GAMATRONIC

Our Power, Your Confidence

Industrial UPS & Inverter Systems

GTSI Series

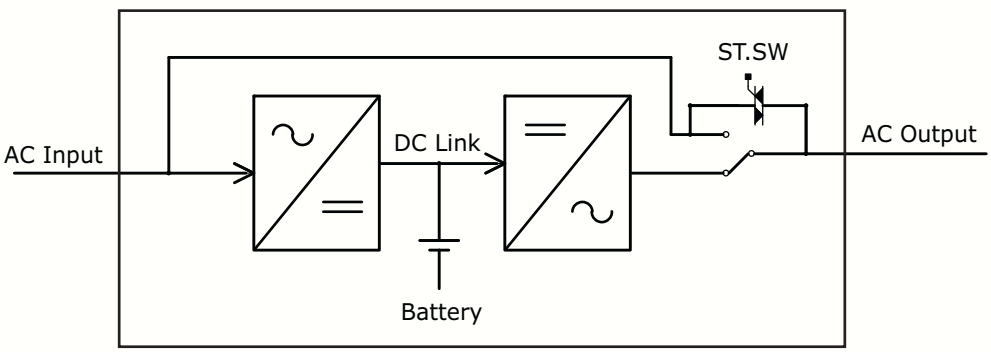
Applications

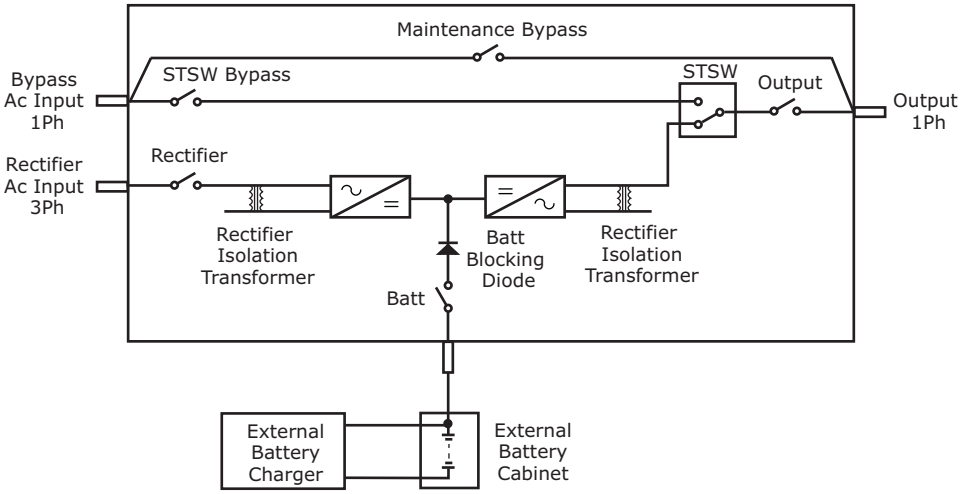
GTSI industrial UPS and Inverter systems are primarily designed to meet requirements for applications in the Oil & Gas, Petrochemical, Chemical, Steel & Metallurgy, Manufacturing, and Power Industries.

Topology

- True on-line double conversion, VFI, as per IEC 62040-3
- Robust 6-pulse/12-pulse phase controller rectifier
- Optional rectifier input isolation transformer for full isolation of the dc circuits
- Built-in inverter isolation transformer
- Extremely reliable hybrid-type static switch with dual SCRs
- High-frequency, PWM-controlled, full bridge IGBT inverter

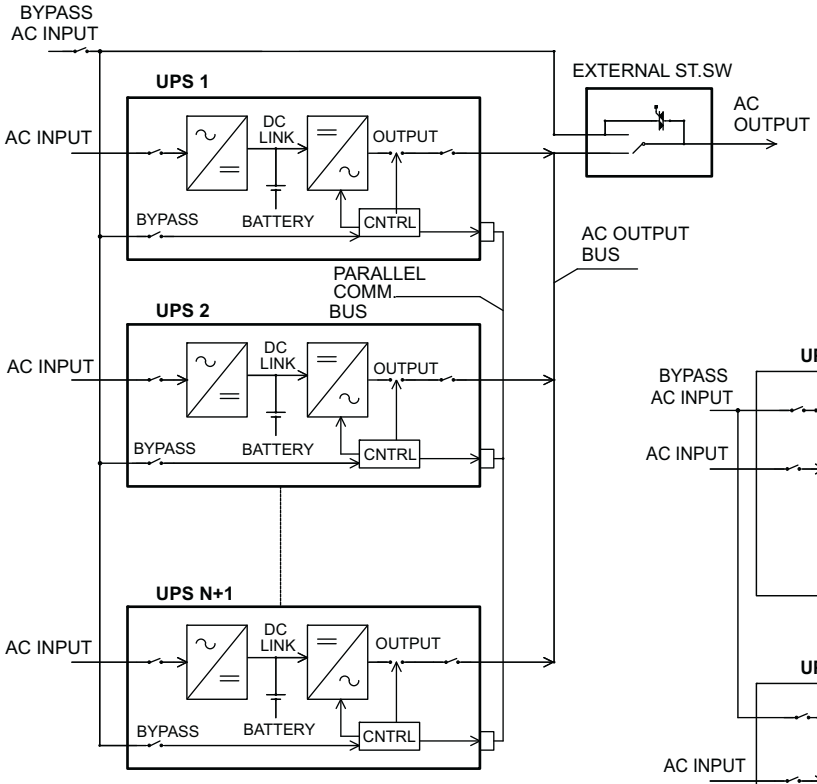
Gamatronic Double Conversion, On-Line Batteries UPS System Topology



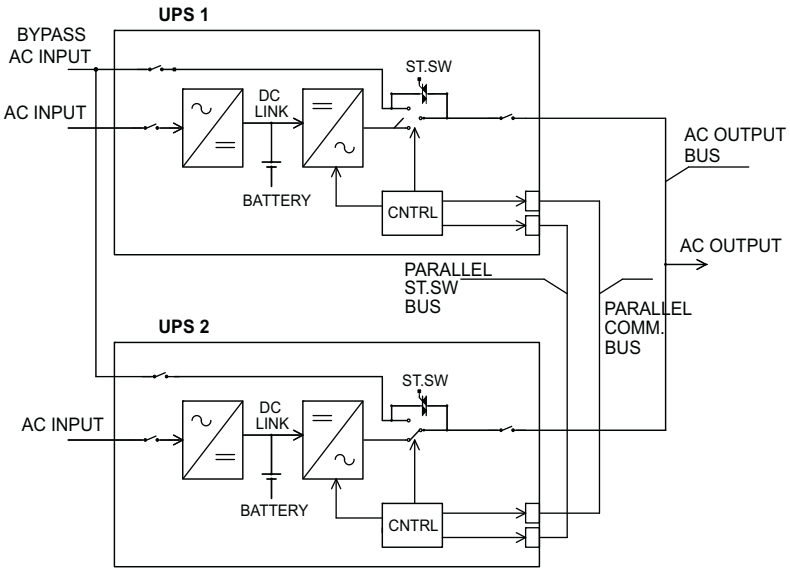


Parallel Operation

- Direct connection of up to 10 units in parallel
- Precise synchronization via microprocessor based- digital PLL
- Active current-sharing circuit ensures accurate sharing of load between paralleled units
- Available in both centralized and decentralized topologies



N+1
Centralized Parallel System



1+1
Decentralized Parallel System

Specifications

MODEL	GTSI	
Ratings	3-3	10,15,20,30,40,60,80,100,125,160, 200, 250 kVA
	3-1	10,15,20,30,40,60,80, 100, 125, 160 kVA
Topology	VFI, True On-Line double conversion, built-in inverter isolation transformer, optional Ac double isolation	
Control	High performance multi-task RISC micro-controller for full and precise digital control of power circuits, protections, synchronization, measurements, and communication	
RECTIFIER		
Input Voltage	3X380/400/415 Vac ±20 %, other voltages available on request	
Frequency	50/60Hz ± 5Hz	
Rectifier Topology	6-pulse phase-controlled rectifier (optional 12-pulse phase controller rectifier)	
Power Factor	>0.8 For 6-pulse controller rectifier, > 0.9 for 12-pulse controlled rectifier	
THDi	<30% for 6-pulse controller rectifier, < 10% for 12-pulse controller rectifier	
Nominal Dc Voltage	110V/220/384VDc ±1%, other voltages available on request	
Ac Ripple	<1% RMS	
Walk in Time	12-15 seconds	
Dc Isolation	Optional input Isolation transformer for full isolation of Dc-circuits from Ac input and output	
Protections	AC input and battery circuit breakers, rectifier Dc current limit, battery recharge current limit, DC-over voltage protection, and rectifier over-temperature protection	
INVERTER		
Topology	High frequency PWM-controlled IGBT full bridge with built-in inverter isolation transformer	
Output Voltage	220/230/240VAC ±1% , 3X380VAC/400/415VAC ±1%, other voltages available on request	
Frequency	Free running: 50Hz/60Hz ±0.01% Tracking range: :± 0.5/1/2/3/4Hz selectable	
Slew Rate	1Hz/second	
Waveform	Pure sinusoidal	
THDv	< 2% at linear load	
Dynamic Response	±2%, recovery within 10msec	
Phase Displacement	$\pm 1^{o}$ includes even under asymmetrical load (for three-phase output models)	
Load Power Factor	0.8 rated, allowable power factor range 0.6 lag to 0.6 lead	
Load Crest Factor	Up to 3:1	
Overload	Transfer to bypass: 125% for 10min, 150% for 30 sec, 1000% for 20msec	
Protections	Inherent inverter pulse by pulse protection (over current and short-circuit electronic protection), Over and under Dc input voltage protection, Over and under Ac voltage protection, input semi-conductor fuse, overload, inverter over temperature, Fast monitor transfers the load immediately to bypass when Dc voltage is lost	
Rejection Ration	> 100 dB	
STATIC SWITCH BYPASS AND OUTPUT		
Topology	Hybrid-type static switch with dual SCRs	
Transfer time	≤0.5 msec	
Efficiency	>99%	
Overload	600% for 2 sec, 1000% for 1 sec	
Protections	Bypass input circuit breaker; Ac output circuit breaker; built in backfeed protection; programmable bypass input over and under voltage protection; programmable over and under bypass frequency; output voltage monitor transfers the load to bypass on inverter fail. Optional "live static switch" option always outputs bypass on inverter shutdown	

Specifications

SYSTEM AND GENERAL	
Ac-Ac efficiency	89-93.5 % depending on type
Dc-Ac efficiency	92-95.5 % depending on type
MTBF	>250,000 hours with standard static switch bypass
Fault-clearing capacity	30 % of the UPS nominal voltage. Current rated gG fuse within 10 msec as per IEC 60269, and bypass available
Battery Management and Protections	- ABM automatic battery management includes: adjustable recharge current limit, temperature compensated charger, automatic battery test every 200 hours, manual battery test - Programmable End of discharge (Inverter cutoff) voltage level - Optional battery- recharges blocking system with monitoring for Battery systems with external battery charger - Adjustable Float charging voltage - Battery back-up remaining time calculation
Front Panel	- LCD display which shows the status of the system, the measurements, and the alarm messages. - Mimic diagram that shows the flow of power - Information and function buttons - Indication LEDs - Buzzer alarm - Log of last 256 events
System Displayed Parameters	- Rectifier: Ac input voltage, Dc voltage, battery current, and Ac input currents (optional) - Inverter: Ac voltage, frequency, and synchronization - Bypass: Ac voltage, current, and frequency - Output: Ac voltage, current, and frequency - Internal temperature and status over-temperature protections - Battery voltage and current status - Real time clock and accumulative run-time
Parallel Operation	Direct Parallel connection, precise synchronization via digital-PLL, accurate current sharing. Available in Centralized and Decentralized topologies for N+1 redundancy and/or Power Sharing
Communication Interfaces	- Dry-contact alarm relay board extendable up to 25 alarms - RS232 interface - Optional RS485 interface - Optional SNMP adaptor (GMACi) - Optional Wireless communication device via cellular interface
Cooling	Redundant forced air cooling
Noise Level	<55~68dBA depending on type and load percentage
Temperature	Operating: -10 to 45 ^{O} C Storage: -20 to 70 ^{O} C
Humidity	Up to 95% (non-condensing)
Altitude	2000 m w/o de-rating
Available cabinets*	Front access , protection grade IP20, optional IP32 Dimensions WXDXH: 550×800×1300 (mm), 700×800×1900 (mm), 1350×800×1900 (mm) Color RAL 7047
Safety	IEC 62040-1
EMC	IEC 62040-2, EN-50091-2
Design & Performance	IEC 62040-3
Conformity	CE

(*) Dimensions and weight will vary depending on the configuration requested.
Gamatronic GTSI series is called as [电源先锋] in Chinese
All of the above specifications are typical and subject to change without notice.

Specifications

MODEL	INV-GTSI	
Ratings	3-Phase	10,15,20,30,40,60,80,100,125,160 kVA
	1-Phase	10,15,20,30,40,60,80 kVA
Topology	High frequency PWM-controlled IGBT full bridge with built-in inverter isolation transformer	
Control	High performance multi-task RISC micro-controller for full and precise digital control of power circuits, protections, synchronization, measurements, and communication	
INVERTER		
Dc input	110/220/384 Vdc (±20%) Other voltages available on request	
Output voltage	3X380/400/415 Vac ±1% Other voltages available on request	
Frequency	Free running: 50/60 Hz ±0.01% Tracking range: ± 0.5/1/2/3/4 Hz selectable	
Slew rate	1 Hz/second	
Waveform	Pure sinusoidal	
THDv	<2 % with linear load	
Dynamic response	±2 %, recovery within 10 msec	
Phase displacement	±1° for three-phase output models includes asymmetrical loads	
Load power factor	0.8, allowable power factor range 0.3 lag to 0.6 lead	
Load crest factor	Up to 3:1	
Overload	Transfer to bypass: 125 % for 10 min, 150% for 30 sec, and 1000 % for 20 msec	
Protections	Inherent inverter pulse-by-pulse protection (over current and short-circuit electronic protection); over- and under-voltage for Dc and Ac input; input semi-conductor fuse; overload, inverter over-temperature; fast monitor transfers the load to bypass immediately when dc voltage is lost; Dc input circuit breaker	
Rejection ration	>100dB	
STATIC SWITCH BYPASS AND OUTPUT		
Topology	Hybrid-type static switch with dual SCRs	
Transfer time	≤0.5 msec	
Efficiency	>99%	
Overload	600% for 2 sec, 1000% for 1 sec	
Protections	Bypass input circuit breaker; Ac output circuit breaker; built in backfeed protection; programmable bypass input over and under voltage protection; programmable over and under bypass frequency; output voltage monitor transfers the load to bypass on inverter fail. Optional "live static switch" option always outputs bypass on inverter shutdown	

Specifications

SYSTEM AND GENERAL	
Dc-Ac efficiency	92-95.5 % depending on type
MTBF	>250,000 hours with standard static switch bypass
Fault-clearing cap.	30 % of the Inv. nominal. Current rated gG fuse according to IEC 60269 within 10 msec and bypass available
Front panel	- LCD screen: displays system status, measurements, alarm messages - Mimic diagram illustrating the power flow - Information and function buttons - Indication LEDs - Buzzer alarm - Log of last 256 system events
Viewable parameters include:	- Input:dc voltage and current - Inverter:Ac voltage, frequency, and synchronization - Bypass:Ac voltage, current, and frequency - Output:Ac voltage, current, and frequency - Internal temperature and status of over-temperature protections - Real time clock and accumulated operation time
Parallel operation	Direct parallel connection, precise synchronization via digital-PLL, accurate current-sharing. Available in centralized and decentralized topologies for N+1 redundancy and/or power sharing.
Communication interfaces	- Dry-contact alarm relay board - RS232 interface - Optional RS485 interface - Optional SNMP adaptor (GMACi) - Optional Wireless communication device via cellular interface
Cooling	Redundant forced air cooling
Noise level	<55~68dBA depending on type and load percentage
Temperature	Operating: -10 to 45 ^{O}C Storage: -20 to 70 ^{O}C
Humidity	Up to 95 % (non-condensing)
Altitude	2000 m without derating
Available cabinets*	Front access, protection grade IP20, optional IP32 Dimensions WxDxH: 550×800×1300 (mm), 700×800×1900 (mm) 1350×800×1900 (mm) RAL 7047 Color
Safety	IEC 62040-1
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Design & performance	IEC 62040-3
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