

RECTIFIER

RECT

ePower



GUSTAV KLEIN
POWER SUPPLIES - since 1948

A company introduces itself



The GUSTAV KLEIN company was founded in Schongau, Germany, in 1948. In 1969 a subsidiary factory was opened in Inzing, Austria west of Innsbruck.



Since January 1st 2007 Mr. Günther Stensitzki is managing director and sole owner of the company.

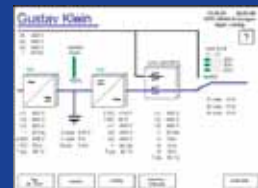


Since 1949 Gustav Klein regularly exhibits at German industrial fairs and is with over 60 exhibitions the "middle class company" with the longest history at the Hannover Fair. Meanwhile Gustav Klein presents worldwide itself on several fairs.

The manufacturing of transformers was the beginning of our rapidly expanding product palette, soon followed by voltage stabilizers and AC mains voltage regulators for radio and television broadcast transmitters of the Deutsche Bundespost (at that time the German telecommunications authority). The first thyristor rectifiers were developed and presented in 1960. When the design of the thyristor inverter was ready for production in 1962, these two were combined to form a „UPS system“ which was completed in 1968 with the newly developed, fully uninterruptible, electronic AC mains switch device (Bypass).

Switch-mode rectifiers and DC converters were delivered from 1970 on.

As soon as high-current bipolar transistors became available in 1985, GUSTAV KLEIN began production of single-phase and 3-phase pulse-width modulated inverters and UPS equipment with ratings up to 100 kVA. New IGBT transistors made it possible to improve the efficiency of our UPS equipment in 1996. Since the year 2000 UPS systems with microprocessors and Touchscreen-Display are in our product range.



Today not only UPS system ratings up to 1500 kVA can be delivered but also bidirectional high power test and simulation systems for DC and AC are in our production range.



→ Experience

More than 260.000 delivered units speak for themselves. The knowledge of our experienced engineers is also available for YOU.



→ High Product Reliability

Decades of practical experience in high security zones of rail networks, electricity generating stations, test and simulation systems, hospitals and industrial plants guarantee the highest reliability and quality.

→ Competence in Consulting and Support

Starting from your inquiry until After-Sales-Service YOU will be supported by our experienced engineers.

→ Competence in Technique

Own research & development department. Own printed-circuit-board design and our own software programming department, emphasise our continuously innovative activities.



→ Custom Designed Power Supplies

Our special competence in producing and developing complete customized solutions match YOUR specific requirements.

→ After-Sales

We guarantee the supply of spare parts for 15 years and a worldwide service. Maintenance contracts and a hot line complete our service for YOU.

→ Trust and Continuance

Gustav Klein produces power supplies for more than 60 years, for famous worldwide customers.



Secure DC power supplies consist of rectifier and batteries and are designed according to application.

Parallel standby operation

The rectifier must be dimensioned so that load is supplied and the battery is being charged out of the discharged condition simultaneously. At mains failure the battery takes over the load without interruption and any switching operation.

Buffer operation

To cover peak load a part of the energy can be drawn from the battery. This permits a reduction of the rated power of the rectifiers.

Depending on application and the customers requirements, either closed or valve regulated lead acid batteries may be used. For small rated powers, the batteries can be integrated into the rectifier cabinet. At greater powers the battery is housed in a separate cabinet or an open rack. For special applications NiCd batteries are also used.

3 different charging voltages are applied to charge lead acid batteries:

Float charging

For float charging, the battery is charged with 2,23 to 2,27 V/cell, depending upon the type of battery. The float charging voltage is kept below the gassing limit of the battery so that a water loss of the batteries is avoided most largely. The recharging time of discharged batteries is about 10-20 hours at this charging voltage.

Boost charging (fast charging)

Lead-acid batteries are given a boost charge with up to 2,4 V/cell. In contrast to float charging, a discharged battery can be recharged up to the required capacity within a much shorter time. Because of the loss of water, the boost charge should be used only after a longer mains failure and if the charging period should be limited.

Equalizing charge (Forming)

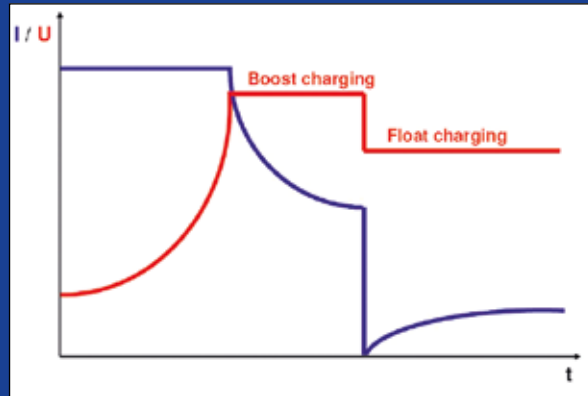
The battery can be charged at 2.65 V/cell before being put into service and as equalization charge. This procedure enables the battery to be safely given a full charge.

Corresponding values apply to NiCd batteries.

Charging characteristics

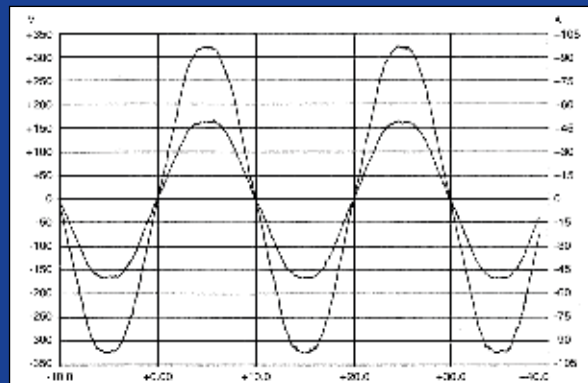
Batteries for DC power supplies are charged in accordance with IU characteristic of DIN 41772. Deeply discharged batteries are first charged with a constant current (I) and then with constant voltage (U) having maintained the fully charged condition.

An automatic charging characteristic control (voltage and/or time-dependent can be provided (see options)).



Special features of the transistor rectifier with IGBT:

- input current absolutely sinusoidal
- no current harmonics
- no reactive input power consumption ($\cos\phi = 1$)
- input power factor = 1
- operation from standby generator without feedback and power restriction
- no inrush current by soft start
- energy recovery during capacity test
- Electrical isolation
- high dynamic regulation
- high efficiency



Applications

- Charging and direct feeding rectifier
- Energy recovery rectifier
- Net feeding for solar plants
- Peak load covering
- Controlled dc-resistor for battery test with energy recovery

Rectifier		Thyristor Type GR- 3812	Transistor Type GR-3864
Rated Power	kW	2 – 500	
Rectifier Input			
Mains voltage*	V	400/230 ± 10%, 3~, N, PE	
Mains frequency*	Hz	50 oder 60 ± 5%	
Rectifier Output			
DC voltage	V	24, 48, 60, 110, 220, 372, 700	60 – 1200
Setting range	% U_{nom}	100 – 120	
Rated current	A	20 – 2000	100 – 1250
Charging characteristics		IU according to DIN 41772 (switchable between 3 characteristics)	
Battery types		Closed or sealed lead-acid or NiCad batteries	
Constant voltage	V/Zelle	2.23 – 2.4 for lead-acid / 1.40 -1.55 for NiCad batteries	
Voltage tolerance:	%	± 0,5	
Current limiting		Can be set at 60 – 105 % of rated current	
Regulation error with current limiting	%	+ 2 in voltage range 80 to 100 %	
Voltage ripple without battery	% eff.	≤ 5	≤ 2
EMV		EN 62040-2	
Efficiency	%	up to 97 %	up to 96 %
Acoustic noise	dB (A)	50 – 70	
Common Data			
Permissible ambient temperature	C°	0... +40	
Permissible climate		3K3 according to IEC 60721-3-3 (85% relatively humidity, none condensation)	
Permissible operating altitude		1000 m above m.s.l. with rated load	
Protection class *		IP 20 according to EN 60529	
Paint finish *		RAL 7035, structured finish	
Cooling		„AN“ convection cooling	„AN“ or „AF“ forced. Cooling
Protection		Semiconductor fuse in rectifier unit output	
Transformer		Isolation transformer according to EN 61558	
Rectifier set		Fully controlled bridge circuit with thyristor	PMW-converter with IGBT (PFC)
Instrumentation		TFT Farbdisplay mit Meldespeicher	
Remote signaling		8 floating contacts	
Indicators on mimic diagram		AC mains supply correct Rectifier operation / fault Battery charging / discharging	

* Other values on request

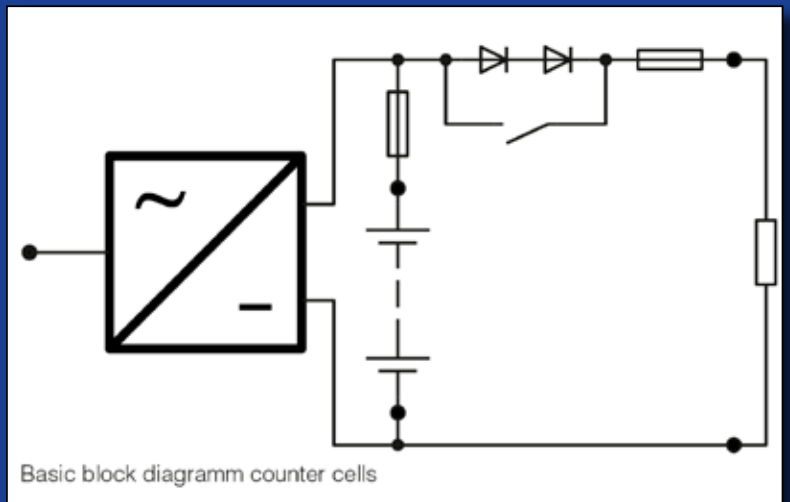
Equipped with

- Phase rotation monitor
- Phase interruption monitor
- Radio interference suppression
- Input contactor
- Isolation transformer
- Automatic softstart
- 3 charging voltages
- Manual control
- Rectifier output fuse
- Overvoltage monitoring latching
- Undervoltage monitoring (current-dependent)
- Floating alarm relay contacts



Options

- Microprocessor control (standard for LGDP-IU)
- Colored Touchscreen display (standard for LGDP-IU)
- 12 pulse rectifier bridge (thyristor rectifier)
- Output filter to reduce ripple
- Paralleling device
- Automatic charging
- Additional instruments
- Fault memory
- Deep discharge supervision
- Battery circuit monitoring
- Higher protection class
- Remote panel
- Special marking of cabinets
- Counter cells
- Cell switching by using main and additional rectifier



UPS Systems	1-phasig:	1 – 200 kVA
	3-phasig:	5 – 500 kVA*
Inverter (24 – 1000 V DC, 16,7 Hz – 400 Hz)	1-phasig:	1,0 – 200 kVA
	3-phasig:	3 – 500 kVA*
Rectifier systems Thyristor technology Switch mode technology Transistor technology (IGBT) Ferrous magnetic technology	24 – 1000 V	5 – 1500 A
DC-voltage converter (24 – 220 V)	System performance:	0,1 – 7 kW 50 kW
Static Transfer System	3-phasig:	50 – 1500 kVA
Frequency converter (16,7 Hz – 800 Hz)		1 – 500 kVA*
Mains voltage regulator		1 – 1600 kVA
Battery test- and simulation systems		5 – 500 kW *
Mains simulation systems		5 – 500 kW *
AC-Load (Back feed)		5 – 500 kW *
AIC Active Infeed Converter		100 - 500 kW *

* systems performance up to 4 MVA (MW)



We provide the technical base for innovative future projects.



Power stations and power lines



Test and simulation system



Stationary power supply for urban traffic and railway lines



Operating theaters



Chemical industry / Oil and Gas



High Power Storage Systems

Technology
Competence
Quality



Reliability
Experience
Innovation

Your Partner for all aspects of power supply equipment



worldwide



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