



# TSI BRAVO 230 VAC



TELECOM



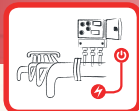
DATA COM



MASS TRANSIT



OIL & GAS



POWER UTILITIES



## MODULAR INVERTER MODULE

POWER 2.5 kVA (1.5 kVA\*)  
INPUT 24\* / 48 / 60 / 110 / 220 Vdc  
OUTPUT 230 Vac



### DESCRIPTION

BRAVO is a compact and scalable modular inverter providing a pure sine wave AC supply. In conjunction with a DC Power system, it provides an excellent AC backup solution. It uses the latest inverter technology, providing superior energy efficiency in a compact size.

The "Twin Sine Innovation" (TSI) technology eliminates all single points of failure with full scalability; up to 32 modules in parallel and high efficiency of up to 96 % reducing operating costs.

### APPLICATIONS

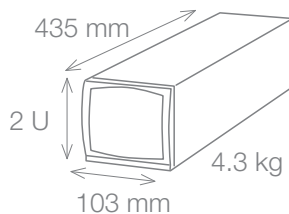
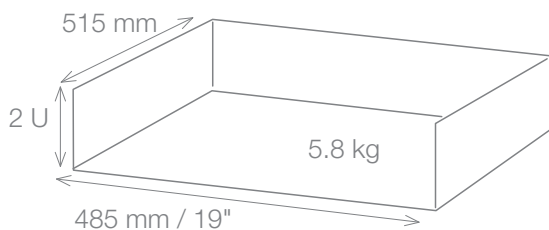
All business critical applications and all types of AC loads. The design is modular and scalable with hot-swappable inverter modules which ensures low Mean Time to Repair (MTTR), reduction in service costs and meets the changing needs for future expansion.

### MAIN FEATURES

- » Dual input sources (AC & DC) with wide AC input range 150 Vac to 265 Vac
- » Compact design
- » High efficiency
- » Transfer time reduced to 0
- » up to 10kVA in 2 U
- » up to 225kVA in 3 enclosures of 75kVA each

|                                                                            | 24 / 230                                                                                                                                                              | 48 / 230                                                                             | 60 / 230                           | 110 ** / 230                        | 220*** / 230                         |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------|-------------------------------------|--------------------------------------|
| GENERAL                                                                    |                                                                                                                                                                       |                                                                                      |                                    |                                     |                                      |
| EMC (immunity)                                                             | EN 61000-4-2 / EN 61000-4-3 / EN 61000-4-4 / EN 61000-4-5 / EN 61000-4-6 / EN 61000-4-8                                                                               |                                                                                      |                                    |                                     |                                      |
| EMC (emission) (class)                                                     | EN 55022 (A)                                                                                                                                                          | EN 55022 (B)                                                                         | EN 55022 (A)                       | EN 55022 (B)                        |                                      |
| Safety                                                                     | EN62040-1                                                                                                                                                             |                                                                                      |                                    |                                     |                                      |
| Cooling / Isolation                                                        | Forced / Doubled                                                                                                                                                      |                                                                                      |                                    |                                     |                                      |
| MTBF                                                                       | 240 000 hrs (MIL-217-F)                                                                                                                                               |                                                                                      |                                    |                                     |                                      |
| Efficiency (Typical): Enhanced power conversion / on line                  | > 95.5% / > 89.5%                                                                                                                                                     | 96% / 91%                                                                            |                                    |                                     | 96.5% / 92.5%                        |
| Dielectric strength DC/AC                                                  | 4300 Vdc                                                                                                                                                              |                                                                                      |                                    |                                     |                                      |
| True Redundant Systems – compliant                                         | 3 disconnection levels on AC out and DC in power ports<br>4 disconnection levels on AC in port                                                                        |                                                                                      |                                    |                                     |                                      |
| RoHS                                                                       | Compliant                                                                                                                                                             |                                                                                      |                                    |                                     |                                      |
| Vibration                                                                  | GR63 office vibration 0 to 100 hz-0.1 g / transport vibration 5-100 Hz 0.5 g 100 to 500 hz-1.5 g / Drop test                                                          |                                                                                      |                                    |                                     |                                      |
| Operating conditions                                                       | Designed for installation in an IP20 or IP21 environment.<br>When installed in a dusty or humid environment, appropriate measures (air filtering, ...) must be taken. |                                                                                      |                                    |                                     |                                      |
| Altitude above sea without de-rating                                       | < 1500 m / derating > 1500 m – 0.8 % per 100 m                                                                                                                        |                                                                                      |                                    |                                     |                                      |
| Ambient / storage temperature / relative humidity                          | -20 to 50 ° C / -40 to 70 ° C / 95 %, non-condensing                                                                                                                  |                                                                                      |                                    |                                     |                                      |
| Material (casing)                                                          | Coated steel-ALU ZINC                                                                                                                                                 |                                                                                      |                                    |                                     |                                      |
| AC OUTPUT POWER                                                            |                                                                                                                                                                       |                                                                                      |                                    |                                     |                                      |
| Nominal Output power (VA) / (W)                                            | 1500 / 1200                                                                                                                                                           | 2500 / 2000                                                                          |                                    |                                     |                                      |
| Short time overload capacity                                               | 150 % (15 seconds) 110 % permanent within T° range                                                                                                                    |                                                                                      |                                    |                                     |                                      |
| Admissible load power factor                                               | Full power rating from 0 inductive to 0 capacitive                                                                                                                    |                                                                                      |                                    |                                     |                                      |
| Internal temperature management and switch off                             | Yes                                                                                                                                                                   |                                                                                      |                                    |                                     |                                      |
| DC INPUT SPECIFICATIONS                                                    |                                                                                                                                                                       |                                                                                      |                                    |                                     |                                      |
| Nominal voltage (DC)                                                       | 24 V                                                                                                                                                                  | 48 V                                                                                 | 60 V                               | 110 V                               | 220 V                                |
| Voltage range (DC)                                                         | 19 – 35 V                                                                                                                                                             | 40 - 60 V                                                                            | 48 - 72 V                          | 90 - 160 V                          | 170 - 300 V                          |
| Nominal current                                                            | 56 A (at 24 Vdc and 1200 W output)                                                                                                                                    | 46 A (at 48 Vdc and 2000 W output)                                                   | 35 A (at 60 Vdc and 2000 W output) | 19 A (at 110 Vdc and 2000 W output) | 9.8 A (at 220 Vdc and 2000 W output) |
| Maximum input current (for 15 second) / voltage ripple                     | 84 A / < 100 mV rms                                                                                                                                                   | 84 A / < 2 mV Psopho                                                                 | 52 A < 100 mV rms                  | 29 A / < 200 mV rms                 | 14.9 A / < 200 mV rms                |
| Input voltage boundaries                                                   | User selectable with T2S interface                                                                                                                                    |                                                                                      |                                    |                                     |                                      |
| AC INPUT SPECIFICATIONS                                                    |                                                                                                                                                                       |                                                                                      |                                    |                                     |                                      |
| AC input available only with EPC modules, REG modules do not have any ACin |                                                                                                                                                                       |                                                                                      |                                    |                                     |                                      |
| Nominal voltage (AC)                                                       | 220/230/240 V 1P or 3P (Min 3 shelves for 3P)                                                                                                                         |                                                                                      |                                    |                                     |                                      |
| Voltage range (AC)                                                         | 150-265 V                                                                                                                                                             |                                                                                      |                                    |                                     |                                      |
| Brownout                                                                   | 1200 VA / 960 W @ 150 Vac                                                                                                                                             | 150 to 185 V linear derating 150 VA/120 Watts per 10 Vac<br>2000 VA/1600 W @ 150 Vac |                                    |                                     |                                      |
| Conformity range before transfer to DC                                     | Adjustable                                                                                                                                                            |                                                                                      |                                    |                                     |                                      |
| Power factor                                                               | > 99%                                                                                                                                                                 |                                                                                      |                                    |                                     |                                      |
| Frequency range (selectable) / synchronization range                       | 50 – 60 Hz / range 47 – 53 Hz / 57 – 63 Hz                                                                                                                            |                                                                                      |                                    |                                     |                                      |
| AC OUTPUT SPECIFICATIONS                                                   |                                                                                                                                                                       |                                                                                      |                                    |                                     |                                      |
| Nominal voltage (AC*)                                                      | 220/230/240 V                                                                                                                                                         |                                                                                      |                                    |                                     |                                      |
| Frequency / frequency accuracy                                             | 50 - 60 Hz / 0.03 %                                                                                                                                                   |                                                                                      |                                    |                                     |                                      |
| Total harmonic distortion (resistive load)                                 | < 1.5 %                                                                                                                                                               |                                                                                      |                                    |                                     |                                      |
| Load impact recovery time                                                  | 0.4 ms                                                                                                                                                                |                                                                                      |                                    |                                     |                                      |
| Turn on delay                                                              | 20 s to 40 s depending on the number of module installed                                                                                                              |                                                                                      |                                    |                                     |                                      |
| Nominal current. Protected against reverse current                         | 6.6 A                                                                                                                                                                 | 10.9 A                                                                               |                                    |                                     |                                      |
| Crest factor at nominal power                                              | 2.8 : 1                                                                                                                                                               | 3 : 1                                                                                |                                    |                                     |                                      |
| With short circuit management and protection                               |                                                                                                                                                                       |                                                                                      |                                    |                                     |                                      |
| Short circuit clear up capacity                                            | 10 x I <sub>n</sub> for 20 msec - Available while Mains is available at AC input port<br>With magnitude control and management                                        |                                                                                      |                                    |                                     |                                      |
| Short circuit current after clear up capacity                              | 2.1 I <sub>n</sub> during 15 s and 1.5 I <sub>n</sub> after 15 s                                                                                                      |                                                                                      |                                    |                                     |                                      |
| IN TRANSFER PERFORMANCE                                                    |                                                                                                                                                                       |                                                                                      |                                    |                                     |                                      |
| Max. voltage interruption / total transient voltage duration (max)         | 0 s / 0 s                                                                                                                                                             |                                                                                      |                                    |                                     |                                      |
| SIGNALING & SUPERVISION                                                    |                                                                                                                                                                       |                                                                                      |                                    |                                     |                                      |
| Display                                                                    | Synoptic LED                                                                                                                                                          |                                                                                      |                                    |                                     |                                      |
| Alarms output / supervision                                                | Dry contacts on shelf / Standard USB port and MODBUS on T2S, optional : Candis Display / Candis TCP-IP                                                                |                                                                                      |                                    |                                     |                                      |
| Remote on / off                                                            | on rear terminal of the shelf via T2S                                                                                                                                 |                                                                                      |                                    |                                     |                                      |

TSI BRAVO 230 – Datasheet v1.4 Specifications can change without notice. New data will be updated on our Web site: [www.cet-power.com](http://www.cet-power.com). The present equipment is protected by several international patents, trademarks and copyrights.



\*Operation within lower voltage networks leads to de-rating of power performances.



KM 621103  
BS EN 50171  
Central Power  
Supply Systems



\*\*\*Bravo 220 Vdc  
DNV DNV-OS-D202 Section 4  
CLASS 4



Illustrations are non-binding and may include customized fittings.

Leading AC Backup Technology