

ProAct™

TRANSFORMER RECTIFIER

PRODUCT DESCRIPTION

A transformer rectifier is a DC power source used in impressed current cathodic protection systems. It converts the AC input supply into the DC output required by the CP system and can automatically regulate the output based on a preset potential setpoint.

Available input power sources include utility AC power, UPS-backed power, and generator power.

A solar-powered version is also available. In this configuration, the photovoltaic DC input is converted and regulated through a DC-DC module.

PRODUCT PERFORMANCE

Operational Reliability

- High-quality core components and, where applicable, an isolation transformer help ensure stable and reliable operation, with low heat generation and excellent insulation performance.

Control Accuracy

- A high-performance CPU and high-precision sampling ADC enable accurate output control.

System Stability & Scalability

- The embedded operating system supports stable operation and provides scalability for future functional expansion.

Data Reliability

- Large-capacity data storage supports automatic recording of operating data for more than 10 years.



PRODUCT FEATURES

Power Supply Configuration

- Available with SMPS, SCR, or DC-DC module configurations, depending on the power supply arrangement.

Output & Control Design

- Modular design supports multi-channel output and both automatic and manual operating modes, including scheduled on/off and GPS-synchronized on/off test modes.

Monitoring & Alarm System

- Comprehensive fault alarm system provides analog output/status indication in the event of reference electrode failure.

User Interface

- Full-color LCD panel provides intuitive data display and easy operation.

Communication & Remote Control

- Supports MODBUS RTU, RS485/RS232, RJ45 interfaces, wireless transmission, and optional Wi-Fi modules.

Reference	Title
EN 13509	CATHODIC PROTECTION MEASUREMENT TECHNIQUES

CORE COMPONENTS

Circuit Board

The circuit board functions as the main controller of the transformer rectifier, coordinating device operation, signal acquisition, output regulation, alarm functions, and communication control.

Core Advantages:

- **Signal Acquisition Accuracy:** Measures reference electrode signals with high accuracy, with measurement accuracy up to $\pm 1\%$.
- **Output Control Accuracy:** Measures and controls transformer rectifier output voltage and current with high accuracy, with measurement accuracy up to $\pm 1\%$.
- **Comprehensive Alarm Functions:** Supports over-temperature, overvoltage, overcurrent, reference electrode failure, reverse polarity, open-circuit, overprotection, and under-protection alarms.
- **Remote Monitoring & Control:** Supports remote data transmission, enabling remote monitoring and remote control of system operation.
- **Reference Electrode Failure Response:** In the event of reference electrode failure, the system provides an alarm and can switch to a predefined safe control mode based on project requirements.

Transformer

The transformer reduces the incoming AC voltage to the required level before rectification into DC output. It also provides electrical isolation between the AC input power supply and the DC output circuit, supporting safe and reliable operation of the cathodic protection system.

Core Advantages:

- **High Efficiency:** Typically $\geq 95\%$ efficiency at rated load.
- **Insulation Reliability:** Designed with high insulation performance, with 35 kV insulation on the primary side and 2 kV insulation on the secondary side.
- **Short-Circuit Withstand Capability:** Designed to withstand short-circuit current impact of 25 kA for 3 seconds without damage.
- **Low Noise:** Operating noise level ≤ 50 dB.
- **Environmental Adaptability:** Suitable for a wide range of operating environments, with an allowable temperature rise of 100 K and a maximum temperature of 155°C.

Silicon Controlled Rectifier

The rectifier converts the stepped-down AC voltage into the DC output required by the cathodic protection system. As a high-power semiconductor switching device, the SCR is a key component affecting circuit reliability, efficiency, and application suitability.

Core Advantages:

- **Trigger Accuracy:** High trigger accuracy with good synchronization performance.
- **Fast Response:** Short conduction time of $\leq 10 \mu s$ and short-circuit commutated turn-off time of $\leq 20 \mu s$.
- **Wide Adjustment Range:** Supports full adjustment from minimum to maximum conduction angle.
- **Overload Capacity:** Capable of withstanding 1.5 times the rated current for one minute without obvious

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performance deterioration.

- **High-Temperature Resistance:** Designed for operation at temperatures up to 150°C.
- **Environmental Adaptability:** Available in industrial-grade configurations rated for -40°C to +85°C, with optional extended-temperature configurations rated for -55°C to +125°C. After high- and low-temperature cycling from -40°C to +125°C for 1,000 cycles, electrical parameter variation is ≤10%.

Switching-mode Power Supply Module

The switching-mode power supply module uses semiconductor switching technology to provide the required DC output. It generates the required DC voltage through high-frequency DC pulse conversion and regulates the output by adjusting the pulse duty cycle.

Core Advantages:

- **Output Precision:** Output voltage accuracy of ±0.1% and output current accuracy of ±0.5%.
- **Wide Adjustment Range:** Supports output voltage up to 0–60 V and output current up to 0–100 A.
- **High Efficiency:** Efficiency up to 90% under load.
- **Fast Response:** Module response time ≤ 100 μs.
- **Protection Functions:** Equipped with overvoltage, overcurrent, short-circuit, and over-temperature protection.
- **Environmental Adaptability:** Designed for operation from -40°C to +85°C, with stable output performance within the specified operating temperature range.

PRODUCT PARAMETERS

Environmental Parameters			
Environment Temperature	-30℃～+75℃	Customizable	
Relative Humidity	0～100%RH	Customizable	
Installation Location	Indoor	Outdoor	
Explosion-proof Requirements	Non-hazardous area version; Exd II BT4; Customizable		
Cooling Type	Air-cooling, oil-cooling		
Installation Method	Pedestal type, mounted type, wall type, pole type		
Power Input			
AC Power	Single-phase 220/230±10% V, 50/60±5% Hz	Three-phase 380/400±10% V, 50/60±5% Hz	Customizable
DC Power	12V, 24V, 36V		Customizable
Device Parameters			
User Interface	LCD Panel		
Rectifier Equipment	Silicon Controlled Rectifier, Switching-mode Power Supply Module, DC-DC Module		
Output Parameter	DC output voltage/current: Per model specification; customizable		
Output Channel Count	Single-channel, multi-channel		
Output Mode	Constant potential, constant current, on-off		
Operating Mode	Automatic, manual		

Control Range	-3V ~ +3V
Control Precision	Constant Potential: ≤ 10 mV; Constant Current: ≤ 1%
Enclosure Material	Painted steel, galvanized steel, stainless steel
Protection Level	IP 22~IP68 Optional
Enclosure Size	1120mm×960mm×780mm; 1055mm×750mm×1645mm; 800mm×800mm×800mm (Various specifications can be customized)
Enclosure Colour	Light gray, dark gray, natural stainless-steel colour (other customized colours available)
Protection	Overvoltage and Overcurrent Protection; Over Temperature Protection; Fault Protection
Alarm	Over temperature alarm; Over voltage alarm; Over current alarm; Reference failure alarm; Reverse polarity alarm; Open circuit alarm; Over protection alarm; Under-protection alarm

MODELS AND SPECIFICATIONS

Onshore Type

The onshore type is mainly used for impressed current cathodic protection of buried or aboveground steel structures, including buried pipelines, storage tanks, vessels, and related engineering facilities. These applications are typically exposed to less severe operating and corrosive environments than offshore or marine applications. Common specifications are listed below:

Application	Installation Location	Model	Output Voltage V	Output Current A
Tank Bottom	Indoor, non-hazardous area version	AT-TR-TBA1	30	10
	Indoor, non-hazardous area version	AT-TR-TBA2	50	50
	Indoor, non-hazardous area area version	AT-TR-TBA3	60	70
Buried Pipeline	Indoor, non-hazardous area version	AT-TR-BPA1	50	30
	Indoor, non-hazardous area version	AT-TR-BPA2	30	20
DC Interference Drain	Outdoor, non-hazardous area version	AT-TR-DCAP	30	10



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Offshore Type

The offshore type is mainly used for impressed current cathodic protection of marine and offshore steel structures, including docks, ship hulls, offshore platforms, and offshore wind power foundations. These applications are exposed to severe corrosive conditions, including seawater spray, marine atmosphere, and environmental pollutants; therefore, the equipment is designed with enhanced environmental protection and project-specific output capacity. Common specifications are listed below:

Application	Model	Output Voltage V	Output Current A
Ship Hull	AT-TR-SHA1	24	24
	AT-TR-SHA2	36	36
Pier Steel Pile	AT-TR-SPA1	40	40
Offshore Wind Power	AT-TR-OWA1	36	36
Offshore Platform	AT-TR-OPA1	24	24



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