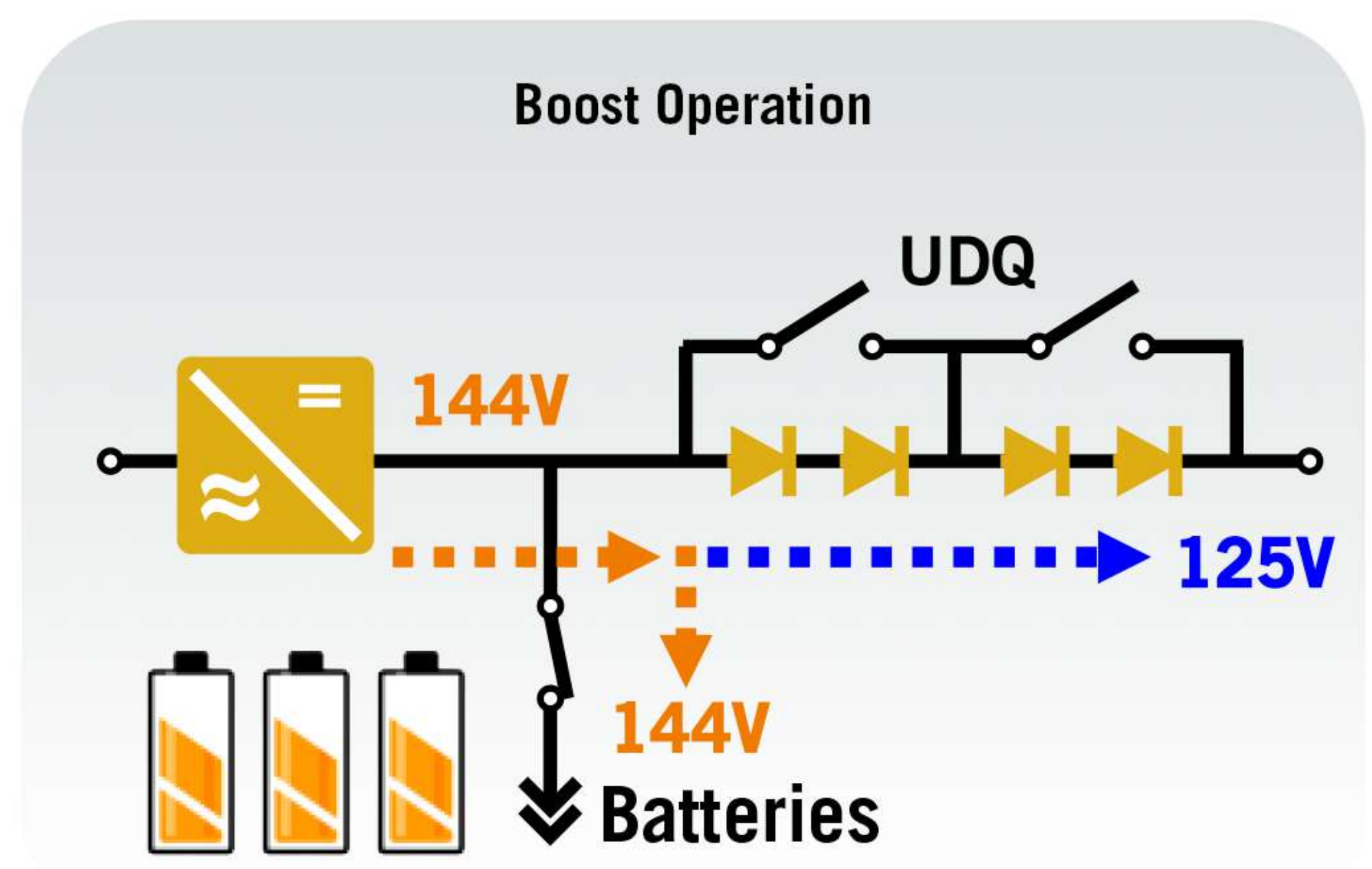
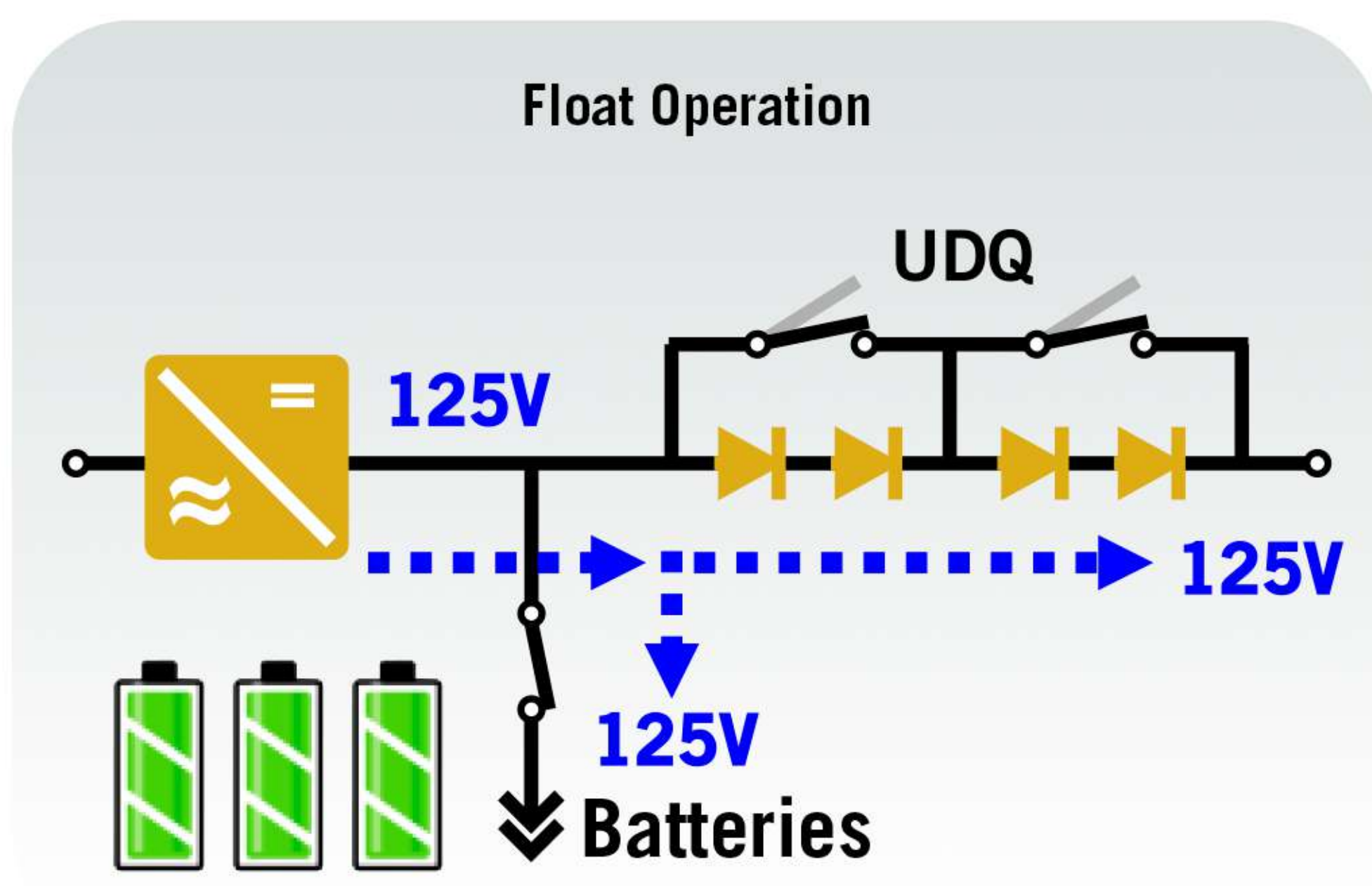
# Advanced Features of Tekpower SCR

## ASYMMETRIC MULTI-STAGE UDQ

The Voltage Drop Diode Unit (UDQ) ensures that the voltage supplied to consumers always remains within safe limits, even when battery banks operate under high load conditions.

The exclusive technology developed by TekSea provides:

- **Reduction in the number of contactors and increase in regulation stages**, according to system requirements;
- **Hysteresis strategy** to prevent contactor oscillations and extend the service life of the set;
- **Protection against contactor failures**, ensuring operational continuity;
- **Intelligent emergency mode** that automatically bypasses the UDQ in case of diode overheating, keeping the output voltage stable and safe even in critical situations.



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# Advanced Features of Tekpower SCR

## INTEGRATED BATTERY TEST

The Tekpower SCR incorporates an exclusive battery testing function that allows precise assessment of the health and autonomy of the battery bank, reducing operational risks and ensuring reliability in emergency situations.

### Mode with Active Current Control

Keeps the discharge current constant, as set in the rectifier

Ideal for standardized tests according to the manufacturer's table

Accurate evaluation of capacity (Ah) and autonomy (minutes).

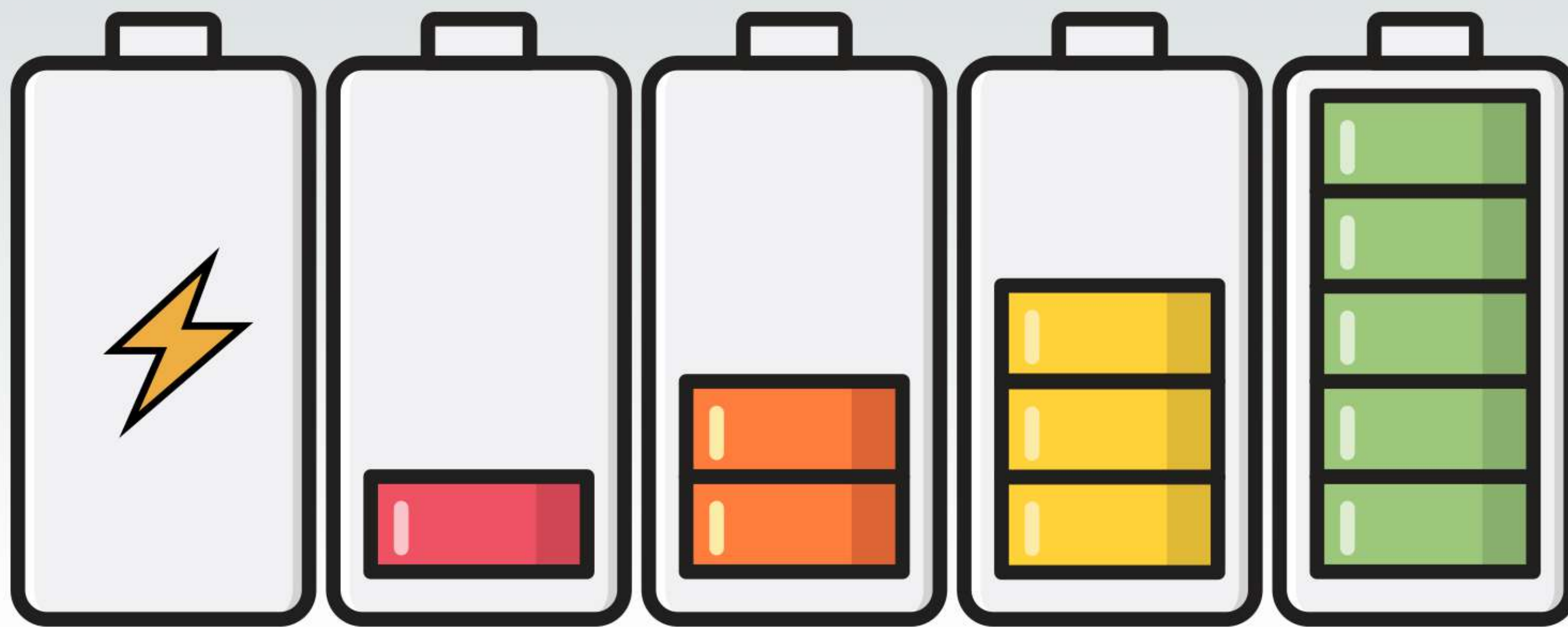
### Discharge Mode with External Load

Accurate evaluation of battery autonomy and real capacity

Verification of dynamic behavior during discharge

Enables assessment of real capacity and autonomy under actual operating conditions.

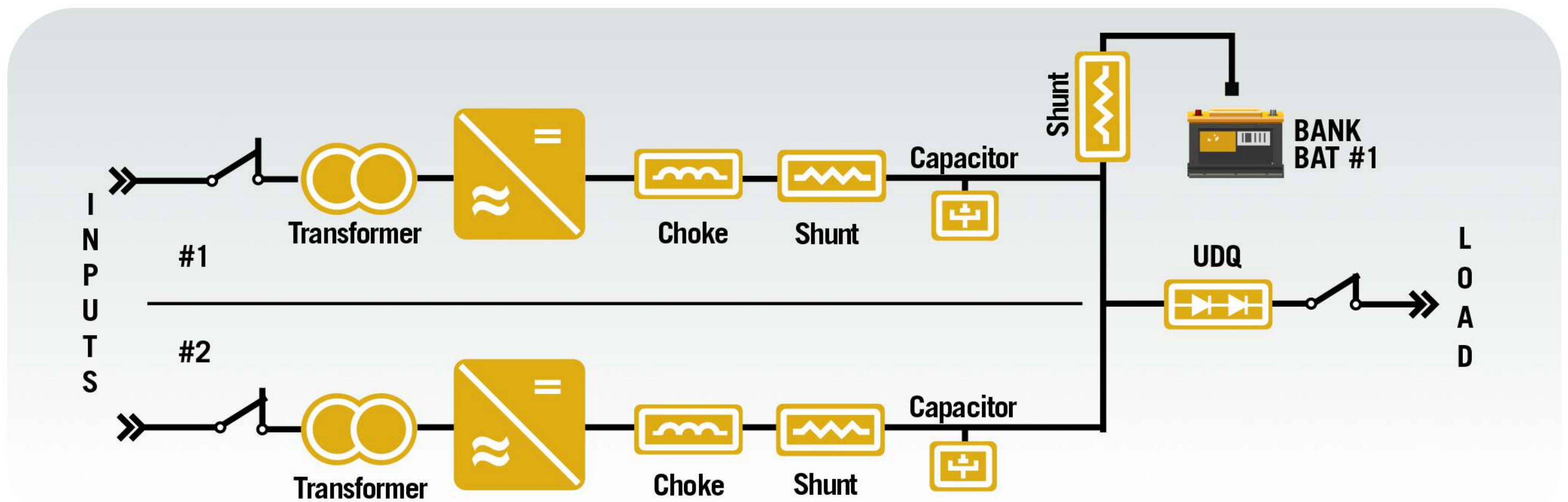
This integrated functionality makes the Tekpower SCR a complete preventive diagnostic tool, avoiding unexpected failures in the field and optimizing battery bank management.



# Advanced Features of Tekpower SCR

## HOT-STANDBY CONFIGURATION

The Tekpower SCR Hot-Standby configuration is designed for applications that demand high availability, ensuring uninterrupted supply to critical loads. With n+1 redundancy, it guarantees maximum reliability and continuous operation even in the event of a rectifier failure.



### Hot-Standby with 1 Battery Bank

One rectifier operates actively, powering the critical loads and charging the battery bank

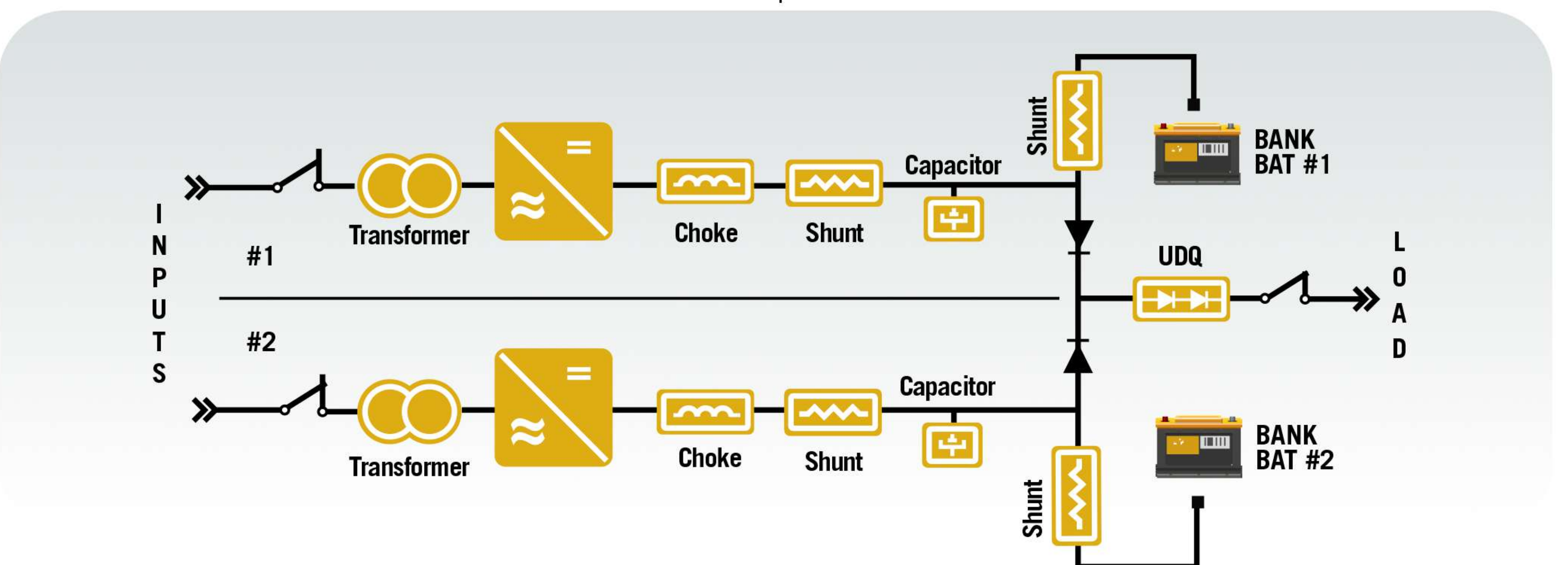
In case of failure, the standby rectifier immediately takes over, without interruption to the critical loads.

### Hot-Standby with 2 Battery Banks

Both rectifiers operate simultaneously, each powering its own battery bank

Critical loads are jointly supplied by the two rectifiers

If one rectifier fails, the other automatically assumes the entire load, keeping the system in continuous operation.



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# Advanced Features of Tekpower SCR

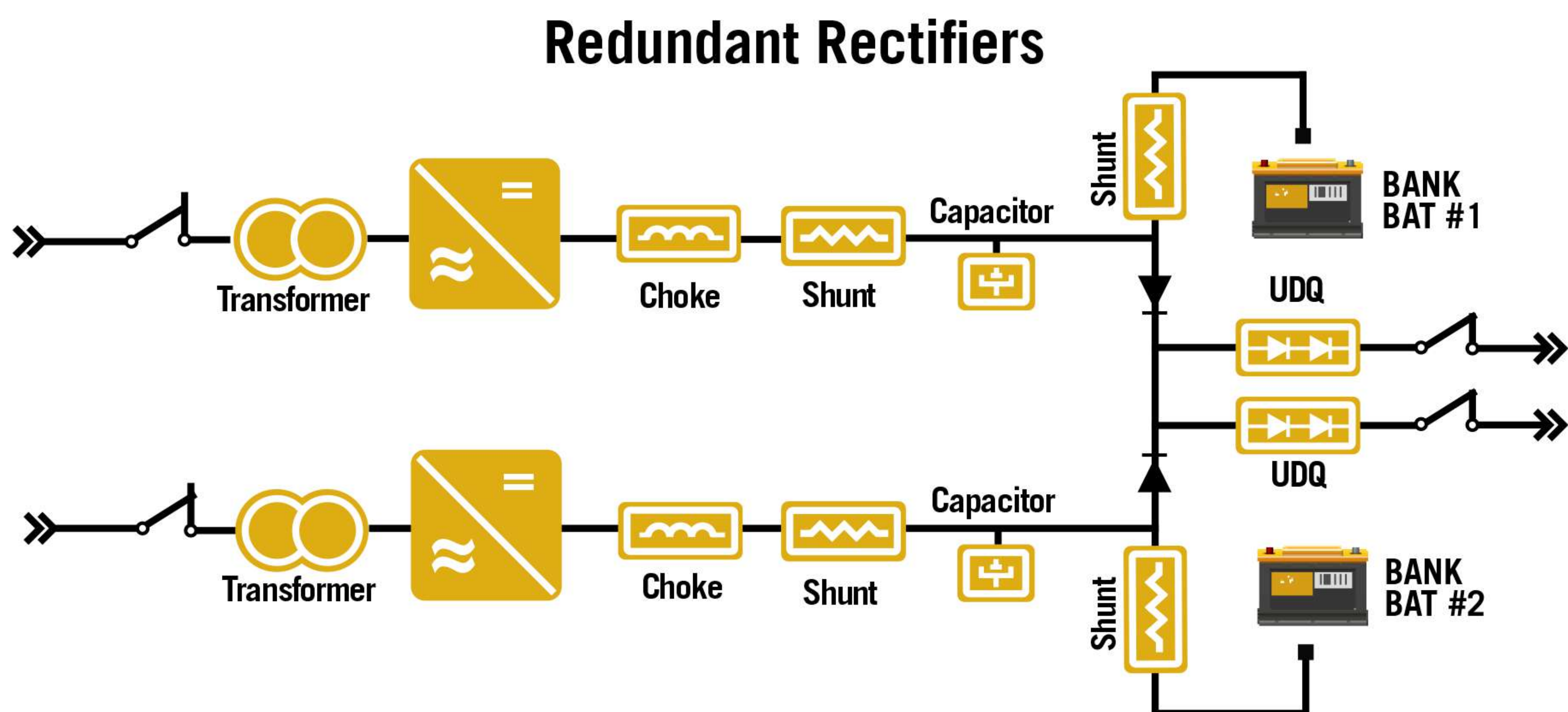
## PARALLEL CONFIGURATION

The Tekpower SCR was developed to operate reliably in parallel with other rectifiers, increasing current capacity and providing greater flexibility for system expansion.

This configuration can be supplied with a blocking diode, which ensures:

- ✓ **Proper charging of the battery bank**, preventing unwanted current circulation between rectifiers
- ✓ **Balanced sharing of consumer loads**, preserving equipment lifespan and ensuring stability of the DC bus
- ✓ **Additional safety** in critical applications, preventing reverse current in case of rectifier failure.

Parallel operation enables everything from simple capacity expansion to the implementation of n+1 redundant architectures, making the Tekpower SCR a robust and scalable solution for mission-critical DC power systems.



## TECHNICAL SPECIFICATIONS

<b>General Data</b>	Power Range	As requested by the client
	Topology	6-pulse / 12-pulse
	Technology	Industrial, SCR Rectifier
	Isolation	Galvanic, through Transformers (AC Input, DC Output)
<b>Alternating Current Input</b>	System	3PH + PE
	Nominal Voltage	220 / 380 / 400 / 440 / 460 / 480 / 690 V *
	Nominal Frequency	50 / 60 Hz *
	Frequency Variation	± 5%
	Power Factor	Without PF correction capacitor   6-pulse: 0.85 / 12-pulse: 0.92
		With PF correction capacitor   6-pulse: 0.92 / 12-pulse: 0.95
	THDi	6-pulse: 30–35% / 12-pulse: 10–15%
	Tolerated THDv	up to 20%
<b>Direct Current Output</b>	Nominal Voltage	12 / 24 / 48 / 110 / 125 / 220 / 250 V *
	Nominal Current	up to 2000 A
	Voltage Ripple	< 1% Vrms
	Efficiency	> 90%
	Static Regulation	± 1%
	Dynamic Regulation	± 6% overshoot for 50%–100% or 100%–50% load variation; Settling time < 50 ms
<b>System</b>	Display	128 x 64 pixel graphical HMI
	Standard Communication Protocols	Modbus RTU – RS485 Dry Contact
	Optional Ethernet Communication Protocols*	Modbus TCP DNP3 SNMP v1, v2c and v3 MMS IEC61850 Profibus Profinet
	Additional Features	Current Limitation at Rectifier and Battery Outputs Automatic DC Pre-Charge Battery Test Function Hour Meter Recharge Cycle Counter Supervisory Access via USB
	Optional	Ground Fault Detector UDQ – Voltage Drop Diode Unit Battery Temperature Sensor Battery Disconnection by Contactor Battery Reverse Polarity Protection AC Pre-Charge and Disconnection Relay Expansion
<b>Environmental Conditions</b>	Operating Temperature	0 ~ 45°C
	Humidity	5 ~ 95%

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\* Other options available upon request.

# Discover other solutions from our portfolio



## Energy

Switched Rectifier Chargers  
(with and without battery banks)

BMS – Battery Monitoring System

DC/AC Inverters with static switch

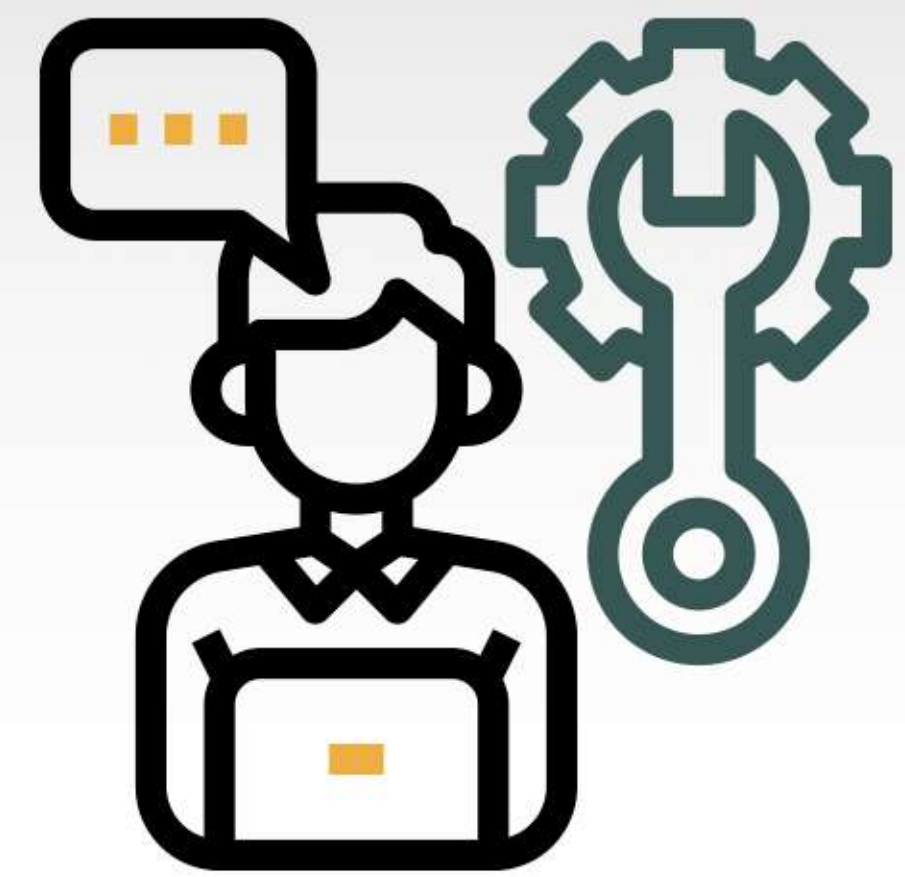
Industrial and Commercial UPS  
(Modular)



## Integration

Electrical Panels for Auxiliary Services

Monitoring and Automation Systems



## Services

Maintenance contracts and specialized technical support

Supply of spare parts

Retrofit and modernization services

24/7 hotline support

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**Get in touch and learn how to integrate these solutions into your project.**

## Need more information?



[www.teksea.net](http://www.teksea.net)

The information contained in this document consists of general descriptions of the available technical solutions and is provided for reference purposes only.

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