

Industrial Rectifier SD Series



Industrial rectifier is an essential component in converting alternating current (AC) to direct current (DC) for a variety of industrial applications. These devices are crucial in industries where consistent and reliable DC power is required. Industrial rectifiers utilize silicon-controlled rectifiers (SCRs) or IGBT to achieve high efficiency and control over the output voltage and current.

Their robust design allows them to handle significant power loads and operate in harsh environments, ensuring that industrial processes can run smoothly and efficiently. Additionally, Hannibal industrial rectifiers are equipped with advanced features like remote monitoring and control, enhancing their functionality and integration into automated systems.

Industrial Battery Charger SD SERIES



Benefits

Continuous and Stable Power Supply:

SD Rectifiers ensure a reliable and uninterrupted power source, which is essential for the smooth operation of industrial equipment and processes.

Enhanced Energy Efficiency:

By converting alternating current (AC) to direct current (DC) efficiently, rectifiers minimize energy losses and improve overall system efficiency.

Flexibility integration with operating environment:

- Various solutions to operate with the differing input voltage networks (nominal value, tolerance, frequency).

- Dedicated fault and status loops for enhanced interfacing with existing DSP system.

Very high reliability:

The unique design provides forced fan cooling of both thyristors and the enclosure on most ratings to:

- Offer full power availability at the maximum design temperature.

- Enable high MTBF above 150 000 hours, with appropriate maintenance plan.

- Eliminate the need to replace hard to reach internal fans on power bridges.

Ruggedized solutions:

The system may be tailored to various environments, e.g. high temperatures, earthquakes or vibrations, dust, elevation, moisture.

Range Overview

Combined with stand-by battery, Hannibal rectifier-charger protects DC critical industrial load from the damaging effects of power interruptions and losses. It features a microprocessor control which offers exceptional output stability and allows adaptability to various application requirements.

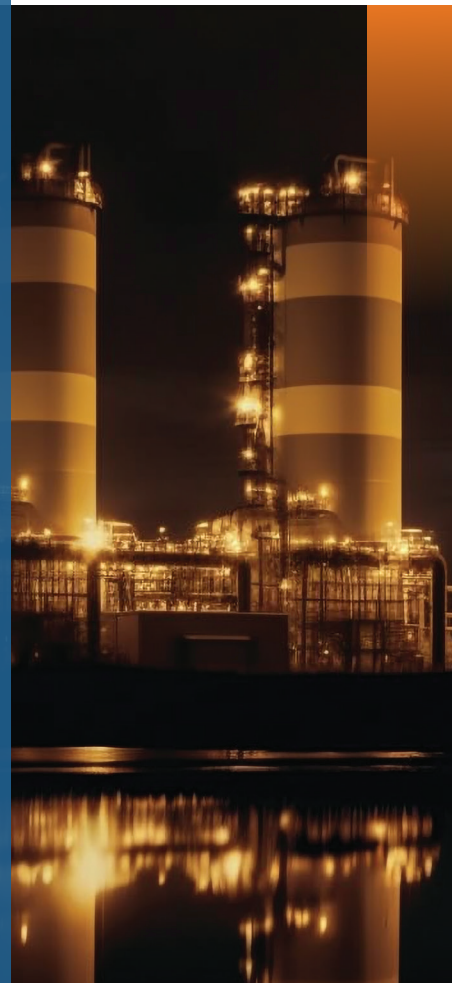
Hannibal range of rectifiers chargers is available from 30 A to 250 A with single-phase input, and from 30 A to 2500 A with three-phase input. It offers several output voltages from 24 Vdc to 384 Vdc.

Hannibal rectifier is also available with 400 Vdc output. This configuration can be combined with a inverter to design specific high ratings double conversion AC UPS systems (up to 500 kVA).

To further improve load availability and process reliability, Hannibal is able to operate in dual or trial parallel configuration, with single or dual batteries, and can include a DC bus-tie.

Applications

- Power generation plants.
- Transmission and Distribution.
- Substations.
- Continuous process industries.
- Oil & Gas and Petrochemical industries.
- Rail transport.
- Telecommunication Projects.



Main technical Features —

- Input Isolation Transformer: Galvanically isolated.
- Fast Control with DSP Controller: Ensures precise control.
- Thyristor/IGBT Technology: For efficient power conversion.
- Float Boost and Equalize Charge: For optimal battery charging.
- Auto and Manual Charge Mode: Flexible charging options.
- Voltage Ripple: Less than 1% (less than 4% on 1 phase).
- Alarm Adjustable Dry Contacts: For monitoring and alerts.
- ModBus Protocol: RS232, RS485 for communication.
- Operation Available While Mains Fail: Ensures continuous operation.
- Current Limiting: Adjustable to protect the system.
- Automatic Start & Fault Recovery: For easy maintenance.
- Smart Fault Diagnosing: For quick troubleshooting.
- Built-in Protection: For safety and reliability.
- Digital Processing: For setting all parameters.
- Monitoring via Front Panel Display: Easy to check system status.
- Built-in Intelligent Battery Management: For optimal battery health.
- Manual or Automatic High-Rate Charge: Flexible charging options.
- Alarm & Event Logger: With date and time-stamped logs.
- Large Communication Facility Options: For extensive connectivity.
- Add-on Options: 12 pulse rectifier, harmonic filter, etc.



Example for Rectifier 125 VDC-150A



Key Features

- Continuous operation at full load at 55 °C ambient to meet industrial-level reliability requirements.
- Resistance to vertical and horizontal acceleration up to 0.5 g using robust mechanical design.
- Designed for 20+ years of continuous operation with appropriate maintenance plan.
- Isolation transformer included.
- Full compatibility with lead-acid and nickel-cadmium batteries, sealed or vented.

Technical Data

Input	
Input Transformer	Galvanic isolation transformer class h (class f optional)
AC Voltage	
- Single phase	1 x 230 V (220, 240) ⁽¹⁾
- Three phase	3 x 400 V (380, 415) ⁽¹⁾
Voltage tolerance	+/- 15 %
Neutral configuration	With or without neutral
Frequency	50 Hz (60 Hz)
Frequency tolerance	+/- 5 %
Frequency range (temporary)	45 Hz to 65 Hz (with 50 Hz nominal)
Total harmonic current distortion (THDI)	< 30 % (6-pulse version) < 12 % (12-pulse version) ⁽²⁾ < 5% (IGBT version)
Inrush current	< 15 x I _n (for 6-pulse and 12-pulse)

Output					
Nominal DC voltage	24 V	48 V	110-125 V	220-240 V	400V
Output DC voltage range	17-40 V	36-75 V	88-160 V	176-300 V	296-550 V
Voltage stability					
- Unitary system	+/- 1 % ⁽³⁾				
- Parallel systems	+/- 1 % to +/- 2 % ⁽³⁾				
Voltage ripple	≤ 1 % RMS, in float mode, battery disconnected				

Battery	
Type	Lead acid or nickel cadmium, vented or recombination
Autonomy	From few minutes to several hours, on request
Battery current limitation (typical, float & boost modes)	- 0.1 C (lead-acid battery) - 0.2 C (nickel-cadmium battery)

General data

General data	
Operating temperature	0 to 40 °C ⁽¹⁾
Storage temperature	-20 to +70 °C
Relative humidity	< 95 % non condensing
Operating altitude	1000 m max without derating
Cooling	Forced Fan Cooling , Natural cooling on request»
Efficiency	Up to 96 % according to rating
External protection	IP 20 ⁽¹⁾ according to IEC 60529
Internal protection	Protection against unintentional direct contacts, as per IEC 60950-1
Noise (at 1m in front of the unit)	55 – 65 dB according to rating
Cabinet color	RAL 7035 ⁽¹⁾
Touch Panel " HMI"	Optional
Dimensions	Varying according to ratings & options

Single phase input : Output current (A) vs Output voltage (Vdc)

24 Vdc	48 Vdc	110-125 Vdc
15	15	15
60	60	60
100	100	100
160	160	160
250	250	250

Three phase input : Output current (A) vs Output voltage (Vdc)

24 Vdc	48 Vdc	110-125 Vdc	220-240 Vdc	400 Vdc
30	10	20 ⁽⁴⁾	30 ⁽⁴⁾	30
60	60 ⁽⁴⁾	50	50	600
100 ⁽⁴⁾	100 ⁽⁴⁾	100 ⁽⁴⁾	100 ⁽⁴⁾	100
120	125 ⁽⁵⁾	125 ⁽⁵⁾	125	120
160	160 ⁽⁴⁾	160	160	150
200 ⁽⁵⁾	200 ⁽⁵⁾	200 ⁽⁵⁾	200	200
250 ⁽⁴⁾	250 ⁽⁴⁾	250	250	250
320 ⁽⁵⁾	320 ⁽⁵⁾	320	320	300
400	400 ⁽⁴⁾	400	400	400
500 ⁽⁵⁾	500	500	500	500
600 ⁽⁴⁾	600 ⁽⁴⁾	600	600	600
800	800	800	800	800
1000 ⁽⁴⁾	1000	1000	1000	1000
1200	1200	1200	1200 ⁽⁵⁾	1200 ⁽⁵⁾
1500 ⁽⁴⁾	1600 ⁽⁵⁾	1600 ⁽⁵⁾	1600 ⁽⁵⁾	1600 ⁽⁵⁾
2000 ⁽⁴⁾	2000 ⁽⁵⁾	2000 ⁽⁵⁾	2000 ⁽⁵⁾	2000 ⁽⁵⁾
2500 ⁽⁴⁾	2400 ⁽⁵⁾	2400 ⁽⁵⁾	-	-

Standards

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IEC60146-1-1:2009	Semiconductor converters - Specification of basic requirements
IEC62040-1:2008 +AMD1:2013	Uninterruptible power systems (UPS) - Part 1-2: General and safety requirements for UPS in restricted access locations
IEC62040-2:2006	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements
IEC60529:1989 +AMD1:1999	Degrees of protection provided by enclosures (IP Code)
IEC60076-11:2004	Power transformers – Part 11: Dry type transformers

Conformity

Low voltage directive	2006/95/EC and 2014/35/EU
EMC directive	2004/108/EC and 2014/30/EU
CE Mark	

(1) Other value on request | (2) May vary between 10 and 14% according to operation conditions, Option for THDi ≈ 5% (+/- 1pt) available on 12-pulse version
(3) May vary depending on DC output voltage and system configuration | (4) 6-pulse version only | (5) 12-pulse version only

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Options

Consult us for any other requirements, subject to feasibility.

Rectifier

- . 12-pulse rectifier
- . IGBT Rectifier
- . Harmonic filter on 12P for THDi $\approx 5\%$ (+/- 1pt)
- . Surge and/or lightning protections
- . Rectifier output switch

Battery

- . Battery circuit protection box
- . Battery reversed polarity detection
- . Battery low-voltage disconnection contactor (LVD)
- . DC earth fault detection
- . Battery room temperature sensor
- . Battery monitoring system (Hannibal BMS)
- . Battery cabinet / rack

System

- . Operation in ambient temperature up to 55°C
- . Parallel configurations (dual, tri)
- . Hot stand-by configuration
- . Input/output isolators
- . Dropping diodes / DC/DC serial regulator
- . Isolated DC/DC converter
- . DC distribution
- . Earth fault detection or monitoring
- . Internal cabinet lighting
- . Anti-condensation heater
- . Cabinet temperature monitor

Mechanical

- . External ingress protection up to IP42
- . Top cable entry
- . Specified color of panels
- . Special feet height (200mm or 300mm)
- . Non-magnetic gland plate (brass or aluminum)
- . Lifting eyes
- . 2 mm side panels thickness
- . Specified cabinet identification (tag, nameplate)
- . Anti-seismic design

Communication

- . Touch pad Human-Machine Interface
- . Front panel analogue meters
- . Transducers 4-20mA
- . Additional volt-free contacts
- . Modbus RTU (RS232 or RS485)
- . Modbus / TCP / IP
- . Mimic panel:
 - . Passive mimic of the system
 - . Active mimic with integrated LEDs Lamp indicator on front panel (22 mm diameter)



Internal components

