Leading Conversion Technology for Power Resilience

BRAVO 25-R 48/230-277

User Manual

BEYOND THE INVERTER

THE NEW GENERATION OF POWER CONVERTERS

- DUAL INPUT INVERTER
  Commercial Power as default source
- AC BACKUP IN A DC ENVIRONMENT
  Leverage your existing DC infrastructure
- ONE STOP SHOP
  Wide output power range
- HARSHEST AC INPUT CONDITIONS
  Without compromising the quality of the AC output



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Version 1.0

Leading Conversion Technology for Power Resilience

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1.0	26/10/2026	-	First release of the Manual

1. CE+T Power at a glance

CE+T Power is your trusted partner in **advanced power solutions** engineered to meet the demands of modern and dynamic industrial applications. With over 60 years of experience in power conversion technology, CE+T Power nurtures the industry with **innovative solutions designed for critical power backup and energy management.**

Our complete range of power solutions includes **modular inverters** (DC to AC), UPS (securing AC loads with batteries), and **multi-directional converters** (inverter, rectifier, and UPS all-in-one). Coupled with our state-of-the-art **monitoring solution**, you have a real energy blender to connect multiple sources of energy seamlessly!

Whether you require **robust backup power solutions**, **energy management solutions**, **or a combination of both**, CE+T Power delivers tailored solutions to meet your specific needs. Our products are **designed with integration in mind, ensuring seamless compatibility with other components of your system**. CE+T Power is committed to providing you with the expertise and resources needed to maximize the performance of your power systems.

Thank you for choosing CE+T Power as your partner in advanced power management. Let's power the future together.

2. Abbreviations

AC	Alternating current
CB	Circuit Breaker
DC	Direct current
DHCP	Dynamic Host Configuration Protocol
DSP	Digital Signal Processor
ECI	Enhanced Conversion Innovation
EMBS	External Maintenance Bypass Switch
EPC	Enhanced Power Conversion
ESD	Electro Static Discharge
ETH	Ethernet
G	Ground / Grounding
HTTP	HyperText Transfer Protocol
HTTPS	Secure HyperText Transfer Protocol
LAN	Local Access Network
MBB	Measure Box Battery
MBP	Manual By-pass
MCB	Miniature Circuit Breaker
MCCB	Molded Case Circuit Breaker
MET	Main Earth Terminal
MIB	Management Information Base
N	Neutral
NTP	Network Time Protocol
NUA	Non-Urgent Alarm
PCB	Printed Circuit Board
PE	Protective Earth (also called Main Protective Conductor)
PEK	Power Extension Kit
PPE	Personal Protective Equipment
PWR	Power
REG	Regular
SNMP	Simple Network Management Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TRS	True Redundant Structure
UA	Urgent Alarm
USB	Universal Serial Bus

3. Warranty and Safety Conditions*

WARNING:

The electronics in the power supply system are designed for an indoor, clean environment.

When installed in a dusty and/or corrosive environment, indoor, it is important to:

- Install an appropriate filter on the enclosure door, or on the room's air conditioning system.
- Keep the enclosure door closed during operation.
- Replace the filters on a regular basis.

Important Safety Instructions, Save These Instructions.

The converter contains electrolytic capacitors. Prolonged storage without energization may result in degradation of the capacitor dielectric layer and increased leakage current when the equipment is returned to service.

To preserve capacitor performance:

- The equipment must be stored according to the specification in terms of T° range, avoid moisture and humidity.
- Equipment stored for more than 12 months **shall be energized for a minimum of one hour at no load and nominal AC and DC voltage** at least once every 12 months.
    - Allow the equipment to remain energized for a minimum of 60 minutes before applying full load.
    - If abnormal conditions is observed, remove the equipment from service and contact CE+T support.

3.1 Disclaimer

- The manufacturer declines all responsibilities if equipment is not installed, used or operated according to the instructions herein by skilled technicians according to local regulations.
- Warranty does not apply if the product is not installed, used or handled according to the instructions in the manual.
- This equipment is shipped with a SHOCKWATCH monitor. If the SHOCKWATCH shows that the equipment was exposed to excessive force the warranty will be void.

3.2 Technical care

- This electric equipment can only be repaired or maintained by a "qualified employee" with adequate training. Even personnel who are in charge of simple repairs or maintenance are required to have knowledge or experience related to electrical maintenance.
- Please follow the procedures contained in this Manual, and note all the "DANGER", "WARNING" AND "NOTICE" marks contained in this Manual. Warning labels must not be removed.
- Qualified employees are trained to recognize and avoid any dangers that might be present when working on or near exposed electrical parts.
- Qualified employees know how to lock out and tag out machines so the machines will not accidentally be turned on and injure employees working on them.
- Qualified employees also know safety related work practices, including those by OSHA and NFPA, as well as knowing what personal protective equipment should be worn.

* These instructions are valid for most CE+T Products/Systems. Some points might however not be valid for the product described in this manual.

- All operators are to be trained to perform the emergency shut-down procedure.
- Never wear metallic objects such as rings, watches, or bracelets during installation, service and maintenance of the product.
- Insulated tools must be used at all times when working with live systems.
- When handling the system/units pay attention to sharp edges.
- This product is suitable for use in a computer room.

3.3 Installation

- This product is intended to be installed only in restricted access areas as defined by local regulations and in accordance with the National Electric Code, ANSI/NFPA 70, or equivalent agencies.
- The Converter System may contain output over current protection in the form of circuit breakers. In addition to these circuit breakers, the user must observe the recommended upstream and downstream circuit breaker requirements as defined in this manual.
- Please use extreme caution when accessing circuits that may be at hazardous voltages or energy levels.
- The modular converter rack is a dual input power supply. The complete system shall be wired in a way that both input and output leads can be de-energized when necessary.
- The systems that have no AC input wired and connected can be seen as independent power sources. To comply with local and international safety standards N (input) and PE shall be bonded. The bonded connection between N (input) and PE must be removed once the AC input is connected.
- AC and DC circuits shall be terminated with no voltage / power applied (de-energized).
- The safety standard IEC/EN62040-1-1 requires that, in the event of an output short circuit, the converter must disconnect in 5 seconds maximum. The parameter can be adjusted on Inview; however, if the parameter is set at a value > 5 seconds, an external protection must be provided so that the short circuit protection operates within 5 seconds. Default setting is 60 seconds.
- The system is designed for installation within an IP20 environment. When installed in a dusty or humid environment, appropriate measures (air filtering) must be taken.
- Environment Conditions:
  - Storage Conditions: -40 to 70°C
  - Relative Humidity: 95%, non-condensing
  - Altitude above sea without de-rating: Less than 1500 m
Greater than 1500 m – de-rating at 0.8% per 100 m
Should not be installed above 4000 m
- All illustrations in the manual are for general reference, refer to the technical drawing which is received along with the system for exact information.

3.3.1 Handling

- The cabinet shall not be lifted using lifting eyes.
- Remove weight from the cabinet by unplugging the converters. Mark inverters clearly with shelf and position for correct rebuild. This is especially important in dual or three phase configurations.
- Empty converter positions must not be left open. Replace with module or blank cover.

3.3.2 Surge and Transients

The mains (AC) supply of the modular converter system shall be fitted with Lightning surge suppression and Transient voltage surge suppression suitable for the application at hand. Manufacturer's recommendations of installation shall be adhered to. Selecting a device with an alarm relay for function failure is advised.

Indoor sites are considered to have a working lightning surge suppression device in service.

- Indoor sites Min Class II.
- Outdoor sites Min Class I + Class II or combined Class I+II. The modular converter system/rack can reach hazardous leakage currents. Grounding must be carried out prior to energizing the system. Grounding shall be made according to local regulations.

Note:

Choosing and installing surge arrestors must obey to precise technical rules. Distance to equipment to protect, cable gage and cable routing have significant influence on proper device service.

Some areas are more susceptible to be hit by electrical strikes, especially when altitude increases.

Good earthing is also crucial for surge arrestors to work properly.

CE+T declines any liability in regard to damaged caused to equipment not correctly or not sufficiently protected.

3.3.3 Other

- Insulation test (Hi-Pot) must not be performed without instructions from the manufacturer.

3.4 Maintenance

- The converter system/rack can reach hazardous leakage currents. Earthing must be carried out prior to energizing the system. Earthing shall be made according to local regulations.
- Prior to any work conducted to a system/unit, make sure that AC input voltage and DC input voltage are disconnected.
- Prior to accessing the system or modules, make sure all source of supply is disconnected.
  CAUTION – Risk of electric shock. Capacitors store hazardous energy. Do not remove cover until 5 minutes after disconnecting all sources of supply.
- Some components and terminals carry high voltage during operation. Contact may result in fatal injury.

3.5 Replacement and Dismantling

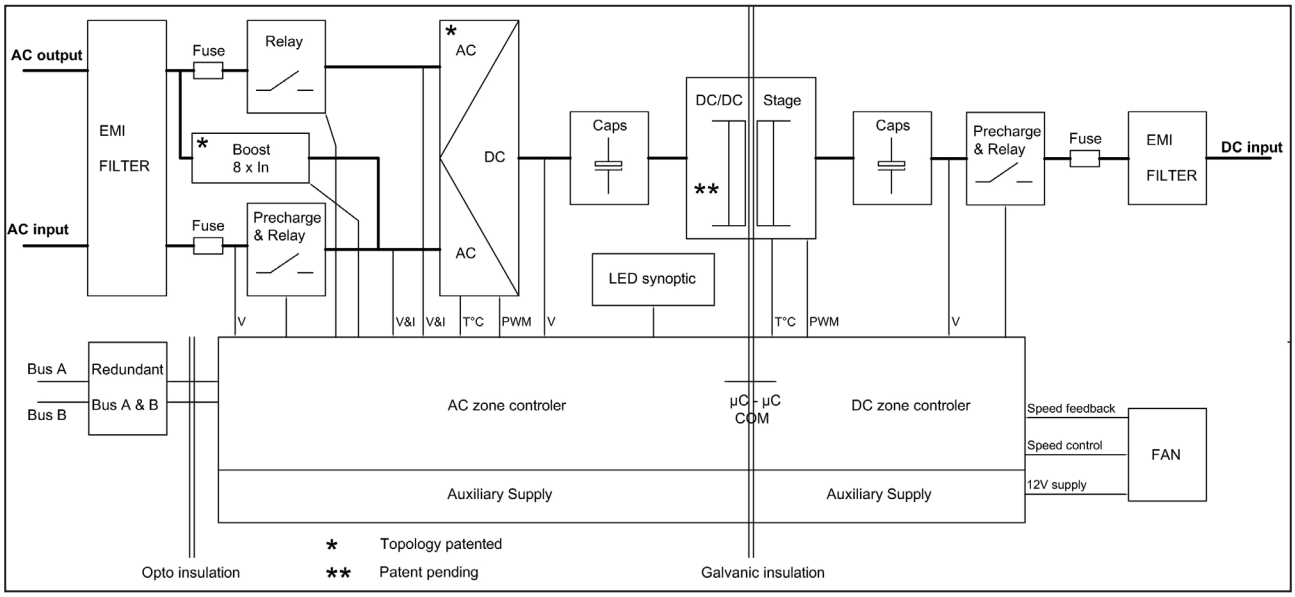
- ESD Strap must be worn when handling PCB's and open units.
- The converter system/rack is not supplied with internal disconnect devices on input nor output.
- CE+T cannot be held responsible for disposal of the converter system and therefore the customer must segregate and dispose of the materials which are potentially harmful to the environment, in accordance with the local regulations in force in the country of installation.
- If the equipment is dismantled, to dispose of its component products, you must comply with the local regulations in force in the country of destination and in any case avoid causing any kind of pollution.

Note: To download the latest documentation and software, please visit our website at www.cet-power.com.

4. ECI Technology[1]

A Bravo module is a triple port converter built with ECI technology. This module delivers pure sinusoidal output and ripple free DC output from AC mains or battery.

The block diagram below gives an explicit description of the topology and operation.



ECI technology has AC to DC, DC to AC, and DC to DC converters to provide constant and disturbance-free output power regardless of the input source.

The power flows either from AC or DC source under the control of the DSP controller. Thanks to the module's internal energy buffering, transferring the load between two input sources is achieved in 0 ms.

ECI can detect short circuit conditions at the AC output level and start the BOOST mode function. This mode will provide 8x of the nominal current to clear the fault within 20 ms, and thus keeping other critical loads in operation.

The ECI works according to True Redundant Structure (TRS) that features decentralized and independent logic, redundant communication bus and three internal levels of disconnection to isolate a module after internal failure.

This functionality is included in every inverter module. Running them in parallel provides a modular system with, no single point of failure, always-conditioned output, high system efficiency and 0 ms source transfer time.

1 Information and data given in this chapter is intended to serve as an overview of the ECI Technology. Detailed features and parameters for each individual module type in the range may differ and should be referred to in the dedicated data sheet.

4.1 On-line Mode

DC is the primary source of supply whilst Mains (AC) works as the secondary source. Switching time between DC input and AC input is 0 ms (source transfer). The power delivered by the DC source (usually a battery, but possibly any other type of DC generator) is converted to provide regulated and transient-free power to the load. In the event of a short circuit on the load side, the boost is automatic, timely and energized for a specific duration to trip downstream protective devices.

4.2 Safe Mode

Safe mode uses DC as the primary source of supply while Mains (AC) is on standby.

Mains (AC) is normally disconnected through an internal inlet relay and is only connected when down stream clearance is required (boost) or if DC is unavailable.

The transfer between DC and AC results in a typical transfer time of 10 ms.

Typically the safe mode is used in extremely harsh environments such as railways. Under such conditions, it provides extra isolation against mains-borne disturbances.

4.3 EPC Mode

Mains input (AC) is the primary source whilst DC works as backup.

The ECI is designed to operate on Mains on a permanent basis and to deliver output voltage conditioned with low THD.

The output sine wave is physically independent of whether the source is AC (or) DC. If the Mains is out of tolerance or goes down, the Inverter seamlessly switches to DC and the Inverter operates in “Back-up mode” (Changeover switching time is 0 ms).

As soon as the Mains returns to its valid range, the EPC mode is automatically resumed.

The EPC mode offers higher efficiency (up to 96% depending on the model) without compromising the purity of the output sine wave.

Remarks: REG modules:

Inverter modules carrying the ECI logo together with the REG mark work only with DC input. Sinusoidal output is converted from DC with the module operating as a traditional inverter. EPC mode and the boost are not available with REG modules.

4.4 Mix Mode & Walk-in Mode

Under some circumstances the DC and AC sources can be combined. The sequence is defined by a user selectable set of parameters. Start, control and exit are fully automatic.

A specific example of Mix-mode is the Walk-in mode where the transfer from DC source to AC source is ramped up within a fixed and adjustable period of time.

5. Building Blocks

5.1 Inverter

Input	48 Vdc 230, 240 and 277 Vac, 50/60 Hz
Output	230, 240 and 277 Vac
Power	2500 VA / 2000 W @ 48 Vdc



- The Bravo 25-R is a triple port inverter.
- Hot swappable and hot pluggable.
- The front LED's indicate the Inverter status and output power.
- The modules is equipped with soft start.
- The modules' fan is field replaceable.
- 435 mm (D) x 102 mm (W) x 88 mm (H).
- 5 Kg.

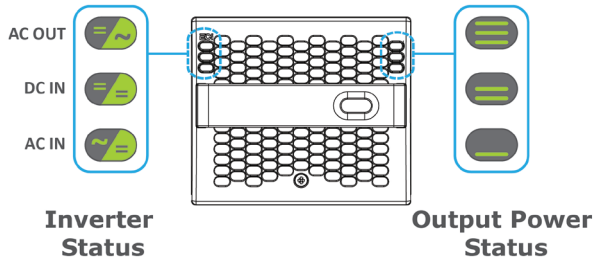
5.2 Specifications

Model	Bravo 25-R 48/230-277
Part Number: Module	T621D30301 (P10023-F06C0_v01)
Cooling / Audible noise	Fan forced cooling / <65db @1meter
MTBF	240 000 hrs (MIL-217-F) at 30°C ambient and 80% load
Dielectric strength DC/AC	4300 Vdc
RoHS / Material (casing)	Compliant / Aluzinc steel
Operating T° / Relative Humidity (RH) non-condensing	Tested according ETS300-019-2-3 Class 3.1 -20°C to 65°C, power de-rating from 40°C to 65°C / Max RH 95% for 96 hours per year
Storage T° / Relative Humidity (RH) non-condensing	Tested according ETS300-019-2-1 Class 1.2 -40°C to 70°C / Max RH 95% for 96 hours per year
Public transport T°/Relative Humidity (RH) non-condensing	Tested according ETS300-019-2-2 Class 3.1 -40°C to 70°C / Max RH 95% for 96 hours per year
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
Altitude above sea without de-rating of power	< 1500 m / derating > 1500 m – 0.8 % per 100 m / max 4000 m
AC Input Data	
Nominal voltage (current)	230 Vac (8.7 A) 240 Vac (8.3 A) 277 Vac (7.2 A)
Voltage range	150 - 293 Vac (derating from 195 to 150 Vac)

Model	Bravo 25-R 48/230-277
Brownout	1600 W @150 Vac / 2000 W @195 Vac linear decreasing
Power factor / THD	> 0.99 / < 3%
Frequency (Synchronization range)	50 Hz (47 - 53 Hz) or 60 Hz (57 - 63 Hz)
DC Input Data	
Nominal voltage (range)	48 Vdc (32 - 63 Vdc)
Nominal current	45.4 A
Maximum input current (for 15 seconds) / voltage ripple	66.8 A / < 10 mV RMS
Reverse polarity protection	Yes
AC Output Data	
Efficiency AC to AC (EPC) / DC to AC	> 96% / > 93.7%
Nominal voltage (User selectable)	230 Vac / 10.9 A, 240 Vac / 10.4 A and 277 Vac / 9 A (200 - 277 Vac)
Frequency / frequency accuracy	50 or 60 Hz / 0.03%
Nominal Output power	2.5 kVA / 2 kW
Short time overload capacity	150% (15 seconds)
Admissible load power factor	Full power rating from 0 inductive to 0 capacitive
Total harmonic distortion (resistive load)	< 3%
Load impact recovery time (10% - 90%)	≤ 0.5 s
Nominal current	10.9 A @ 230 Vac
Crest factor at nominal power	3 : 1 for load P.F. ≤ 0.7
Short circuit clear up capacity at AC input / On battery	97.28 Arms for 20 ms / 29.45 Arms for 20 ms
Short circuit current after > 20 ms	19.37 Arms for 15 seconds
AC Output voltage stability	±1% from 10% to 100% load
Static / Dynamic voltage regulation	±1% between 10% and 100% load / <5% from 0 to 100% to 0 load impact (100 ms)
In Transfer Performance	
Max. Voltage interruption / total transient voltage duration (max)	0 sec / 0 sec

Model	Bravo 25-R 48/230-277
Signalling & Supervision	
Display	Synoptic LEDs on module and Inview Fit, touch screen with Inview X+
Supervision / Part number	Inview X+ / T602004220 (P20007-F02C0_v01) and Inview FIT / T602004160 (P200010-F00C0_v01)
Remote ON/OFF	At rear terminal of the shelf
Battery Monitoring / Part number	MBB (Measure Box Battery) - 6 dry contacts and 8 digital Inputs / T602006000
Safety & EMC	
Electrical Safety	EN60950-EN62040-1-UL1778-IEC62109/1-IEC62109/2
EMC	EN300386V1.6.1 / EN61000-1-2-3-4
Environment	GR3108 class 2 for outdoor

5.2.1 Inverter module - LED Indications



Inverter Status LED	Description	Remedial action
OFF	No input power or forced stop	Check environment
Permanent green	Operation	
Blinking green	Inverter OK but working conditions are not fulfilled to operate properly	
Blinking green/orange alternatively	Recovery mode after boost (10 In short circuit condition)	
Permanent orange	Starting mode	
Blinking orange	Modules cannot start	Check Inview
Blinking red	Recoverable fault	
Permanent red	Non recoverable fault	Send module back for repair

Output Power (redundancy not counted)						
<5%	5% to 40%	40 to 80%	80 to 95%	100%	100% = overload	Output Power (redundancy not counted)
×	×	×	≡	≡	≡	Status output power LED
×	×	=	=	=	=	
—	—	—	×	—	—	
1B	1P	2P	2P	3P	3B	Behaviour (B = Blinking, P = Permanent)

5.3 Sub-rack

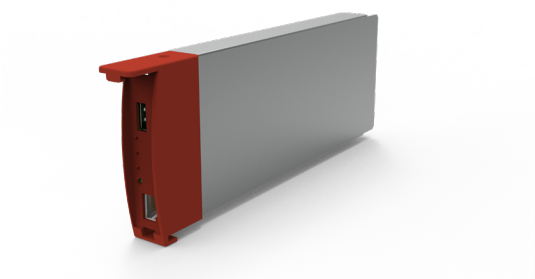
- The Bravo shelf shall be integrated in min 600 mm deep cabinets, Inch/ETSI mounting.
- The Bravo shelf houses max four (4) Inverter modules.
- The Bravo shelf is designed with individual DC Input / Output, Common AC Input and Common AC Output.
- Optional rear cover for IP 20 in open rack.
- Max 10 kVA per shelf.
- 480 mm (D) x 19” (W) x 2U (H).
- 6 Kg (without modules).



6. Monitoring Device - Inview S, X and GW

Bravo 25-R modules can be monitored through Inview Fit or Inview X+.

For more details about these monitoring devices and the hardware connections, refer to the Inview user manual - https://datasheet.cet-power.com/CET - Monitoring - User Manual - Inview - EN.pdf



Inview Fit



Inview X+

7. Inserting/removing/replacing - modules

7.1 Bravo 25-R Inverter

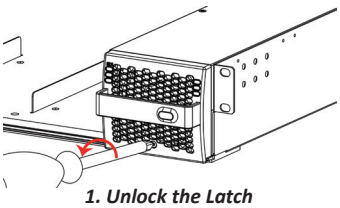
- The Bravo 25-R inverter is hot swappable.
- When a new module is inserted in a live system it automatically takes the working set of parameters.
- When a new module is inserted in a live system it is automatically assigned to the next available address.

Caution: After removing a module from a slot in a live system, wait at least 60 seconds before inserting it into another slot; ensure that the LEDs are off and the fan is completely stopped.

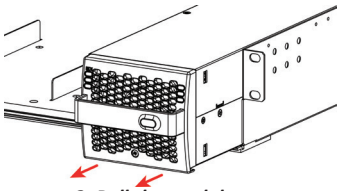
7.1.1 Removal

Caution: When one or several inverter modules is/are removed, possible to access the live parts. So, replace the module(s) with blanks without delay.

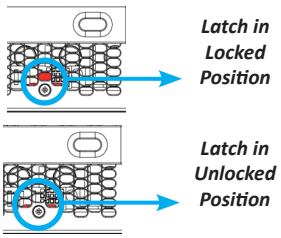
1. Rotate the screw in anti clockwise by using cross head screw driver to unlock the latch.
2. Hold the front handle and pull the module out.
3. Replace with a new module or a blind unit.



1. Unlock the Latch



2. Pull the module out

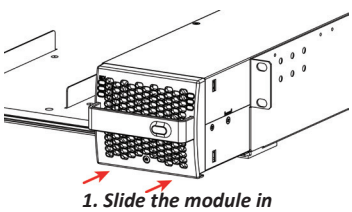


7.1.2 Inserting

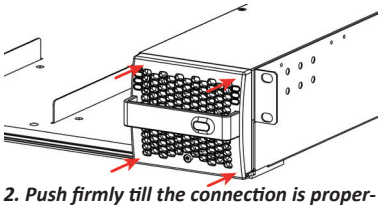
1. Check module compatibility (DC Voltage!).
2. Place the module in the shelf and slide in.

Caution: Make sure that the module is oriented and locked properly into the shelf. Module not properly inserted and locked might cause damage due to improper electrical connection.

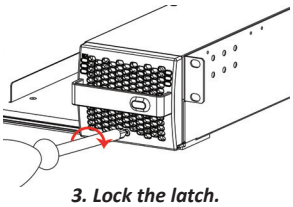
3. Using the module handle, push firmly until the unit is properly connected.
4. Rotate the screw in clockwise by using cross head screw driver to lock the latch.
5. The module will start up and take the first address available on the bus.



1. Slide the module in



2. Push firmly till the connection is properly engaged.



3. Lock the latch.

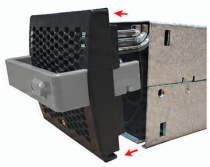
7.2 Fan replacement

The inverter modules have fan runtime meters and fan failure alarms. Fan failure can result from a failing fan or driver circuit.

1. Let the module rest at least 5 minutes before initiating work. 
2. The inverter front cover must be removed. Use a screw driver and remove the screws on both side of the module.
3. Free up the fan. (Note the fan connector and wires position)
4. Disconnect the supply cord, and remove the fan.
5. Replace with new fan and connect supply cord.
6. Place the front cover and tighten the screws on both sides of the module.
7. Check fan for operation.
8. Log on to Inview, navigate to System > Inverter System > Inverter #x > Control, and execute parameter CT15 to reset the fan.



Remove the screws



Remove the front cover



Disconnect the fan



Take the new fan



Make sure the fan is positioned correctly

8. Manual By-Pass (MBP)

Manual By-Pass has to be operated by trained people only.

When system is in manual by-pass the load is subjected to mains voltage without active filtering. Output alarm is activated when system is in manual by-pass.

The Manual By-Pass cannot be operated remotely.

The Manual By-Pass can be integrated into the CE+T cabinet if requested at time of order. A Manual By-Pass purchased separately must comply with the instructions within section 8.2, page 19.

8.1 Pre-requisites

Commercial AC power must be present, and the inverter must be synchronized with it, before operating MBP. The upstream commercial breaker must be correctly sized to accept the overload, and if the AC is supplied by a genset, the minimal required power will be twice the nominal power of the inverter.

The inverter may be overloaded during the MBP procedure, depending on voltage network and output. Inverter voltage setting: To reduce the impact of an overload, the inverter power and current will be reduced from 150% to nominal value.

The by-pass switch disconnects all AC voltage on the shelves but has no effect on the DC feeding the inverter and the remote alarm terminal.

It is requested in order to reduce the inrush current during manual by pass operation to adjust the inverter AC output voltage to the same value as AC input voltage. If the difference between AC input and AC output voltage exceed 5 Vac, there is a risk of shutdown of inverter due to high inrush current during the return to normal operation from Manual By Pass engaged.

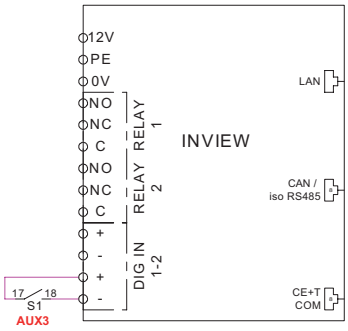
8.2 MBP Auxiliary Connection

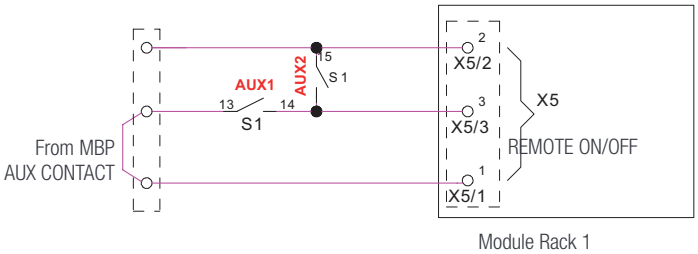
If manual by pass is installed in the system, then its auxiliary should be wired as per the following:

- **MBP - Single rotary switch**

Note: The below connection is for a sub-rack system, and auxiliary (Aux) number varies depending upon the MBP switch. So it is recommended to refer the technical sheet received along with the system.

  - Connect **Aux3** of MBP to **Digital Input 01** of controller. So that the controller gets information when MBP is engaged.Connect **Aux1** and **Aux2** of MBP to Remote ON/OFF terminal in the shelf where controller is installed.





Module Rack 1

The Digital Input Mode must be configured as below through Inview web Interface:

In Advanced View, go to Site > Configuration > Digital Input > D1 > CF501 and select "convs1_ManulByPass"

8.3 Manual Bypass operation



Manual Bypass operation creates a bypass from mains input via output AC distribution. Inverter modules are bypassed and possible to disconnect without impacting the load.

Manual By-Pass operation is "Make before Break" logic.

The Bravo 25-R system has a single rotary switch. It has three positions - Normal, Interim and Bypass.

8.3.1 Normal to Bypass

1. Rotate the MBP Switch (S1) from **NORMAL** to **BYPASS**.
   (Note: Do not stop at INTERIM position)
2. Switch **OFF** the DC power and/or disconnect batteries.

Manual By-Pass puts the module in the OFF state but does not disconnect the DC. Make sure DC is disconnected before any intervention inside the system.

Warning: Risk of electric shock. Power will be available at AC Input terminal, AC Output terminal, DC Input terminal, and Surge Arresters.

8.3.2 By-Pass to Normal

1. Switch **ON** the DC power and/or connect batteries.
2. Rotate the MBP Switch (S1) from **BYPASS** to **INTERIM**.
   (Wait until the modules turn on and synchronized, approximately 30-60 seconds).
3. Rotate the MBP Switch (S1) from **INTERIM** to **NORMAL**.

9. Trouble Shooting and Defective Situations Fixing

9.1 Trouble Shooting

Inverter module does not power up:	Check AC Input present and in range (AC breakers)
	Check DC Input present and in range (DC breakers)
	Check that the Inverter is properly inserted
	Remove Inverter to verify that slot is not damaged, check connectors
	Check that module(s) is (are) in OFF state
	Check for loose terminations
Inverter system does not start:	Check that Inview is present and properly connected
	Check remote ON/OFF terminal
	Check the configuration and setting
	Check threshold level
Inverter only run on AC or DC:	Check AC Input present and in range (AC breakers)
	Check DC Input present and in range (DC breakers)
	Check the configuration and setting
	Check threshold level(s)
No output power:	Check output breaker
All OK but I have alarm:	Check the type of event and log file in the controller
No alarm:	Check relay delay time of alarms in the controller
	Check configuration file

9.2 Defective modules

- A repair request should follow the regular logistics chain:
  End-user => Distributor => CE+T Power.
- Before returning a defective product, a RMA number must be requested through the *http://my.cet-power.com* extranet.
- The RMA number should be mentioned on all shipping documents related to the repair.
- Be aware that products shipped back to CE+T Power without being registered first will not be treated with high priority!

10. Maintenance

Maintenance should be performed by properly trained people.

10.1 Access Inview with Laptop

NOTE! Please refer to Inview user manual for detailed explanation.

- Download system LOG FILE and save
  - Analyse log file and correct errors
- Download system CONFIGURATION FILE and save
  - Check/correct configuration file according to operation conditions
  - Check/correct alarm configuration
- Check module internal temperature for deviation between modules
  - Temperature deviation may indicate build up of dust. Clean the module by air suction blower or vacuum cleaner.
- Check module/system load
- Check/Correct inverter mapping (DC Group/AC Group/ Address)

10.2 Manual check

- Check voltages of AC Input, DC Input, AC Output and DC Output using the multi-meter.
- Replace door filter if more dust is accumulated.
- Take a snap shot of the cabinet and site condition.

10.3 Optional

- With an infrared camera check termination hot spots:
  - Tighten terminations

10.4 Manual By-Pass

- Make sure AC input source is available during MBP operation. Otherwise the LOAD will be affected.

11. Service

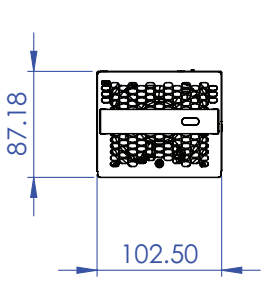
For Service

- Check Service Level Agreement (SLA) of your vendor. Most of the time they provide assistance on call with integrated service. If such SLA is in place, you must call their assistance first.
- If your vendor doesn't provide such assistance (*) you may contact CE+T through email:
  - USA and Canada: *tech.support@cetamerica.com*
  - Rest of the world: *customer.support@cet-power.com*

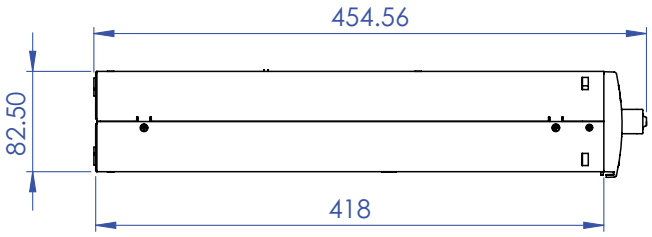
(*) CE+T will redirect your call to your vendor if he has such SLA in place.

12. Appendix I: Bravo 25-R Dimensions

12.1 Module

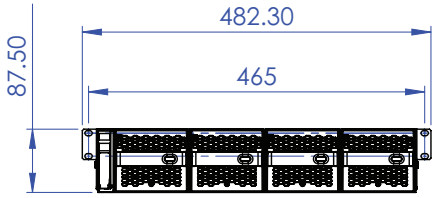


Front View

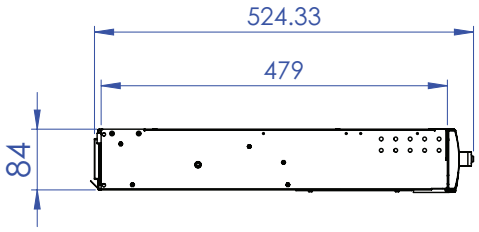


Left View

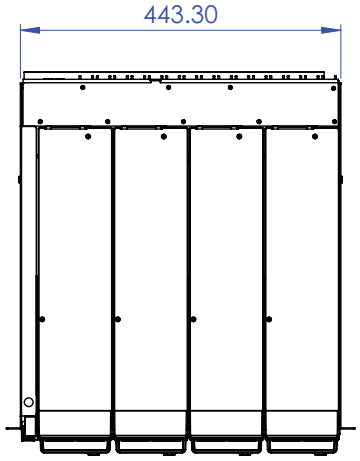
12.2 Shelf



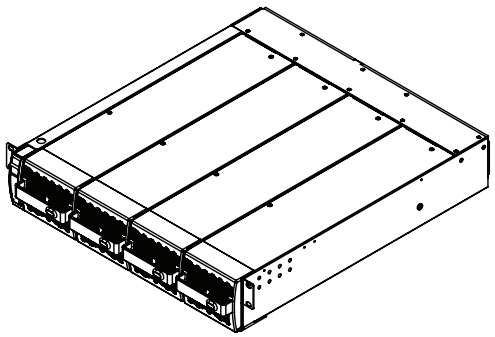
Front View



Left View



Top View



ISO View

All dimensions are in mm

13. Appendix II: Modules - Parameter List

With Inview, you can access the modules' parameter list and descriptions. Refer to the Inview user manual to access the Inview web interface - https://datasheet.cet-power.com/CET - Monitoring - User Manual - Inview - EN.pdf

If you want to have an overview of standard systems' parameters, you can also view the parameters in our Monitoring Emulator - https://www.cet-power.com/en/monitoring-emulator/

Do not hesitate to use the help buttons to get more information about the parameters.

14. Appendix III: Retrofit of Bravo TSI systems

14.1 Purpose and scope

This section explains the main points that must be understood when an existing Bravo TSI installation is modernised with Bravo 25-R inverter modules and an Inview Fit controller. It complements the dedicated replacement procedure, which remains the reference for the detailed retrofit sequence.

Existing Installation	After Retrofit
Bravo TSI modules	Bravo 25-R modules
T2S controller	Inview Fit controller
Existing TSI shelves, cabinet and cabling	Existing compatible TSI shelves retained and mechanically adapted

14.2 Compatibility of the existing TSI shelf

The Bravo 25-R has been developed specifically for the replacement of legacy Bravo TSI 48/230 modules. The existing Bravo TSI shelf can therefore be retained, provided that the shelf is adapted as described in the dedicated replacement procedure.

- The existing Bravo TSI shelf, cabinet and power cabling are retained.
- The shelf front reinforcement must be replaced with the retrofit version before inserting the Bravo 25-R modules.
- After this mechanical adaptation, the Bravo 25-R modules are inserted into the original TSI module positions.
- The Inview Fit controller replaces the legacy T2S controller in the existing installation.

IMPORTANT COMPATIBILITY RESTRICTION! Bravo 25-R modules are intended for the adapted Bravo TSI shelf used in the retrofit solution. They must not be installed in other shelf types. Conversely, standard Bravo 25 modules must not be used as substitutes for Bravo 25-R modules in a TSI retrofit shelf. Bravo 25-R and Bravo TSI modules cannot be used together.

14.3 Installation of Bravo 25-R modules in the TSI shelf

The mechanical preparation of the shelf must be completed before installing the new modules. The following overview is provided to explain the principle. For the complete method, required tools, safety conditions and illustrations, refer to the applicable CE+T Power replacement procedure for the installed T2S variant.

1. Transfer the installation to manual bypass, when available, or de-energise it in accordance with the replacement procedure.
2. Remove the legacy Bravo TSI modules and the T2S controller from the shelves.
3. Remove the five screws securing the existing shelf front reinforcement. A right-angle or short ratchet screwdriver may be required because access between shelves can be limited.
4. Install the dedicated retrofit shelf front reinforcement and tighten the five screws in the correct positions.
5. Insert the Bravo 25-R modules into the adapted TSI shelf and install the Inview Fit controller.
6. Complete startup, configuration upload, phase assignment and verification in accordance with the replacement procedure before returning the load to normal operation.

14.4 Existing manual bypass

When the existing installation is equipped with a Manual By-Pass (MBP), the bypass continues to be used according to the same operating principle as with the original Bravo TSI system. During bypass operation, the load is supplied directly from the AC mains and is not protected by the inverter output conditioning.

- The existing bypass may be used to maintain the load supply while the inverter system is being retrofitted, provided that all safety conditions in the replacement procedure are met.
- The retrofit does not change the normal operating purpose of the bypass.
- After the Bravo 25-R modules and Inview Fit are installed and configured, the system is returned from BYPASS to NORMAL operation using the applicable bypass sequence.

14.5 Bypass indication and Inview Fit digital input

Before the system is returned to normal operation, the bypass auxiliary contact is wired to the corresponding Inview Fit digital input in the same functional manner as in the original T2S-based installation. This connection allows Inview Fit to detect and indicate that the manual bypass is engaged.

- The digital input must be configured for the Manual By-Pass function.
- The exact terminal identification and wiring must follow the technical drawing and replacement procedure supplied for the specific system.
- Verify on Inview Fit web interface, that the bypass status changes correctly when the bypass is operated.

14.6 Return from bypass to normal operation

The system must only be returned to normal operation after the retrofit installation and configuration checks have been completed.

1. Confirm that the Inview Fit configuration has been uploaded and reviewed.
2. Confirm that all installed Bravo 25-R modules have completed their start-up sequence and that no blocking alarm is active.
3. For a three-phase system, verify that each module is assigned to the correct phase.
4. While the system remains in bypass, verify phase displacement across the bypass terminals before transferring the load back to the inverter output.
5. Return the bypass switch from BYPASS to NORMAL by following the operating sequence applicable to the installed bypass type.
6. Confirm that the load is supplied by the inverter system and Inview Fit indicates normal operation.

WARNING! An incorrect phase assignment may create an unsafe switching condition when returning a three-phase system from bypass to normal operation. Always complete the phase verification required by replacement procedure before operating the bypass.