BENNING
World Class Power Solutions

Excellent Technology, Efficiency and Quality

INVERTRONIC

- single and three phase IGBT inverters
- robust and reliable
- ideal for tough industrial applications

INVERTRONIC – maximum uptime for process-critical consumers in industry

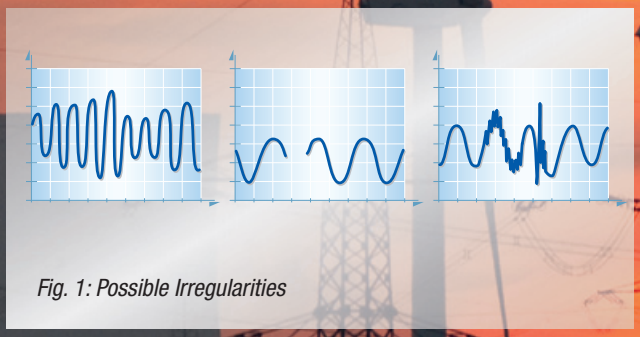

Fig. 1: Possible Irregularities

- **outstanding availability**
- **high cost-effectiveness**
- **maximum power supply quality**

- **high quality of output voltage**
  - true sinewave output
  - low output ripple
  - good control dynamics even during rapid load cycles, thus no overshoot/undershoot with consumer voltage
  - marked improvement in quality of voltage and frequency – by comparison with standard grade – and this results in a reduction of stress on consumers

- **digitally regulated switching concept**
  - can be configured rapidly
  - low parts count
  - straightforward optical and digital interfaces

- **extensive reporting and monitoring functions**
  - internal controllers
  - all currently used interfaces are available, e.g. remote monitoring/modem control, HTML or SNMP, MODBus or Profibus etc.

- **Output expansion or redundancy configuration**
  - by parallel switching of up to 8 individual systems with smart bus connection

- **straightforward coupling of A and B rails**
  - via coupling switch with no interim changeover to bypass mode

- **Using any battery and rectifier infrastructure that's already in place**

Dependable, cost-effective solutions "Made in Germany"

Far-reaching budgeting and financial repercussions can arise as the result of faults on the area of power supply. Due to disturbances on the public power supply system caused by repercussions from large-scale consumers, and due to energisation events during peak consumption periods – or in the event of lightning strikes – it's impossible to prevent these irregularities from occurring. These will result in voltage dips, overshoots and transients in the public grid voltage (Fig. 1).
These may exert a considerable influence on the availability of connected consumers, giving rise to process faults or production failures.

For the supply of power to consumers requiring AC power which is independent of faults arising on the public grid, BENNING offers very robust, single-phase and three-phase inverter systems – in the form of the INVERTRONIC power inverter – for the tough applications that come up in industry, typically for:

- **the power stations sector**
- **the oil, gas and petrochemical industry**
- **the processing industry**

These are connected up to AC power grids that are supported (e.g. by batteries) and provide a reliable source of good quality electrical power to critical consumers.

INVERTRONIC – technical details
Flexible, safe and scalable

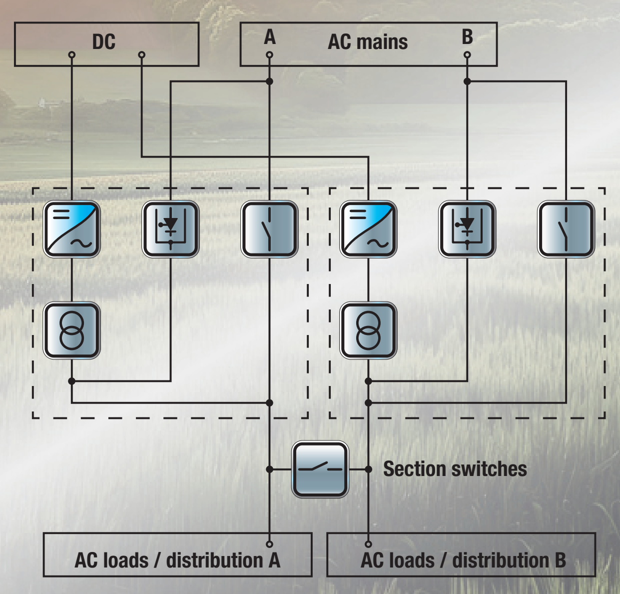

Fig. 2: Supply of power to two bus bars (A+B). Coupling can be brought about without having to switch over to bypass mode.

Instrumentation

The unit indicates the following specified measured values:

Inverter:
- input voltage
- input current
- output voltage
- output current of each phase and frequency
- apparent power
- real power

Bypass:
- input voltage
- input current of each phase and frequency

Flexible, safe and scalable – for the toughest industrial demands

Parallel Operation
For redundancy or increased output power, up to eight INVERTRONIC units can be connected in parallel, operating in an active load-sharing mode.

Half load parallel operation is achieved using two separate bus bars, connected with a coupling switch. The state of the coupling switch is relayed to the microprocessor, via an auxiliary contact.

Straightforward coupling without using bypass mode
INVERTRONIC power inverters use section switches directly and without having to switch over to bypass mode. The switching process is controlled by corresponding logic, thus dispensing with the need for complex switching routines. All consumers remain isolated from the public grid and receive a continuous supply of the best quality of power.

Option
For power plant applications where higher than normal fault clearing current is required, it is possible to specify an option for 7 x I nominal system output. Depending on the output power, a bigger cabinet may be required.

Reliability is sustained continuously – thanks to proactive 360° services

Because you can rely on a BENNING power inverter, you can consequently opt for a high-quality product from a worldwide leader in AC and DC power supply manufacturers.

This means that you can expect a reliable, globally aligned service structure which provides the optimum support for your requirements.

That's the best way for you to gear up for the challenges of today and the opportunities of tomorrow.

www.benning-services.com

360° pro-active Service

INVERTRONIC – the most important technical data at a glance

Technical data of the INVERTRONIC with three-phase output

INVERTRONIC (3ph output)												
Ratings (cosφ = 0.8)	[kVA]	10	20	30	40	50	60	80	100	120	160	200
Ratings (cosφ = 1.0)	[kW]	10	20	30	40	50	60	80	100	120	160	200
Operating temperature		0 … 40 °C (derating at higher temp.)										
Relative humidity		5 … 95 % (non condensing)										
Noise level		< 65 dBA (depending on rating)										
Protection kind		IP20 (others on request)										
Altitude above sea level		1000 m (without derating)										
Cable entry		bottom (top on request)										
Color		RAL 7035 (others on request)										
Cooling		redundant forced ventilated										
Standards												
Safety		IEC / EN 62040-1, IEC / EN 62477-1										
EMC		IEC / EN 62040-2										
Performance		IEC / EN 62040-3										
Output												
Voltage		380 V / 400 V / 415 V (others on request)										
Voltage tolerance (static)		± 1 %										
Frequency tolerance		± 0.1 %										
Distortion THDu		linear load: ≤ 1 %										
Efficiency		up to 95 % (depending on configuration)										
Overload inverter		200 % for 1 s, 150 % for 60 s, 125 % for 10 min										
Overload bypass		1000 % for 100 ms, 150 % for 10 min										
Short circuit behavior inverter		up to 350 % for 1 s (higher on request)										
Short circuit behavior bypass		1000 % for 100 ms										
Transformer		isolation transformer										
Battery												
Nominal voltage		110 V										
		220 V										

Higher ratings on request.

We reserve the right to make technical changes.

INVERTRONIC
Technical data at a glance

Technical data of the INVERTRONIC with single-phase output

INVERTRONIC (1ph output)										
Ratings (cosφ = 0.8)	[kVA]	10	20	30	40	50	60	80	100	120
Ratings (cosφ = 1.0)	[kW]	10	20	30	40	50	60	80	100	120
Operating temperature		0 … 40 °C (derating at higher temp.)								
Relative humidity		5 … 95 % (non condensing)								
Noise level		< 65 dBA (depending on rating)								
Protection kind		IP20 (others on request)								
Altitude above sea level		1000 m (without derating)								
Cable entry		bottom (top on request)								
Color		RAL 7035 (others on request)								
Cooling		redundant forced ventilated								
Standards										
Safety		IEC / EN 62040-1, IEC / EN 62477-1								
EMC		IEC / EN 62040-2								
Performance		IEC / EN 62040-3								
Output										
Voltage		220 V / 230 V / 240 V (others on request)								
Voltage tolerance (static)		± 1 %								
Frequency tolerance		± 0.1 %								
Distortion THDu		linear load: ≤ 1 %								
Efficiency		up to 93 % (depending on configuration)								
Overload inverter		200 % for 1 s, 150 % for 60 s, 125 % for 10 min								
Overload bypass		500 % for 100 ms, 150 % for 10 min								
Short circuit behavior inverter		up to 300 % for 1 s (higher on request)								
Short circuit behavior bypass		500 % for 100 ms								
Transformer		isolation transformer								
Battery										
Nominal voltage		110 V								
		220 V								

Higher ratings on request.

We reserve the right to make technical changes.

Easy, reliable operation combined with comprehensive reporting and monitoring functions

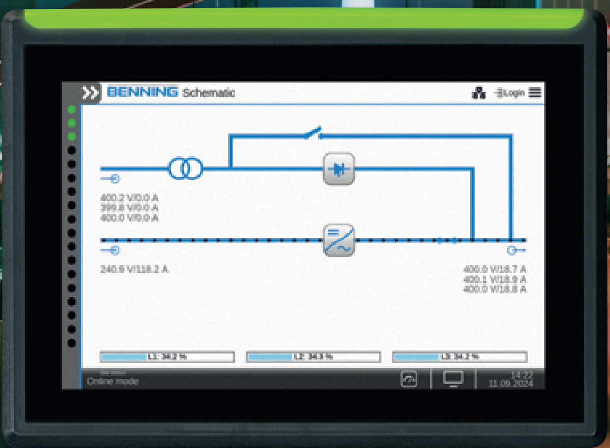

Figure 3: The MCU 3000 is inserted into the cabinet door of the inverter system. This version has a 10' touch display. The start screen shows an uncluttered single line with the most important measured values and system statistics.

Fig. 4: INVERTRONIC inverter

Display and control unit

The Monitoring Control Unit 3000 (MCU 3000) is used to operate and remotely monitor the inverter (see Fig. 3). It is consistently tailored to the needs of the user and provides all the necessary measurement and setting values in a straightforward and user-friendly manner. Only the information required to perform the task at hand is displayed on the screen. The operation becomes safer and more efficient. The time required for service and maintenance processes is significantly reduced.

Actions or service processes are automatically triggered by events via individually adjustable limit values, filters and prioritisation. In addition, a hysteresis range can be defined for alarms and messages.

Among other things, the MCU 3000 has an integrated web server and thus enables connection to various network topologies in addition to remote maintenance.

MCU 3000 – Smart connectivity

- **Supports all common communication protocols and interfaces, e.g: DNP 3, Profibus and MODBUS, TCP/IP, SNMP, e-mail[*1], modem, Ethernet and USB**
- **RS-232 for serial communication and modem**
- **RS-485 for MODBUS (MODBUS can also be addressed via network)**
- **USB 2.0 interface**
- **Configurable via web browser and mobile devices**
- **Integration of external error messages (e.g. fire protection systems, alarm systems, etc.)**

[*1] *customised configuration on request*

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