



Leading Conversion Technology for Power Resilience

BRAVO 10 - 48/120

User Manual V1.1

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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Table of Contents

1. Introduction to CE+T	6
2. Abbreviations	7
3. Warranty and Safety Conditions	8
3.1 Disclaimer	8
3.2 Technical care	8
3.3 Installation	9
3.3.1 Handling.....	9
3.3.2 Surge and transients	10
3.3.3 Other.....	10
3.4 Maintenance	10
3.5 Replacement and Dismantling.....	10
4. ECI Technology.....	11
4.1 On-line Mode	12
4.2 Safe Mode.....	12
4.3 EPC Mode	12
4.4 Mix Mode & Walk-in Mode.....	12
5. Building Blocks	13
5.1 Bravo 10 - 48/120	13
5.1.1 Inverter	13
5.1.2 Specifications.....	13
5.1.3 Sub-rack	15
5.2 Controller Unit	15
5.2.1 Inview Slot	15
5.2.2 Inview S	17
5.2.3 Inview S - Connections.....	17
6. System Installation.....	18
6.1 Transformer and Generator Sizing	18
6.2 Mounting kit for Bravo 10 shelf.....	19
6.3 Cable Routing and Fixation	20
6.3.1 Grounding	20
6.4 Electrical Installation for Bravo 10 shelf	21
6.4.1 Pre requisites	21
6.4.2 Terminations	21
6.4.3 Single phase configuration - 120 Vac	22
6.4.4 Split phase or Single phase configuration - 240 Vac	23
6.4.5 Three Phase Configuration - 208 Vac.....	24
6.4.6 AC Input and Output	25
6.4.7 DC.....	26
6.4.8 Bravo 10 System with Inview S - Connections	27
6.4.9 Signalling	27

7. Interface	29
7.1 Inverter module	29
7.2 Inview Slot - LCD Display	30
7.2.1 LED indications	30
7.2.2 Menu structure.....	31
7.3 Inview S - LCD interface.....	32
7.3.1 LED indications	32
7.3.2 Menu structure.....	33
7.4 LCD interface - Terminology	34
7.5 Inview S and Inview Slot - Web Interface	35
7.5.1 Login.....	36
7.5.2 Interface Areas	36
7.5.3 Web page Controls	38
8. Replacement procedures	40
8.1 Module - Bravo 10	40
8.1.1 Removal.....	40
8.1.2 Inserting.....	40
8.2 Controller - Inview Slot.....	41
8.2.1 Removal.....	41
8.2.2 Inserting.....	41
8.3 Controller - Inview S.....	42
8.3.1 Panel Mounting	42
9. Finishing	43
10. Commissioning	44
10.1 Check list.....	45
11. Trouble Shooting and Defective Situations Fixing.....	46
11.1 Trouble Shooting	46
11.2 Defective modules.....	47
12. Maintenance.....	48
12.1 Access Inview with Laptop	48
12.2 Manual check.....	48
12.3 Optional	48
13. Service	49
14. Appendix.....	50
14.1 Bravo 10 - 48/120 - Dimensions	50
14.1.1 Module.....	50
14.1.2 Shelf	50
14.2 Connections and Wiring Diagrams	51
14.2.1 Single phase (L-N).....	51
14.2.2 Single phase (L-N) - REG.....	52
14.2.3 Single shelf - Split phase (L1-L2-N)	53
14.2.4 Single shelf - Split phase (L1-L2-N) - REG.....	54

14.2.5	Two shelves - Split phase (L1-L2-N)	55
14.2.6	Two shelves - Split phase (L1-L2-N) - REG	56
14.2.7	Three phase (L1-L2-L3-N)	57
14.2.8	Three phase (L1-L2-L3-N) - REG	58

Release Note:

Version	Release date (DD/MM/YYYY)	Modified page number	Modifications
1.0	07/02/2022	-	First release of the manual
1.1	09/09/2022	-	Updated the shelf connections

1. Introduction to CE+T

CE+T Power designs, manufactures and markets a range of products for industrial operators with mission critical applications, who are not satisfied with existing AC backup systems performances, and related maintenance costs.

Our product is an innovative AC backup solution that unlike most used UPS's

- Maximizes the operator's applications uptime;
- Operates with lowest OPEX;
- Provides best protection to disturbances;
- Optimizes footprint.

Our systems are:

- Modular
- Truly redundant
- Highly efficient
- Maintenance free
- Battery friendly

CE+T power puts 60+ years expertise in power conversion together with worldwide presence to provide customized solutions and extended service 24/7 - 365 days per year.

2. Abbreviations

AC	Alternating current
DC	Direct current
DHCP	Dynamic Host Configuration Protocol
DSP	Digital Signal Processor
ECI	Enhanced Conversion Innovation
EPC	Enhanced Power Conversion
ESD	Electro Static Discharge
ETH	Ethernet
HTTP	HyperText Transfer Protocol
HTTPS	Secure HyperText Transfer Protocol
LAN	Local Access Network
MBB	Measure Box Battery
MBP	Manual By-pass
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)
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, outdoor or indoor, it is important to:

- Install an appropriate filter on the enclosure door, or on the room's air conditioning system. Installation of filters may result in derating of module.
- Keep the enclosure door closed during operation.
- Replace the filters on a regular basis.

Important Safety Instructions and Save These Instructions.

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. Manufacturer may waive warranty if the system is not installed and commissioned by factory trained technician.

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 are trained in OSHA and NFPA safety related work practices, and NFPA 70E Arc Flash Protection and PPE requirements.
- 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.
- The maximum operating ambient temperature of the system is 40°C (104°F).
- 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.

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

3.3 Installation

- This product is intended to be installed only in restricted access areas as defined by UL UL60950 and in accordance with the National Electric Code, ANSI/NFPA 70, or equivalent agencies and in a temperature-regulated, indoor area that is relatively free of conductive contaminants.
- The Inverter 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 UL listed 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 inverter 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.
- REG systems and EPC 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 (output) and PE shall be bonded. The bonded connection between N (output) 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 inverter 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 or IP21 environment. When installed in a dusty or humid environment, appropriate measures (air filtering) must be taken.
- All illustrations in the manual are for general reference, refer to the technical drawing which is received along with the system for exact information.
- 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

3.3.1 Handling

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

3.3.2 Surge and transients

The mains (AC) supply of the modular inverter system shall be equipped with Lightning surge suppression and Transient voltage surge suppression suitable for the application. Follow manufacturer's recommendation for installation. Selecting a device with an alarm relay for function failure is advised.

All sites are considered to have a working lightning surge suppression device in service and installed close enough to ensure effective protection in accordance with best industry practice.

- Indoor sites Min Class II.
- Outdoor sites Min Class I + Class II or combined Class I+II. The modular inverter 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.

3.3.3 Other

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

3.4 Maintenance

- The modular inverter 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 on a system/unit make sure that AC input voltage and DC input voltage are disconnected.
- **CAUTION** – Risk of electric shock. Inverter modules and shelves contain capacitors for filtering and energy storage. Prior to accessing the system/modules after power down, wait at least 5 minutes to allow capacitors to discharge.
- **CAUTION** – During system operation, the system and module surfaces will be hot. Do not touch, and contact may cause severe burns. So, please turn off the power and allow it to cool before accessing. 
- Some components and terminals carry high voltage during operation. Contact may result in fatal injury.

3.5 Replacement and Dismantling

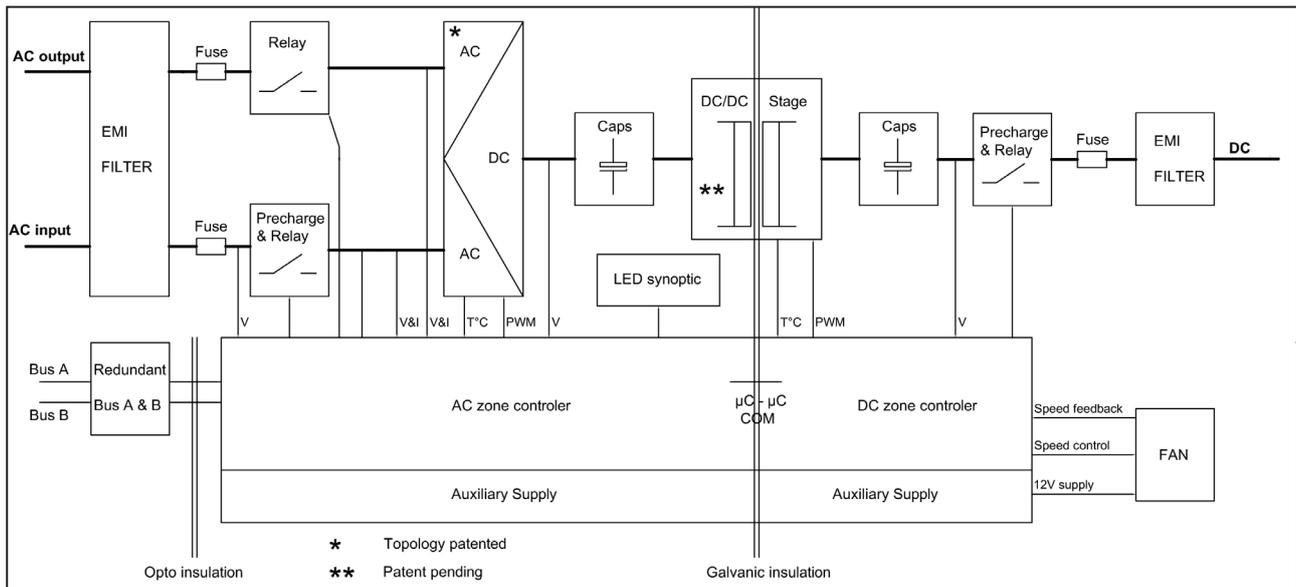
- ESD Strap must be worn when handling PCB's and open units.
- CE+T cannot be held responsible for disposal of the Inverter system and therefore the customer must segregate and dispose of the materials which are potentially harmful to the environment, in accordance with the local regulations in force 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.

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

4. ECI Technology¹

Inverter modules carrying the ECI logo and the EPC mark are triple port converters (AC in, DC in, AC out). Sinusoidal output is converted from Mains or/and DC.

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



The module is built around the following sub-converters:

- AC to DC at input
- DC to DC at input
- DC to AC at output

The energy can flow either from the AC source or the DC source under the control of the local DSP controller. Thanks to internal energy buffering, the output sine wave is constant and disturbance free regardless of the active source.

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.

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 is not available with REG modules.

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.

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 converter seamlessly switches to DC and the converter 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 94% depending on the model) without compromising the purity of the output sine wave.

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.

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 Bravo 10 - 48/120

5.1.1 Inverter

Telecom / Datacom:	Input	48 Vdc 120 Vac, 50/60 Hz
	Output	120 Vac
	Power	1000 VA / 800 W



- The module is a triple port inverter.
- Hot-swappable and hot-pluggable.
- The module operator interface is LEDs showing converter status and output power.
- The module is equipped with a soft start.
- The fan in the module is equipped with alarm and run time meter, and it is field replaceable.
- 346 mm (D) x 87 mm (W) x 1U (H).
- 1.5 Kg.

5.1.2 Specifications

Model	Bravo 10 - 48/120
General	
Part Number: Module / Shelf	T611330201 / T614330000
Cooling / Audible noise	Fan forced cooling / <65db @1meter
MTBF	200 000 hrs at 30°C, @80% load (MIL-217-F)
Dielectric strength DC/AC	4300 Vdc
RoHS	Compliant
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 >50°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
Material (casing)	Zinc coated steel
AC Input Data	
Nominal voltage (AC) / Current	120 Vac / 7.2 A
Voltage range (AC)	95 - 140 Vac
Brownout	< 108 Vac linear decreasing

Power factor / THD	> 99% / < 3%
Frequency range (selectable) / synchronization range	60 Hz (range 57 – 63 Hz) / 50 Hz (range 47 – 53 Hz)
DC Input Data	
DC voltage: Nominal / range	48 Vdc / (40-60V)*
Nominal current (at 48 Vdc and 800 W output)	18.5 A
Maximum input current (for 15 second) / voltage ripple	22.5 A / < 10 mV RMS
AC Output Data	
Efficiency AC to AC (EPC) / DC to AC	95% / >92%
Nominal voltage AC** (Adjustable)	120 V (100 - 130 Vac)
Frequency / frequency accuracy	60 or 50 Hz / 0.03%
Nominal Output power (VA) / (W)	1000 VA / 800 W
Short time overload capacity	125% (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%)	≤ 0.4 ms
Nominal current	8.3 A @ 120 Vac
Crest factor at nominal power	3 : 1 for load P.F. ≤ 0.7
Short circuit clear up capacity 0-20 ms	34 A
Short circuit current after 20 ms	16.5 A for 15 s, 12.5 A from 15 to 60 s, after 60 s - manual reset is required
AC output voltage stability	±1% from 10% to 100% load
Signaling & Supervision	
Display	Synoptic LED
Supervision / Part number	Inview S Slot - T602004110 and Inview S - T302004100
Remote on / off	On rear terminal of the shelf through Inview
Safety & EMC	
Safety	UL1778
EMC	EN 61000-4-2 / EN 61000-4-3 / EN 61000-4-4 / EN 61000-4-5 / EN 61000-4-6 / EN 61000-4-8 ETSI EN 300386 v1.9.1 / FCCpart 15 class A

* Permanent 800 W / derating apply based on internal heatsink T°.

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

5.1.3 Sub-rack

- The shelf is designed with both Single-phase and Split-phase
- The shelf can be integrated into min 600 mm depth cabinets, Inch/ETSI mounting
- The shelf house max four (4) modules and one (1) Inview Slot
- The extension shelf can accommodate max five (5) modules
- Each shelf has common DC input, AC Input and AC Output
- It is featured with rear protection cover (IP 20)
- Max 5 kVA / 4 kW per shelf
- Dimension: 370 mm (D) x 19" (W) x 1U (H)
- Weight: 2.5 Kg (without modules)



5.2 Controller Unit

5.2.1 Inview Slot

Inview Slot is an advanced monitoring and controller unit for Bravo 10 and Sierra 10 power systems. The product is specially designed in 1U height to accommodate in the module shelf and reduces the additional space in the cabinet.

It allows the user to easily access the system information through inbuilt powerful LCD touch screen graphic display. In addition to the touch screen display, the user can also access the system information through the web interface.

The Inview Slot interface provides the user to access the configuration and setup files of the modules in the system.

Inview Slot can monitor up to 32 inverters/converters and featured with:

- LCD touch screen display
- 2 Digital Inputs
- 2 Output Relay contacts
- Records 5000 events as FIFO

Note: In the Bravo shelf, signalling connections are present at left first slot. So the Inview Slot controller should be placed only at the left side of the first slot in the shelf, while you are looking from the front.

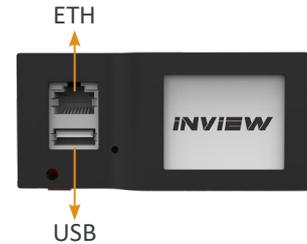


5.2.1.1 Inview Slot - Connections

Inview Slot has an ETH port and USB at the front. Output relays, free potential contacts, Modbus and power connections are present at the rear side of the Inview Slot connected shelf.

Inview Slot - Front connections

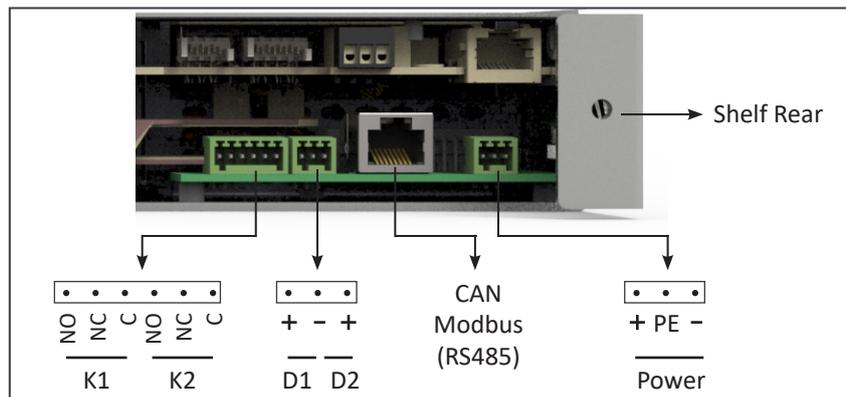
- **LAN** port is used for network connectivity and user can access the system information in the Web Interface.
- **USB** port is used to access the Inview S configuration and setup files.



Inview Slot - Shelf rear connections

- **Digital Inputs (D1 and D2):** Two potential free Digital Inputs are available for customer connections.
 - Digital Input 1 is assigned for MBP operation if used.
 - Digital Input 2 is assigned for Surge Arrester if used.
- **Output Relays (K1 and K2):** Two output relays are available and can be used for Major and Minor Alarms.
- **CAN Modbus (RS485)** port is used to establish communication between Inview Slot and MBB. It also provide the +12 Vdc power to one connected MBB.
- **Power:** The additional +12 V for Inview Slot and it is from external Auxiliary power supply converter. This power should not be shared with other devices.

By default, Inview Slot works on 48 Vdc from battery/rectifier source. If DC is not present, it takes +12 V from external Auxiliary power supply converter (AC to DC).



5.2.2 Inview S

Inview S is an advanced monitoring and controller unit for **Bravo 25**, **Bravo 10**, **Sierra 25**, and **Sierra 10** power systems. It allows the user to easily access the system information through inbuilt powerful touch screen graphic display. In addition to the touch screen display, the user can also access the system information through the web interface and SNMP protocol.

The Inview S interface provides the user to access the configuration and setup files of the modules in the system. Also, it is a controller for DC regulation.

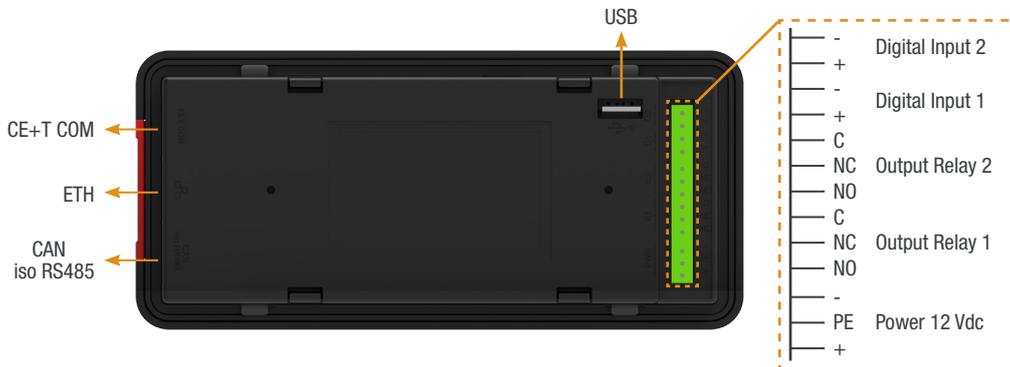
Inview S can monitor up to 32 inverters/converters and featured with:

- LCD touch screen display
- 2 Digital Inputs
- 2 Output Relay contacts
- Records 5000 events as FIFO



5.2.3 Inview S - Connections

Inview S is composed of multiple network ports and inbuilt free potential contacts.



- **CE+T COM** port is dedicated to establish connection between Inview S and Bravo 10 - shelf.
- **ETH** () port is used for network connectivity and user can access the system information in the Web Interface.
- **CAN / iso RS485** port is used to establish communication between Inview S and MBB.
- **USB** port is used to access the Inview S configuration and setup files.
- **Digital Inputs (D1 and D2):** Two potential free Digital Inputs are available for customer connections.
 - Digital Input 1 is assigned for MBP operation if used.
 - Digital Input 2 is assigned for Surge Arrester if used.
- **Output Relays (K1 and K2):** Two output relays are available and can be used for Major and Minor Alarms.
- **Power:** The unregulated separate +12 V power supply is required for powering Inview S and this power should not be shared with other devices. (CET can provide Auxiliary Power Supply converter and the part number is T602004120).

6. System Installation

Input and output protections

When installing Bravo 10 inverter systems, UL489 listed AC upstream (input) and downstream (output) circuit breakers are required. Refer section 6.4.6, page 25.

AC Input and Output

- Branch circuit protection breaker should be provided in upstream switchgear regardless of any protective device already installed at the input of the Bravo 10 system.
- An appropriate branch protection should be provided between the Bravo 10 System and the load.

DC

- An appropriate DC disconnection device should be installed at Input.

Output distribution should be structured to guarantee tripping segregation. Contact the manufacturer for recommendations and calculation methodology.

- Refer to section 6.4.6, page 25 for sizing protections and connecting cables. All cables must be copper rated for min 90°C (194°F).
- All cables must be C-UL-US or CSA Listed cables.
- All cables lugs must be C-UL-US or CSA listed. They must be sized according to the rated current of the converter system and to the customer terminal connection.
- Wire all positions for future expansion.
- Input AC / Output AC / Input DC / Signal cables shall be separated.
- Cable crossings shall be done in 90 deg angles.
- Empty converter positions shall be covered with blank module.
- Bravo 10 system is designed for temperature controlled (40°C / 104°F max) and clean environments. The presence of airborne particles such as urban dust, sand, metallic dust, and corrosive vapours is forbidden. Install only in a relatively free of conductive contaminants environment.

6.1 Transformer and Generator Sizing

The inverter is capable of operating at 125% of rated capacity for 15 seconds.

- Transformers supplying AC to the converter should be sized at a minimum of 1.25 times the kVA rating of the converter to meet this requirement.
- Generators supplying emergency AC to the building and to the converter should be sized at a minimum of two times the kVA rating of the converter.

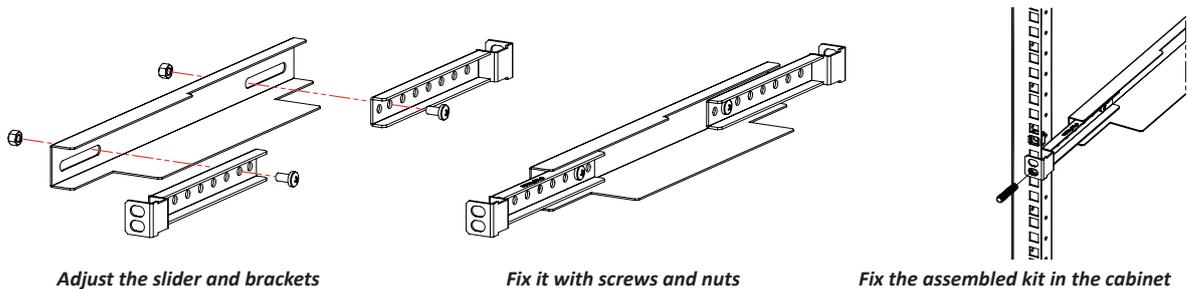
6.2 Mounting kit for Bravo 10 shelf

Bravo 10 shelf mounting kit is designed to fix in different depth cabinets. The part number is **T319000001** and has the following accessories in the kit.

4 x Fixing brackets	2 x Sliders	8 x (M5 Philips head screws and nuts)
2 x (M6 Hex socket screws, cage nuts and nuts)		6 x (M6 Philips head screws and cage nuts)

Perform the following steps to install the shelf mounting kit in the cabinet:

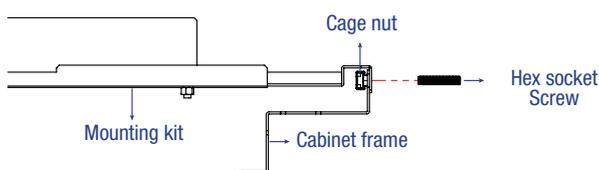
1. Adjust the slider and brackets depending upon the cabinet depth, and fix it with M5 screws and nuts. If holes are available in the kit, fix it with the additional screws and nuts to increase the kit strength.
2. Place the assembled mounting kit in the cabinet and fix it on the front side at any one hole with the M6 Hex socket screw and cage nut. (Note: Tighten the Hex socket screw with Allen key till it touches behind the metal part.)
3. Fix the other end of the mounting kit at cabinet rear using the M6 Philips head screw and cage nut.
4. Similarly, assemble another mounting kit and fix it on another side of the cabinet.



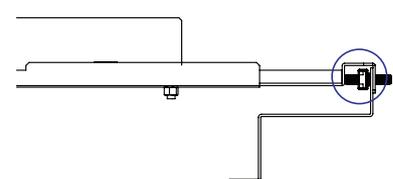
Adjust the slider and brackets

Fix it with screws and nuts

Fix the assembled kit in the cabinet

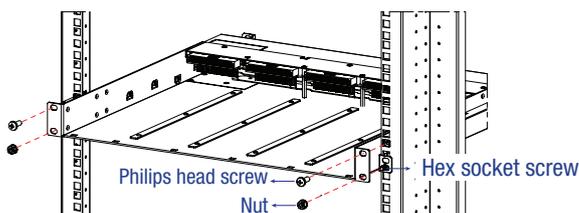


Screw, mounting kit & cage nut arrangement

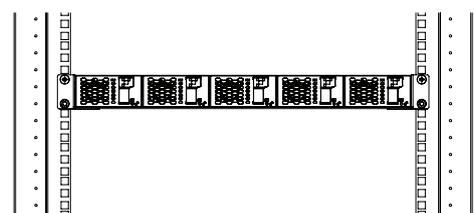


Tighten the screw till it touches the metal part

5. Place the shelf on the mounting kit and fix it with a M6 nut in the already installed hex socket screw used for the mounting kit.
6. Fix the other hole of the shelf in the cabinet using M6 Philips head screw and cage nut.
7. Similarly, fix the other side of the shelf and insert modules in the corresponding slot.



Place the shelf in the cabinet and fix it



Insert the modules in the shelf

6.3 Cable Routing and Fixation

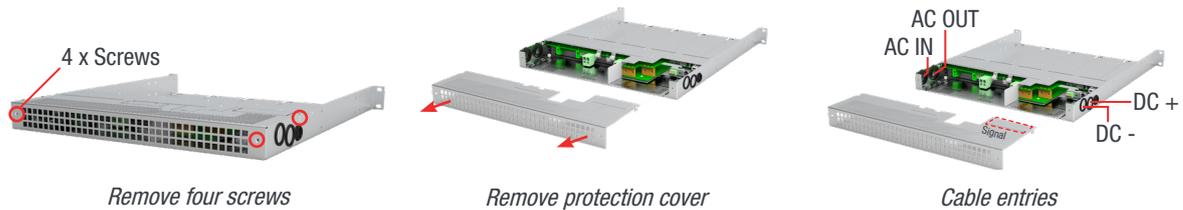
Terminations are present at rear side of the shelf and it is protected with IP 20 metal cover.

Perform the following steps to connect power and signal cables:

1. Remove the rear protection cover by unscrewing four screws (Two at the rear and one on both sides).
2. Break the required knockouts and insert the grommets (1 x large, 2 x small, and 1-meter strip) for cable protection, and it is shipped along with the shelf. **(Warning: Take special attention while breaking knockouts to avoid damaging the connectors, terminals and PCB in the shelf.)**
 - AC IN and OUT cables entry – Right end of the shelf (2 - Knockouts)
 - DC cables entry – Left end of the shelf (2 - Knockouts)
 - Knockouts are also available at top and bottom of the protection cover.

Note: Refer to section 14.1, page 50, to know more about knockout dimensions.

3. Connect the power and signal cables with **supplied screws**, refer section 6.4.2, page 21 for terminals position.
4. Close the rear protection cover and tighten with four screws.

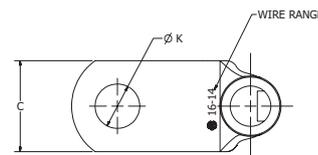
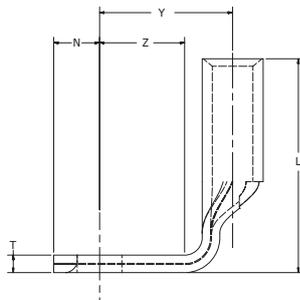
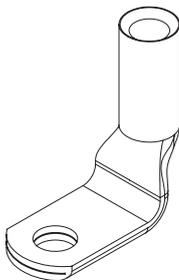


6.3.1 Grounding

“PE Chassis Ground” 

PE Chassis ground should be wired to MET (Main Earth Terminal) or distributed earth bar connected to MET, according to local regulations. The wire size should be 4 AWG.

It is mandatory to use only C-UL-US or CSA listed Right angle ring terminal Cable Lugs (Burndy: YAV4CRS). Fix the lug with 1/4-20 inch **Nut** with torque 5.7 to 8.3 ft-lb.



C : 0.56
K : 0.28
L : 1.06
Y : 0.70
Z : 0.28
N : 0.27
T : 0.09

All dimensions are in inch

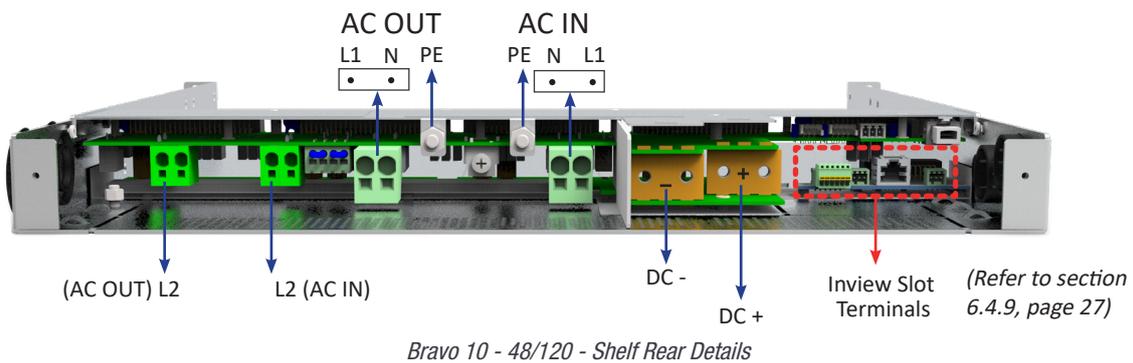
6.4 Electrical Installation for Bravo 10 shelf

6.4.1 Pre requisites

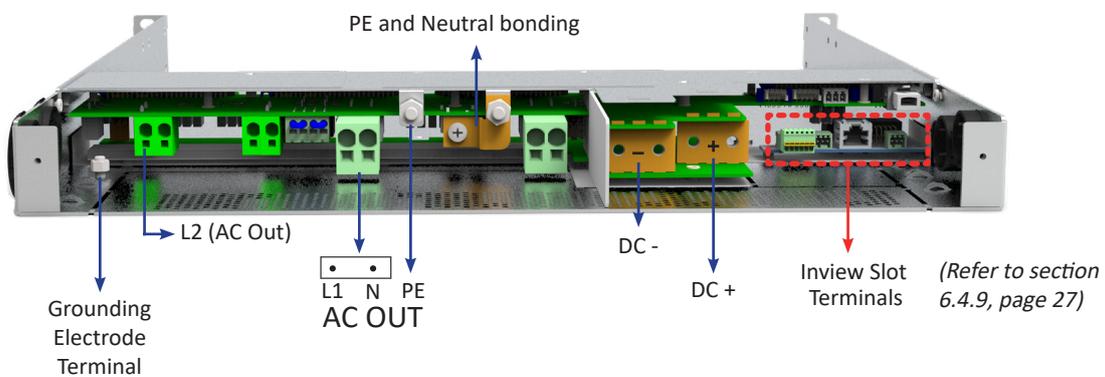
- The sub-rack have markings for all terminations.
- All cables shall be rated at Min 90 deg C.
- Electrical terminations shall be tightened with 5 Nm.
- All connection screws are M5 x 12 mm.
- DC Input - Common (per shelf), check DC polarity.
- AC Input / AC output - Common (per shelf), check AC phase angle.
- Wire all positions in the sub-rack for future expansion.

6.4.2 Terminations

6.4.2.1 EPC Version



6.4.2.2 REG Version (No AC In)



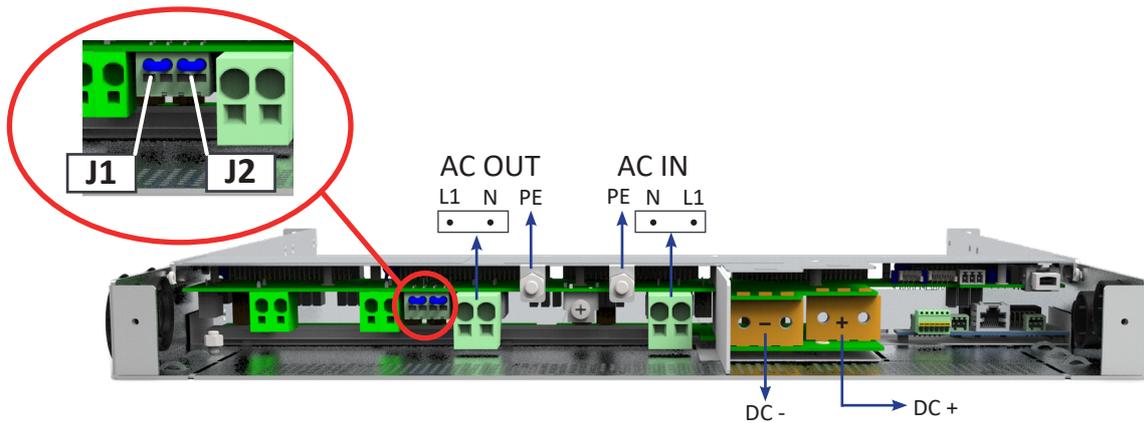
Note: In REG version, a copper plate is placed between PE and Neutral. Also, ground should be connected to Grounding electrode terminal using 10-24 inch nut of torque 3.2 to 4.8 ft-lb.

6.4.3 Single phase configuration - 120 Vac

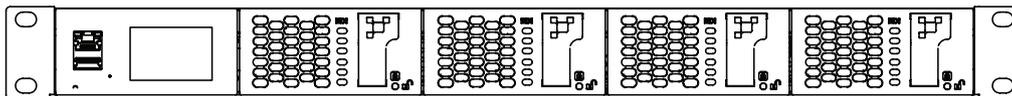
Each shelf is designed with both Single-phase and Split-phase. If it is a single-phase, place the two jumpers (J1 & J2) and connect AC cables at AC IN 1 and AC OUT 1 terminals. A single-phase system is 120 Vac from L to N.

Input and output are the same, consisting of 2 wires + (PE) Ground.

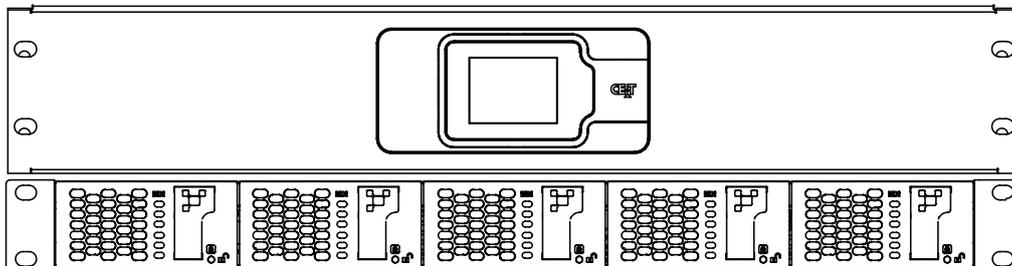
Note: The jumper cable should be a minimum of 12 AWG.



6.4.3.1 Single phase configurations with Inview Slot and S



Single phase with Inview Slot - 4 kVA



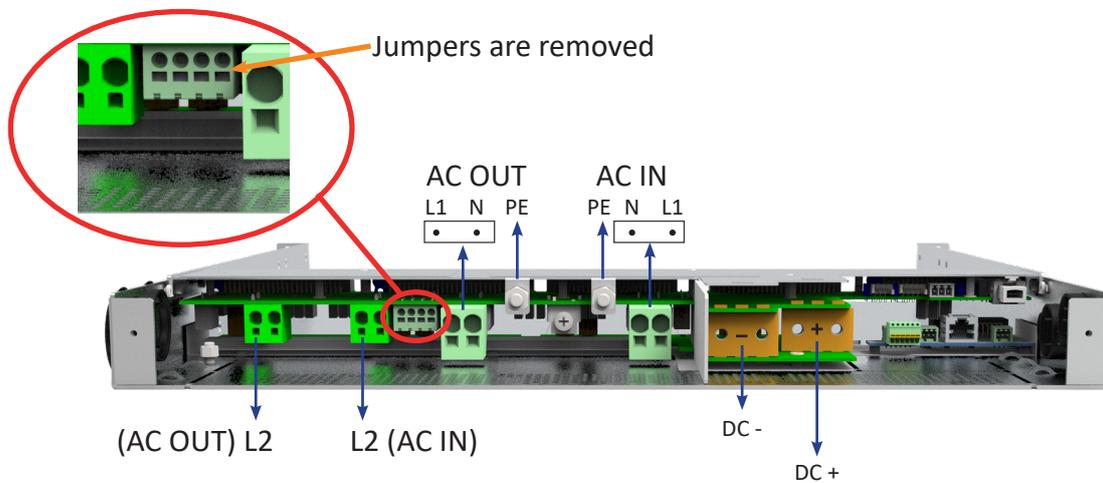
Single phase with Inview S - 5 KVA

6.4.4 Split phase or Single phase configuration - 240 Vac

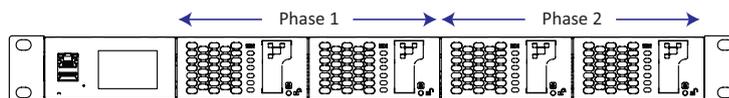
A split-phase system is 120 Vac from L to N, and 240 Vac from L1 to L2 and L1 and L2 are phase-shifted by 180 degrees.

A shelf can be configured as Split-phase. To do it, **remove the two jumpers** and connect AC cables in the terminals as per the below image.

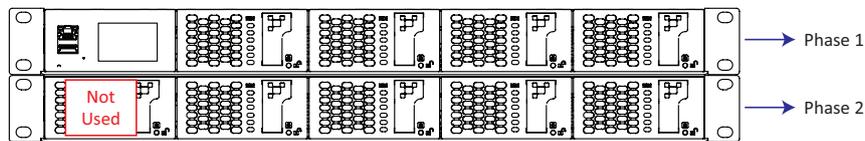
Note: If the Split-phase is designed with two shelves, the Jumpers (J1 and J2) should be present on both shelves. For connection details, refer to sections 14.2.5, page 55 and 14.2.6, page 56. In each phase, the number of modules should be equal.



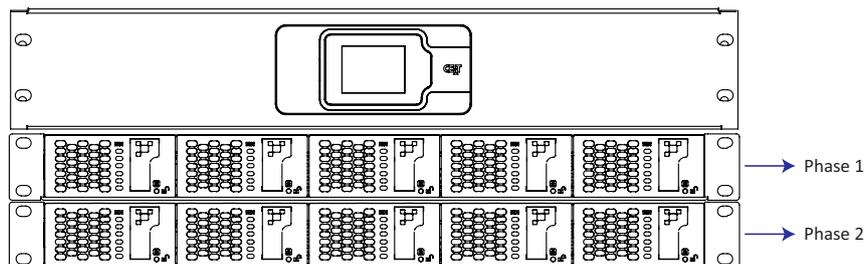
6.4.4.1 Split phase configurations with Inview Slot and S



Split phase with Inview Slot - 4 kVA



Split phase with Inview Slot - 8 kVA



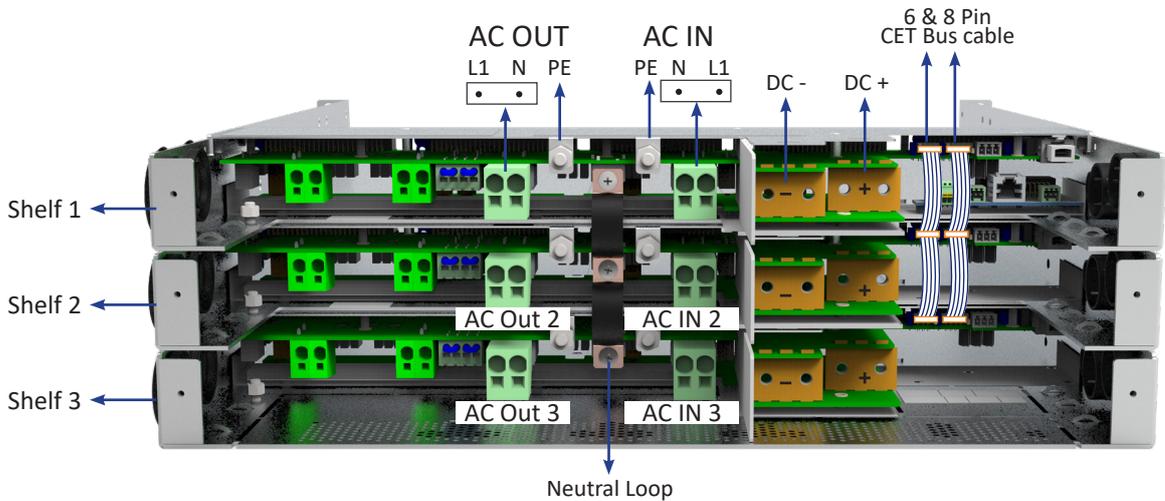
Split phase with Inview S - 10 kVA

6.4.5 Three Phase Configuration - 208 Vac

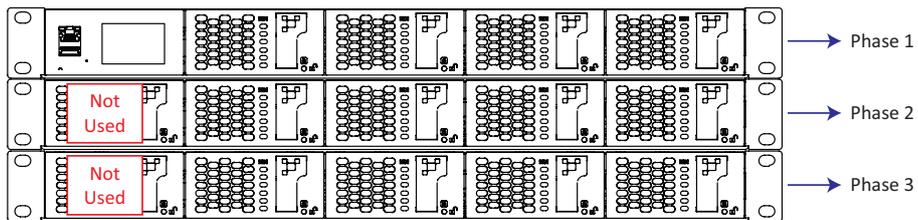
Three-phase systems are 120 Vac L to N and 208 Vac from L1 to L2, L1 to L3, L2 to L3. Input and output are made upon four wires + (PE) Ground, “Y” or “Star” connection. All phases are phase shifted by 120 degrees one to the other.

Three-phase can be configured with three shelves as per in the below image. **CET Bus** and **Neutral** cables must be paralleled if it is multiple shelves.

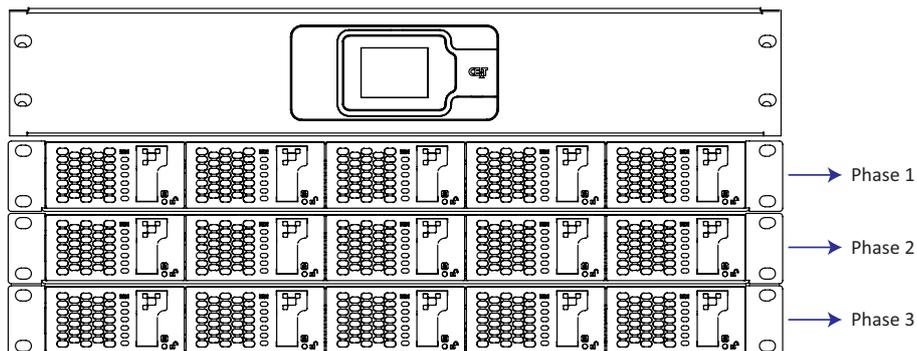
Note: In each phase, the number of modules should be equal.



6.4.5.1 Three phase configurations with Inview Slot and S



Three phase with Inview Slot - 12 kVA



Three phase with Inview S - 15 kVA

6.4.6 AC Input and Output

WARNING !!!

Recommendation of IEC 60364 4. 43

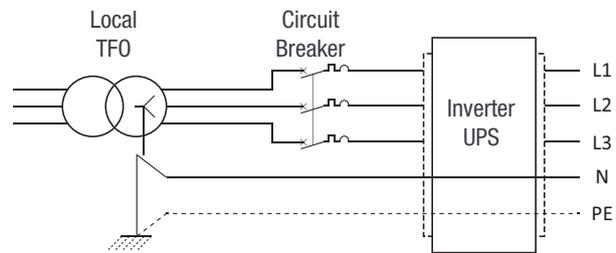
431.3 Disconnection and reconnection of the neutral conductor in multi-phase systems

Where disconnection of the neutral conductor is required, disconnection and reconnection shall be such that the neutral conductor shall not be disconnected before the line conductors and shall be reconnected at the same time as or before the line conductors.

WARNING !!!

Input Neutral is required to operate the Inverter, UPS

In TN-S System no 4 pole input switch or circuit breaker shall be used. If you have to use 4 pole protective device, be aware that the neutral against the ground is floating. The inverter, UPS will operate without problem but you may infringe the local regulation.



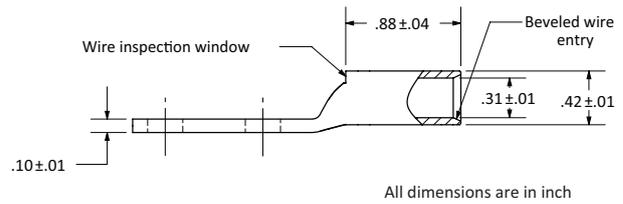
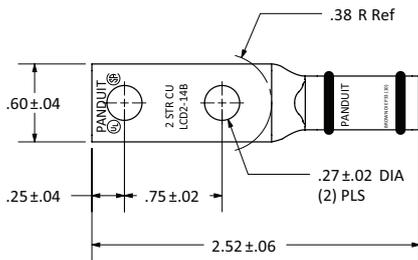
Model	Configuration	Maximum Capacity	Current @ 120 Vac	MCB per Shelf	Cable Minimum*
S61A33CDD04SNF00G00H	Single-Phase 2 Wires (L-N)	4 kVA / 3.2 kW	34 A	45 A	6 AWG
S61A33CDD05SNF00G00H		5 kVA / 4 kW	42 A	60 A	4 AWG
S61A63CDD04SNF00G00H	Split-Phase 3 Wires (L1-L2-N)	4 kVA / 3.2 kW	17 A	25 A	10 AWG
S61A63CDD08SNF00G00H		8 kVA / 6.4 kW	34 A	45 A	6 AWG
S61A63CDD10SNF00G00H		10 kVA / 8 kW	42 A	60 A	4 AWG
S61A53CDD12SNF00G00H	Three-Phase 4 Wires (L1-L2-L3-N)	12 kVA / 9.6 kW	34 A	45 A	6 AWG
S61A53CDD15SNF00G00H		15 kVA / 12 kW	42 A	60 A	4 AWG

* One conductor / pole - 90°C

Note: The Icc value measured as 60 Arms per shelf with five modules.

6.4.7 DC

- One (1) common DC connection
- Two holes of 1/4" hole with 0.75" between center
- It is mandatory to use only C-UL-US, or CSA listed Cable Lugs (Panduit: LCD2-14B-Q). Fix the lug with Pan Head 1/4-20 inch screw with torque 5.7 to 8.3 ft-lb



Model	Configuration	Maximum Capacity	Current @ 48 Vdc	MCB per Shelf	Cable Minimum
S61A33CDD04SNF00G00H	Single-Phase 2 Wires (L-N)	4 kVA / 3.2 kW	74 A	100 A	3 AWG*
S61A33CDD05SNF00G00H		5 kVA / 4 kW	93 A	125 A	2 AWG*
S61A63CDD04SNF00G00H	Split-Phase 3 Wires (L1-L2-N)	4 kVA / 3.2 kW	74 A	100 A	3 AWG*
S61A63CDD08SNF00G00H		8 kVA / 6.4 kW	2 x 74 A	2 x 100 A	3 AWG**
S61A63CDD10SNF00G00H		10 kVA / 8 kW	2 x 93 A	2 x 125 A	2 AWG**
S61A53CDD12SNF00G00H	Three-Phase 4 Wires (L1-L2-L3-N)	12 kVA / 9.6 kW	3 x 74 A	3 x 100 A	3 AWG**
S61A53CDD15SNF00G00H		15 kVA / 12 kW	3 x 93 A	3 x 125 A	2 AWG*

* One conductor / pole - 90°C.

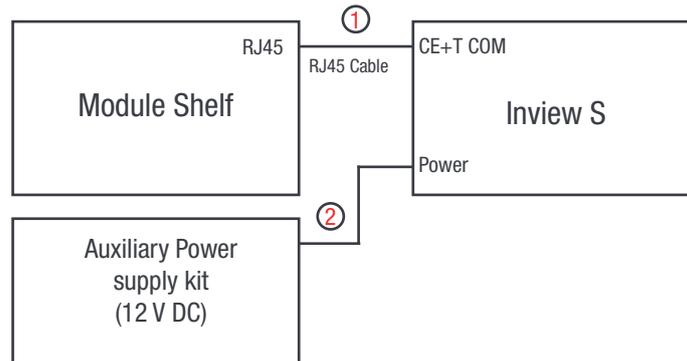
** One conductor / pole - 90°C and One set of cables per shelf.

Note:

- For each shelf, the DC breaker should be a separate branch protection (MCB) to distribute the DC.
- The Inner hole diameter of the DC lug (two holes) should be 1/4", and it is recommended to use only the supplied screws.

6.4.8 Bravo 10 System with Inview S - Connections

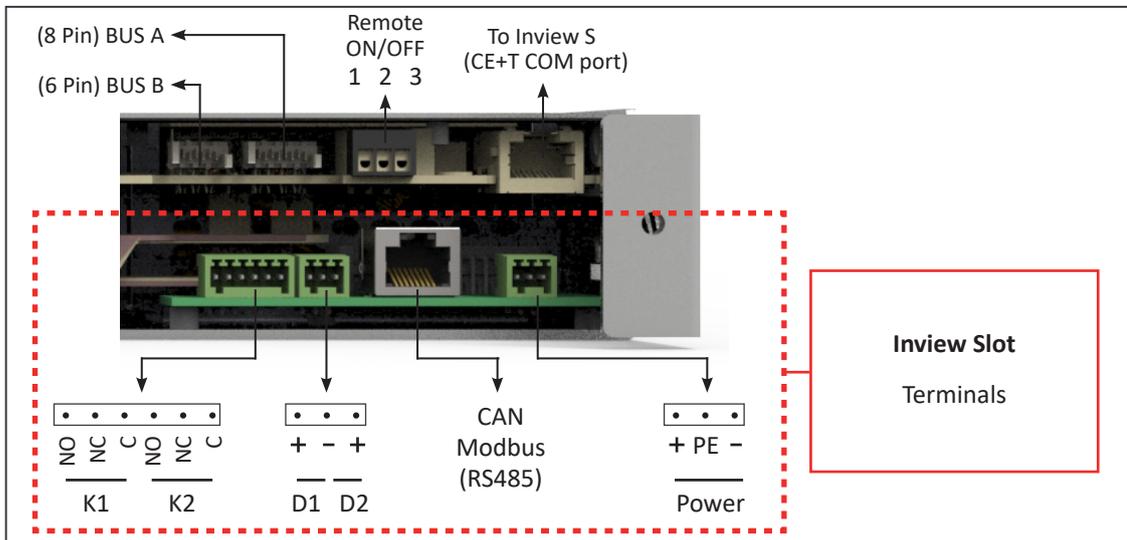
1. Connect module shelf RJ45 port and Inview S CE+T COM port using RJ45 straight cable.
2. Connect power to Inview S from auxiliary power supply kit.



To know more about Inview S terminal details, refer to section 5.2.3, page 17.

6.4.9 Signalling

Each shelf comprise of 8 and 6 pin connector, Remote ON/OFF and ETH port for communication. The PCB at the bottom of the rear shelf is for Inview Slot. It can only be accessed if Inview Slot connected to that shelf.



6.4.9.1 Remote ON/OFF

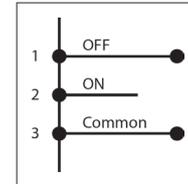
The shelf is by default equipped with a connection between pin 3 and 2. If remote ON/OFF is not used the strap shall remain in all connected shelves. Should the remote ON/OFF be used, all straps must be removed and in one (1) shelf replaced with a changeover contact or emergency button.

- The remote ON/OFF switch the output AC OFF.
- Input AC and input DC is not affected by the remote ON/OFF.

- The remote ON/OFF can be connected to any shelf.
- The remote ON/OFF requires changeover contacts, one input opens as the other close.
If both transitions are not picked up the status is not changed.

Relay characteristics (Remote ON/OFF)

- Signal voltage +5 VDC (galvanic insulated)
- Max wire size 1 mm²



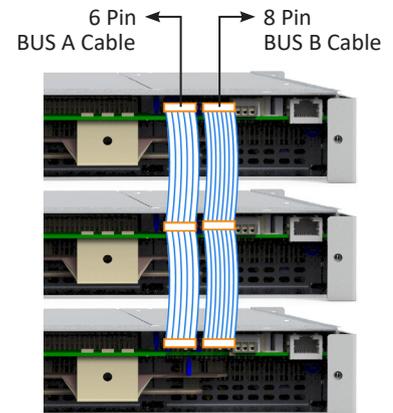
Functional table for remote ON/OFF function

#	Pin 1-3	Pin 2-3	Status	Indication
1	Open	Open	Normal operation	All (Green)
2	Closed	Open	OFF	AC output (OFF) AC Input (Green) DC Input (Green)
3	Open	Closed	Normal operation	All (Green)
4	Closed	Closed	Normal operation	All (Green)

Warning! If remote ON/OFF is not used, pin 2 and 3 **MUST** be bridged together.

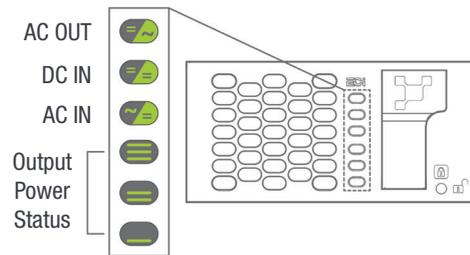
6.4.9.2 Internal bus (BUS A / BUS B)

- In a la carte system, Internal bus is pre installed and connected in series from the first shelf to last shelf.
- Internal bus is comprised of 6 and 8 pole CAN bus cables.
- If more than one shelf is ordered separately and installed in others cabinet, 6 and 8 pin connector of each shelf should be connected in series with all shelf using CAN bus cables.
- The internal bus connectors are sensitive and special caution should be taken during installation to keep them out of harms way.



7. Interface

7.1 Inverter module

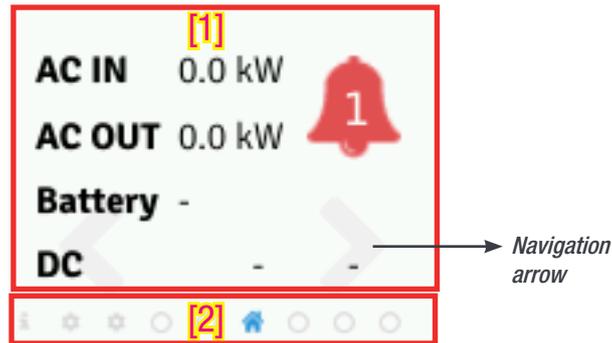


Inverter Status LED	Description	Remedial action
OFF	No input power or forced stop	Check environment
Permanent green	Operation	
Blinking green	Converter OK but working conditions are not fulfilled to operate properly	
Blinking green/orange alternatively	Recovery mode	
Permanent orange	Starting mode	
Blinking 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 70%	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)

7.2 Inview Slot - LCD Display

Once the system is powered upon, the Inview Slot is up and ready for operation. The LCD is a 1.8-inch touch screen and user can only view the system details through the interface.



- **[1] Interface area**

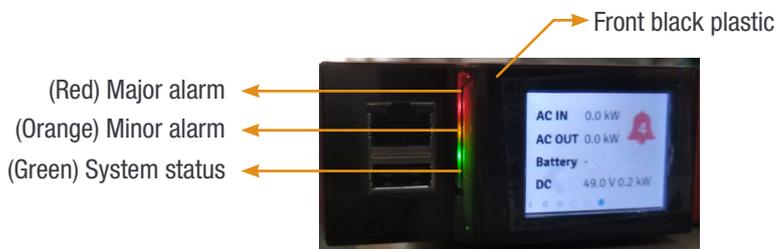
Interface area provides information about the corresponding page. At the bottom of the screen, left and right arrows are present for moving next and the previous screen. In some screens, up and down arrows appear at the top of the page, indicating more contents are present.

- **[2] Status bar**

The status bar appears throughout the interface and illuminate the current page icon.

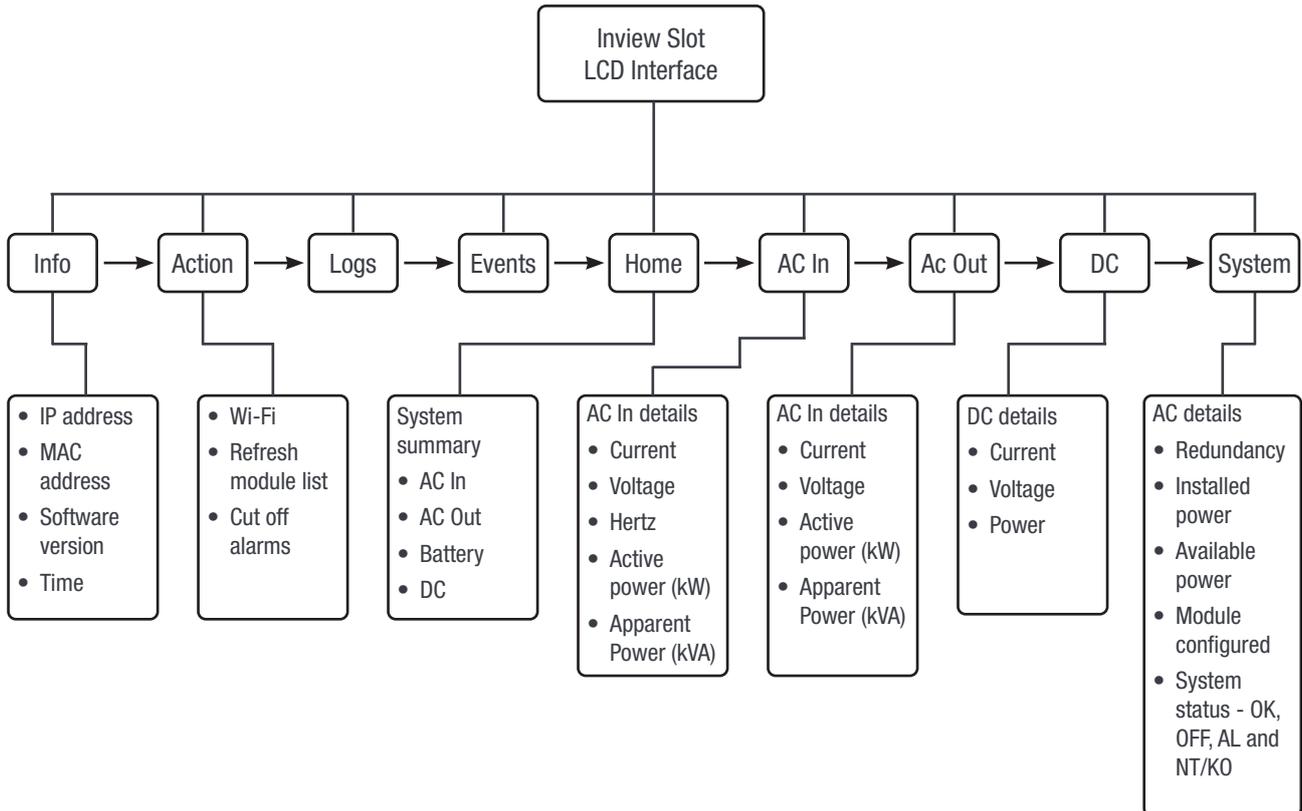
7.2.1 LED indications

Three LED's are present behind the front black plastic of the controller to indicate major alarm, minor alarm, and system status. These LED's are not visible until they illuminate during the corresponding action occurs.



7.2.2 Menu structure

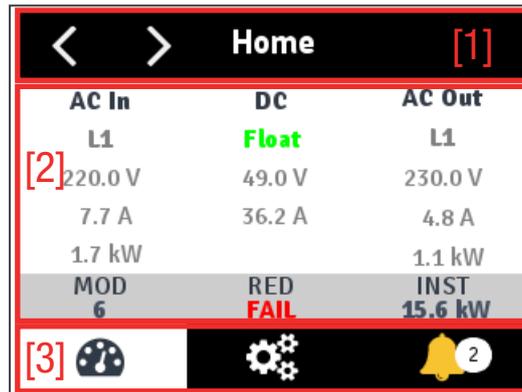
The home page is the default page in the LCD interface, and other pages are arranged in the below sequence.



7.3 Inview S - LCD interface

Inview S LCD interface is a 2.8-inch touch screen. It does not have any user account, the user can only view the system details. The LCD interface is protected with the PIN during any action request.

Once system is powered upon, the Inview S is up and ready for operation.



- **[1] Header**

Displays the title of the current page and navigation buttons for next and previous page. In some pages, Up and Down navigation buttons appear at the right side, indicating more contents are present.

- **[2] Information Area**

Provides information about the corresponding page.

- **[3] Toolbar**

The toolbar is present at the bottom throughout the interface, to provide quick access to following pages:

- Measures
- Settings
- Alarms and Logs

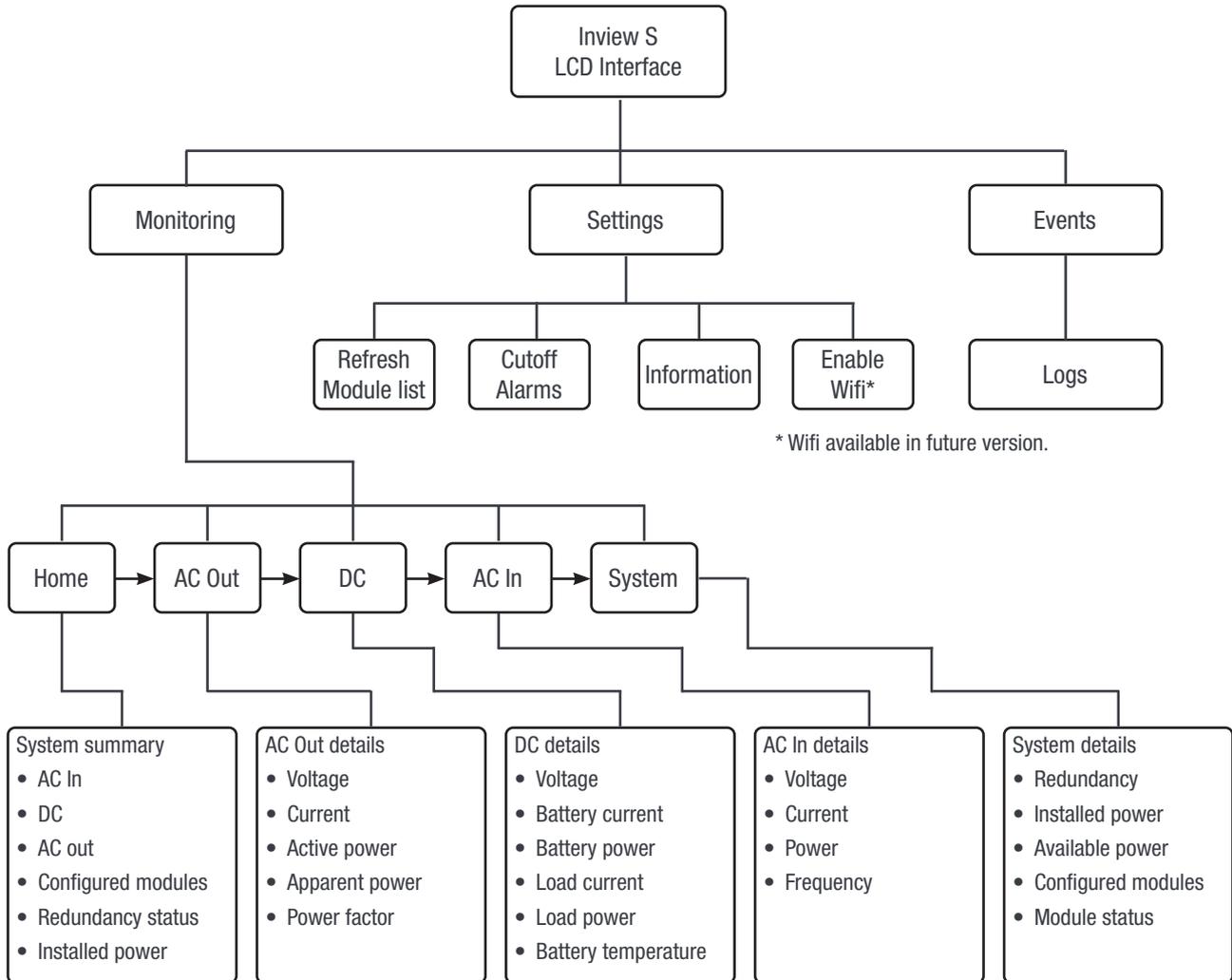
7.3.1 LED indications

Three LED's are present at front side of the controller to indicate major alarm, minor alarm, and system status.



7.3.2 Menu structure

The below tree provides an overview of the menu structure in the Inview S LCD interface.



7.4 LCD interface - Terminology

The below table provides the description of abbreviation and terminology which appears in Inview Slot, S and X LCD interface.

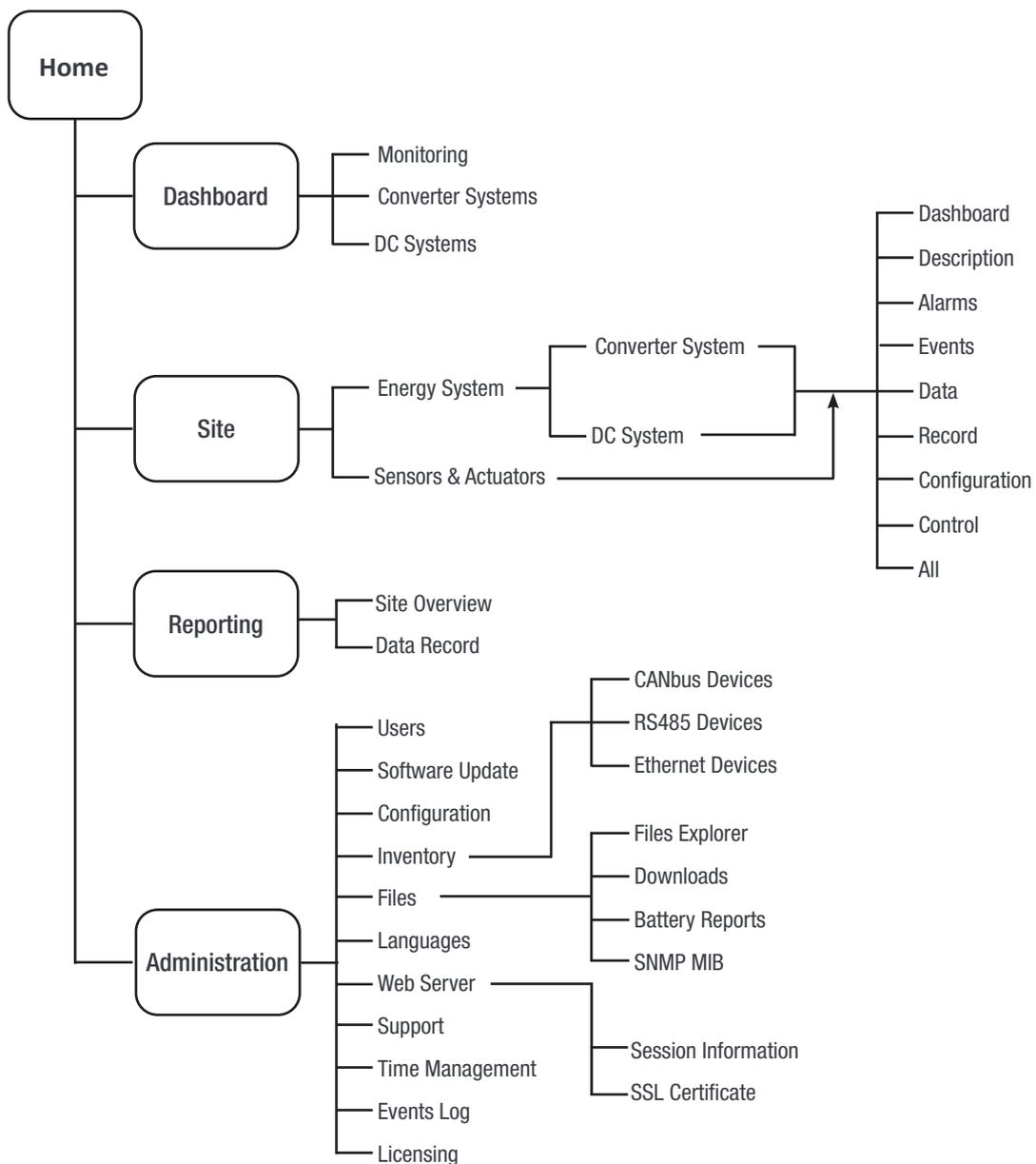
S.NO	Terminology	Description
1	MOD	Number of converters configured in the system
2	RED	Redundancy satisfied or not
3	INST	Installed Power
4	Redundancy	Number of redundancy from the configured converters
5	OK	Number of active converters
6	OFF	OFF: Number of non-active or switched off converters.
7	AL	Displays the alarms
8	NT/OK (Not Okay)	Number of faulty converters or missing converters when compare to configured converters
9	Installed power	It is the total power of the configured converters, including redundancy. Moreover, it is a user configuration based upon the system capacity.
10	Available power	It is the total power of active converters present in the system.
11	Modules configured	Total number of converters configured in the system
12	Refresh converter list	The controller performs a complete scan and remove the non-active converters from the converter list. Note: If any parameter is changed, an authentication page appears. Enter the display PIN password to apply changes.
13	Cutoff alarms	Buzzer sound will be muted
14	Logs	Display the latest 100 events occurred.
15	Information	Displays product and network details

7.5 Inview S and Inview Slot - Web Interface

The web interface of all the controller **Inview Slot, S** and **X** is same. The Inview web interface provides the user to interact with system, access, configure and modify the system parameters.

The below tree provides an overview of the menu structure in the web interface.

Note: Dashboard page varies depending upon the topology selection.



7.5.1 Login

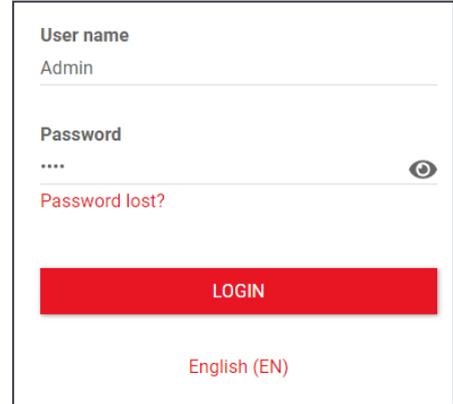
Once system is powered on, the Inview Slot/S and X is up and ready for operation. Configuration and other parameters can be changed using the web interface. Perform the following procedure to configure the system through web interface.

Open the web browser and type the default IP address **10.250.250.1** in the address field and press enter.

Note: Use any one of the following latest web browsers: Google Chrome, Mozilla Firefox, Safari, or Microsoft Edge.

Inview Slot, S and X have three login – Basic, Expert and Admin. All three login is password protected.

The default password for all three logins is “1234”.



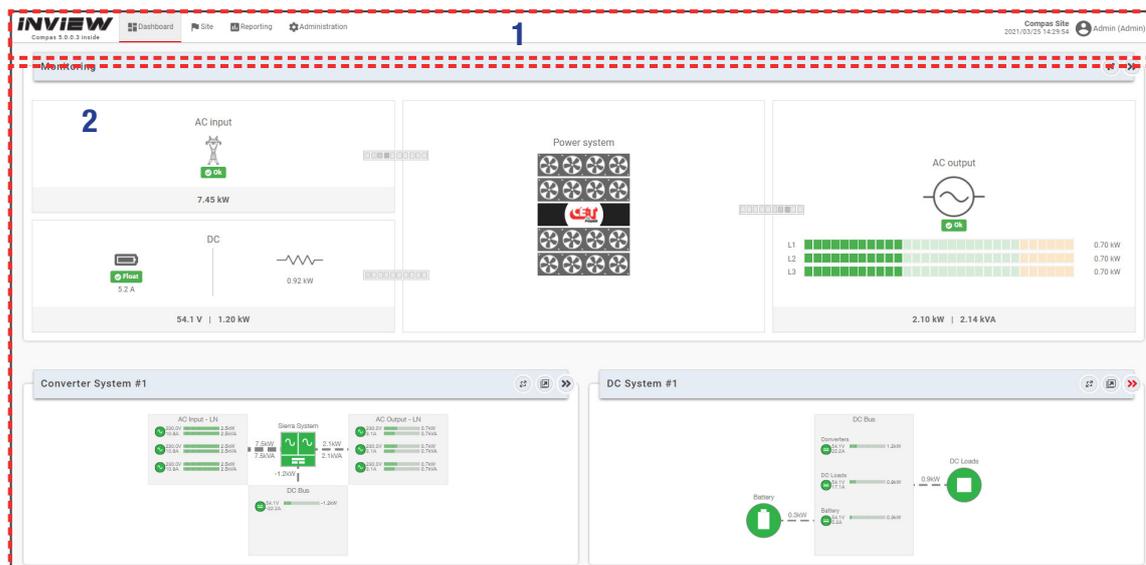
Basic login can only browse the pages and download the files, but Expert and Admin login can access and also modify the system parameter values.

An auto-logout feature is available to avoid a user being connected all the time. When no action is performed for more than 10 minutes, the session will expire and goes to login screen.

7.5.2 Interface Areas

1 → Header

2 → Main Page



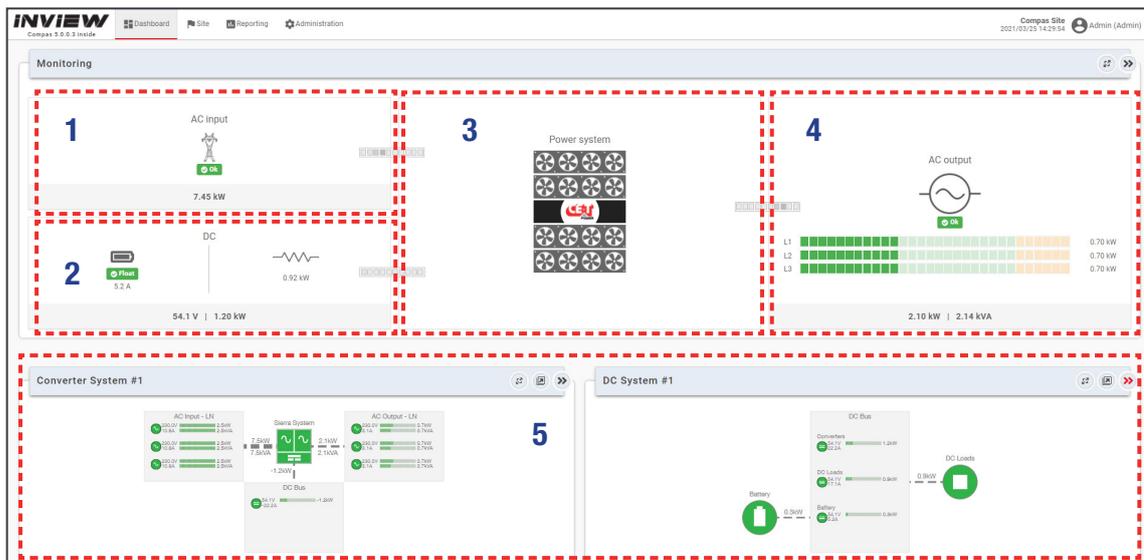
7.5.2.1 Header



The tabs in header provide quick access to the corresponding pages.

- 1 → **Home:** Clicking on **INVIEW** logo goes to the home page from any page you are accessing in the interface.
- 2 → **Menu:** Provides access to other pages.
- 3 → Display the date, time and the site name of the system.
- 4 → **Account:** Provides the information of which account is logged in (Basic, Expert or Admin). Clicking on drop-down arrow user can perform the following actions: Save Configuration and Inventory, Reboot Controller, Change Password and Logout.

7.5.2.2 Home Page



- 1 → **AC Input:** Clicking on the AC Input region displays the page contain all measurements regarding AC Input.
- 2 → **DC:** Clicking on the DC region displays the page contains all measurements regarding DC input and output.
- 3 → **Power System:** Clicking on the Power System region display the page contains regarding system information such as overall system power and also in each phase, configured converters, active converters, and list of detected converters and accessories.
- 4 → **AC Output:** Clicking on the AC Output region displays the page contains all measurements regarding AC Output. Regardless of the system configuration (1P, 3P), display the power fed to the load on each phase.
- 5 → **System Information:** Displays system information such as Converter System, DC System, Site, Energy system, Sensors and Actuators details.

(Note: System information screen varies depending upon the topology selection.)

7.5.3 Web page Controls

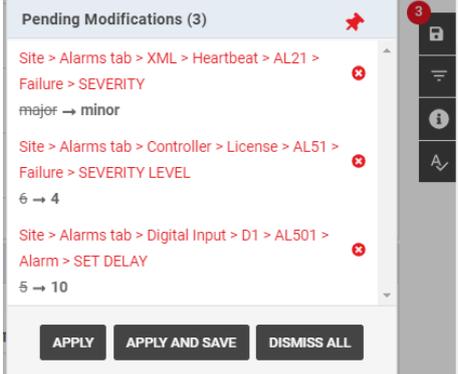
Placing or clicking on it performs the corresponding action.

Controls	Description
	Page changes to edit mode and the user can change the parameters. If any parameter value is changed, the edit icon changes to modification icon and displays the list.
	Filters: Page displays depending upon the filter selection.
	On-Board help: Provide a short description to help to know about the corresponding parameters.
	Rename parameter name.
	Page or section expands
	Page or section collapse
	Particular section opens in a new tab
	Particular section open as a pop-up
	Drop down list – more options are present
	Delete / Clear the corresponding parameter.



Note: Edit, Filter, Help and Rename icons are present at right side of the web page.



Controls	Description
	<p>Modifications list: It appears at right side of the “Site” page. This list helps the user to overview the changes and can apply the required parameters.</p> <p>Apply: Clicking on “APPLY” button, the controller accepts all the parameter changes in the modifications list.</p> <p>Apply and Save: Clicking on “APPLY AND SAVE” button, the controller accepts all the parameter changes in the modifications list and saves them in the configuration file.</p> <p>Dismiss All: Clicking on “DISMISS ALL” button, the controller rejects all the parameter changes in the modifications list.</p> <p>Clicking on  button, the controller rejects only the particular modification from the list.</p> <p>Note: The number on the icon indicates the number of modifications in the list.</p> 

Note: To know more about Inview S and Inview Slot operation, refer to the Inview manual and it is available on request.

8. Replacement procedures

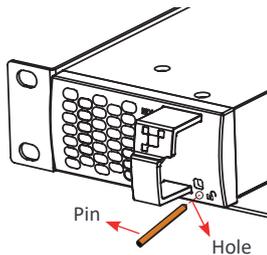
8.1 Module - Bravo 10

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

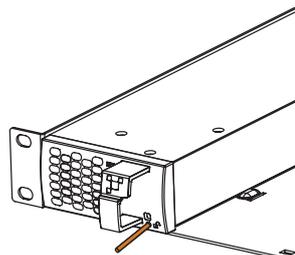
8.1.1 Removal

Notice: When one or several inverter modules is/are removed access to live parts becomes possible. Replace module(s) with dummy cover without delay.

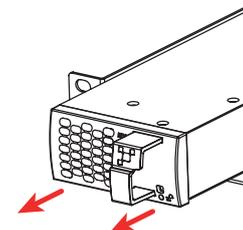
1. Insert a soft edged pin into the hole to unlock the latch. (Hole diameter is 3 mm)
2. Push the pin and simultaneously pull the module using front handle.
3. Remove the module from shelf and replace with a new module or dummy cover.



Insert the pin into the hole



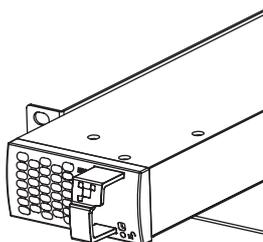
Push the pin and pull the module



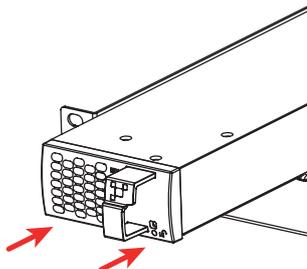
Remove the module from shelf

8.1.2 Inserting

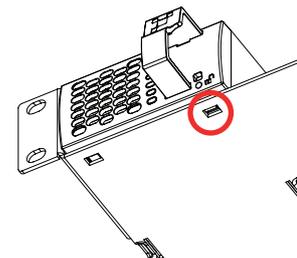
1. Check module compatibility (DC Voltage!).
2. Place the module and slide into the shelf.
3. Push the module firmly using the front handle, until the module rear is connected correctly with shelf.
4. Make sure the bottom latch in the module is locked in the shelf.
5. The module will start up and take the first address available on the bus.



Place the module & slide into the shelf



Push firmly until module is engaged



Make sure the latch is locked in the shelf

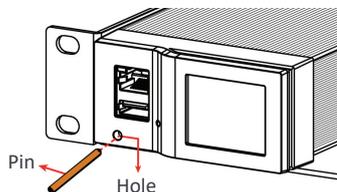
8.2 Controller - Inview Slot

8.2.1 Removal

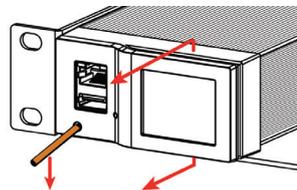
1. Insert a soft edged pin into the hole to unlock the latch. (Hole diameter is 3 mm)
2. Gently push and press down the pin to unlock the latch and then remove the controller.

Warning: while removing the controller from the shelf, hold the top and bottom part of front plastic. Do not press on the touch screen.

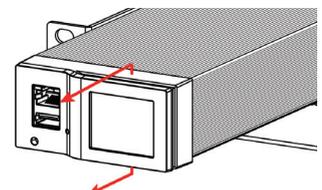
3. Remove the controller from shelf and replace with a new unit or dummy cover.



Insert the pin into the hole



Push and press down the pin, and pull the unit



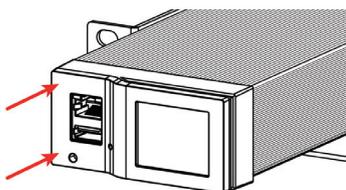
Remove the module from shelf

8.2.2 Inserting

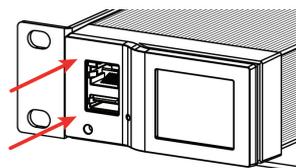
1. Place the Inview Slot and slide into the shelf.
2. Push the unit firmly until the controller rear part is engaged correctly with shelf.

Warning: while inserting the controller into the shelf, push on the left side (ETH and USB port) of the controller. Do not press on the touch screen.

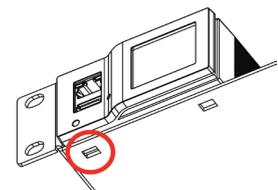
3. Make sure the latch is locked in the shelf.
4. The controller begins to start up and read the parameters from modules in the live system.



Place the module & slide into the shelf



Push firmly until unit is engaged



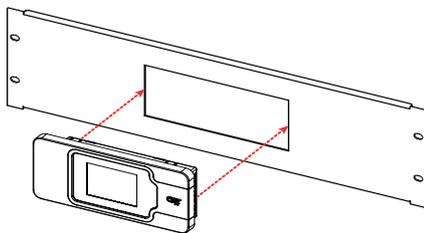
Make sure the latch is locked in the shelf

8.3 Controller - Inview S

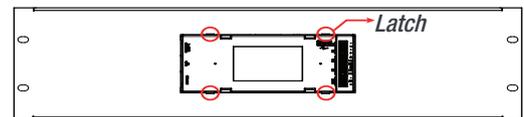
8.3.1 Panel Mounting

Before mounting the Inview S in the system, route all the required connection cables from the system and place near to the Inview S mounting location.

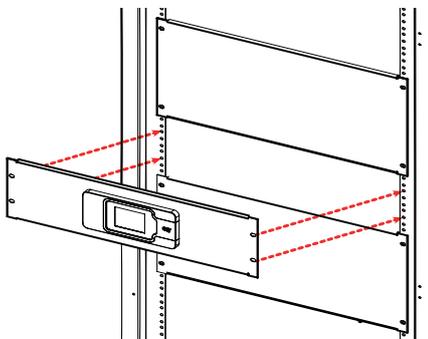
1. Place the Inview S in the panel sheet.
2. Lock all the four latches at the rear side of the Inview S in the panel sheet.
3. Connect required connection cables to the Inview S.
4. Place the panel sheet in the system and fix it with screws.



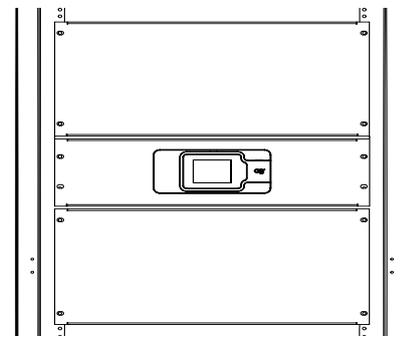
Place the Inview S in the panel sheet



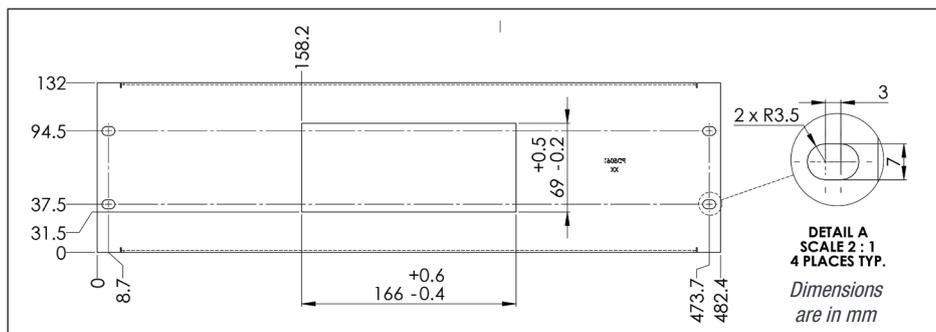
Fix it with four latches



Connect wires and place the panel sheet in the cabinet



Fix the panel sheet with screws



Panel sheet - cut-out details

9. Finishing

- Make sure that the sub-rack/cabinet is properly fixed to the cabinet/floor.
- Make sure that the sub-rack/cabinet is connected to Ground.
- Make sure that all DC and AC input breakers are switched OFF.
- Make sure that all cables are according to recommendations and local regulations.
- Make sure that all cables are strained relieved.
- Make sure that all breakers are according to recommendation and local regulations.
- Make sure that DC polarity is according to marking.
- Re tighten all electrical terminations.
- Make sure that no inverter/controller positions are left open.
- Cover empty inverter positions with dummy cover.
- Make sure that the Remote ON/OFF is appropriately wired according to local regulations.
- Make sure that the point of AC supply meets local regulations.

10. Commissioning

The DC breaker is a protection device. Modules are plugged in a system and DC breaker is then engaged. Please make sure the corresponding DC breaker is engaged in the ON position. Failure to observe this rules will result not to have all module operating when running on DC and have module failure when AC input recover from fault condition.

Installation and commissioning must be done and conducted by trained people fully authorized to act on installation.

It is prohibited to perform any isolation test without instruction from manufacturer.

Equipments are not covered by warranty if procedures are not respected.

10.1 Check list

DATA	
Date	
Performed by	
Site	
System serial number	
Module serial numbers	
Inview GW/S/X Serial number	
ACTION	OK/ N.OK
Unplug all inverters except one inverter per phase (Just pull off the inverter from the shelf, to interrupt electrical contacts)	
Check the commercial AC before closing the AC input breaker.	
Switch ON the commercial AC	
Check if inverters are working (Green led)	
Check the DC power supply and switch ON the DC breakers	
Plug in all inverters one by one	
Check output voltage (on bulk output or on breaker)	
Check if inverters are working properly	
Check if system has no alarm (Disable the alarm if any)	
Read configuration file and review all parameters. Some parameters should be adapted according to the site condition.	
Switch OFF AC IN and check if system is working on DC	
Switch ON AC IN and check if system correctly transferred load on AC	
Switch OFF system and start on AC only	
Switch OFF system and start on DC only	
Check if display working properly (if this Inview option is present)	
Test on load (if available)	
ALARM	
Switch ON AC input and DC input and check that no alarm are present	
Pull out one inverter and check alarm according to redundancy	
Pull out two inverters and check alarm according to redundancy	
Switch OFF AC input (commercial power failure) and check the alarm according to the configuration	
Switch OFF DC input (DC power failure) and check that the alarm according to the configuration	
Check the different digital input according to the configuration (when used)	

11. Trouble Shooting and Defective Situations Fixing

11.1 Trouble Shooting

Inverter module does not power up:	<ul style="list-style-type: none"> 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:	<ul style="list-style-type: none"> Check that Inview is present and properly inserted Check remote ON/OFF terminal Check the configuration and setting Check threshold level
Inverter only run on AC or DC:	<ul style="list-style-type: none"> 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:	<ul style="list-style-type: none"> Check output breaker
All OK but I have alarm:	<ul style="list-style-type: none"> Check configuration file and correct No of modules Download/clear log file
No output alarm:	<ul style="list-style-type: none"> Mind the default time delay (UA: 60s, NUA: 30s) Check configuration file

11.2 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. Repair registering guidelines may be requested by email at tech.support@cetamerica.com.
- 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.
- While returning the defective module, should mention all the details in the RMA document.

12. Maintenance

Maintenance shall only be performed by properly trained people.

12.1 Access Inview with Laptop

- Download system LOG FILE and save.
 - Analyze 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).
- Change configuration file to validate that system operates on both supply sources.
- Check outgoing alarm, consult configuration file what actions will generate alarm.

12.2 Manual check

- Validate input voltage (AC input, DC input, AC output) with multi-meter.
- Replace dust filter.

12.3 Optional

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

13. 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 by calling toll free Number **+1-855-669 - 4627(**)** or tech.support@cetamerica.com

Normal service hours are 8:00 AM to 5:00 PM Eastern Time, Monday through Friday, except closing periods for holidays or inclement weather.

Critical/emergency conditions by calling **+1-855-669-4627** or emailing tech.support@cetamerica.com

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

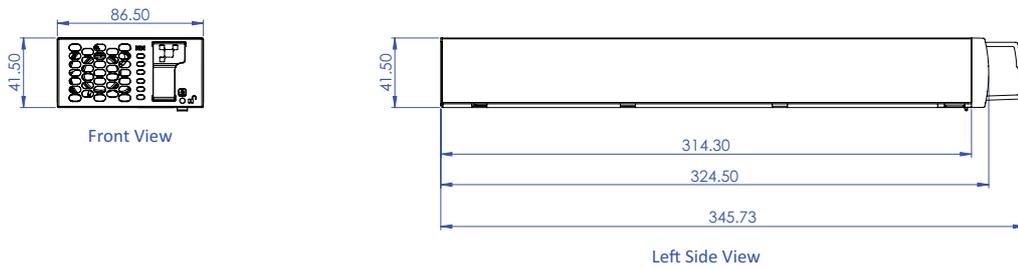
(**) Valid in USA and Canada only.

(***) Messages that are not Major Incident or Emergency will be served at the next scheduled working day.

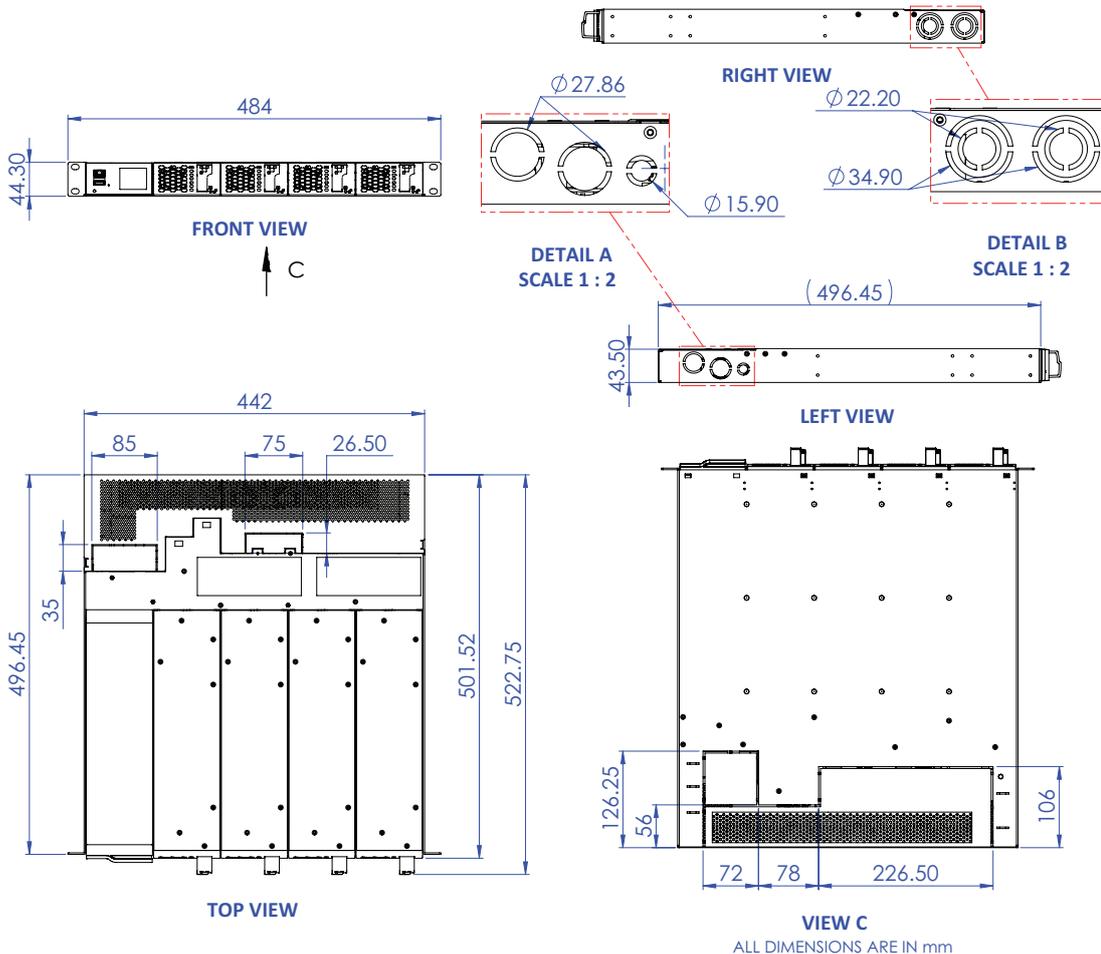
14. Appendix

14.1 Bravo 10 - 48/120 - Dimensions

14.1.1 Module

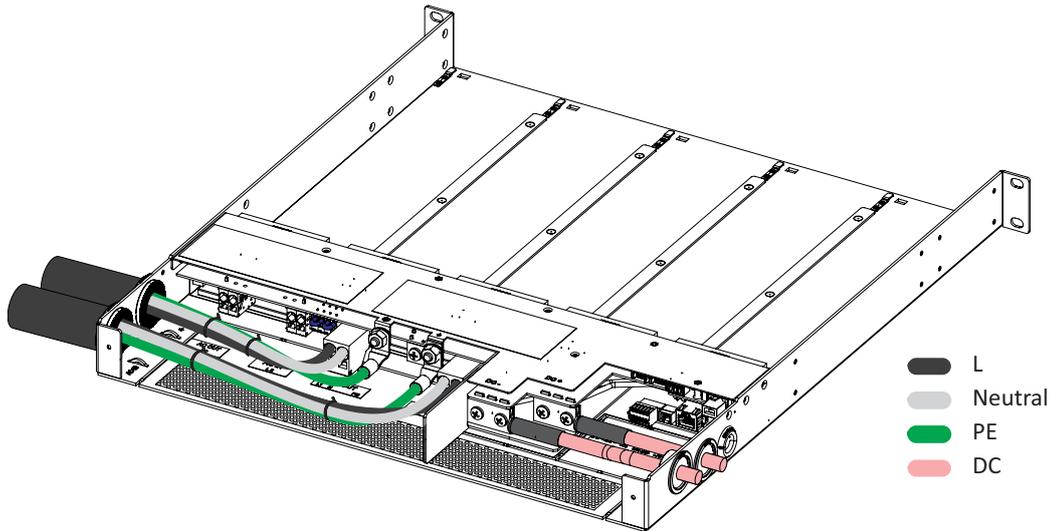


14.1.2 Shelf

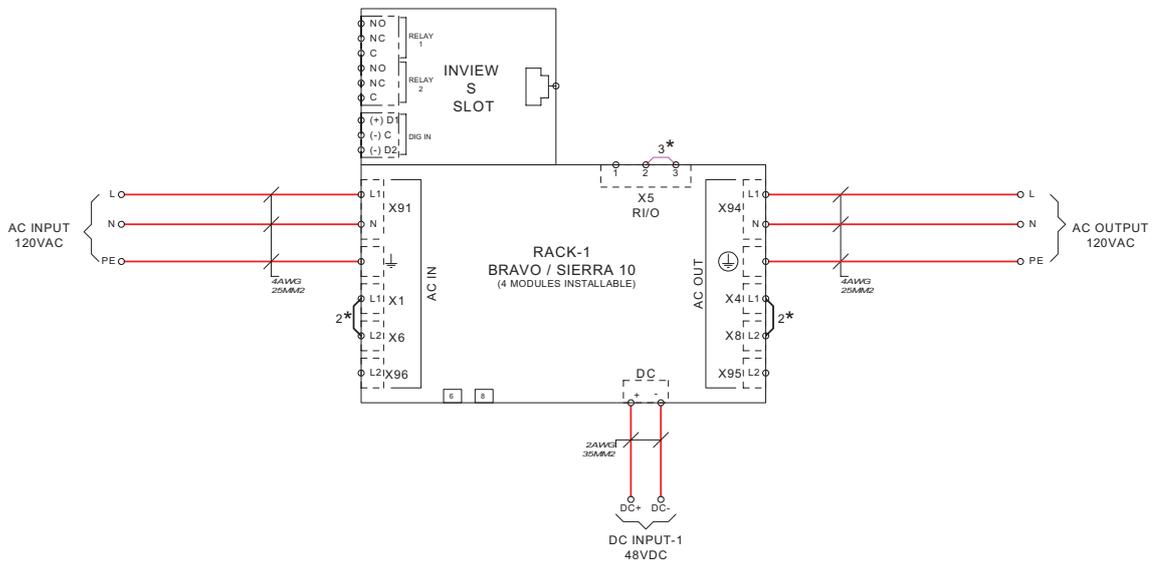


14.2 Connections and Wiring Diagrams

14.2.1 Single phase (L-N)



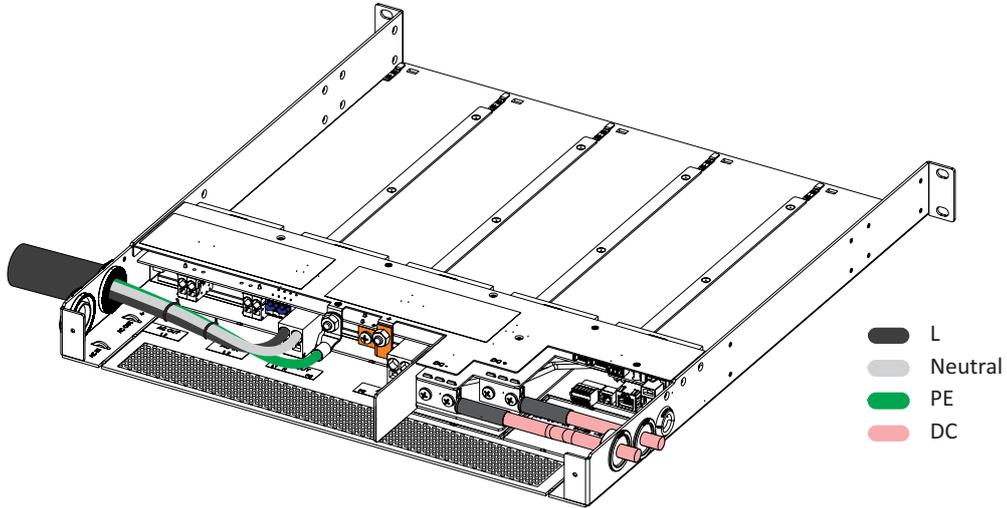
Single phase - Cable connections



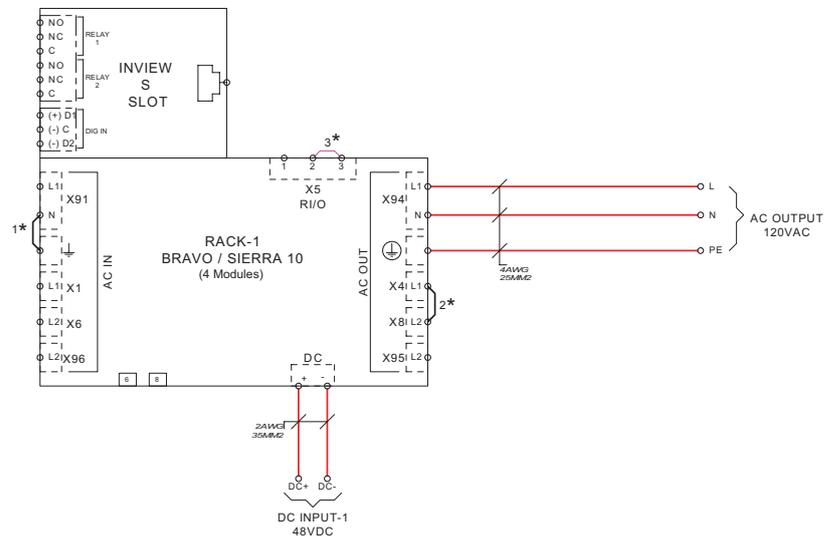
2* -----> AC OUTPUT L1 & L2 INTERLINK CONNECTION
3* -----> TO BE REMOVED WHEN EXTERNAL REMOTE USED

Single phase - Wiring diagram

14.2.2 Single phase (L-N) - REG

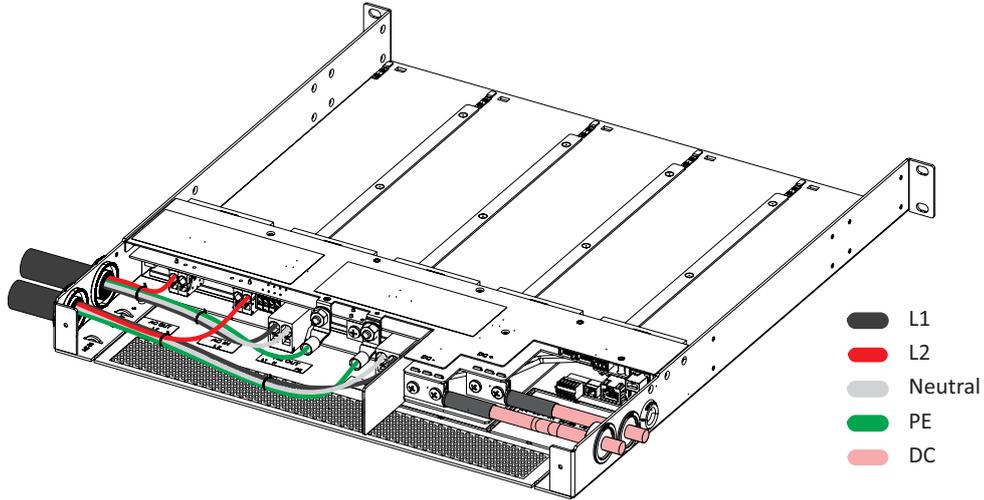


Single phase - REG- Cable connections

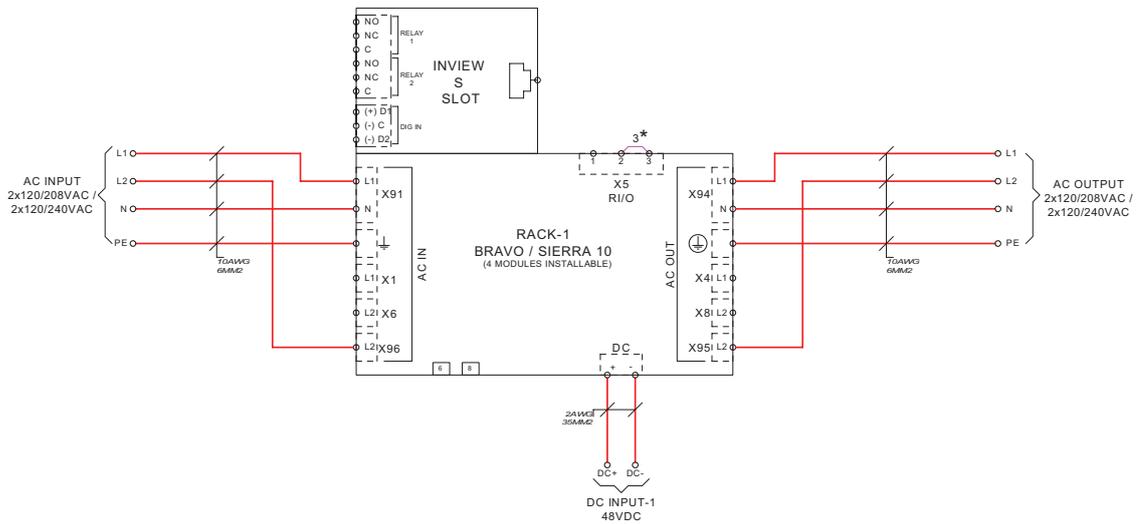


Single phase - REG - Wiring diagram

14.2.3 Single shelf - Split phase (L1-L2-N)

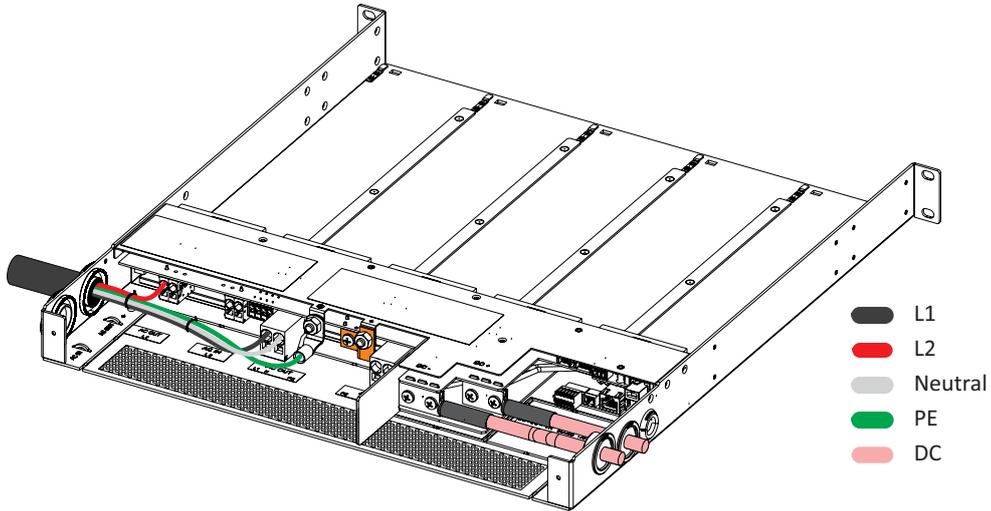


Split phase - Single shelf - Cable connections

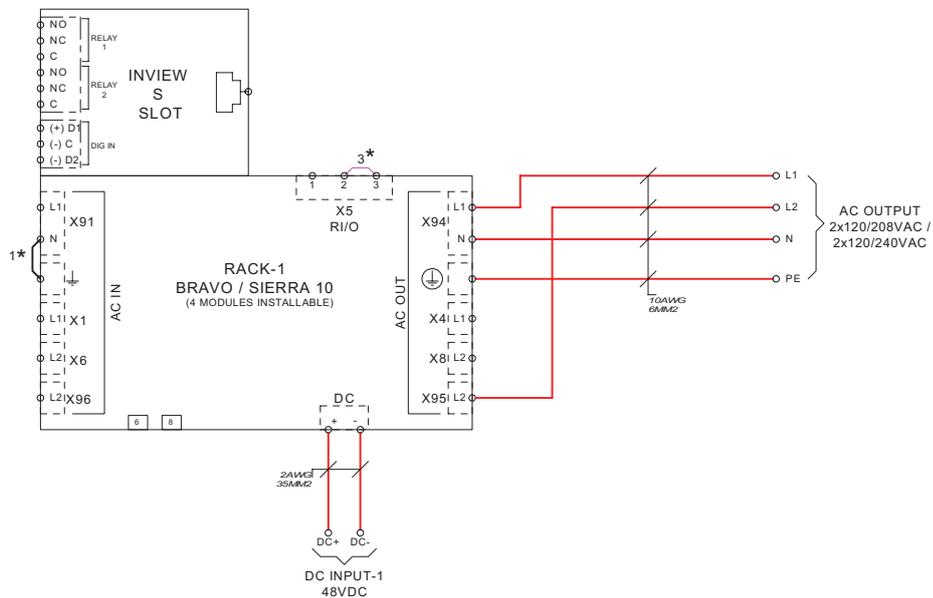


Split phase - Single shelf - Wiring diagram

14.2.4 Single shelf - Split phase (L1-L2-N) - REG



Single shelf - Split phase - REG - Cable connections

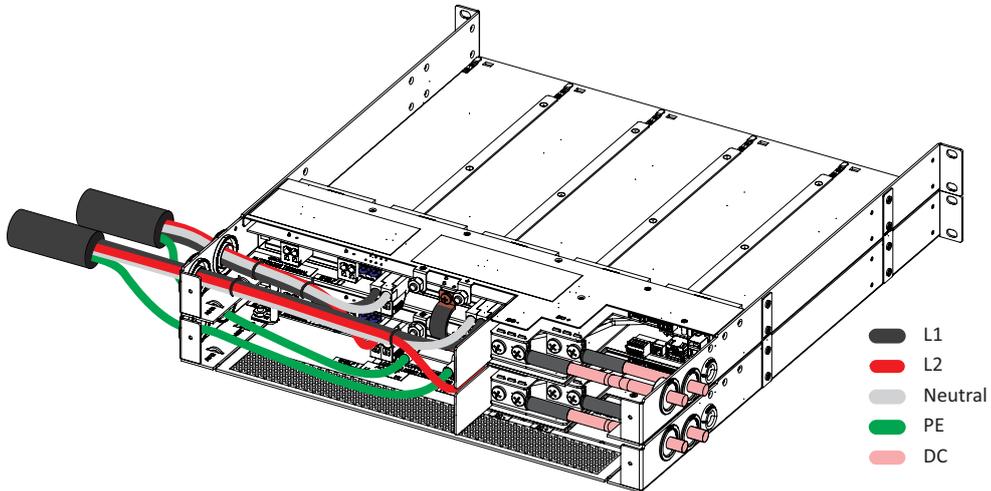


1* -----> REG MODE [MEN] CONNECTION B/W AC OUTPUT NEUTRAL AND EARTH

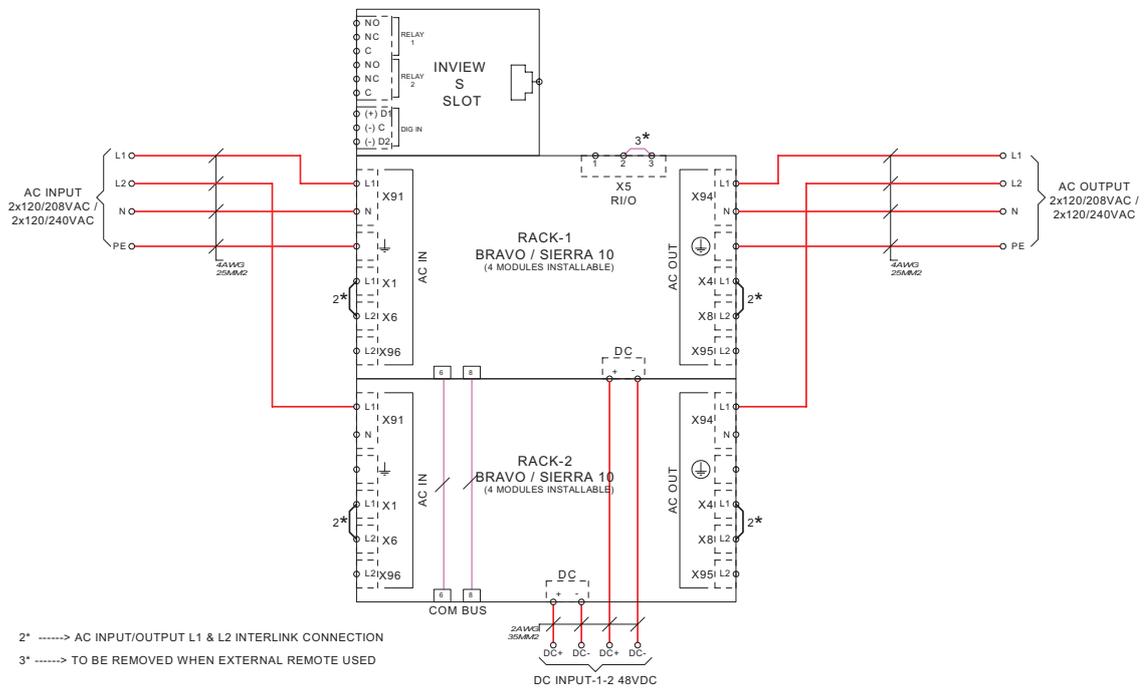
3* -----> TO BE REMOVED WHEN EXTERNAL REMOTE USED

Single shelf - Split phase - REG - Wiring diagram

14.2.5 Two shelves - Split phase (L1-L2-N)

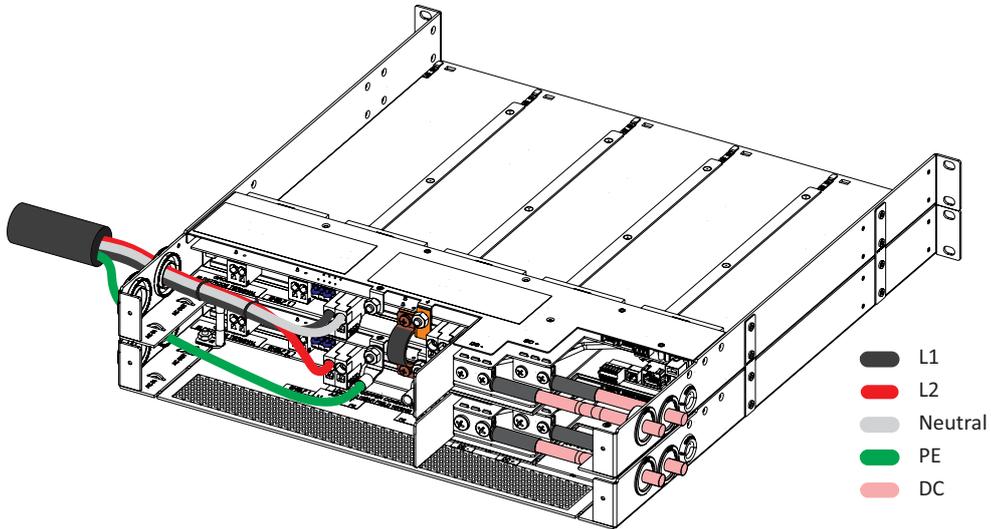


Split phase - Cable connections

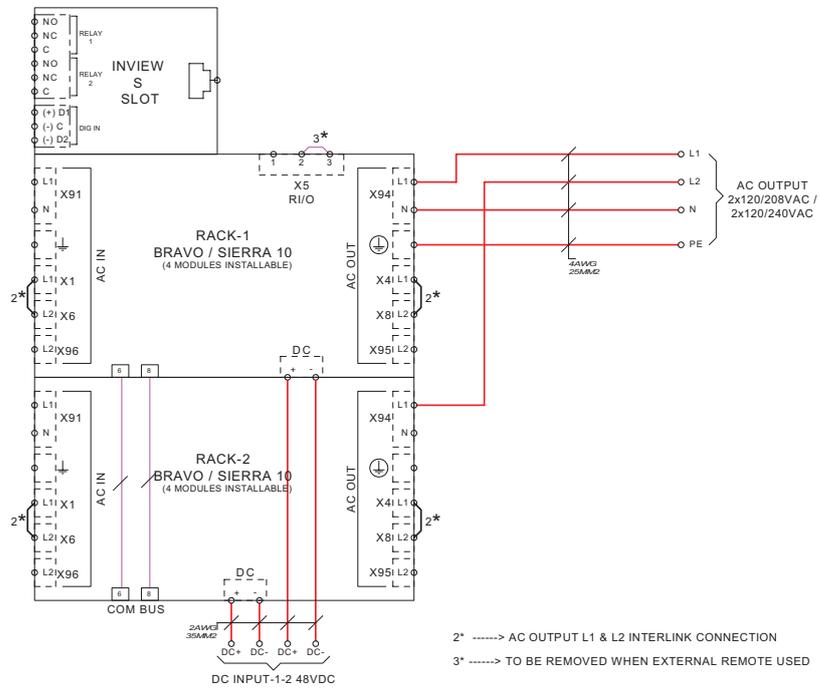


Split phase - Wiring diagram

14.2.6 Two shelves - Split phase (L1-L2-N) - REG

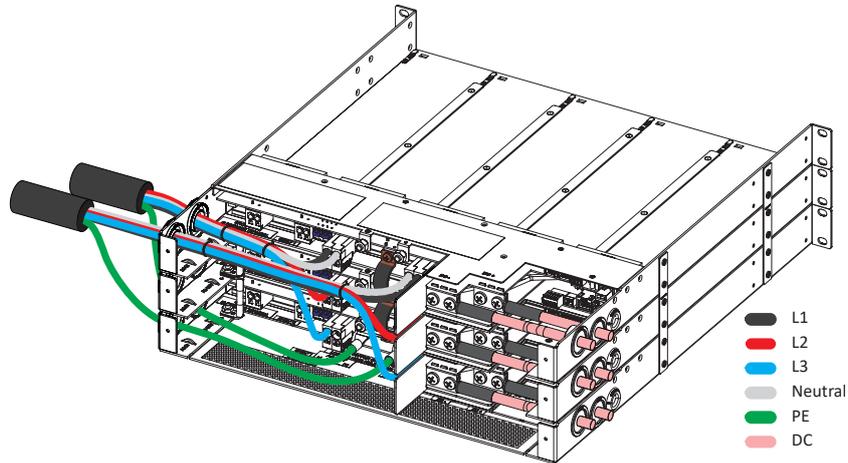


Split phase - REG - Cable connections

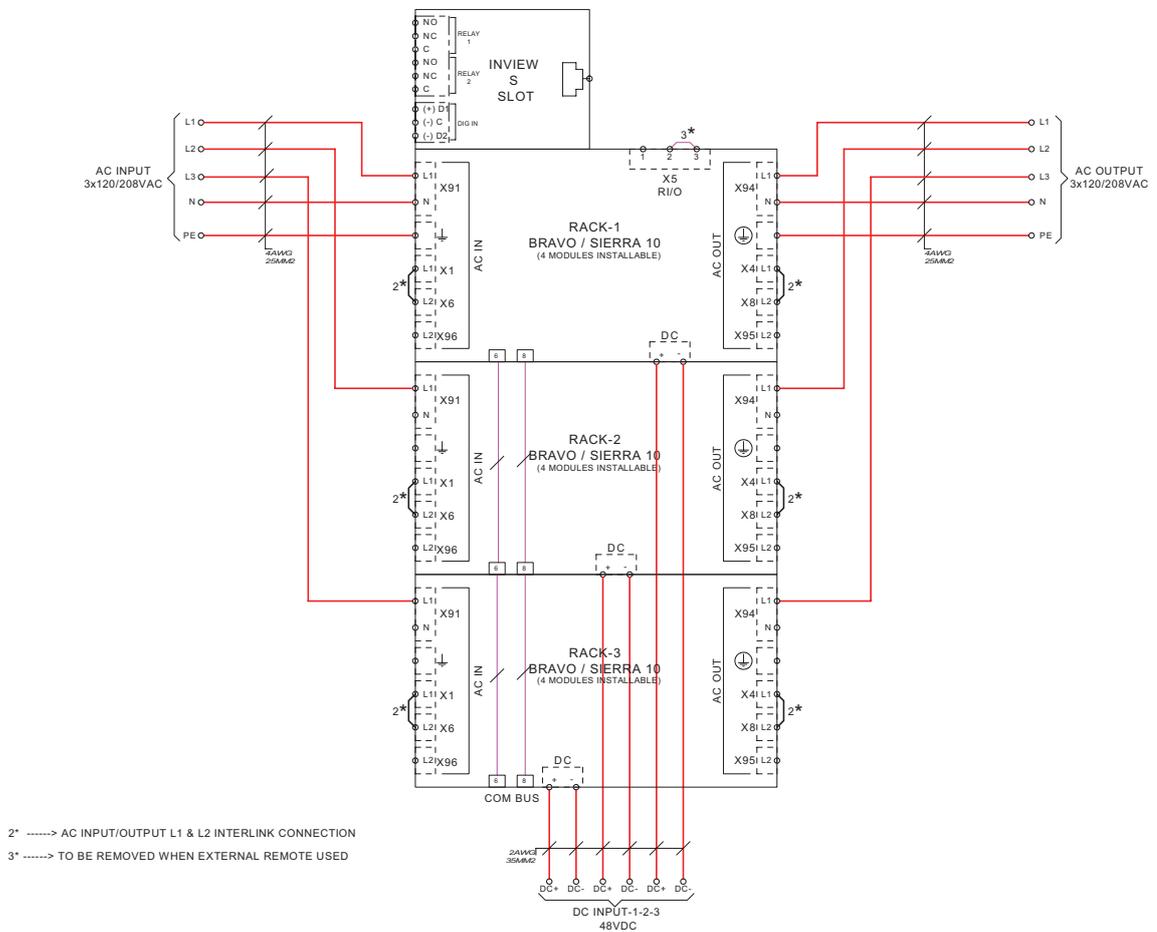


Split phase - REG - Wiring diagram

14.2.7 Three phase (L1-L2-L3-N)

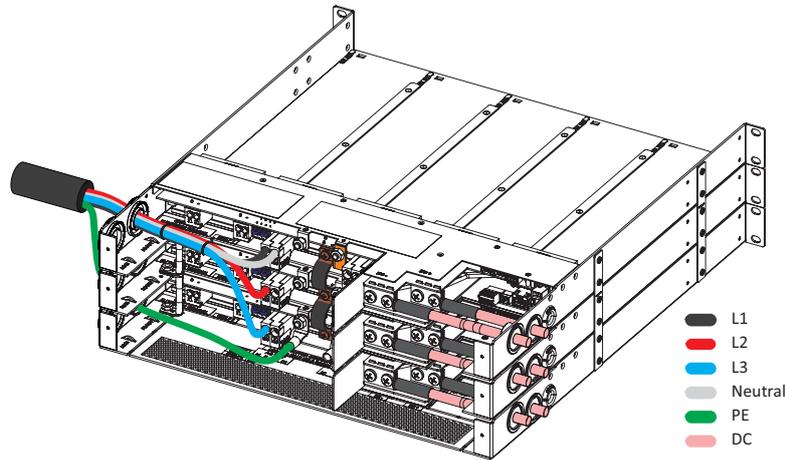


Three phase - Cable connections

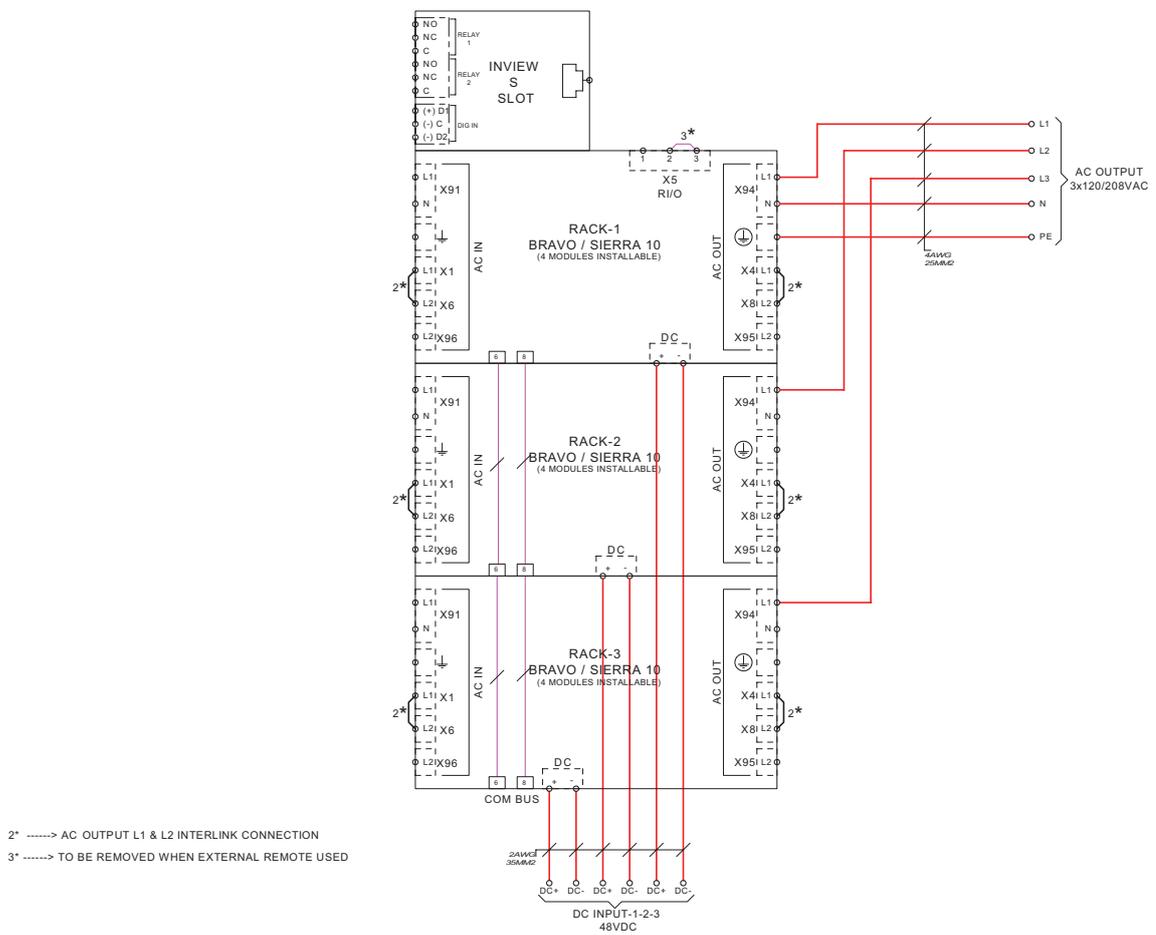


Three phase - Wiring diagram

14.2.8 Three phase (L1-L2-L3-N) - REG



Three phase - REG - Cable connections



Three phase - REG - Wiring diagram

