



Leading Conversion Technology for Power Resilience

SIERRA 25 - 277 VAC

User Manual V3.1

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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Release Note:

Version	Release date (DD/MM/YYYY)	Modified page number	Modifications
1.0	10/07/2020	-	First release of the manual
2.0	29/07/2020	-	Amendment and correction.
3.0	22/01/2021	12 - 14	Updated specifications and added product labels
3.1	18/08/2021	10 13 21 34 38 -	Updated section 4. Updated specifications section 5.1.1. Added new section 7.2.11. Added new section 15.5. Added new appendix 17.3. Added information about 380 Vdc version.

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 performance 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 power disturbances;
- Optimizes footprint.

Our systems are:

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

CE+T puts 60+ years expertise in power conversion together with worldwide presence to provide customized solutions and extended services 24/7 – 365 days a 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)
PV	Photovoltaic cell
PWR	Power
REG	Regular
SNMP	Simple Network Management Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TRS	True Redundant Structure
UA	Urgent Alarm
USB	Universal Serial Bus

3. Warranty and Safety Conditions*

WARNING:

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

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

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

Important Safety Instructions, Save These Instructions.

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 dummy cover.
- Before working on the system, Isolate Uninterrupted Power Supply (UPS) and check for hazardous voltage between all terminals including the protective earth.

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

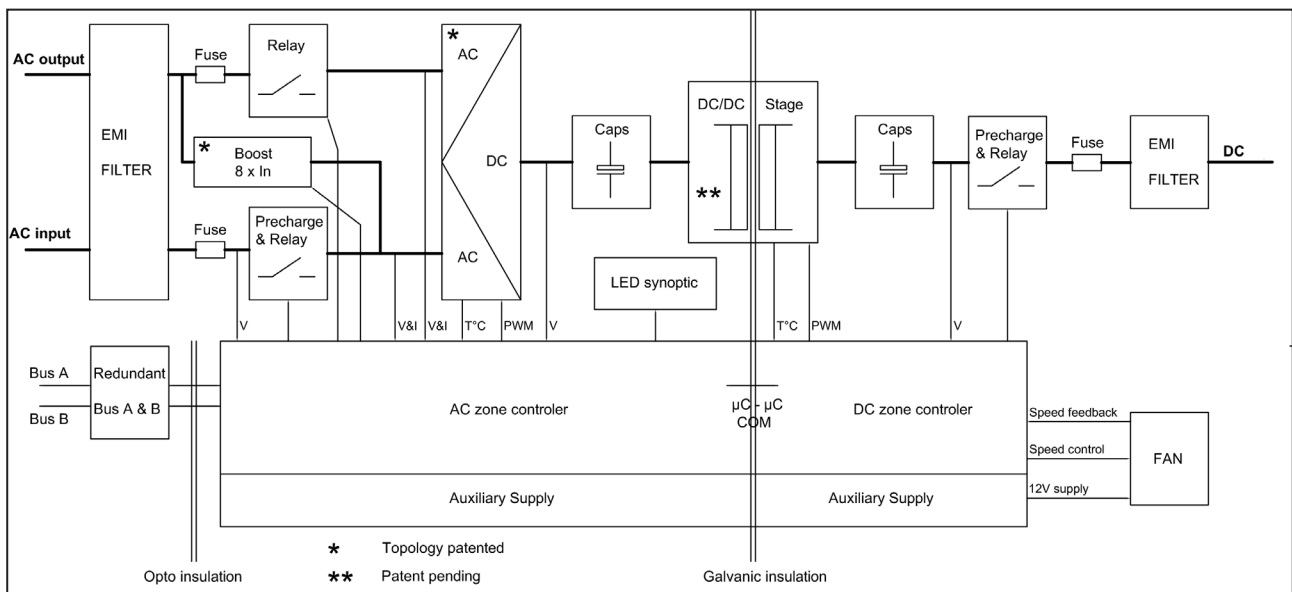
- ESD Strap must be worn when handling PCB's and open units.
- The converter system/rack is not supplied with internal disconnect devices on input nor output.
- CE+T cannot be held responsible for disposal of the converter system and therefore the customer must segregate and dispose of the materials 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 TECHNOLOGY¹

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.

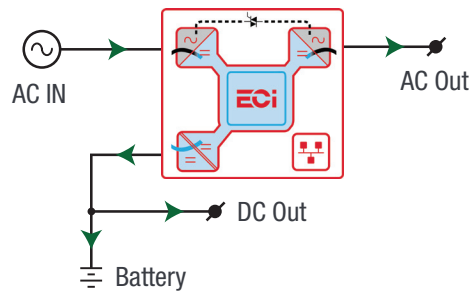
Reinforced transformer isolation is available between DC port and AC ports.

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.

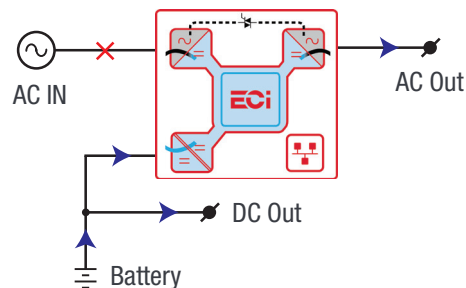
If the AC source is not present, the module seamlessly switches to DC source without impacting the critical loads and resumes to EPC mode once AC source returns. The transfer time between AC to DC and DC to AC is 0 ms.

The EPC mode provides a higher efficiency of $\geq 96\%$ 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 - 277 Vac

Telecom / Datacom:	Input	48 Vdc / 380 Vdc 230 Vac, 50/60 Hz
	Output	230 Vac and 48 Vdc / 380 Vdc
	Power	3000 VA / 2400 W



- The Sierra converter is a triple port converter.
- Each converter can supply 2400 W 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 (2400 W), 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 for Sierra 25 - 48/277

Model	Sierra 25 - 48/277
Part Number: Module / Shelf	T721D30271 / T724730070
Cooling / Audible noise	Fan forced cooling / <65db @1meter
MTBF	240 000 hrs (MIL-217IF) at 30°C ambient and 80% load
Dielectric strength DC/AC	4300 Vdc
RoHS / WEEE	Compliant to RoHS Directive 2011/65/EU / WEEE Directive 2012/19/EU
Operating T° / Relative Humidity (RH) non-condensing	-40°C to 65°C, power de-rating from 50°C to 65°C / RH 5% to 85%- Tested according GR3108 Class 2
Storage T° / Relative Humidity (RH) non-condensing	-40°C to 70°C / RH 5% to 85% - Tested according GR3108 Class 2
Maximum Altitude	2000 m Greater than 1500 m – de-rating at 0.8% per 100 m
Material (casing)	Zinc coated steel
AC Input Data	
Nominal voltage / current at full output power (AC+DC) 2.7kW	208 Vac (13.8 A), 230 Vac (12.5 A) & 277 Vac (10.4 A)
Voltage range	150 - 293 Vac (derating from 187 Vac to 150 Vac)
Power factor / THD	> 0.99 / < 3%
Frequency (Synchronization range)	50 Hz (47 - 53 Hz) or 60 Hz (57 - 63 Hz)

DC Input Data	
Nominal voltage (range)	48 Vdc (32 - 63 Vdc)
Nominal current	54.4 A
Maximum input current (for 15 seconds) / voltage ripple	66.8 A / < 10 mV RMS
AC Output Data	
Efficiency AC to AC (EPC) / DC to AC / AC to DC	> 96% / > 93.5% / > 93.5%
Nominal voltage (current) / Adjustable	208 Vac (13.2 A), 230 Vac (13.1 A) & 277 Vac (10.8 A) / (208 - 277 Vac)
Frequency / frequency accuracy	50 or 60 Hz / 0.03%
Nominal Output power	3 kVA / 2.4 kW @ 230 Vac and 2.75 kVA / 2.4 kW @ 208 Vac (at 2.4 kW AC load, still 300 W available for 48V DC Load)
Short time overload capacity	125% (15 seconds)
Total harmonic distortion (resistive load)	< 3%
Load impact recovery time (10% - 90%)	≤ 0.4 ms
Nominal current	13 A @ 230 Vac
Crest factor at nominal power	2.5 : 1 for load P.F. ≤ 0.6
Short circuit clear up capacity at AC input / On battery	100 A / 34 Arms for 20 ms
Short circuit current after > 20 ms	22.5 A for 15 seconds
AC output voltage stability	±1% from 10% to 100% load
DC Output Data	
Nominal voltage (range)	53.5 Vdc (32 - 63 Vdc)
Maximum power	2.4 kW (constant power from 48V to 63V derating constant current from 32 to 48V) within AC output voltage 187 to 293 Vac without AC output load
Maximum current at 48 Vdc	50 A
Reverse polarity protection	Yes
Efficiency AC to DC	> 93.5%
Signaling & Supervision	
Display	Synoptic LED
Remote on / off	On rear terminal of the shelf through Inview
Safety & EMC	
Safety	IEC62040-1 / UL1778
Protective Class	Class I
Pollution Degree	Degree II
Over Voltage Category	OVC II
EMI/EMC	FCC Part 15 class A, CISPR 32 Class A, IEC61000-4-2/3/4/5/6 ETSI300386
Environment	ETSI300019
NEBS	GR3108 class 2

5.1.2 Specifications for Sierra 25 - 380/277

Model	Sierra 25 - 380/277
Part Number: Module / Shelf	T721D70201 / T724D70000
Cooling / Audible noise	Fan forced cooling / <65db @1meter
MTBF	240 000 hrs (MIL-217IF)
Dielectric strength DC/AC	2100 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
Maximum Altitude	2000 m Greater than 1500 m – de-rating at 0.8% per 100 m
Material (casing)	Zinc coated steel
AC Input Data	
Nominal voltage / Current	120 Vac /13 A and 230 Vac /11.7 A
Voltage range	90 - 295 Vac (De-rating in 120 Vac to 1.5 kW)
Brownout	1500 VA / 1500 W @120 VAC, 2500 VA / 2500 W @190 VAC, 3000 VA / 2500 W @ 230 VAC
Power factor / THD	> 0.99 / < 3%
Frequency (Synchronization range)	50 Hz (47 - 53 Hz) or 60 Hz (57 - 63 Hz)
DC Input Data	
Nominal voltage (range)	336 Vdc (200 - 430 Vdc) ¹
Nominal current at 336 Vdc and 2500 W / 1500 W	8 A / 5 A
Maximum input current (for 15 seconds) / voltage ripple	9.9 A / < 250 mV RMS
AC Output Data	
Efficiency AC to AC (EPC) / DC to AC / AC to DC	> 96% / > 94.5% / > 94.5%
Nominal voltage ² (User selectable)	120 / 208 / 220 / 230 / 240 Vac
Frequency / frequency accuracy	50 or 60 Hz / 0.03%
Nominal Output power	3000 VA / 2500 W @ 230 Vac, 1500 VA / 1500 W @ 120 Vac (at AC full load, still 200 W available for DC output)
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	13 A @ 120 Vac and @ 230 Vac
Crest factor at nominal power	3 : 1 for load P.F. ≤ 0.7

Short circuit clear up capacity at AC input / On battery	109 Arms for 20 ms / 34 Arms for 20 ms
Short circuit current after > 20 ms	22.5 A for 15 seconds
AC output voltage stability	±1% from 10% to 100% load
DC Output Data	
Nominal voltage (range)	336 Vdc (310 - 430 Vdc)
Maximum power	2700 W @ 230 Vac and 1700 W @ 120 Vac ³
Maximum current at 380 Vdc and 2500 W / 1500 W	7 A / 4.2 A
Reverse polarity protection	YES
Efficiency AC to DC	> 94.5%
Max. Voltage interruption / total transient voltage duration (max)	0 sec / 0 sec
Signaling & Supervision	
Display	Synoptic LED
Supervision / Part number	Inview ranges: Inview S - T302004100 and Inview GW - T602004000
Remote on / off	On rear terminal of the shelf through Inview
Battery Monitoring / Part number	MBB (Measure Box Battery) - 6 dry contacts and 8 digital Inputs / T302006000
Safety & EMC	
Safety	IEC62040-1 / UL1778
Protective Class	Class I
Pollution Degree	Degree II
Over Voltage Category	OVC II
EMI/EMC	FCC Part 15 class A, CISPR 32 Class A, IEC61000-4-2/3/4/5/6 ETSI300386

1 - De-rating below 270 Vdc

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

3 - AC output load is the highest priority. Even if AC output is fully loaded, still 200 W is available for DC output.

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 12 kVA per shelf.
- 480 mm (D) x 19" (W) x 2U (H).
- 6 Kg empty.



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

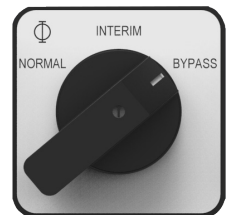
The cabinet comes with a separable top cover to facilitate cabling. Tie strap support at cable entrance/exit.

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, converter 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).

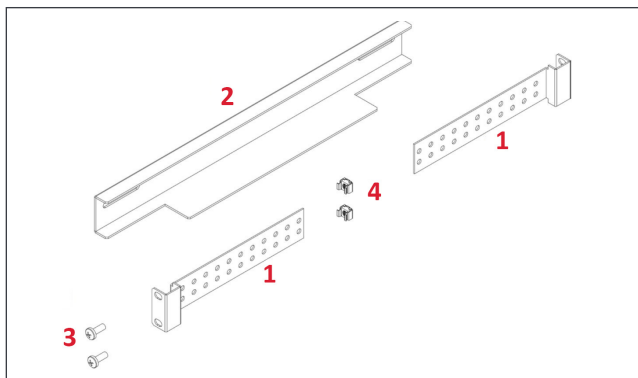
Max two MCCB per converter cabinet.

7. Installation of Sierra Shelf

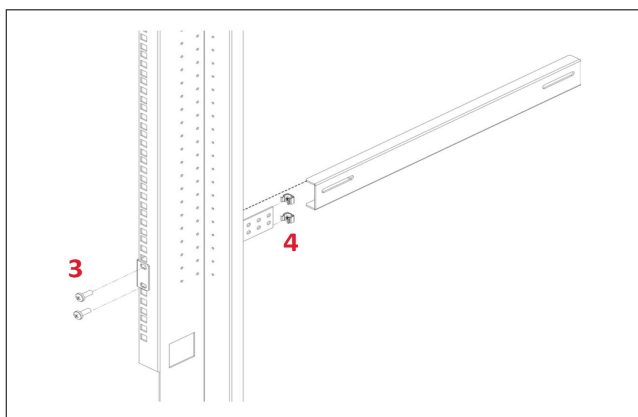
- Read safety instructions prior starting any work.
- Do not attempt to use lifting eyes to erect the cabinet.
- System is preferable handled without modules.
- Pay attention to the module position, make sure that modules are repositioned in the same slot.
- In three phase systems, the modules are configured 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.)

7.1 Mounting kit for Sierra shelf

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



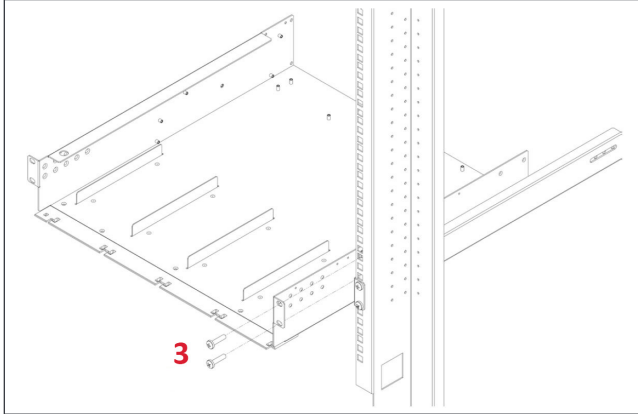
- 1** → Fixing brackets - 4 Nos
- 2** → Slider - 2 Nos
- 3** → Mounting screws - 12 Nos
- 4** → Cage nuts - 12 Nos



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

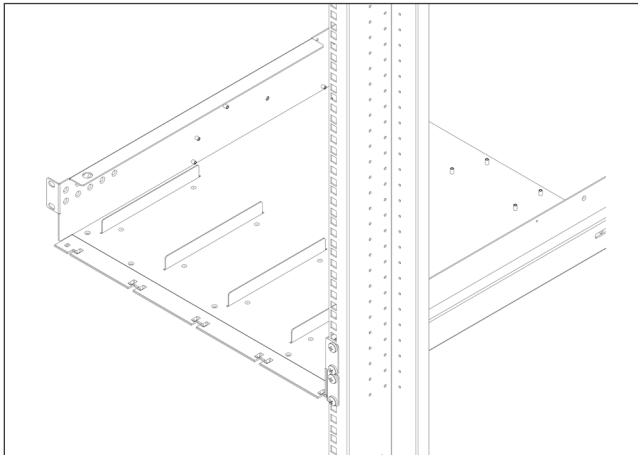
Fix cage nuts (**4**) in the cabinet front and rear frame of the left and the right side.

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.

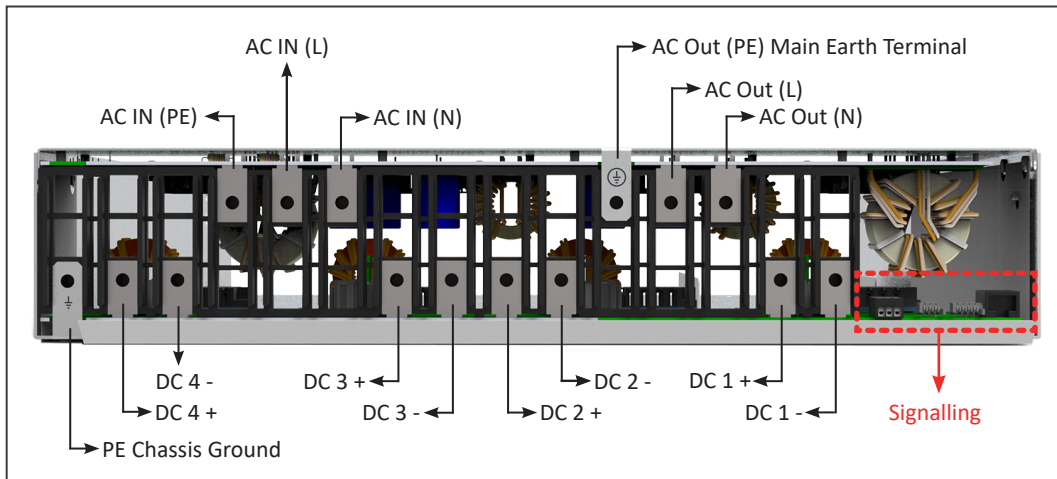
7.2 Electrical installation for Sierra shelf

7.2.1 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.
- Empty converter positions shall be covered with dummy cover or module
- For proper ventilation, the gap between the cabinet door and module must be atleast 100 mm.

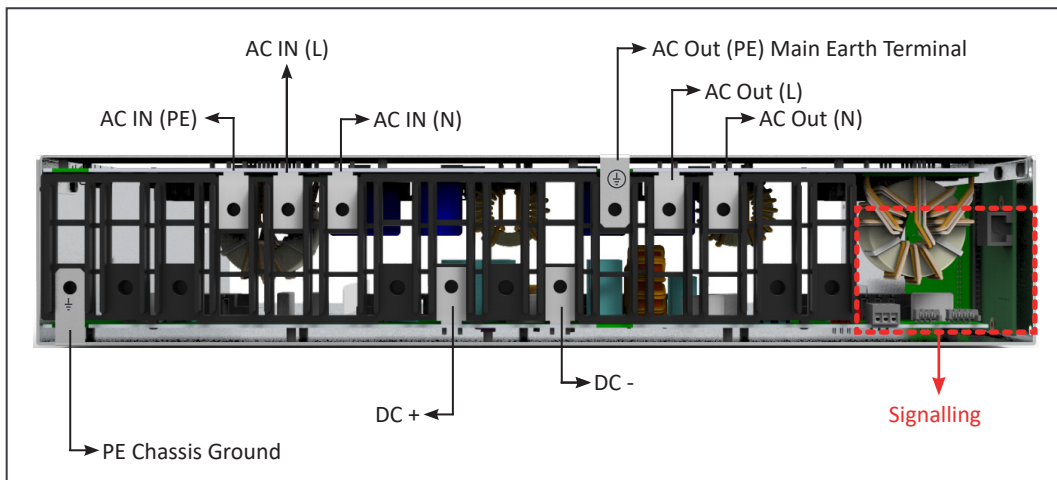
7.2.2 Terminations

The below image is termination details of Sierra 25 - 48/277 shelf.




Sierra 25 - 48/277 - Shelf Rear Details

The below image is termination details of Sierra 25 - 380/277 shelf.



Sierra 25 - 380/277 - Shelf Rear Details

7.2.3 Grounding

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. "PE CHASSIS GROUND"  shall be wired to MET or distributed earth bar connected to MET, according to local regulations.

7.2.4 DC connection

Model	MCB per converter module	Cable, min	Connector	Torque
Sierra 25 - 48/277	80 A	2 x 16 mm ²	M5	5 Nm
Sierra 25 - 380/277	40 A	2 x 10 mm ²	M5	5 Nm

7.2.5 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	MCB per shelf	Cable, min	Connector	Torque
Sierra 25 - 48/277 & Sierra 25 - 380/277	2P 63 A	3 x 16 mm ²	M5	5 Nm

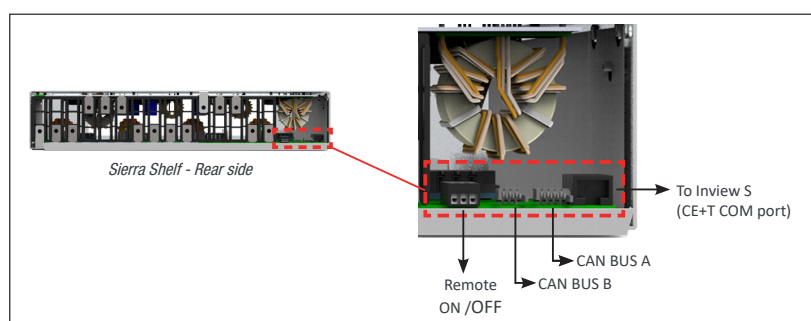
Note: Icc value measured as 75 Arms per shelf with four modules.

7.2.6 AC Output connection

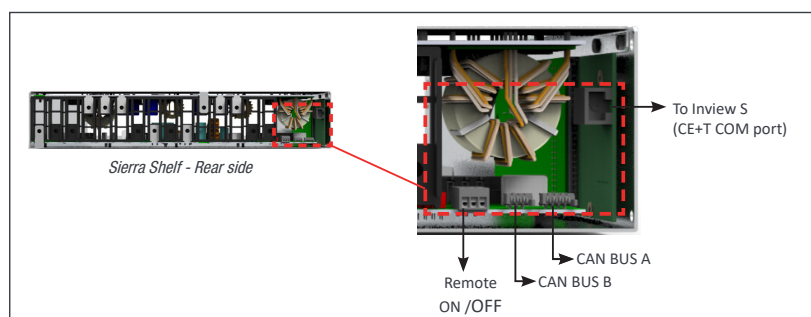
Model	MCB per shelf	Cable, min	Connector	Torque
Sierra 25 - 48/277 & Sierra 25 - 380/277	2P 63 A	3 x 16 mm ²	M5	5 Nm

7.2.7 Signalling

7.2.7.1 Sierra 25 - 48/277



7.2.7.2 Sierra 25 - 380/277



7.2.8 Remote ON/OFF

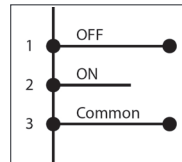
The function of remote ON/OFF is used turn off the module/system output.

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!

7.2.9 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.



7.2.10 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

7.2.11 Grid Interactive Installation

For grid interactive application, route the AC input to the shelf using anti-islanding device with contactor and RCD breaker setup, to pass the IEC62109-1 and IEC62109-2 safety requirements. For detailed information, refer to “17.3 Grid Interactive application schematics”, page 40

- Anti-islanding device - ZIEHL UFR1001E or similar.
- Contactor - rated 63 A, 230 V coil.
- RCD - rated 30 mA, Type B.
- AC input breaker - rated 63 A.

Below are the Inrush currents measured for 1 shelf + 4 modules setup.

- At AC input - 50 A for 10 ms.
- At DC input - 125 A for 4 ms (for 48 Vdc model).
- At DC input - 235 A for 25 μ s (for 380 Vdc model).
- At AC output - 50 A for 10 ms.

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. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

7.2.11.1 Photovoltaic Cell Installation

This Product does not have direct PV port. Either PV charge controller (at DC port with Battery connections) or PV inverter (AC output port) needs to be installed in between the PV panel and the Inverter ports. Reinforced transformer isolation is available between DC port and AC ports. For detailed information, refer to “17.3 Grid Interactive application schematics”, page 40.

The inverter and the array must be installed in closed electrical operating areas. The residual current monitoring is not inbuilt with the Inverter. System integrator must use the RCD recommendation as per PV charge controller and PV inverter device used in the grid interactive system. The DC-DC side isolation transformer complies with 30 mA touch current limit. The insulation resistance of the DC-DC isolation transformer is 1.68 Mega Ohm.

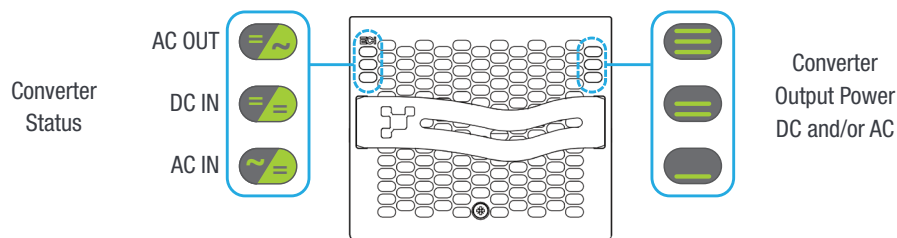
7.2.11.2 Battery Information

This product supports many battery types such as Lead acid, Lithium Ion, Ni-MH, etc. To configure the charger information, please refer to Inview user manual. The number of batteries must be calculated based on cell voltage and nominal voltage. The size of the batteries must be calculated based on the back-up time. The charging current of the batteries must be calculated based on the battery datasheet.

- Nominal Voltages - 48 Vdc / 336 Vdc.

8. Operation

8.1 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)

9. Inserting/removing/replacing - modules

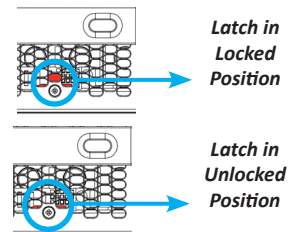
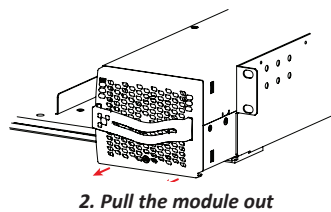
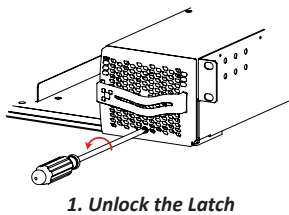
9.1 Sierra Converter

- 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.

9.1.1 Removal

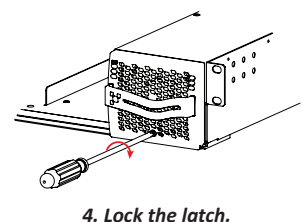
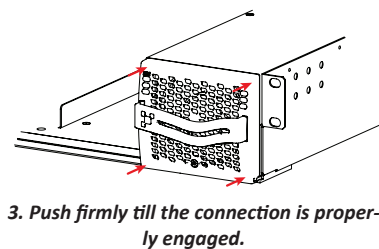
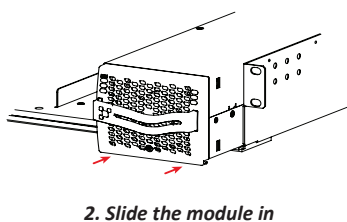
Notice: When one or several converter modules is/are removed access to live parts becomes possible. Replace module(s) with dummy cover without delay.

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 dummy cover.




9.1.2 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.



9.2 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



10. AC Output Distribution

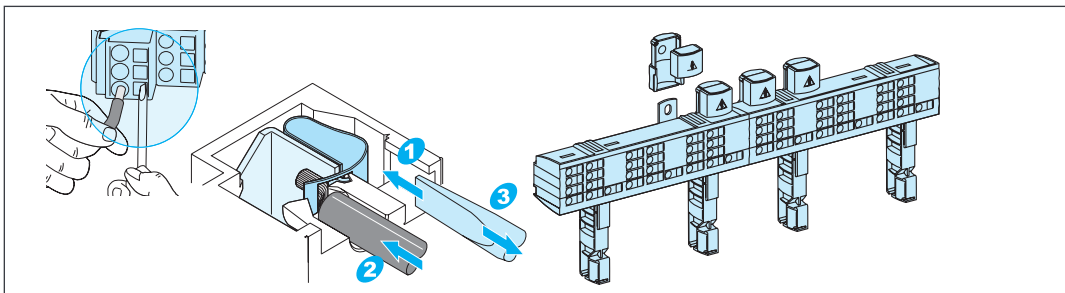
10.1 Miniature Circuit breaker Installation/Removal

Circuit breakers are normally factory installed.

How to add breakers:

1. Insert the short connection cable (10 mm² (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



10.2 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.



11. 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 11.2, page 28

11.1 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.

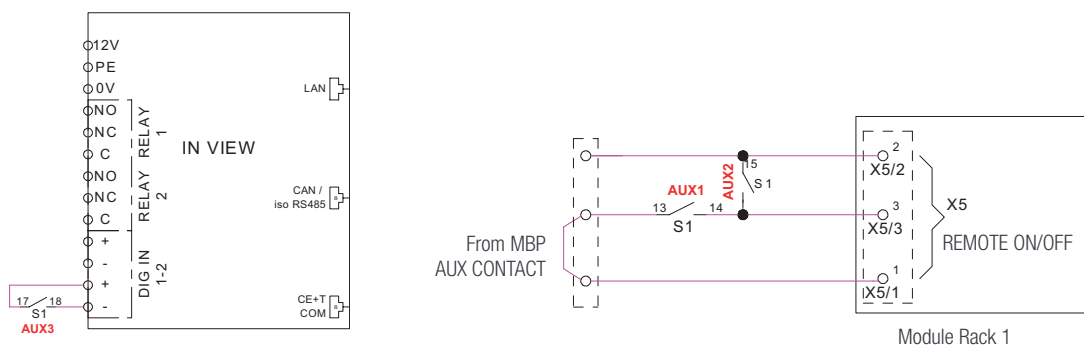
11.2 MBP Auxiliary connection

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

- MBP - Single rotary switch

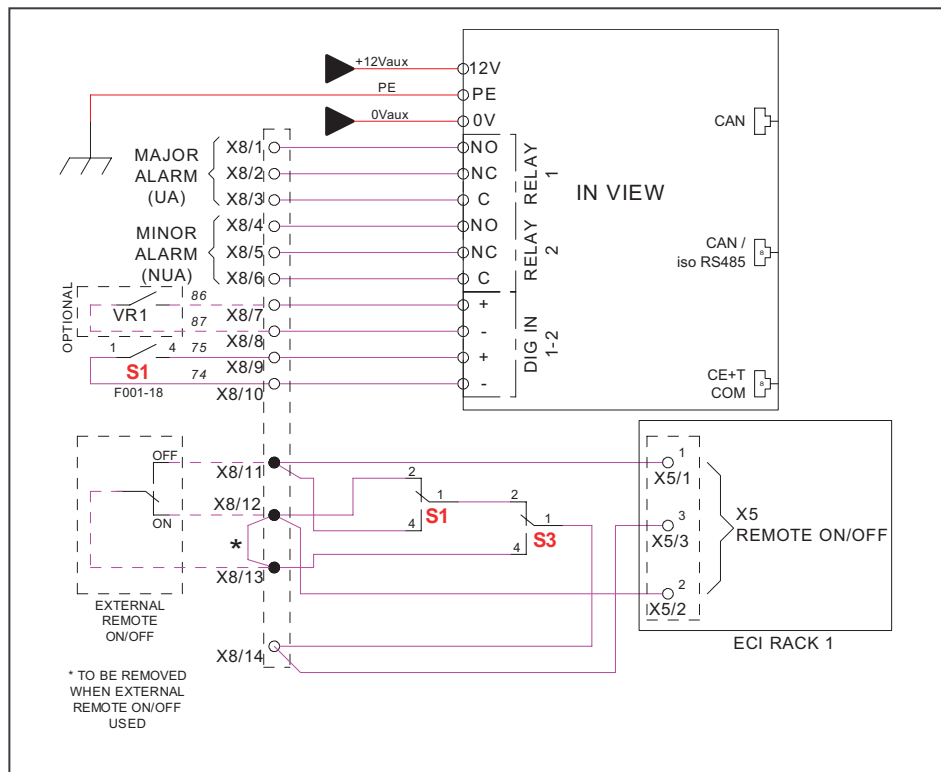
Note: The below connection is for a sub-rack system, and auxiliary (Aux) number varies depending upon the MBP switch. So it is recommended to refer the technical sheet received along with the system.

- 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.



11.3 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

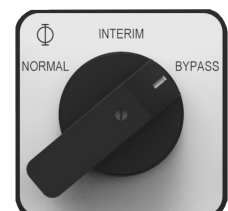
The sierra system has a single rotary switch or three individual switches depending upon the system configuration, and the operation also varies for each model.

11.3.1 MBP - Single rotary switch

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

11.3.1.1 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.

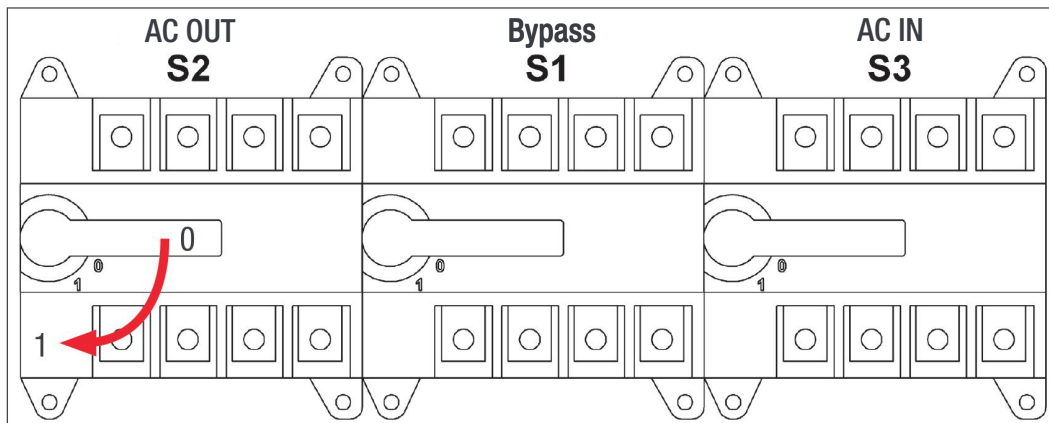


11.3.1.2 By-Pass to Normal

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**.

11.3.2 MBP - Three individual switches

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



11.3.2.1 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

11.3.2.2 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

12. 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 converter/controller positions are left open.
- Cover empty converter 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.

13. 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.

13.1 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 converter 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 TCP/IP 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)	

14. Trouble Shooting and Defective Situations Fixing

14.1 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:

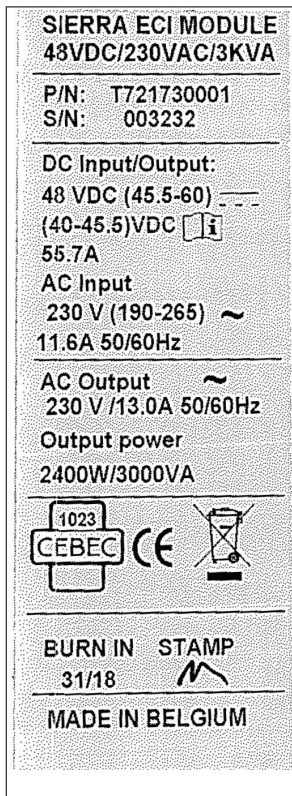
- Check the type of event and log file in the controller

No alarm:

- Check relay delay time of alarms in the controller
- Check configuration file

14.2 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 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! (Label shown here is only for representation)



15. Maintenance

Maintenance should be performed by properly trained people.

15.1 Access Inview controller 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 converter mapping (DC group/AC group/ Address).

15.2 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..

15.3 Optional

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

15.4 Manual By-Pass

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

15.5 Disconnection of Grid Interactive Application



RISK OF DANGER - Please follow the below instructions before starting maintenance.



**CAUTION, RISK OF ELECTRIC SHOCK.
RISK OF VOLTAGE BACKFEED.**



**5 MINUTES,
ENERGY STORAGE TIMED DISCHARGE**

- Switch off the AC input breaker of the Anti-Islanding box.
- Switch off the DC input breakers of the shelf.
- Switch off the AC output breaker of the shelf.
- Check that all the ports are de-energized, using a multimeter.
- Dismantle the shelf for maintenance.

For detailed information, refer to “17.3 Grid Interactive application schematics”, page 40

16. Service

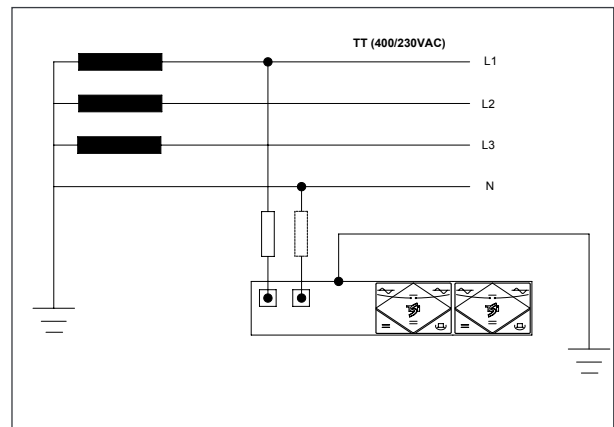
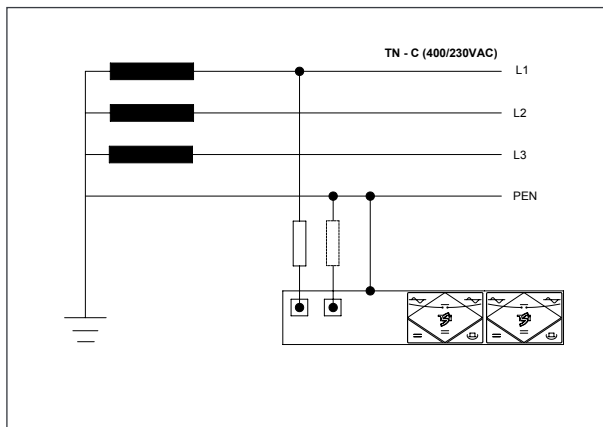
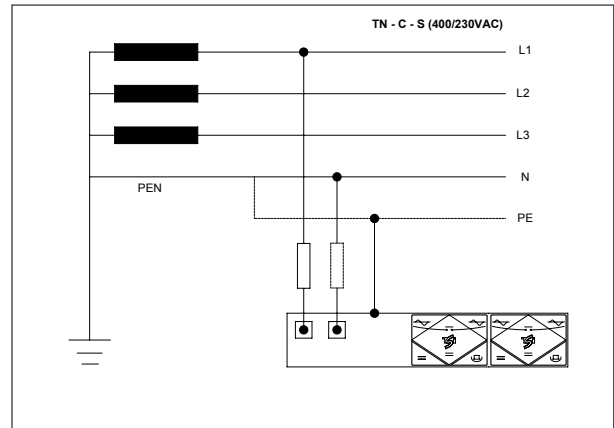
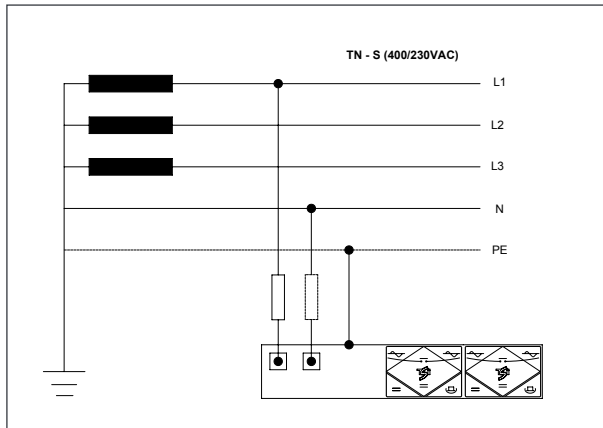
For Service

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

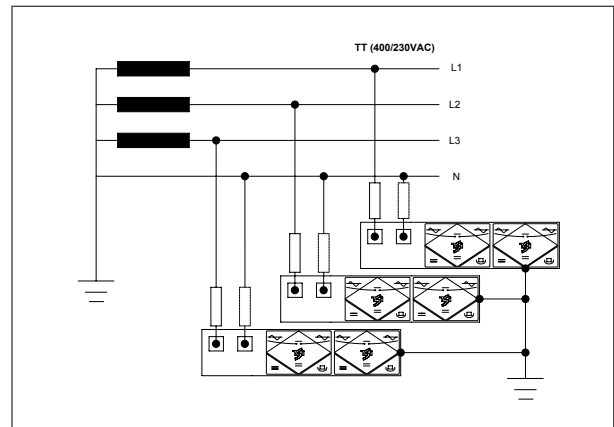
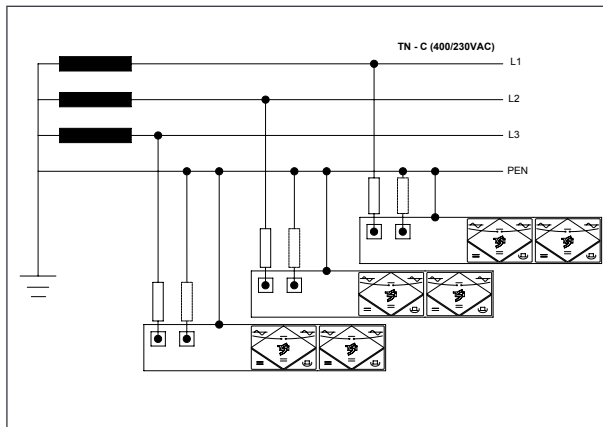
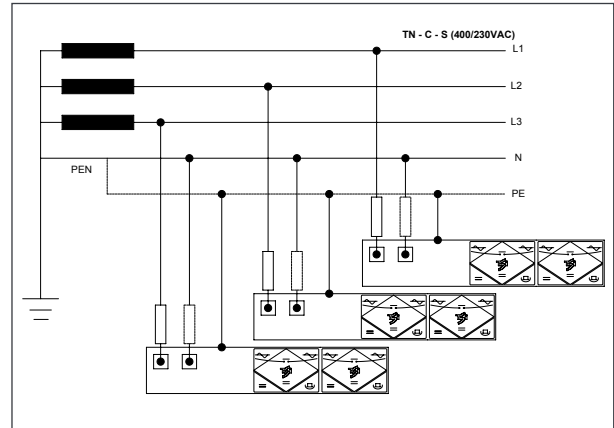
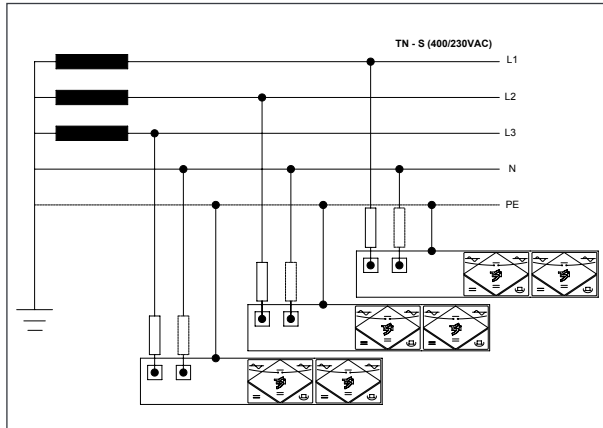
(*) CE+T will redirect your call to your vendor if he has such SLA in place.

17. Appendix

17.1 Mains connection, Single phase

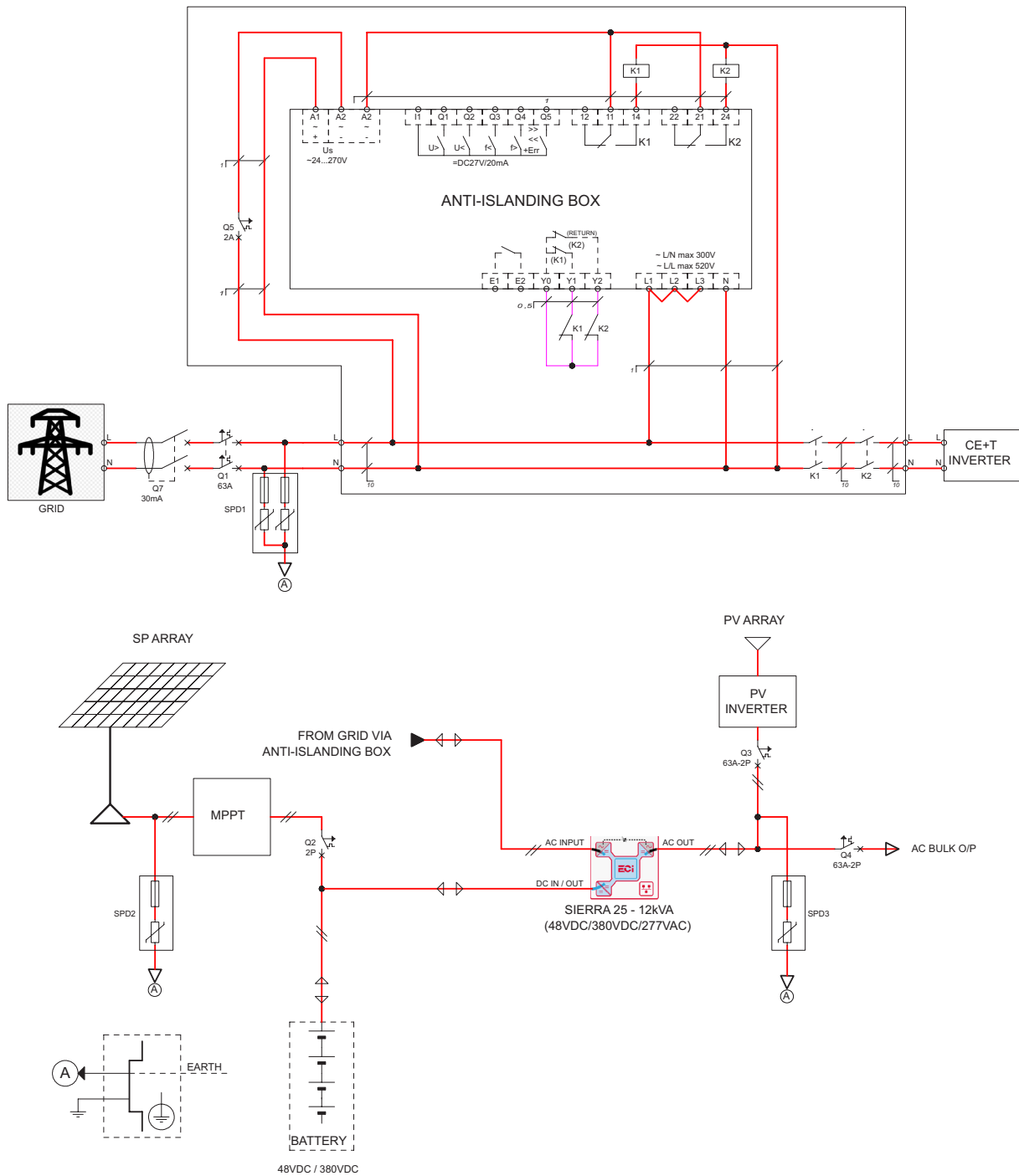


17.2 Mains connection, Three phases

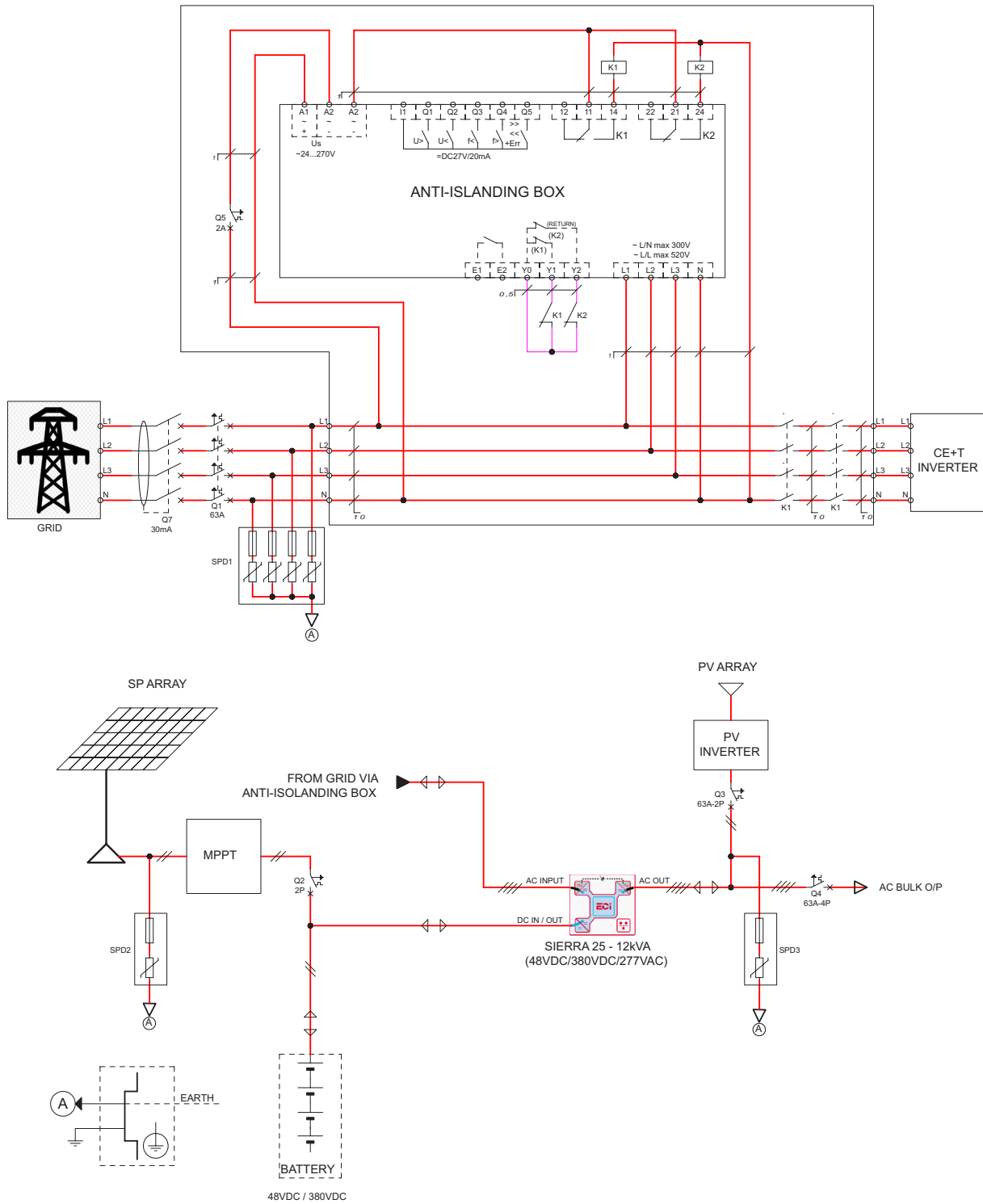


17.3 Grid Interactive application schematics

17.3.1 Single Phase application



17.3.2 Three Phase application



17.4 Modules - Parameter List

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	2850	2850	2850	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	2900	2900	2900	dV
V AC in high stop - dV (011)	AC IN Voltage where a higher value leads to stop the AC IN converter	2950	2950	2950	dV
F AC in low start - cHz (012)	Frequency where a higher value leads the outlet of the converters 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 converters stop to synchronize with AC IN	4700	4700	6300	cHz
F AC in high start - cHz (014)	Frequency where a lower value leads the converters outlet to synchronize with AC IN	4700	5270	6300	cHz

Parameter	Description	Min	Default	Max	Unit
F AC in high stop - cHz (015)	Frequency where a higher value leads the converters outlet to stop to synchronize with AC IN	4700	5300	6300	cHz
Free running frequency - cHz (016)	Set the Converters 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

Parameter	Description	Min	Default	Max	Unit
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	
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 converter).	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 converter 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 converter is build with extra capacitor running on 400VDC to provide the requested energy.	0	0	1	

Parameter	Description	Min	Default	Max	Unit
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	
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				

