KTC

UPS and DC Charger Catalogue

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Industrial UPS System

Complete Power Solution With Maximum Protection

> Individual Control panels for each unit
> AC & DC Distributions
> Optional Redundant Rectifiers
> Optional Redundant Inverters

INDUSTRIAL UPS SYSTEM UNITS

The system consists of rectifier / charger, inverter, static bypass, maintenance bypass, rectifier isolation transformer, inverter isolation transformer, bypass line isolation transformer, automatic line stabilizer, DC distribution, AC distribution, controls and monitoring. The AC output of the inverter is connected to the critical load, the storage battery is connected between the inverter input and rectifier / charger output through a battery isolation MCB. The normal AC input power is connected to the rectifier; the bypass circuit also takes power from the same power source to provide power for the critical load during bypass operation when the system is in maintenance mode.

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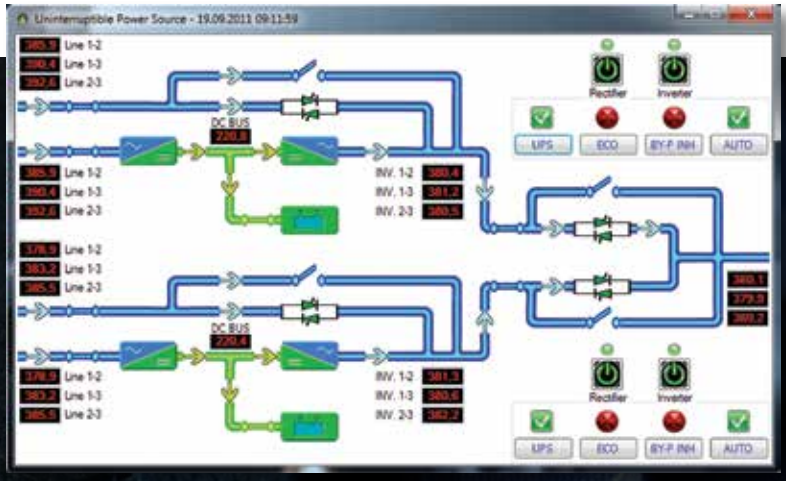

INDUSTRIAL UPS CONCEPT:

Industrial UPSs are regarded as fully customized power supply systems for rugged environments and designed particularly to safeguard critical loads in industrial applications where voltage transients, created by degraded mains supply, can seriously damage both UPS and the critical load. Industrial UPS Systems are fully flexible and customizable and designed for active–on line installation between the power source, by-pass source and critical load where the inverter delivers regulated AC voltage and frequency to the load and rectifier delivers regulated DC voltage / current to the DC load at all times without interruption.

The power conversion process isolates the critical load from the normal mains disturbances and isolates the mains from load induced reflected harmonics affecting other loads connected to the input mains feeder. The rectifier converts AC power into DC to charge maintenance free lead acid or nickel cadmium batteries; it also provides the necessary DC for continuously rated capacity of the inverter. IGBT semiconductor modules are used in PWM inverter and the control logic creates the precise sinusoidal output waveform with a very low harmonic content. Thyristor semiconductor modules are also used in rectifier for reliable operation.

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INDUSTRIAL UPS SYSTEM OPERATION MODES

NORMAL OPERATION

The rectifier with input isolation transformer converts normal input AC power info DC for the inverter and DC loads and for charging the battery group. The inverter is synchronized with the mains providing it is within the tolerances permitted by the logic, the inverter delivers its closely regulated frequency and voltage with output isolation transformer through the static switch to the load. Where the reference frequency and voltage are outside the permitted limits, the inverter will 'uncouple 'from the mains and will free run using its internal oscillator to assure the high stability power for the load.

LOSS OF INPUT POWER

In the event of input power failure, the inverter will free run using its internal oscillator and DC loads will operate from the battery until the low DC threshold is reached or the input power to the rectifier is restored. When the input AC power to the rectifier is restored, the rectifier resumes the provision of DC for the inverter, DC load and it will simultaneously recharge the battery. The critical AC load connected to the inverter and the critical DC load connected to the rectifier will not be disturbed during the loss and restoration of the input AC power feeding the rectifier.

BYPASS OPERATION

The inverter is provided with a sensing circuit which can detect transient overload, sustained overloads and short circuits. The sensing circuit initiates 'current limit', which causes the static switch to transfer the critical load to the bypass line without interruption for load security. There is also an isolation transformer with automatic line stabilizer. So, bypass line is also reliable source for the AC load across line fluctuations and disturbances.

Applications

Industrial UPS Systems are primarily designed to meet requirements for the applications;

- Oil and gas offshore and onshore,
- Petrochemical,
- Chemical,
- Power- and Substations
- Production process plants
- Offshore installations
- Pipeline control centers
- Airport, avionics and airfields
- Railways and metro lines
- Hospitals and healthcare
- Security and Alarm equipments
- Defense

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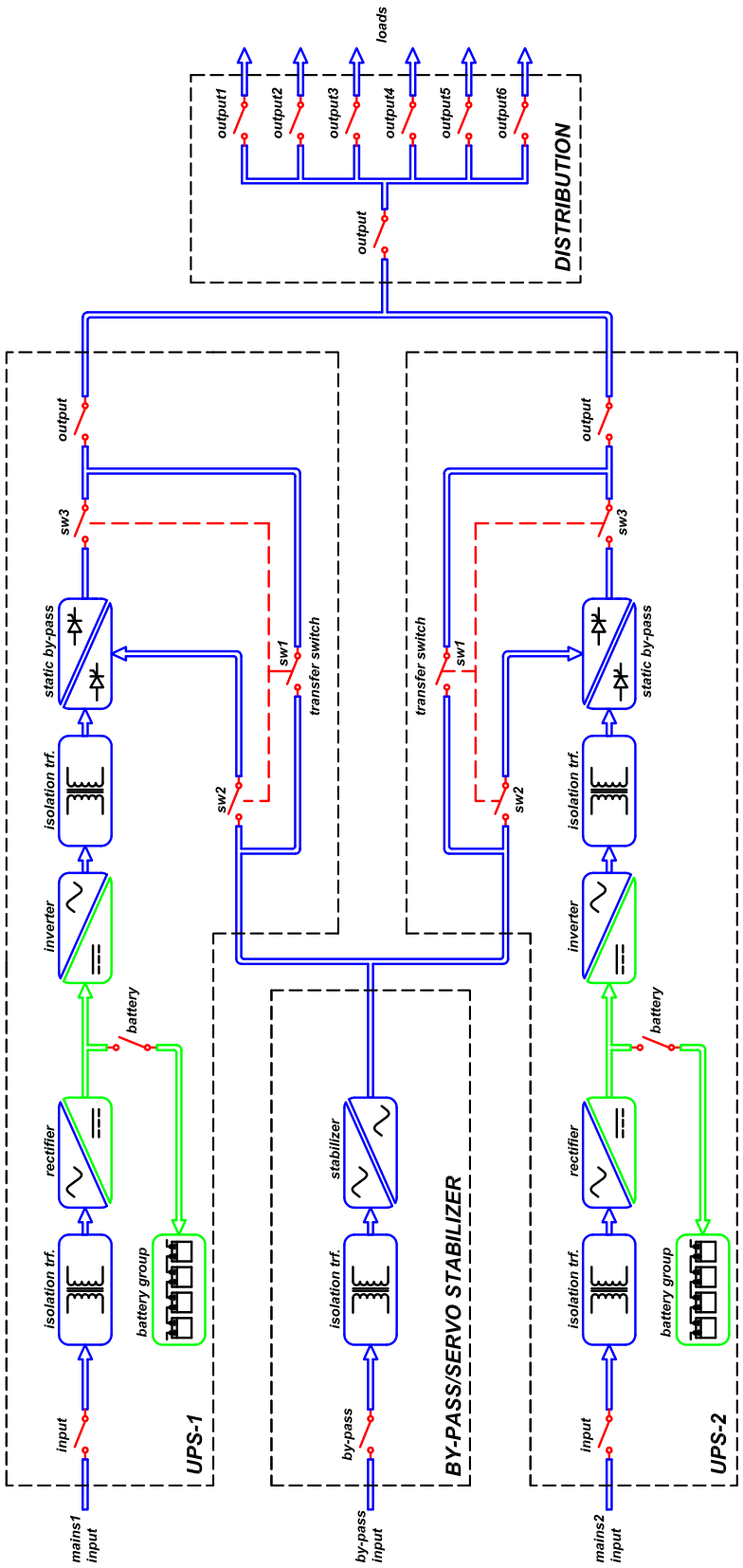
TYPICAL REDUNDANT AND FULLY ISOLATED DESIGN



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TECHNICAL SPECIFICATIONS

GENERAL	
Power Range	1-1 PHASE/ 1, 2, 3, 4, 5, 6, 7.5, 10, 15, 20 KVA
	3-1 PHASE / 10, 15, 20, 30, 40, 60 KVA
	3-3 PHASE / 10, 15, 20, 30, 40, 60, 80, 100, 125,150, 200 KVA"
Topology	Double Conversion Online System with Output Isolation Transformer
Control	Microprocessor Controlled System
RECTIFIER	
Topology	Full Bridge Phase Angle Controlled Thyristor Module Rectifier (6 Pulse / 12 Pulse Options)
Control	Microprocessor Controlled System
Nominal Input Voltage	110 VAC / 220 VAC / 230 VAC / 240 VAC / 380 VAC / 400 VAC / 415 VAC / 480 VAC ±15%
Nominal Input Frequency	50 hz. ±5% or 60 hz. ±5%
Input Cosφ	>0.8 Inductive (>0.9 with 12 Pulse Rectifier)
Nominal DC Voltage	110 VDC / 125 VDC / 144 VDC / 220 VDC / 264 VDC / 360 VDC
Nominal DC Current	Available upto 1200 Amp (12 Pulse over 400 Amp)
Static Tolerance	<1%
Output Voltage Ripple RMS	<1% (at full load)
Input Isolation Transformer	Galvanically Isolated (optional)
Serial Dropper Diodes	Optional depending on DC load input voltage range
Total harmonic Distortion (ThDi)	<35% (standard); <10% (with 12 Pulse Rectifier)
Battery Charging Principle	Constant Current Constant Voltage
Battery Charging Current Range	0-20 Adjustable based on Battery Current (standard); Can be higher based on Battery Capacity
Float Charge Voltage	100% to 115% of Floating Output Voltage Programmable
Boost Charge Voltage	100% to 125% of Floating Output Voltage Programmable
Boost voltage (V/C)	2,4 lead acid battery 1,55 NiCd Battery
Float voltage (V/C)	2,23 lead acid battery 1,40 NiCd battery
Equalize voltage (V/C)	2,7 lead acid battery 1,7 NiCd battery with reduced current
Front Panel Measured Values	LCD Display for Load Output Voltage / Current , Battery Output Voltage / Current and Line Voltage / Line Current / Frequency
Alarm Contacts (1 Open 1 Closed)	Open or closed; rectifier failure, over voltage, low battery, over temperature, line failure, Input MCB, Load MCB, Battery MCB
Front Panel Indicators	Float mode, Boost mode, Current mode, Equalize Mode, Battery ending, Low battery, Battery test failure, Line failure, Fan failure, Over voltage, Under voltage, Over temperature, Rectifier failure, SCR fuse failure (LED indication), Line MCB (LED indication), Load MCB (LED indication), Battery MCB (LED indication)
Front Panel Set Menu	Boost charge voltage, Float charge voltage, Low battery voltage , Battery test , Charger output current, Battery charge current, Battery automatic boost current and float current, Auto & Manual boost selection, Manual boost time, LED test and On - OFF.
Event History	Last 250 events recorded and displayed on front panel and on PC via RS 485
Communication (Optional)	Parameter monitoring and setting through RS 485/Modbus over local area network or through RS485/TCP-IP over internet

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TECHNICAL SPECIFICATIONS

Protections	Input: Thermic-Magnetic Over Current Protection, Over Voltage Protection, Phase Sequence Free Operation (3 Phase), Soft Start, MCB
	Output: Short Circuit Protection, Over Voltage Protection, Reverse Voltage Protection, optional MCB
	Battery: L-C filters, Overcurrent Electronic protection,Over Voltage Protection and Thermic Fuse, optional MCB
INVERTER	
Topology	3 Full Bridge 6 high Frequency IGBT Inverter Modules (3 Phase); 1 Full Bridge 2 high Frequency IGBT Inverter Modules (1 Phase)
Power Factor	0.8
Nominal Input Voltage	110 VDC / 125 VDC / 144 VDC / 220 VDC / 264 VDC / 360 VDC
Operating Input Voltage	±15%
Nominal Output Voltage	110 VAC / 220 VAC / 230 VAC / 240 VAC / 380 VAC / 400 VAC / 415 VAC / 480 VAC
Voltage Tolerance	
static	± 1%
dynamic with 100% load change	± 10% in 50 msec.
Overload	
at 125% Load	10 minutes
at 150% Load	1 minute
at 300% Load	1 second
Waveform	Pure Sinusoidal
Total Harmonic Distortion (ThDv)	
at Linear Load	< 3%
at Non-Linear Load	<7%
Crest Factor	3 : 1 (1 second)
Angle Deviation / Static Tolerance Deviation	
symmetric load	- - < 1° / <1%
50% asymmetric load	- - < 1° / <1%
100% asymmetric load	- - < 1° / <1%
Nominal Output Frequency	
while synchronized with the line	50 hz ±2% or 60 hz ±2%
while not synchronized with the line	50 hz ± 0.1% or 60 hz ± 0.1%
Switching Frequency	20 Khz.
Efficiency with Nominal Load	>85% / >90% depending on DC Bus Voltage
Isolation Transformer	Galvanically Isolated (standard)
Short-circuit behaviour:	3 x Nominal Output Current
Protection	Short Circuit Protection, Over Voltage Protection, Under Voltage Protection, Over Current Protection and Over Temperature Protection
Paralleling (Optional)	Provided through precision synchronizing technique OR through Static Transfer Switch
Communication (Optional)	Parameter monitoring and setting through RS 485/Modbus over local area network or through RS485/TCP-IP over internet

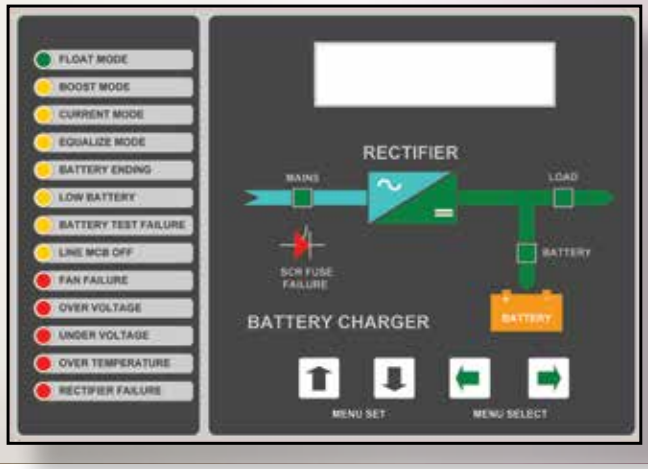
BATTERY CHARGER / DC RECTIFIER

RDA / RDAT AUTOMATION TYPE SERIES

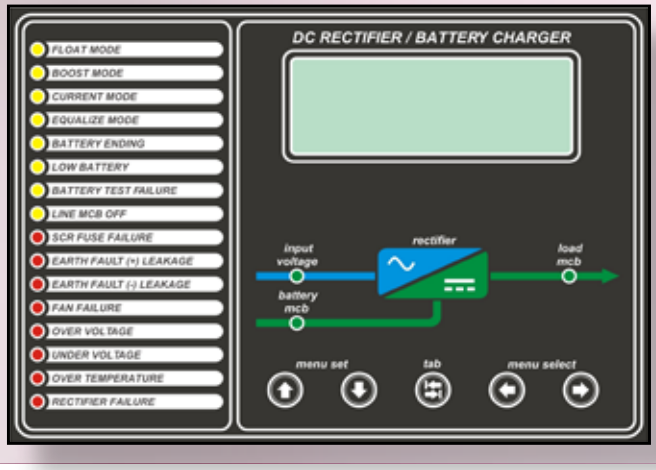
KTC Battery Charger is thyristor controlled, fully digital, static AC/DC rectifier with constant voltage / constant current characteristic. Galvanic isolation is provided with input transformer. Battery Charger is Scada ready through free contacts and communication features (Modbus protocol; RS-485 or TCP/IP port).

KTC Battery Chargers are widely used in different industries such as Power Generation, Power Distribution, Power Transmission, Manufacturing, Transportation, Mining, Oil & Gas with different applications such as Alarm, Control, Signal and Supply of DC Breakers in Power Plants, Substations, Switchgears, Railways and Offshore Plants

FRONT PANEL WITH 2 LINE LCD SCREEN



FRONT PANEL WITH 4 LINE LCD SCREEN



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STANDARD FEATURES

- 6 Pulse (for 3 Phase)
- Input Transformer for Galvanic Isolation
- Front Panel with LCD Screen (2 Lines), LED Indication and MIMIC diagram
- Digital Metering on LCD including, Input Voltage and Current (for 1 Phase), Battery Voltage and Current, Load Voltage, Charger Output Current
- Redundant Supply for LCD
- Separate Battery Charge Current and Output Current Adjustment via Current Transformer
- Output LC Filter
- Transient Surge Protection (via Varistor)
- Input MCB with Auxiliary Contacts
- Load and Battery MCB (up to 60A) with Auxiliary Contacts
- Load and Battery NH Fuse (higher than 60A) with Auxiliary Contacts
- Forced Ventilation with Smart Fan
- Event History up to 250 Events
- 8 Free Contacts
- Automatic Online Battery Performance Test
- Automatic and Manual Boost Function

OPTIONAL FEATURES

- 12 Pulse (3 Phase), THDi ≤ 10%, (PF) ≥ 0.85 Inductive
- 12 Pulse (3 Phase) with Active Harmonic Elimination, THDi ≤ 5%, (PF) ≥ 0.95 Inductive
- LCD Screen (4 Lines)
- Digital Metering on LCD Input Current (for 3 Phase)
- Analogue AC or DC Voltmeter and Ammeter
- Dropper Diodes
- LVD (Battery deep discharge protection contactor)
- SCR Fuse (Semiconductor Fast Fuse)
- Transient Surge Protection (via Surge Arrester)
- Input, Load and Battery MCCB
- Front Access Industrial Enclosure
- Battery and Battery Charger Inside Same Enclosure
- Natural Ventilation
- Custom IP Protection
- Custom Paint
- Enclosure Heater and Lighting
- Internal or External Distribution
- Forced/Active Load Sharing in Parallel Configuration
- Battery Temperature Compensation
- 8 Free Contacts (Configurable via Communication interface)
- Communication (PC Remote, Modbus, SNMP, Profibus, DNP 3.0 via RS 232, RS 485 or Ethernet TCP/IP ports)

CONTROL PANEL

The control panel of the battery charger is user friendly and consist of LCD screen, LED indications, MIMIC diagram and push buttons.

Removing the control panel due to a failure or any dysfunction of the control panel do not stop the operation of the battery charger.

Control panel supply is redundant. In case of an interruption of input AC voltage, battery charger control panel (LCD screen, LED indications, MIMIC diagram) keeps operating. In case of a total power loss, memory of the settings is kept and upon restoration of the mains power supply battery charger keeps operating based on the previously adjusted parameters.

INTELLIGENT BATTERY TEST FUNCTION

Battery capacity and battery connection between battery and battery charger is checked by battery test function. This test is done online while battery is connected and battery charger is operating in normal conditions.

During the test, battery capacity is tested based on 3 parameters:

· Discharge current
· Minimum voltage (voltage level that is assumed as battery discharged)
· Autonomy time

The operator is able to adjust battery discharge current (expected load current for test), expected autonomy time and the final/minimum voltage of the battery. Based on this set up, load is fed through the battery during this autonomy time. If battery voltage falls to minimum voltage value before autonomy time run out, the battery test result is failed and battery test failed LED will be ON. If not, the battery test will be considered as successful.

Battery test function can be activated manually or automatically. Automatic battery test periods are adjustable from the front panel.

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DC CHARGER: TECHNICAL SPECIFICATIONS

GENERAL		
Model	Monophase Input	Threephase Input
Topology	Standard: 6 Pulse (for 3 Ph input) Thyristor Controlled AC/DC Rectifier with Input Isolation Transformer Optional: 12 Pulse (for 3 Ph input) Thyristor Controlled AC/DC Rectifier with Input Isolation Transformer	
INPUT		
Nominal Voltage	110 VAC / 115VAC /208 VAC / 220 VAC / 230 VAC / 240 VAC ±15%	190 VAC / 200 VAC /380 VAC / 400 VAC / 415 / 480 VAC ±15%
Nominal Frequency	50 / 60 Hz ±5%	
Cosφ (For 3 Phase)	>0.8 Inductive (6 Pulse) >0.85 Inductive (12 Pulse) >0.95 Inductive (12 Pulse with active harmonic elimination)	
Transformer	Galvanically isolated	
THDi (For 3 Phase)	<30% (6 Pulse) <10% (12 Pulse) <5% (12 Pulse with active harmonic elimination)	
Input Protection	Thermic-Magnetic Over Current Protection, Over Voltage Protection, Phase Sequence Free Operation (for only 6 Pulse), Soft Start	
OUTPUT		
Nominal Output Voltage	12 VDC / 24 VDC / 48 VDC / 110 VDC / 220 VDC	
Output Voltage Adjustment	24VDC output: 10VDC to 30VDC, 48VDC output: 48VDC to 60VDC, 110VDC output: 110VDC to 160VDC, 220VDC output: 220VDC to 300VDC	
Output Current Adjustment	0-100% of Nominal Output Current	
Battery Charge Current Adjustment	24VDC output: 10VDC to 30VDC, 48VDC output: 48VDC to 60VDC, 110VDC output: 110VDC to 160VDC, 220VDC output: 220VDC to 300VDC	
Boost Charge Voltage	100% to 120% of Floating Output Voltage	
Boost voltage (V/C)	2,4 Lead Acid Battery 1,60 NiCd Battery (Based on battery brand and type)	
Float voltage (V/C)	2.23 Lead Acid Battery 1,40 NiCd Battery Based (Based on battery brand and type)	
Output Static Voltage Tolerance	±1% (Lower values available upon request)	
Nominal Output Current	Available upto 1000 Amp (12 Pulse over 400 Amp)	
Maximum Output Current	100% of nominal output current	
DC Ripple*	<1% RMS AC of Output Voltage	
Dynamic Response Time and Voltage Variation	<50msec, <+/-5% (for 10% - 100%, 100% - 10% step load change)	
Battery Charging Principle	Constant Current/ Constant Voltage	
Output Protection	Short Circuit Protection, Over Voltage Protection, MCB or NH Fuse (based on current value)	
Battery Protection	L-C filters, Overcurrent and Over Voltage Protection	

*Battery must be connected to the charger. Battery capacity must be at least 5 times higher than charger output rating

Factory

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