Leading Conversion Technology for Power Resilience

SIERRA 25 - 48/120

User Manual V1.0

THE NEW GENERATION OF POWER CONVERTERS

- DUAL AC AND DC OUTPUT CONVERTER
  Commercial Power as default source
- AC AND DC 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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Leading Conversion Technology for Power Resilience

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Release Note:

Version	Release date (DD/MM/YYYY)	Modified page number	Modifications
1.0	05/05/2021	-	First release of the Manual

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 system performances and related maintenance costs.

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

- 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
CB	Circuit Breaker
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
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)
PPE	Personal Protective Equipment
PWR	Power
REG	Regular
SNMP	Simple Network Management Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TRS	True Redundant Structure
TUS	TSI Universal Synchronization
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.

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.
- 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.
- Maximum operating ambient temperature 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 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.
- 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 (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
- 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 converters 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

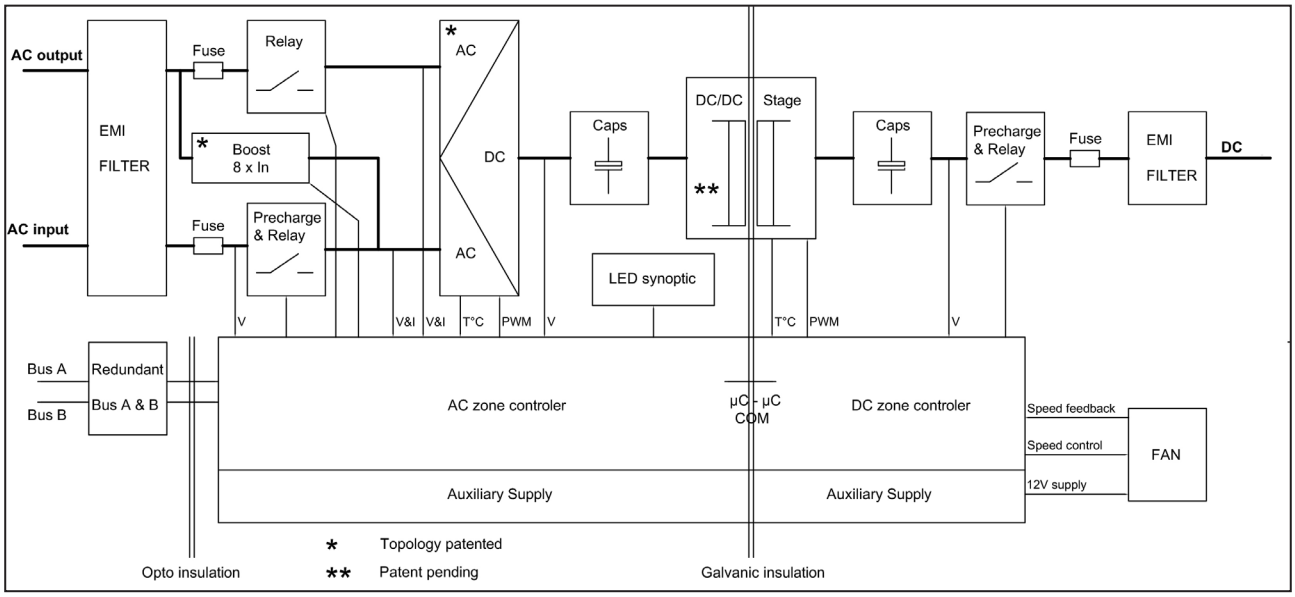
- ESD Strap must be worn when handling PCB's and open units.
- The converter system/rack is not supplied with internal disconnect devices on input nor output.
- CE+T cannot be held responsible for disposal of the converter system and therefore the customer must segregate and dispose of the materials 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.

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

4. ECI Technology[1]

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

The below block diagram gives an explicit description of the topology and its 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 internal energy buffering for transferring the load between two input sources by 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 20ms, and thus keeping other critical loads in operation.

Sierra module works on True Redundant Structure (TRS) that features decentralized, independent logic, and redundant communication bus.

Each Sierra module has three levels of protection, and it will help to isolate from other modules in case of any fault in the corresponding module. Due to this functionality in each module, it provides no single point of failure in modular systems.

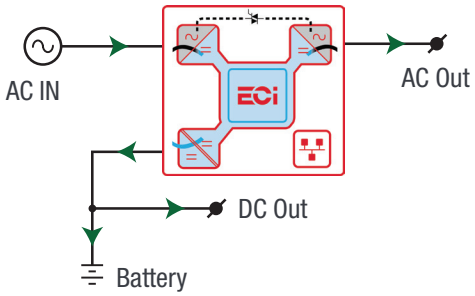
The Sierra modular systems provide quality output power with higher efficiency.

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 EPC mode

In EPC mode, the **AC Mains** is the primary source and DC source works as a backup. When AC mains is present, the sierra module takes energy from the AC source and feed to:

- **AC Load** via a double conversation to provide a pure sine wave.
- **DC load** and also charges the battery with a regulated DC.



The total output power of a module can be shared between the AC load, DC load and charging power based upon the requirement.

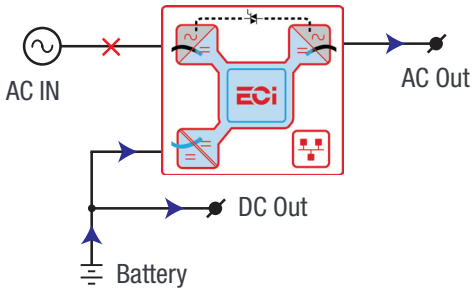
If the AC source is not present, the module seamlessly switches to DC source without impacting the critical loads and resumes to EPC mode once AC source returns. The transfer time between AC to DC and DC to AC is 0 ms.

The EPC mode provides a higher efficiency of ≥ 94.5% without compromising the purity of the output sine wave.

4.2 Back up mode

In back up mode, module operates in DC source and feed to:

- **AC Load** via a double conversation to provide a pure sine wave.
- **DC load** directly.



5. Building Blocks

5.1 Sierra 25 - 48/120

Telecom / Datacom:	Input	48 Vdc 120 Vac, 50/60 Hz
	Output	48 Vdc 120 Vac
	Power	2.75 kVA / 2.25 kW

- The Sierra converter is a triple port converter.
- Each converter can supply 2.25 kW on any **DC**, **AC** or combination of **both AC** and **DC** output ports. AC output load is the highest priority. Even if AC output is fully loaded (2.25 kW), still 300 W is available for DC output.
- Hot swappable and hot pluggable.
- The front LED's indicate the converter status and output power.
- Module is equipped with soft start.
- Fan is equipped with alarm and run time meter. The fan is field replaceable.
- 435 mm (D) x 102 mm (W) x 88 mm (H).
- 5 Kg.

5.1.1 Specifications

Model	Sierra 25 - 48/120
Part Number: Module / shelf	T721330201 / T724330000
Cooling / Audible noise	Fan forced cooling / <65db @1meter
MTBF	240 000 hrs (MIL-217IF)
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 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
Material (casing)	Zinc coated steel
AC Input Data	

Model	Sierra 25 - 48/120
Nominal voltage	120 Vac
Voltage range	90 - 140 Vac
Brownout	1600 W @ 90 Vac / 2550 W @ 100 Vac linear decreasing
Power factor	> 0.99
Frequency (Synchronization range)	50 Hz (47 – 53 Hz) / 60 Hz (57 – 63 Hz)
DC Input Data	
Nominal voltage / range	48 Vdc / 40-60 V
Nominal current	52.3 A @ 48 Vdc & 2.25 kW
Maximum input current (for 15 seconds) / voltage ripple	63 A / < 10 mV_{RMS}
AC Output Data	
Efficiency AC to AC (EPC) / DC to AC / AC to DC	94.5% / > 92.5% / > 92.5%
Nominal voltage (Adjustable)	120 V (100 - 130 Vac)
Frequency / frequency accuracy	50 or 60 Hz / 0.03%
Nominal Output power	2.75 kVA / 2.25 kW @ 48 Vdc
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	22.9 A @ 48 Vdc
Crest factor at nominal power	3 : 1 for load P.F. ≤ 0.7
Short circuit clear up capacity 0 - 20 ms	167.7 A (peak) and 116.4 A (rms) on AC / 88.8 A (peak) and 58.9 A (rms) on DC
Short circuit current after >20 ms -15 sec / 15 sec - 1 min	45.5 A (peak) and 36 A (rms) / 38.6 A (peak) and 30 A (rms)
AC output voltage stability	±1% from 10% to 100% load
DC Output Data	
Nominal Voltage / range	53.5 Vdc / 40-61 V
Maximum power	2.25 kW
Maximum current	46.8 A @ 48 Vdc
Reverse polarity protection	Yes
Efficiency AC to DC	> 92.5%
In Transfer Performance	

Model	Sierra 25 - 48/120
Max. Voltage interruption / total transient voltage duration (max)	0 sec / 0 sec
Signalling & Supervision	
Display	Synoptic LED
Supervision / Part number	Inview S / T302004100
Remote on / off	On rear terminal of the shelf through Inview S
Battery Monitoring / Part number	MBB (Measure Box Battery) / P602006000
Safety & EMC	
Safety	UL1778 recognized
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

5.2 Sub-rack

- The Sierra shelf shall be integrated in min 600 mm deep cabinets, Inch/ETSI mounting.
- The Sierra shelf house max four (4) converter modules.
- The Sierra 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 11 kVA per shelf.
- 480 mm (D) x 19” (W) x 2U (H).
- 6 Kg empty.

5.3 Controller - 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.

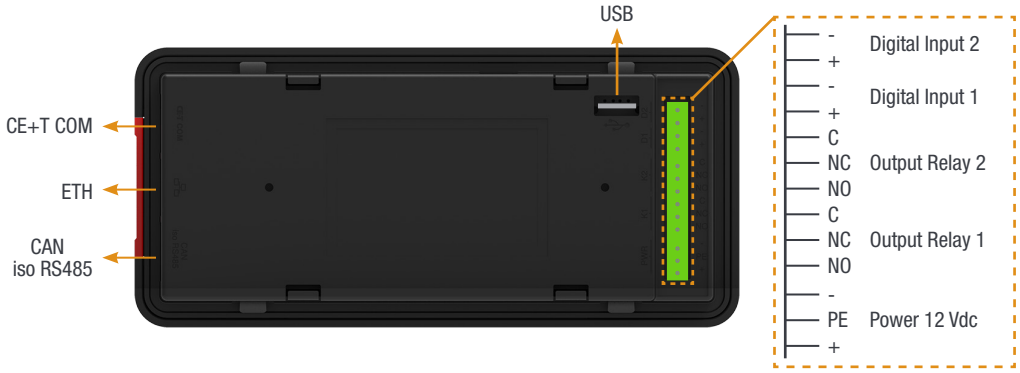
The Inview S interface provides the user to access the configuration and setup files of the modules in the system. Also, it is a controller for DC regulation.

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

5.3.1 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 Sierra - shelf.
- **ETH** port is used for network connectivity and user can access the system information in the web interface.
- **CAN / iso RS485** is used share the system (DC) information to MBB (Measure Box Battery).
- **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).

5.4 Measure Box Battery (MBB)

Measure Box Battery is a unit which monitors the Battery. It is composed of multiple digital inputs and analog outputs. They are used for:

- Battery management
  - Voltage (V1 to V3)
  - Current (I1 to I3)
  - Temperature (T1 and T2)
  - Driving the Low Voltage Disconnection
- 8 Digital Input (D1 to D8)
- 6 Output Relay (k1 to K6)

6. Accessories

6.1 Cabinet

Powder coated (RAL 7024), 19 inch Flat Pack cabinet with 600 x 600 mm foot print. Cabinet designed for top cabling or bottom cabling.

- 1100 mm (600 x 600 mm) 21U
- 1800 mm (600 x 600 mm) 37U
- 2100 mm (600 x 600 mm) 44U

The cabinet comes with a separable top cover to facilitate cabling. Tie strap support at cable entrance/exit.

Door accessory optional.

6.2 Manual By-Pass

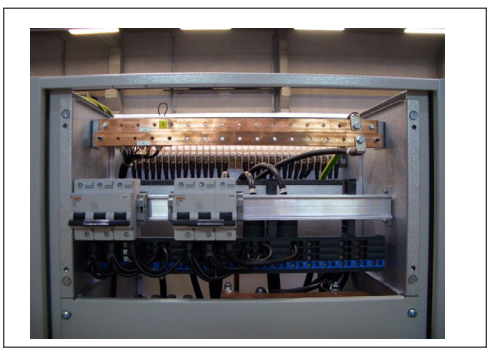
The manual by pass operates via manually operated switches to create a short circuit from the AC main input directly to the output AC distribution. Standard manual by-pass is “Make before Break”. When engaged or disengaged, no disturbance is transmitted to the load.

When MBP is engaged, inverter modules are switched off and can be removed without impacting the load. The battery supply is not physically disconnected. After disconnecting the battery supply (by opening the battery breakers), the shelf section is safe for maintenance.

Warning: When the system is in by-pass, the load is subjected to AC main disturbances. Before engaging manual bypass, make sure the voltage difference between AC IN and AC OUT should be less than 5 Vac to limit the inrush current.

6.3 AC Distribution Unit

6.3.1 Miniature Circuit Breakers



The standard AC output distribution unit is designed with a 35 mm DIN rail, Multi Clip termination board and N/PE copper terminal bars, and built as a part of the cabinet.

The Multi Clip offers unique flexibility during installation and expansion. The terminals are spring loaded and adapt contact pressure to the size of conductor. Only one cable can be inserted per spring loaded terminal.

The AC distribution unit is available with 1 pole, 2 pole or 3 poles.

Max current per AC DU is 200 A, max current per terminal connector is 40 A. Two adjacent terminal connectors shall be used for 63 A breakers.

If an alarm is required for AC output breakers, a help contact attached to each individual breaker is used (OF or SD). The alarm function is common and uses one of the digital inputs on the control unit. The help contact limits the breakers quantity.

	Single pole		Double pole		Three pole	
	w/o help contact	With help contact OF/ SD	w/o help contact	With help contact OF/ SD	w/o help contact	With help contact OF/ SD
Up to 40A	24	16	12	9	8	6

6.3.2 MCCB

AC output distribution via MCCB in the range up to 400 A (1p, 2p or 3p).

Max two MCCB per inverter cabinet.

7. System Design

7.1 A la Carte

The A la Carte is pre-assembled and configured as a single phase or three phase system. The system comprises cabinet, converter sub rack, converter modules, manual by-pass, monitor device and output distributions.

Single phase system accommodates **1 to 32** modules and provides maximum **88 kVA**.

Three phase system accommodates **3 to 30** modules and provides maximum **82.5 kVA**.

Sierra system featured with:

- Dual input (AC & DC).
- Dual output for AC and DC loads.
- More than 94.5% efficiency during normal operation (EPC).
- Pure sinusoidal AC output and ripple free DC output.
- Seamless transfer (0 ms) between primary and secondary source of supply.
- No single point of failure.
- Flexible output distribution.
- True modularity, redundancy and hot-swappable.

Optional

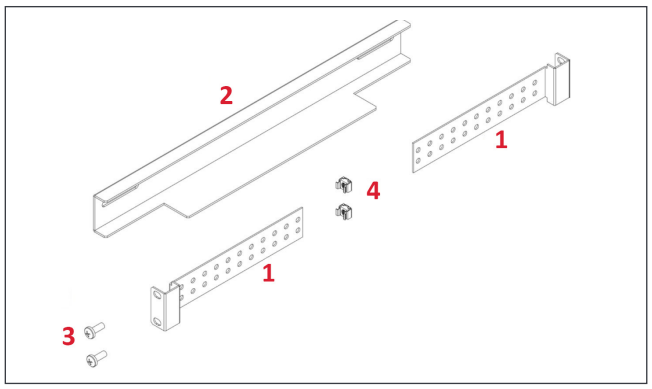
- Manual by-pass
- AC output distribution
- DC distribution
- Battery fuses
- Battery LVD
- Surge arresters
- Door

8. Installation of Sierra Shelf

- Read safety instructions prior starting any work.
- Do not attempt to use lifting eyes to erect the cabinet.
- System is preferable handled without modules.
- Pay attention to the module position, make sure that modules are repositioned in the same slot.
- In three phase systems, the modules are configured as per phase 1 (A, R), phase 2 (B, S) and phase 3 (C, T). As long as the system is not in operation, make sure that modules from one phase are not mixed with modules from another phase.
  (When the system is running, modules can be moved from one phase to another without issue.)

8.1 Mounting kit for Sierra shelf

The fixing brackets, together with the sliders, allow for different cabinet depths.

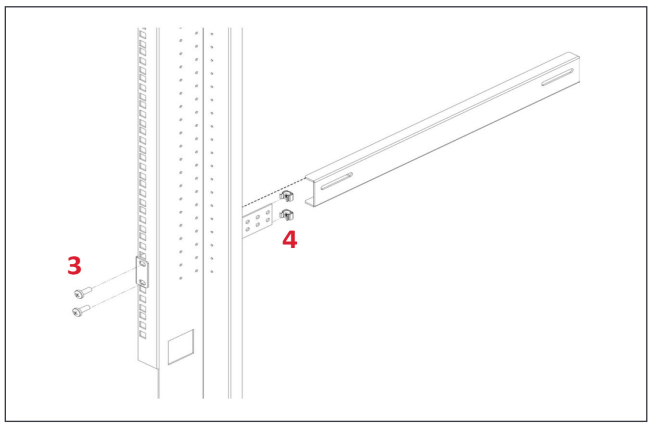


1 → Fixing brackets - 4 Nos

2 → Slider - 2 Nos

3 → Mounting screws - 12 Nos

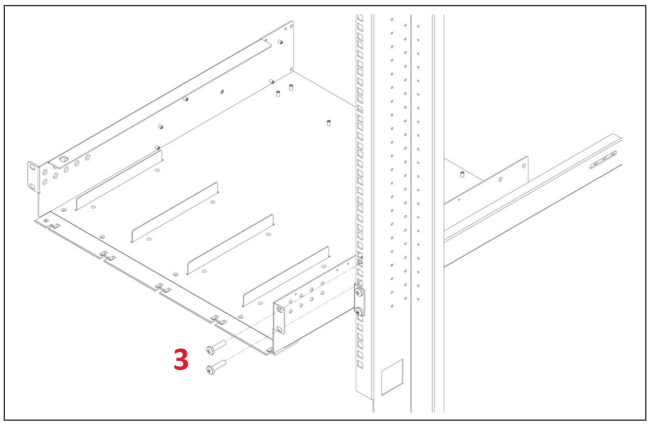
4 → Cage nuts - 12 Nos



Assemble the sliders and adjust the length to suit the mounting depth.

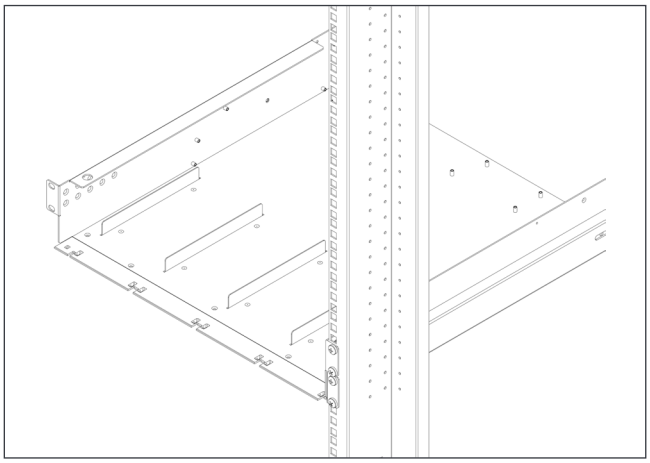
Fix cage nuts (**4**) in the cabinet front and rear frame of the left and the right side.

Fix the left and right slider of the cabinet with the supplied screws (**3**).



Fix cage nuts (4) in the mounting frame.

Slide the shelf in position and fix the shelf with the supplied screws (3).



Finished.

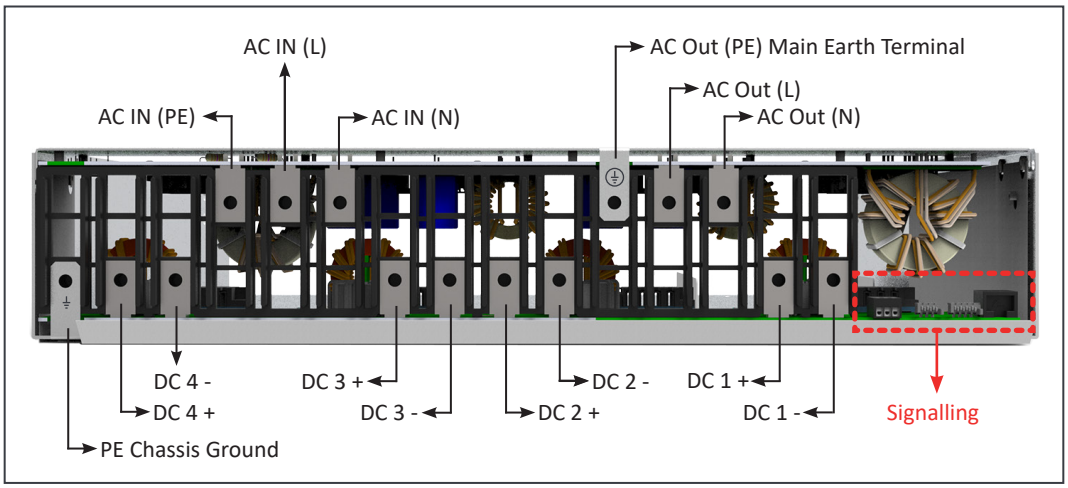
8.2 Electrical installation for Sierra shelf

8.2.1 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 5Nm.
- All connection screws are M5 x 12 mm.
- DC Input-Individual (per module), observe polarity.
- AC Input / AC output-Common (per shelf), respect phases.
- Wire all positions in the sub-rack for future expansion.
- Input AC / Output AC / Input DC / Signal cables shall be separated.
- Cable crossings shall be done in 90 deg angles.

8.2.2 Terminations

The below image is termination details of Sierra 25 - 48/120 shelf.



Sierra 25 - 48/120 - Shelf Rear Details

8.2.3 Grounding

"PE CHASSIS GROUND" ⏚

PE Chassis ground shall be wired to MET or distributed earth bar connected to MET, according to local regulations.

8.2.4 DC Connection

Model	MCB per converter module	Cable, min	Connector	Torque
Sierra 25 - 48/120	63 A	2 x 16 mm²	M5	5 Nm

8.2.5 AC Input Connection

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.

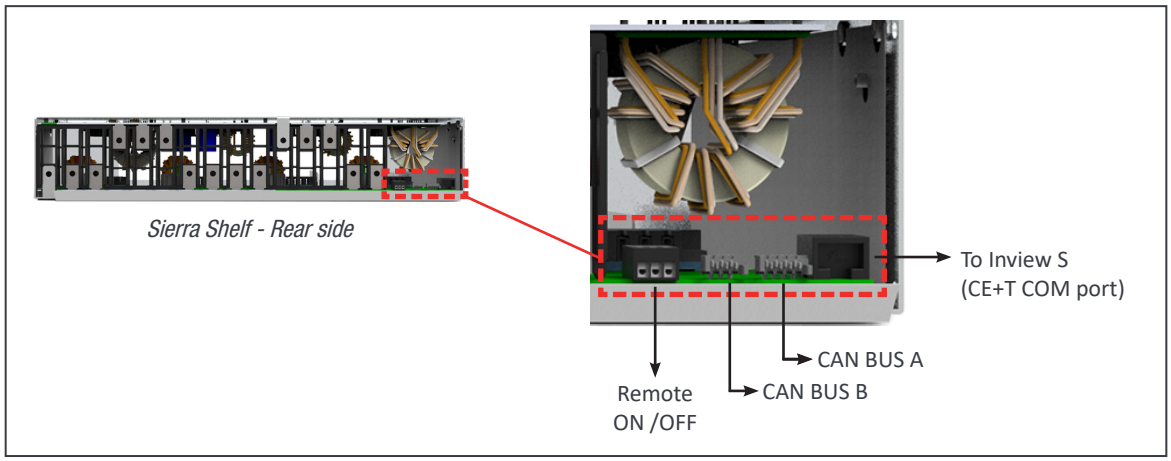
Model	CB per shelf	Cable, min	Connector	Torque
Sierra 25 - 48/120	2p 100A	3 x 4 AWG (2 x 16 mm²)	M5	5 Nm

Note: Icc value measured as 140 A_{rms} per shelf with four modules.

8.2.6 AC Output connection

Model	MCB per shelf	Cable, min	Connector	Torque
Sierra 25 - 48/120	2P 100 A	3 x 4 AWG (2 x 16 mm²)	M5	5 Nm

8.2.7 Signalling



8.2.8 Remote ON/OFF

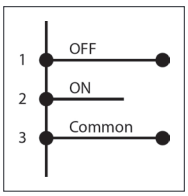
The function of remote ON/OFF is used turn off the module/system output.

By default a jumper is placed between pin 3 and 2. If remote on/off is used, jumper should be removed from the shelf and connect changeover contactor.

- AC and DC inputs are not affected by the remote ON/OFF function.
- The remote ON/OFF can be connected to any shelf.
- The remote ON/OFF requires changeover contactor, 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!

8.2.9 Internal CAN BUS A and B

- In A la Carte systems the internal Bus is pre installed.
- The internal bus comprise of a 6 and 8 pin ribbon cables.
- The internal bus connectors are sensitive and special caution should be taken during installation to keep them out of harms way.
- The internal bus is connected from the first shelf to the last shelf.

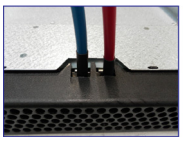
8.2.10 Shelf rear cover

The rear cover provides IP20 protection for the terminations at the backside of the shelf. It is optional and can order it separately.

- The rear cover is snapped into position in the rear of the sub-rack.
- Remove material using a pair of side-cutters to allow cable entry and exit.

Connect cables

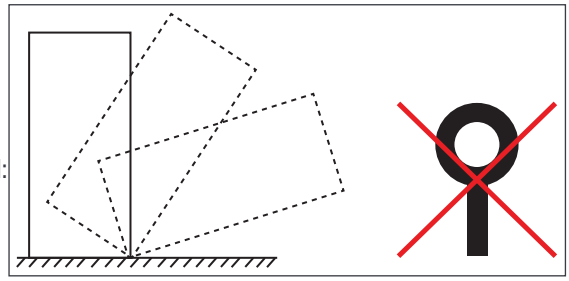
Cut holes to allow cable access



Clip rear cover into place

9. Installation of Cabinet (A la Carte)

9.1 Unpacking the system



CE+T cabinets are always fixed on a pallet, and then packed in a wooden crate.

These crates are usually delivered laying flat, horizontally.

To unpack your cabinet, we recommend the following method:

1. Make sure that the crate is laying flat, with the correct side up. This side is identified by a double red arrow.
2. Remove the top cover in order to be able to identify the top and bottom sides of the cabinet.
3. Raise the crate vertically with the top side of the cabinet up. Make sure that the cabinet does not fall forward out of the crate while you do so.
4. Remove the cabinet and its attached pallet from the crate.

If you prefer to take the wooden crate apart before raising the cabinet, make sure you do not damage or dent the cabinet while doing so.

Warning: The top cover fixing bolts may NEVER be replaced with lifting eye bolts.

9.2 Module packing

When converters are ordered **together with a system**, they are either delivered in the cabinet or on a separate pallet.

- If you find the converters in the cabinet: you need to remove them in order to raise the cabinet more easily, b**ut before you do so make sure to have identified in which slot was each module. Indeed, it is important to replace each module in the same slot** it was delivered in!
- If the modules have been delivered separately, in carton on pallet, they will be clearly identified in order to be placed in the right slot.
- It is important to place the modules in the right slot, as this will ensure that the addressing of each module in the config file corresponds to the physical slot. Without this, the system will of course function properly but you might find it difficult to identify on which modules your applying changes you would be bringing to the config file.
- Also, in 3 phase systems, replacing modules configured to function in a specific phase in a slot assigned to another phase will result in the module to be un-synchronized. Your system may not start and you will have to reconfigure manually each module that was misplaced.

If you ordered modules only:

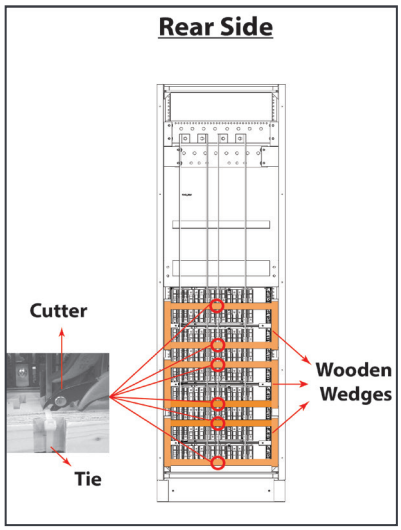
- If they are meant to be used in running systems or in a not operational single phase system, you may insert them in any slot.
- If they are meant to be placed in a not yet started 3 Phase system, follow these steps:
  - Insert one module per phase.
  - Start the system according to the start-up and commissioning procedure.
  - Insert the remaining modules progressively.

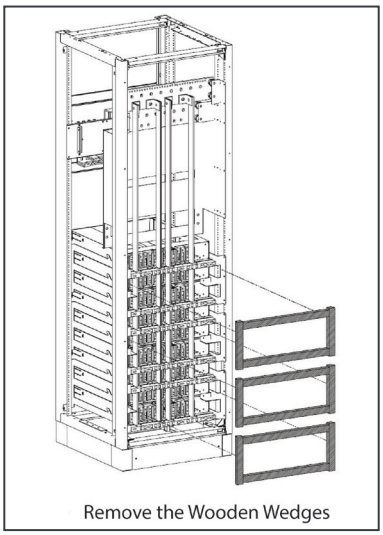
Module packing material shall be taken apart.

9.3 Removing the cabinet rear protection

Wooden wedges are fixed at the back of the cabinet to prevent parts from moving and sustaining damage during transportation. These wooden wedges must be removed before going further with the cabinet's installation and commissioning.

1. Remove the rear panel.
2. Identify the protection (see the following figure).
3. Cut the tie wraps holding the back wedges and remove them.

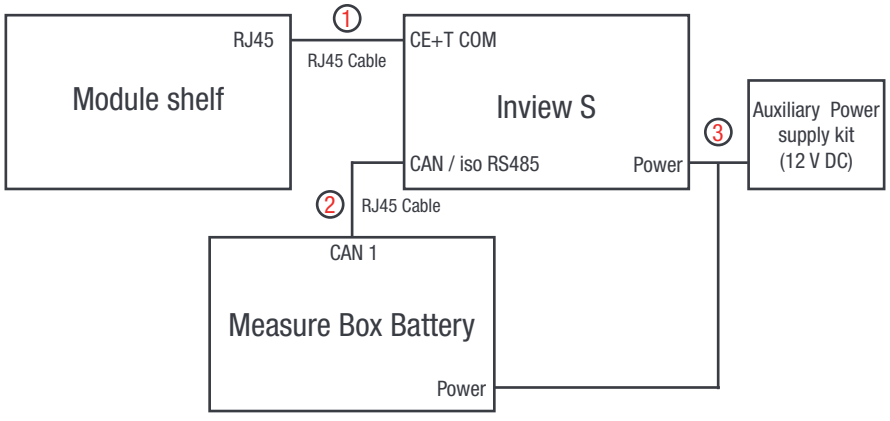




9.4 Hardware Connections

In Sierra 25 - 48/120 system, the Inview S and Measure Box Battery should be connected as per the following:

1. Connect **"RJ45"** port in shelf and **"CE+T COM"** port in Inview S using RJ45 straight cable.
2. Connect **"CAN / iso RS485"** port in Inview S and **"CAN1"** port in Measure Box Battery using RJ45 straight cable.
3. Connect 12 V supply to Inview S and MBB from auxiliary power supply kit.

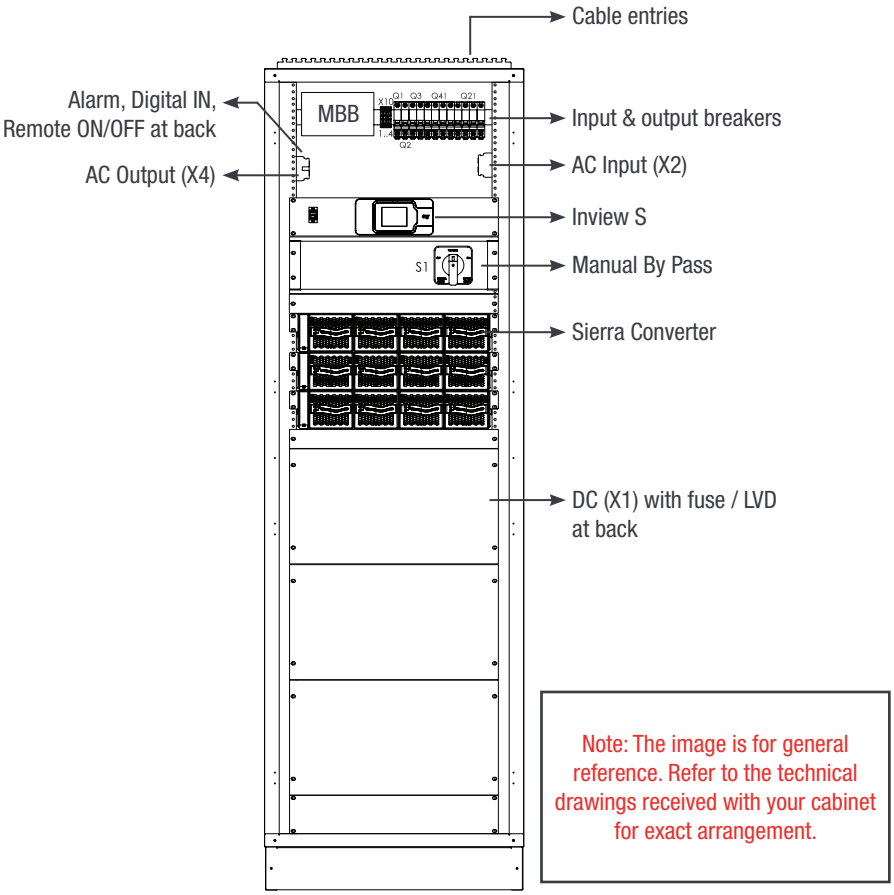


For more information about wiring refer to the section 19.3, page 54

9.5 Electrical Installation

- All cables shall be halogen free and rated min 90 deg C.
- Wire all positions for future expansion.
- Input AC / Output AC / Input DC / Signal cables shall be separated.
- Cable crossings shall be made at 90 deg angles.
- Empty module positions shall be covered with blank or dummy module.

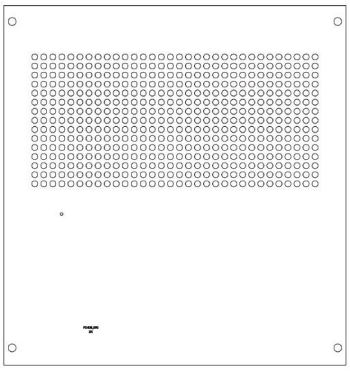
9.5.1 Positioning



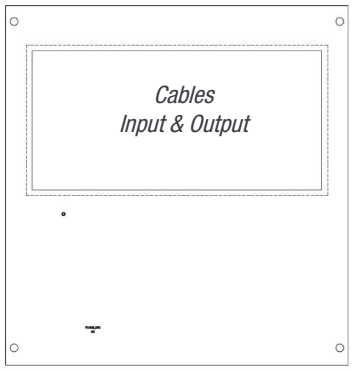
9.5.2 Cabling

All the cable routings are made through top or bottom of the system. The top cover can be split into two parts to facilitate cabling. The top cover accommodates nylon tie straps used to strap the cables.

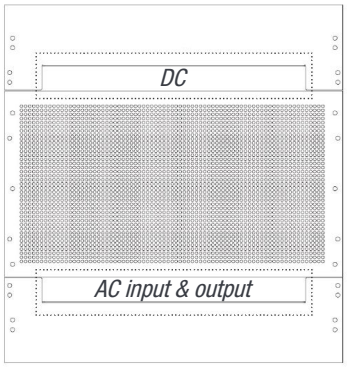
Note: Do not block the airflow at top of the cabinet.



Top plate - Type I



Top plate - Type II



Top plate - Type III

9.5.3 Grounding

Ground terminals are located in the top rear left corner, labelled"PE CHASSIS GROUND" ⏚

PE Chassis ground shall be wired to MET or distributed earth bar (MET). Ground must be terminated even if commercial mains is not available.

According to local regulations, Min 16 mm^2.

9.5.4 Surge Suppression

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

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.

9.5.5 AC Input (X2) and Output (X4)

WARNING !!!
Recommendation of IEC 60364 4. 43

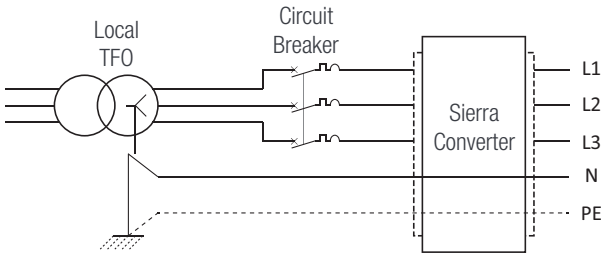
431.3 Disconnection and reconnection of the neutral conductor in multi-phase systems

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 Converter, UPS

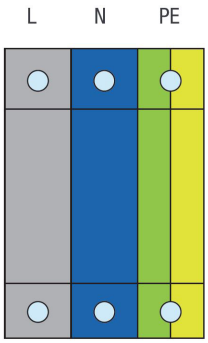
In TN-S System no 4 pole input switch or circuit breaker shall be used. If you have to use 4 pole protective device, be aware that the neutral against the ground is floating. The converter, UPS will operate without problem but you may infringe the local regulation.



The AC input is wired to a screw terminal.

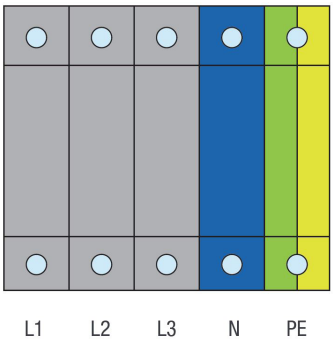
Max cable area is 180 mm^2

9.5.5.1 Single phase



9.5.5.2 Three phase

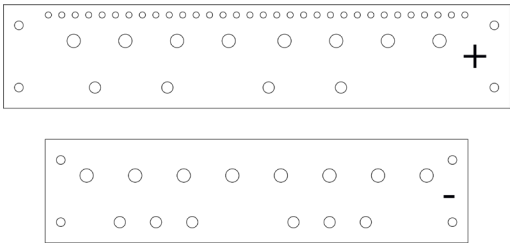
The three phase input is 123, ABC, RST phase sensitive; clockwise rotation is recommended. Phase one starts at 0° phase shift, while the other phases will be at -120° phase shift and + 120° phase shift resulting in three phase output.



9.5.6 DC (X1)

- Common DC input per system.
- M12 holes in bar.
- Max 8 x 240 mm² per pole (group).

Note: *Screws and nuts are not included in the delivery.*



9.5.7 Connection table – DC 48 Vdc (X1)

Power (kVA)		DC	
1ph	**3ph**	**Fuse/CB**	**Min Cable mm²**
11	-	250 A	120
22		500 A	240
33		800 A	2 x 240
-	33		
44	-	1000 A	4 x 150
55		1250 A	3 x 240
66		2 X 800 A	4 x 240
-	66		
77	-	2 X 1000 A	8 x 150
-	82.5	2 X 1000 A	8 x 150
88		2 X 1000 A	8 x 150

9.5.8 Connection table – AC Input (X2) & Output (X4)

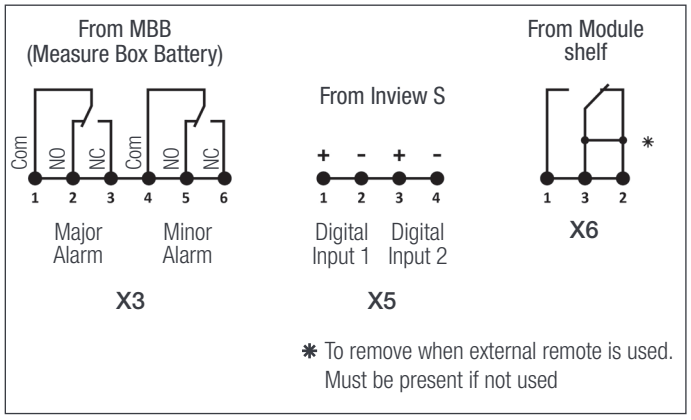
The AC input supply breaker shall be 2p for single phase, and minimum 3p for three phase.

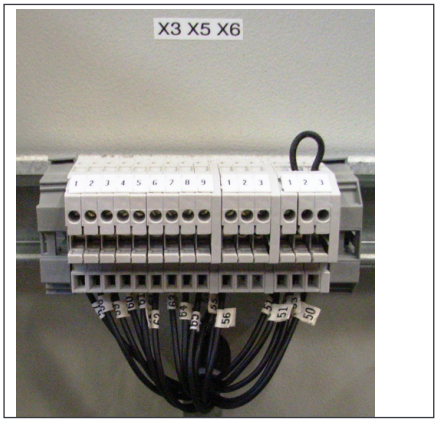
Power (kVA)			AC Input & Output (Screw terminal)		
1ph	**2ph**	**3ph**	**Calculated**	**Fuse/CB**	**Min.Cable mm²**
11	-	-	92A	100 A	35
22			183 A	200 A	95
-	22		2 x 92 A + N	100A	2 x 35
33	-		275 A	325 A	70
-		33	3 x 92 A + N	3 x 100 A	3 x 35

Power (kVA)			AC Input & Output (Screw terminal)		
1ph	2ph	3ph	Calculated	Fuse/CB	Min.Cable mm²
44	-	-	367 A	400A	180
-	44		2 x 183 A + N	2 x 200 A	2 x 95
55	-		458 A	500 A	95
66			550 A	600 A	150
-	66	-	2 x 275 A + N	2 x 300 A	2 x 150
-		66	3 x 183 A + N	3 x 200 A	3 x 95
77	-		642 A	700 A	180
-		82.5	3 x 229 A + N	3 x 250 A	3 x 150
88	-		733 A	800 A	2 x 180
-	88	-	2 x 367 A + N	2 x 400 A	3 x 180

9.5.9 Signalling

The illustration below shows the X3 relays contacts in a non-alarm state when the system is operational. In this case, the relays are energized and as below.





When an alarm occurs, the X3 relay contacts are de-energized and switch.

Note: For auxiliary connections from MBP, refer section 13.2, page 43.

9.5.9.1 Alarm (X3)

Relay characteristics X3 (Major and Minor Alarm)

- Switching power 60 W
- Rating 2 A at 30 Vdc / 1 A at 60 Vdc
- Max wire size 1 mm²

9.5.9.2 Digital In (X5)

Input characteristics X5 (Digital Input 1and 2)

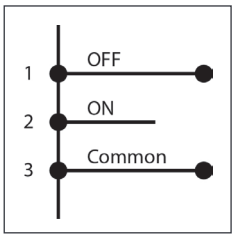
- Signal voltage +5 Vdc (galvanically insulated)
- Max wire size 1 mm^2

9.5.9.3 Remote ON/OFF (X6)

The function of remote ON/OFF is used turn off the module/system output.

By default a jumper is placed between pin 3 and 2. If remote on/off is used, jumper should be removed from the shelf and connect changeover contactor.

- AC and DC inputs are not affected by the remote ON/OFF function.
- The remote ON/OFF can be connected to any shelf.
- The remote ON/OFF requires changeover contactor, one input opens as the other close. If both transitions are not picked up the status is not changed.
- Digital input characteristics (Remote ON/OFF)
  - Signal voltage +5 VDC (galvanically insulated)
  - Max wire size 1 mm^2



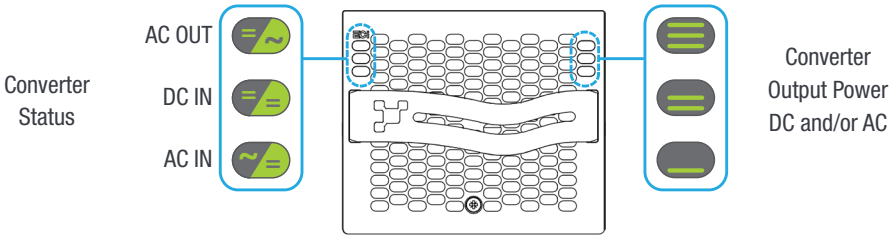
Functional table for remote ON/OFF function

#	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 not used, pin 2 and 3 MUST be bridged together!

10. Operation

10.1 Converter module



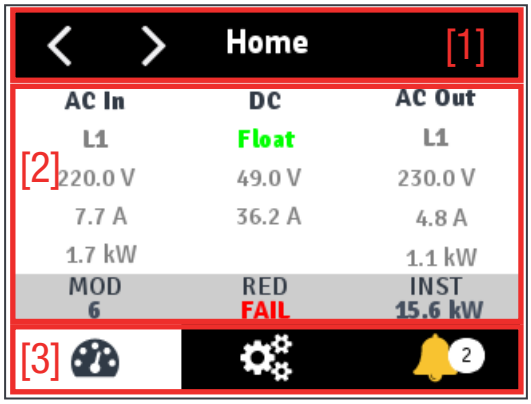
Converter Status LED	Description	Remedial action
OFF	No input power or forced stop	Check environment
Permanent green	Operation	
Blinking green	Converter OK but working conditions are not fulfilled to operate properly	
Blinking green/orange alternatively	Recovery mode after boost (10 In short circuit 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 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)

10.2 Inview S - LCD interface

Inview S LCD interface is a 2.8-inch touch screen. It does not have any 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.

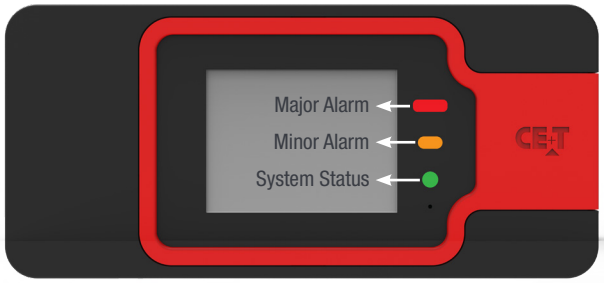
- **[3] Toolbar**

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

  - Measures
  - Settings
  - Alarms and Logs

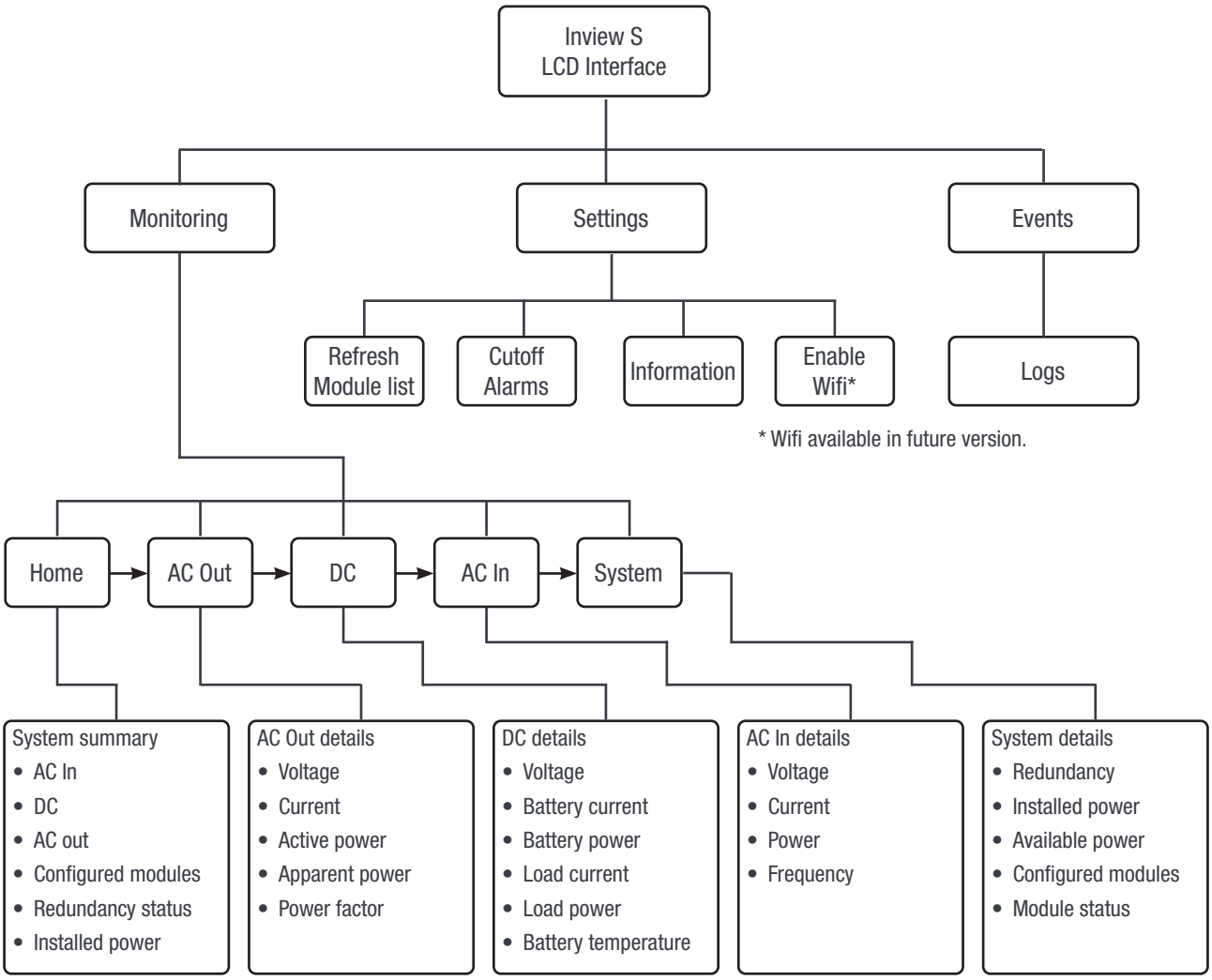
10.2.1 LED indications

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



10.2.2 Menu structure

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



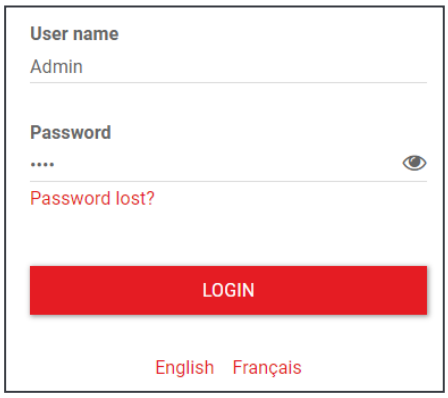
10.3 Inview S and Inview S Slot - Web Interface

The web interface of both controller Inview S and Inview S Slot is same, and the user can access the controller on the laptop through ETH port.

This section provides an overview of the web interface, refer Inview S user manual for detailed information.

10.3.1 Login

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



Note: Use any one of the following latest version of web browser: Google Chrome, Mozilla Firefox, Safari or Internet Explorer.

Inview S has three login – Basic, Expert and Admin. All three login is password protected.

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

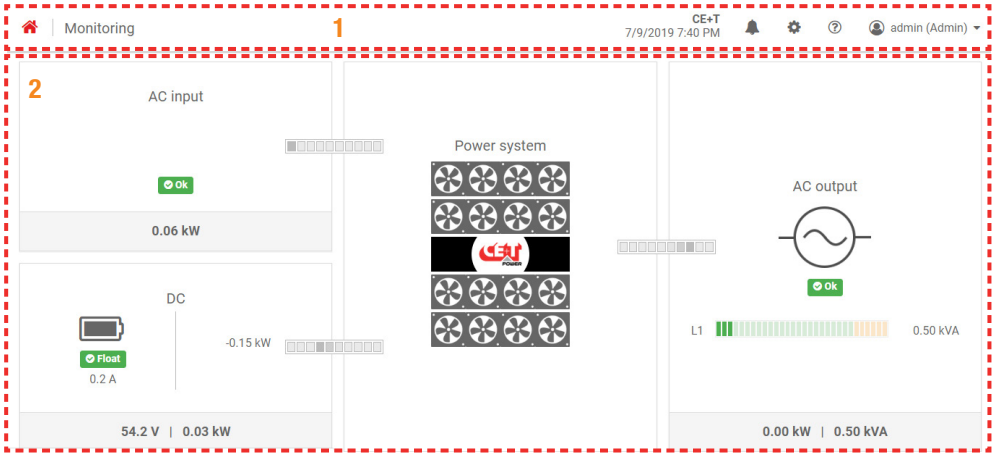
Basic login can only browse the pages and download the files, but Expert and Admin login can access and also modify the system parameter values.

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

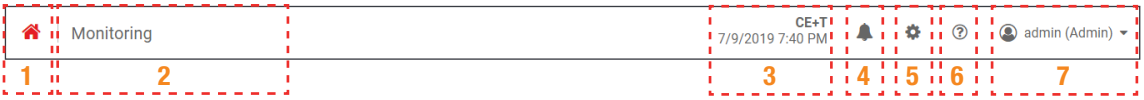
10.3.2 Interface Areas

1 → Header

2 → Main Page



10.3.2.1 Header



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

1 → **Home**: Tapping on goes to the home page from any page you are accessing in the interface.

2 → **Breadcrumbs:** Provide navigation of the page. It trails all levels so that user can know where you are within the interface and can go to any previous menu.

3 → **Date and Time**: Display the date, time and the location of the system.

4 → **Events:** Tapping on goes to Events and Logs page.

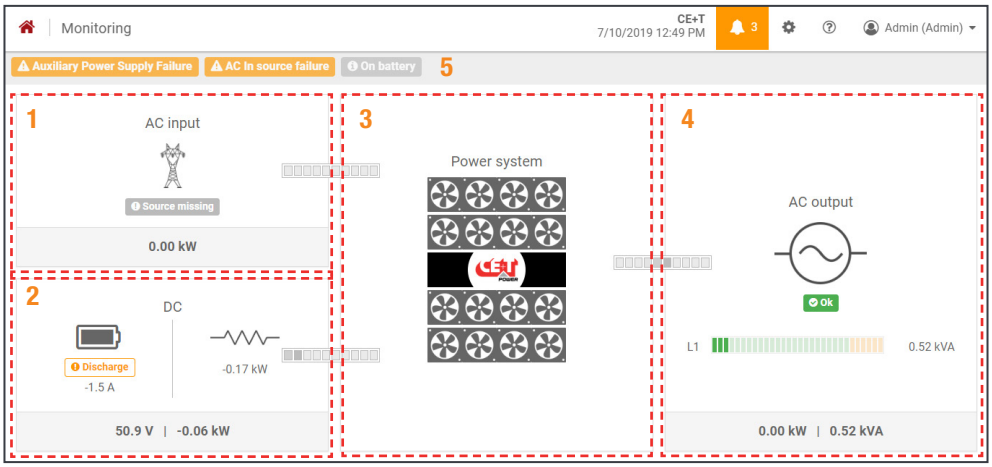
5 → **Settings:** Tapping on provide access to Users, Parameters and Maintenance pages.

6 → **Info**: Tapping on in the home page, provides brief information about the parameters, while in other pages provide the latest three ongoing events.

7 → **Account**: Provides the information of which account is logged in (Basic, Expert or Admin). Clicking on drop-down arrow user can access the following pages:

- **Administration** - Provide quick access to Users, Parameters and Maintenance pages. (Administration page will appear only in Expert login).
- **About** - Provides the information of Inview product details and network connectivity details.
- **Logout** - An act of logging out of an Inview S.

10.3.2.2 Home Page



1 → **AC Input**: Tapping on the AC Input region displays the page contain all measurements regarding AC Input.

2 → **DC:** Tapping on the DC region displays the page contain all measurements regarding Battery and DC Output.

3 → **Power System**: Tapping on the Power System region display the page contain regarding system information such as overall system power and also in each phase, configured modules, active modules, and list of detected modules and accessories.

4 → **AC Output**: Tapping on the AC Output region displays the page contain all measurements regarding AC Output. Regardless of the system configuration (1P, 3P), display the power fed to the load on each phase.

5 → **Notifications**: Display the current generated alarms and events.

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

11. Inserting/removing/replacing - modules

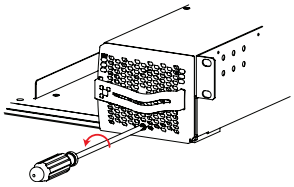
11.1 Sierra Converter

- The Sierra converter 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.

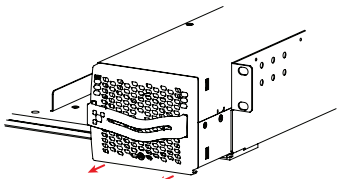
11.1.1 Removal

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

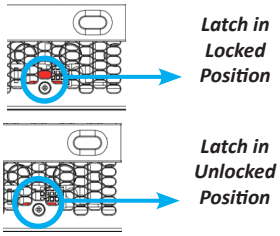
1. Rotate the screw in anti clockwise by using cross head screw driver to unlock the latch.
2. Hold the front handle and pull the module out.
3. Replace with a new module or a blind unit



1. Unlock the Latch

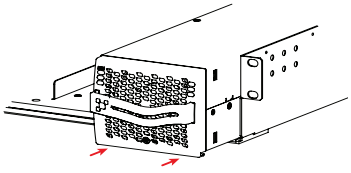


2. Pull the module out

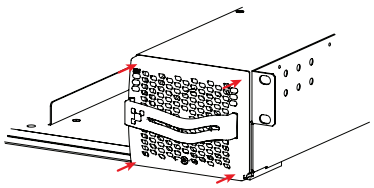


11.1.2 Inserting

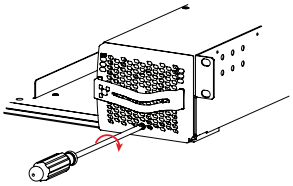
1. Check module compatibility (DC Voltage!).
2. Place the module in the shelf and slide in.
3. Using the module handle, push firmly until the unit is properly connected.
4. Rotate the screw in clockwise by using cross head screw driver to lock the latch.
5. The module will start up and take the first address available on the bus.



2. Slide the module in



3. Push firmly till the connection is properly engaged.



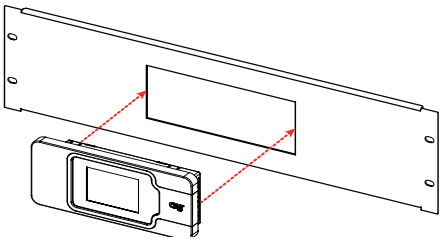
4. Lock the latch.

11.2 Inview S

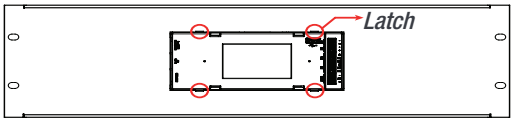
11.2.1 Panel Mounting

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.

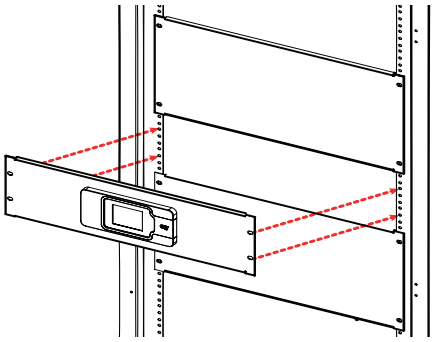
1. Place the Inview S in the panel sheet.
2. Lock all the four latches at the rear side of the Inview S in the panel sheet.
3. Connect required connection cables to the Inview S.
4. Place the panel sheet in the system and fix it with screws.



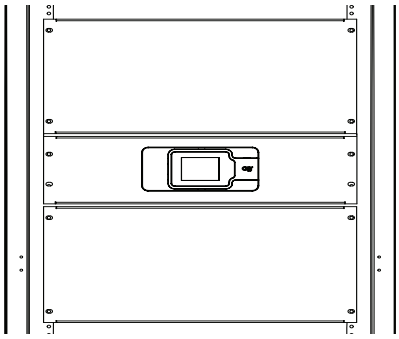
Place the Inview S in the panel sheet



Fix it with four latches



Connect wires and place the panel sheet in the cabinet



Fix the panel sheet with screws

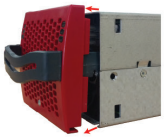
11.3 Fan replacement

The FAN life is approximately 60,000 (Sixty Thousand) hours. The converter 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 converter 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. Access Inview and reset the fan run time alarm from within the action menu

Remove the screws



Remove the front cover

Disconnect the fan

Take the new fan

Make sure the fan is in the right position

12. AC Output Distribution

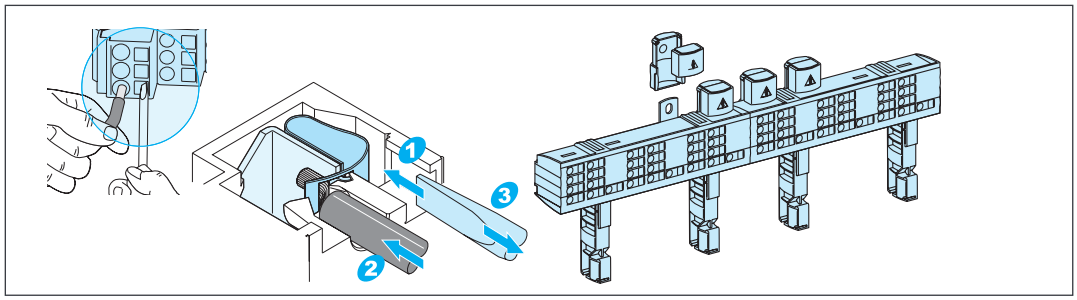
12.1 Miniature Circuit breaker Installation/Removal

Circuit breakers are normally factory installed.

How to add breakers:

1. Insert the short connection cable (10 mm^2 (included)) in the breaker Line-side and tighten.
   - Up to 40 A breaker - use one connection cable.
   - 63 A breaker - use two connection cables.
2. Clip breaker on to the DIN rail.
3. Insert insulated screw driver into the terminal to load the spring.
4. Insert connection cable and remove screw driver.
5. Connect load cable to breaker, Neutral and Ground.
6. Switch breaker ON.

Remove breaker in reverse order



12.2 MCCB

MCCBs are factory installed.

A wide range of breakers is used. Delivered breakers may vary from the example shown in the picture.

1. Make sure that the breaker is in OFF position.
2. Connect load cables to the terminal.
3. Switch the breaker ON.

13. 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 13.2, page 43

13.1 Pre-requisites

Commercial AC power must be present, and the converter 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 Gen-set, the minimal required power will be twice the nominal power of the converter.

The converter may be overloaded during the MBP procedure, depending on voltage network and output. Converter voltage setting: To reduce the impact of an overload, the converter 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 converter and the remote alarm terminal.

It is requested in order to reduce the inrush current during manual by pass operation to adjust the converter 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 converter due to high inrush current during the return to normal operation from Manual By Pass engaged.

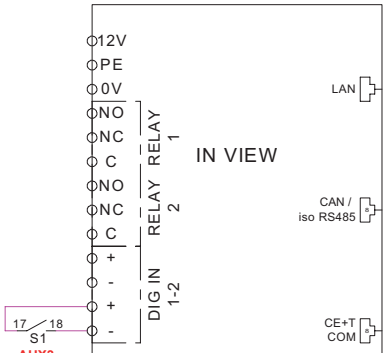
13.2 MBP Auxiliary connection

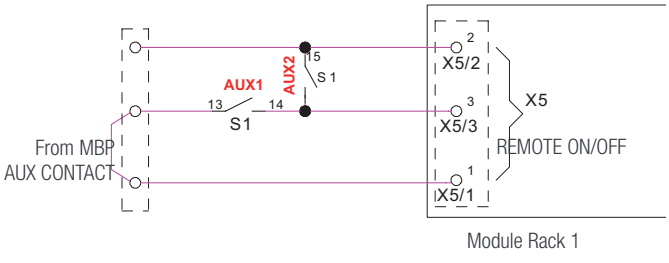
If manual by pass is installed in the system and its auxiliary should be wired as per the following:

- **MBP - Single rotary switch**

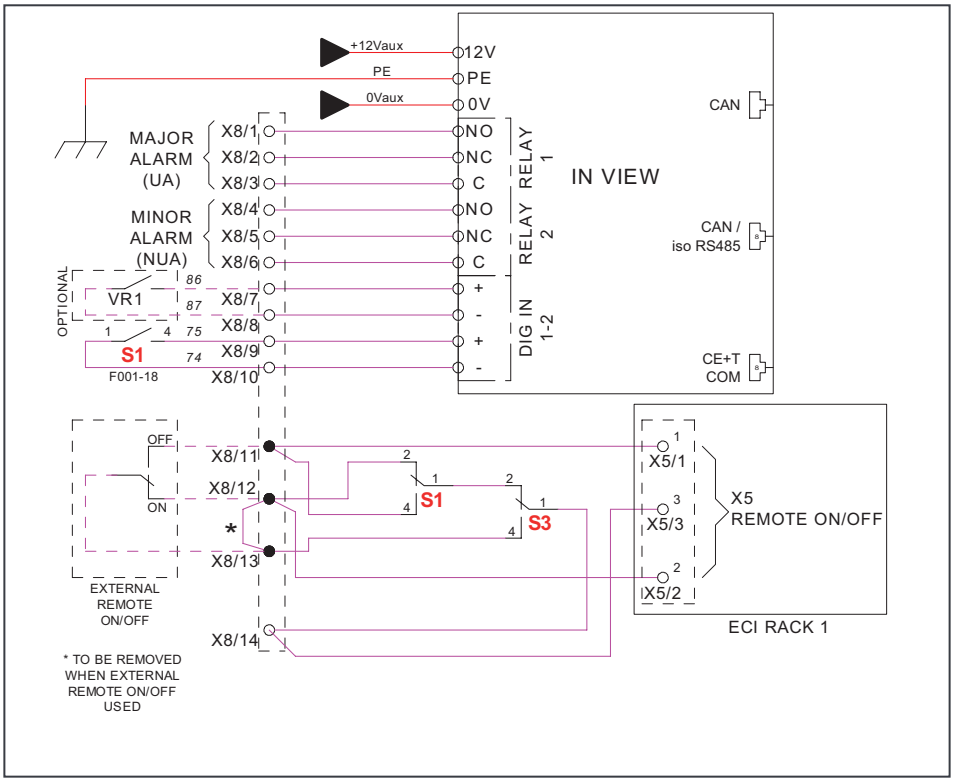
Note: The below connection is for a sub-rack system, and auxiliary (Aux) number varies depending upon the MBP switch. So it is recommended to refer the technical sheet received along with the system.

- 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.





- MBP - Three independent switch
  - Connect auxiliary wire from **MBP switch (S1)** to **Digital Input 01** of controller. So that the controller gets information when MBP is engaged.
  - Connect auxiliary wire from **MBP switch (S1)** and **AC input switch (S3)** to **Remote ON/OFF** terminal in the shelf where controller is installed.



13.3 Manual Bypass operation

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

Manual By-Pass operation is “Make before Break” logic

The sierra system has a single rotary switch or three individual switches depending upon the system configuration, and the operation also varies for each model.

13.3.1 MBP - Single rotary switch

In this model, manual bypass operates in single switch and it has three positions - Normal, Interim and Bypass.

13.3.1.1 Normal to Bypass

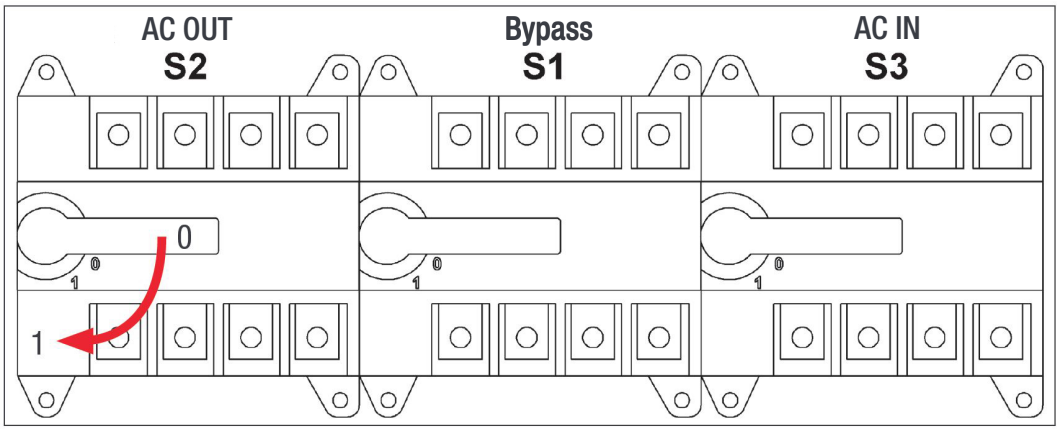
1. Rotate the MBP Switch (S1) from **NORMAL** to **BYPASS**. (Note: Do not stop at INTERIM position)
2. Switch **OFF** the DC power and/or disconnect batteries.

13.3.1.2 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**.

13.3.2 MBP - Three individual switches

In this model, manual bypass operates through three individual switches - S1 (Manual Bypass), S2 (AC out) and S3 (AC IN).



13.3.2.1 Normal to By-Pass

1. Close the By-Pass switch **S1**, 0 to 1
2. Open the AC Out switch **S2**, 1 to 0
3. Open the AC IN switch **S3**, 1 to 0
4. Switch **OFF** the DC power and/or disconnect batteries

13.3.2.2 By-Pass to Normal

1. Switch **ON** the DC power and/or connect batteries.
2. Close the AC IN switch **S3**, 0 to 1.
   (Wait until the modules turn on and synchronized, approximately 30-60 seconds).
3. Close the AC Out switch **S2**, 0 to 1.
4. Open the By-Pass switch **S1**, 1 to 0

14. 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 relived.
- 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 converter/controller positions are left open.
- Cover empty converter positions with blanks.
- 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.

15. 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.

15.1 Check list

DATA	
Date	
Performed by	
Site	
System serial number	
Module serial numbers	
Inview Serial number	
ACTION	**OK/ N.OK**
Unplug all converters except one converter 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 converters are working (Green led)	
Check the DC power supply and switch ON the DC breakers	
Plug in all converters one by one	
Check output voltage (on bulk output or on breaker)	
Check if converters are working properly	
Check if system has no alarm (Disable the alarm if any)	
Read configuration file and review all parameters. Some parameters must be adapted according to the site (LVD, load on AC, AC threshold level)	
Switch OFF ACin and check if system is working on DC	
Switch ON ACin 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 (Inview)	
Check if TCPIP working properly (if this 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 converter and check alarm according to redundancy	
Pull out two converters 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)	

16. Trouble Shooting and Defective Situations Fixing

16.1 Trouble Shooting

Converter 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 converter is properly inserted
	Remove converter to verify that slot is not damaged, check connectors
	Check that module(s) is (are) in OFF state
	Check for loose terminations
Converter 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
Converter 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

17. Maintenance

Maintenance should be performed by properly trained people.

17.1 Access Inview S 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)

17.2 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

17.3 Optional

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

17.4 Manual By-Pass

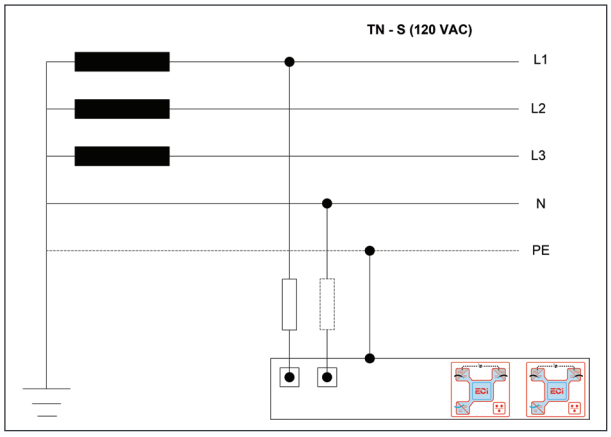
- Make sure AC input source is available during MBP operation. Otherwise the LOAD will be affected.

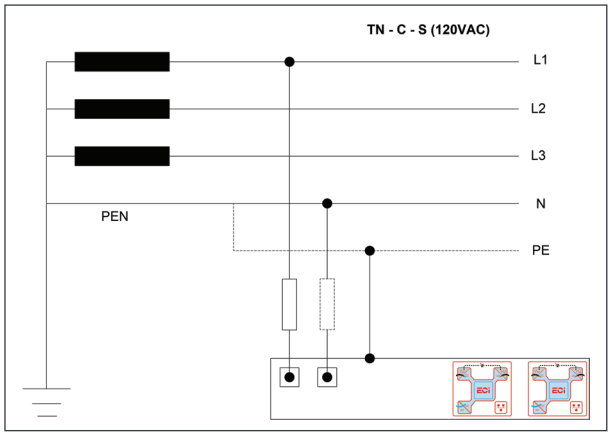
18. Defective modules

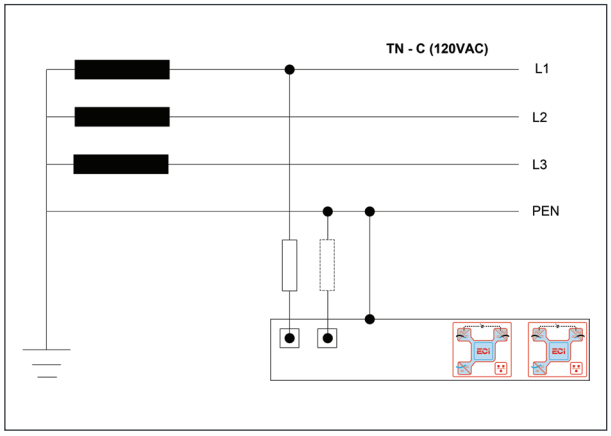
- A repair request should follow the regular logistics chain:
  End-user => Distributor => CE+T Power.
- Before returning a defective product, a RMA number must be requested through the http://my.cet-power.com extranet. Repair registering guidelines may be requested by email at repair@cet-power.com.
- 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!

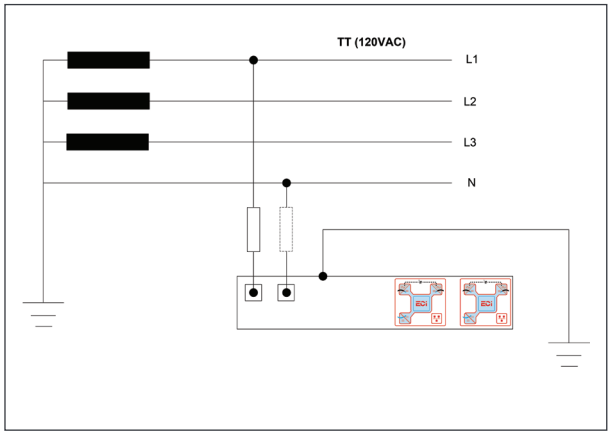
19. Appendix

19.1 Mains connection, Single phase

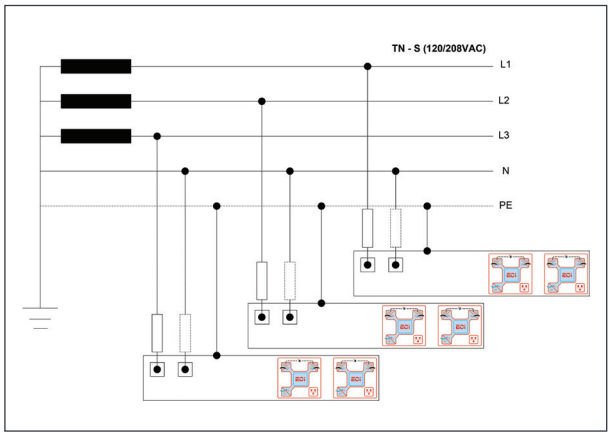


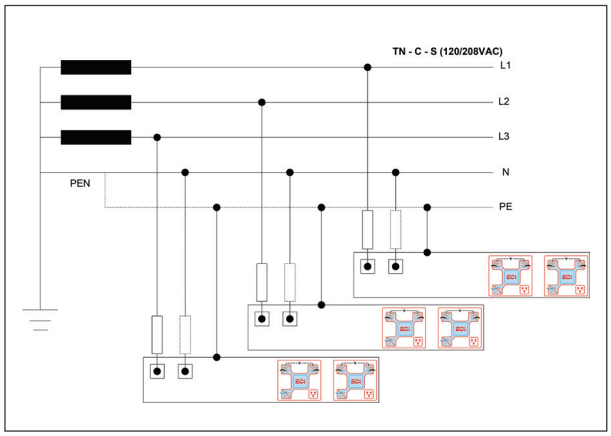


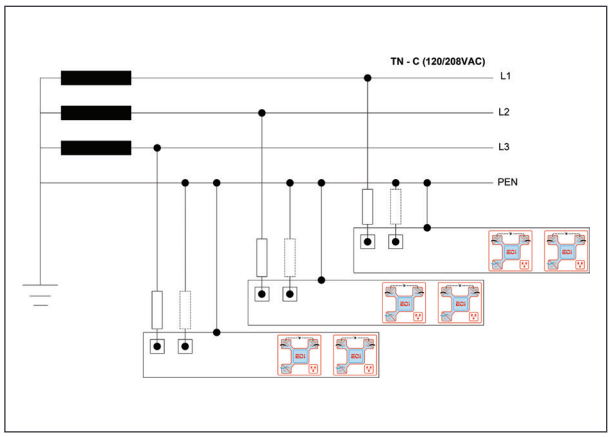


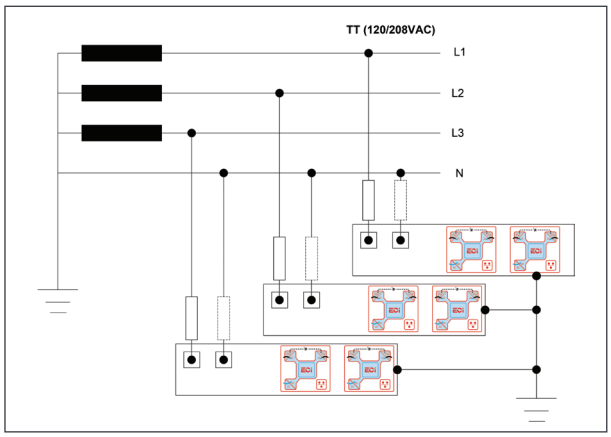


19.2 Mains connection, Three phases

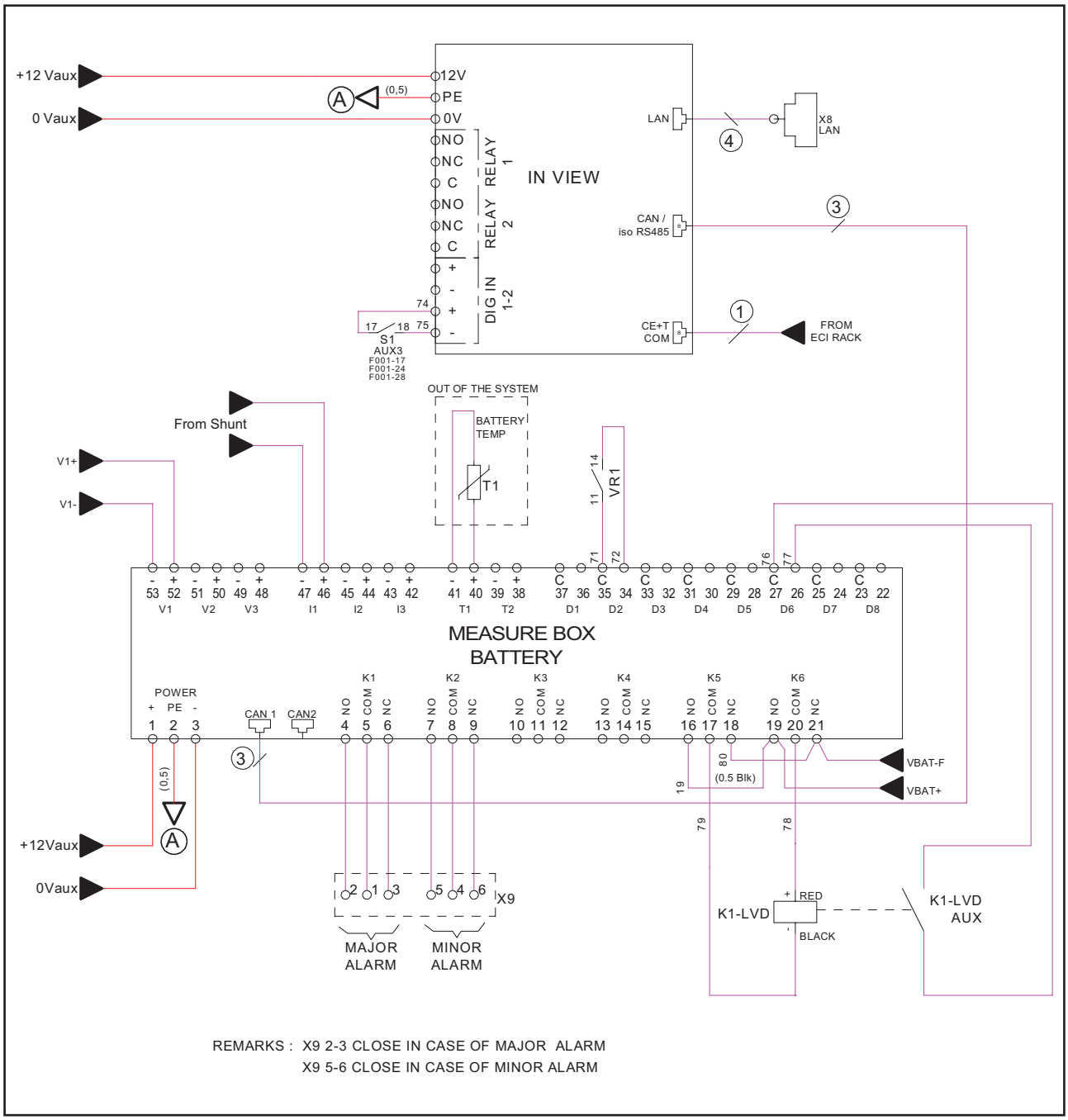








19.3 Inview S with MBB - Wiring diagram



REMARKS : X9 2-3 CLOSE IN CASE OF MAJOR ALARM
X9 5-6 CLOSE IN CASE OF MINOR ALARM

19.4 Modules - Parameter List

The below table is reference for 48 Vdc / 230 Vac converters. If it is other DC and AC voltages, enter the appropriate values.

Parameter	Description	Min	Default	Max	Unit
V DC in low start - dV (000)	Low DC Voltage where a higher value leads the DC/AC converter to re-start	390	440	610	dV
V DC in low transfer - dV (001)	Low DC Voltage where a lower value leads to transfer the load from DC IN to AC IN. Under this voltage peak-shaving is relaxed and battery discharge test is stopped.	390	390	610	dV
V DC in low stop - dV (002)	Low DC voltage where a lower value stops the DC/AC converter	390	390	610	dV
V DC in high start - dV (003)	High DC voltage where a higher value re-starts the DC/AC converter	390	580	610	dV
V DC in high transfer - dV (004)	High DC Voltage where a higher value leads to transfer the load from DC IN to AC IN	390	610	610	dV
V DC in high stop - dV (005)	High DC voltage where a higher value stops the DC IN converter. Value increased from sw 173 to 62 VDC	390	610	610	dV
V AC in low start - dV (006)	AC IN Voltage where a higher value leads the AC IN to start	1950	1950	1950	dV
V AC in low transfer - dV (007)	AC IN Voltage where a lower value leads to the transfer of the load from the AC IN to DC IN	1850	1850	1850	dV
V AC in low stop - dV (008)	AC IN Voltage where a lower value leads the AC IN converter to stops. It is possible to step down to 150 Vac. In this case, the AC/DC converter will run at a lower power. The converter DC/DC supply the rest (ONLY if DC is available, if not, there is a de-rating)	1820	1820	1820	dV
V AC in high start - dV (009)	AC IN Voltage where a lower value leads the AC IN converter re-start	2550	2550	2550	dV
V AC in high transfer - dV (010)	AC IN Voltage where a higher value leads to the transfer the load of the charge from the AC IN converter to the DC IN converter	2600	2600	2600	dV
V AC in high stop - dV (011)	AC IN Voltage where a higher value leads to stop the AC IN converter	2650	2650	2650	dV
F AC in low start - cHz (012)	Frequency where a higher value leads the outlet of the inverters trying to synchronize with AC IN	4700	4730	6300	cHz
F AC in low stop - cHz (013)	Frequency where a lower value leads the outlet of inverters stop to synchronize with AC IN	4700	4700	6300	cHz
F AC in high start - cHz (014)	Frequency where a lower value leads the inverters outlet to synchronize with AC IN	4700	5270	6300	cHz
F AC in high stop - cHz (015)	Frequency where a higher value leads the inverters outlet to stop to synchronize with AC IN	4700	5300	6300	cHz

Parameter	Description	Min	Default	Max	Unit
Free running frequency - cHz (016)	Set the Inverters system frequency. This frequency is used when the system is not synchronized on AC input.	-	5000	-	cHz
Out 1 phase shift - deg (018)	Phase displacement.	0	0	360	Deg
Out 2 phase shift - deg (019)		0	120	360	Deg
Out 3 phase shift - deg (020)		0	240	360	Deg
Out 4 phase shift - deg (021)		0	0	0	Deg
Out 5 phase shift - deg (022)		0	0	0	Deg
Out 6 phase shift - deg (023)		0	0	0	Deg
Out 7 phase shift - deg (024)		0	0	0	Deg
Out 8 phase shift - deg (025)		0	0	0	Deg
Out 1 nominal voltage - dV (026)	Set output voltage for each phase.	2000	2300	2450	dV
Out 2 nominal voltage - dV (027)		2000	2300	2450	dV
Out 3 nominal voltage - dV (028)		2000	2300	2450	dV
Out 4 nominal voltage - dV (029)		2000	2300	2450	dV
Out 5 nominal voltage - dV (030)		2000	2300	2450	dV
Out 6 nominal voltage - dV (031)		2000	2300	2450	dV
Out 7 nominal voltage - dV (032)		2000	2300	2450	dV
Out 8 nominal voltage - dV (033)		2000	2300	2450	dV
Short circuit voltage threshold - V (034)	Minimum Voltage Threshold where module considers that outlet is in short circuit.	80	80	200	V
Short circuit hold time - ds (035)	Time Duration when a module tries to eliminate the short-circuit existing on outlet. If the system is still in short-circuit after this time, the output will be stopped.	1	600	6000	ds
Input source - % (036)	Defines the priority source **0** - Feeding from AC IN has priority (converter AC/AC - EPC mode) default value. **100** - Feeding from DC has priority (converter DC/AC - On Line mode)	0	0	100	%
Synchronisation tracking speed (037)	The speed at which the module tries to synchronize the AC Out with AC IN. The lowest value will have the fastest synchronization.	-2	0	2	
Max power - % (038)	Maximum Power that module can supply	30	150	150	%
Max current - % (039)	Maximum Current that module can supply.	30	150	150	%
Max overload duration - s (040)	Maximum Time Duration when module can run with overload	0	15	15	s
AC in mode (041)	Allows to open the AC IN inlet relay **0** - normal running in EPC mode. **1** - AC IN inlet relay is open and so the system is insulated from the Mains. This parameter can be set to **1** only if repartition is on DC (parameter 036 should be 100)	0	0	1	

Parameter	Description	Min	Default	Max	Unit
Booster 10x I in (042)	Allow to inhibit the Booster option which generates a current of 10 In for 20ms in case of short-circuit (9 In for Nova inverter).	0	1	1	
Remote off disable AC in power (043)	This parameter change the attribution of the remote ON/OFF input. If parameter is **1**, then, when system is in remote OFF position, output is not stopped and AC input is stopped instead.	0	0	1	
Reinjection allowed (044)	If this parameter is 1, the module is allowed to inject power in the grid with its AC input.	0	0	1	
External clock (045)	Records the “External Clock” mode configuration 0 - no protection in: phase drift is allowed. 1 - protection in: no phase drift allowed, stops the system after 1 minute. 2 - System stops immediately.	0	0	2	
Walk in mode - das (046)	The Walk-in mode allows the inverter to come back progressively on the AC priority source after an outage. Friendly use on Genset	0	0	12	
Triangle mode (047)	Defines the protection type for working on Delta load. **0** - Default setting, and no delta load protection **1** - The mode is active. If one output phase stops, the other phases will also stop.	0	0	1	
Airco mode (048)	When this mode is activated, the overload capabilities are moved from default value to 330% overload in current and power for maximum 900 ms.	0	0	1	
Start without supervision (049)	When this mode is activated, the module is able to start without Inview S.	0	1	1	
P DC max - W (050)	This feature allow to limit or reduce the INRUSH DC current when the system work on battery. To limit the current this configuration line should limit the inrush DC current. To allow for the high capability this inverter is build with extra capacitor running on 400VDC to provide the requested energy.	0	0	1	
AC 1 stop power (051)	Stops the power of the corresponding AC group. The AC input of the modules of this AC group will then be used for synchronisation only, no power will be taken.	0	0	1	
AC 2 stop power (052)		0	0	1	
AC 3 stop power (053)		0	0	1	
AC 4 stop power (054)		0	0	1	
St module number (055)	NA	0	0	3	
St module redundancy (056)	NA	0	0	4	
Tus (057)	Mode TUS activation	0	0	1	

Parameter	Description	Min	Default	Max	Unit
Tus modules number (058)	Number of TUS modules in the system (typically 2) -> number of tus seen by local supervision	0	0	24	
Tus sub sub system address (059)	address of the system on TUS bus -> address of local supervision which need to be different from other local supervisions	0	0	4	
Tus sub sub system output phase (060)	Output phase in TUS mode	0	0	11	
Tus sub system index (061)	System index in TUS mode (for example, if we have a A+B redundancy, this parameter is 1 for A systems, 2 for B systems)				
Number of tus sub sub system (062)	Number of systems connected on TUS bus	0	0	8	
Tus supply x supervision mode (063)	X TUS supply source	-	-	-	
Tus supply y supervision mode (064)	Y TUS supply source	-	-	-	
Tus sub sub system dc group (065)	DC group of the system in TUS mode	0	0	3	
V DC charger safe mode - cV (066)	DC voltage set point in SIERRA mode	5300	5400	5400	cV
P DC charger safe mode - W (067)	DC power setpoint in sierra mode (> 0 if battery discharge, <0 if battery charging)	0	-	2400	W
P AC peak shaving safe mode - W (068)	global peak-shaving (-1 if no peak-shaving)				
P AC max per phase safe mode - W (069)	Peak-shaving for each individual phase (-1 if no peak-shaving)				
Phase compensation (070)	Phase balancing	0	1	1	
Sierra mode (071)	Is module allowed to run in charger mode	0	1	1	
V DC low stop charger - cV (072)	Dc voltage under which charger is stopped	0	0	1	
Lvd mode (073)	If this mode is ON, module goes in low consumption mode 1 minute after it stops by Vdc LowStop	0	0	1	
Max V DC increment safe mode - cV (074)	Vdc set point rising speed when there is no supervision				