

PRODUCT CATALOGUE 2025

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Hannibal
Power and Technology



ABOUT US

At Hannibal Power and Technology, we are proud to be a global leader in delivering innovative industrial power solutions tailored to your unique needs. Our expertise spans Low Voltage Power Control, encompassing state-of-the-art Industrial UPS systems, battery backup solutions, and advanced power management systems.

Hannibal ensures seamless operations and enhanced efficiency across various industries, including data centers, healthcare, telecommunications, oil and gas, and infrastructure. Our commitment to quality, innovation, and customer satisfaction ensures that you receive not just products, but transformative partnerships.

Choose Hannibal Power and Technology – where your requirements become powerful outcomes. Experience sustainability, reliability, and growth in the ever-evolving industrial landscape.



OUR HISTORY

Since 1968, Hannibal Power and Technology has been at the forefront of low-voltage power solutions, driven by a commitment to excellence and innovation. With global operations spanning from Hannibal, Missouri, to Valencia, Spain, and a state-of-the-art facility in Istanbul, Turkey, we are dedicated to meeting the diverse needs of our clients.

Our comprehensive portfolio includes Industrial UPS, battery chargers, inverters, static transfer switches, voltage regulators, and static frequency converters. Trust Hannibal Power and Technology to provide reliable, customized solutions that empower your industry and shape the future of power technology.



Our MISSION and VISION



INNOVATIVE EXCELLENCE

Deliver power solutions using top-quality materials and advanced technologies.



SETTING INDUSTRY STANDARDS

Push the boundaries of innovation to create products that define new benchmarks.



CONTINUOUS SUPPORT

Commit to ongoing customer support, ensuring reliability and durability in every solution.

Global Presence:

Our Work Across Countries



 Oman	 Morocco	 Malaysia
 Qatar	 France	 Indonesia
 Saudi Arabia	 Germany	 Tanzania
 Bahrain	 Netherland	 Uganda
 Tunis	 United Kingdom	 Turkmenistan
 Algeria	 Vietnam	 Azerbaijan
 Argentina	 Mexico	 Peru
 Kenya	 Chile	 USA (Missouri)
 Singapore	 Pakistan	 India
 Egypt	 Jordan	 Brazil
 Turkey	 Russia	 UAE



Hannibal
Power and Technology

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Hannibal
Power and Technology

Industrial Products

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.

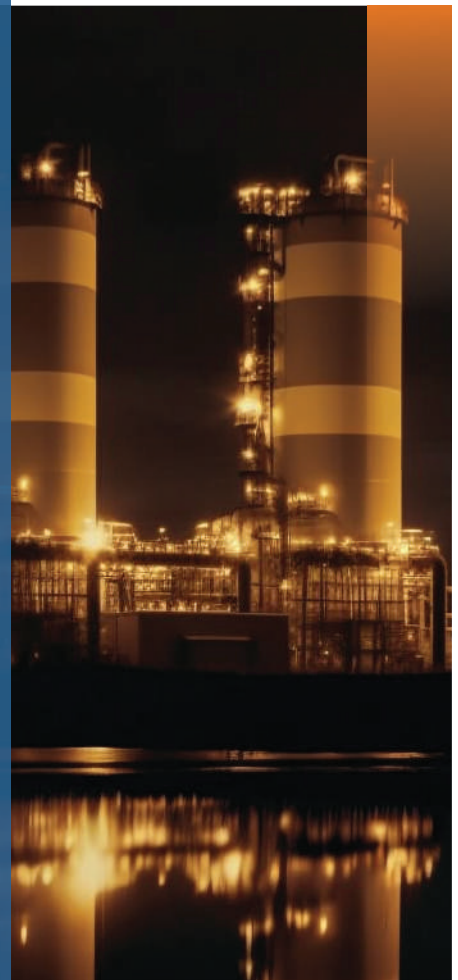
Hannibal range of rectifiers chargers is available from 30 A to 250 A with single-phase input, and from 30 A to 2500 A with three-phase input. It offers several output voltages from 24 Vdc to 384 Vdc.

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 tri 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 f (class h 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) < 30 % (6-pulse version) < 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

Single 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

Standards

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

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, trial)
- . 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

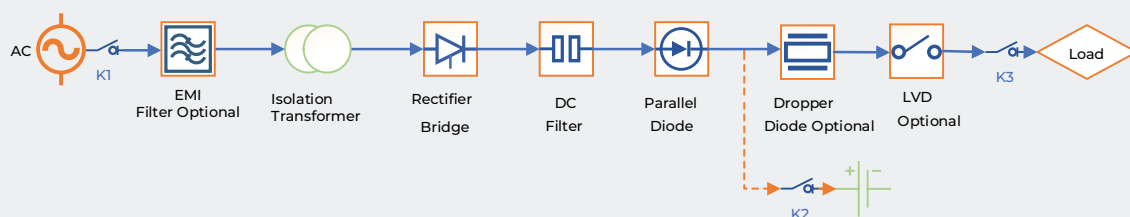
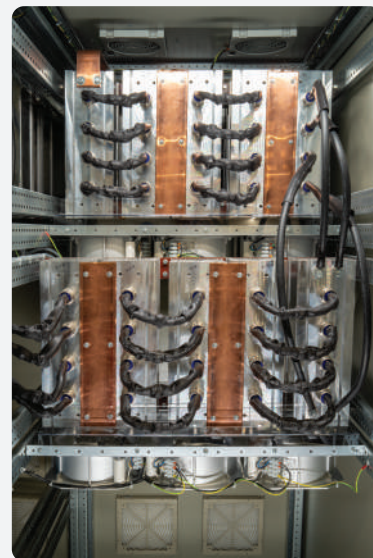
- . External ingress protection up to IP42
- . Top cable entry
- . Specified color of panels
- . Special feet height (200mm or 300mm)
- . Non-magnetic gland plate (brass or aluminum)
- . Lifting eyes
- . 2 mm side panels thickness
- . Specified cabinet identification (tag, nameplate)
- . Anti-seismic 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
- . Mimic panel:
 - . Passive mimic of the system
 - . Active mimic with integrated LEDs Lamp indicator on front panel (22 mm diameter)



Internal components



Industrial UPS PL Series



Industrial Uninterruptible Power Supply (UPS) is a critical component in various sectors, designed to provide reliable backup power and ensure the continuity of operations during power outages or fluctuations.

Industrial UPS systems are engineered to handle high power demands and are often equipped with advanced features such as real-time monitoring, battery management, and scalability to meet the growing needs of an operation. By stabilizing power supply and protecting sensitive equipment from voltage spikes or drops, industrial UPS units play a vital role in maintaining operational efficiency and safeguarding critical processes.

Industrial UPS PL SERIES



Benefits

Strengthened reliability:

- Streamlined cooling design for airflow optimization.
- Reduced operation temperature of critical components.

Improved maintainability:

- "True" front access to all replaceable components to reduce MTTR.
- Simplified design of major subassemblies to allow complete replacement in minutes.
- Easier maintenance of paralleled systems thanks to unique Hannibal Smart Parallel Switching function.

Increased availability:

- Multiplied redundancy with Hannibal Smart Parallel Switching function that dynamically controls paralleled systems.
- built- in static and manual bypass switch and LCD display.
- Remote support from experts to efficiently update settings as required.

Industrial grade inverters:

- Industrial grade inverters are based on transformer technology for robustness and endurance. The output isolation transformer protects the semiconductors against peak currents and distortion, supplying short circuit currents and filtering noise. Transformer based technologies offer therefore a longer service life and higher degree of protection.

Range Overview

Hannibal is a system range based on SCR/IGBT technology with proven digital control. It is available from 2.5 to 250 kVA in single-phase output version and from 5 to 500 kVA in three-phase output version. It is configurable with a set of industrial options such as custom protection devices, bypass transformer and/or stabilizer, various communication solutions, etc. Designed as an industrial system, it includes most frequently specified features as default, for example dual cooling channel, input and output transformers, conformal coating of all printed circuit boards, halogenfree flame retardant internal cables. The architecture of the system allows the segregation of different pre-defined functions that help to increase personnel safety on site as well as improve overall system availability. As part of Hannibal solution, we offer the calculation and set up of a system with various industrial style batteries (VRLA, sealed, NiCd, Li-Ion, Sodium) as well as low-voltage.



Applications

- Oil and Gas industries, offshore and onshore.
- Refining and petrochemical plants.
- Power generation plants.
- Rail transport.
- Process industries.



PL industrial UPS advantage: —

- Output Power factor 0.8 / 0.9.
- Inverter bridge with IGBT technology.
- Output galvanic separation transformer.
- No DC component can be present on the output.
- Designed based on industry requirement.
- Fault tolerant in control and power.
- Best price / Performance ratio.
- Highest reliability.
- Possibility of customization.

Front panel LED Standard: —

- Operation.
- Battery operation.
- General Alarm.
- Inverter failure.
- DC Voltage High.
- DC Voltage Low.
- High Temperature.
- Bypass out of limits.
- Output out of limits.



The above illustrations show some examples of finished systems. As each system is customized to specification, the internal layout might be different for different units.



Technical Data

Input	
Rectifier Bridge Topology	- Thyristor 6 Pulses - Standard - Thyristor 12 Pulses- Optional - IGBT - Optional
Input Voltage -Single Phase	110/120/200/220/240/277 V
Input Voltage -Three Phase	208/220/240/380/400/415/480 V
Voltage tolerance	+/- 15 %
Frequency	50 Hz (60 Hz)
Efficiency	90%
Power Factor	0.8
THD	<30% for 6 pulses Rectifier - <12% for 12 Pulses version
Inrush current	$\leq 10 \times I_n^{(4)}$
Float Voltage	- 2.17-2.27 V/cell VRLA - 1.4-1.42 V/cell Ni cd
Boost Voltage	- 2.25-2.4 V/cell VRLA - 1.55-1.65 V/cell Ni cd
Ripple	<5% 1Ph <2% 3Ph
Battery	
Type	Lead acid or nickel cadmium, vented or recombination
Autonomy	From few minutes to several hours, on request
Battery current limitation	1- 0.1 C (lead-acid battery) 2- 0.2 C (nickel-cadmium battery)

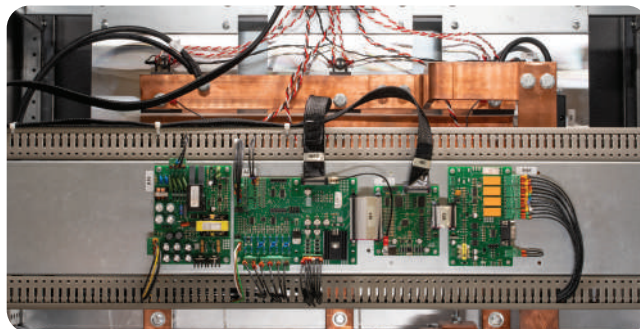
Output	
Inverter Bridge Topology	IGBT with output isolation Transformer
AC Voltage Single phase Three phase	1 x 230 V (220, 240) ; 1 x 110 V (115, 120) ⁽⁴⁾ 3 x 400 V (380, 415) ; 3 x 220 V (200, 208, 230) ⁽⁴⁾
AC Voltage Tolerance	1%
Frequency	50 Hz (60 Hz)
Frequency Tolerance	+/- 0.05 %
Inverter overload capability	
- 1 minute - 10 minutes	150 % of nominal power 125 % of nominal power
Short circuit clearance (in % of nominal current)	
- 1-ph output - 3-ph output Ph-N: - 3-ph output Ph-Ph:	250 % / 100ms - 175% / 5s 315 % / 100 ms - 220 % / 5s 190 % / 100 ms - 135 % / 5 s
Harmonic voltage distortion	
- With 100 % linear load - With 100 % non-linear load	<3 % <5%
Power Factor	0.8
Efficiency	90%
Allowable crest factor	up to 3/1
Static Transfer Switch	SCR Type
Static Bypass transfer Time	<4 ms
Maintenance Bypass switch	Isolator

General Data

Title	
Rectifier Bridge Topology	- Thyristor 6 Pulses - Standard - Thyristor 12 Pulses- Optional - IGBT - Optional
Operating temperature	0 to 40° C ⁽⁴⁾
Storage temperature	< 95 % non condensing
Operating altitude	1000 m max without derating ⁽⁴⁾
Cooling	Fan Forced, free cooling -Optional
MTBF	<150,000 h
External protection	IP 20 ⁽⁴⁾ according to IEC 60529
Internal protection	Protection against unintentional direct contacts as per IEC 60950-1/62477-1
Noise (at 1m in front of the unit)	60 – 75 dB according to rating
Cabinet colour	RAL 7035 ⁽⁴⁾
Touch Panel " HMI"	Standard
Communication	- RTU RS485-Standard - TCP/ IP - Optional
Conformity	
Low voltage directive	2006/95/EC and 2014/35/EU
EMC directive	2004/108/EC and 2014/30/EU
CE Mark	

Standards

Standards	
IEC62040-1:2017	Uninterruptible power systems (UPS) - Part 1: Safety requirements
IEC62040-2:2016	Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements
IEC62040-3:2011	Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements
IEC61439-1:2011	Low voltage switchgear and controlgear assemblies - Part 1: General rules
IEC60529:1989 +AMD1:1999	Degrees of protection provided by enclosures (IP Code)
IEC60076-11:2004	Power transformers – Part 11: Dry type transformers



- 3-ph output only
(1) at power factor 0.8 lagging
(2) 1-ph output only

(3) Up to 250 kVA 1-ph output or up to 500kVA 3-ph output on request

(4) other available on request
(5) derating may apply

Options

Consult us for any other requirements, subject to feasibility

Rectifier charger

- . 12-pulse rectifier
- . IGBT Rectifier
- . Harmonic filter on 12P for THDi $\approx 5\%$ (+/- 1pt)
- . Other input voltage (3 x 190 to 3 x 690 VAC)
- . Surge and/or lightning protections
- . Rectifier output switch

Battery line

- . Battery reversed polarity detection
- . Battery low-voltage disconnection
- . DC earth fault detection
- . Battery black start
- . Battery room temperature sensor
- . Battery cabinet / rack

System

- . Dual distributed parallel configuration with one or two reserve lines
- . Input / output isolators
- . AC distribution
- . AC earth fault detection or monitoring
- . Internal cabinet lighting
- . Anti-condensation heater
- . UPS cabinet temperature monitor

Bypass line

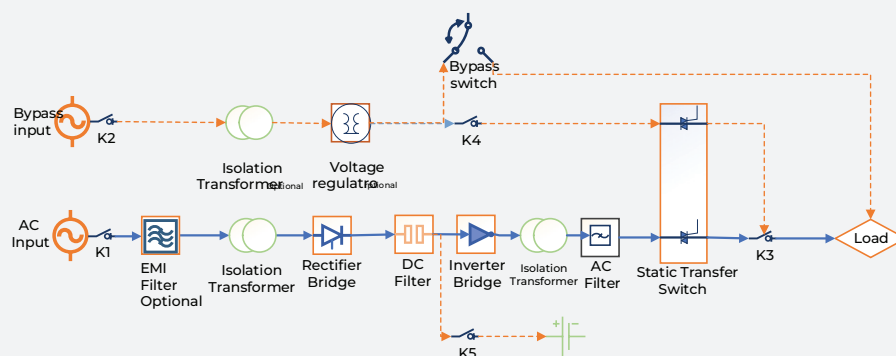
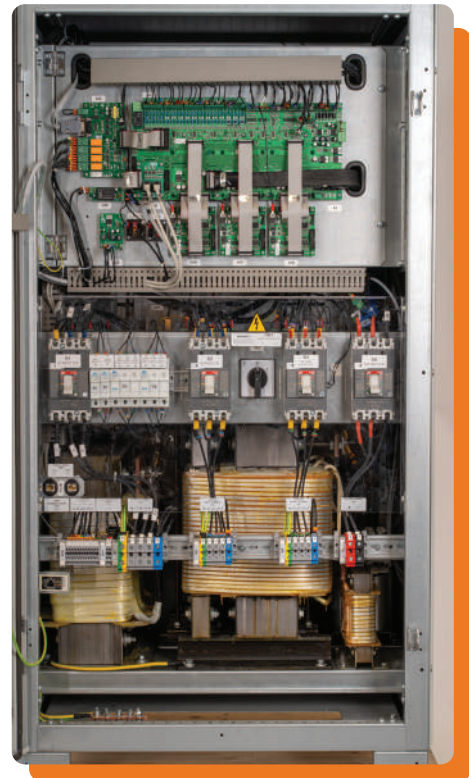
- . Bypass isolator(s)
- . Bypass transformer (H class)
- . Bypass stabilizer (servo-controlled)
- . Backfeed protection
- . Surge and/or lightning protections

Communication

- . Front panel analogue meters (72x72, class 1.5)
- . Transducers 4-20mA
- . Additional volt-free contacts
- . Modbus / TCP
- . IEC61850 protocol
- . monitoring software
- . Mimic panel:
 - Passive mimic of the system
 - Active mimic with integrated LEDs Lamp indicator on front panel (22 mm diameter)

Mechanical

- . External ingress protection up to IP42
- . Top cable entry
- . Specified color of panels
- . Special feet height (200mm or 300mm)
- . Special keylock
- . Non-magnetic gland plate (brass or aluminum)
- . Specified cabinet identification (tag, nameplate)



Industrial Inverter



In the dynamic world of industrial applications, Hannibal industrial inverters stand out as essential components for converting direct current (DC) into reliable alternating current (AC). Designed to manage high power loads, they are integral to manufacturing, Power generation, and large-scale data centers.

Experience enhanced energy efficiency and operational continuity with our advanced inverters, featuring remote monitoring, fault diagnosis, and automated control. Their robust design ensures stability in fluctuating conditions, making them indispensable for your industrial systems.

Industrial Inverter INV SERIES



Benefits

Unrivalled adaptability to existing site conditions, thanks to the wide input DC voltage range:

- Compatibility with any battery configuration already installed on site.
- Optimum operation with DC bus having a wide voltage excursion.

Technical and budgetary optimization of the battery: On greenfield or brownfield projects where battery may represent an important part of the system total price, the wide input DC voltage range allows:

- Optimization of the number of battery cells as per the input tolerance of the loads to be secured.
 - Optimization of the battery capacity and therefore the price, as per the required autonomy.
- Smart access to inverter data:
- User interface with large, colour touchscreen.
 - Embedded event logger (up to 2000 events) and capability to export recorded events via USB stick.

Easy maintenance and serviceability:

- Full front access for easy maintenance and a very low mean time to repair (MTTR), achieving the highest possible availability.

Features

Reliability: Unique design which allows the UPS to continuously operate for at least 20 years at full load at 40 °C.

Robust mechanical design: the system withstands vertical and horizontal acceleration stress tests 0.5g as standard.

Galvanic isolation: output transformer is included as standard
Remote monitoring solutions: Modbus, Profibus, Ethernet, IEC61850, volt-free contact, monitoring software.

Range Overview

Hannibal inverter converts a DC input voltage (from batteries or from a DC bus) into a perfect sinusoidal output voltage to provide power to critical AC loads.

It uses the patented digital Vector Control technology which increases the performances of power components, enables an active conditioning of the load and allows personalized system settings. The result is improved reliability for the process and enhanced safety for the personnel.

Hannibal range offers a wide choice of DC input voltages (from 110 Vdc to 240 Vdc) and of output voltages. It is available from 5 kVA to 250 kVA in single- phase output configuration, and from 5 kVA to 320 kVA in three-phase output configuration.

Hannibal inverter is also available with 400 Vdc input. To further improve load availability and process reliability, Hannibal is able to operate in dual parallel configuration, with centralized or distributed reserve line, and can include an AC bus-tie.



Applications

- Oil & Gas.
- Power Generation.
- Transportation.
- Water Desalination.
- Chemical Industries.
- Marine.
- Other Heavy Industries.

Technical Data

Input	
AC Bypass Voltage	1 x 230 V (220, 240) ; 1 x 110 V (115, 120) ⁽³⁾ 3 x 400 V (380, 415) ; 3 x 220 V (200, 208, 230) ⁽³⁾
DC voltage	24/48/110/125/220/384 VDC
Output	
AC Voltage - Single phase - Three phase	1 x 230 V (220, 240) ; 1 x 110 V (115, 120) ⁽⁴⁾ 3 x 400 V (380, 415) ; 3 x 220 V (200, 208, 230) ⁽⁴⁾
Frequency	50 Hz (60 Hz)
Frequency stability - With internal oscillator - With reserve synchronism	+/- 0.05 % +/- 3 % (from 1 to 5 % adjustable)
Voltage stability (for 0 to 100 % load variation)	
- Static - Dynamic	+/- 1 % (+/- 2 % for parallel systems) VFI SS 11 as per IEC/EN 62040-3:2021, class 1
Inverter overload capability	
- 1 minute - 10 minutes	150 % of nominal power 125 % of nominal power
Short-circuit clearance (in % of nominal current)	
- 1-ph output Ph-N: - 3-ph output Ph-N(ik1): Ph-Ph(ik2): Ph-Ph(ik3):	250 % / 100ms - 180% / 5s 315 % / 100 ms - 220 % / 5s 190 % / 100 ms - 135 % / 5s 225 % / 100 ms - 135% / 5 s
Harmonic voltage distortion - With 100 % linear load - With 100 % non-linear load	< 3 % SS as per IEC/EN 62040-3
Allowable power factor	0,5 lagging to 0,5 leading
Allowable crest factor	Up to 3/1

General data

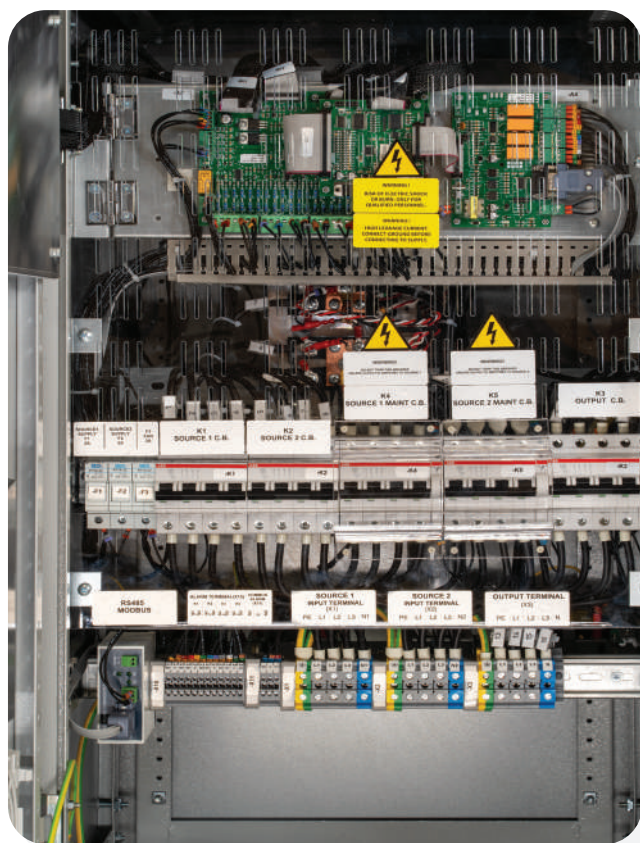
General data	
Operating temperature	0 to 40 °C ⁽³⁾
Storage temperature	-20 to +70 °C
Relative humidity	< 95 % non condensing
Operating altitude	1000 m max without derating
Cooling	Forced ventilation
Efficiency	Up to 94 % according to rating
External protection	IP 21 ⁽³⁾ according to IEC 60529
Internal protection	Protection against unintentional direct contacts, as per IEC 60950-1
Noise (at 1m in front of the unit)	60-72 dB according to rating
Cabinet color	RAL 7035 ⁽³⁾
Dimensions	Varying according to ratings and options

Standards

Standards	
IEC62040-1:2017 +AMD1:2013	Uninterruptible power systems (UPS) - Part 1-2: General and safety requirements for UPS in restricted access locations
IEC62040-2:2016	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements
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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 & UKCA Mark	



Options

Consult us for any other requirements, subject to feasibility

Inverter

- . Automatic precharge of capacitors
- . AC distribution
- . Inverter oversizing

Bypass line

- . Bypass transformer (H class)(3)
- . Bypass stabilizer (servo-controlled)
- . Backfeed protection (standard option)

System

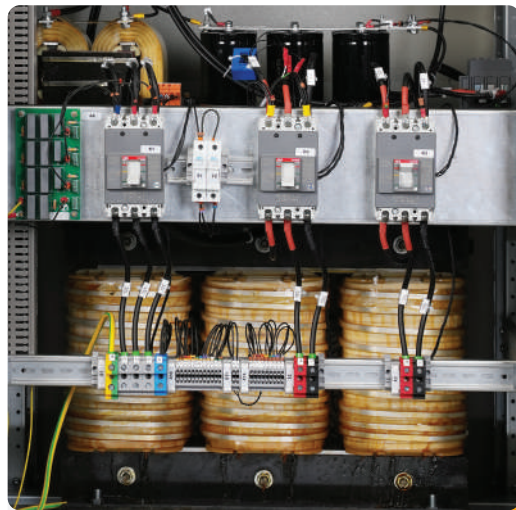
- . Inverter with or without bypass line
- . Parallel configurations
- . Earth fault detection or monitoring
- . Internal lighting
- . Anti-condensation heater
- . Cabinet temperature monitor

Mechanical

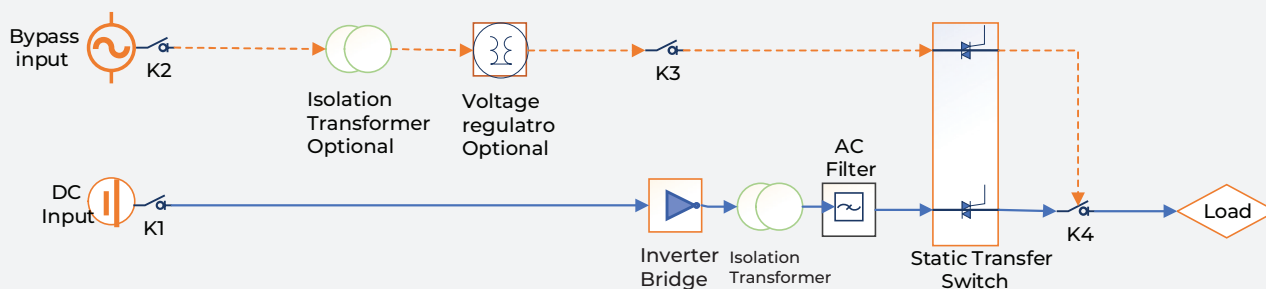
- . External ingress protection up to IP42
- . Top cable entry
- . Specified color of panels
- . Special feet height (200mm or 300mm)
- . Special keylock
- . Non-magnetic gland plate (brass or aluminum)
- . Lifting eyes
- . Specified cabinet identification (tag, nameplate)
- . Anti-seismic design on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

Communication

- . Front panel analogue meters (72x72, class 1.5 or class 1)
- . Transducers 4-20mA
- . Additional volt-free contacts, 5 in standard, up to 20 in option
- . Modbus RTU (RS232 or RS485)
- . Modbus / TCP
- . Profibus
- . IEC61850 protocol
- . PPVis monitoring software
- . Mimic panel on front:
 - Passive mimic of the system
 - Active mimic with integrated LEDs Lamp indicators on front panel (22 mm diameter)



- (1) at power factor 0.8 lagging
- (2) 3-ph output only
- (3) other available on request
- (4) derating may apply



Semi-Industrial UPS PLM Series



The state-of-the-art, double-conversion topology and “building block” design of the Uninterruptible Power Supply (UPS), PLM series is flexible. The system ensures the continuous availability of power and safe operations for all types of critical loads.

With an expected lifetime of at least 20 years, the PLM Series is a robust, cost-effective solution.

Key Features

- IGBT rectifier at the core of the best-in-class reliability.
- Reduced inrush current $\leq 10 \times I_n$ to avoid oversizing upstream protection and 2-step strat-up.
- $< 3\%$ THDI.
- Smart access to UPS data via a large color touchscreen with 2000-event exportable log.
- Unmatched overload and short-circuit capacity at 315% for 100ms*.

Technical Data

Input	
Rectifier Bridge Topology	IGBT
Input Voltage	380/400/415 V
Voltage tolerance	+/- 15 %
Frequency	50 Hz (60 Hz)
Frequency tolerance	+/- 5 %
Efficiency	99%
Power Factor	0.99
THD	$< 3\%$
Inrush current	$\leq 10 \times I_n^{(4)}$
Float Voltage	- 2.17-2.27 V/cell VRLA - 1.4-1.42 V/cell Ni cd
Boost Voltage	- 2.25-2.4 V/cell VRLA - 1.55-1.65 V/cell Ni cd
Ripple	$< 1\%$

Battery	
Type	Lead acid or nickel cadmium, vented or recombination
Autonomy	From few minutes to several hours, on request
DC Bus Voltage	480 VDC
Battery current limitation	- 0.1 C (lead-acid battery) - 0.2 C (nickel-cadmium battery)

Output	
Inverter Bridge Topology	IGBT with output isolation Transformer
AC Voltage	1 x 230 V (220, 240) ; 1 x 110 V (115, 120) ⁽⁴⁾ 3 x 400 V (380, 415) ; 3 x 220 V (200, 208, 230) ⁽⁴⁾
AC Voltage Tolerance	1%
Frequency	50 Hz (60 Hz)
Frequency Tolerance	+/- 0.05 %
Inverter overload capability	
- 1 minute	150 % of nominal power
- 10 minute	125 % of nominal power
Short circuit clearance (in % of nominal current)	
- 1-ph output	250 % / 100ms - 175% / 5s
- 3-ph output Ph-N:	315 % / 100 ms - 220 % / 5 s
- 3-ph output Ph-Ph:	190 % / 100 ms - 135 % / 5 s
Harmonic voltage distortion	
- With 100 % linear load	$< 3\%$
- With 100 % non-linear load	$< 5\%$
Power Factor	0.9
Efficiency	95%
Allowable crest factor	up to 3/1
Static Transfer Switch	SCR Type
Static Bypass transfer Time	< 4 ms

General Data

Title	
Operating temperature	0 to 40 °C ⁽⁴⁾
Storage temperature	-20 to +70 °C
Relative humidity	< 95 % non condensing
Operating altitude	1000 m max without derating ⁽⁴⁾
Cooling	Fan Forced, free cooling -Optional
MTBF	$< 150,000$ h
External protection	IP 20 ⁽⁴⁾ according to IEC 60529
Internal protection	Protection against unintentional direct contacts, as per IEC 60950-1/62477-1
Noise (at 1m in front of the unit)	60 – 75 dB according to rating
Cabinet colour	RAL 7035 ⁽⁴⁾
Touch Panel " HMI"	Optional
Communication	- RTU RS232-Standard - RTU RS485-Optional - TCP/ IP - Optional
Dimensions	Varying according to ratings and options

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

Standards

Standards	
IEC62040-1:2017	Uninterruptible power systems (UPS) - Part 1: Safety requirements
IEC62040-2:2016	Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements
IEC62040-3:2011	Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements
IEC61439-1:2011	Low voltage switchgear and controlgear assemblies - Part 1: General rules
IEC60529:1989 +AMD1:1999	Degrees of protection provided by enclosures (IP Code)
IEC60076-11:2004	Power transformers – Part 11: Dry type transformers

* 3-ph output only
(1) at power factor 0.8 lagging

(4) other available on request
(5) derating may apply

Options

Consult us for any other requirements, subject to feasibility

Rectifier charger

- . Harmonic filter
- . Surge and/or lightning protections

Battery line

- . Battery circuit protection box
- . Battery reversed polarity detection
- . Battery low-voltage disconnection
- . DC earth fault detection
- . Battery black start
- . Battery room temperature sensor
- . Battery cabinet / rack

System

- . Inverter with or without bypass line
- . Parallel configurations

Bypass line

- . Bypass isolator(s)
- . Bypass transformer (H class)
- . Bypass stabilizer (servo-controlled)
- . Backfeed protection
- . Surge and/or lightning protections

Communication

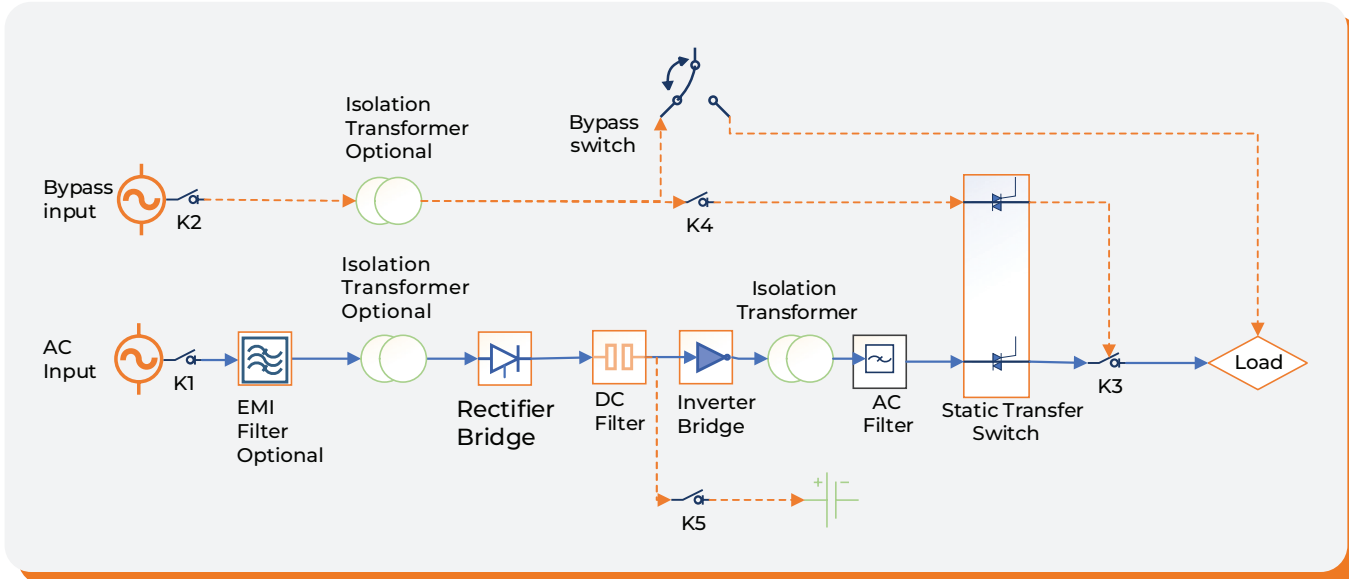
- . Additional volt-free contacts
- . Modbus / TCP
- . IEC61850 protocol
- . Monitoring software

Mechanical

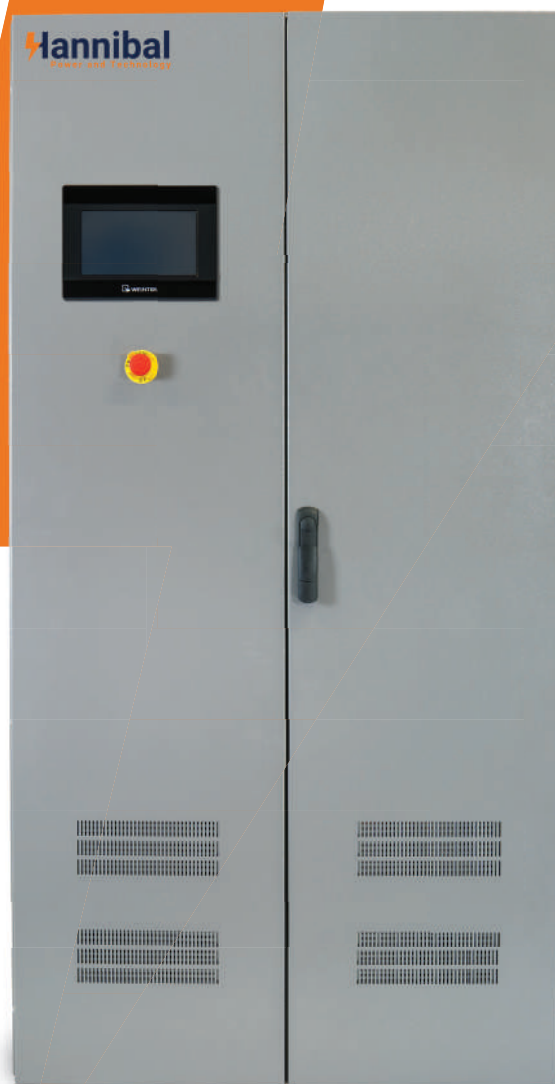
- . Specified color of panels
- . Special feet height (200mm or 300mm)
- . Special keylock
- . Non-magnetic gland plate (brass or aluminum)
- . Specified cabinet identification (tag, nameplate)

Applications

- Data center
- Telecom
- Financial services
- Security and surveillance system
- Automatic control system
- Building management
- Manufacturing process control
- Petro Chemical Industry



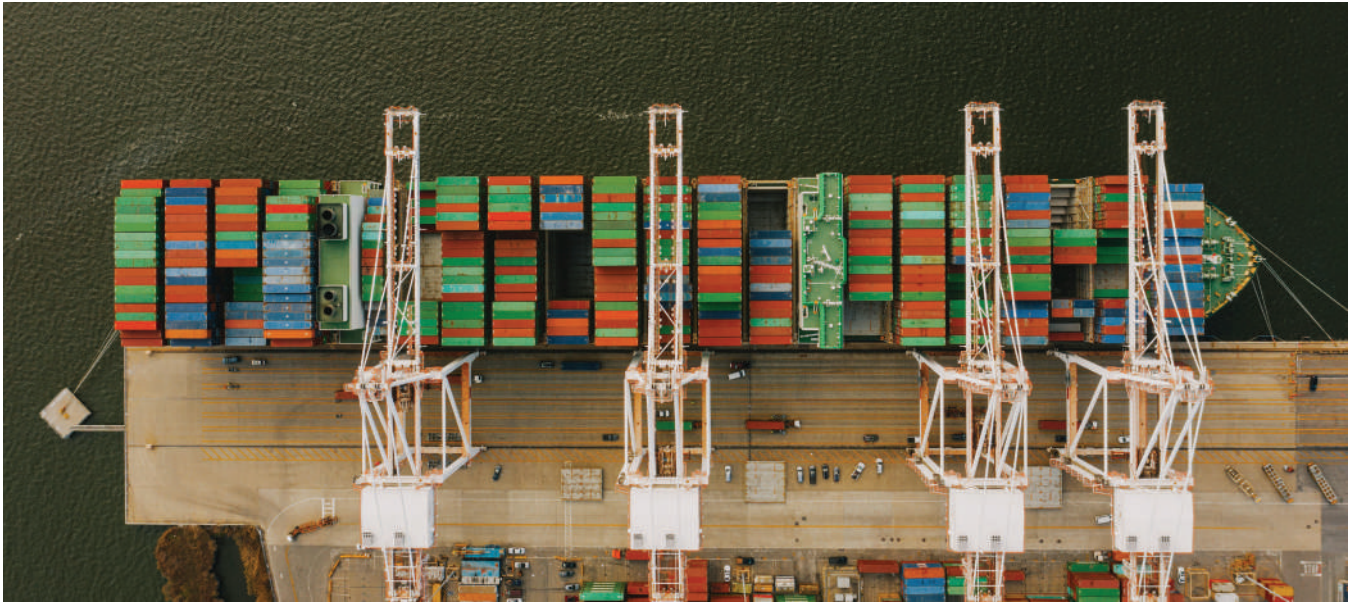
Industrial Static Frequency Converter FC Series



Industrial frequency converter, also known as a frequency changer, is a device that alters the electrical frequency of power supplied to industrial machinery and equipment. It plays a crucial role in various industrial applications where equipment designed for one frequency needs to be operated on a different frequency power supply.

Frequency converters can be static (electronic circuits) or rotary (motor-generator). They enable regional compatibility, improve energy efficiency, reduce equipment wear, and enhance motor speed control for smoother, more flexible industrial operations.

Industrial Frequency converter FC SERIES



Benefits

Strengthened reliability:

- Streamlined cooling design for airflow optimization.
- Reduced operation temperature of critical components.

Improved maintainability:

- "True" front access to all replaceable components to reduce MTTR.
- Simplified design of major subassemblies to allow complete replacement in minutes.
- Easier maintenance of paralleled systems thanks to unique Hannibal Smart Parallel Switching function.

Increased availability:

- Multiplied redundancy with Hannibal.
- Smart Parallel Switching function that dynamically controls paralleled systems.
- Remote support from experts to efficiently update settings as required.

Industrial grade inverters

- Industrial grade inverters are based on transformer technology for robustness and endurance. The output isolation transformer protects the semiconductors against peak currents and distortion, supplying short circuit currents and filtering noise. Transformer based technologies offer therefore a longer service life and higher degree of protection.

Range Overview

Hannibal system range is based on SCR/IGBT technology with proven digital control. It is available from 2.5 to 250 kVA in single-phase output version and from 5 to 600 kVA in three-phase output version. It is configurable with a set of industrial options such as custom protection devices, bypass transformer and/or stabilizer, various communication solutions, etc.

Designed as an industrial system, it includes most frequently specified features as default, for example dual cooling channel, input and output transformers, conformal coating of all printed circuit boards, halogenfree flame retardant internal cables.

The architecture of the system allows the segregation of different pre-defined functions that help to increase personnel safety on site as well as improve overall system availability.

Applications

- Marine and ports.
- Industry.
- Military.
- Mining.
- Transportation.



FC industrial Frequency converter advantage:

- Compact design, high power density.
- No moving elements - low maintenance.
- High reliability and availability.
- Precise output frequency generation.
- Remote monitoring and control through Ethernet, Modbus TCP/IP protocols.
- Flexible in-built features.
- Optional operation with battery.
- Highly customizable.
- Easy maintenance and serviceability.

Front panel LED Standard:

- Operation.
- General Alarm.
- Inverter failure.
- High Temperature.
- Output out of limits.



The above illustrations show some examples of finished systems. As each system is customized to specification, the internal layout might be different for different units.



Key Features

- 6- or 12-pulse thyristor rectifier at the core of the best-in-class reliability.
- Reduced inrush current $\leq 10 \times I_n$ to avoid oversizing upstream protection and 2-step strat-up.
- <10% THDI in 12-pulse SCR system is possible without additional harmonic filters.
- <5% THDI in IGBT Base system is possible with additional harmonic filters.
- Smart access to FC data via a large color touchscreen with 2000-event exportable log.
- Unmatched overload and short-circuit capacity at 315% for 100ms*.

Technical Data

Input	
Rectifier Bridge Topology	- Thyristor 6 Pulses - Standard - Thyristor 12 Pulses- Optional - IGBT - Optional
Input Voltage -Single Phase	110/120/200/220/240/277 V
Input Voltage -Three Phase	208/220/240/380/400/415/480 V
Voltage tolerance	+/- 15 %
Frequency	50 Hz (60 Hz)
Frequency tolerance	+/- 5 %
Efficiency	90% to 95%
Power Factor	0.8
THD	<30% for 6 pulses Rectifier - <12% for 12 Pulses version
Inrush current	$\leq 10 \times I_n(4)$
Ripple	- <5% 1Ph - <2% 3Ph

Output	
Inverter Bridge Topology	IGBT with output isolation Transformer
AC Voltage - Single phase - Three phase	1 x 230 V (220, 240) ; 1 x 110 V (115, 120) ⁽⁴⁾ 3 x 400 V (380, 415) ; 3 x 220 V (200, 208, 230) ⁽⁴⁾
AC Voltage Tolerance	1%
Frequency	50 Hz (60 Hz)
Frequency Tolerance	+/- 0.05 %
Inverter overload capability	
- 1 minute - 10 minute	150 % of nominal power 125% of nominal power
Short circuit clearance (in % of nominal current)	
- 1-ph output - 3-ph output Ph-N: - 3-ph output Ph-Ph:	250 % / 100ms - 175% / 5s 315 % / 100 ms - 220 % / 5 s 190 % / 100 ms - 135 % / 5 s
Harmonic voltage distortion	
- With 100 % linear load - With 100 % non-linear load	< 3% SS as per IEC/EN 62040-3
Power Factor	0.8
Efficiency	90%
Allowable crest factor	up to 3/1

General Data

Title	
Operating temperature	0 to 40 °C ⁽⁴⁾
Storage temperature	-20 to +70 °C
Relative humidity	< 95 % non condensing
Operating altitude	1000 m max without derating ⁽⁴⁾
Cooling	Fan Forced, free cooling -Optional
MTBF	<150,000 h
External protection	IP 20 ⁽⁴⁾ according to IEC 60529
Internal protection	Protection against unintentional direct contacts, as per IEC 60950-1/62477-1
Noise (at 1m in front of the unit)	60 – 75 dB according to rating
Cabinet colour	RAL 7035 ⁽⁴⁾
Touch Panel " HMI"	Optional
Communication	- RTU RS232-Standard - TCP/ IP – Optional - RTU RS485- Optional
Dimensions	Varying according to ratings and options

Standards

Standards	
IEC62040-1:2017	Uninterruptible power systems (UPS) - Part 1: Safety requirements
IEC62040-2:2016	Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements
IEC62040-3:2011	Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements
IEC61439-1:2011	Low voltage switchgear and controlgear assemblies - Part 1: General rules
IEC60529:1989 +AMD1:1999	Degrees of protection provided by enclosures (IP Code)
IEC60076-11:2004	Power transformers – Part 11: Dry type transformers
* 3-ph output only (1) at power factor 0.8 lagging (2) 1-ph output only	(3) Up to 250 kVA 1-ph output or up to 500kVA 3-ph output on request (4) (5)

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

Options

Consult us for any other requirements, subject to feasibility

Rectifier charger

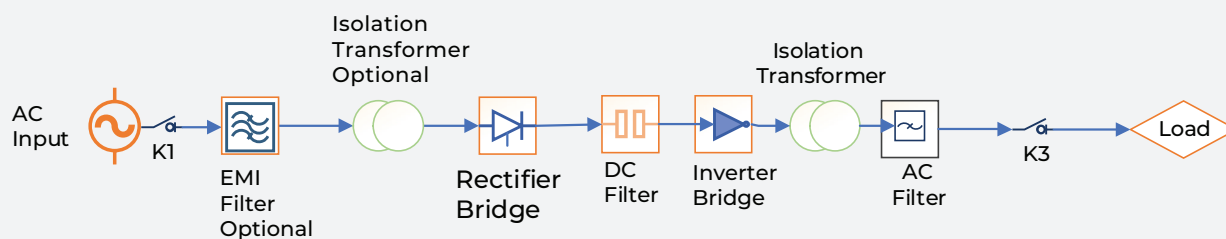
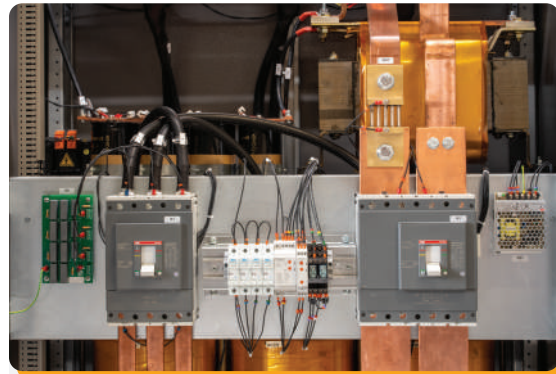
- . 12-pulse rectifier
- . IGBT Rectifier
- . Harmonic filter on 12P for THDi $\approx 5\%$ (+/- 1pt)
- . Other input voltage (3 x 190 to 3 x 690 VAC)
- . Surge and/or lightning protections
- . Rectifier output switch

Communication

- . Front panel analogue meters (72x72, class 1.5)
- . Transducers 4-20mA
- . Additional volt-free contacts
- . Modbus / TCP
- . IEC61850 protocol
- . Monitoring software
- . Mimic panel:
 - Passive mimic of the system
 - Active mimic with integrated LEDs Lamp indicator on front panel (22 mm diameter)

Mechanical

- . External ingress protection up to IP42
- . Top cable entry
- . Specified color of panels
- . Special feet height (200mm or 300mm)
- . Special keylock
- . Non-magnetic gland plate (brass or aluminum)
- . Specified cabinet identification (tag, nameplate)



Servo Voltage Regulator AVR SERIES



Hannibal Servo Voltage Regulators consist of the Toroidal Variac “Variable Transformer”, Booster Transformer, Servo Motor, and Microprocessor control circuit. The microprocessor-based electronic card measures the mains voltage and adjusts the position of the supply with the servomotor so that the output voltage is 220 VAC or 380 VAC. Protect the loads against voltage fluctuations and low or high voltage. It is ideal for industry and the military, especially for machines, and elevators that are sensitive and require fast regulation, and for the installations in locations with demurrage problems.

Servo Voltage Regulator AVR SERIES

Product overview

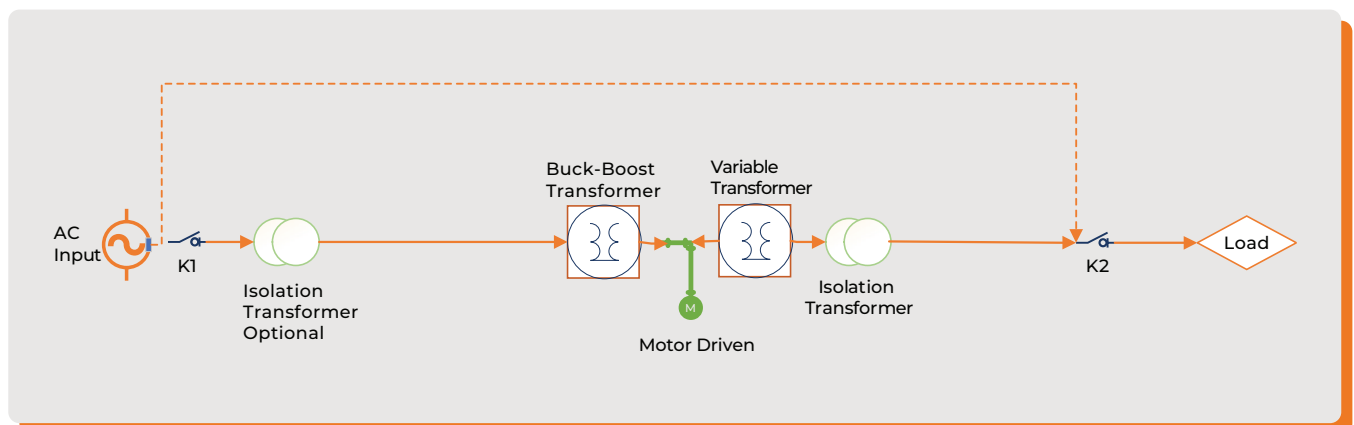
- Hannibal servomotor voltage stabilizers are the ideal solution to protect sensitive equipment from constant voltage fluctuations in the power supply.
- Moreover, in the event of drops in the total consumption of a power line, voltage tends to rise, causing overconsumption in the equipment that remains connected. By using a stabilizer, overconsumption can be eliminated, thereby producing significant cost savings and ensuring that connected loads function within the voltage range for which they were designed.
- The operating principle is based on regulation, by means of a control circuit, of the variable autotransformer that supplies the voltage for the booster transformer in series, to achieve the rated value of the output voltage.

GENERAL SPECIFICATIONS

- Microprocessor Controlled.
- Output Voltage Correction with $\pm 1\%$ Accuracy.
- High Efficiency $>96\%$.
- Over Current, High Temperature, High-Low Voltage and Short Circuit Protection.
- 1min at 100%-125% load, 10sec at 125%+ load.
- Input Voltage, Output Voltage-Current in User-Friendly Panel, Showing %Load and Transformer Temperature Values.
- Advanced Alarm Menu.
- Manual Bypass.
- Chassis Technology Not Affected by Dust, Moisture and Vibration.
- Fan Cooling System.
- Compact Production with Quality Materials.
- Minimum Risk of Failure.
- CE Certified.

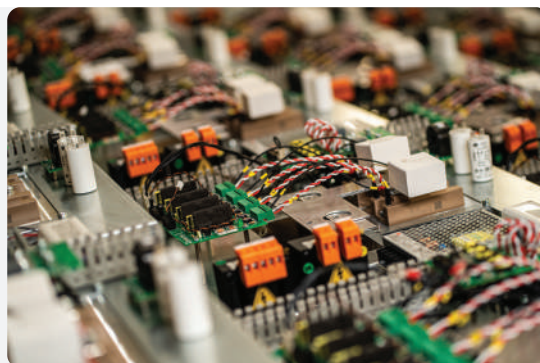
Advantages of Servo Type AC Voltage Stabilizer :

- Fast Voltage regulation.
- Output voltage accuracy 1%.
- Smooth stepless variation in the output voltage.
- sinusoidal waveform output.



Key Features

- Power Range, Single phase up to 50 kva and Three phase up to 3000 kva.
- High Speed regulation up to 150 V/s.
- Stable operation in event of load or voltage variation.
- Quite Operation.
- Suitable for regenerative loads.



Technical Data

Input	
AVR Topology	Servo
Control System	AC Servo Motor
Input Voltage -Single Phase	110/120/200/220/240/277 V
Input Voltage -Three Phase	208/220/240/380/400/415/480 V
Voltage tolerance	+/- 15 %
Frequency	50 Hz (60 Hz)
Frequency range (temporary)	+/- 5 %
Efficiency	94%
Power Factor	0.8

Output	
AC Voltage	
- Single phase	1 x 230 V (220, 240) ; 1 x 110 V (115, 120)
- Three phase	3 x 400 V (380, 415) ; 3 x 220 V (200, 208, 230)
AC Voltage Tolerance	3%
Frequency	50 Hz (60 Hz)
Frequency Tolerance	+/- 0.05 %
Regulation speed	150 V/s
overload capability	
- 1 minute	125% of nominal power
- 10 minutes	110 % of nominal power
Harmonic voltage distortion	
- With 100 % linear load	< 3 %
- With 100 % non-linear load	SS as per IEC/EN 62040-3
Power Factor	0.8
Efficiency	90%

General Data

Title	
Operating temperature	0 to 40 °C
Storage temperature	-20 to +70 °C
Relative humidity	< 95 % non condensing
Operating altitude	1000 m max without derating
Cooling	Fan Forced, free cooling -Optional
MTBF	<150,000 h
External protection	IP 20v according to IEC 60529
Internal protection	Protection against unintentional direct contacts as per IEC 60950-1/62477-1
Noise (at 1m in front of the unit)	60 – 75 dB according to rating
Cabinet colour	RAL 7035v
Touch Panel " HMI"	Optional
Communication	RTU RS232-Standard RTU RS485 -TCP/ IP - Optional
Dimensions	Varying according to ratings and options

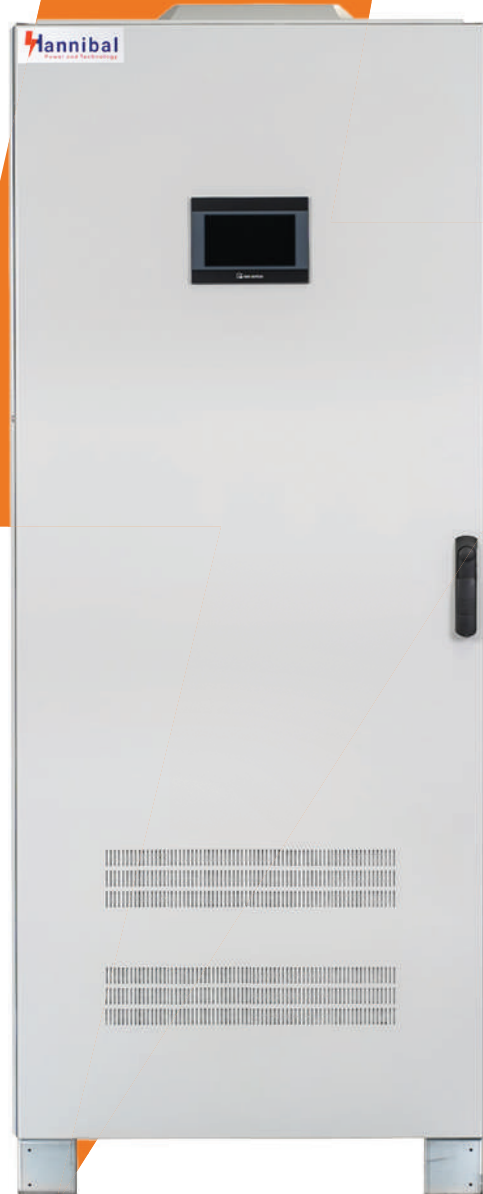
Standards

Standards	
IEC61558-2-2014	Safety requirements
IEC62041-2:2016	Electromagnetic compatibility (EMC) requirements
ISO 9001, ISO 14001	Certificate

Options

RFI filter.
 Bypass line.
 Surge Protection.
 Redundant Fans.
 Natural Cooling + Smart Fan System.
 Cabinet color can be chosen from RAL codes.
 Cable Entry (Top/side/bottom/rear).
 Ingress Protection: up to IP66.
 Touch Panel with Mimic Diagram.
 Auxiliary Trip Contact.
 Earth Fault Protection (adjustable).
 Phase Voltage/Sequence protection.
 500 Real Time Event Log with Detailed Parameters.
 User Friendly Multilingual 320x240 Graphic Display.
 Operation Information.
 Monitoring and Shutdown Software.
 RS232 Serial and RS485 Ports.
 Modbus RTU.
 2 Communication Slots.
 Remote Emergency Power Off.
 Remote Display Panel.
 Dry Contact.
 SNMP.

Static Voltage Regulator TCON SERIES



Hannibal Static Voltage Stabilizer regulates grid fluctuations in the best way possible. With adequate regulation speed (500 V/sec.) and full protection, by compensating the difference between phases as well as voltage fluctuations, it ensures the connected systems operate reliably. Since the output voltage tolerance is $\pm 1\%$, the electronic stabilizer is an ideal solution to secure the electronic load. In cases of the network voltage changes momentarily and frequently, an Electronic Stabilizer could be the solution.

Static Voltage Regulator TCON SERIES

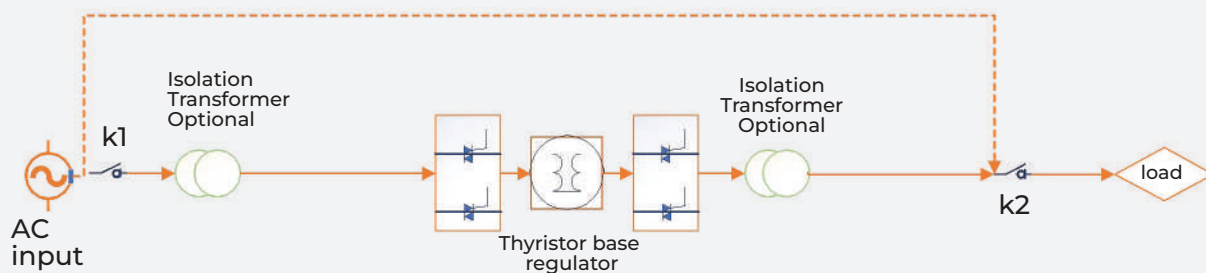
General specifications

- Wide Input Voltage Range.
- Precise Output Voltage Accuracy $\pm 1\%$ to $\pm 5\%$
- Ultra Fast Voltage Regulation (500V/s).
- True 32-bit Microcontroller Controlled.
- High Efficiency $> 97\%$.
- Independent Phase Regulation to Correct Voltage and Load Imbalance.
- Electronic Protection Against Over Load, Low Voltage, High Voltage, Over Temperature, Over Current and Short Circuit.
- Overload Protection up to 150%.
- Fast Responsive to Voltage Surges.
- Auto Restart when Mains Available.
- Full Electronic Static Structure with No Moving Parts, Delivering a 'Maintenance Free' Voltage Regulation Solution.
- Fully CE Compliant and Labelled



Add on Options

- Bypass line.
- Fusible Surge Suppression.
- Redundant Fans.
- Natural Cooling + Smart Fan System.
- Cabinet color can be chosen from RAL codes.
- Cable Entry (Top/side/bottom/rear).
- Ingress Protection: up to IP66.
- Touch Panel with Mimic Diagram.
- Auxiliary Trip Contact.
- Earth Fault Protection (adjustable).
- Phase Voltage/Sequence protection.
- 500 Real-Time Event Log with Detailed Parameters.
- User Friendly Multilingual 320x240 Graphic Display Provided.
- Operation Information.
- Monitoring and Shutdown Software.
- RS232 Serial and RS485 Ports.
- Modbus RTU (Optional).
- 2 Communication Slots.
- Remote Emergency Power Off (Optional).
- Remote Display Panel (Optional).
- Dry Contact (Optional).
- SNMP (Optional).



Static Voltage Regulator TCON SERIES

Key Features

- Power Range, Single phase up to 200 kva and Three phase up to 2000 kva.
- High Speed regulation up to 500 V/s.
- Stable operation in event of load or voltage variation.
- Quite Operation.
- Suitable for regenerative loads.

Technical Data

Input	
AVR Topology	Thyristor
Control System	Micro processor
Input Voltage -Single Phase	110/120/200/220/240/277 V
Input Voltage -Three Phase	208/220/240/380/400/415/480 V
Voltage tolerance	+/- 15 %
Frequency	50 Hz (60 Hz)
Frequency tolerance	+/- 5 %
Efficiency	94%
Power Factor	0.8

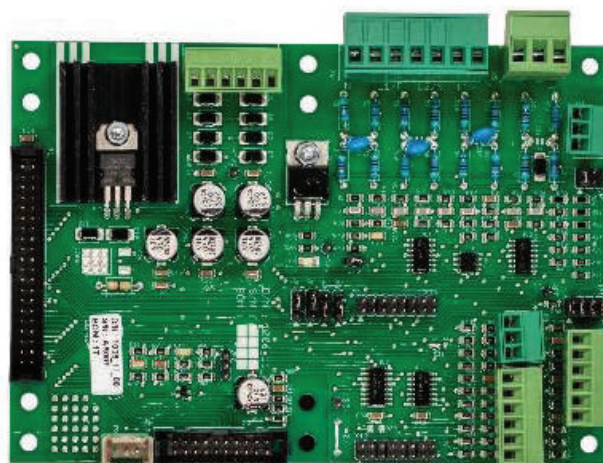
Output	
AC Voltage	
- Single phase	1 x 230 V (220, 240) ; 1 x 110 V (115, 120)
- Three phase	3 x 400 V (380, 415) ; 3 x 220 V (200, 208, 230)
AC Voltage Tolerance	3%
Frequency	50 Hz (60 Hz)
Frequency Tolerance	+/- 0.05 %
Regulation speed	500 V/s
Overload capability	
- 1 minute	125% of nominal power
- 10 minutes	110 % of nominal power
Harmonic voltage distortion	
- With 100 % linear load	< 3 %
- With 100 % non-linear load	SS as per IEC/EN 62040-3
Power Factor	0.8
Efficiency	90%

General Data

Title	
Operating temperature	0 to 40 °C
Storage temperature	-20 to +70 °C
Relative humidity	< 95 % non condensing
Operating altitude	1000 m max without derating
Cooling	Fan Forced, free cooling -Optional
MTBF	<150,000 h
External protection	IP 20(4) according to IEC 60529
Internal protection	Protection against unintentional direct contacts as per IEC 60950-1/62477-1
Noise (at 1m in front of the unit)	60 – 75 dB according to rating
Cabinet colour	RAL 7035(4)
Touch Panel " HMI"	Optional
Communication	RTU RS232-Standard RTU RS485 -TCP/ IP - Optional
Dimensions	Varying according to ratings and options

Standards

Standards	
IEC61558-2-2014	Safety requirements
IEC62041-2:2016	Electromagnetic compatibility (EMC) requirements
ISO 9001, ISO 14001,	Certificate



Static Transfer Switch STS SERIES



Hannibal microprocessor-controlled static transfer switch designed to automatically transfer electrical power from a primary source to a secondary source without interruption, constantly monitors the sources connected to the inputs; checks whether they remain within the current and frequency limits and decides if they are synchronized with each other. If the prioritized source is within the determined limits, the critical load is transferred over to the prioritized source. If the prioritized source is not within the determined limits, the load is then transferred to the other source which is within the determined limits.

Static Transfer Switch **STS Series**

General specifications

- **Instantaneous Switching:** STS performs rapid switching operations, typically within milliseconds, ensuring continuous power supply to critical loads.
- **No Moving Parts:** Unlike mechanical switches, STS operates without moving parts, reducing wear and tear and increasing reliability.
- **Dual Power Sources:** It monitors two independent AC power sources and switches to the backup source seamlessly if the primary source fails.
- **High Availability:** Ensures high availability of power for sensitive applications such as data centers, telecommunications, and industrial processes.
- **Protection:** Protects equipment from power disturbances and interruptions.

Electrical specifications

- Microprocessor Based Control.
- Thyristor-based Static Transfer Switch.
- Suitable with Synchronous and Asynchronous Transfer.
- Selectable Asynchronous Transfer Enable \ Disable.
- Synchronous Transfer Time: < 5 msec. ($\frac{1}{4}$ cycle at 50 Hz).
- Asynchronous Transfer Time: < 11 msec.
- Thermal Fuse Protection at Source Inputs.
- Overvoltage Protection at Source Inputs.
- 4 Dry Contacts.
- 2×16 LCD Front Panel.
- Selectable Source Priority via Front Panel.
- Suitable with 3rd Input Source (Optional).



Static Transfer Switch **STS Series**

Input Specification- Single Phase

1 PHASE Technical Specification	
Voltage (Ph-Ph)	110/127/208/220/230/240/265VAC 1Ph + N + PE
Voltage Range	± 20% (Transfer when out of range)
Frequency	50/60Hz
Frequency Range	45-65Hz (Transfer when out of range, adjustable)
Efficiency	>99%
Transfer Type	Break before make
Transfer Options	Automatic / Manual / Remote
Transfer Time	<4ms (Sync) & ~10ms (Unsync)
Switching Topology	1 Pole (w/o neutral breaking) or 2 Pole (w neutral Breaking)

Mechanical Specification- Single Phase

1 PHASE Technical Specification						
Nominal Current	16A	32A	50A	63A	100A	150A
Cooling			Natural Cooling			
MECHANICAL						
Net Weight (kg)	3	6	6	8	Refer to Hannibal	
Dimensions (mm) WxDxH	19' / 1U		19', 2U	500*450*1000mm		

Input Specification- Three Phase

3 PHASE Technical Specification	
Voltage (Ph-Ph)	200/227/380/400/415/440/460/600VAC 3Ph + N + PE
Voltage Range	± 15% (Transfer when out of range)
Frequency	50/60Hz
Frequency Range	45-65Hz (Transfer when out of range, adjustable)
Efficiency	>99%
Transfer Type	Break before make
Transfer Options	Automatic / Manual / Remote
Transfer Time	<4ms (Sync) & ~10ms (Unsync)
Switching Topology	3 Pole (w/o neutral breaking) or 4 Pole (w neutral Breaking)

Mechanical Specification- Three Phase

1 PHASE Technical Specification									
Nominal Current	50A	63A	100A	150A	200A	300A	400A	600A	800A
Cooling	Fan Forced (Dual Redundant), Natural Cooling (Optional)								
MECHANICAL									
Net Weight (kg)	Advise to Hannibal								
Dimensions (mm) WxDxH	500*450*1000 mm			600*600*1300mm		750*700*1600mm		1000/800*800*2100mm	

General Specification

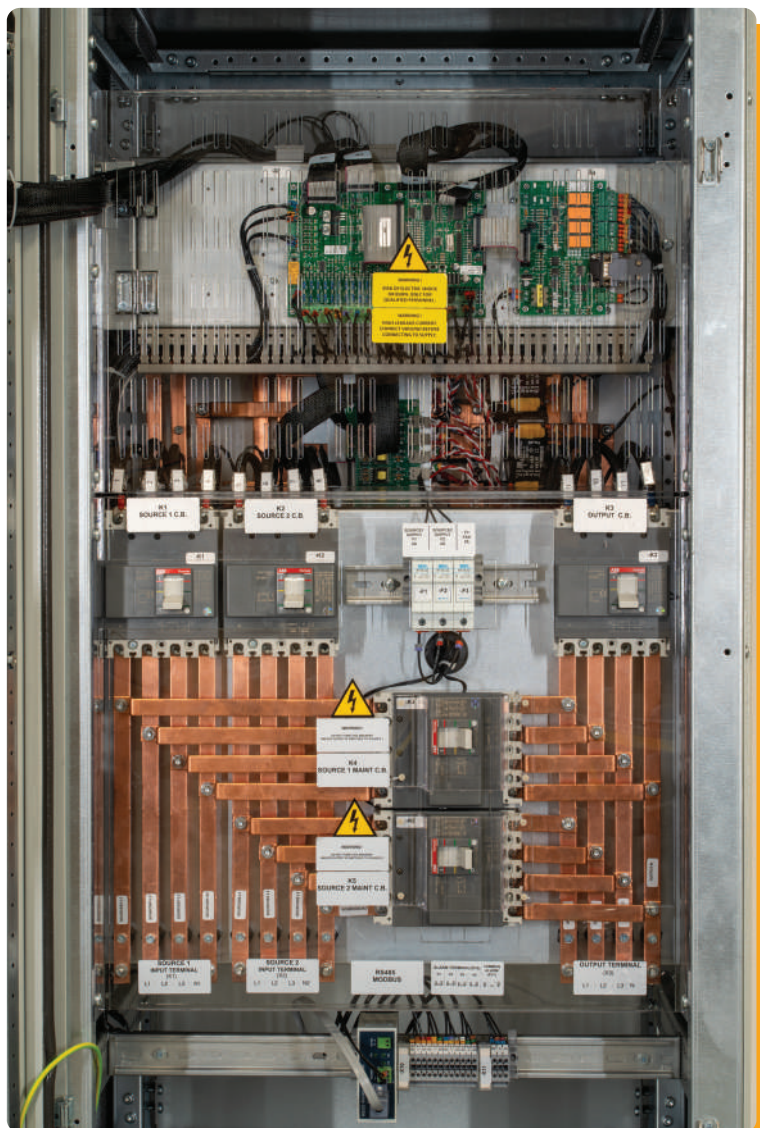
General Specifications	
Operational Temperature	0°C - 50°C
Storage Temperature	-10°C - 70°C
Relative Humidity	<90% (non-condensing)
Ingress Protection	IP20, IP21 (Standard), up to IP66 (Optional)
Standards	EN62310-1, EN62310-2, EN62310-3
Crest Factor	3:1
Overload	100-110% continuous / 100-125% 10mins / 125%-150% 1min / 150-200% 10sec / >200% 250msec
Protections	Overload, Short circuit, Over Temperature, Backfeed, SCR Fault Alarm, Unsync protection, Bypass protection (Interlock)
Communication	RS232, Dry Contact (Standard) - RS485, TCP/IP (Optional), SNMP (Optional)



Static Transfer Switch STS Series

Options —

- Fusible Surge Protection.
- Maintenance Bypass Switch protection.
- Redundant Fans.
- Natural Cooling + Smart Fan System.
- Cabinet color.
- Cable Entry(Top/side/bottom/rear).
- Ingress Protection: up to IP66
- Touch Panel with Mimic Diagram.
- Auxiliary Trip Contact
- Earth Fault Protection (adjustable).
- Phase Voltage/Sequence protection.
- Operation Information.
- Monitoring and Shutdown Software.
- RS232 Serial and RS485 Ports.
- Modbus RTU (Optional).
- 2 Communication Slots.
- Remote Emergency Power Off (Optional).
- Remote Display Panel (Optional).
- Dry Contact (Optional).
- SNMP (Optional).



Bypass input



AC input



Static Transfer Switch

load

Industrial DC-DC Converter IGBT Full Bridge Topology Industrial



Industrial DC-DC converters are vital in modern electronic systems, efficiently converting one DC voltage level to another.

They are used in telecommunications, automotive, industrial equipment, and renewable energy. Their main role is to deliver appropriate voltage and current, ensuring optimal performance and energy efficiency. Available in topologies like buck (step-down) and boost (step-up), these converters feature advanced control, thermal management, and protection systems for reliability in demanding environments. As technology evolves, DC-DC converters play an increasingly crucial role in maintaining seamless, efficient operations.

DC- DC Converter

DC Voltage Regulation with Dropper Diode System

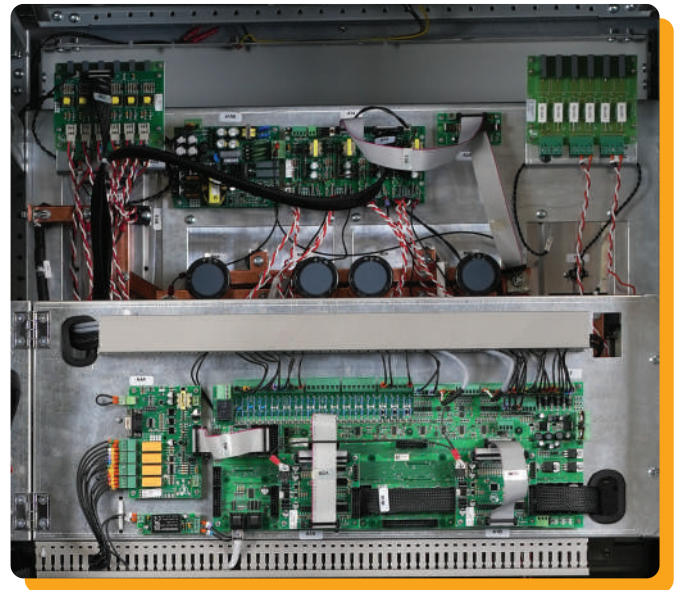
For precise DC voltage regulation, a dropper diode system is often utilized in conjunction with DC-DC converters. This system helps in maintaining a stable output voltage by dropping excess voltage, ensuring that the connected devices receive a consistent and regulated power supply.

General specifications

- Fast control with DSP controller.
- IGBT technology.
- <1% Voltage Ripple (<4% on 1 phase).
- Alarm adjustable.
- Dry contacts.
- ModBus Protocol - RS232, RS485.
- Operation available while mains fail Current limiting (adjustable).
- Automatic start & fault recovery.

Features

- Full Bridge High-Frequency IGBT Module
- Customized input range based on specification.
- +/- 1% Output Voltage Stability.
- Buck (decrease) and Boost (increase) DC/DC Converter (Optional as only Buck or Only Boost).
- DC/DC Converter can be used in DC Charger as a voltage regulator instead of Dropper Diode.
- High reliability & efficiency.
- High Compact Design.
- Electronic short circuit protection.
- Price competitive solution.



Applications

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



Industrial DC – DC converter

Technical Data

Input	
DC voltage	110VDC (between 90VDC-160VDC)/ 220VDC (between 180VDC-300VDC)
Input Protection	• Overcurrent protection via MCB and • Overvoltage / Undervoltage protection
Topology	Full Bridge High Frequency IGBT Module
Control	Microprocessor Controlled System

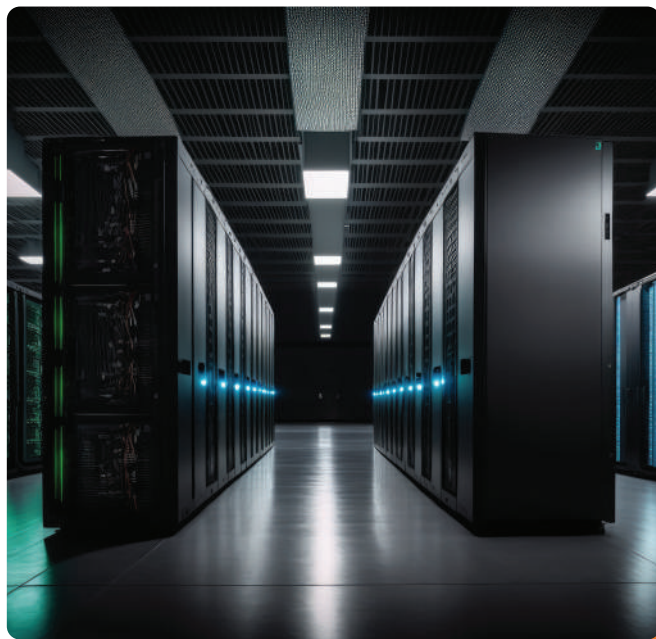
Output	
DC voltage	110VDC \ 220VDC • For other voltage level ask for more information
Output Tolerance	1%
Dynamic Response	+/- 5% at 50msec
Output Protection	Short Circuit, Overvoltage, Overload protection

General data	
Operating temperature	0 to 40 °C ⁽³⁾
Storage temperature	-20 to +70 °C
Relative humidity	< 95 % non condensing
Operating altitude	1000 m max without derating ⁽³⁾
Cooling	Forced ventilation
Efficiency	Up to 94 % according to rating
External protection	IP 20 according to IEC 60529
Noise (at 1m in front of the unit)	60-72 dB according to rating
Cabinet color	RAL 7035 ⁽³⁾
Dimensions	Varying according to ratings and options
MTBF	100,000
Cable Entry	Bottom (Standard) / Top (OPTIONAL)
Isolation Voltage	2000VAC input/chassis and output/chassis
Enclosure Material	Mild Steel, Zinc-phosphate coated; 100 µm electrostatic paint; 1.5 mm thickness

DISPLAY PANEL & MEASUREMENT	
Measurements	Input Voltage • Output Voltage • Output Current
Indicators	• DC Input High/Low • DC Output High/Low • Input MCB/FUSE OFF • Output MCB/FUSE OFF • Overload • IGBT SCR Fuse Failure • Overtemperature • Fan Failure • Converter Failure
Adjustable Parameters	Output Voltage and Current
Sound Alarm	Warning Messages 2 Short 'beep' per 2 seconds
free alarm contacts	• Input MCB OFF • Output MCB OFF • over output voltage • convertor failure • over temperature

Standards

Standards	
EN 50091-1	Security
EN 50091-2	EMC



Modular Products

Modular Rectifier
Modular UPS

Modular Rectifier SDM SERIES



The high-frequency commutated Modular rectifiers are designed to provide direct current stabilized power. This system's advanced modular design makes it a compact system and can provide enough power to meet the requirements of Communication and Power Industrial Systems.

This system consists of one or multiple rectifier modules together with the monitor module. The power of rectifier systems can vary, depending on the quantity of rectifier modules.

Modular Rectifier **SDM SERIES**

General specifications

- High frequency commutated Modules (IGBT).
- Modules cooled by forced ventilation.
- 19" rack and cabinet mount configurations.
- Possibility of redundant module operation.
- Room temperature probe included in the equipment.
- LVD (Battery Low Voltage Disconnect).
- Output breakers for loads.
- Audible & LED Alarm.
- User-friendly HMI (All parameters, and calibrations can be made through the front panel).
- High-frequency.



Features

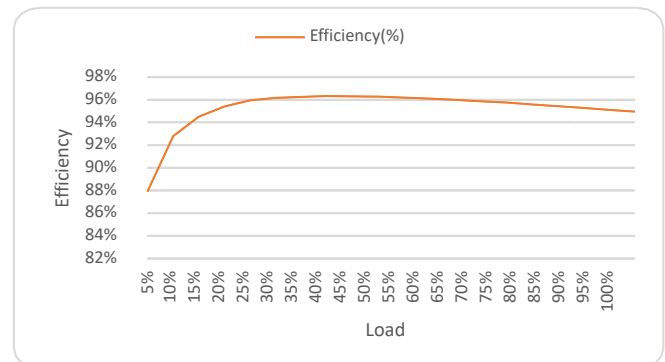
- Remote monitoring: serial port, Ethernet, and dry contacts.
- Temperature Compensated Battery Charging.
- Battery test function.
- Monitoring of all parameters via the front panel display.
- Built-in intelligent battery management.
- Alarm- and event logger, with a date and time-stamped event log memory.
- Large communication facility options.
- Operation with different types of batteries: Lead Acid VRLA.

Add on Options

- Voltage Drop Diode Unit.
- Digital or analog voltage and current meters.
- Internal cabinet lighting.
- Door open sensor.
- Heating resistance to avoid condensation.
- Earth leakage current sensor (positive and negative).
- Removing input neutral at the site.
- Fusible Surge Suppression (AC/DC).
- Redundant Fans.
- Cabinet color can be chosen from RAL codes.
- Cable Entry (Top/side/bottom/rear).
- Ingress Protection: up to IP66.
- RS485, TCP, SNMP and GSM Communication.
- Automatic Battery Test Add on Options 98% 96%.

Applications

- Macro cell BTS.
- Microwave.
- LTE / WiMax.
- FTTX.
- Broadband Access.
- Optical Fibre Transmission System.
- IDC (Internet Data Centres).



Modular Rectifier **SDM SERIES**



Technical Data

Product 48-3000	
Capacity	3000W
AC INPUT	
Voltage Range	90Vac to 300Vac (Nominal @ 175Vac to 275Vac)
Frequency	45Hz to 66Hz
Maximum Input Current	Max. 18 Arms @ 175Vac (full load)
Power Factor	≥0.99 @ rated input and ≥50% load
Input Protection	Varistors for transient protection, Mains Fuse for both input lines, Shutdown @ > 300Vac with hysteresis
DC OUTPUT	
Output Voltage	53.5Vdc (adjustable 43Vdc to 58Vdc)
Output Power (Maximum)	3000W @ nominal input
Output Current (Maximum)	62.5 A @ 42-50 Vdc with nominal input
Peak Efficiency	>95%
Current Sharing	±5% of max current from 20% to 100% load
Static Voltage Regulation	±0.6% from 10% to 100% load
Dynamic Voltage Regulation	±5% for 10%-90% or 90%-10% load variation, regulation time <50ms
Hold Up Time	>20ms; output voltage >43.5Vdc @ 1500W
Ripple and Noise	≤200mVp-p, 20MHz bandwidth, ≤2mVrms sophomoric
Output Protection	Overvoltage shutdown; hot plug-in; inrush current limiting; high temperature protection; short circuit proof
CONTROL and MONITORING	
Rectifier Alarm and Signaling	High & low mains shutdown, high temperature shutdown, rectifier failure, overvoltage shutdown, fan failure, communication failure
Visual Indications	Alarms - RED Warning - YELLOW Normal operation - GREEN
OTHER SPECIFICATIONS	
Isolation	Input to Output: 3.0kVac, Input to Earth: 1.5kVac, Output to Earth: 0.5kVdc
Cooling	Fan-cooled, front to back airflow
Fan Speed	Regulated by temperature and output power
MTBF	> 300,000 hrs @ 25° C

General Specification

ENVIRONMENTAL	
Operating Temperature Range	-40° C to +75° C (de-rates above 55° C)
Storage Temperature Range	-40° C to +85° C
Relative Humidity	Operating: 5% to 95% RH non-condensing Storage: 0% to 99% RH non-condensing
Acoustic Noise	≤58dB @ full load, 25° C
PHYSICAL	
Dimensions WxDxH (mm)	108x325x 41 (1U)
Net Weight (kg)	≤1.7
DESIGN STANDARDS	
Electrical Safety	EN/IEC62368-1
EMC	ETSI EN 300 386 V2.1.1, EN61000-6-1/-2/-3/-4
AC Harmonics / AC Flicker & Fluctuations	EN61000-3-2 / EN61000-3-3
Others	CE, RoHS compliant

Key Features

- Fully Digital Controlled:
Reduces component count and improves reliability.
- Modular, Scalable and Hot Swappable Flexible installations.
- High Power Density:
Reduces footprint.
- Highly Efficient @ >96%:
Reduces losses and lowers operating costs.
- Front-to-back Airflow:
Unobstructed scalability of shelves.
- Excellent EMC Performance:
Lower interference and excellent susceptibility.
- Wide Input Voltage Range:
Continued operation in demanding grid conditions.
- Wide Temperature Range:
Applications in harsh climatic conditions.
- Compliant with Global Standards:
Delivers quality, performance and reliability in power solutions.



Technical Data

Product 48--6000	
Capacity	6000W
AC INPUT	
Voltage Range	250Vac to 475Vac (Nominal @ 323Vac to 456Vac)
Frequency	45Hz to 66Hz
Maximum Input Current	Max. 12A per Phase
Power Factor	≥0.99 @ rated input and ≥50% load
Input Protection	Varistors for transient protection, Mains Fuse for both input lines, Shutdown @ > 475Vac with hysteresis
DC OUTPUT	
Output Voltage	53.5Vdc (adjustable 43Vdc to 58Vdc)
Output Power (Maximum)	6000W @ nominal input
Output Current (Maximum)	125 A @ 42-50 Vdc with nominal input
Peak Efficiency	>96.5%
Current Sharing	±5% of max current from 20% to 100% load
Static Voltage Regulation	±0.6% from 10% to 100% load
Dynamic Voltage Regulation	±5% for 10%-90% or 90%-10% load variation, regulation time <50ms
Hold Up Time	>20ms; output voltage >43.5Vdc @ 3000W
Ripple and Noise	≤200mVp-p, 20MHz bandwidth, ≤2mVrms sophomoric
Output Protection	Overvoltage shutdown; hot plug-in; inrush current limiting; high temperature protection; short circuit proof
CONTROL and MONITORING	
Rectifier Alarm and Signaling	High & low mains shutdown, high temperature shutdown, rectifier failure, overvoltage shutdown, fan failure, communication failure
Visual Indications	Alarms - RED Warning - YELLOW Normal operation - GREEN
OTHER SPECIFICATIONS	
Isolation	Input to Output: 3.0kVac, Input to Earth: 1.5kVac, Output to Earth: 0.5kVdc
Cooling	Fan-cooled, front to back airflow
Fan Speed	Regulated by temperature and output power
MTBF	> 300,000 hrs @ 25° C

General Specification

ENVIRONMENTAL	
Operating Temperature Range	-40° C to +75° C (de-rates above 55° C)
Storage Temperature Range	-40° C to +85° C
Relative Humidity	Operating: 5% to 95% RH non-condensing Storage: 0% to 99% RH non-condensing
Acoustic Noise	≤58dB @ full load, 25° C
PHYSICAL	
Dimensions WxDxH (mm)	210x345x 86 (2U)
Net Weight (kg)	≤6.2
DESIGN STANDARDS	
Electrical Safety	EN/IEC62368-1
EMC	ETSI EN 300 386 V2.1.1, EN61000-6-1/-2/-3/-4
AC Harmonics / AC Flicker & Fluctuations	EN61000-3-2 / EN61000-3-3
Others	CE, RoHS compliant

Key Features

- Fully Digital Controlled:
Reduces component count and improves reliability.
- Modular, Scalable and Hot Swappable Flexible installations
- High Power Density:
Reduces footprint.
- Highly Efficient @ >96%:
Reduces losses and lowers operating costs.
- Front-to-back Airflow:
Unobstructed scalability of shelves.
- Excellent EMC Performance:
Lower interference and excellent susceptibility.
- Wide Input Voltage Range:
Continued operation in demanding grid conditions.
- Wide Temperature Range:
Applications in harsh climatic conditions.
- Compliant with Global Standards:
Delivers quality, performance and reliability in power solutions.

Modular UPS PLRM SERIES



PLRM Series is a scalable, redundant Modular UPS system designed to cost-effectively provide high level availability for high-density data centers and critical applications. True Online Double Conversion and advanced DSP control technology.

Modular Architecture can scale power and runtime as demand grows or as higher levels of availability are required. Combines the modular design with the N+X parallel redundancy technology. As a result, all unwanted situations that may occur in the network are filtered by the online UPS, and your sensitive devices are fed with clean energy.

Modular UPS PLRM SERIES

General specifications

- Excellent performance on non-linear loads (computer and switching power supplies).
- Input and output 50hz, 60hz, frequency optional.
- Intelligent power module based on IGBT technology full reliability.
- DSP (digital signal processor) control.
- Low output distortion factor.
- High efficiency.
- Audible alarm.
- User-friendly control panel.
- Modular design with swappable power module.



Ethernet port



APP



On Cloud monitoring



Cloud port



WLAN dongle



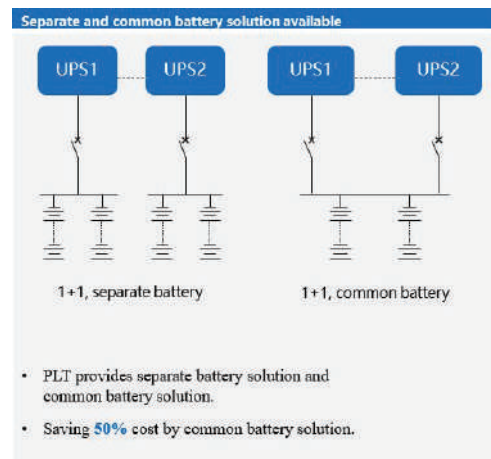
NMC card

Features

- Redundant parallel operation.
- Potential free output voltage.
- Full redundant control architecture.
- Very fast dynamic response time.
- Output short circuit proof.
- Wide range of ratings with IP protection up to 56 as standard.
- Low voltage ripple to prolong battery life time.
- Intelligent battery charge and monitoring control.
- Lithium Ion Battery charging options ready and available.

Options

- 2 Source input.
- <3% Input THDi with harmonic filter.
- Various voltage settings for different countries.
- Removing input neutral at site.
- Fusible Surge Suppression (AC/DC).
- Redundant Fans.
- Cabinet color can be chosen from RAL codes.
- Cable Entry (Top/side/bottom/rear).
- RS485, TCP, SNMP and GSM Communication.
- Automatic Battery Test.
- Touch Panel with Mimic Diagram.
- Parallel up to 4 units.
- DC Load supply.



Modular UPS PLRM SERIES

The PLRM series modular, online UPS ranging from 100 kVA to 600kVA is designed to protect any critical load for medium and large data centers achieving maximum availability

Key Features

- IGBT rectifier at the core of the best-in-class reliability.
- Modular Compact Cabinet Design contains maximum 6 slots.
- <3% THDI.
- Smart access to UPS data via a large color touchscreen with 2000-event exportable log.
- Modular design, up to 3 units in parallel online hot-swappable N+X redundancy.



Technical Data

Input	
Power Module Capacity	IGBT
Input Voltage -Single Phase	100 KVA/ Kw
Input Voltage -Three Phase	380/400/415 V
Voltage tolerance	323~478Vac
Frequency	50 Hz (60 Hz)
Frequency tolerance	40Hz~70Hz
Efficiency	99%
Power Factor	0.99
THD	<3%
Inrush current	≤ 10 x In(4)
Float Voltage	- 2.17-2.27 V/cell VRLA - 1.4-1.42 V/cell Ni cd
Ripple	<1%

Battery	
Type	Lead acid or nickel cadmium, Li
Autonomy	From few minutes to several hours, on request
Battery Voltage	± 240VDC
Charge Power	Up to 15 % from System Power

Output	
Inverter Bridge Topology	IGBT with output isolation Transformer
AC Voltage	380/400/415VAC
AC Voltage Tolerance	1%
Frequency	50 Hz (60 Hz)
Frequency Tolerance	+/- 0.1 %
Inverter overload capability	
- 1 minute	<150%
- 10 minute	<125 %
- 1hour	<110 %
Harmonic voltage distortion	
- With 100 % linear load	< 3 %
- With 100 % non-linear load	<5%
Power Factor	0.97
Static Transfer Switch	SCR Type
Static Bypass transfer Time	<4 ms

Title	
Operating temperature	0 to 40 °C ⁽⁴⁾
Storage temperature	-20 to +70 °C
Relative humidity	< 95 % non condensing
Operating altitude	1000 m max without derating ⁽⁴⁾
Cooling	Fan Forced, free cooling -Optional
MTBF	<150,000 h
External protection	IP 20 ⁽⁴⁾ according to IEC 60529
Internal protection	Protection against unintentional direct contacts, as per IEC 60950-1/62477-1
Noise (at 1m in front of the unit)	60 – 75 dB according to rating
Cabinet colour	RAL 7035 ⁽⁴⁾
Touch Panel " HMI"	Standard
Communication	- RTU RS485-Standard - TCP/ IP - Optional
Dimensions Cabinet	1000 * 1100 * 2000
Dimentions Power Module	440*795*174
Weight KG Cabinet	400
Weight KG Power Module	53.5

Standards

Standards	
IEC62040-1:2017	Uninterruptible power systems (UPS) - Part 1: Safety requirements
IEC62040-2:2016	Uninterruptible power systems (UPS) – Part 2: Electromagnetic compatibility (EMC) requirements
IEC62040-3:2011	Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements
IEC60529:1989 +AMD1:1999	Degrees of protection provided by enclosures (IP Code)

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

Hannibal Laboratory



Hannibal Laboratory is a specialized facility designed to test, and analyze various types of power equipment which is manufactured at Hannibal. It serves as a critical environment for engineers and technicians to develop, evaluate, and improve power systems and components. Below is an overview of the key aspects of a Power Equipment Laboratory.



Key Equipment and Tools —

HANNIBAL Laboratory is equipped with a variety of tools and devices necessary for testing and analysis. Some essential equipment includes:

- Digital oscilloscope: visualize and measure the voltage waveforms of electronic signals, making it easier to diagnose and troubleshoot circuit issues.
 - Digital multimeter: measures various electrical properties, including voltage, current, and resistance.
 - Thermal Camera: useful for applications like industrial inspections, maintenance, leak detection, and troubleshooting machines.
 - Load Banks: For simulating power loads and testing UPS or Rectifier performance.
- Safety Protocols: Safety is a paramount concern in a Hannibal Laboratory, Key safety protocols include:
- Protective Gear: Mandatory use of safety glasses, gloves, and appropriate clothing.
 - Training: Comprehensive training on equipment and emergency procedures.
 - Regular Inspections: Routine checks of equipment and safety mechanisms.
 - Emergency Shut-off: Easily accessible emergency power cut-off switches.



Digital oscilloscope



Digital multimeter



Thermal camera





UNDERSTANDING FACTORY ACCFPTAMCE TESTING (FAT) *Key Aspects and Importance*

Benefits of FAT	PURPOSE OF FAT	CONTROLLED ENVIRONMENT	TIMMING OF FAT	THE IMPTANCE OF FAT
Factory Acceptance Testing (FAT) is a verification method for power equipment.	FAT ensures systems meet specified requirements before field delivery	FAT is conducted manufacturer's facility in a controlled environment.	FAT occurs before installation and commissioning at the end- user's site.	Vital for ensuring reliability and performance of power equipment.
Testing Process	DOCUMENTATIONS	CHALLENGES IN FAT	STAKEHOLDERS COALBRATION	FUTURE OF FAT
Includes functional tests, performance evaluations, and safety checks.	Results and findings are documented for compliance and reference.	Challenges include scheduling resource allocation, and equipment readiness.	Involves collaboration between manufacturers, engineers, and clients.	Evolving with technology to improve efficiency and accuracy.

KEY OBJECTIV OF FACTORY ACCEPTANCE TESTING

Ensuring equipment readiness and compliance



verification for design and specifications

Confirm that equipment meets contract design and operational criteria.



Functionality Testing

Ensure all systems correctly under various conditions.



verification for design and specifications

Assess performance metrics operate against benchmarks like efficiency and load capacity



Safety assessment

Evaluate safety features and compliance with standards to protect operators.



Documentations

Provide a record of tests performed, results, and corrective actions

CASE STUDY IMPLEMENTATION OF FAT

01| PROJECT OVERVIEW

A utility company needed a high- capacity transformer for renewable energy.

02| FAT OBJECTIVE

Key goals included performance validation, compliance assurance, and safety feature confirmation.

03| TESTING CONDUCTED

Three main tests were performed: functionality and load, insulation resistance, and thermal imaging.

04| FUNCTIONALITY AND LOAD

This ensured the transformer could operate under expected load conditions effectively

05| INSULATION RESISTANCE TESTING

Critical for assessing the insulation's ability to withstand electrical stress.

06| THERMAL IMAGING

Used for detecting hotspots, ensuring safety in operation.

07| THERMAL IMAGING

The transformer passed all tests, leading to timely, issue-free installation.

08| SIGNIFICANCE OF FAT

Highlights the importance of FAT in ensuring reliability and readiness of equipment.

Hannibal FAT procedure



IMPORTANCE OF FACTORY ACCEPTANCE TESTING



RISK REDUCTION
minimizes the chances of costly rework or delays during installation



QUALITY ASSURANCE
Ensures equipment meets specifications for enhanced reliability and performance.



COST EFFICIENCY
minimizes the chances of costly rework or delays during installation



CUSTOMER CONFIDENCE
Builds trust with clients by showcasing commitment to quality through thorough testing



REGULATORY COMPLIANCE
Ensures adherence to industry standards and safety regulations, reducing legal risks.

A FAT is conducted at the Hannibal facility to ensure that the system meets the specified requirements and functions correctly under simulated real-life conditions.

It involves a series of tests and inspections to verify the system's performance and reliability.

Key Components of a FAT:

Visual Inspections: Checking the physical condition and installation of the UPS components.

Static-State Tests: Evaluating input/output stability, harmonics, and operational efficiency.

Dynamic Tests: Testing different operating modes, overloads, and failure simulations (e.g., battery failure, AC mains failure).

Conformity Checks: Ensuring the system complies with contractual and customer specifications.

Documentation Review: Auditing the original contract agreement to confirm all obligations are met



Hannibal FAT procedure



UPS FAT, or Factory Acceptance Testing:

Is a critical phase in the delivery of uninterruptible power supply (UPS) systems. This testing process ensures that the UPS equipment meets specified performance criteria and operates effectively within the defined parameters before installation at the client's site.

During UPS FAT, a variety of tests are conducted, including:

- 01- Load testing.
- 02- Functionality checks.
- 03- Power quality assessment.

All aimed at verifying the system's reliability and efficiency. This phase not only enhances the confidence of stakeholders in the product but also helps identify and rectify any potential issues prior to deployment, thereby minimizing the risk of operational disruptions in critical environments. Ultimately, UPS FAT is an indispensable step in maintaining the highest standards of quality and performance for power protection solutions.





The Rectifier Factory Acceptance Test (FAT):

Is a critical quality assurance process that assesses the functionality and performance of rectifier systems before they are delivered to the end user. During this rigorous testing phase, various electrical parameters, including:

- 01- Current capacity.
- 02- Harmonic distortion.
- 03- Output voltage.

Are meticulously measured to ensure compliance with specified design criteria and industry standards. Additionally, safety features, such as: Overcurrent and short-circuit protection, are thoroughly evaluated to mitigate potential operational risks. By conducting a comprehensive FAT, manufacturers can identify and rectify any discrepancies early in the production process, thereby enhancing product reliability and customer satisfaction while minimizing costly post-installation modifications. Ultimately, the FAT serves as an essential safeguard, ensuring that rectifiers operate efficiently and effectively within their intended applications.



Hannibal for Power Supply

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At Hannibal Power and Technology, we find a product for your power supply or make a new one. Our skilled team provides the best solutions for your industrial power needs. Additionally, we offer custom power solutions tailored to your needs, empowering you to make a difference.

We are one of the oldest companies in Hannibal City, Missouri. Since 1968, we have been dedicated to serving our customers. Our two main principles are using high-quality materials and offering lifelong customer support.

Thanks to our R&D team, we offer many products for different industries. For example, our products include Industrial UPS, Industrial Battery Chargers, Static Frequency Converters, Static Transfer Switches, Static Voltage Regulators, and Servo Stabilizers. Moreover, we provide solutions for Ni-Cd batteries like SAFT, VRLA, OPzV, and OPzS. Furthermore, Hannibal Power Supply systems are compatible with generators such as CAT and Kohler Diesel Generators.

