BENNING
World Class Power Solutions

Excellent Technology, Efficiency and Quality

INVERTRONIC compact

Inverter systems in modular technology
Scalable, durable and cost-effective

INVERTRONIC compact
high energy reliability and cost-effectiveness

19" rack with 3 INVERTRONIC compact inverter modules, manual bypass and "EUE" electronic bypass switch unit (Figure 7)

19" rack with 5 INVERTRONIC compact inverter modules (Figure 8)
Up to 5 output modules can be fitted into one 19" rack.

Energy reliability maximised thanks to INVERTRONIC compact systems

With BENNING's INVERTRONIC compact range of inverters, the company offers highly reliable, cost-effective, single-phase, modular inverter systems which provide high-quality, maximum-reliability electrical power to the critical loads.

In combination with TEBECHOP modular rectifier systems, the result is a highly versatile, cost-effective platform for the construction of comprehensive, battery-supported standby power supply systems with the optimum of reliability and availability (refer Figure 1).

Main advantages

- **first-class design and high-quality components designed for the harsh conditions encountered in industry**
- **redundancy of n+1 (or n+r)**
- **reliable hot-swap technology**
- **extensive reporting & monitoring functions, e.g. via HTML, SNMP, Modbus, Profibus or IEC 61850**
- **maximum reliability**
- **low output ripple with excellent dynamic output characteristics**
- **cost-effective in partial-load range**
- **high output density and correspondingly low space requirement at point of installation**
- **option of operation with or without battery**
- **straightforward scalable system power output**

The INVERTRONIC compact range consists of the following system components:

- **Inverter module**
- **Electronic bypass switch**
- **Manual bypass switch**

- **maximised availability**
- **maximised versatility of use and investment**
- **minimised operating costs**

INVERTRONIC compact – diverse system technology thanks to modular platforming

Rectifier / inverter system cabinet (Fig. 1)
This system is populated with 3 inverter modules, "EUE" electronic bypass switch modules and manual bypass, output power of 4.5 kVA and 5 rectifier modules, output voltage of 220 V DC and output power of 50 A DC.

Block diagrams for modular architecture with INVERTRONIC compact inverter systems

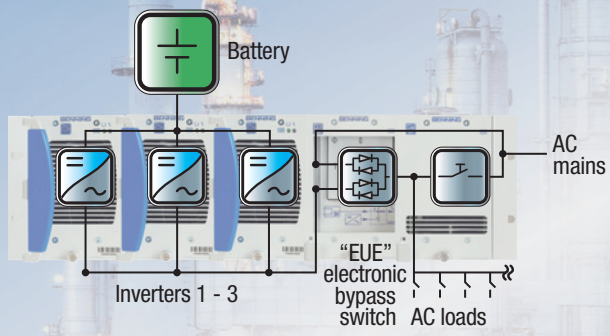

Figure 2 (top): Rack with 3 inverter modules and "EUE" electronic bypass switch with manual bypass

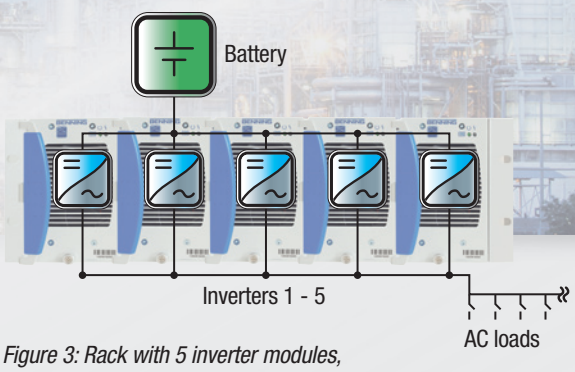

Figure 3: Rack with 5 inverter modules, without electronic bypass switch

INVERTRONIC series compact, modular system components

Parallel switchable inverter modules
The inverter modules are available for various input and output voltages, and the output power varies according to the voltage combination.

INVERTRONIC compact inverter systems and their racks, comprising hot-swapping 1/5 19" rack modules with a range of 3 heights, are characterised by their modular architecture (Figure 2 and Figure 3).

Electronic bypass switch ("EUE")
Electronic bypass switch assures system availability, enables interruption-free switching and is available in two power ratings.
At higher outputs, you can have a higher-power electronic bypass switch fitted in your cabinet.

Manual bypass
There is the option of switching the load to the bypass mains or to the inverter output, thanks to the manual bypass which is also housed in a 1/5, 19" rack module.

This covers the switching of all of the installed inverter modules and the electronic bypass switch. Accordingly, the system can be serviced and maintained with no interruption to the power supply for the load. In systems with higher plant power outputs, the manual bypass is fitted in the control cabinet.

Monitoring & Remote Management with the MCU 3000

MCU 3000 remote monitoring system
System cabinets are available in a range of different sizes, coming with the required number of racks for inverters and for rectifiers (Figure 1 and Figure 5).
Here, the MCU 3000 features as the central remote monitoring unit.

On the MCU 3000 display & control unit which is installed in the cabinet door, operating statuses are indicated by a range of LEDs.
A graphic digital instrument enables messages and readings to be displayed at the position of installation.

Remote monitoring is available by means of modem, ethernet, the web, SNMP, MODBus or Profibus.

19" rack module with INVERTRONIC compact output modules (Figure 4)
19" rack: 5 inverter modules, output voltage of 230 V AC, output power of 7.5 kVA at 110 V and 220 V, 12.5 kVA at 48/60 V, 5.5 kVA at 24 V

Technical data

Inverter modules					
Input					
Voltage (DC supply)	24 V [20.4 ; 30] V	48 V [40.8 ; 60] V	60 V [51 ; 75] V	110 V [93.5 ; 155] V	220 V [187 ; 275] V
Current	42 A	45 A	36 A	12 A	6 A
U_{Ripple} max	5 % eff.				
Output					
Voltage	220 V / 230 V / 240 V				
Power	1.1 kVA	2.5 kVA	2.5 kVA	1.5 kVA	1.5 kVA
Static voltage tolerance	± 1 %				
Frequency	50 / 60 Hz				
Frequency tolerance	± 0.1 % (free running)				
Distortion factor	≤ 2 % for linear loads				
Crest factor	≤ 2.8				
Overload	125 % for 30 s, 135 % for 4 s			120 % for 60 s, 200 % for 4 s	
Short circuit	> 10.8 A for 4 s	> 27.2 A for 4 s	> 27.2 A for 4 s	> 16.5 A for 4 s	
Efficiency	up to 93 %				
Standards					
Electrical Safety	EN 62368-1				
EMC	EN 55022 Class B			EN 55022 Class A	

Input				
Voltage (DC supply)	24 V [20.4 ; 30] V	48 V [40.8 ; 60] V	60 V [51 ; 75] V	125 V [105.4 ; 155] V
Current	39 A	37 A	29 A	9 A
U_{Ripple} max	5 % eff.			
Output				
Voltage	110 V / 120 V / 127 V			
Power	1.0 kVA	2.0 kVA	2.0 kVA	1.25 kVA
Static voltage tolerance	± 1 %			
Frequency	50 / 60 Hz			
Frequency tolerance	± 0.1 % (free running)			
Distortion factor	≤ 2 % for linear loads			
Crest factor	≤ 2.8			
Overload	125 % for 30 s, 135 % for 4 s			120 % for 60 s, 200 % for 4 s
Short circuit	> 20.83 A for 0.5 s	> 41.67 A for 0.5 s	> 41.67 A for 0.5 s	> 26 A for 4 s
Efficiency	up to 92 %			
Standards				
Electrical Safety	EN 62368-1, UL 60950-1			
EMC	EN 55022 Class A			

General data		
Dimension (HxWxD)	132.6 x 85.6 x 303.5 mm	
Cooling	forced-air ventilated	
Operating temperature	-40 … +75 °C (note reduction in power)	0 … +40 °C (reduction in power beyond this)
Relative humidity	5 ... 95 % (non-condensing)	
Storage temperature	-40 °C to +85 °C	
Installation height	2000 m (without reduction in power)	
Weight	3.2 kg	3.1 kg
Connection	hot swap modular	
Protection class	IP 20	
Parallel operation	up to 30 modules	
Acoustic noise	< 65 dB(A)	

Specifications are subject to change without notice.

INVERTRONIC compact – scalable, tough and cost-effective

Rectifier / inverter system cabinet (Fig. 5)
System cabinet of reduced height, populated with inverter modules, "EUE" electronic bypass switch and manual bypass, together with rectifier modules.

INVERTRONIC compact 19" rack with electronic bypass switch unit (Figure 6)

Technical data

Electronic bypass switch		
AC mains		
Voltage	110 V / 120 V / 127 V / 220 V / 230 V / 240 V	
Voltage tolerance	mains supply ± 15 % / inverter supply ± 1 %	
Current	100 A	250 A
Frequency	50 / 60 Hz	
Frequency tolerance	± 0.1 % (free running)	
Overload	120 % for 600 s	
Short circuit	1,000 % for 10 ms	
General data		
Dimension (HxWxD)	132.6 x 85.6 x 303.5 mm	132.6 x 483 x 305 mm
Cooling	forced-air ventilated	
Operating temperature	0 … +40 °C (reduction in power beyond this)	
Relative humidity	5 ... 95 % (non-condensing)	
Storage temperature	-40 °C to +85 °C	
Installation height	2000 m (without reduction in power)	
Weight	2.8 kg	13 kg
Connection	hot swap modular	
Protection class	IP 20	
Acoustic noise	< 65 dB(A)	
Standards		
Electrical Safety	EN 62368-1 / UL 60950-1	
EMC	EN 55022 Class B	EN 55022 Class A

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