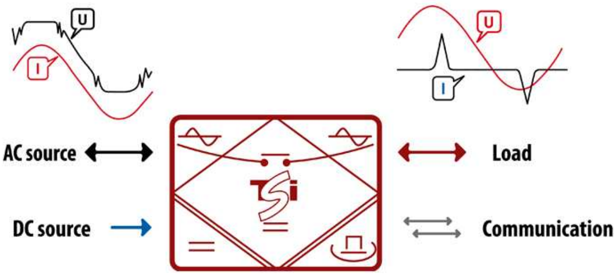
TSI BRAVO 48/230

Triple power port inverter without single point of failure

The TSI is designed according to the golden rules of **True Redundant Systems**. One of the most important features is the disconnection capability. A TSI converter has at least 3 disconnecting levels in series (i.e. a relay, a fuse...) on each power port as well as an optical isolation on the double communication bus. The AC grid port is specifically designed to clean up the surges, bursts and all of the well-known disturbances met on a power network. As designed, the AC grid input has four (4) disconnecting devices in series in order to insure a higher MTBF of the DC/AC converter inside the TSI.
The AC-to-AC conversion chain isolates the AC output from the AC input and features a double filtering function. Consequently, the voltage supplied to the critical load is a pure sine despite all the disturbances (harmonics, surges, glitches …) usually carried by the grid and the input current remains sinusoidal even when the load is not linear.
Pure sine wave at the output and ideal power factor



at the input are achieved without pumping any energy from the DC source.
With the TSI concept the filtering of current and voltage is similar to a rectifier combined with an inverter (on-line mode) but with a significantly better efficiency. Compared to a UPS operating in off-line mode, the efficiency is in the same range but the rejection of grid disturbances is much higher. Furthermore, the transfer between energy input sources is disturbance free and can be considered as a "soft-switching" operation. It is so wise to consider this functioning mode as the normal operating mode and we will name it "**Enhanced Power Conversion**" (**EPC**) mode.

The AC-to-AC efficiency, which ranges to 96% up is a significant improvement compared to less than 85% overall efficiency given by the rectifier-battery-inverter chain usually in use when similar reliability performances have to be achieved. So losses are divided by 3.
The TSI is able to supply 10 times its nominal output current for a time longer than 20ms in case of downstream short-circuit in the AC distribution. Nominal performances are kept and clean AC power supply is guaranteed to any other load connected in parallel.
This short-circuit current is also controlled in magnitude to prevent tripping of the upstream breaker. Full segregation is so ensured and is an additional guaranty that loads are kept free of disturbances even after failure occurrence.
The internal switch as well as the inverter of the TSI can be paralleled up to 32 units. The "synchronization communication bus" is redundant too. The communication is therefore fault-tolerant, each bus being self-sufficient to handle synchronization, load sharing and data communication.
With the TSI, the manual bypass is no longer needed to allow the replacement of the static switch. It is just limited to cabinet maintenance purposes bearing in mind that the TSI module is hot plug and redundant.
When designing a customized system with, it is very convenient to have modules integrating inverter and switch functions to get a simplified wiring system in such a way that stacked modules are easily interconnected by means of just three (3) vertical bus bars: one for the AC input, one for the AC output and one for the DC input. Initial cabling as well as further extensions capabilities is dramatically improved.
With TSI one can talk of TOTAL MODULARITY since the static switch has not to be sized according to the eventual capacity of the AC power system, the evolution of the load consumption being likely unpredictable. With the TSI the available AC power can be gradually increased to closely follow the load requirements.

TSi Twin Sine Inverter REVEALED »A revolution in power

TSI BRAVO 48/230 — Technical features

Version 05

GENERAL

EMC (immunity)	EN 61000-4
EMC (emission)	EN 55022 (Class B)
Safety	IEC 60950
Cooling	Forced
Isolation	Doubled
MTBF	240000 hrs
Efficiency (Typical)	
Enhanced Power Conversion	96%
On Line	91%
Dielectric strength DC/AC	4300Vdc
True Redundant Systems	Compliant
3 disconnection levels on AC_{out} and DC_{in} power ports	
4 disconnection levels on AC_{in} port	
RoHS	Compliant
Connection I/O	Terminal block
Protected against inversion of polarity	
Self adaptive to wide operating conditions and comprehensive table of troubleshooting codes	

AC OUTPUT POWER

Nominal Output power	2500 VA
Output power (resistive load)	2000 W
Short time overload capacity	150% 15 second
Permanent overload capacity	110%
Admissible load power factor	Full power rating from 0 inductive to 0 capacitive
Internal temperature management and switch off	

DC INPUT SPECIFICATIONS

Nominal voltage (DC)	48 V
Voltage range (DC)	40 - 60 V
Nominal current (at 40Vdc)	56 A
Maximum input current (for 5 second)	84 A
Voltage ripple	< 2mV
Input voltage boundaries user selectable	

AC INPUT SPECIFICATIONS

Nominal voltage (AC)	230 V
Voltage range (AC)	150 – 265 V
Brownout	150 to 185 V 2230VA@150V
Conformity range	Adjustable
Power Factor	>99%
Frequency range (selectable)	50 - 60 Hz
Synchronization range	47 – 53 Hz 57 – 63 Hz

AC OUTPUT SPECIFICATIONS

Nominal voltage (AC) (*)	230 V
Voltage range (AC)	200 – 240 V
Voltage accuracy	2 %
Frequency	50 - 60 Hz
Frequency accuracy	0.03 %
Total harmonic distortion (resistive load)	<1.5 %
Load impact recovery time	0.4 ms
Turn on delay	20 s
Nominal current	10.9 A
Protected against reverse current	
Crest factor at nominal power	3.1 In
Short circuit clear up capacity	$10 \times I_n$ for 20msec
Available while Mains is available at AC input port With magnitude control and management	
Short circuit current after clear up capacity	2.1 In

TRANSFER PERFORMANCE

Maximum voltage interruption	0 s
Total transient voltage duration (max)	0 s

ENVIRONMENT

Altitude above sea	<1500m
Ambient temperature	-20 to 50 ℃
Storage temperature	-40 to 70 ℃
Relative humidity	95% , non condensing

SIGNALING & SUPERVISION

Display	Synoptic LED
Alarms output	Dry contacts on shelf
Supervision	Use optional devices

WEIGHT & DIMENSIONS

Width	102 mm
Depth	435 mm
Height	2 U
Weight	5 Kg
Material (casing)	Coated steel

(*) Operation within lower voltage networks leads to derating of power performances.

Specifications can change without notice. New data will be updated on our Web site: www.cet.be.

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