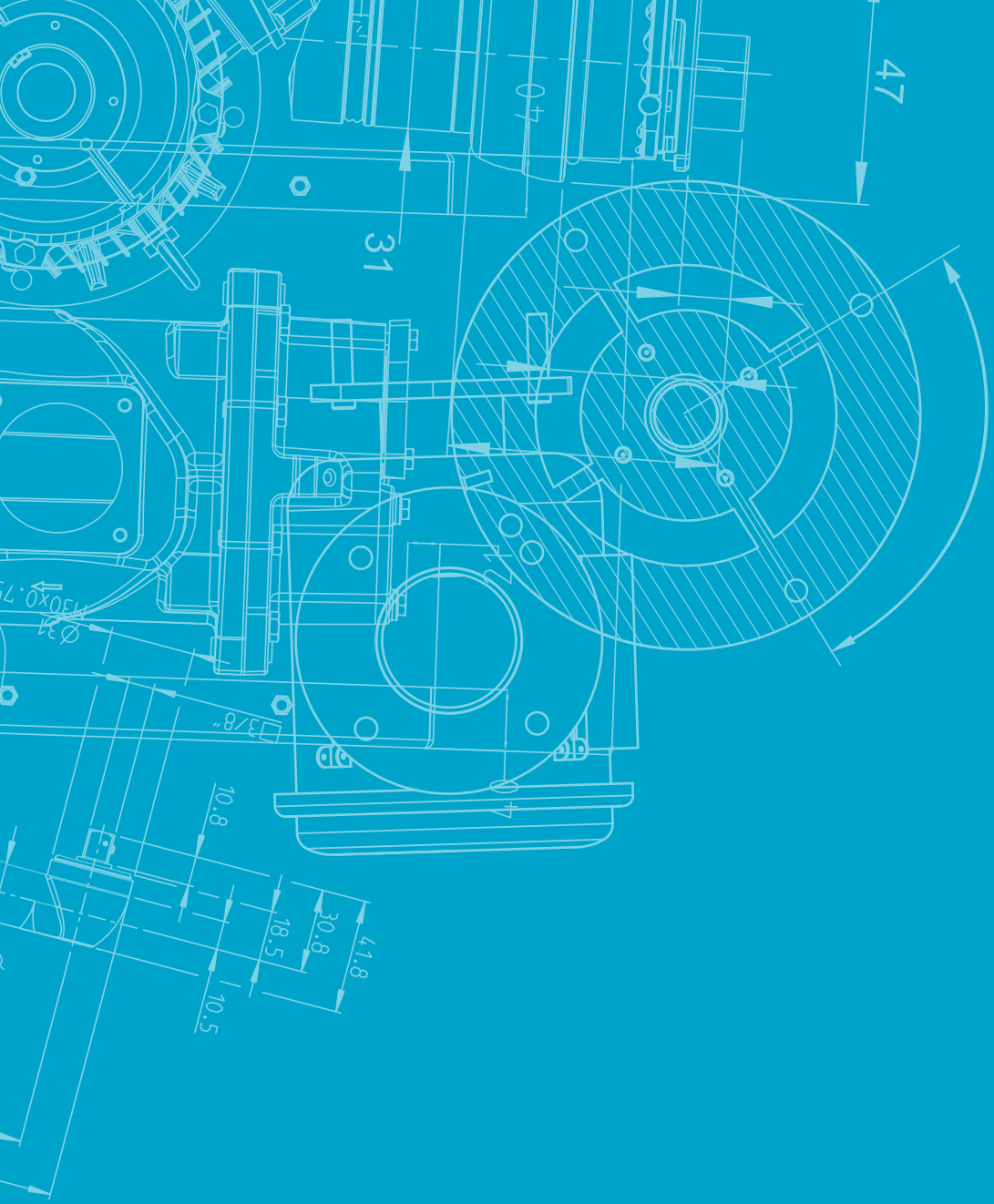


Instruction book

Energy Storage Systems (ESS)

ZBP 15-60, ZBP 35-40, ZBP 45-60, ZBP 45-75 ESF

Atlas Copco

Energy Storage Systems (ESS)

ZBP 15-60, ZBP 35-40, ZBP 45-60, ZBP 45-75 ESF

Instruction book

Original instructions

WARNING

Read all safety warnings, instructions, illustrations and specifications provided with this product. Failure to follow all instructions listed in this instruction book may result in personal injury, death and/or property damage.

This instruction book is valid for CE, non-CE as well as UKCA labelled machines. It meets the requirements for instructions specified by the applicable European directives or UK statutory instruments as identified in the Declaration of Conformity.

2025 October

No. 2960850001

www.atlascopco.com

Table of contents

1 Safety precautions

1.1 Introduction

The policy of Atlas Copco is to provide the users of their equipment with safe, reliable and efficient products. Factors taken into account are among others:

- the intended and predictable future use of the products, and the environments in which they are expected to operate,
- applicable rules, codes and regulations,
- the expected useful product life, assuming proper service and maintenance,
- providing the manual with up-to-date information.

Before handling any product, take time to read the relevant instruction manual. Besides giving detailed operating instructions, it also gives specific information about safety, preventive maintenance, etc.

Keep the manual always at the unit location, easy accessible to the operating personnel.

See also the safety precautions of other equipment, which are separately sent along or are mentioned on the equipment or parts of the unit.

These safety precautions are general and some statements will therefore not always apply to a particular unit.

Only people that have the right skills should be allowed to operate, adjust, perform maintenance or repair on Atlas Copco equipment. It is the responsibility of management to appoint operators with the appropriate training and skill for each category of job.

Skill level 1: Operator

An operator is trained in all aspects of operating the unit with the push-buttons, and is trained to know the safety aspects.

Skill level 2: Mechanical technician

A mechanical technician is trained to operate the unit the same as the operator. In addition, the mechanical technician is also trained to perform maintenance and repair, as described in the instruction manual, and is allowed to change settings of the control and safety system. A mechanical technician does not work on live electrical components.

Skill level 3: Electrical technician

An electrical technician is trained and has the same qualifications as both the operator and the mechanical technician. In addition, the electrical technician may carry out electrical repairs within the various enclosures of the unit. This includes work on live electrical components.

Skill level 4: Specialist from the manufacturer

This is a skilled specialist sent by the manufacturer or its agent to perform complex repairs or modifications to the equipment.

In general it is recommended that not more than two people operate the unit, more operators could lead to unsafe operating conditions. Take necessary steps to keep unauthorized persons away from the unit and eliminate all possible sources of danger at the unit.

When handling, operating, overhauling and/or performing maintenance or repair on Atlas Copco equipment, the mechanics are expected to use safe engineering practices and to observe all relevant local safety requirements and ordinances. The following list is a reminder of special safety directives and precautions mainly applicable to Atlas Copco equipment.

Neglecting the safety precautions may endanger people as well as environment and machinery:

- endanger people due to electrical, mechanical or chemical influences,
- endanger the environment due to leakage of, solvents or other substances,
- endanger the machinery due to function failures.

All responsibility for any damage or injury resulting from neglecting these precautions or by non-observance of ordinary caution and due care required in handling, operating, maintenance or repair, also if not expressly mentioned in this instruction manual, is disclaimed by Atlas Copco.

The manufacturer does not accept any liability for any damage arising from the use of non-original parts and for modifications, additions or conversions made without the manufacturer's approval in writing.

If any statement in this manual does not comply with local legislation, the stricter of the two shall be applied.

Statements in these safety precautions should not be interpreted as suggestions, recommendations or inducements that it should be used in violation of any applicable laws or regulations.

Atlas Copco is also not responsible for patent infringement or violation of any rights of third parties arising out of the use of the ESS. Atlas Copco reserves the right to make changes regarding the technical specifications of this product without prior notice.

1.2 General safety precautions

- The owner is responsible for maintaining the unit in a safe operating condition. Unit parts and accessories must be replaced if missing or unsuitable for safe operation.
- The supervisor, or the responsible person, shall at all times make sure that all instructions regarding machinery and equipment operation and maintenance are strictly followed and that the machines with all accessories and safety devices, as well as the consuming devices, are in good repair, free of abnormal wear or abuse, and are not tampered with.
- Whenever there is an indication or any suspicion that an internal part of a machine is overheated, the machine shall be stopped but no inspection covers shall be opened before sufficient cooling time has elapsed.
- Normal ratings (pressures, temperatures, speeds, etc.) shall be durably marked.
- Operate the unit only for the intended purpose and within its rated limits (pressure, temperature, speeds, etc.).
- The machinery and equipment shall be kept clean, i.e. as free as possible from dust or other deposits.
- To prevent an increase in working temperature, inspect filters regularly. See the *maintenance schedule*.
- All regulating and safety devices shall be maintained with due care to ensure that they function properly. They may not be put out of action.
- Safety devices shall be tested as described in the maintenance schedule of the instruction manual to determine that they are in good operating condition.
- Mind the markings and information labels on the unit.

- In the event the safety labels are damaged or destroyed, they must be replaced to ensure operator safety.
- Keep the work area neat. Lack of order will increase the risk of accidents.
- When working on the unit, wear safety clothing. Depending on the kind of activities these are: safety glasses, ear protection, safety helmet (including visor), safety gloves, protective clothing, safety shoes. Do not wear the hair long and loose (protect long hair with a hairnet), or wear loose clothing or jewelry.
- Take precautions against fire. Keep a fire-extinguisher in the vicinity.
-

WARNING

The ESS is suitable for use in outdoor areas. Protection against moisture is equivalent to the class IPX5 (splash water protection).

ESS (with earthing pin): Earth the pack of batteries as well as the load properly. During operation, hazardous voltages can be present at the ESS surroundings. Work on or in the vicinity of the device is only allowed to be performed by qualified electricians. Before each job (maintenance and repair) of the ESS, the device must be taken out of service by pressing the emergency off switch! All consumers and voltage sources (generator, network or similar) must be removed from the ESS surroundings. Otherwise, the ESS or a connected generator could automatically start (under certain circumstances). Even routine maintenance may only be carried out by qualified electricians.

It must therefore be ensured that, during the work on the electrical system, the device is stress-free, i.e. separated from the generator or mains (AC voltage). Even if the ESS has been separated from its voltage source (generator or grid), there may still be a dangerous voltage present at the outputs. To avoid this, the emergency off switch must be pressed. Inputs and outputs are separated by all Poles. All electrical components are discharged after 30 seconds and the respective work can then be carried out safely.

If a thunderstorm occurs in the immediate vicinity of the ESS, disconnect all electrical devices from the ESS and press the emergency off switch or the main switch! Overvoltage hazard! Cleaning with steam radiators, high pressure cleaners, hard water jet or similar devices is not allowed.

1.3 Safety during transport and installation

To lift a unit, all loose or pivoting parts, e.g. doors, shall first be securely fastened.

Do not attach cables, chains or ropes directly to the lifting eye; apply a crane hook or lifting shackle meeting local safety regulations. Never allow sharp bends in lifting cables, chains or ropes.

Helicopter lifting is not allowed.

It is strictly forbidden to dwell or stay in the risk zone under a lifted load. Never lift the unit over people or residential areas. Lifting acceleration and deceleration shall be kept within safe limits.

- In case of transporting a non-trailer unit on a truck, fasten it to the truck by attaching straps mainly via the marked roof guides and additionally via the fork lift holes, via the holes in the frame at the front and back or via the lifting beam. To prevent damage, never put straps on the roof surface of the unit.
- To lift heavy parts, a hoist of ample capacity, tested and approved according to local safety regulations, shall be used.

- Lifting hooks, eyes, shackles, etc., shall never be bent and shall only have stress in line with their design load axis. The capacity of a lifting device diminishes when the lifting force is applied at an angle to its load axis.
- Lifting eye of the unit can only be used when the environment temperature is between -20°C and 80°C.
- For maximum safety and efficiency of the lifting apparatus all lifting members shall be applied as near to perpendicular as possible. If required, a lifting beam shall be applied between hoist and load.
- Never leave a load hanging on a hoist.
- A hoist has to be installed in such a way that the object will be lifted perpendicular. If that is not possible, the necessary precautions must be taken to prevent load-swinging, e.g. by using two hoists, each at approximately the same angle not exceeding 30° from the vertical.
- ESSs shall be stalled on an even, solid floor, in a clean location with sufficient ventilation. If the floor is not level or can vary in inclination, consult Atlas Copco.
- The electrical connections shall correspond to local codes. The machines shall be earthed and protected against short circuits by fuses or circuit breakers.
- Never connect the ESS outlets to an installation which is also connected to a public mains.
- Before connecting a load, switch off the corresponding circuit breaker, and check whether frequency, voltage, current and power factor comply with the ratings of the pack of batteries.
- Before transportation of the unit, switch off all the circuit breakers.

1.4 Safety during use and operation

- When operating in a dust-laden atmosphere, place the unit so that dust is not carried towards it by the wind. Operation in clean surroundings considerably extends the intervals for cleaning the air intake filters and the cores of the coolers.
- All doors shall be shut during operation so as not to disturb the cooling air flow inside the bodywork and/or render the silencing less effective.
- Periodically carry out maintenance works according to the maintenance schedule.
- Stationary housing guards are provided on all rotating or reciprocating parts not otherwise protected and which may be hazardous to personnel. Machinery shall never be put into operation, when such guards have been removed, before the guards are securely reinstalled.
- Noise, even at reasonable levels, can cause irritation and disturbance which, over a long period of time, may cause severe injuries to the nervous system of human beings.
- When the sound pressure level, at any point where personnel normally has to attend, is:
    - below 70 dB(A): no action needs to be taken,
    - above 70 dB(A): noise-protective devices should be provided for people continuously being present in the room,
    - below 85 dB(A): no action needs to be taken for occasional visitors staying a limited time only,
    - above 85 dB(A): room to be classified as a noise hazardous area and an obvious warning shall be placed permanently at each entrance to alert people entering the room, for even relatively short times, about the need to wear ear protectors,
    - above 95 dB(A): the warning(s) at the entrance(s) shall be completed with the recommendation that also occasional visitors shall wear ear protectors,
    - above 105 dB(A): special ear protectors that are adequate for this noise level and the spectral composition of the noise shall be provided and a special warning to that effect shall be placed at each entrance.

- This unit can work together with a generator, which can cause high sound pressure levels, so could be necessary some of this previous actions.
- Never operate the unit in surroundings where there is a possibility of taking in flammable or toxic fumes.
- If the working process produces fumes, dust or vibration hazards, etc. (hybrid mode with generator), take the necessary steps to eliminate the risk of personnel injury.
- When using compressed air or inert gas to clean down equipment, do so with caution and use the appropriate protection, at least safety glasses, for the operator as well as for any bystander. Do not apply compressed air or inert gas to your skin or direct an air or gas stream at people. Never use it to clean dirt from your clothes.
- Safety shoes should be compulsory in any workshop and if there is a risk, however small, of falling objects, wearing of a safety helmet should be included.
- If there is a risk of inhaling hazardous gases, fumes or dust, the respiratory organs must be protected and depending on the nature of the hazard, so must the eyes and skin.
- Remember that where there is visible dust, the finer, invisible particles will almost certainly be present too; but the fact that no dust can be seen is not a reliable indication that dangerous, invisible dust is not present in the air.
- Never operate the ESS in excess of its limits as indicated in the technical specifications.
- Do not open electrical cabinets, cubicles or other equipment while voltage is supplied. If such cannot be avoided, e.g. for measurements, tests or adjustments, have the action carried out by a qualified electrician only, with appropriate insulated tools, and ascertain that the required bodily protection against electrical hazards is applied.
- Never touch the power terminals during operation of the machine.
- Whenever an abnormal condition arises, e.g. excessive vibration, noise, odor, etc., switch the circuit breakers to OFF and stop the ESS. Correct the faulty condition before restarting.
- Check the electric cables regularly. Damaged cables and insufficient tightening of connections may cause electric shocks. Whenever damaged wires or dangerous conditions are observed, switch the circuit breakers to OFF. Replace the damaged wires or correct the dangerous condition before restarting. Make sure that all electric connections are securely tightened.
- Avoid overloading the ESS, it is provided with circuit breakers for overload protection. When a breaker has tripped, reduce the concerned load before restarting.
- Never remove the cover of the output terminals during operation. Before connecting or disconnecting wires, switch off the load and the circuit breakers, stop the machine and make sure that the machine cannot be started inadvertently or there is any residual voltage on the power circuit.
- When operating the ESS in Remote or Auto mode, observe all relevant local legislation.

1.5 Safety during maintenance and repair

Maintenance, overhaul and repair work shall only be carried out by adequately trained personnel; if required, under supervision of someone qualified for the job.

- Use only the correct insulated tools for maintenance and repair work, and only tools which are in good condition.
- Parts shall only be replaced by genuine Atlas Copco replacement parts.
- All maintenance work, other than routine attention, shall only be undertaken when the unit is stopped. Steps shall be taken to prevent inadvertent starting. In addition, a warning sign bearing a legend such as “work in progress; do not start” shall be attached to the starting equipment.

On electrically driven units the main switch shall be locked in open position and the fuses shall be taken out. A warning sign bearing a legend such as “work in progress; do not supply voltage” shall be attached to the fuse box or main switch.

- Prior to stripping a fan or undertaking major overhaul on it, disconnect to prevent any moving.
- Make sure that no tools, loose parts or rags are left in or on the machine. Never leave rags or loose clothing near the engine air intake.
- Never use solvents for cleaning (components damage and fire risk).
- Take safety precautions against toxic vapors of cleaning liquids.
- Never use machine parts as a climbing aid.
- Observe scrupulous cleanliness during maintenance and repair. Keep away dirt, cover the parts and exposed openings with a clean cloth, paper or tape.
- Do not remove any of, or tamper with, the sound damping material. Keep the material free of dirt and liquids such as cleansing agents. If any sound damping material is damaged, replace it to prevent the sound pressure level from increasing.
- When performing any operation involving heat, flames or sparks on a machine, the surrounding components shall first be screened with nonflammable material.
- Never use a light source with open flame for inspecting the interior of a machine.
- Check the direction of rotation of electric motors when starting up the machine initially and after any alteration to the electrical connection(s) or switch gear, to check that the pumps and the fans function properly.
- Maintenance and repair work should be recorded in an operator’s logbook for all machinery. Frequency and nature of repairs can reveal unsafe conditions.
- When hot parts have to be handled, e.g. shrink fitting, special heat-resistant gloves shall be used and, if required, other body protection shall be applied.
- When using cartridge type breathing filter equipment, ascertain that the correct type of cartridge is used and that its useful service life is not surpassed.
- Make sure that solvents and other substances likely to pollute the environment are properly disposed of.
- Before clearing the ESS for use after maintenance, submit it to a test run, check that the AC power performance is correct and that the control and shutdown devices function correctly.

All precautions regarding batteries: see section *Battery safety precautions*.

1.6 Tool applications safety

Apply the proper tool for each job. Knowing how to use the right tools and limitations, along with common sense, can prevent many accidents.

Special service tools are available for specific jobs and should be used when recommended. The use of these tools will save time and prevent damage to parts. Only insulated tools are allowed.

1.7 Battery safety precautions

While working on the Li-ion Battery wear protective eyeglasses and clothing.

- Observe these instructions and keep them located near the Li-ion Battery for future reference.

  Work on the Li-ion Battery should be carried out by qualified personnel only.

- Any uncovered battery material such as electrolyte or powder on the skin or in the eyes must be flushed with plenty of clean water immediately. Then seek medical assistance. Spillages on clothing should be rinsed out with water.
- Explosion and fire hazard.

  Terminals of the Li-ion Battery are always a live; therefore do not place items or tools on the Li-ion Battery. Avoid short circuits, too deep discharges and too high charge currents. Use insulated tools. Do not wear any metallic items such as watches, bracelets, etc. In case of fire, you must use a type D, foam or CO_2 fire extinguisher.
- Never try to open or dismantle the Li-ion Battery. Electrolyte is very corrosive. In normal working conditions contact with the electrolyte is impossible. If the battery casing is damaged do not touch the exposed electrolyte or powder because it is corrosive.
- Too deep discharges damage the Li-ion battery seriously and can even be dangerous. Therefore, use of an external safety relay is obligatory.
- Li-ion Batteries are heavy. If involved in an accident they can become a projectile. Ensure adequate and secure mounting and always use suitable handling equipment for transportation.

  Handle with care because Li-ion Batteries are sensitive to mechanical shock.
- If charged after the Li-ion battery was discharged below the Discharge cut-off voltage, or when the Li-ion battery is damaged or overcharged, the Li-ion battery can release a harmful mixture of gasses such as phosphate.
- Non-compliance with operating instructions, repairs made with other than original parts, or repairs made without authorization render the warranty void.
- The Li-ion battery must be transported in its original or equivalent package and in an upright position.

  If the battery is in its package, use soft slings to avoid damage.

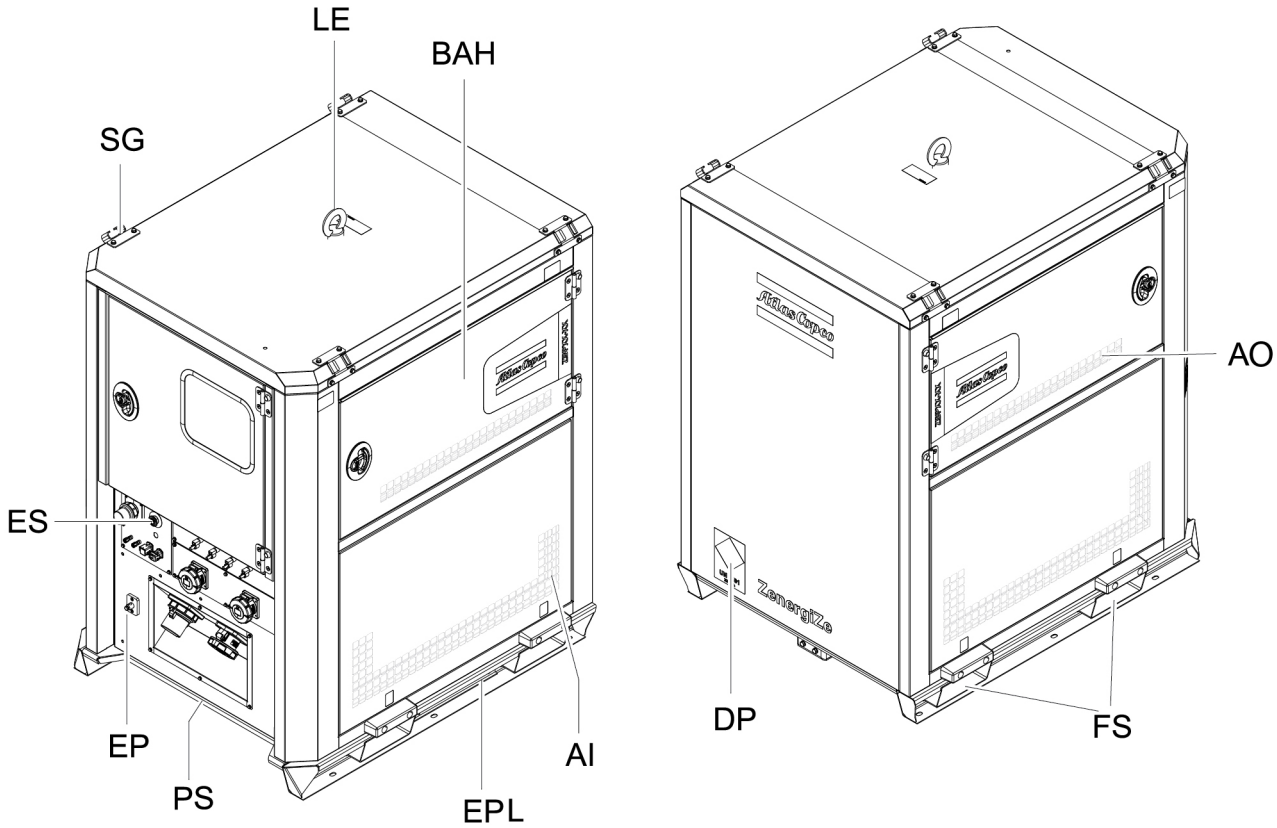
  Do not stand below a Li-ion battery when it is hoisted. Never lift the battery at the terminals, only lift the battery at the handles.
- Batteries are tested according to UN Handbook of Tests and Criteria, part III, sub section 38.3 (ST/SG/ AC.10/11/Rev.5).

  For transport the batteries belong to the category UN3480, Class 9, Packaging Group II and have to be transported according to this regulation. This means that for land and sea transport (ADR, RID & IMDG) they have to be packed according to packaging instruction P903 and for air transport (IATA) according to packaging instruction P965. The original packaging satisfies these instructions.

2 Main parts

2.1 General description

ZenergiZe modular ESS design to meet the requirements of applications such as rental, events and telecom. Ideal for any metropolitan job or event. Based in lithium ion batteries, this portable product is ready to supply power in the most demanding situation, working in island mode or a hybrid solution together with a diesel generator. Giving flexibility to the final product with a list of options such as solar panel connection to increase its sustainability or cold weather kit for the most critical environments. A greener solution for a more efficient performance.

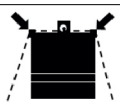


Reference	Description	Reference	Description
AI	Air inlets	ES	Emergency stop
AO	Air outlet	FS	Forklift slots
BAH	Batteries access hatch	LE	Lifting eye
DP	Data plate	PS	Pallet slot
EP	Earthing point	SG	Sling guides
EPL	Earth pin location		

2.2 Markings and labels

Markings provide instructions and information. They also warn of hazards. For convenience and safety, keep all markings in legible condition, replacing them when damaged or missing. Replacement markings are available from the factory.

A brief description of all markings provided on the ESS is given hereafter. The precise location of all markings can be found in the parts manual of this ESS.

Markings	Description
	Indicates that an electric voltage,dangerous to life, is present. Never touch the electric terminals during operation.
	Indicates that these parts can become very hot during operation (e.g. engine, cooler, etc.). Always make sure that these parts are cooled down before touching them.
	Indicatesthe forklift slots.
	Indicates that the machine should not be cleaned with high pressurised water.
	Indicates that the unit may start automatically and that the instruction book has to be consulted prior to use.
	Read the instruction manual before using the lifting eye.
	Indicates the location of the battery. Avoid water ingress as this could cause short circuits.
	Indicates the earthing connections on the ESS.
	Indicates the roof guides.
	Indicates that the unit contains a chargeable battery.
	Indicates that the unit contains lithium cells or batteries.

2.3 Mechanical features

The mechanical features described in this chapter are standard provided on this energy storage pack.

2.3.1 Galvanized skid

To be able to lift the ESS by means of a forklift, a galvanized skid with rectangular slots is provided.

2.3.2 Galvanized and painted canopy

The unit is equipped with a galvanized steel canopy to avoid corrosion. This process means, there is a considerable barrier between the steel plate and air ensuring that the painted surface is not compromised.

The pieces are also cut with a Nitrogen high-pressure laser (prevents from rust while its production). And they are all finished and protected with a powder coating paint.

Also rain caps are placed in the most sensitive parts of the machine to protect from water ingress.

2.3.3 Lifting beam and sling guides

A lifting beam is attached to the unit base frame. This single lifting point will allow to lift easily the ESS.

In order to secure the position while transport, use the guides placed in the roof to avoid any canopy damage with the proper slings.

This is not a lifting system alternative.

2.3.4 Data plate and serial number

The ESS is furnished with a data plate showing the product code, the unit number, the energy stored and the power output. Refer section *Data plate*.

The serial number is located on the front side of the canopy.

2.4 Electrical features

The electrical features described in this chapter are standard provided on this ESS.

2.4.1 Lithium ION batteries

Lithium-iron-phosphate (LiFePO4 or LFP) is the safest of its family. Service life even slightly improves in case of partial charge instead of a full charge. This is a major advantage in addition, its wide operating temperature range, excellent cycling performance, low internal resistance and high efficiency.

LFP is therefore the chemistry of choice for very demanding applications.

Each battery is controlled by the BMS (Battery Management System) that makes possible the communication between components and learn from each performance, as for example, get automatically their cells balanced.

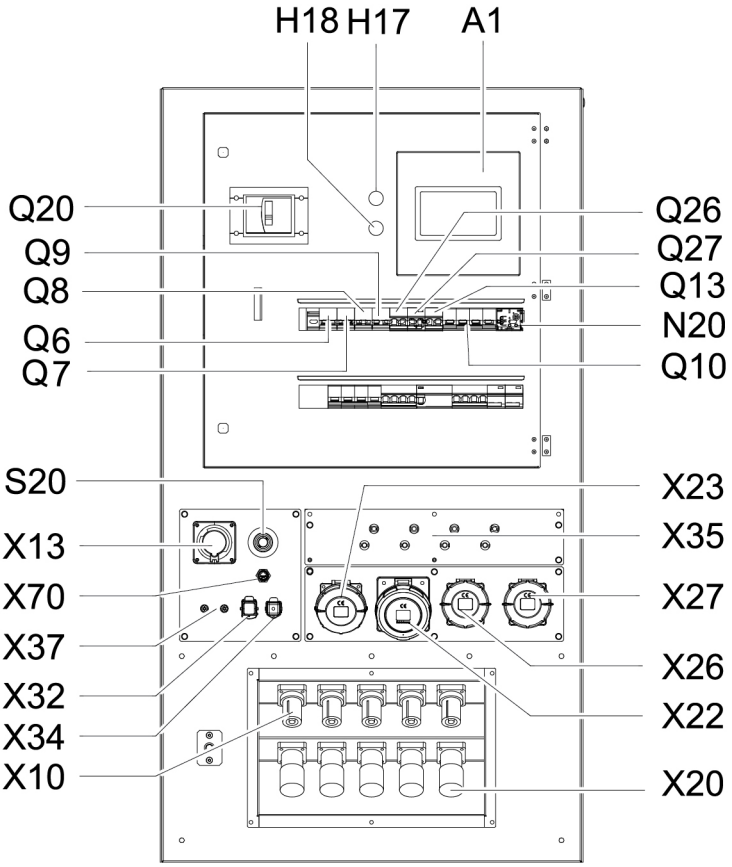
2.4.2 Inverter / battery charger

Power electronics that combines inverter and charger. It is needed to transform the energy supply from batteries (DC) to the loads (AC) with or without additional sources as diesel generators or grid. They can provide to the consumer double of their nominal power during short period (seconds) thanks to its overload capability, enabling the start of inductive loads as electric motors.

2.4.3 Control and power cubicle

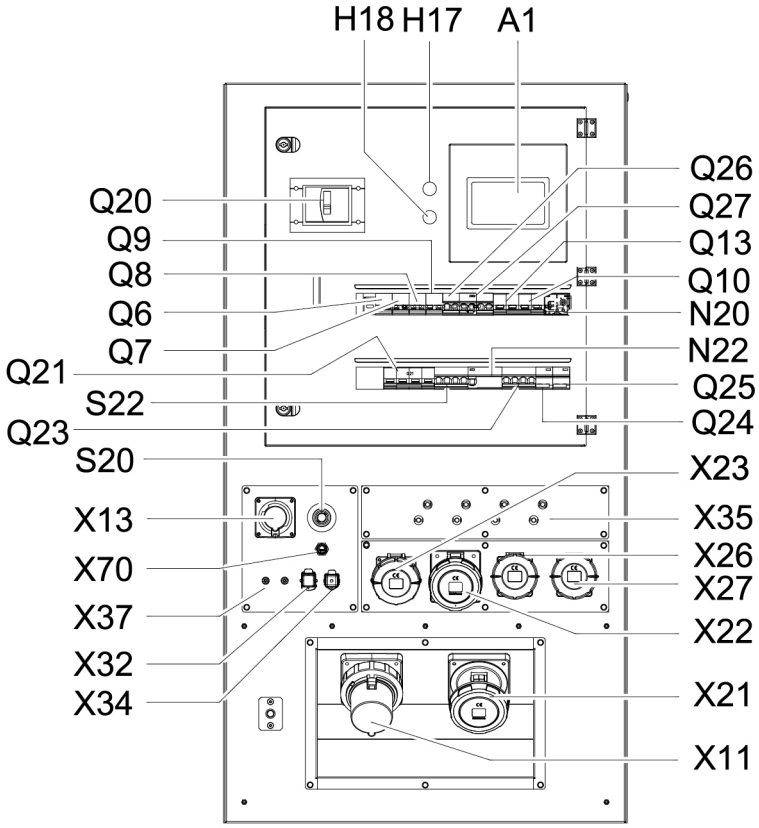
The control cubicle grouping the ESS controller, fuses, automatic switches sockets, etc., is accessible by opening the door at the front.

ZBP 35-40, ZBP 45-60, ZBP 45-74



Reference	Description	Reference	Description
A1	EMS 1	X10	MALE POWER LOCKS
H17	GREEN LAMP 24 VDC	X13	MALE 3P 16A SOCKET
H18	GREEN LAMP 230 VAC	X20	FEMALE POWER LOCKS
Q6	BREAKER 2P 20A DC	X22	FEMALE 5P 63A SOCKET
Q7		X23	FEMALE 5P 32A SOCKET
Q8		X26	FEMALE 3P 16A SOCKET
Q9		X27	FEMALE 3P 16A SOCKET
Q10	BREAKER 4P 100/63A	X32	HARTING CONNECTOR 7P
Q13	BREAKER 2P 16A	X34	HARTING CONNECTOR 4P
Q20	BREAKER 4P 160A	X35	SOLAR CONNECTOR +
Q26	RCBO C16 30MA	X37	SOLAR CONNECTOR -
Q27		X70	RJ45
N20	ELR 30-300mA	S20	EMERGENCY STOP

ZBP 35-40, ZBP 45-60, ZBP 45-74

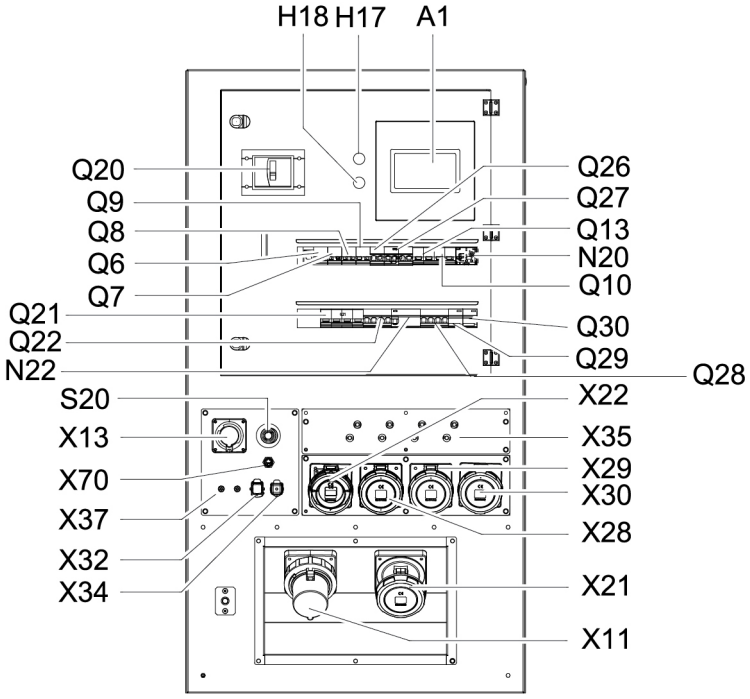


Reference	Description	Reference	Description
Q21	BREAKER 4P 125A	Q25	RCBO 2P 32A 30MA
Q22	BREAKER 4P 63A	N22	RCBO 4P 63A
Q23	BREAKER 4P 32A	X11	MALE 5P 125A SOCKET
Q24	RCBO 2P 32A 30MA	X21	FEMALE 5P 125A SOCKET

NOTE

Refer previous table for rest of the descritptions.

ZBP 35-40, ZBP 45-60, ZBP 45-74

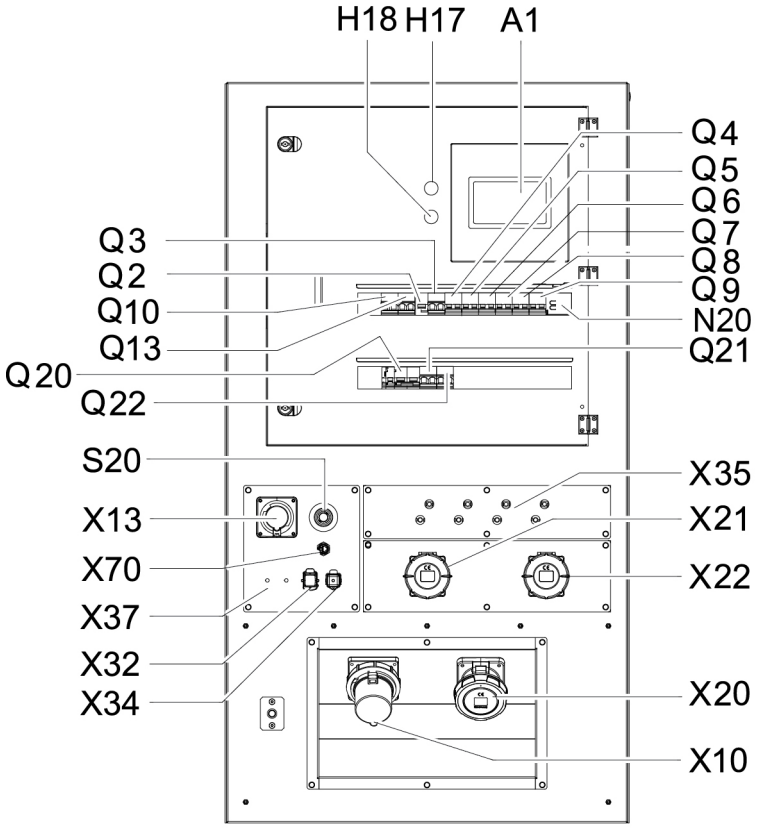


Reference	Description	Reference	Description
Q28	BREAKER 2P 63A	X28	FEMALE 3P 63A SOCKET
Q29		X29	
Q30		X30	

NOTE

Refer previous table for rest of the descritptions.

ZBP 15-60



Reference	Description	Reference	Description
A1	EMS 1	Q21	RCBO 2P 32A 30MA
H17	GREEN LAMP 24 VDC	Q22	RCBO 2P 32A 30MA
H18	GREEN LAMP 230 VAC	N20	ELR 30-300 mA
Q2	BREAKER 1P 2A	X10	MALE 3P 63A SOCKET
Q3	BREAKER 2P 16A	X13	MALE 3P 16A SOCKET
Q4	BREAKER 2P 20A DC	X20	FEMALE 3P 63A SOCKET
Q5	BREAKER 2P 20A DC	X21	FEMALE 3P 32A SOCKET
Q6	BREAKER 2P 20A DC	X22	FEMALE 3P 32A SOCKET
Q7	BREAKER 2P 20A DC	X32	HARTING CONNECTOR 7P
Q8	BREAKER 2P 20A DC	X34	HARTING CONNECTOR 4P
Q9	BREAKER 2P 20A DC	X35	SOLAR CONNECTORS +
Q10	BREAKER 2P 63A	X37	TERMINAL STRIP
Q13	BREAKER 2P 16A	X70	RJ45
Q20	BREAKER 2P 125A	S20	EMERGENCY STOP

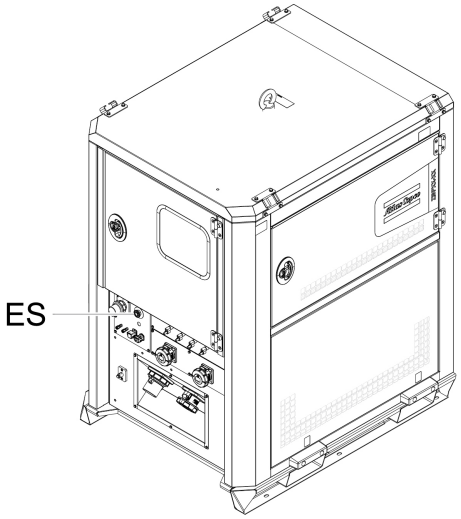
Sockets panel

The ESS is provided with inlet and outlets sockets:

- One main inlet 3-phases socket X21 to connect to the external power supply (genset or mains).
- Several 3-phases (X11-X22) and 2 single phase outlet sockets (X29-X30) to connect the different loads to the ESS.
- One single phase inlet socket X13 to connect the ESS to an external supply in order to slowly recharge the ESS and maintain the batteries voltage and charge during storage or non-activity.

2.4.4 Emergency stop button

Push the button to stop the ESS in case of an emergency. When the button is pressed, it must be unlocked by rotating it clockwise, before the ESS can be restarted.

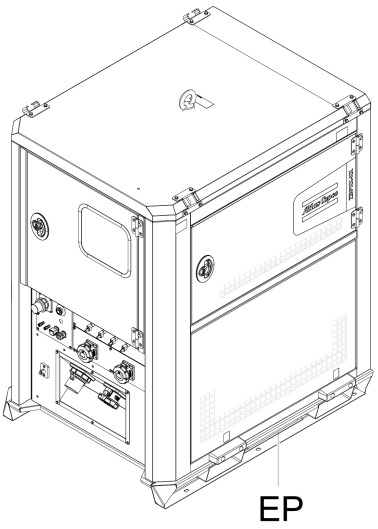


2.4.5 Earth leakage relay

An earth leakage relay provides protection in case of an earth leak current. It detects and indicates an earth fault current and activates the main circuit breaker. The detection level is set at 30 mA with instantaneous trip, but it is adjustable in intensity and in trip delay.

2.4.6 Earth pin

The earth pin, to be connected to the ESS's earth terminal is located at the bottom of the frame on the outside.



3 Installation and connection

3.1 Lifting

The lifting eye, to lift the ESS by means of a hoist, is integrated in the bodywork and easily accessible from the outside.

When lifting the ESS, the hoist has to be placed in such a way that the ESS, which must be placed leveled, will be lifted vertically.

WARNING

Lifting acceleration and deceleration must be kept within safe limits (max. 2g).

Helicopter lifting is not allowed.

To be able to lift the ESS by means of a forklift, forklift slots are provided in the frame at each side of the unit.

3.2 Positioning and transport

WARNING

The operator is expected to apply all relevant safety precautions, see section *Safety precautions*.

3.2.1 Positioning for operation

Follow the steps below to position the ESS. The installation location must be selected according to the following criteria:

1. Place the ESS on a horizontal, even and solid floor.
2. Protect it from unauthorized access.
3. Ensure that your ESS is never placed in a water puddle that is deeper than the slots for the forklift transport (7 cm).
4. The unit should be as close as possible to itssources of energy (diesel generator, PV system, mobile PV, grid) and grounding point.
5. Keep the ventilation openings clear and a keep a minimum distance of 100 cm to the left and right of all objects that might obstruct the ventilation of the appliance.
6. If several ESSs are placed next to each other, a minimum distance of 150 cm between the devices must be maintained.
7. In the case of permanent use on vehicles, additional measures must be taken to prevent vibrations.
8. Ensure that the unit is not exposed to saline or particularly aggressive solvents (such as ammonia fumes in agriculture), as this may adversely affect the life of the components.
9. Avoid large temperature fluctuations. If there are too many differences, condensation may form inside the housing, causing a short circuit.

10. Once the ESS is correctly positioned, install a suitable earthing and make sure that it is correctly connected to the ESS.
11. In stand alone mode connect the earth point. In hybrid mode check earth point from generator or mains is connected.

For more detailed installation instructions, see section *Installation*.

3.2.2 Transportation and positioning of the ESS onto vehicles

Due to its compact and optimized design, the ESS offers a great transport efficiency.

The ESS can be easily lifted and moved to difficult areas thanks to its central lifting eye and double forklift pockets in its frame. All that is needed is a forklift truck or a mechanical arm.

The forklift pockets and the lifting eye can also be used to place the ESS onto trucks for road transportation. For safe transport of the ESS on trucks or similar vehicles:

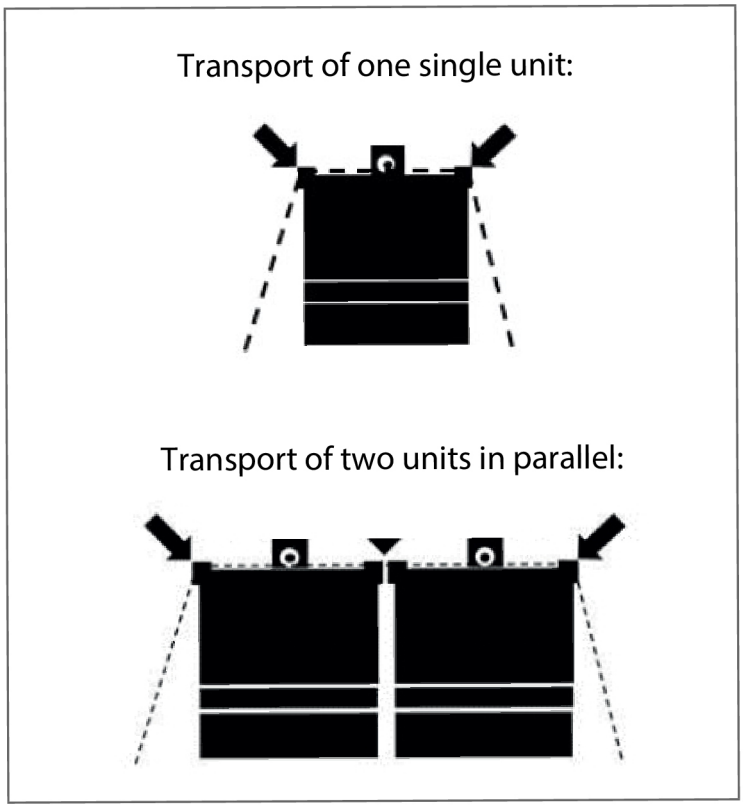
1. Ensure that the machine is stable and secure.
2. Check that the ESS is placed perfectly horizontally (check the levels on top of the unit).
3. To ensure stability, use the fork lift slots and marked roof guides to fix the ESS to the transport vehicle.
4. Use slinges or other means of anchoring, provided that these do not affect the machine's safe transportation and integrity.

NOTICE

Guide the slinges carefully through the marked roof guides at both sides of the lifting beam to avoid that the canopy gets damaged.

5. It is recommended that the machine is covered by a tarpaulin to protect it against bad weather conditions if it is transported on an open truck.

Schematic overview:



3.3 Installation

3.3.1 Indoor installation

Place the machine at least at 1m from each wall and the ceiling and provide suitable openings to allow sufficient air flow for adequate cooling.

NOTE

For more information about indoor installation, consult your local Atlas Copco dealer.

3.3.2 Outdoor installation

1. Place the ESS on a horizontal, even and solid floor.
2. Keep the ESS with the doors closed, in order to avoid the ingress of water and dust.
3. Leave enough space for operation, inspection and maintenance (at least 1 meter at each side).
4. Check that the inner earthing system is in compliance with the local legislation.

NOTE

For standalone mode, follow the below steps:

5. Use a cable of suitable section to connect the PE terminal to an earth plate that can ensure an earth resistance suited to the characteristics of the ESS.
6. Check that the cable end of the earth pin is connected to the earth terminal.

NOTE

The ESS is wired for a TN-system to IEC 364-3, i.e. one point in the power source directly earthed - in this case the neutral. The exposed conductive parts of the electric installation must be directly connected to the functional earth.

NOTE

For hybrid mode, follow the below step:

7. Connect the inlet to the source (generator or mains) and check the earth point of the source is properly connected.

3.4 Connecting the ESS

3.4.1 Precautions for non-linear and sensitive loads

CAUTION

Non-linear loads draw currents with high contents in harmonics, causing distortion in the wave form of the voltage generated by the alternator.

The most common non-linear, 3-phase loads are thyristor/ rectifier-controlled loads, such as convertors supplying voltage to variable speed motors, uninterruptable power supplies and Telecom supplies. Gasdischarge lighting arranged in single-phase circuits generate high 3rd harmonics and risk for excessive neutral current.

Loads most sensitive to voltage distortion include incandescent lamps, discharge lamps, computers, Xray equipment, audio amplifiers and elevators.

Consult Atlas Copco for measures against the adverse influence of non-linear loads.

3.4.2 Quality, minimum section and maximum length of cables

The cable connected to the sockets or powerlocks of the ESS must be selected in accordance with local legislation. The type of cable, its rated voltage and current carrying capacity are determined by installation conditions, stress and ambient temperature. For flexible wiring, rubber-sheathed, flexible core conductors of the type H07 RN-F (Cenelec HD.22) or better must be used.

The following table indicates the maximum allowable 3-phase currents (in A), at an ambient temperature of 40°C, for cable types (multiple and single core PVC insulated conductors and H07 RN-F multiple core conductors) and wire sections as listed, in accordance with VDE 0298 installation method C3. Local regulations remain applicable if they are stricter than those proposed below.

Wire section (mm^2)	Max. current (A)		
	Multiple core	Single core	H07 RN-F
2.5	22	25	21
4	30	33	28
6	38	42	36
10	53	57	50

Wire section (mm^2)	Max. current (A)		
	Multiple core	Single core	H07 RN-F
16	71	76	67
25	94	101	88
35	114	123	110
50	138	155	138
70	176	191	170
95	212	228	205

The lowest acceptable wire section and the corresponding maximum cable or conductor length for multiple core cable or H07 RN-F, at rated current (20 A), for a voltage drop lower than 5% and at a power factor of 0.80, are respectively 2.5 mm² and 144 m. In case electric motors must be started, oversizing the cable is advisable.

The voltage drop across a cable can be determined as follows:

$e = \sqrt{3} \cdot I \cdot L \cdot (R \cdot \cos\phi + X \cdot \sin\phi) / 1000$

e = Voltage drop (V)

I = Rated current (A)

L = Length of conductors (m)

R = Resistance (Ω/km to VDE 0102)

X = Reactance (Ω/km to VDE 0102)

3.4.3 Connecting the power supply

In order to recharge the ESS or use it as an hybrid solution, it is necessary to connect the ESS to a external power supply, either to the mains or to a genset.

Connecting to the mains

Use the inlet socket or powerlocks to connect the ESS to the mains.

NOTICE

Use the correct cable section and protection according to local requirements.

Connecting to a genset

NOTE

The genset connected to the ESS must be isochronous mounting electronic governor or electronic control module.

Use the inlet socket or powerlocks to connect the power cables from the genset to the ESS.

NOTICE

Use the correct cable section and protection according to local requirements.

Also connect the start and stop connector X30 to remote start and stop the genset, the ESS provides a volt free contact.

NOTE

Generator must be grounded properly.

3.4.4 Connecting the load

Protection

WARNING

For safety reasons, it is necessary to provide an isolating switch or circuit breaker in each load circuit. Local legislation may impose the use of isolating devices which can be locked.

- Check whether frequency, voltage and current comply with the ratings of the ESS.

Connecting the load

Connect the load to the respective socket or powerlocks considering the rating of the socket and the appliance.

4 Operating instructions

IMPORTANT

In your own interest, always strictly observe all relevant safety instructions.

Do not operate the ESS in excess of the limitations mentioned in the Technical Specifications.

Local rules concerning the setting up of low voltage power installations (below 1000 V) must be respected when connecting site distribution panels, switch gear or loads to the ESS.

At each start-up and at any time a new load is connected, the earthing and protections (GB trip and earth leakage relay) of the ESS must be verified. Earthing must be done either by the earth pin (Stand Alone mode) or by the inlet connection with the generator o grid (Hybrid mode). The protective system against excessive contact voltage is not effective unless a suitable earthing is made.

4.1 Before starting

- Perform all daily checks and maintenance as specified in the section *Maintenance schedule*.
- Check that circuit breaker Q1 is switched off.
- Check that the fuses have not tripped and that the emergency stop is in the OUT position.
- Check that the load is switched off.

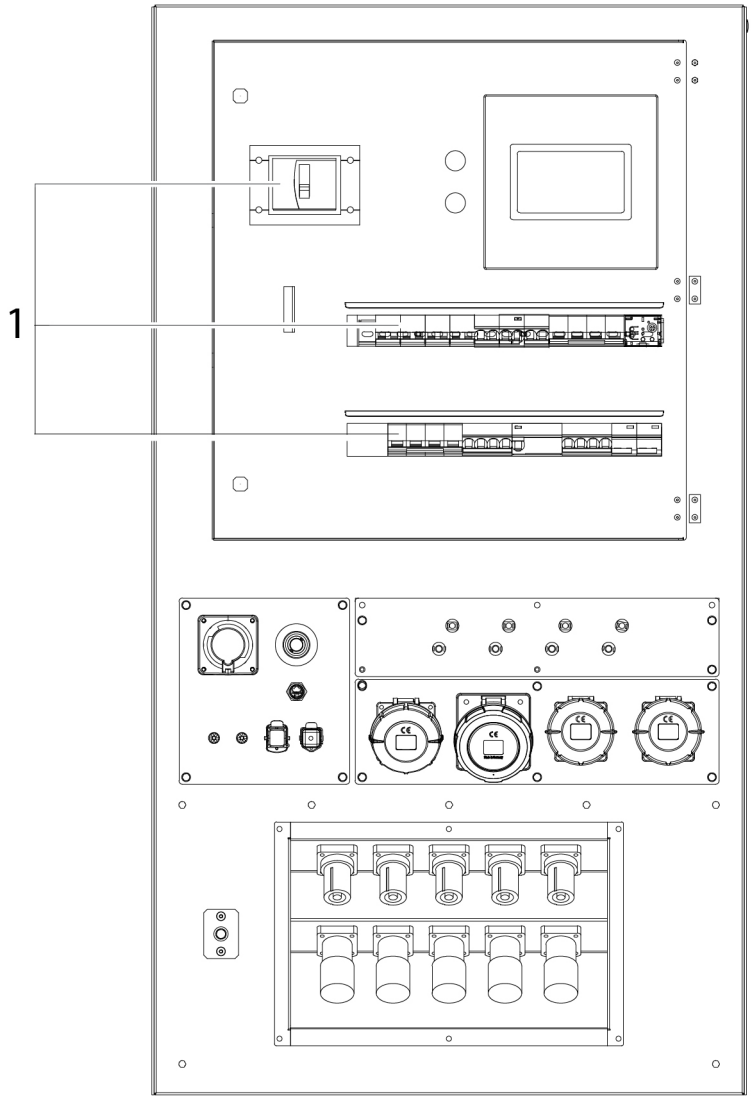
4.2 Operating the ESS

IMPORTANT

Carefully read and follow in sequence all the operating instructions in this manual.

4.2.1 Before the ESS is started

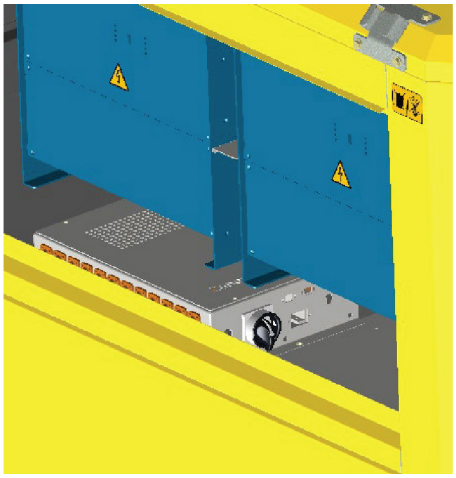
Before starting the system, check that all the automatic switches (general ELCB, sockets protections and main circuit breaker) are in the OFF position (1).



4.2.2 Starting the ESS

If batteries are switched ON, then move to step 3.

1. Open left door.
2. Turn selector to start point during 2 seconds and left in ON position.



NOTE

Once batteries start, there are several process to protect the equipment (pre-charge and ECO controller initialization).

3. Make sure the switches from the inverter are in ON position.

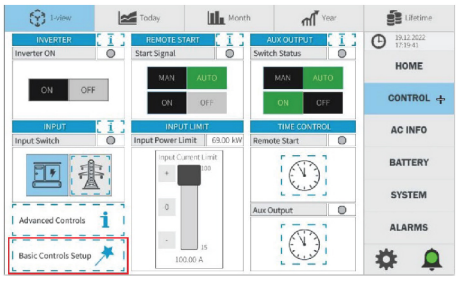
4.

NOTE

Once ECO controller is initialized several parameters must be configured. A quick start guide is available. Select Basic Controls Setup.

Select CONTROLS tap on the right.

5. Select Basic Control Setup.



6. Select the available type of AC input Source connected to the ZBP.

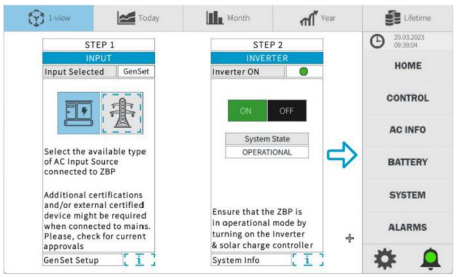
NOTE

Additional certifications and/or an external certified device might be required when connecting the ZBP to Mains. Check for current approvals.

7. Select AUTO mode to enable the automatic control of the AC Input Source.

NOTE

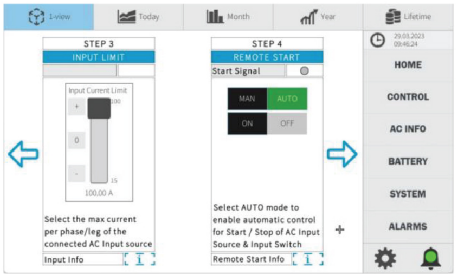
It is recommended to check ZBP is successfully controlling the genset by following the instructions in the Remote Start info tab, which is accessible from the info button located at the bottom of this table. Refer section *Remote Start Info*.



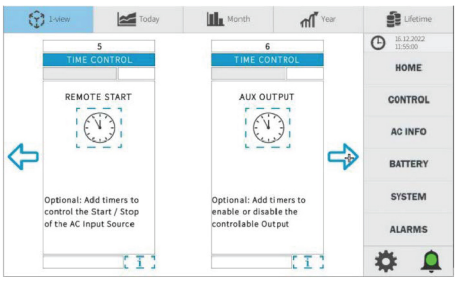
8. Set the ZBP in operational mode by turning ON Inverter.
9. Select the size of the AC Input Source to avoid exceeding its maximum power.

NOTE

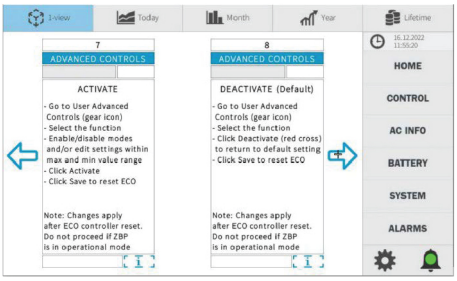
The selected size will be the maximum amperage per phase that ZBP will request to the Input source.



10. Adding timers to start/stop the AC Input source or enable/disable the Auxiliary Output if the application requires it.



11. Select AUTO mode to enable the automatic control of the AC Input Source. Check ZBP is successfully controlling the genset by following the instructions in the Remote Start info tab, which is accessible from the info button.
12. To activate and deactivate advanced controls, the user will jump to the summary of advanced controls to easily check if additional modes are enabled or advanced settings are modified.



NOTE

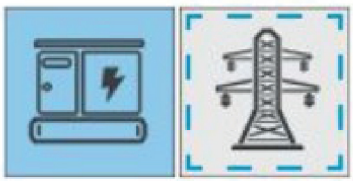
After this configuration system will start to provide power.

Application mode - Island mode

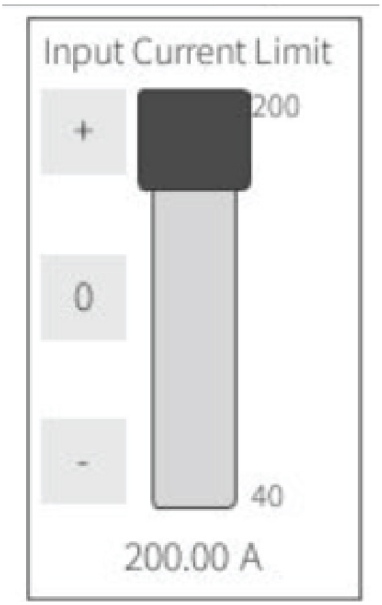
1. Plug the load to the output socket or output powerlocks.
2. Close the Q20 output breaker.

Hybrid mode with generator

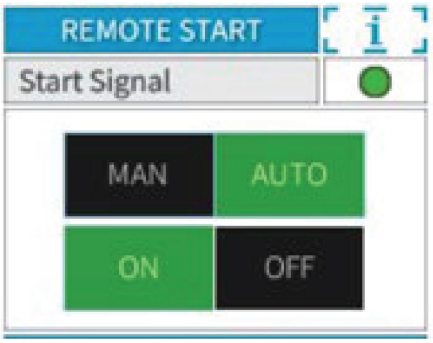
1. Select on the controller the input type as generator.



2. Plug in the input socket or powerlocks of the ZBP to the output of the generator.
3. Plug in the output socket or powerlocks of the ZBP to the load.
4. Plug in the remote start signal from the generator to the X32 or X37 connector.
5. Configure the Input current limit according to the data plate of the generator as: Igen*0.8.



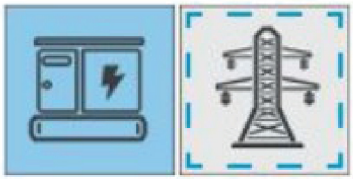
6. Set the remote start signal in Auto.



7. Switch on the output breaker of the generator.
8. Switch on the Q10 input breaker of the ZBP.
9. Turn on the generator and set it to AUTO mode.
10. Switch on the Q20 output breaker of the ZBP and socket breakers.

Hybrid mode with grid

1. Select on the controller the input type as grid.



2. Follow the steps 2 through 10 of hybrid mode with generator.

4.2.3 Connecting appliances

IMPORTANT

Keep in mind that this machine is a ESS, not a generator set!

1. Start the ESS. See section *Starting the ESS*.
2. Plug in the sockets.
3. Make sure that a correct voltage is displayed.
4. Switch on circuit breakers.

WARNING

To correctly disconnect the appliances from the ESS, first switch off the corresponding circuit breaker to isolate the electric load and only then remove the plug.

4.2.4 During operation

Regularly carry out following checks:

- Check the controller display for normal readings.
- Check that the voltage between the phases is identical and that the rated current is not exceeded.
- When single-phase loads are connected to the output terminals, try to keep all loads well balanced.

- If circuit breakers have tripped during operation, switch off the load. Check and, if necessary, decrease the load.

4.2.5 Recharging the ESS

There are two possibilities for charging the ESS:

Parking mode

Parking mode is useful to maintain the status of charge of ESS when it is stored. But also when main input source is not available and there is only single phase source (230V 1ph).

Charge will be slow because maximum power is limited.

1. Follow section *Starting the ESS* procedure and after connect the X12 parking mode input.
2. Switch ON Q12 breaker.

NOTE

If main input source is available at the same time it has priority. Therefore system will move to standard charge.

Standard charge

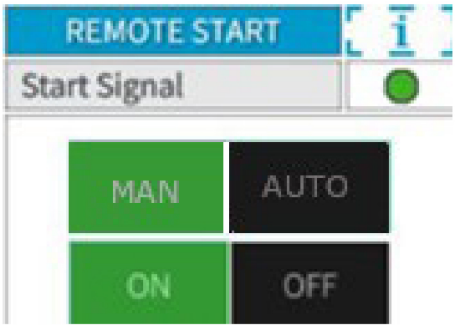
Standard mode allows to charge the ESS using the main input (400/230V 3Ph+N).

Power charge can be limited depending on the availability from generator or grid (see section *Hybrid mode with generator/grid*)

1. Follow the section *Starting the ESS* procedure and section *Hybrid with generator or grid*.

In case of grid, if the load is lower than the power available, system will use this extra power to charge automatically.

In case of generator, if it is needed to force charging, start manually the generator and setup Remote Start Manual in ON.



4.2.6 Stopping the ESS

1. Switch the input and output breakers off.
2. Switch off the generator or disconnect grid.
3. Turn off the inverters.

WARNING

It is only advised for transport or extended storage, not for daily usage.

4. Switch off the battery switch on the DC cubicle.

NOTE

FleetLink will not be available if batteries are switched off.

IMPORTANT

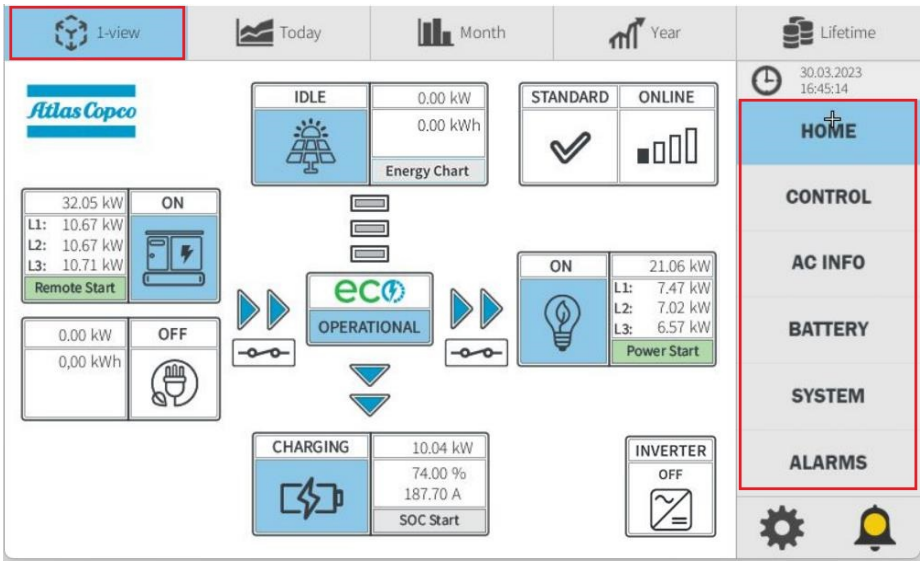
Should an emergency arise, it is also possible to stop the machine by pressing the EMERGENCY 'STOP' button. If the ESS has been stopped in this way, the emergency stop button must be released by rotating it clockwise, for next operation.

5 Operating the ECO Controller

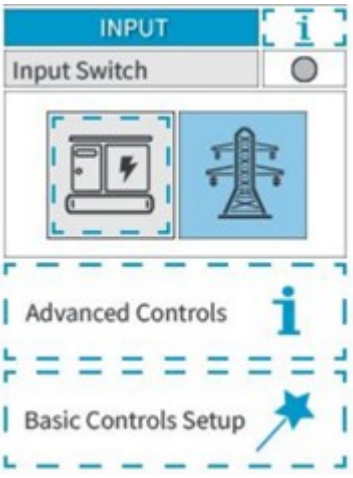
5.1 General

View

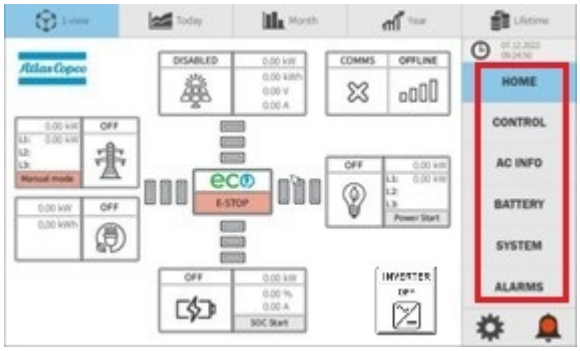
It provides the access to main side tabs which contains data, controls, and information of the ECO Controller User Interface.

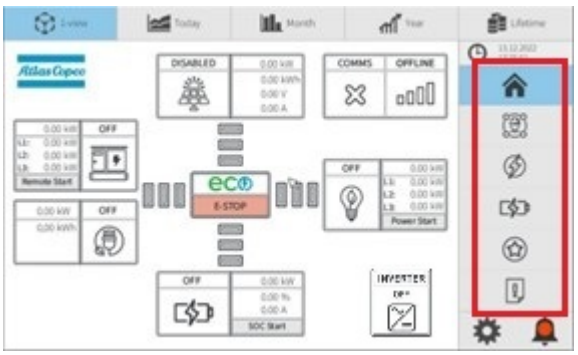


- Additional tabs are displayed with blue dotted rectangular marks that can be clicked on.



- Main side tabs can be displayed with texts or icons. Refer section *Side Tabs with Icons.*



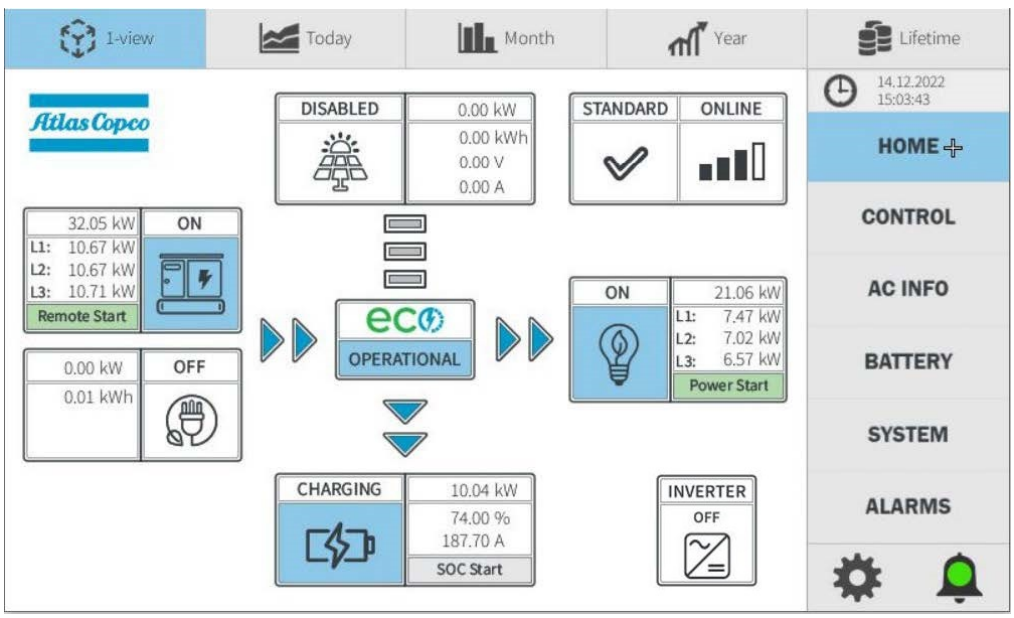


5.2 Main side tabs

Home

The home tab provides basic information of the overall performance and status of the ZBP.

It allows access to additional data when optional modes are activated.



The home tab shows how real-time power is efficiently distributed and what is the state of the main key components such as available energy sources, battery and output. It contains following features:

- ECO Controller

    - Status: Operational, Parking, Stand-by & OFF. Refer section *Systme states*.
- AC Input Source (Generator or Mains)
    - Data: Instantaneous Total Power & Power per phase/leg.
    - Status: ON, Idle or OFF.
    - Indicators:
        - Manual mode: When Remote Start is in MAN mode allowing manual control of the Input Source.
        - Remote Start in Green: If Remote Start is in AUTO ON mode.
        - Remote Start in Grey: If Remote Start is in AUTO OFF mode.
        - Warm up: When ZBP is allowing the Generator to initially warm up.
        - Phase Rotation: Shown if this alarm is triggered. Refer section *Alarms*.
- Parking Input Source
    - Data: Instantaneous Power and Daily Energy. Some ZBP models also show Voltage and Current.
    - Status: ON, Idle & OFF.
    - Indicators:
        - Reverse Polarity: Shown if this alarm is triggered. Refer section *Alarms*.
- Solar
    - Data: instantaneous DC Power, Daily Energy, Voltage and Current.
    - Status: ON, Idle and OFF.
    - Energy Charts: Access to Solar Energy values data and charts. Available only if solaris included on the ZBP.
- Battery
    - Data: instantaneous DC Power (+ charging / - discharging), State of Charge (SOC) & Daily Charging & Discharging Energy.
    - Status: Charging, Discharging, Idle & OFF
    - Indicators:
        - SOC Start in Green: If Low SOC condition to activate AC Input Source is triggered. Refer section *Advance Controls Info*.
        - SOC Start in Grey: If Low SOC condition to activate AC Input Source is not triggered.
        - Minimum Charge: Related to Charge Soft Start that indicates the Charging is limited to avoid initial load impact on the genset. Refer section *Battery*.
- Output
    - Instantaneous Total Consumed Power & Power per phase/leg.
    - Status: ON, Idle or OFF.
    - Indicators:
        - Power Start in Green: If high output power condition to activate AC Input Source is triggered. Refer section *Advanced Controls Info*.
        - Power Start in Grey: If high output power condition to activate AC Input Source is not triggered.
- The arrows indicate the direction of the instantaneous power.
- The widget on the top right corner shows the following info:
    - ZBP selected mode.

- Standard
- Series, refer section *Series mode*.
- AC Coupled, refer section *AC Coupled mode*.

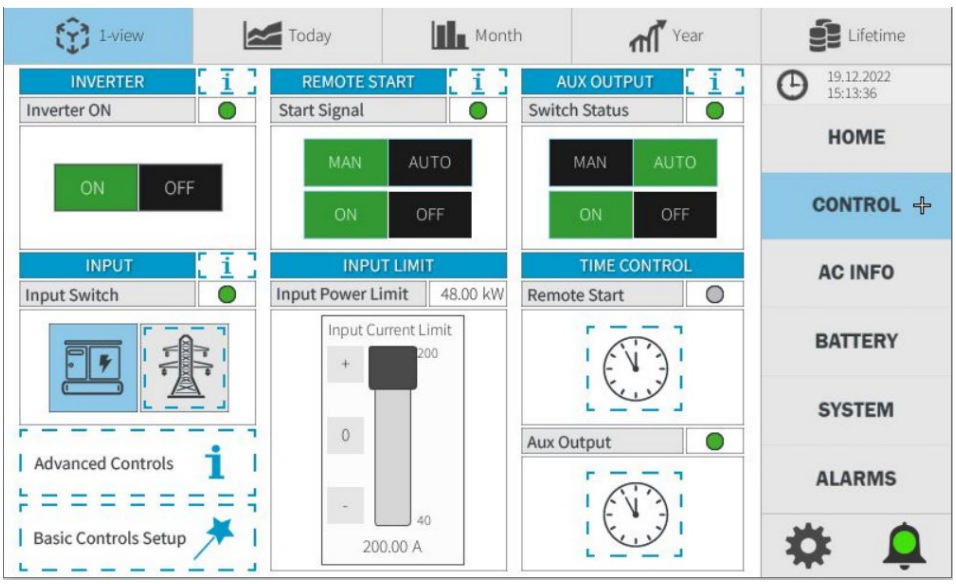
- Internal communication issue alarm
- Internet Signal Status

- Series mode data access tab if activated.
- External genset Controller data access tab if activated. Refer section *External genset Controllers – Deepsea*.

Control

It contains the controls to setup and operate the ZBP whether connected to an AC Input Source and a Load on site or connected to a single-phase input on depot for a slow maintenance charge.

In addition to multiple info tabs that can be accessed to help users understand how to use these controls and the advanced controls info tab that shows an overview of the internal settings and selected optional modes and functions, there is also a basic control setup to guide first time user to easily configure the controls for their installation.



- Additional tabs:
  - Advanced Controls: Summary of the internal assigned settings. Refer section *Advanced Controls*.
  - Basic Controls Setup: Guide to easily setup the controls of the ZBP. Refer section *Basic Controls Setup*.

Inverter

Virtual switch to control Inverter & Solar Charge Controller

- Switch
  - ON: Inverter ad Solar Charge Controller are Active
  - OFF: Inverter and Solar Charge Controller are OFF
- Indicator
  - Inverter ON in Green: Inverter and Solar Charge Controller are ON
  - Inverter ON in Grey: Inverter and Solar Charge Controller are OFF

- Additional tab:
  - Inverter Info, refer section *Inverter Info & troubleshooting*.

Input Selector

Allows to select whether the AC Input Source is a genset or Grid.

- Genset as Input

  If the user selects the genset as AC Input Source (genset icon in blue), genset alarms, Warm up function and Charge Soft Start function will be enabled.
- Mains as Input

  If the user selects the Mains as AC Input Source (Mains icon in blue), Mains alarm will be enabled and Warm up function and Charge Soft Start function will be disabled.

NOTE

Additional certifications and/or an external certified device might be required when connecting the ZBP to Mains. Please, check for current approvals.

- Indicator
  - Input Switch in Green: Input Switch is Closed, refer section *Input Switch description*.
  - Input Switch in Grey: Input Switch is Open
- Additional tab:
  - Input Info, refer section *Input Info*.

Remote Start

Control of the signal to Start/Stop the AC Input Source based on configurable management optimization algorithms.

- **MAN mode**. Status ON or OFF must be selected by user.
  - ON: Force signal ON (Start)
  - OFF: Force signal OFF (Stop)
- **AUTO mode**. ECO Controlling is automatically deciding the status ON or OFF according to following conditions:
  - ON: If one of below condition is Active
  - OFF: If all below conditions are OFF
  - Conditions, refer section *Advanced Controls Info*
    - Load Power Start
      - Based on total output power
      - Configurable Start / Stop Power Setpoints and Stop delay
    - Inverter Power Start
      - Based on ZBP nominal power per phase
      - Configurable Start / Stop setpoints and Stop delay
    - SOC Start
      - Based on Battery SOC (State of Charge)
      - Configurable Start / Stop setpoints and Stop delay

- Timer Start
  - Based on configurable timer by pressing the Clock Icon on Time Control
- Indicator
  - Start Signal in Green: Remote Start is ON
  - Start Signal in Grey: Remote Start is OFF
- Additional tab:
  - Remote Start Info, refer section *Remote Start Info*.

Input Limit

This function allows the setting of the maximum current per phase that can input the ZBP.

This setting may be used, for example, to prevent a low rated genset from overloading and thus avoid inverter disconnection due to genset voltage drop or to set the maximum power that the Mains supply can deliver.

Auxiliary Output

Control of the Auxiliary single phase output status

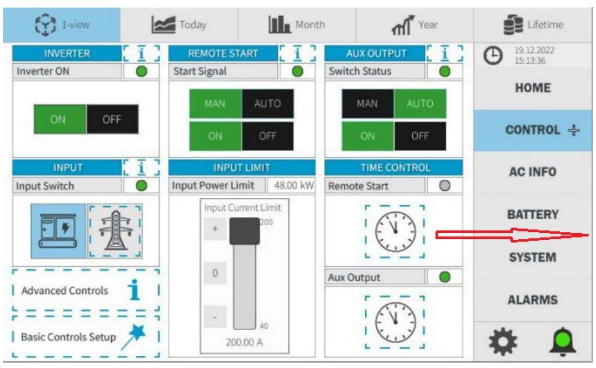
- MAN mode.
  - ON: Aux Output Enabled
  - OFF: Aux Output Disabled
- AUTO mode. Status ON or OFF based on configurable timer by pressing the Clock Icon on Time Control.
- Indicator
  - Switch Status in Green: Aux Output is Enabled
  - Switch Status in Grey: Aux Output is Disabled
- Additional tab:
  - Auxiliary Output Info, refer section *Output Info*.

Time Control

Function to add up to 3 timers per day every day of the week for controlling the Remote Start and Auxiliary Output at specific period of times in AUTO mode.

Remote Start Timer

Click on the clock widget to access the Remote Start - Time Control tab as shown below.

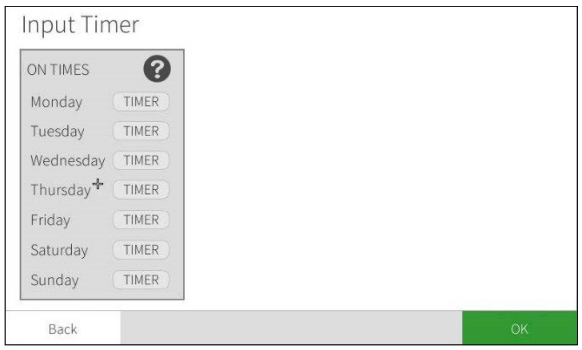


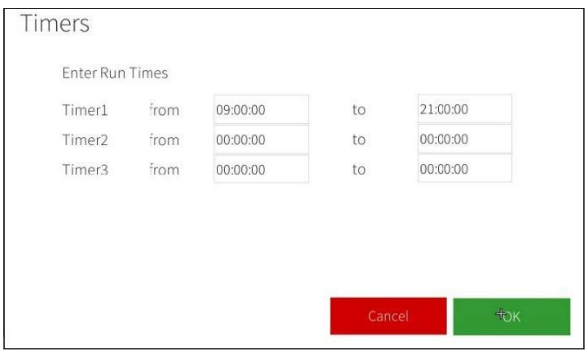
- Programmed Time Control

  Click on the calendar widget to add timers as shown below.

  Time format period is 24h. A tick is displayed on the day that a timer has been added.

  If no timers are added, the Timer Start condition is OFF.





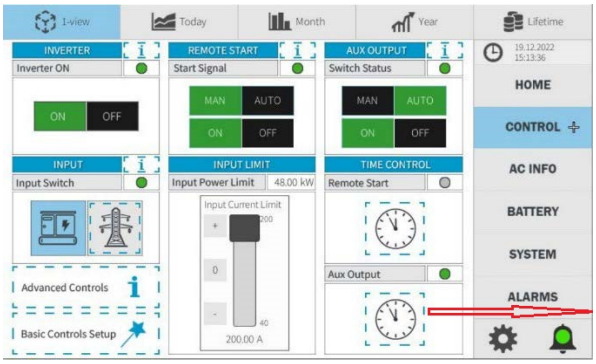
- Timer SOC Stop

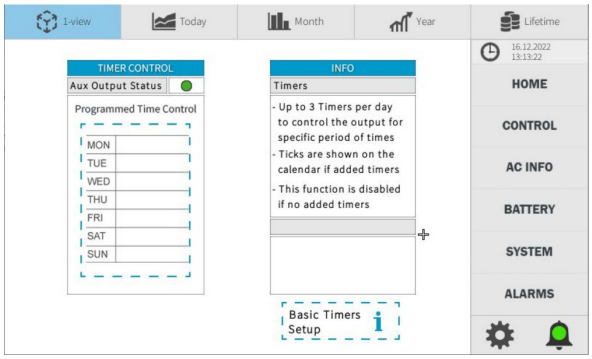
  Function that allows to add an extra condition to turn off the Remote Start signal if Battery SOC reached the SOC Stop Setpoint.

  Therefore, is this function is enabled, the Timer Start will turn OFF if time gets to defined end period as usual or if Battery gets to Stop setpoint.

Auxiliary Output Timer

Click on the clock widget to access the Auxiliary Output - Time Control tab as shown below.





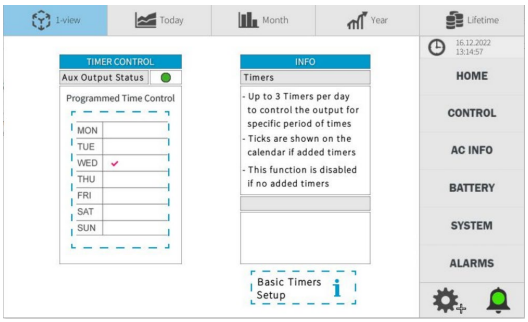
- Programmed Time Control

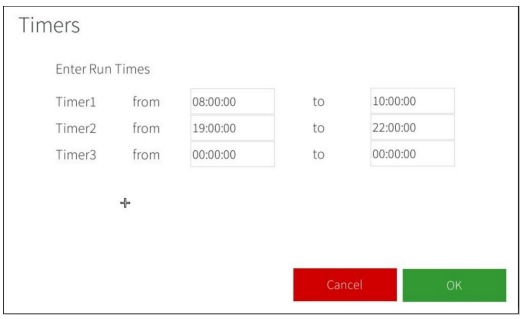
  Same function as on Remote Control, where the calendar widget allows the user to add up to three times per day every day of the week.

  If timers are added, the Auxiliary Output will enable only during timer period, and will be disabled the rest of the time during that day.

  If no timers are added, the Auxiliary Output is Enabled.

  The following scenario shows 2x timers has been added on Wednesday, therefore the Auxiliary Output status will be as follows:





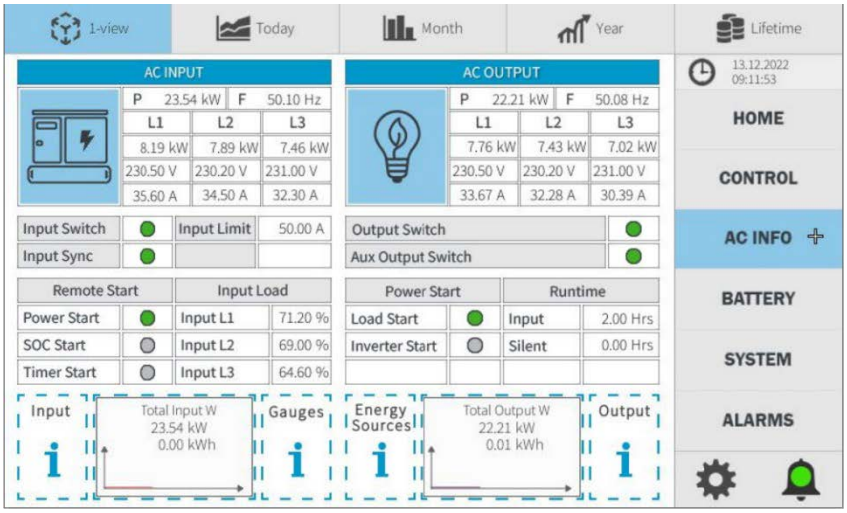
- Wednesday:

- Output Enabled: From 8am to 10am & from 7pm to 10pm
- Output Disabled: rest of that day

- Any other day of the week the output is enabled the entire day.

AC Information

Information recorded from the AC Input Source and the Output as well as related functions are displayed on this tab.



AC Input Info

- Data: Instantaneous Total Power, Frequency and Power, Voltage and Current per phase/leg.
- Input Switch Status:
  - Green: Input Switch is Closed, refer section *Input Switch description*.
  - Grey: Input Switch is Open
- Input Sync Status:
  - Green: ZBP is synchronized with the available AC Input Source
  - Grey: ZBP is not synchronized with the available AC Input Source
- Input Limit datapoint from Inverter which is set by selected setpoint on Control Tab. Refer section *Input Limit*.
- Remote Start
  - Power Start: Auto condition to Start/Stop the AC Input Source based on Output Power.
  - SOC Start: Auto condition to Start/Stop the AC Input Source based on Battery SOC.
  - Timer Start: Auto condition to Start/Stop the AC Input Source based on timers.
- Input Load: Percentage of instant AC Input Power per phase determined by the selected Input Limit setpoint.
- Additional tabs:
  - Input Info, refer section *Input Info*
  - Total Input Power Chart, refer section *Historical Data*
  - Gauges, refer section *Gauges AC IN & OUT*

AC Output Information

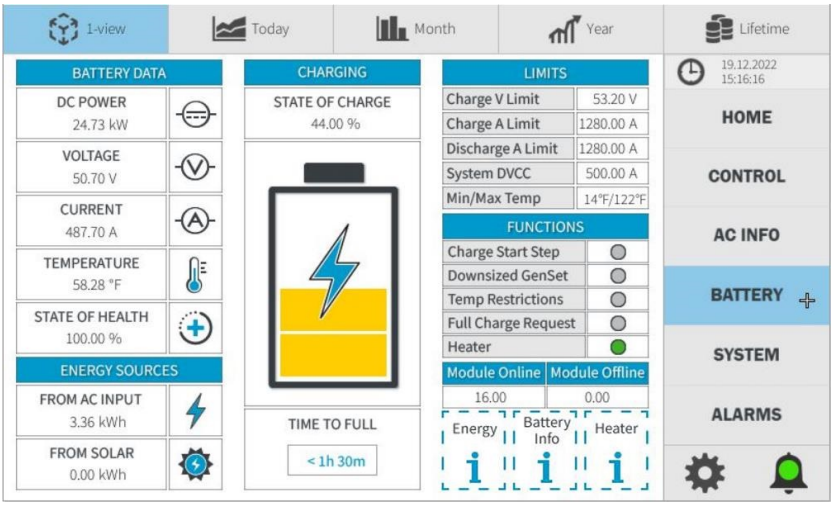
- Data: Instantaneous Total Power, Frequency and Power, Voltage and Current per phase/leg.
- Output Switch Status:

- Green: Main Output Switch is Closed, refer section *Output Info*.
- Grey: Main Output Switch is Open

- Auxiliary Output Switch Status:
  - Green: Auxiliary Output Switch is Closed, refer section *Output Info*.
  - Grey: Auxiliary Output Switch is Open.
- Power Start
  - Load Start: Auto condition to Start/Stop the AC Input Source based on Total Output Power.
  - Inverter Start: Auto condition to Start/Stop the AC Input Source based on Nominal Power per phase.
- Runtime
  - Input: Daily runtime of the genset.
  - Silent: Daily runtime of the Load when powered by battery and/or solar.
- Additional tabs:
  - Energy Sources, refer section *Energy Sources*
  - Total Output Power Chart, refer section *Historical Data*
  - Output Info, refer section *Output Info*

Battery

Historical and instantaneous information from the batteries is displayed on this tab.

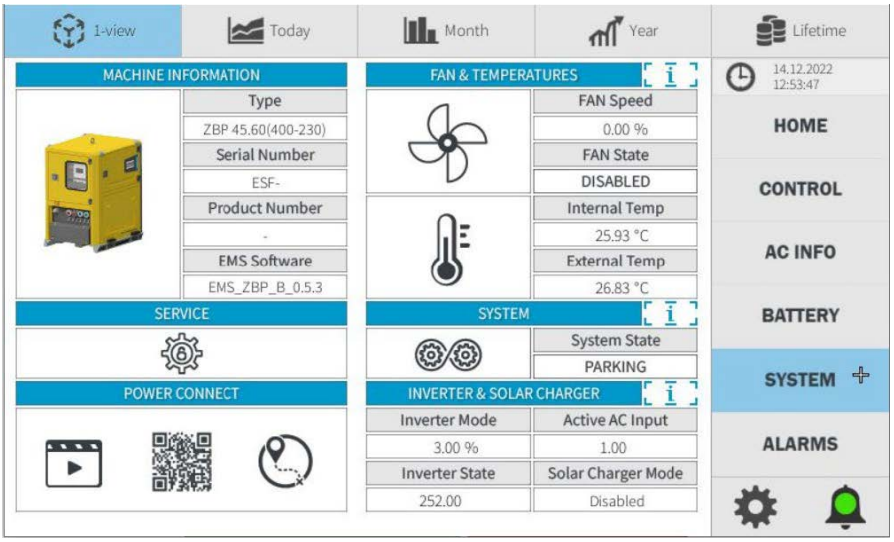


- Battery Data
  - DC Power (+ charging / - discharging)
  - Voltage: Battery DC bus voltage (V)
  - Current: Battery DC bus current (+ charging/- discharging)
  - Temperature: Average battery bank temperature (°C or °F).
  - State of Health: It is a measurement that indicates the level of degradation and remaining capacity of the battery bank.
- Energy Sources
  - From AC Input: Daily Energy used to charge the battery from the available AC Input Source.
  - From Solar: Daily Energy used to charge the battery produced by Solar.

- State of Charge: Available storage level of the battery.
- Time to Full: Approximated time to fully charge the battery at current charging power.
- Limits
  - Charge V Limit, Charge A Limit & Discharge A Limit: Protection parameters set by battery manufacturer.
  - System DVCC: Max Battery Charging in amps set at inverter and solar charge controller. This parameter is automatically adjusted by ECO Controller.
  - Min/Max Temp: Operating temperature range in °C or °F of the battery bank.
- Functions
  - Charge Soft-Start: It assists the genset in a smooth transition to full power by initially limiting the battery charge power for a short period. The delay can be customized. Refer section *Charge Soft Start*.
  - Downsized genset: Charging power is automatically reduced to avoid big load steps that cause a voltage / frequency drop in small generators that make the inverter consider it as unreliable source.
  - Temperature Restrictions: Automatic charge restriction to protect the battery from high or cold temperatures.
  - Full Charge Request: Improve calibration of SOC for optimal performance.
  - Heater (optional): Heat the batteries when an AC Input source is connected to avoid power restrictions due to low temperature.
- Modules online/offline: Display the total number of battery modules contained in the ZBP and their connection status.
  - Online: number of modules that are communicating and available for charging or discharging.
  - Offline: number of modules with communication failure that could block charging or discharging. Alarms will be triggered if offline modules are detected, and charge or discharge is compromised. Refer section *Battery Troubleshooting*.
- Additional Tabs
  - Energy, refer section *Energy*
  - Battery Info, refer section *Battery Info*
  - Heater, refer section *Fan & Heater Test*

System

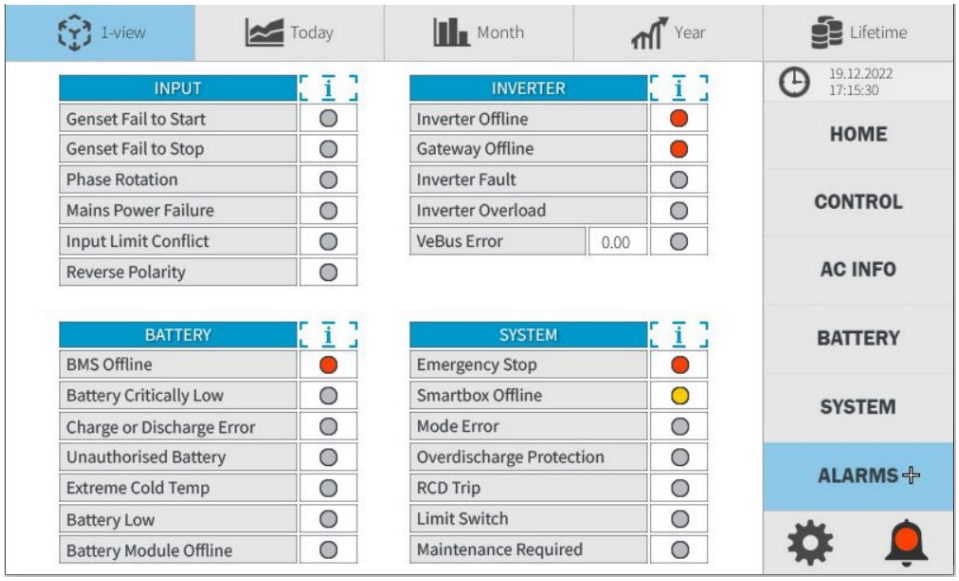
The system tab displays general information for the ZBP with access to inverter reset & fan test functions, system mode descriptions and VEBus Error code meanings.



- Machine Information: Shows specific information of your ZBP unit.
- Service: Password protected tab for Atlas Copco service.
- Power Connect: QR code for easy access to repair parts after entering the serial number of the ZBP. https://powerconnect.atlascopco.com
- Fan & Temperatures
  - Fan Speed & Status (enabled or disabled)
  - Internal & External Temperature sensors in °C or °F
- System State which can be operational, parking, stand-by or OFF.
- Inverter & Solar Charger
  - Inverter mode code number which can be Charger Only, Inverter Only, ON, OFF.
  - Inverter State code number
  - Inverter Active Input code number which is 2 when connected to an AC Input Source.
  - Solar Charger mode code number which can be OFF, Voltage/current limited, Active & Not Connected.
- Additional tabs:
  - Fan & Heater Test, refer section *Fan & Heater Test*
  - System Info, refer section *System info & troubleshooting*
  - Inverter Info, refer section *Inverter Info & troubleshooting*

Alarms

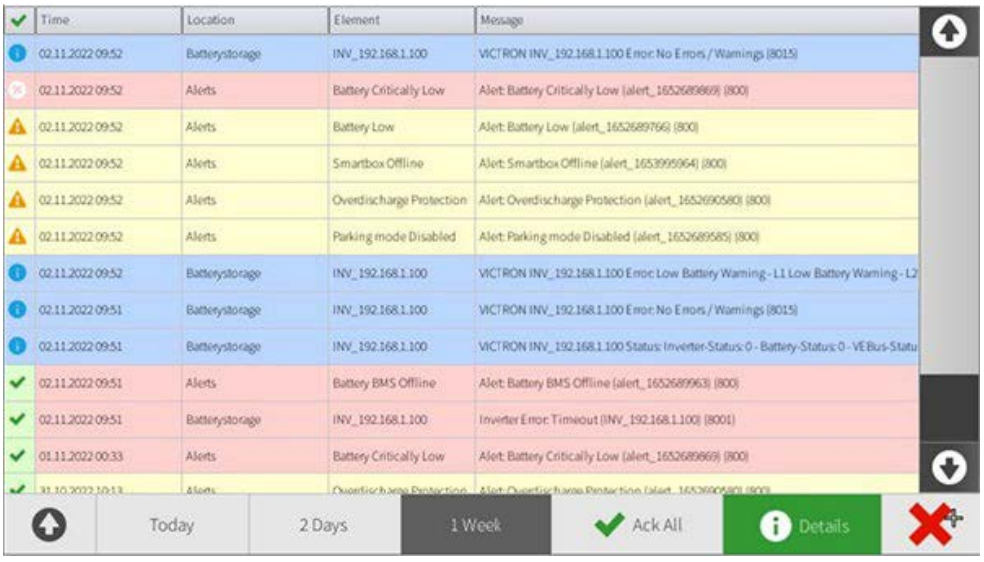
This tab displays both warnings (yellow) and alarms (red) in real time, with access to troubleshooting guides that provide users with simple instructions on how to deactivate them.



- Input, refer section *Checks and troubleshooting*
- Battery, refer section *Checks and troubleshooting*
- Inverter, refer section *Checks and troubleshooting*
- System, refer section *Checks and troubleshooting*

Alarms log

Logging of real-time and historical information on internal events, warnings and alarms, where users can check when they were triggered and cleared. It can be accessed by pressing the bottom right belt icon.



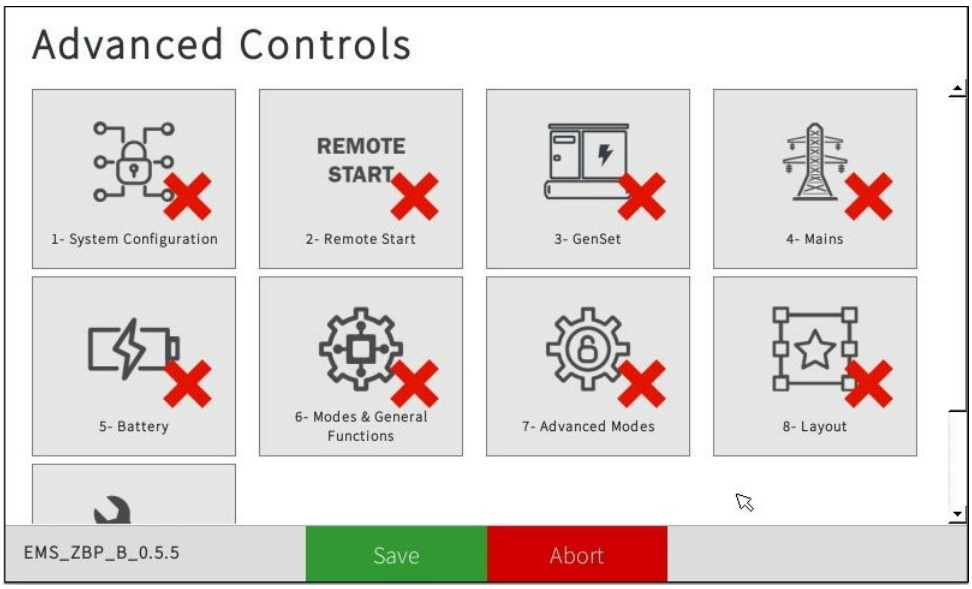
Advanced Controls

This tab contains advanced functions to edit, enable or disable additional operating modes and internal settings that allow users to easily customize the ZBP to provide the best performance for the most demanding applications.

NOTE

ECO Controller will reset itself to update the changes once the user clicks on SAVE button. Do not proceed if ZBP is in operation mode.

An overview of the assigned advanced controls settings of the ZBP is located on Advanced Control Info tab. Refer section *Advanced Controls Info*.



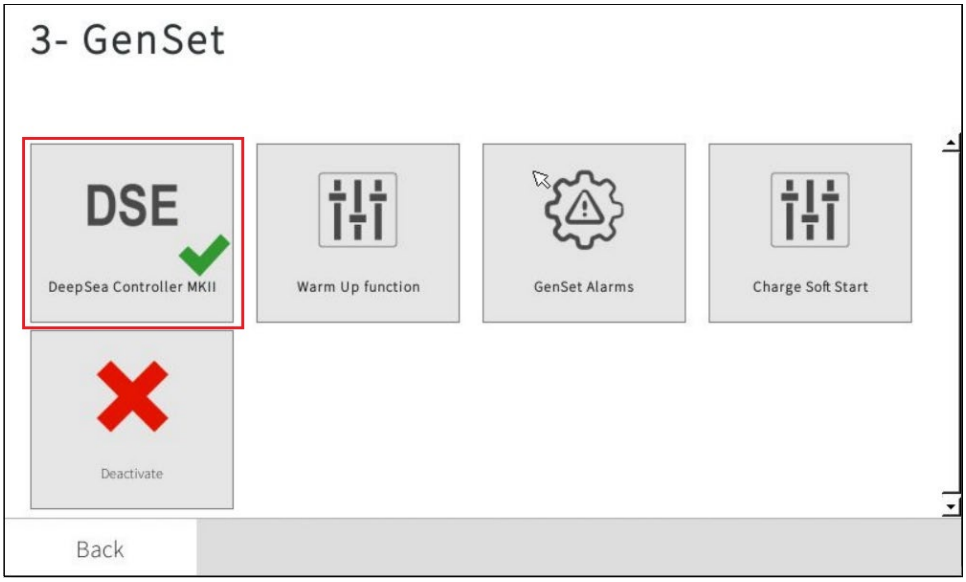
How to Activate or Deactivate functions

Each function of the Advanced Controls tab can be activated or deactivated to apply the new changes or restore the default settings.

Activate procedure

- Edit the settings of the function according to your requirements within the predefined range of max and min values.
- Click on “Activate” button

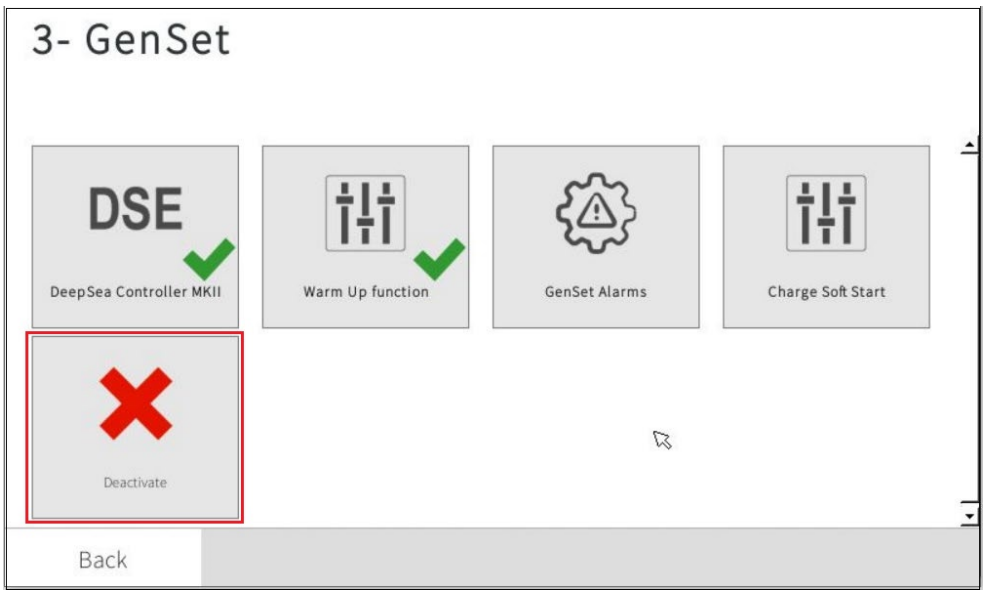
- Green check marks are shown if a function is activated.



- Click on SAVE button located on the Advanced Controls landing tab to reset the ECO Controller and apply the new settings.

Deactivate procedure

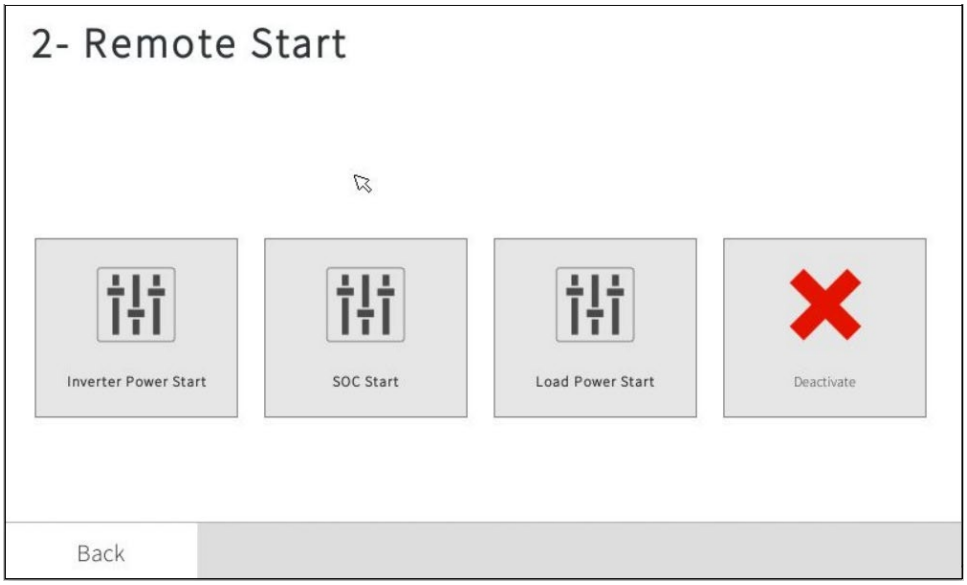
- Restore to default all functions from a specific module
  - Select the module and click on Deactivate.



  - Click on SAVE button located in the Advanced Controls landing tab to reset the ECO Controller.

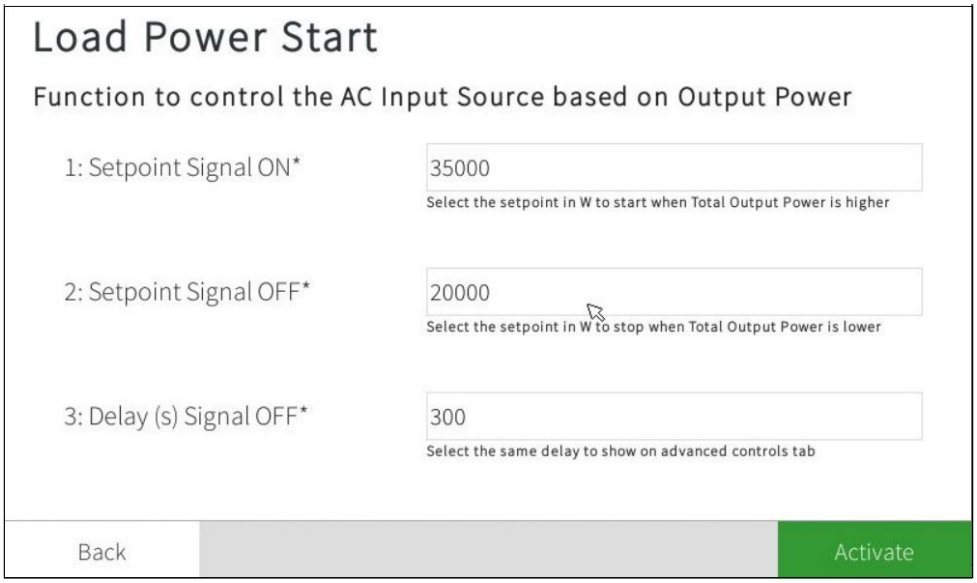
Remote Start

Provide the customizable settings when Remote Start is in Auto mode to control the signal to Start/Stop the AC Input Source.



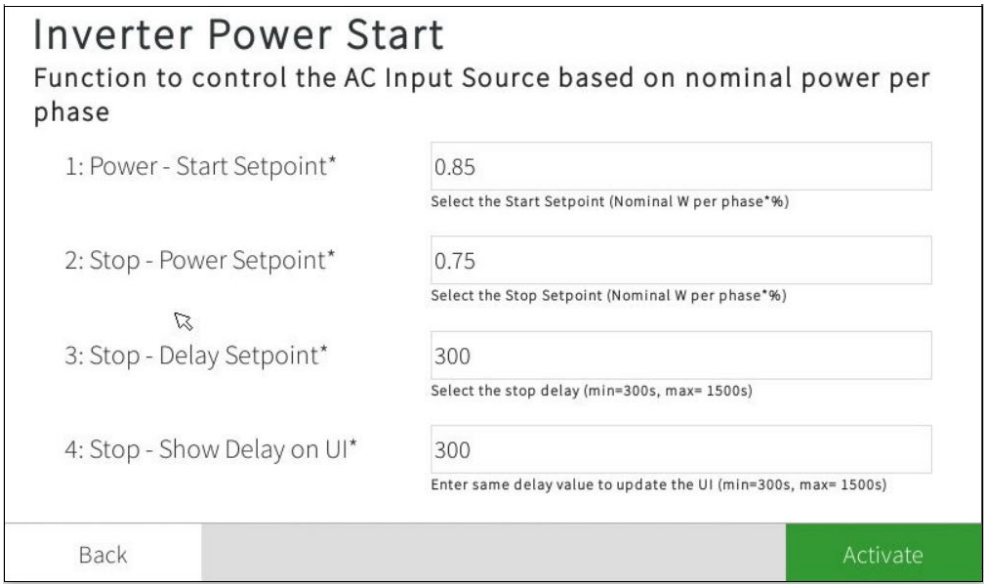
Load Power Start

Function to customize the setpoints of the condition to control the Remote Start signal based on total output power.



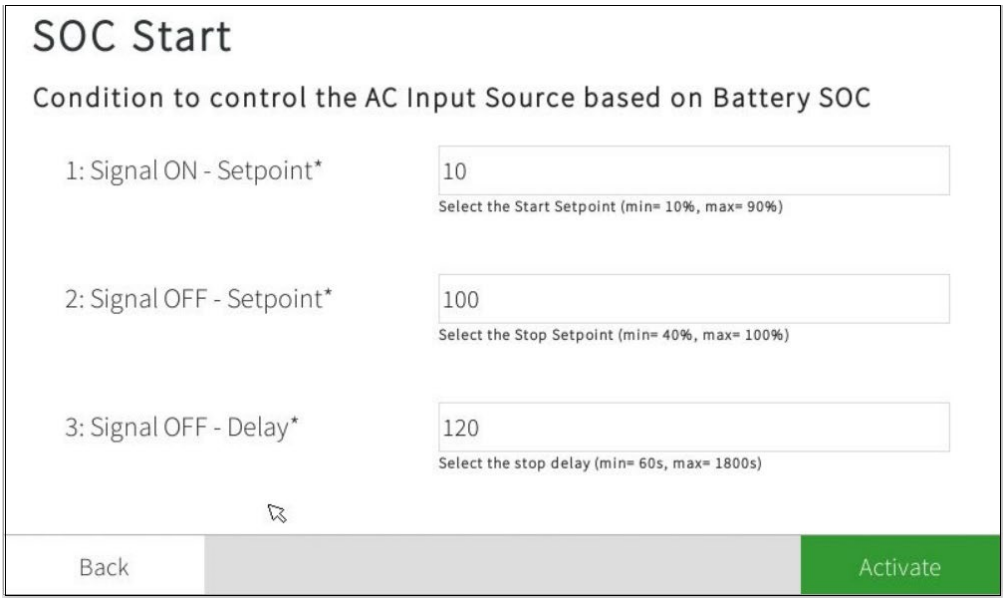
Inverter Power Start

Function to customize the setpoints of the condition to control the Remote Start signal based on ZBP nominal power per phase.



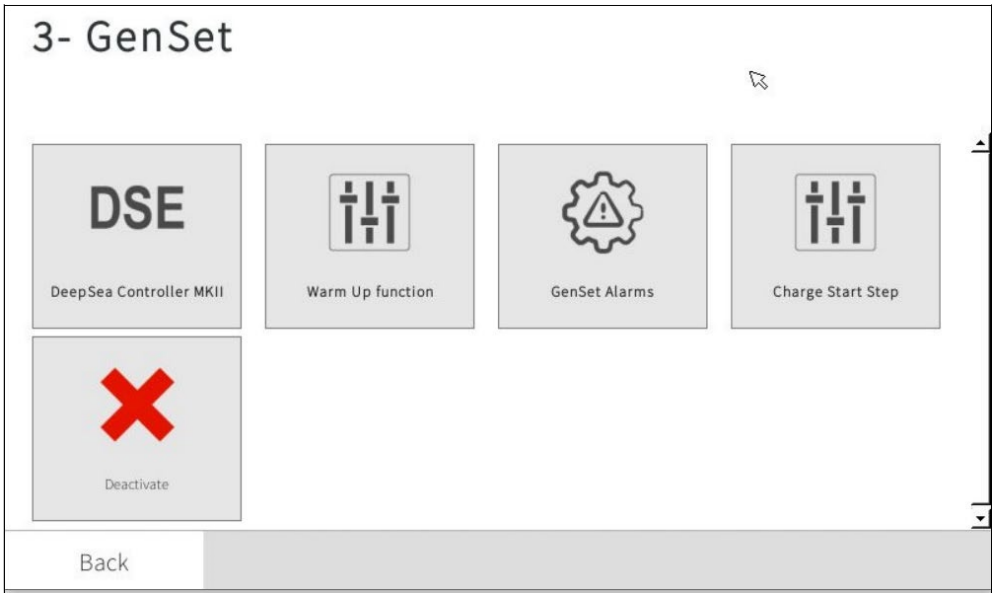
SOC Start

Function to customize the setpoints of the condition to control the Remote Start signal based on Battery SOC.



genset

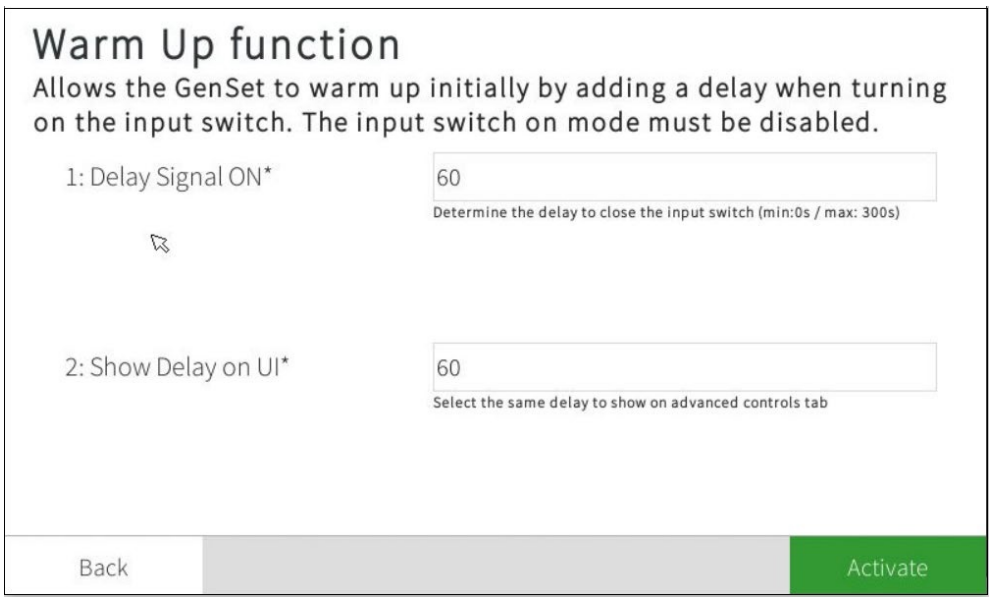
Provide the customizable settings when genset is selected as main AC Input Source.



Warm Up function

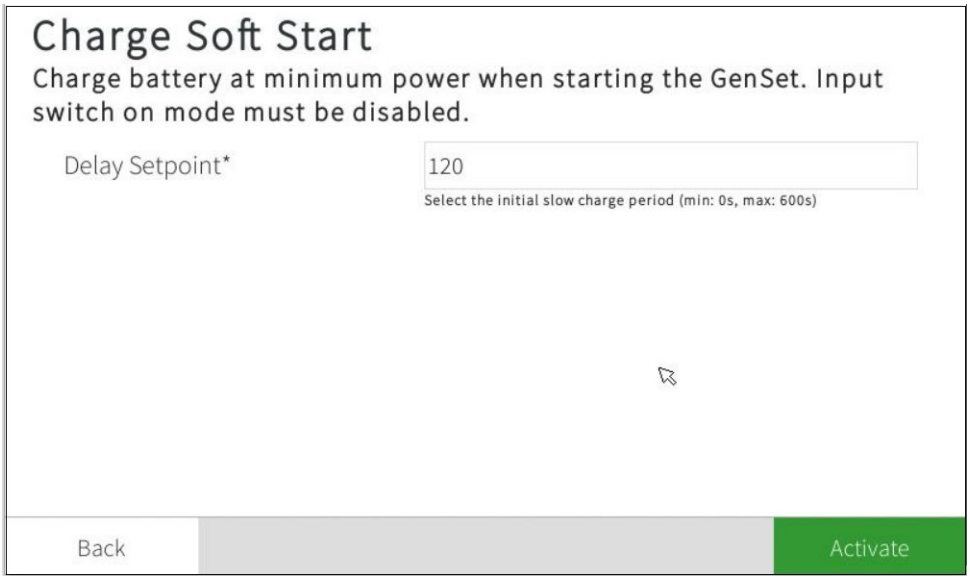
The user can edit the delay to synchronize the ZBP with a running Generator to increase or decrease its warm-up time before supplying power to the ZBP.

Modify these settings to suit the requirements of your Generator or application.



Charge Soft Start

Function to select how long the battery charging power is restricted to a minimum when starting the genset. Refer section *Battery*.

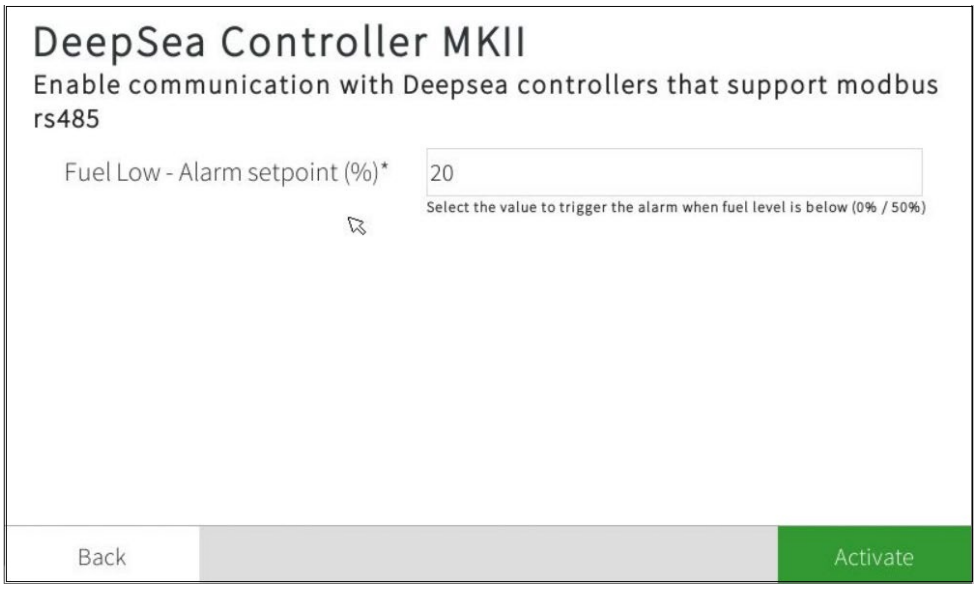


Deepsea Controller MKII

Function to allow communication with a Deepsea Controller MKII connected to the ECO Controller via rs485.

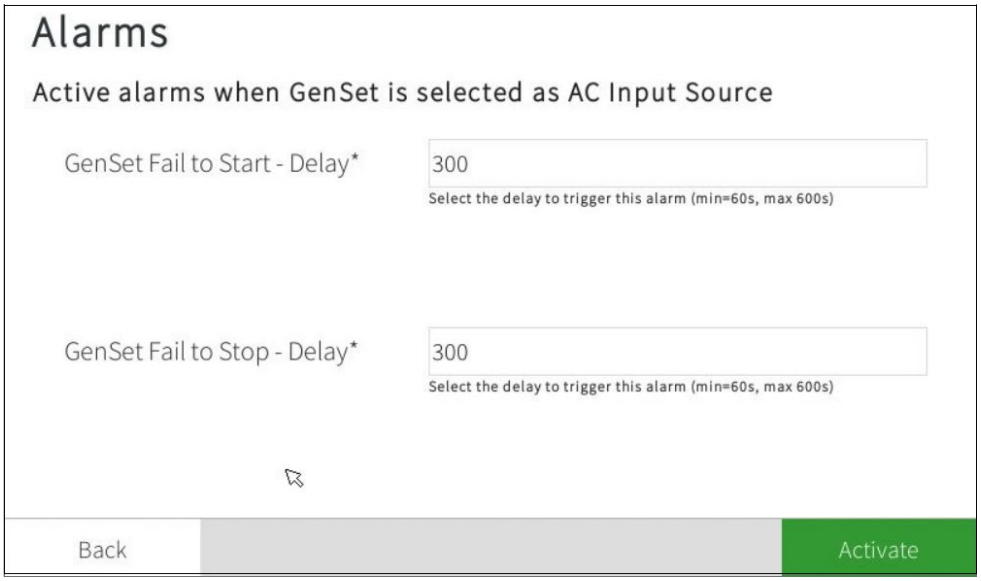
The user can also determine the setpoint to trigger an alarm based on the level of fuel recorded by the Deepsea controller.

A new tab is displayed with data and controls from the Deepsea device on the Home tab after activated. Refer section *DeepSea – Operation Info*.



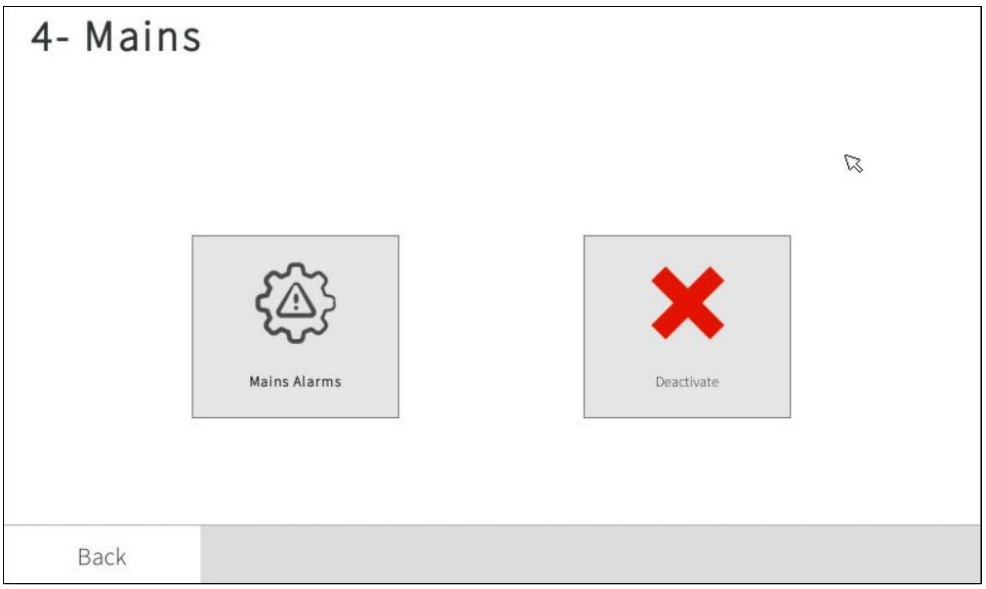
genset Alarms

Function to customize the delays to trigger alarms related to genset.



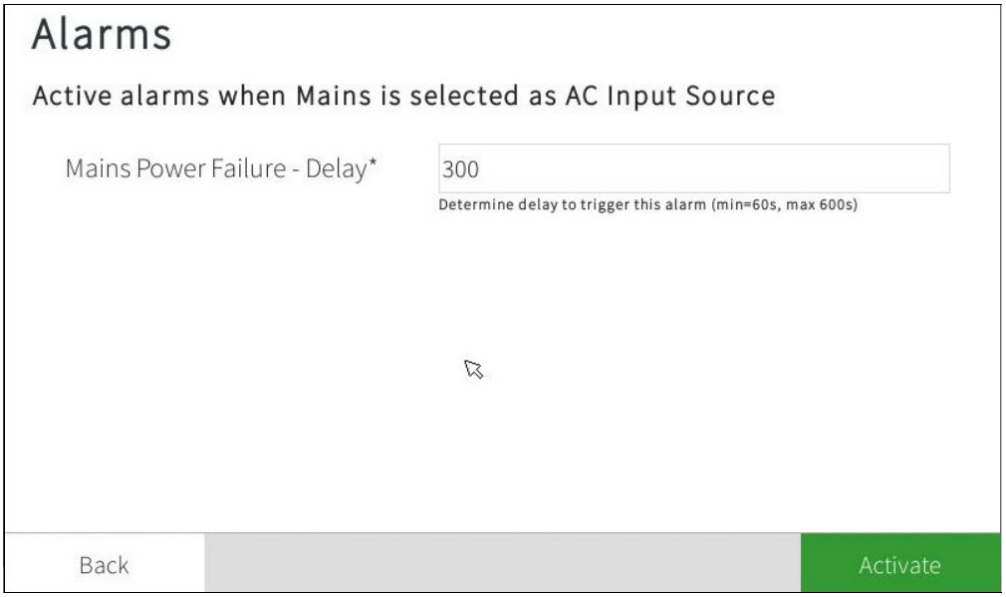
Mains

Provide the customizable settings when Mains is selected as main AC Input Source.



Mains Alarms

Function to customize the delays to trigger alarms related to Mains. Refer section *Checks and troubleshooting*.



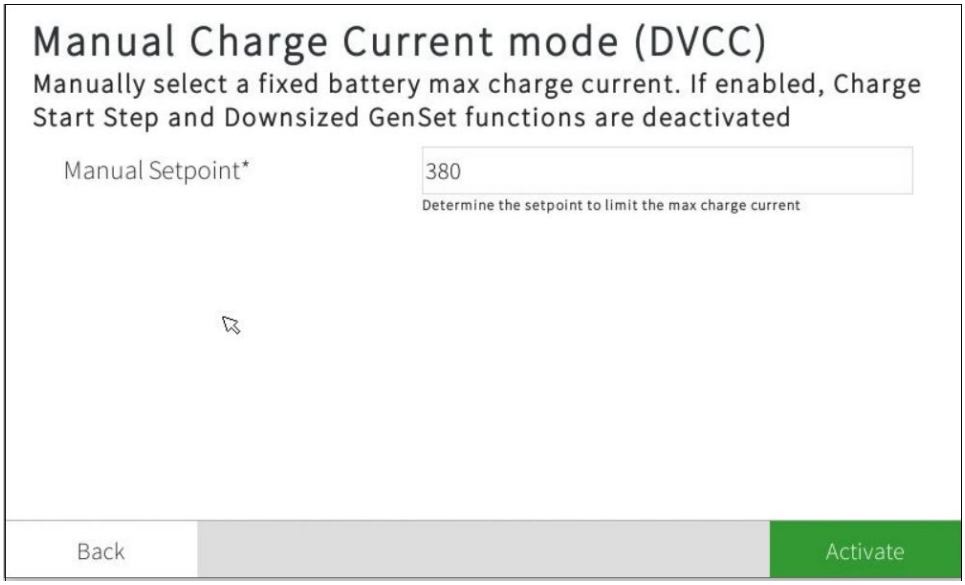
Battery

Provide the customizable settings related to the battery of the ZBP.

Manual Charge Current mode (DVCC)

Function that allows the user to manually select a fixed maximum battery charge current and disable the automatically control of the charging power algorithm based on the size of the available genset.

Therefore, Charge Soft Start and Downsized genset functions are deactivated if the Manual Charge Current mode is activated.

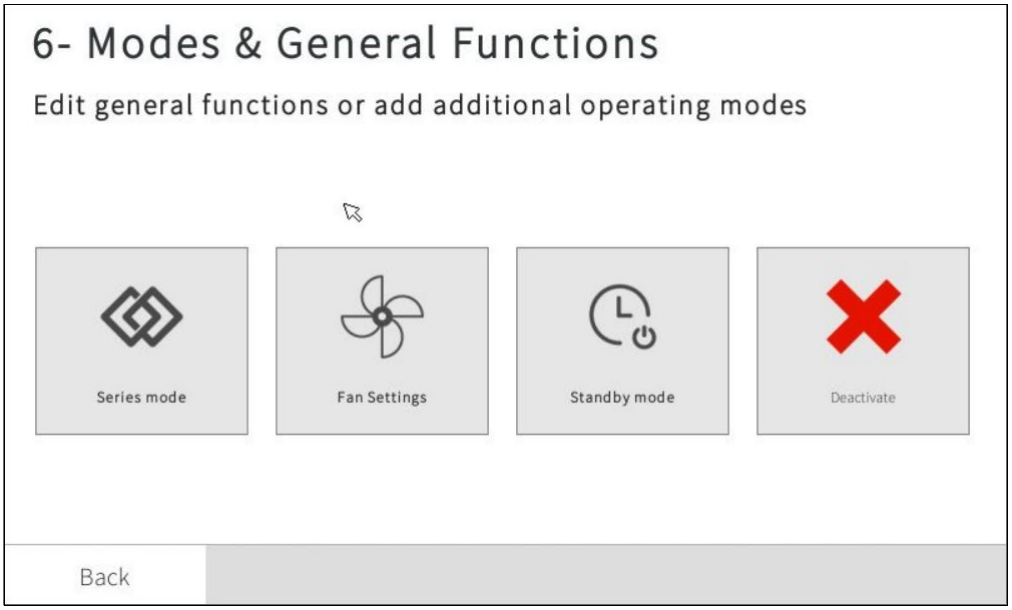


Battery Alarms

Function to customize the delays to trigger alarms related to Battery.

Modes & General Functions

Allow to edit general functions and to activate and/or change settings of additional or existing operating modes of the ZBP.



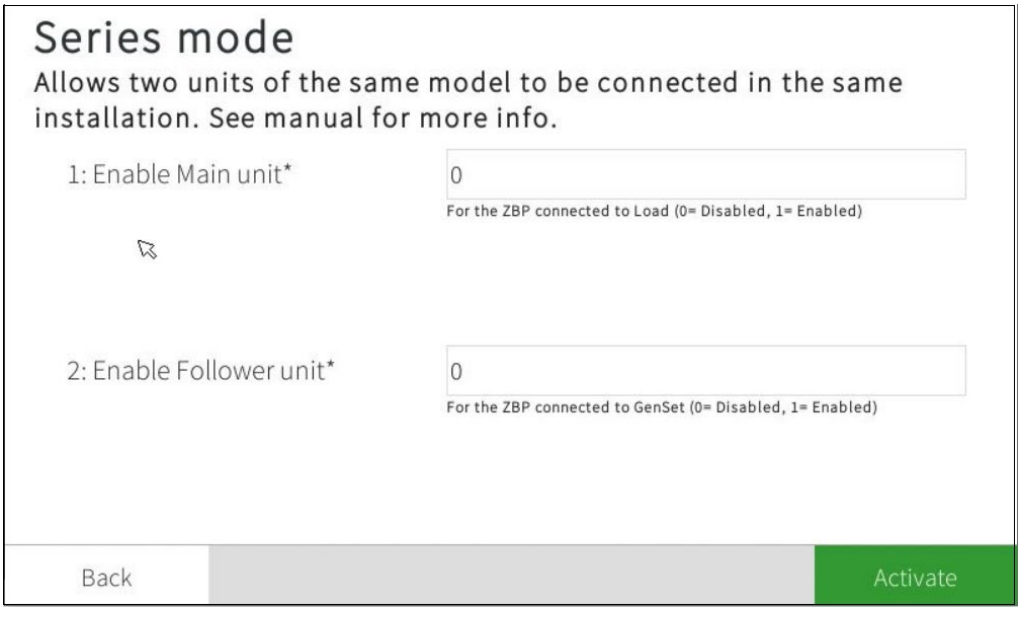
Series mode

Function to enable the ZBP to operate in series mode where the user must select whether the unit is the Main (connected to the Load and controlling the genset) or the Follower (connected to the genset).

WARNING

not enable both modes in the same ZBP.

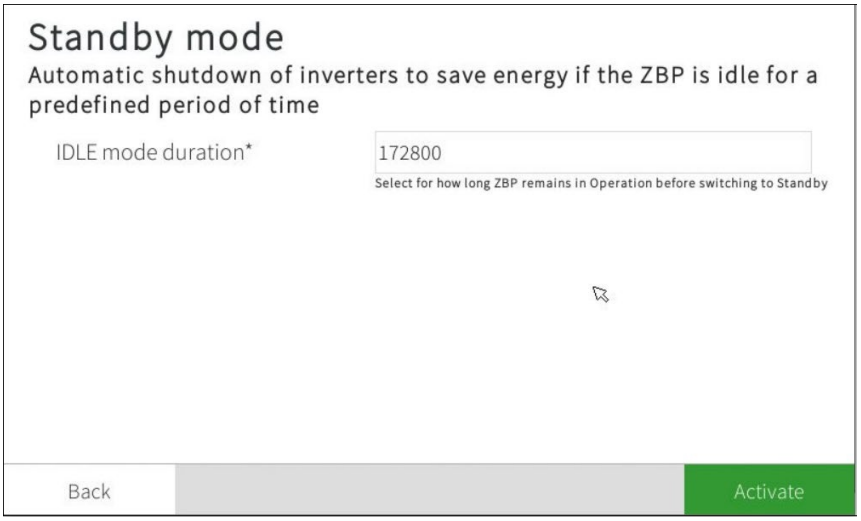
The series mode tab will be accessible on the Home tab as soon as it is activated. Refer section *Series mode - Operation Info*.

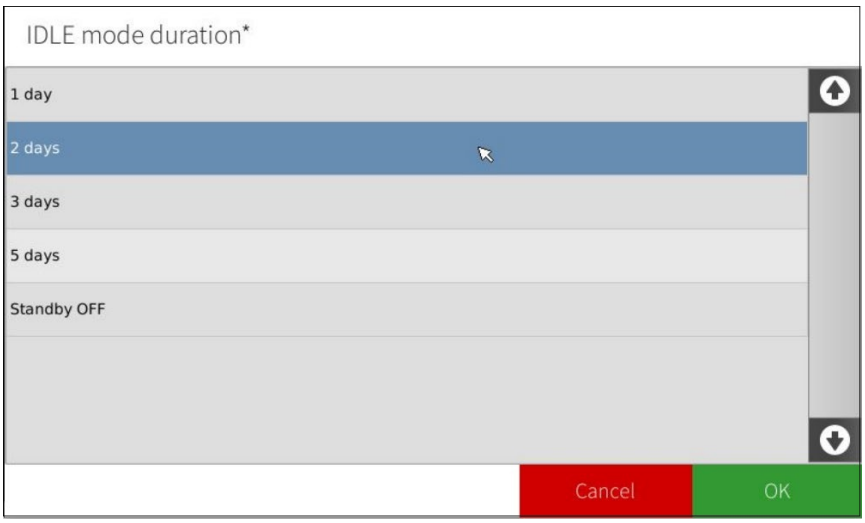


Standby mode

Function to select how long the inverters can remain on when the ZBP is idle before automatically shutting down the inverters.

Default period is 2 days.





Fan Settings

Edit settings of the variable speed fan of the ZBP according to the site environment or sound requirements.

- Fan Limit: Following max speed limits can be selected:

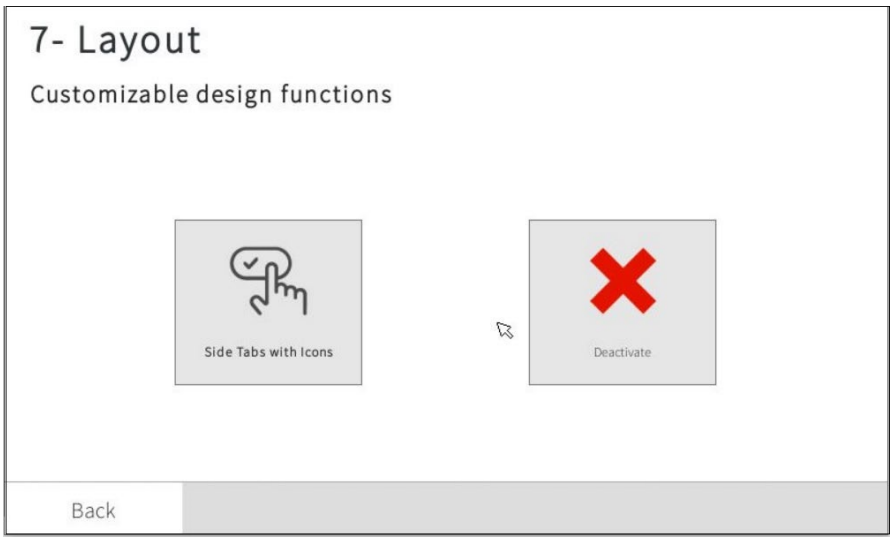
The selected max speed is shown on the Fan and Heater Test tab. Refer section *Fan & Heater Test*.

Layout

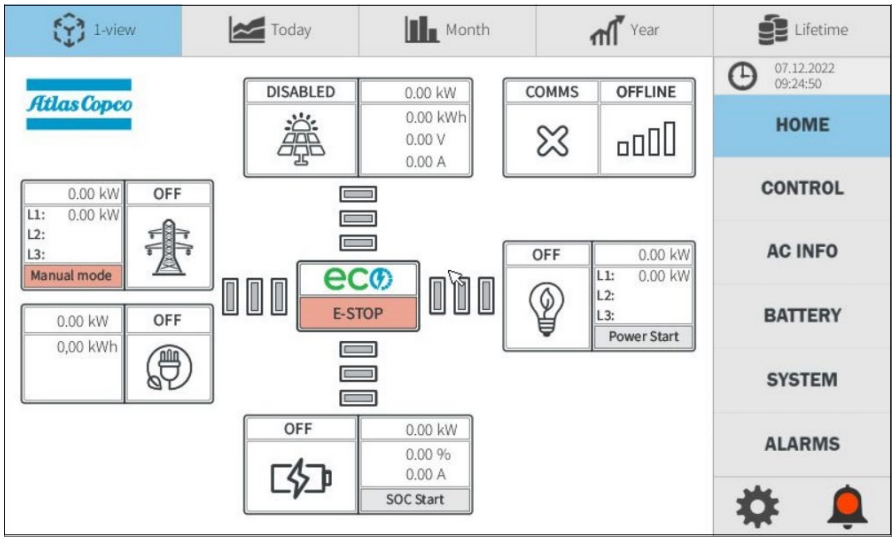
Provide functions to change the design of the user interface.

Side Tabs with Icons

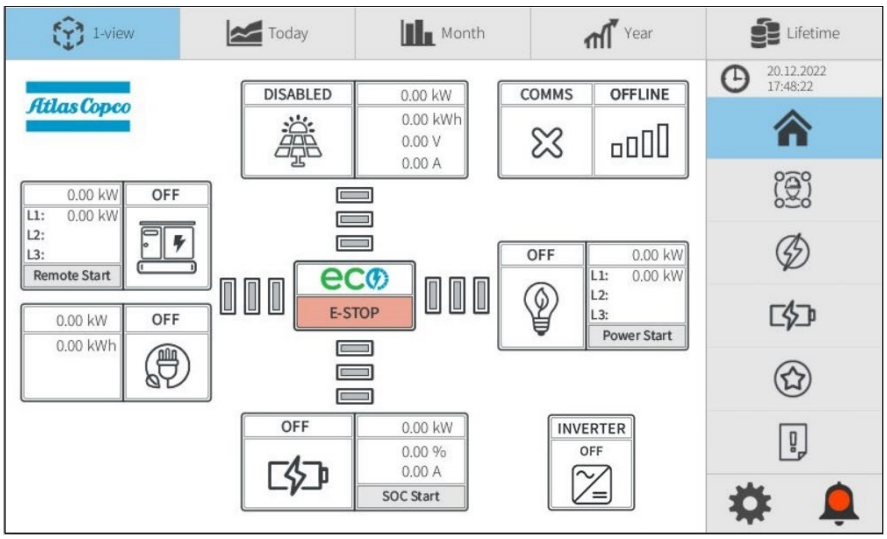
Allow the user to change the design of the main side tabs displaying icons instead of texts.



If Side Tabs with Icons is not activated as default, the side tabs are visualized with texts as shown below.

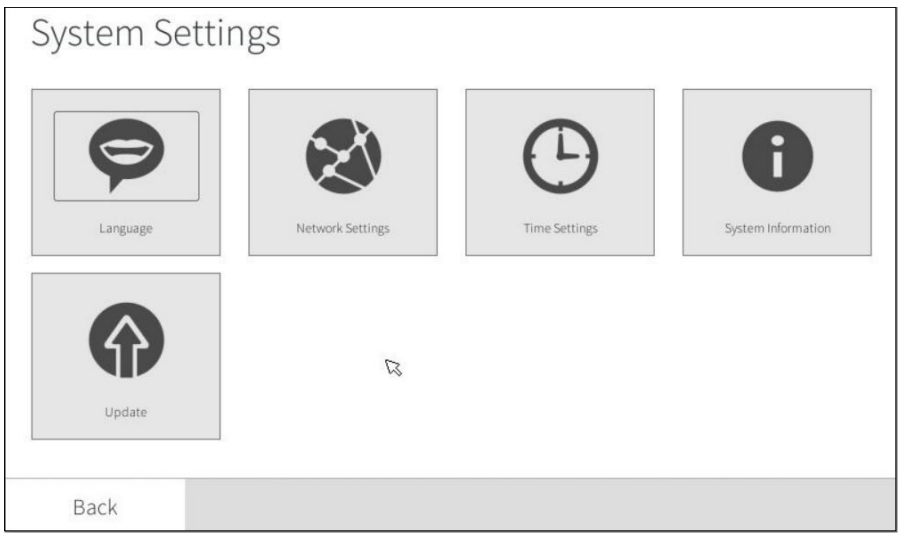


If Side Tabs with Icons is activated, the side tabs are visualized with icons as shown below.



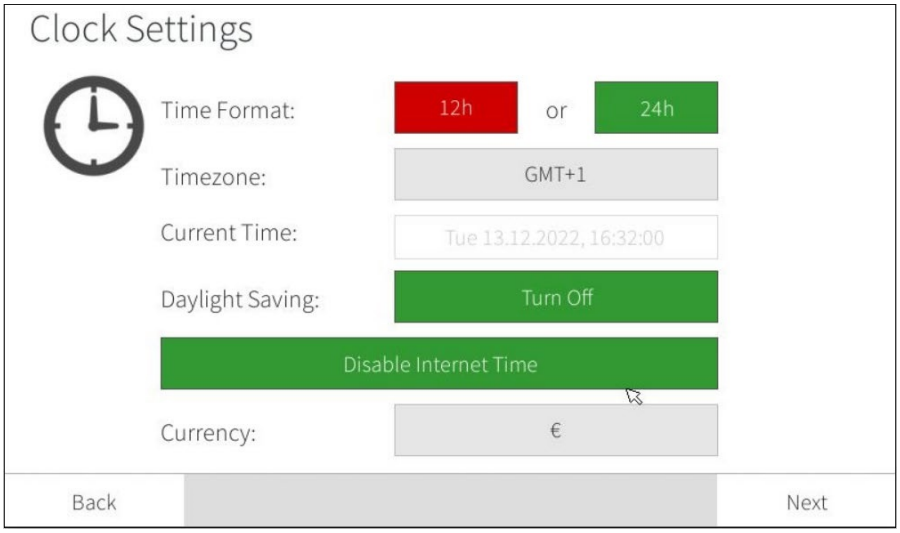
System Settings

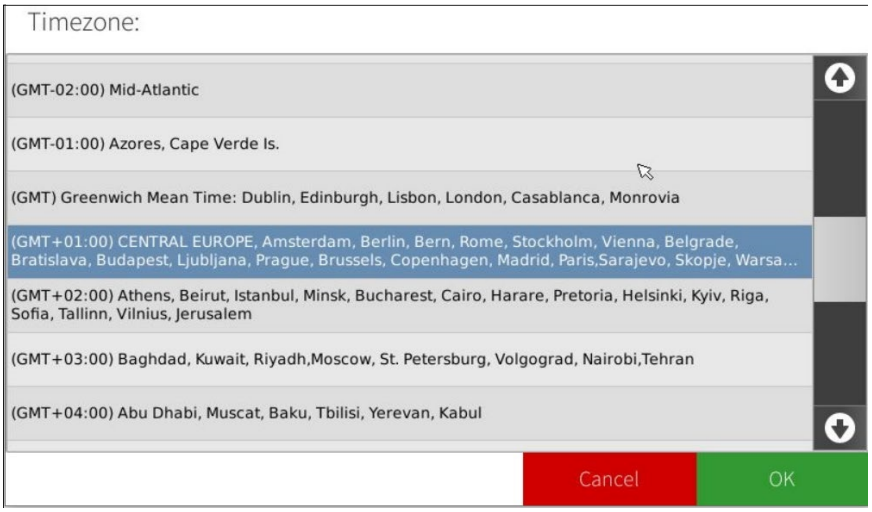
Edit some of the internal settings of the ECO Controller.



Time Settings

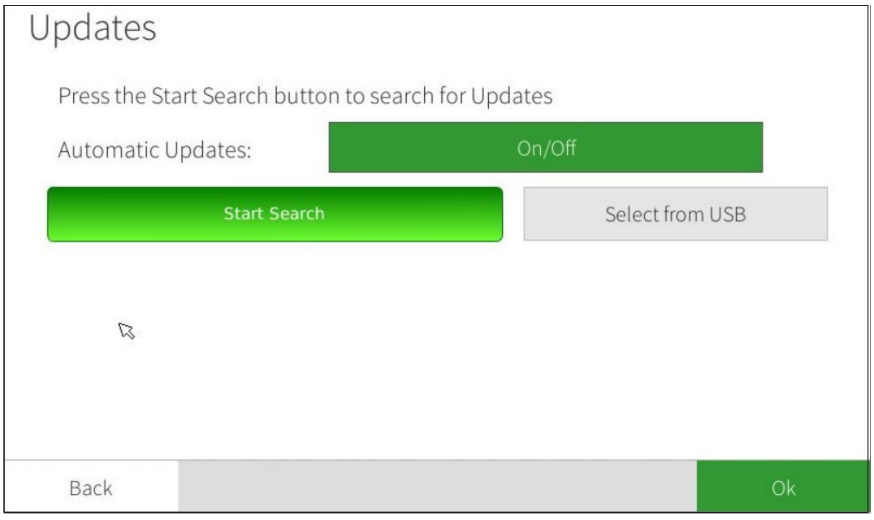
Modify the default time settings





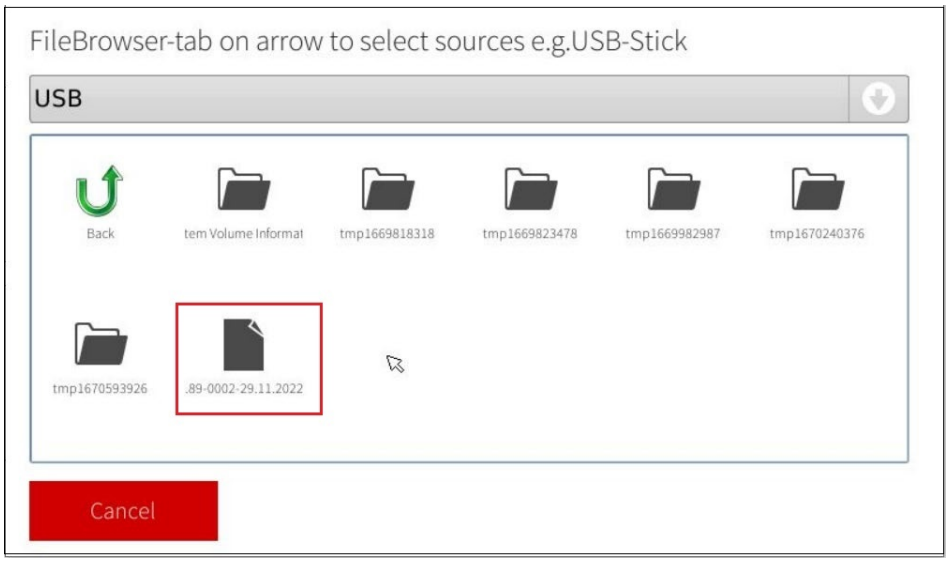
Update

Update the ECO Controller firmware.

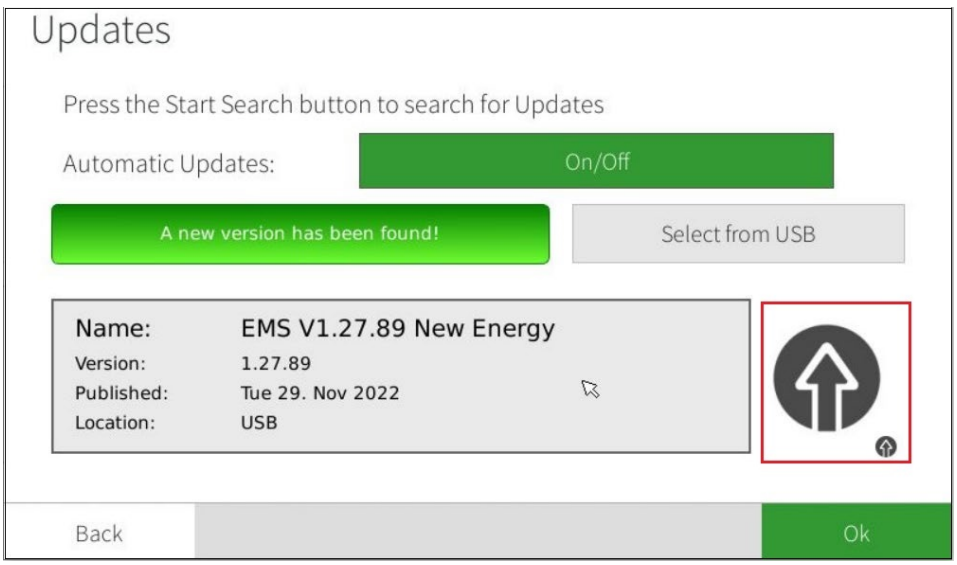


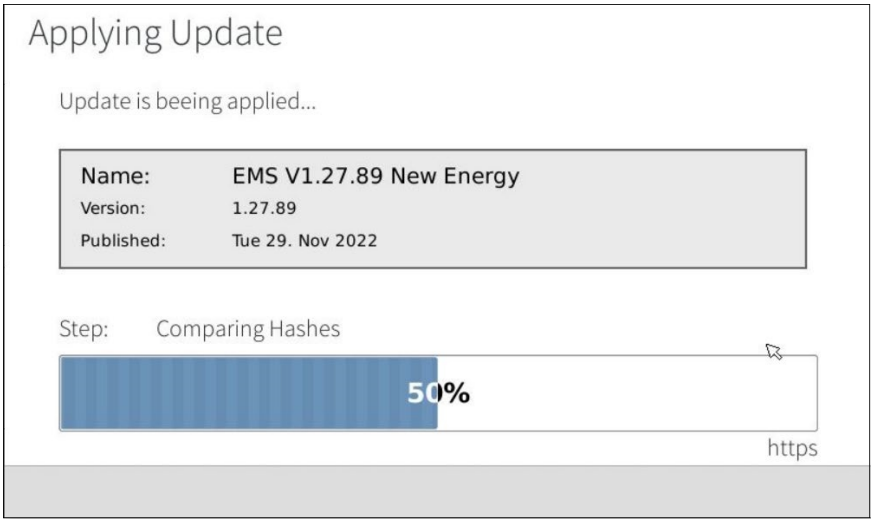
Procedure to update the Firmware:

1. Save the file in a USB.
2. Insert the USB in one of the USB ports available in the back of the ECO Controller.
3. Go to Updated / Select from USB and select USB Folder.
4. Select the firmware file.



5. Click on the arrow to apply the update. The ECO Controller will reset itself after the update is being applied.

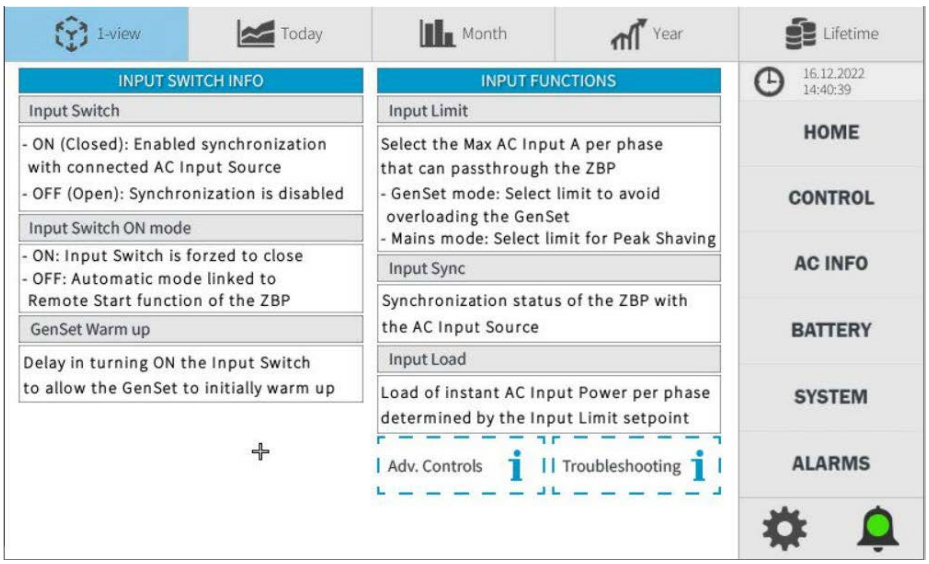




5.3 Additional tabs

Input Info

Provide a description of the functions related to the input of the ZBP.



Input Switch description

Internal switch located in the input of the inverter which is controllable by the ECO Controller.

This switch must be closed to be able to synchronize the ZBP with an AC Input Source. The ZBP provides two modes to control the input switch:

- Auto mode: It is set as default where the Input Switch is linked to the status of the Remote Start signal, therefore if the signal is ON then Input Switch is closed and if the signal is OFF the input switch is open.

  If the genset warm up function is activated, there will be a short delay to close the input switch.
- On mode: The user can force the input switch to be permanently closed and therefore avoid following the Remote Start signal by activating this mode in the User Advance Controls / Modes / Input Switch On mode. Refer section *Input Switch ON mode*.

Genset warm up description

This function automatically adds a delay to close the input switch to help the genset to heat up before delivering power to the ZBP.

The default delay is 1 minute but the user can edit the value of the delay from 0s to 5 minutes in the Advanced Controls tab. Refer section *Warm Up function*.

The genset warm up function is deactivated (no delay is added) if one of the following conditions is true:

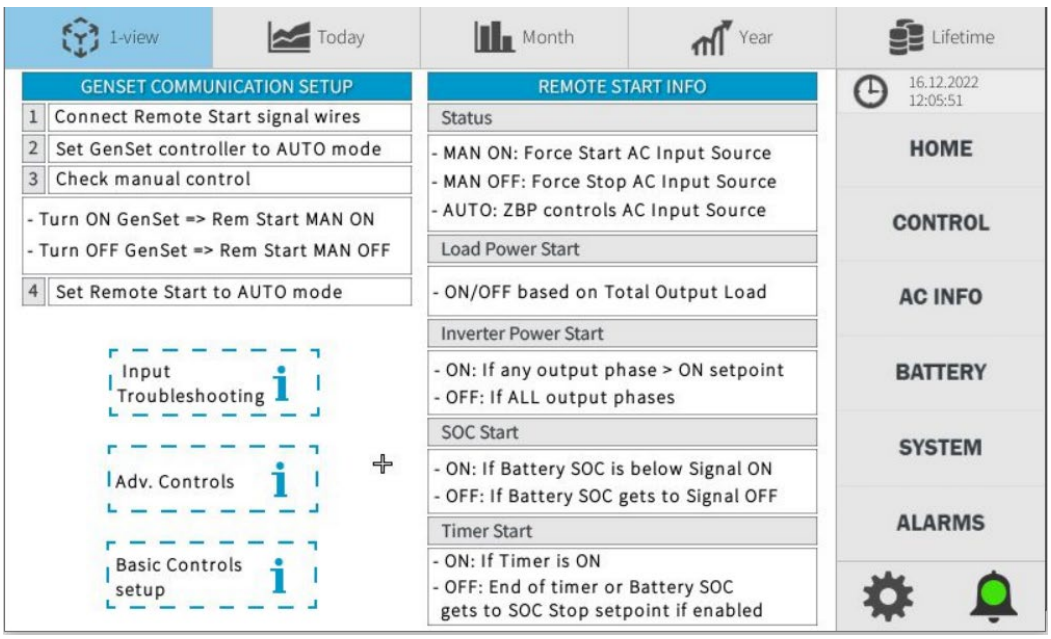
- Input Switch On mode is activated
- Mains is selected as AC Input
- Remote Start signal is ON due to Inverter Power Start

Input Functions description

- Input Limit, refer section *Input Limit*
- Input Sync and Input Load, refer section *AC Input Info*

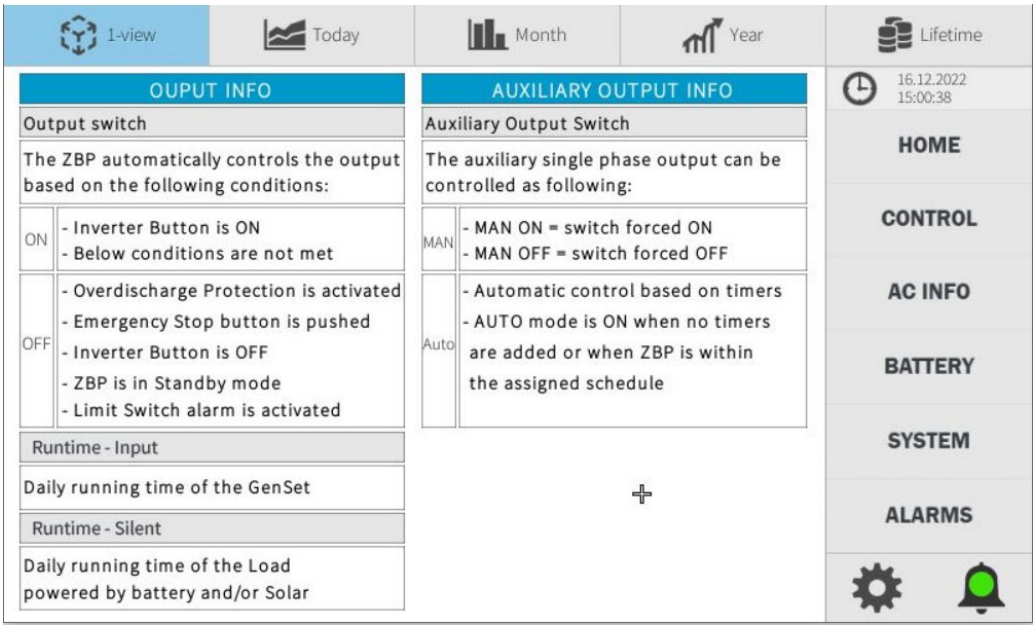
Remote Start Info

Provide a description of the conditions that automatically turn ON and OFF the Remote Start signal in AUTO mode and describe the steps to verify the ZBP is correctly controlling the genset.



Output Info

Provide a description of how the ZBP is automatically enabling or disabling the output and auxiliary output switches.



- Output Switch:

  The main output switch of the Inverter is automatically controlled by the ECO Controller when switching the mode of the inverter based on dynamic functions to improve the lifetime of the batteries and the overall performance of the ZBP.

  For instances, the output switch is turned off when over discharge protection alarm is raised to protect the batteries or when ZBP is in Standby mode to save energy.
- Auxiliary Output Switch

  The switch of the controllable single-phase output can be controlled by adding timers to enable it during specific periods of time, refer section *Auxiliary Output Timer*.
- Runtime – Input

  Daily running time of the genset when powering a load and or charging the batteries.
- Runtime – Silent

  Daily running time of the Load when powered by Battery and/or Solar.

Inverter Info & troubleshooting

Provide a description of the mode and state codes of the Inverter and Solar Charge Controller, as well as the steps to clear related alarms. The button to reset Inverters is also located on this tab.

Inverter Mode, State & Active AC Input

Information of the mode and status of the Inverter as state below.

- Inverter Modes:
  - 1- Charger Only: Inverter only allow to charge and does not allow to discharge if no AC Voltage is detected at the input.
  - 2- Inverter Only: Inverter only allow to discharge and does not allow to charge.
  - 3- ON: Charge and discharge is allowed.
  - 4- OFF: Inverter is switched off.
- Inverter States:
  - 0- OFF
  - 1- Low Power
  - 2- Alarm
  - 3,4,5,6- Charging
  - 8- Passthrough
  - 9- Inverting
  - 10- PowerAssist
  - 252- Bulk Protection
- Active AC Input:
  - 0- Unknown
  - 1,240- Not Connected
  - 2- AC IN Source Synchronized

Solar Charger Info

Information of the Solar Charger Controller mode. It does not show any value in case the ZBP is not equipped with this device.

- Solar Charger Modes:
  - 0- OFF
  - 1-Voltage and or Current Limited

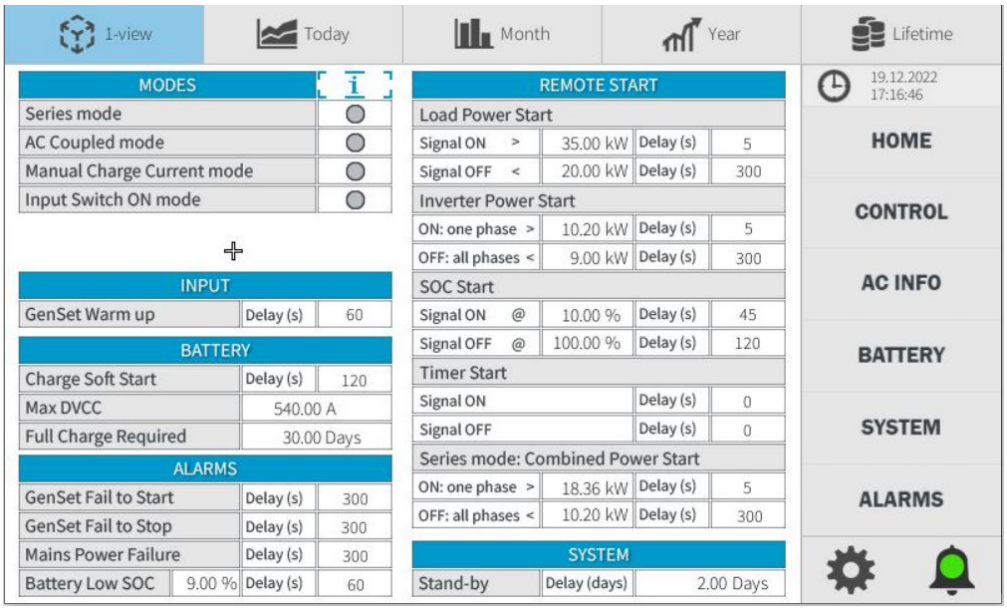
- 2- Active
- 255- Not available

Advanced Controls Info

Provide a summary of the configurable settings and additional modes set in the Advanced Controls tab according to the type of ZBP. Refer section *Advanced Controls*.

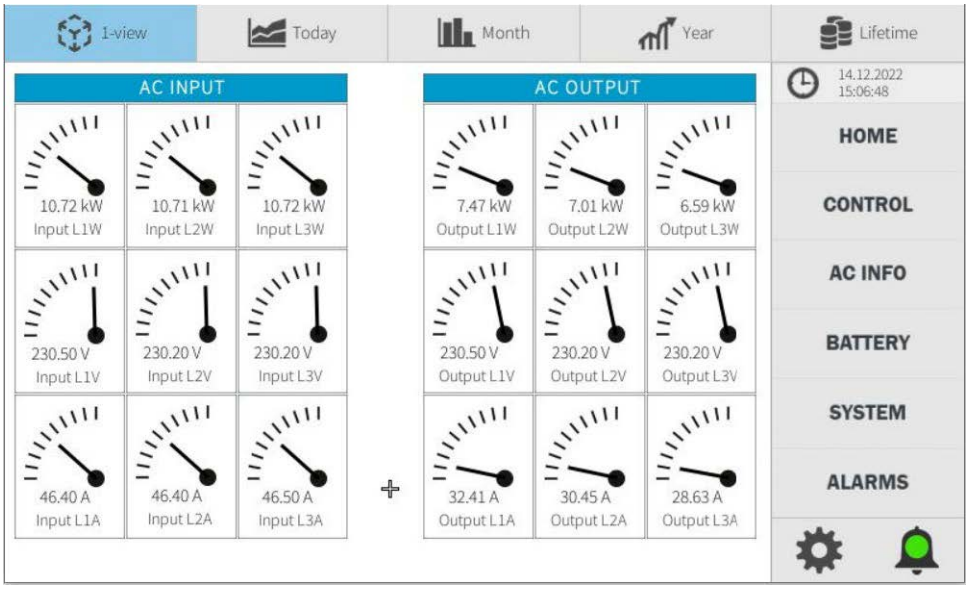
Questions such as what is the maximum power the ZBP can deliver before starting the AC Input Source or how long it will be charging the battery at minimum power can be easily answered on this tab.

It is highly advisable to check these settings any time the ZBP is required to be used to ensure the ECO Controller is configured according to site and user requirements before it is put into operational mode.



Gauges AC IN & OUT

Provide a gauge widget style to show instantaneous values of power, voltage and current per phase of the input and output. It can be accessed from the AC Info tab.



Energy Sources

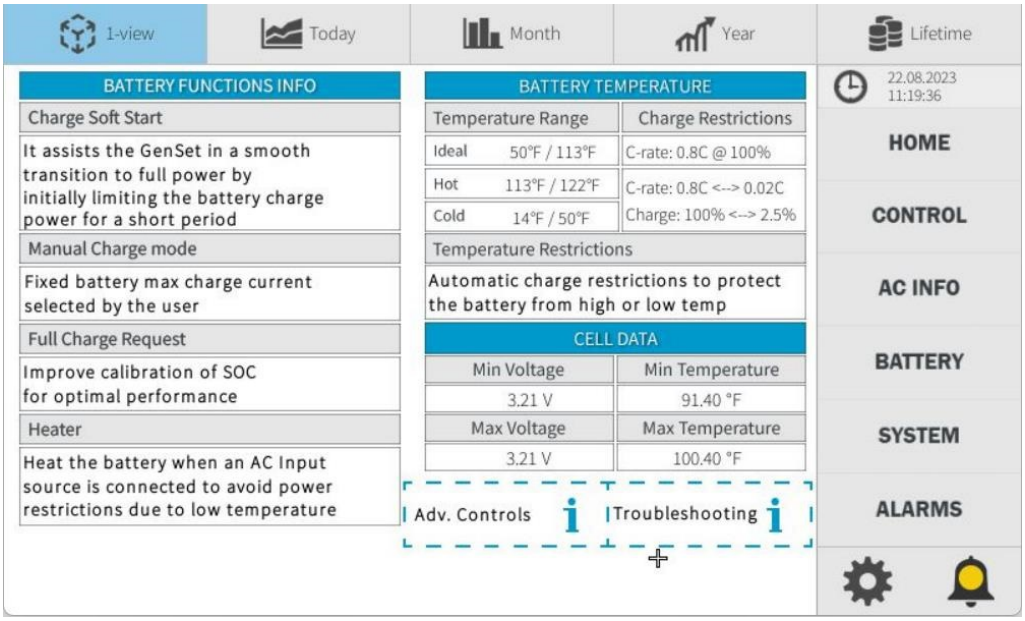
This tab is accessible from the AC Info tab and contains data of the different sources used to charge the batteries in both text and graph.

The power data displayed is instantaneous and the energy data is daily, meaning that they reset to zero at the end of the day.

Each individual energy source rectangular datapoint and the chart are clickable providing legacy data by using the top buttons. Refer section *Historical Data*.

Battery Info

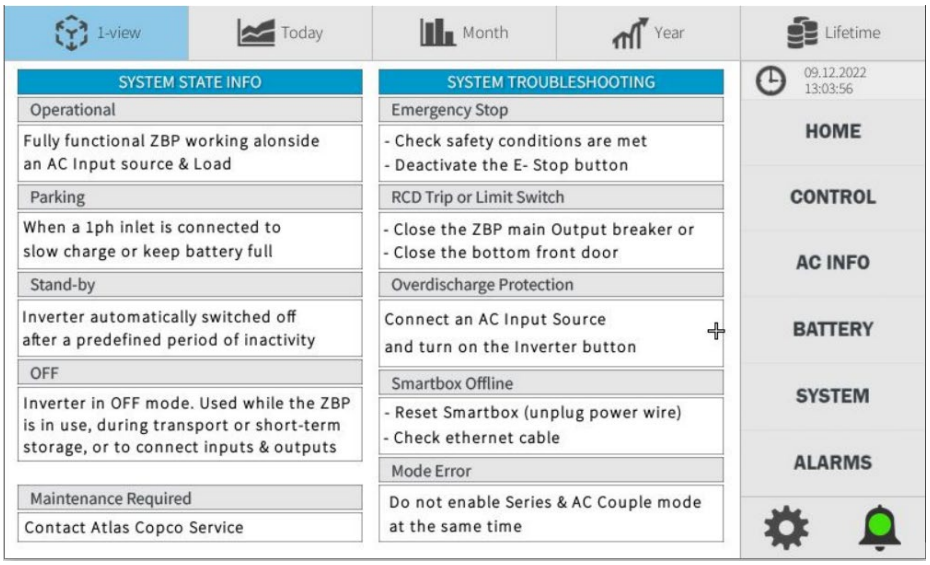
Status of the battery cells, description of the functions related to the Battery as well as other important information is displayed on this tab with direct access to advanced controls info tab to check internal settings of the battery functions and battery troubleshooting guide.



- Battery functions: described on the image above. Refer section *Battery*.
- Battery temperature: charge restrictions based on battery temperature (°C or °F).
- Cell Data: display the maximum and minimum voltage and temperature of the cells in the battery bank.
- Additional tabs: Advanced controls and Battery troubleshooting

System info

Description of the system statuses as well as the steps to clear related.



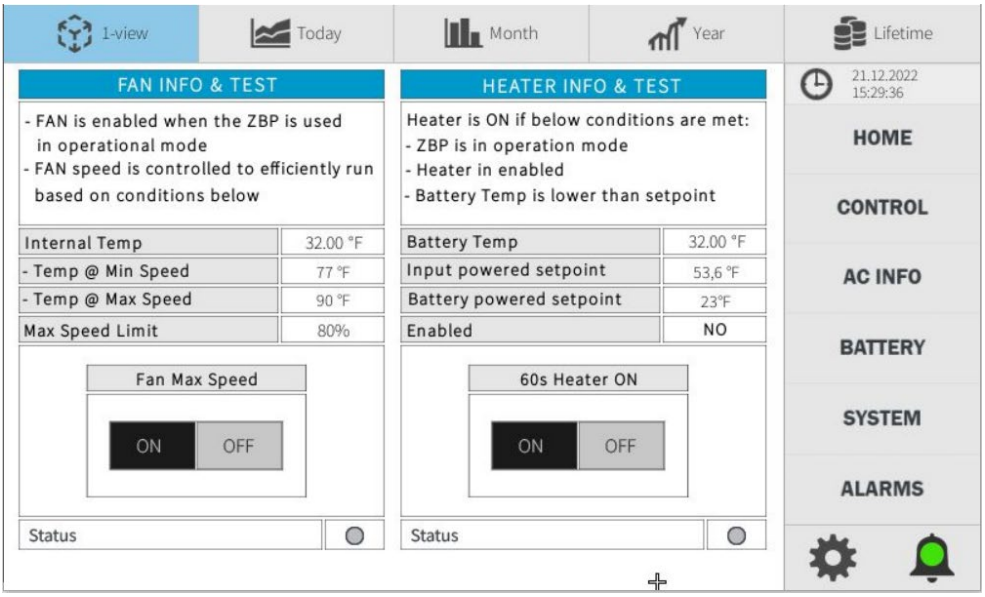
System States

- Operational: Fully functional ZBP
- Parking: When a single-phase inlet is connected to slowly charge or maintain the batteries at full level.
- Stand-by: The ZBP automatically switches the inverter off after a specific time during idle to save energy.

- OFF: Inverter in OFF mode. Used while the ZBP is not used, during transport or short-term storage, or for wiring inputs & outputs.

Fan & Heater Test

Provide information and controls to test the Fan and Heaters of the ZBP.



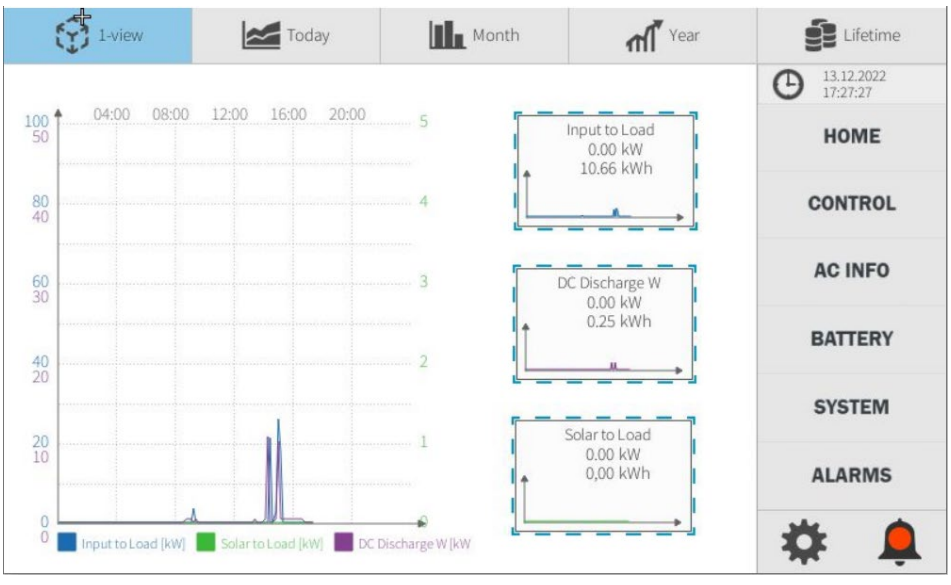
Historical Data

There are four buttons at the top of the chart which provides access to historic data with graphs and values for some of the datapoints measured in the ZBP.

To access the top buttons, click on available datapoints located in the main side tabs which are displayed in a rectangular format or inside a chart.

To return to side tabs, click on 1-View (top left corner) as shown on previous section.

For example, energy sources tab (refer section *Energy Sources*) provides up to 3 datapoints which can be also displayed to view historical data on the top buttons.

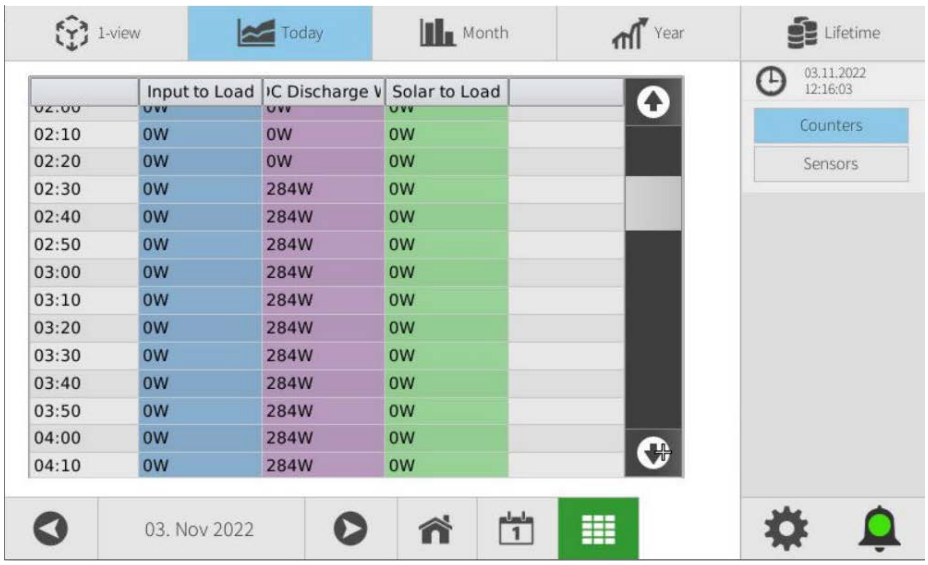


Here the features of these buttons:

- Today button: Display daily power and energy data
- Month button: Display monthly energy data
- Year button: Display yearly energy data
- Lifetime: Display overall energy data

Use the buttons available at the bottom of the charts to do the following actions:

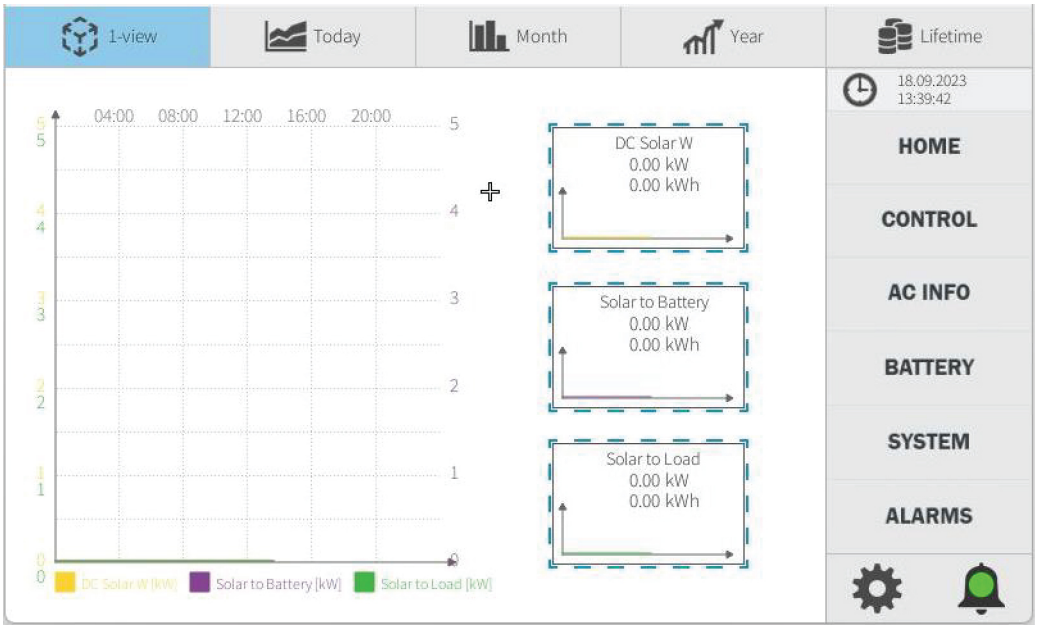
- Arrows (left & right): navigate to previous or next days, months and years.
- Home: back to current day, month or year.
- Calendar: Pop-up calendar to select a specific day, month or year.
- Grid: Opens up the data in CSV format as shown below.



Energy (Battery)

- This tab is accessible from the Battery tab and displays both DC Charge and DC Discharge instantaneous power and daily stored energy with access to legacy data.
- The power data displayed is instantaneous and the energy data is daily, meaning that they reset to zero at the end of the day.

- Each individual energy source rectangular datapoint and the chart are clickable providing legacy data by using the top buttons



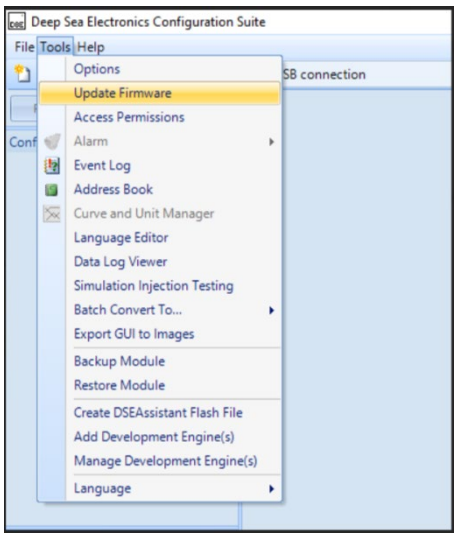
5.4 Additional working modes

External GenSet Controllers – Deep Sea

Communication with a Deep Sea MKII controller via rs485 provides deeper control and information of the device from the ECO Controller.

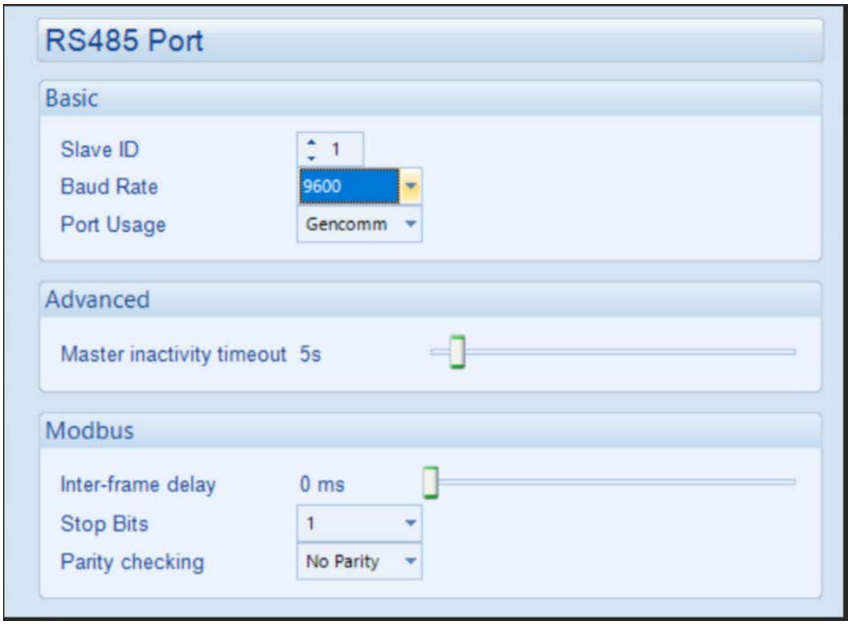
Installation

- The communication is only possible with Deep Sea Controllers that provide rs485 interfaz such as the DSE7310 MKII or DSE7410 MKII.
- Ensure the Deep Sea Controller is updated with latest firmware.

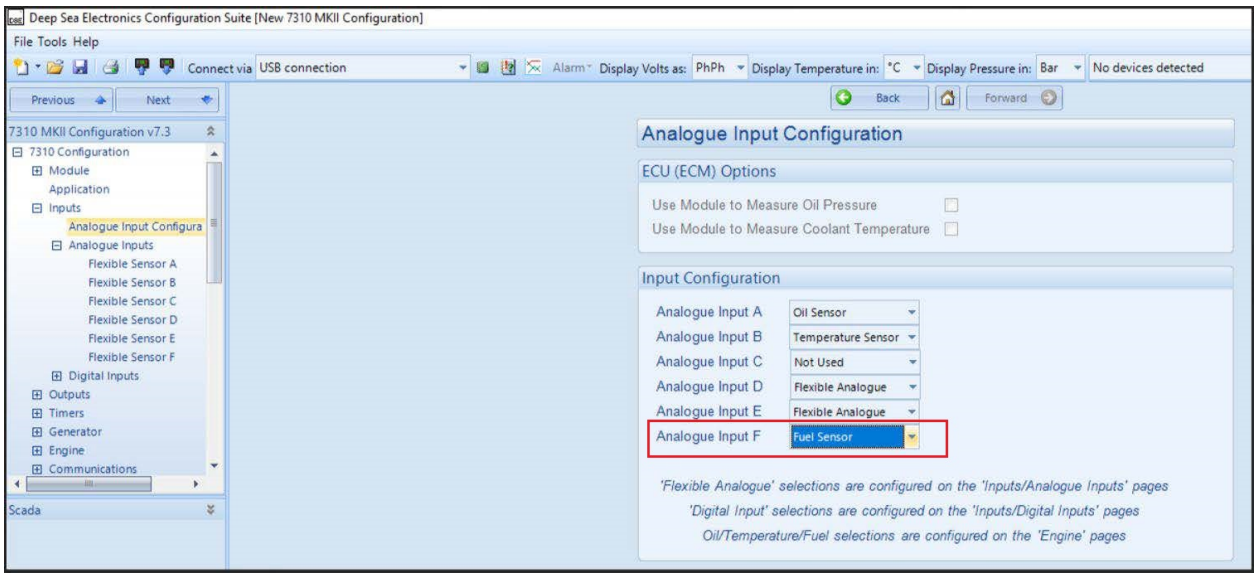


- Baud rate: 9600
- Slave ID: 1

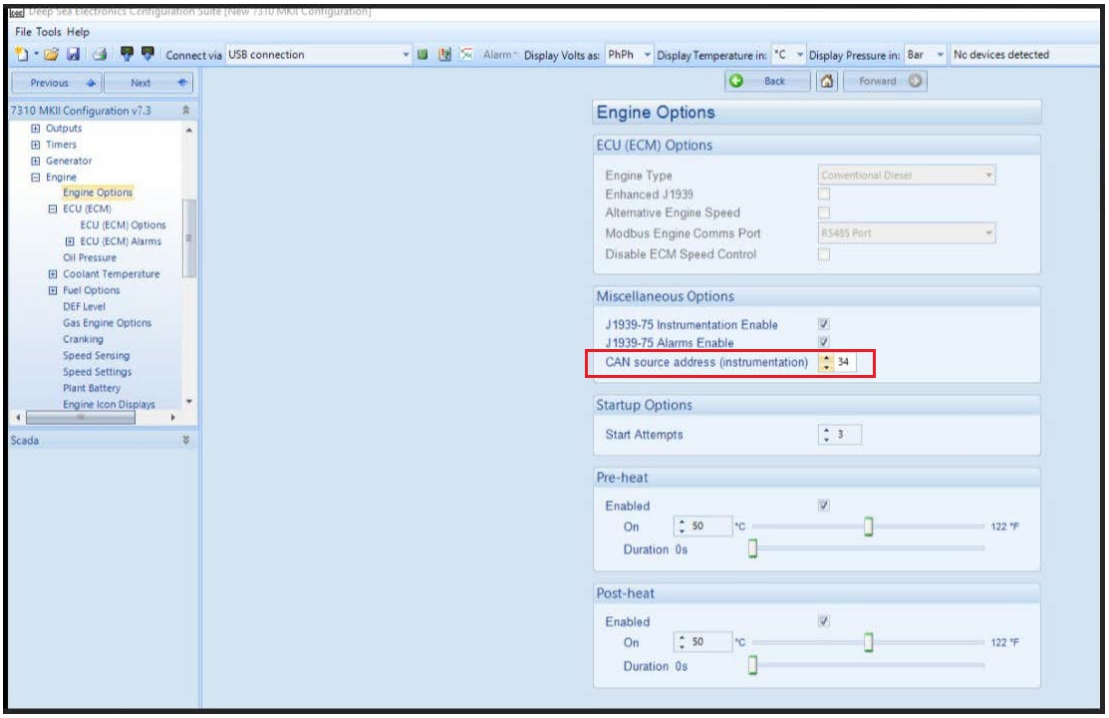
- Stop Bits: 1
- Parity Checking: No Parity



- Select the Fuel Sensor to show the fuel level.



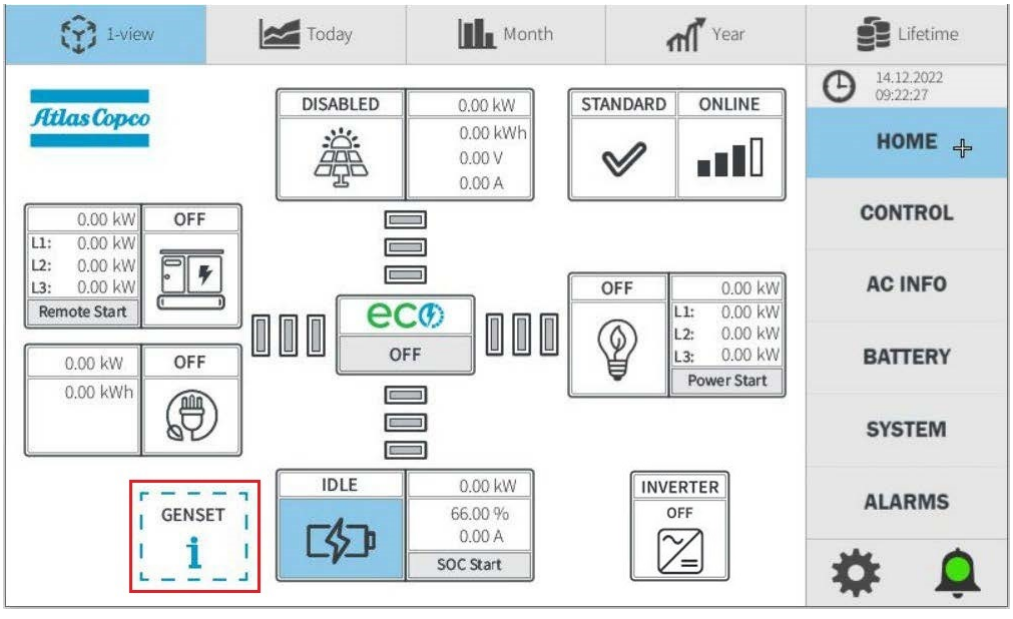
- Ensure the Deep Sea Controller is communicating with the Engine via CAN by adding the corresponding address code.



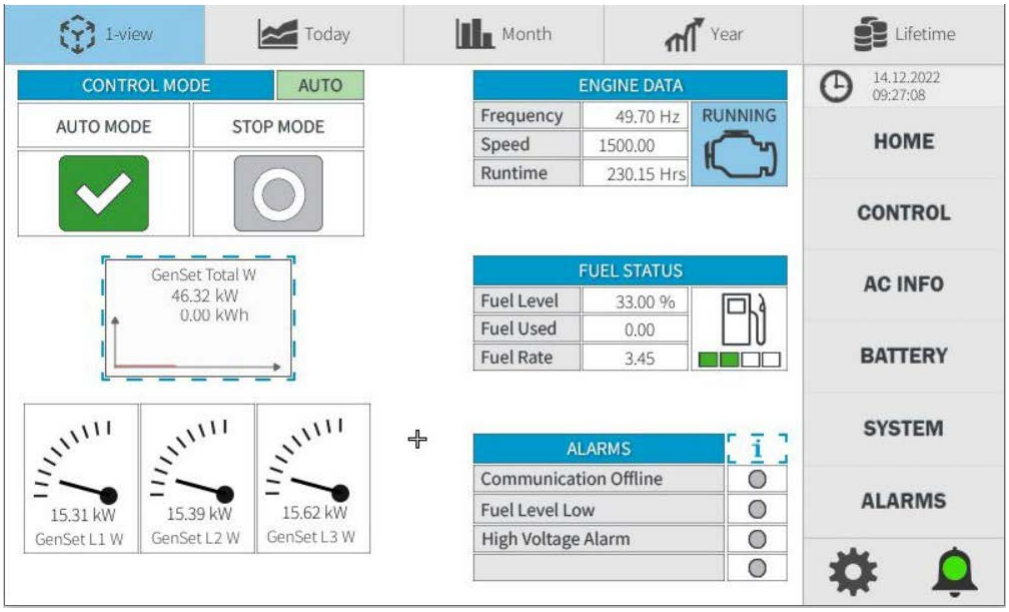
- Ensure the Remote Start of ZBP hurting connector is connected to the GenSet and the Deep Sea Controller is wired up.
- Activate the Deep Sea communication on the ECO Controller. Refer section *Deep Sea Controller MKII*.

Deep Sea – Operation Info

The Deep Sea tab is accessible from the Home tab after activating the communication with the Deep Sea controller.



The Deep Sea tab contains the following features:

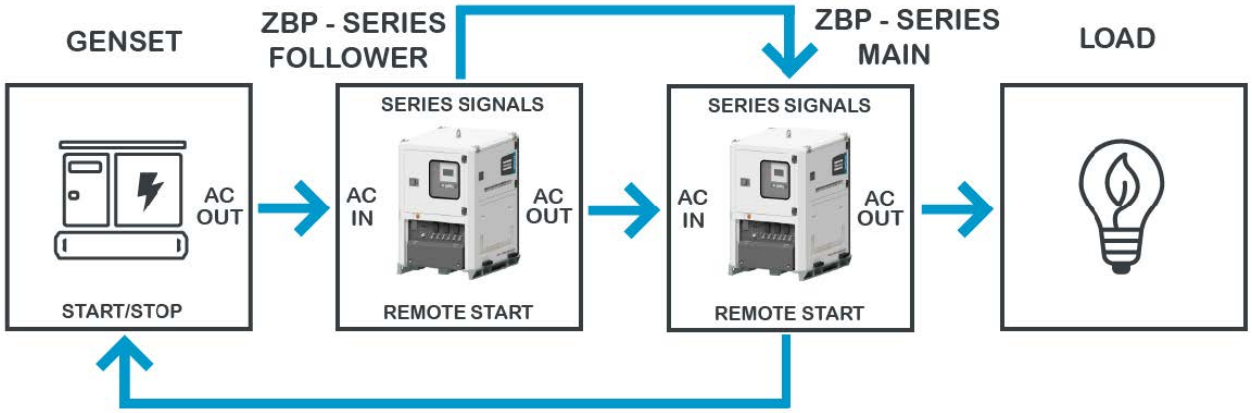


- Control Mode:
  - Current status of the Deep Sea controller: Auto, Stop or Manual.
  - Auto mode button => ON (green) / OFF (grey)
  - Stop mode button => ON (red) / OFF (grey)
- Engine Data
  - Instantaneous frequency, speed and runtime of the engine.
  - Engine status: running, stop & communication error.
- Fuel Status
  - Instantaneous fuel level, fuel used and fuel rate.
- Alarms
  - Communication Offline: indicates a communication failure with the Deep Sea Controller.
  - Fuel Level Low: indicates fuel is lower than assigned value when activating Deep Sea.
  - High Voltage Alarm: indicates the GenSet provides out of range voltage that cannot be accepted by the ZBP. Only available for 60Hz models.

Series mode

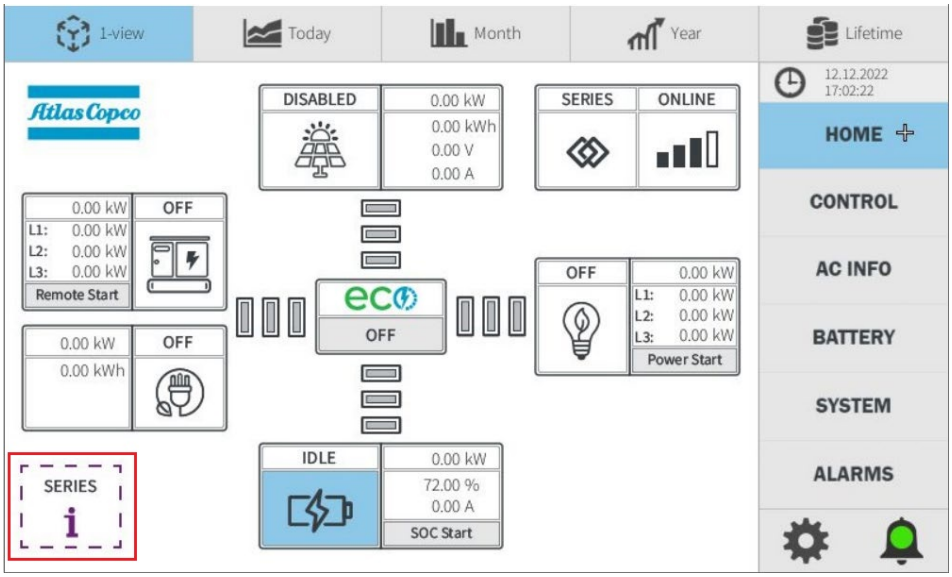
Enable this mode to connect two ZBP of same model type in series to provide greater autonomy on the same installation.

Installation



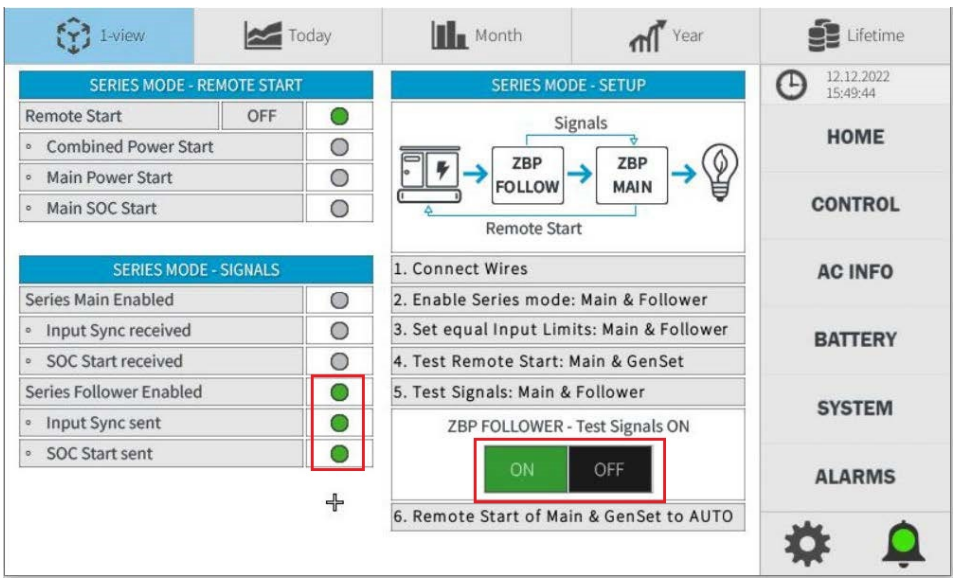
1. Ensure no more than two ZBP of same model type are available.
2. Select a suitable GenSet.
   - ZBP 15.60.230 –> Recommended Size 24kVA
   - ZBP 30.30.400 –> Recommended Size 112kVA
   - ZBP 30.60.208 & 30.75.208 –> Recommended Size 112kVA
   - ZBP 40.60.208 & 40.75.240 –> Recommended Size 72kVA
   - ZBP 45.60.400 & 45.75.400 –> Recommended Size 112kVA
3. Connect Wires as shown above.
   - AC Wires: GenSet to Input of ZBP Follower
   - AC Wires: Output of ZBP Follower to Input of ZBP Main
   - AC Wires: Output of ZBP Main to Load
   - Signal Wires: Series mode signals from ZBP Follower to ZBP Main
   - Signal Wires: Remote Start of ZBP Main to GenSet
4. Enable Series mode in both ZBP (refer section *Series mode*). Ensure no more modes are enabled.
   - ZBP connected to Genset= Series Follower mode
   - ZBP connected to Load and controlling GenSet = Series Main mode

   The Series mode tab is now displayed on the Home tab after series mode is enabled.



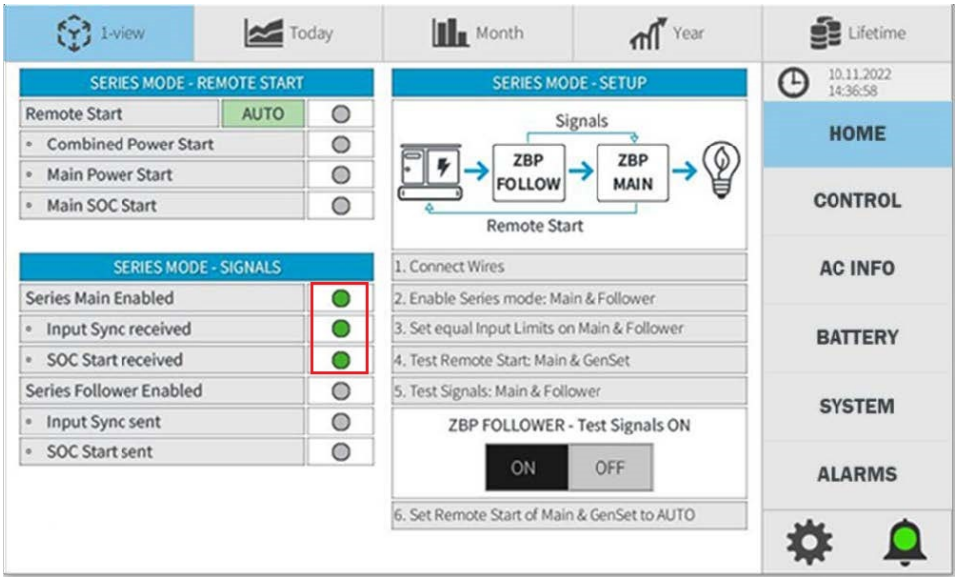
5. Turn ON Inverters and select the same Input Limit in both Main and Follower according to the GenSet Size. Check Input Limit alarm is not triggered after turning on Inverters in both units.
6. Test Remote Start in ZBP Main unit to ensure successful communication to control the Genset.
   - Remote Start MAN ON –> GenSet Start
   - Remote Start MAN OFF –> GenSet Stop
7. Access Series tab and test Series mode signals to ensure successful communication with the two units.
   - Go to ZBP in Series Follower mode and press the button “Test Signals ON” to force sending Input Sync & SOC Start signals to ZBP in Series Main mode.

     This button will be turned on for 60s after pressed.



   - Go to ZBP in Series Main mode and check the statuses of Input Sync and Start signals.

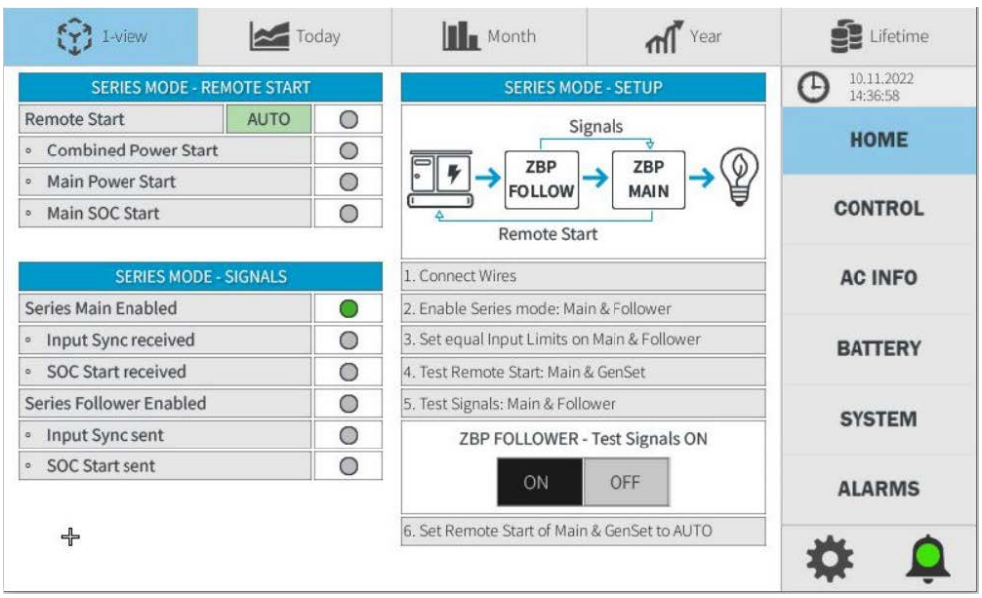
     I both are displayed as received, meaning the indicators are in green as shown below, the signals between both ZBPs are successfully connected.



8. Ensure the GenSet Controller and Remote Start of the ZBP in Series Main mode are both in AUTO.

Series mode - Operation Info

Once both units are configured as explained in above section, the entire installation is controlled by the ZBP in Series Main mode which automatically will start/stop the GenSet according to the following conditions:



- Combined Power Start: condition based on total power output of ZBP Main (Load) which combines power from both the Main and Follower. Therefore, the system can use the power from both units if only ZBP Follower battery is not low.
- Main Power Start: this condition takes place when battery of ZBP Follower is low (SOC Start activated) therefore the ZBP Main is performing as single unit and it will start/stop the GenSet according to Power Inverter Start of ZBP Main. Refer section *Remote Start Info*.
- Main SOC Start: same as main power start but according to SOC Start of ZBP Main.

6 Maintenance

6.1 QR code

Scan the QR code to access into the Atlas Copco Power Connect site. Enter the machine serial number to get the Atlas Copco Spare Part List (ASL).

6.2 Maintenance schedule

WARNING

Before carrying out any maintenance activity, check that the battery switch is in position OFF and that no electrical power is present on the terminals.

Category	Maintenance schedule (running hrs)	* Every Day	* Every Week	* Every Month	** Every 3 Months	** Every 6 Months	** Every Year
General	Check control panel for alarms and warnings	x					
	Check all electrical connections						x
	Replace the air filters (1)						x
	Check earth connection	x					
	Test Earth Leakage protection (12)	x					
	Check the entire unit for external damage	x					
	Check connected cables	x					
	Check the free space around the battery set	x					
	Check the cooling fans			x			
	Check the heaters				x		
	Check/test emergency stop (12)		x				
	Check torque on critical bolt connections (11)						x
	Grease locks and hinges						x
Battery System	Fully charge the batteries to100%			x			

Category	Maintenance schedule (running hrs)	* Every Day	* Every Week	* Every Month	** Every 3 Months	** Every 6 Months	** Every Year
	Check battery status via Bluetooth/diagnosis software			x			
	Check the voltage of battery system through the monitor system if abnormal or not.				x		
	Visual inspect all the cables of the battery system if any broken, aging, getting loose or				x		
	Check the function of output relay.				x		
	Analyse the history alarms and BMS data.				x		
	Check each battery's cleanness, damage or overheating trace of the terminal and battery cases.					x	
	Check whether communication and power cable connectors are loose or not.					x	
Undercarriage	Check tyre pressure 2.5 bars						x
	Check tyres for uneven wear						x
	Check torque of wheel nuts 120Nm						x
	Check torque of coupling head 82Nm						x
	Check towbar handbrake lever spring actuator, reversing lever, linkage						x
	Grease coupling head, towbar bearings at the housing of the overrun brake						x
	Check brake system (if installed) and adjust if necessary						x
	Oil or grease brake lever and moving parts such as bolts and joints						x
	Grease sliding points on height adjusting parts						x
	Check safety cable for damage						x
	Check electrical cable towards road signaliation						x
	Check brake pads wear						x
	Change wheel hub bearing grease						x

NOTE

1. **More frequently when operating in a dusty environment.**
2. **Refer to engine operation manual.**
3. **After a days work.**

4. **Or when using PARCOOL/GENCOOL replace after 5 years, whichever comes first.**
5. **Gummed or clogged filters means fuel starvation and reduced engine performance. Reduce service interval in heavy duty application.**
6. **See section *Oil specifications*.**
7. **The following part numbers can be ordered from Atlas Copco to check on inhibitors and freezing points:**
   - **2913 0028 00 refractometer**
   - **2913 0029 00 pH meter**
8. **Replace all rubber flexibles every 5 years.**
9. **See section *Battery maintenance and safety recomendations*.**
10. **Also measure after a possible accumulation of moisture and dirt on the alternator windings. For details see section *Measure alternator insulation resistance*.**
11. **See section *Critical bolt connections.***
12. **The function of this protection should be tested minimum on every new installation.**
13. **Water in fuel tank can be detected by means of 2914 8700 00. Drain fuel tank when water is detected.**
14. **Turbo shield protection; fan grating etc.**
15. **Remove all starters from the cylinder until the last step of the maintenance procedure is completed, and reinstall the safety transport bottle cap to the bottle head valve.**
16. **Cylinders with a weight loss of more than 5% must be refilled.**
17. **If training is not possible, it is necessary to refer to the equipment product manual every year and familiarize yourself with every part of the equipment.**

6.2.1 Use of maintenance schedule

Regular maintenance is essential for the optimum performance, safe operation and a longer working life of the machine.

The maintenance schedule contains a summary of the maintenance instructions. Read the respective section before taking maintenance measures.

6.2.2 Use of service paks

Service Paks include all genuine parts needed for normal maintenance of battery set. Service Paks minimize downtime and keep your maintenance budget low.

The order number of the Service Paks are listed in the Atlas Copco Parts list (ASL). Order Service Paks at your local Atlas Copco dealer.

6.3 Adjustments and service procedures

6.3.1 Battery care

CAUTION

The Li-ion battery must be transported in its original or equivalent package and in an upright position. If the battery is in its package, use soft slings to avoid damage. Do not stand below a Li-ion battery when it is hoisted. Never lift the battery at the terminals, only lift the battery at the handles.

CAUTION

Li-ion batteries are heavy. If involved in an accident they can become a projectile! Ensure adequate and secure mounting and always use suitable handling equipment for transportation. Handle with care because Li-ion batteries are sensitive to mechanical shock.

CAUTION

Explosion and fire hazard. Terminals of the Li-ion battery are always a live; therefore do not place items or tools on the Li-ion battery. Avoid short circuits, too deep discharges and too high charge currents. Use insulated tools. Do not wear any metallic items such as watches, bracelets, et cetera. In case of fire, you must use a type D, foam or CO_2 fire extinguisher.

CAUTION

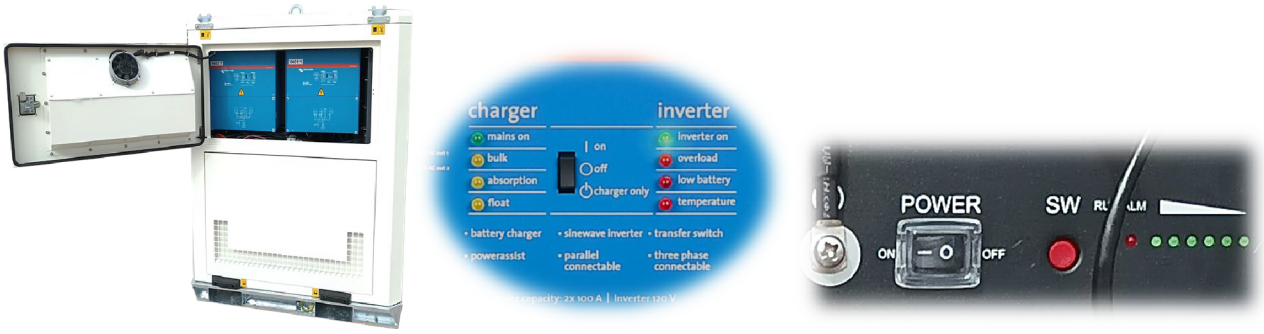
While working on the Li-ion battery wear protective eyeglasses and clothing.

The battery set is largely maintenance-free when used correctly. Nevertheless, small maintenance as well as regular checks are useful in order to reliably operate your battery set in the long term.

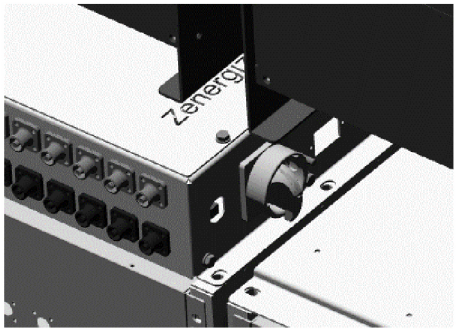
6.3.2 Commissioning & starting

Follow the below steps to start the ESS:

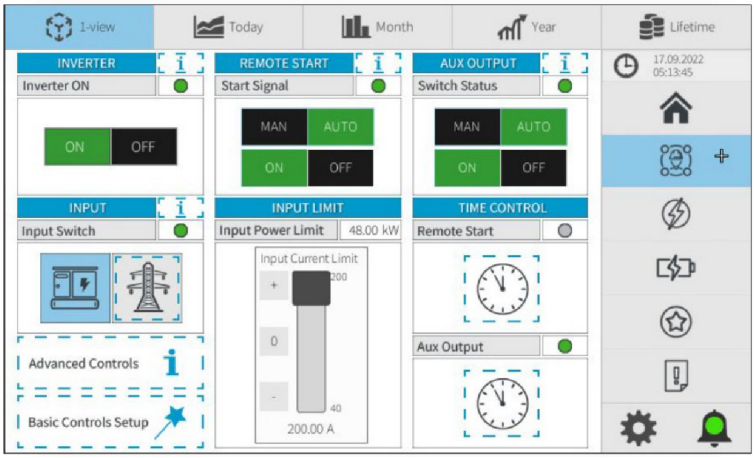
1. Unpack the ESS.
2. Open the upper and lower doors and turn on inverters and batteries from the front switch of the devices.



3. Turn on the main battery switch to the start position and release it.



4. Switch on the inverters from the screen, once the controller is ON.

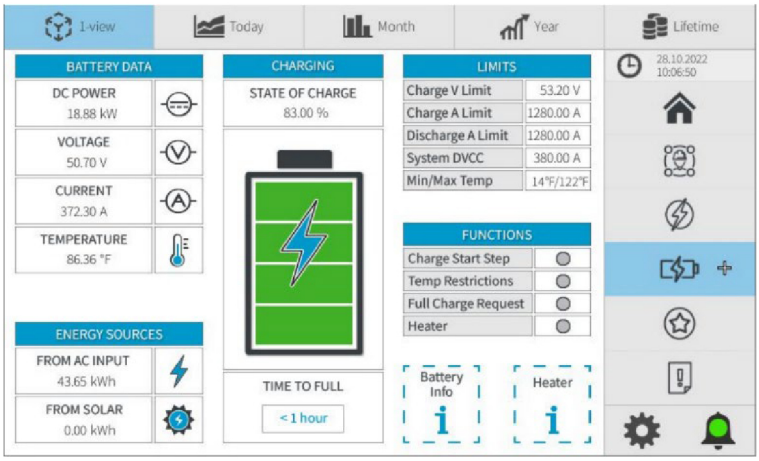


6.3.3 Storage & long time stop

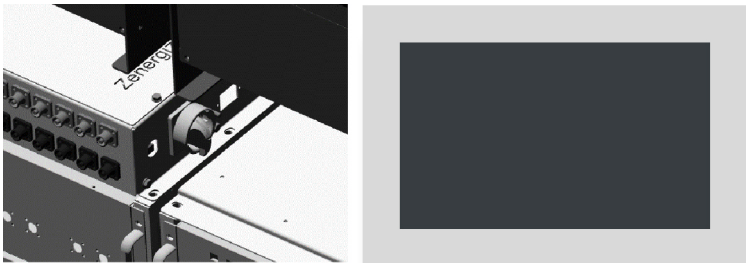
NOTE

The ESS has been developed for outdoor installation and operation. However, in order to avoid unnecessary weathering and prolong the service life of the battery set, it is recommended that the device is stored in the interior, if possible.

1. Make sure that the battery is fully (100%) charged, before storing the ESS for a long period of time.



2. Make sure the battery switch is turned to off and the controller screen is off.



3. Make sure all the doors are correctly closed and store the ESS.

NOTE

It is important to check the SOC of the ESS every three monthe, and fully charge it, if necessary.

6.3.4 Battery replacement

WARNING

Use protective gear, insulated gloves, and insulated tools to replace the battery.

WARNING

Before carrying out any maintenance activity, check that the battery switch is in position OFF and that no electrical power is present at the output.

WARNING

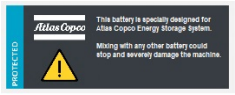
Disconnect all the sockets, inputs and outputs of the machine before performing any service operation.

WARNING

This operation should only be performed by trained AC service personnel. Risk of injury to persons and damage to the ESS if the operation is not carried out correctly.

NOTE

Batteries that are not purchased & branded as Atlas Copco will not work in the ESS.

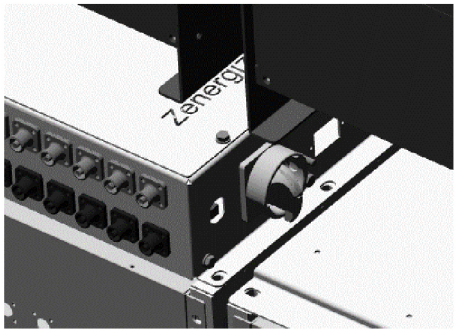


NOTE

Increasing the number of batteries of the ESS is not allowed without Atlas Copco authorization.

1. Make sure to fully charge the ESS including the failed battery if possible.

2. Switch off the ESS using the switch.



3. Disconnect all the input and output wires connected to the sockets of the ESS.
4. Turn off the battery and remove ground data cables and power wires of the broken battery.

5. Unscrew and remove the battery from the ESS.

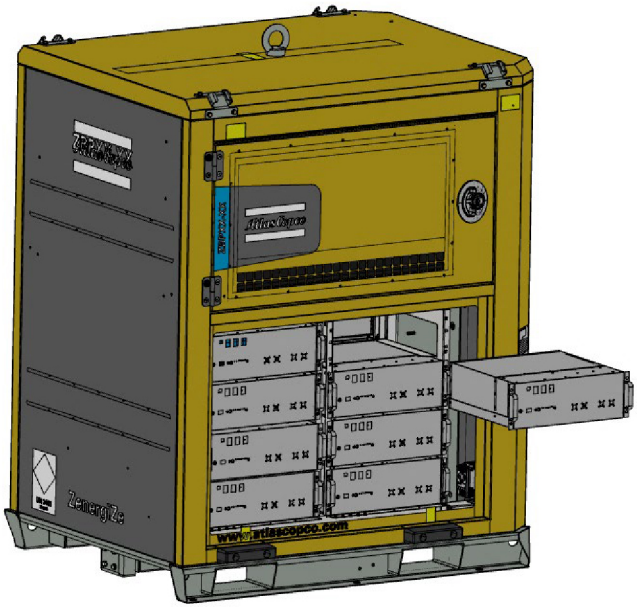
CAUTION

Battery is heavy. You might need to use two persons for this operation or a lifting tool.

6. Remove the damaged battery from the ESS.

7. Remove the master battery of ESS and place it in the open space that remains after removing the damaged battery.

8. Make sure to fully charge the new battery before inserting it in the ESS.
9. Take the new battery and connect it as master battery.



10. Connect grounds, power wires and communication cables on both batteries.
11. Turn on main battery switch and check that ESS works and no alarms are present.
12. Charge the ESS.

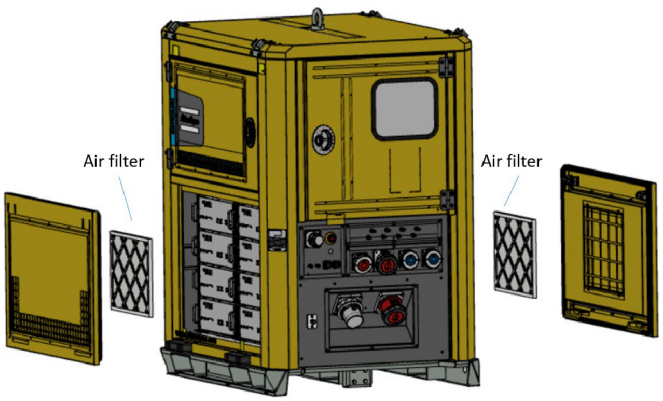
6.3.5 Cooling system

To allow a correct operation in all conditions of temperature, the ESS has its own air cooling system.

This system needs to be checked and maintained to avoid poor operation of the ESS. System consists of two cooling fans and two air filters.

Air filters replacement

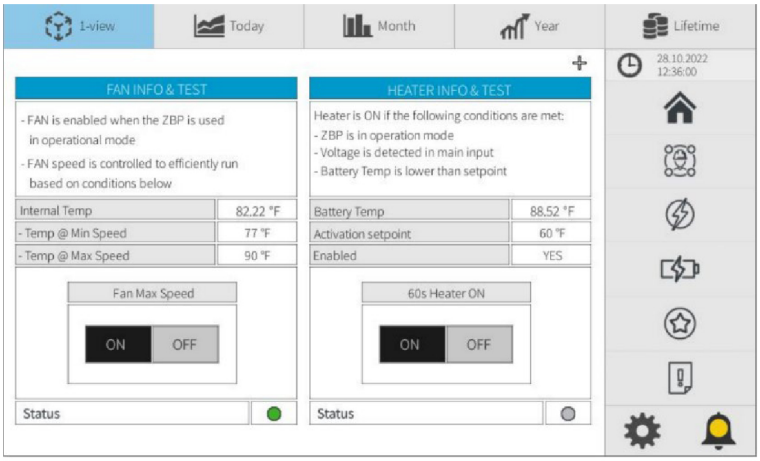
Clean airflow inside the canopy is possible thanks to the 2 filters that are on both inferior panels. These filters have to be replaced according to maintenance schedule.



Checking the cooling fans

The ESS contains 2 cooling fans to take the hot air from the inverters out of the unit.

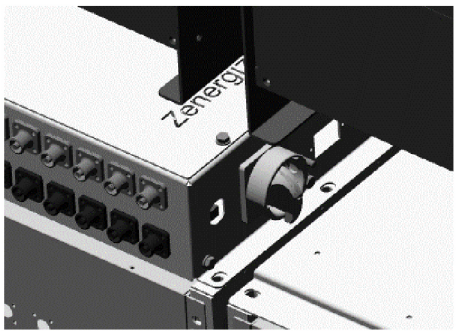
To check the correct operation go to the controller and test them from the following screen.



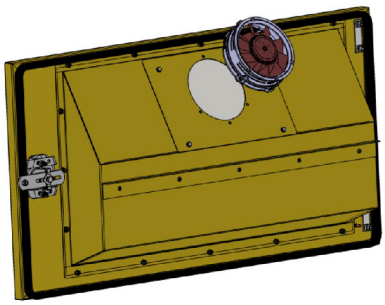
6.3.6 Cooling fan replacement

Follow the below steps to replace the fan, if necessary.

1. Turn the ESS off using the battery switch located on the DC cubicle.



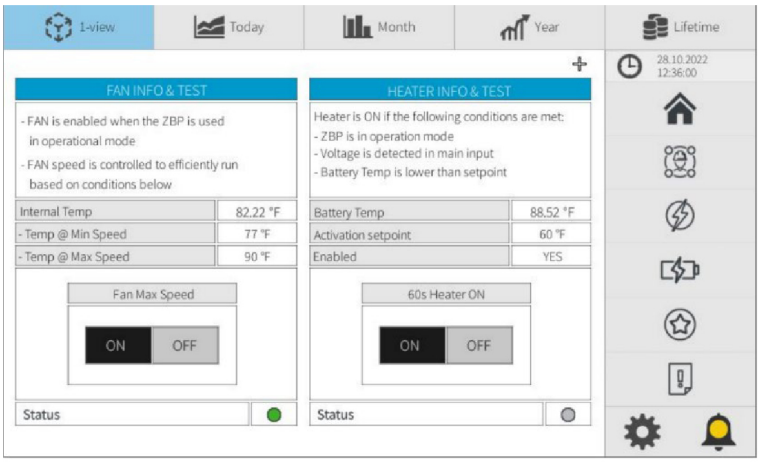
2. Remove all the electrical connections from the fans.
3. Unscrew the fan from the door.



6.3.7 Heaters checking and replacement

The ESS has 4 heaters to heat up the batteries in the event of low temperature. Without them if temperature drops below the -10ºC, the unit stops working.

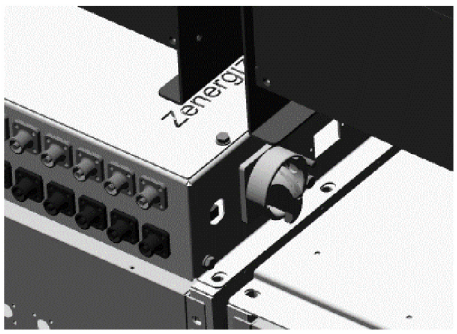
Check the correct operation of the heaters by activating them from the following screen.



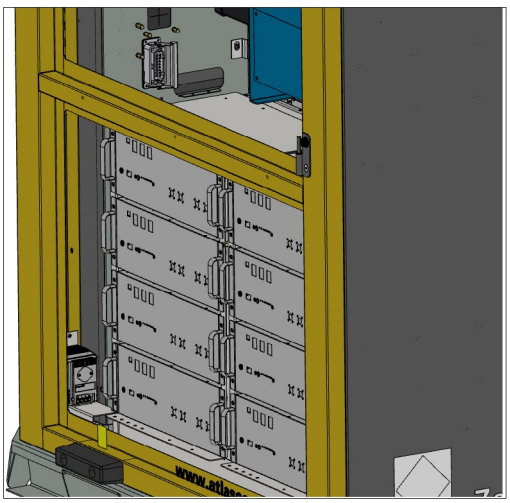
Replacing the heaters

Follow the below steps to replace the heater, if necessary.

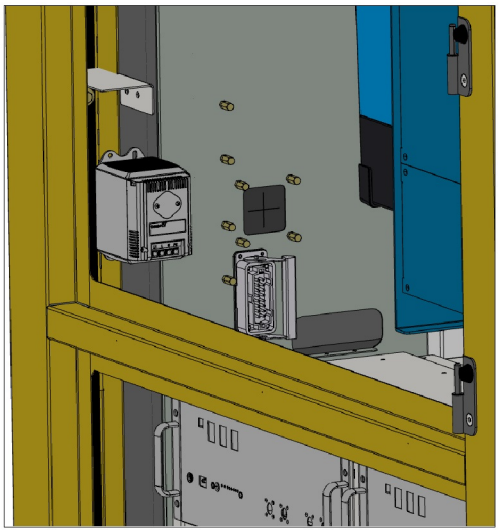
1. Turn the ESS off using the battery switch located on the DC cubicle.



2. Remove all the electrical connections from the fans.
3. Locate the defective heater. Heaters are placed in the corners of the ESS on the lower side.
4. Remove the lower lateral doors and open the upper doors of the ZBP.
5. Disconnect the electrical connections from the heater and remove the fixation screws.



6. Slide the heater now to the upper side until you have enough clearance to take it out.



7. Install the new heater following these steps backwards.

7 Checks and troubleshooting

WARNING

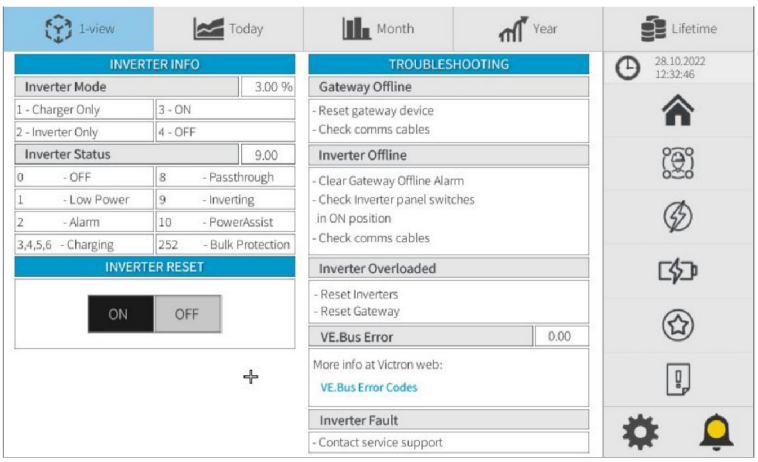
Never perform a test run with connected power cables. Never touch an electrical connector without a voltage check.

WARNING

When a failure occurs, always report what you experienced before, during and after the failure. Information with regard to the load (type, size, power factor, etc.), vibrations, insulation check, odors, output voltage, damaged parts, ambient temperature, daily and normal maintenance and altitude might be helpful to quickly locate the problem. Also report any information regarding the humidity and location of the ESS (e.g. close to sea).

If a malfunction of the ESS occurs, start the troubleshooting by finding out what alarm is ON. For this, go to the Alarms menu on the eco controller.

Once identified the alarm, click on the information and a clearer description of the problem will be given. Example on the “I” tab of the inverter:



Disorder	Possible cause/solution
Device switches off due to overload	The ESS attempts a reboot three times in the interval of a few seconds and then switches off if the overload still exists. Solution: Eliminate the cause of overload by electrician.
Load is not working despite the batteries are recharged or the power inlet is supplied by mains or running genset	• ESS is off. Solution: Switch on the device. • Emergency stop is activated. Solution: Release emergency stop. • Batteries are full. No action required.
PV performance significantly below expectation	PV module defective or PV fuse fallen. Solution: Determine the cause of the electrical load and re-place the PV fuse(s) if necessary.
GenSet fail to start	Activated if GenSet is not synchronized with ESS when Remote Start signal is ON after an assigned delay. It is disabled if Mains is selected as AC Input Source or Series mode is enabled. Default delay is 5 minutes. • Verify GenSet communication setup • Check GenSet controller and Remote Start of ESS are both in AUTO mode. • Check Remote Start wires are connected to the GenSet. • Check breakers in both GenSet and ESS. • Check fuel level in GenSet.
GenSet fail to stop	Activated if GenSet does not stop when Remote Start signal is OFF after an assigned delay. It is disabled if Mains is selected as AC input source or series mode is enabled. Default delay is 5 minutes. • Verify GenSet communication setup • Check GenSet controller and Remote Start of ZBP are both in AUTO mode. • Check Remote Start wires are connected to the GenSet.
Reverse polarity	Activated if a single-phase AC input source is connected with live and neutral reversed when using parking mode. Switch the AC source wires to their corresponding side. It is disabled on 60 Hz models.
Phase rotation	Activated if the AC Input Source wires are connected to the wrong ESS phase input connection.
Mains power failure	Activated if Mains stop supplying power to the ESS when input switch is ON after an assigned delay. It is disabled if GenSet is selected as AC input source or series mode is enabled. Default delay is 5 minutes. • Check breaker in both Mains and ESS. • Ensure availability status of the Mains.
Input Limit Conflict	Activated if selected setpoint of input current limit in control tab, which is the command to determine the size of the AC Input Source, is not identical to the Input Limit on Ac Info tab which is the actual value set in the system. Make sure to set the value after turning on the inverter and check both values are identical. • Input Limit Error: Set as 90A in Control tab but shown as 0A in AC Info tab • Input Limit OK: Set as 200A in Control tab and shown as 200A in AC Info tab • Turn ON Inverter and move the Input Current Limit slider in Control tab to refresh the value. • Reset EMS: Advanced Controls / Save.

Disorder	Possible cause/solution
Gateway or Inverter Offline	Activated if communication failure with Gateway or Inverter. • Proceed to reset the Inverter or Gateway device (Victron Cerbo GX) by manually unplugging its power terminal. • Check JR45 communication cables: Inverter L1A (master) to Gateway, Gateway to router or switch, ECO Controller to router or switch • Ensure Inverter onboard switches located in the Inverter physical front panel are in ON position.
Inverter overloaded	Activated if one or more phases of the ESS are overloaded due to below situations. Number of overloaded phases is shown in the alarm log tab. Excessive high output power, High output power and low battery voltage, High output power and internal temperature • Proceed to reset the Inverter • Proceed to reset the Gateway device (Victron Cerbo GX) by manually unplugging its power terminal.
VE.Bus Error	Activated if Inverter internal system displays an error code. Check the following website to know to know the issue and solution related to the error code. https://www.victronenergy.com/live/ve.bus:ve.bus_error_codes
Inverter Fault	Activated if Inverter internal alarm is detected. • Proceed to reset the Inverter • Proceed to reset the Gateway device (Victron Cerbo GX) by manually unplugging its power terminal. • Contact Atlas Copco Service
Battery Low or Critically Low	Activated if Battery SOC is below default or assigned setpoint. Connect an AC Input Source to charge the battery.
BMS Offline	Activated if communication failure with Battery BMS. • Often activated if Gateway Offline alarm is triggered. • Proceed to reset the ESS by doing the sleep and wake procedures.
Battery Module Offline	Activated if battery BMS detects a failure with the communication of one or more battery modules. • In some situations, and in case the alarm “Restricted to Charge or Discharge” is not raised, the offline module is automatically reconnected when cycling the batteries (normally happens when voltage of online modules is close to the offline module). • It might be triggered in case of low or high battery temperature, in this case the alarm will be cleared itself when temperature is within operating range. • Proceed to reset the ESS by doing the sleep and wake procedures. • If after that the alarm is still triggered, open the bottom side doors and check for battery modules with red LEDs. After that, contact service support to report this issue.
Charge or Discharge Error	Activated if battery BMS detects a failure that prevents the batteries from charging and discharging. This error is caused when Battery Module Offline alarm is triggered, therefore clear the alarm of Battery Module Offline.

Disorder	Possible cause/solution
Unauthorized Battery	Activated if standard battery modules are replaced by unauthorized Atlas Copco modules which may damage the rest of modules and compromise the performance of the ESS. For this reason, the ESS is protected with management algorithms to prevent batteries from discharging until this alarm is no longer active. • Contact Atlas Copco Service in case this alarm is activated.
Extreme Cold Temperature	Activated when internal temperature of the ESS is below operating conditions. At this stage, the battery bank may be in sleep mode, so it is not possible to wake up the batteries until temperature is within operating conditions. In case the ESS contain heaters, connect an AC Input Source to power the heaters and accelerate the heating process of the batteries.
Emergency Stop	Activated if communication the emergency stop button is pushed. • Ensure safety conditions are met. • Release the emergency stop button.
RCD Trip or Limit Switch	Activated if communication one of these devices is triggered. RCD is only available in 50 Hz models. • Close the ZBP main output breaker to clear the RCD trip alarm • Close the ZBP bottom front door to clear the Limit Switch alarm
Overdischarge Protection	Battery protection, which is activated to prevent battery from discharging when low SOC. • Connect an AC Input Source and ensure batteries can be charged.
Smartbox Offline	Activated if communication failure with the smartbox device. • Proceed to reset the smartbox by unplugging its power terminal. • Check JR45 communication cables from Smartbox to router or switch.
Mode Error	Do not enable Series ad AC Couple mode at the same time.

The device will restart automatically if the causes of the malfunction are rectified.

8 Storage of the ESS

8.1 Storage

The ESS has been developed for outdoor installation and operation. However, in order to avoid unnecessary weathering and prolong the service life of the battery set, it is recommended that the device is stored in the interior, if possible.

Should the device be taken out of service for an extended period of time (more than 2 weeks), it must be charged regularly.

WARNING

In order to avoid unnecessary discharging of the battery set, the ESS, if it is not being charged, must be stored in the switched-off state. For this, the main switch must be switched off.

Store the device in rooms with low humidity (<70% relative humidity, non-condensing) and at an ambient temperature between 5°C and 30°C. Before commissioning, the ESS should be at least 6h in its place of installation, in order to avoid condensation in the device and consequent damage to the electronics.

8.2 Preparing for operation after storage

Before operating the ESS again, remove the wrapping, VCI paper and silica gel bags and check the ESS thoroughly (go through the *checklist "Before starting"*).

- Recharge the batteries to its maximum level.
- Submit the ESS to a test run.

9 Disposal

9.1 General

When developing products and services, Atlas Copco tries to understand, address, and minimize the negative environmental effects that the products and services may have, when being manufactured, distributed, and used, as well as at their disposal.

Recycling and disposal policy are part of the development of all Atlas Copco products. Atlas Copco company standards determine strict requirements.

Selecting materials the substantial recyclability, the disassembly possibilities and the separability of materials and assemblies are considered as well as the environmental perils and dangers to health during the recycling and disposal of the unavoidable rates of not recyclable materials.

Your Atlas Copco ESS mainly consists of metallic materials, that can be re-melted in steelworks and smelting works and that is therefore almost infinite recyclable. The plastic used is labelled; sorting and fractioning of the materials for recycling in the future is foreseen.

IMPORTANT

This concept can only succeed with your help. Support us by disposing professionally. By assuring a correct disposal of the product you help to prevent possible negative consequences for environment and health, that can occur with an inappropriate waste handling. Recycling and re-usage of material helps to preserve natural resources.

9.2 Disposal of materials

- Dispose contaminated substances and material separately, according to local applicable environmental legislation.
- Before dismantling a machine at the end of its operating lifetime drain all fluids and dispose of according the applicable local disposal regulations.
- Remove the batteries. Do not throw batteries into the fire (explosion risk) or into the residual waste. Separate the machine into metal, electronics, wiring, hoses, insulation and plastic parts.
- Dispose all components according to the applicable disposal regulations.
- Remove spilled fluid mechanically; pick up the rest with absorbing agent (for example sand, sawdust) and dispose it according the applicable local disposal regulations. Do not drain into the sewage system or surface water.

9.3 Disposal of Li-ion batteries

Batteries marked with the recycling symbol must be processed via a recognized recycling agency. By agreement, they may be returned to the manufacturer. Batteries must not be mixed with domestic or industrial waste.

10 Available option

10.1 Overview of the electrical options

- Power connection configurations
- ELP sockets
- Solar charger
- Cold weather

10.2 Electrical options

Solar charger controllers

The MPPT (Maximum Power Point Tracking) Solar charger is necessary to connect to the ESS a PV power module.

It is necessary for any solar power systems and it allows to extract maximum power from PV modules; it forces PV module to operate at voltage close to maximum power point to draw maximum available power.

Depending on the solar charger, there are different pairs of MC4 connectors included to connect to the PV module (See below table). Each pair limited to 30 Amps.

PV module / solar panels are not included in the scope of supply.

1. Switch off all PV breakers (Q6…Q9).
2. Connect the PV arrays to the MC4 connectors.
3. Switch on all PV breakers (Q6…Q9).
4. Switch off PV breakers and disconnect PV array from the MC4 connectors to stop the solar charging.

		ZBP 15-60	ZBP 35-40, ZBP 45-xx
Solar charger 5,8kW	2x MC4	Option	Option
Solar charger 11,5kW	4x MC4	Option	Option
Solar charger 17,3kW	6x MC4	Option	-

		Solar Charger 5,8kW	Solar Charger 11,5kW	Solar Charger 17,3kW
Battery voltage	V	48		
Rated charge current	A	100	200	300
Maximum charge power	kW	5.8	11.5	17.3
Maximum efficiency	%	96		
Self-consumption	mA	15		
Maximum DC PV voltage	V	450		
Start-up voltage	V	120		

		Solar Charger 5,8kW	Solar Charger 11,5kW	Solar Charger 17,3kW
MPPT operating voltage range	V	80-450		
Number of trackers		2	4	6
Max. PV operational input current	A	18		
Max. PV short circuit current	A	20		
Max. DC output charging power	W	4000 per tracker 5760 total	4000 per tracker 11500 total	4000 per tracker 17300 total
Protection		PV reverse polarity Output short circuit Over temperature		
Operating temperature range	ºC	-40 to +60		
Humidity (non-condensing)	%	95		
Protection category		IP21		

NOTE

If more PV power is connected, then the controller will limit input power.

NOTE

A PV array with a higher short circuit current may damage the controller.

Power connection configurations

Different inlets and outlets sockets configuration:

		ZBP 15-60 230V	ZBP 35-40, ZBP 45-60, ZBP 45-75 400/230V				
IN	Terminal board						1
	Power Locks 400A					1	
	CEE 400V 5P 125A		1	2	1		
	CEE 400V 5P 63A						
	CEE 230V 3P 63A	1					
	CEE 230V 3P 16A	1	1		1	1	1
OUT	Terminal board						1
	Power Locks 400A					1	
	CEE 400V 5P 125A		1	1	1		
	CEE 400V 5P 63A		1	1	1	1	1
	CEE 400V 5P 32A		1	1		1	1
	CEE 230V 3P 63A	1			3		
	CEE 230V 3P 32A	2*	2*	2*		2*	2*
	CEE 230V 3P 16A						
	Domestic socket-RIM 230V 3P 16A						
	Domestic socket-PIN 230V 3P 16A						

Table 1:

NOTE

*** - Select a pair of one os these models.**

ELP sockets

The option provides an individual earth leakage protection per socket that will trip the respective socket breaker when an earth fault current is detected.

The different individual earth leakage protections are summed up in the table below:

		General / PowerLock	5P 125A	5P 63A	5P 32A	3P 63A	3P 32A	3P 16A
			CEE	CEE	CEE	CEE	CEE	(*)
Standard	Circuit Breaker - Curve	C	C	C	C	C	C	C
	ELP-Installation	Relay RH99	-	-	-	-	Integrated	Integrated
	ELP-TYPE	A	-	-	-	-	AC	AC
	ELP-Sensitivity	Adjustable	-	-	-	-	30mA	30mA
Option ELP-A	Circuit Breaker - Curve	C	-	C	C	-	C	C
	ELP-Installation	Relay RH99	-	Integrated	Integrated	-	Integrated	Integrated
	ELP-TYPE	A	-	AC	AC	-	AC	AC
	ELP-Sensitivity	Adjustable	-	300mA	300mA	-	30mA	30mA
Option ELP-B	Circuit Breaker - Curve	C	C	C	C	-	C	C
	ELP-Installation	relay type B	-	-	Integrated	-	Integrated	Integrated
	ELP-TYPE	B	-	-	B	-	A	A
	ELP-Sensitivity	500 mA or adjustable	-	-	30mA	-	30mA	30mA

NOTE

(*) - CEE, RIM and PIM available

Cold weather

The cold weather option includes specific heaters in order to warm the ESS battery compartment so the batteries can be charged with ambient temperatures below 0ºC. This option includes some heaters controlled by the batteries temperature.

10.3 Overview of the mechanical options

- Special colour canopy
- Trailer

10.4 Mechanical options

Special colour canopy

This option allows you to select a specific colour for the whole external parts of the canopy. Contact your Atlas Copco dealer for available configurations.

Trailer

The ESS can be optionally provided with an on-road trailer equipped with an adjustable towbar with brakes, with DIN-eye, NATO-eye, AFR-eye or ball coupling and with road signalisation which is approved by EC legislation.

When using this option:

- Make sure that the towing equipment of the vehicle matches the towing eye before towing the ESS.
- Never move the ESS while electrical cables are connected to the unit.
- Always apply the hand brake when parking the ESS.
- Leave enough space for operation, inspection and maintenance (at least 1 meter at each side).

To maintain the undercarriage:

- Check the tightness of the towbar bolts, the axle bolts and the wheel nuts at least twice a year and after the initial 50 hours of operation.
- Grease the wheel axle suspension bearings, the drawbar to the steering gear shaft and the spindle of the brake handle at least twice a year. Use ball bearing grease for the wheel bearings and graphite grease for the drawbar and spindle.
- Check the brake system twice a year.
- Check the condition of the vibration dampers twice a year.
- Repack the wheel hub bearings once a year using grease.
- Wheel chocks allows to park the ESS on sloping ground. Place wheel chocks in front of or behind the wheels to immobilize the ESS.

11 Technical specifications of the ESS

11.1 Technical specifications of the ZBP 15-60, ZBP 35-40, ZBP 45-60, ZBP 45-75 unit

	Standard Unit	ZBP 15-60	ZBP 35-40	ZBP 45-60	ZBP 45-75
Referenc conditions					
Generator service duty		NA			
Absolute inlet pressure	bar	1			
Relative air humidity	%	30			
Air inlet temperature	°C	22			
Performance data					
Model name		ZBP 15-60	ZBP 35-40	ZBP 45-60	ZBP 45-75
Rated frequency	HZ	50			
Rated voltage	VAC	230	400/230	400/230	400/230
Operating temperature - discharge (min)	°C	-10			
Operating temperature - discharge (max)	°C	50			
Operating temperature - charge (min)	°C	-8			
Operating temperature - charge (max)	°C	50			
Altitude capability	m	3000			
Relative air humidity maximum	%	80			
Rated power	kW	12	34	36	36
Rated apparent power	kVA	15	34	45	45
Rated voltage line to line (V)	VAC	230	400	400	400
Input voltage range	VAC	180-270	315-465	315-465	315-465
Output voltage range (1)	VAC	230 (Adjustable 210-245)	400 (Adjustable 365 - 426)		
Rated current	A	52	49	52	52
Passthrough	A	100			
Nominal Energy	kWh	57.60	38.40	57.60	76.80
Net Energy	kWh	53.57	35.71	53.57	71.42
Battery					
Voltage	V	48			
Nominal capacity	Wh	4800			
Max. Usable Capacity (100 -- 5% SOC)	Wh	4560			
Usable Capacity (100 -- 7% SOC)	Wh	4464			
Modules	pcs	12	8	12	16
Life Time Nº Cycles (@25ºC, 80% DoD, 0.5C, 70%EOL)	cycles	6000			
Maximum Deep Of Discharge (DoD)	%	95	93	95	95
Discharge autonomy 100% (100 -- 7% SOC) fdp = 1 (C1)	h	3.98	0.8	1.3	1.8
Discharge autonomy 75% (100 -- 7% SOC) fdp = 1	h	5.3	1.0	1.8	2.4
Discharge autonomy 50% (100 -- 7% SOC) fdp = 1	h	8.0	1.6	2.7	3.5

	Standard Unit	ZBP 15-60	ZBP 35-40	ZBP 45-60	ZBP 45-75
Discharge autonomy 25% (100 -- 7% SOC) fdp = 1	h	15.9	3.1	5.3	7.1
Recharging Time (SOC 10 to 100%)	h	6.9	1.8	2.3	3.1
Recharging Time - Parking mode (SOC 7 to 100%)	h	24.9	16.7	24.9	33.2
Battery type		LFP (LiFePO4)			
Operational Dimensions					
Operational length	mm	1450			
Operational width	mm	1230			
Operational height	mm	1865			
Weight	kg	1105	1185	1292	1467
Transport Dimensions					
Transport length	mm	1450			
Transport width	mm	1160			
Transport height	mm	1865			

NOTE

When AC source is available, Output voltage is syncronised with input

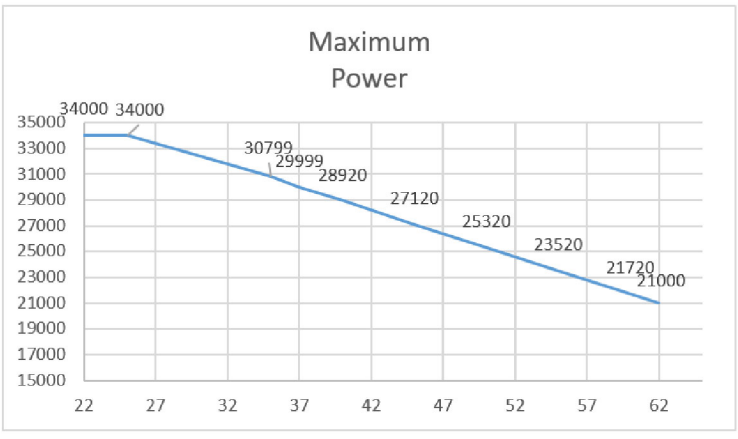
For use of the ESS outside these conditions, please contact Atlas Copco.

Derating table - ZBP 15-60 - 230V

Ambient T (ºC)	Maximum Power	Derating
15	12000	0%
20	12000	0%
22	12000	0%
25	11600	3%
35	10266	14%
40	9640	20%
45	9040	25%
50	8440	30%
55	7840	35%
60	7240	40%
62	7000	42%

Derating table - ZBP 35-40 - 400/230V

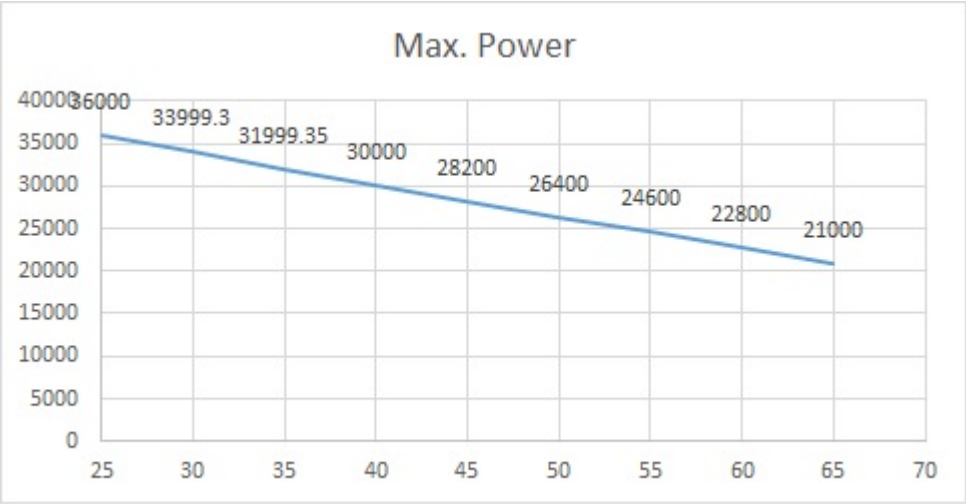
Ambient T (ºC)	Maximum Power	Derating
15	34000	0%
20	34000	0%
22	34000	0%
25	34000	0%
35	30799	14%
37	29999	17%
40	28920	20%
45	27120	25%
50	25320	30%
55	23520	35%
60	21720	40%
62	21000	42%



Derating table - ZBP 45-60, ZBP 45-75 - 400/230V

Ambient T (ºC)	Maximum Power	Derating
15	36000	0%

20	33999.3	0%
22	36000	0%
25	34799	3%
35	30799	14%
37	29999	17%
40	28920	20%
45	27120	25%
50	25320	30%
55	23520	35%
60	21720	40%
62	21000	42%



11.2 Critical bolt connections

Assembly location: ESF

Parts to assembly A	**Parts to assembly B**	**Dimension**	**Utilization**	**Quality**	**Torque (N/m)**	**Allowed deviation (N/m)**	**Applicable standard**
Canopy	Frame	M8	90%	8.8	24.3	± 5	AC- STD 4369
Lifting beam	Frame	M10	90%	8.8	48.2	± 5	AC- STD 4369
Cubicle	Frame	M8	90%	8.8	24.3	± 5	AC- STD 4369
Battery support	Frame	M8	90%	8.8	24.3	± 5	AC- STD 4369
Inverters bracket (ZBE)	Lifting beam	M6	90%	8.8	10.1	± 1	AC- STD 4369
Inverter support (ZBP)	Lifting beam	M8	90%	8.8	24.3	± 5	AC- STD 4369

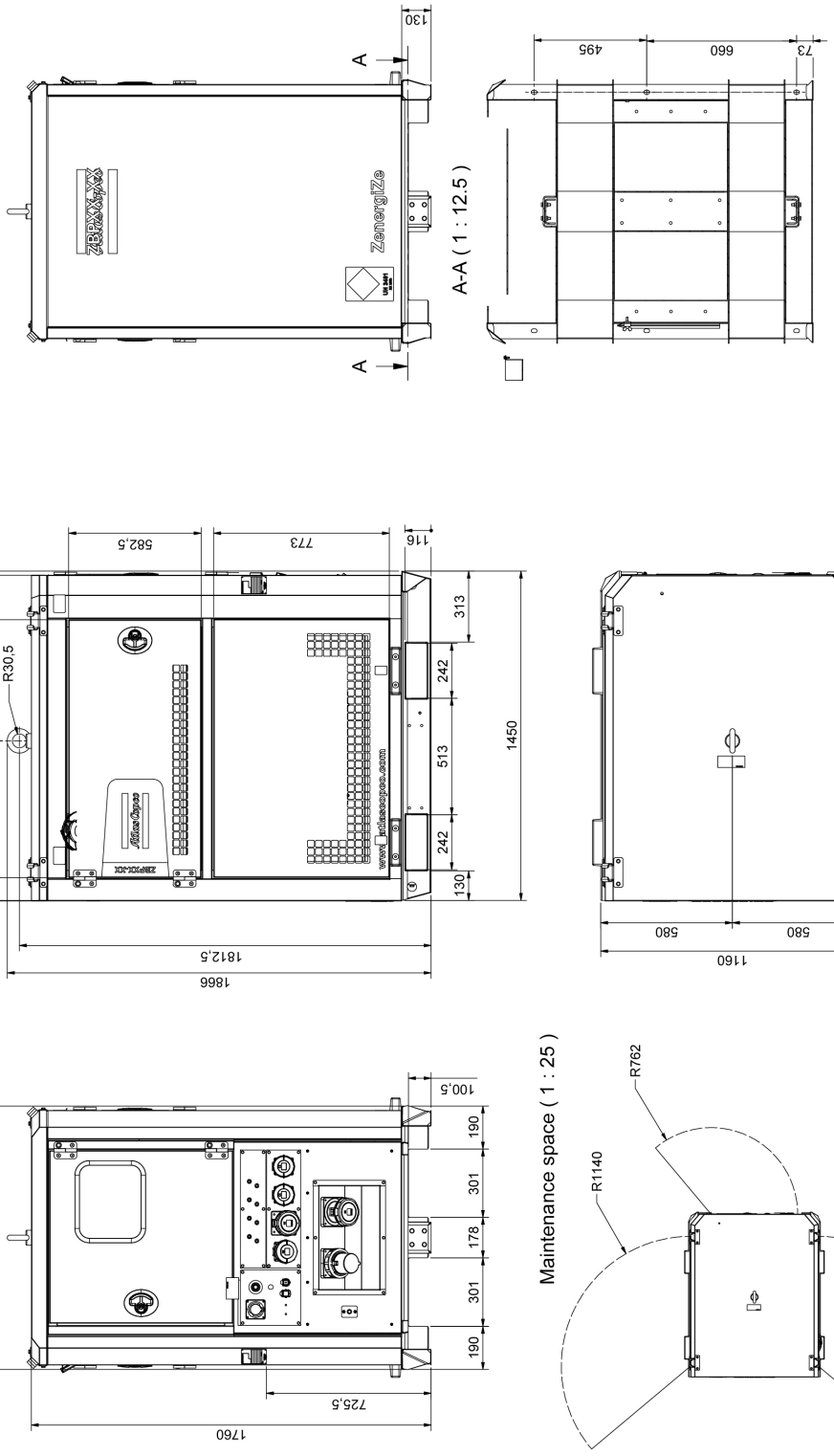
Inverters bracket (ZBP)	Lifting beam	M8	90%	8.8	24.3	± 5	AC- STD 4369
Battery cables	Battery terminals	M10			20	± 1	Victron datasheet
ACIN-OUT cables	INVERTER	M8			7	± 1	Victron datasheet
Standard torques for metric bolted joints		M4	75%	8.8	2.51	± 0,63	AC- STD 4369
Standard torques for metric bolted joints		M5	75%	8.8	4.96	± 1,24	AC- STD 4369
Standard torques for metric bolted joints		M6	75%	8.8	8.4	± 2,1	AC- STD 4369
Standard torques for metric bolted joints		M8	75%	8.8	20.3	± 5	AC- STD 4369
Standard torques for metric bolted joints		M10	75%	8.8	40.2	± 10	AC- STD 4369
Standard torques for metric bolted joints		M12	75%	8.8	69	± 17	AC- STD 4369
Standard torques for metric bolted joints		M14	75%	8.8	109	± 28	AC- STD 4369

Additional treatment if any;

Remarks:

11.3 Dimension drawing

ZBP 15-60, ZBP 35-40, ZBP 45-60 & ZBP 45-75



11.4 Conversion list of SI units into British units

1 bar	=	14.504 psi
1 g	=	0.035 oz
1 kg	=	2.205 lbs
1 km/h	=	0.621 mile/h
1 kW	=	1.341 hp (UK and US)
1 l	=	0.264 US gal
1 l	=	0.220 Imp gal (UK)
1 l	=	0.035 cu.ft
1 m	=	3.281 ft
1 mm	=	0.039 in
1 m³/min	=	35.315 cfm
1 mbar	=	0.401 in wc
1 N	=	0.225 lbf
1 Nm	=	0.738 lbf.ft
t°F	=	32+ (1.8 x t°C)
t°C	=	(t°F-32) /1.8

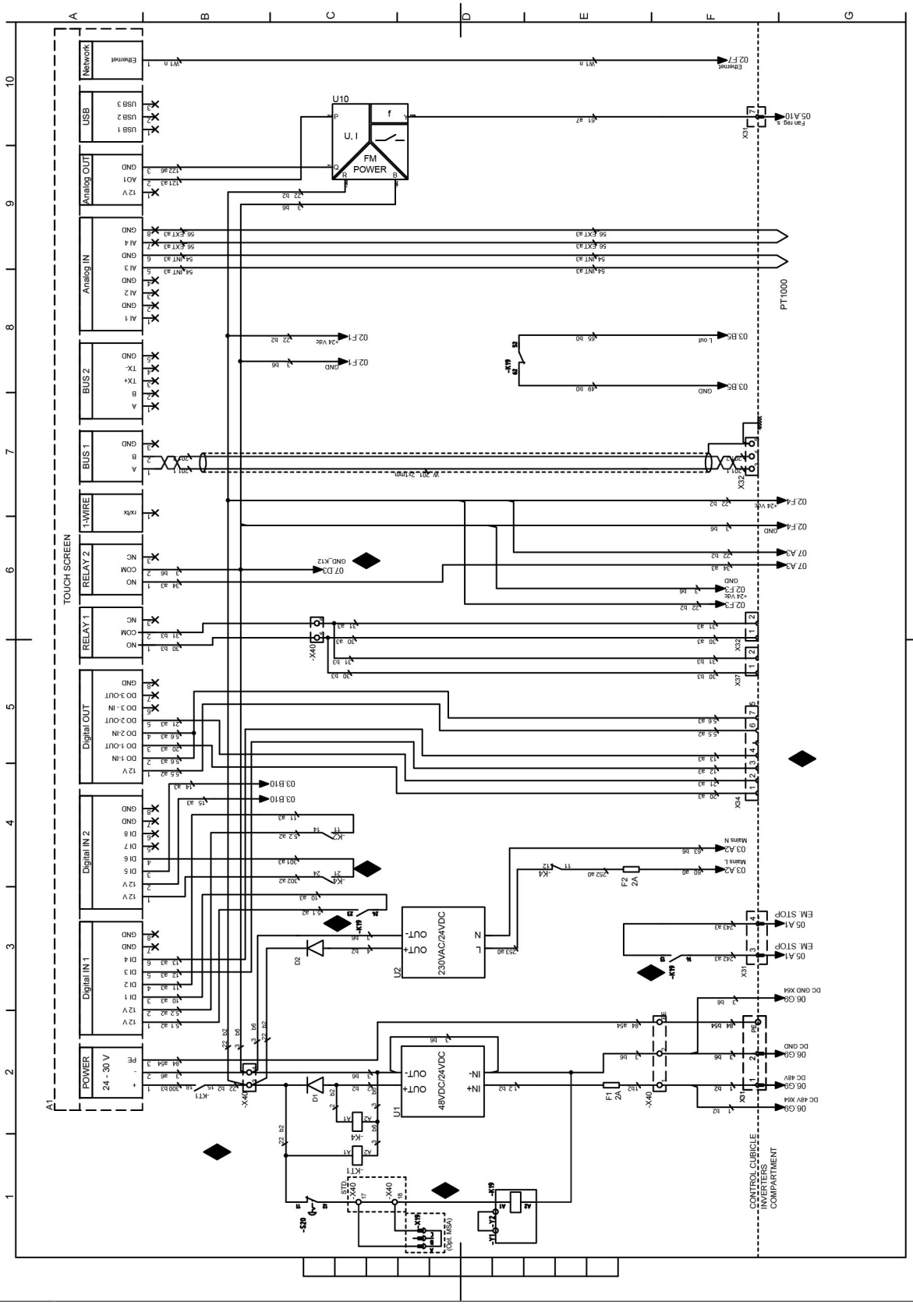
11.5 Data plate

Reference	Description	Reference	Description
1	Weight	15	Output hybrid value
2	Range	16	Nominal voltage
3	Model	17	Nominal frequency
4	Input value	18	Maximum nominal current

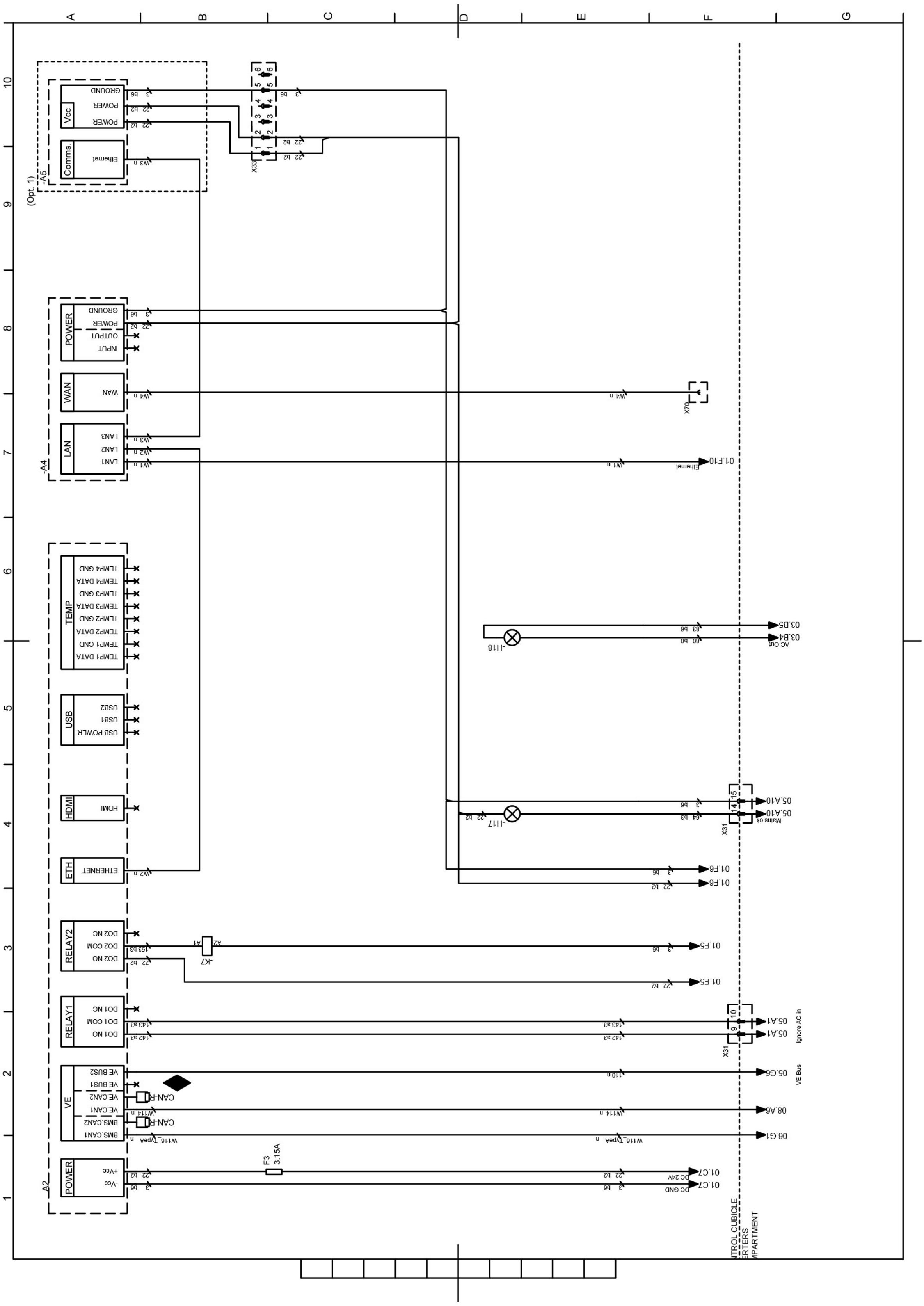
Reference	Description	Reference	Description
5	Nominal voltage	19	PV input value
6	Nominal frequency	20	Maximum voltage
7	Maximum nominal current	21	Maximum current
8	Output island value	22	Maximum peak power
9	Nominal voltage	23	Ambient values
10	Nominal frequency	24	IP protection
11	Nominal current	25	S/N value
12	Nominal active power	26	Serial number of the machine
13	Nominal apparent power	27	Manufacture value
14	Energy stored	28	Manufacturing date (Month/Year)

12 Circuit diagrams

Circuit diagram ZBP 15-60 - 1636056892 - Sheet 1 of 10

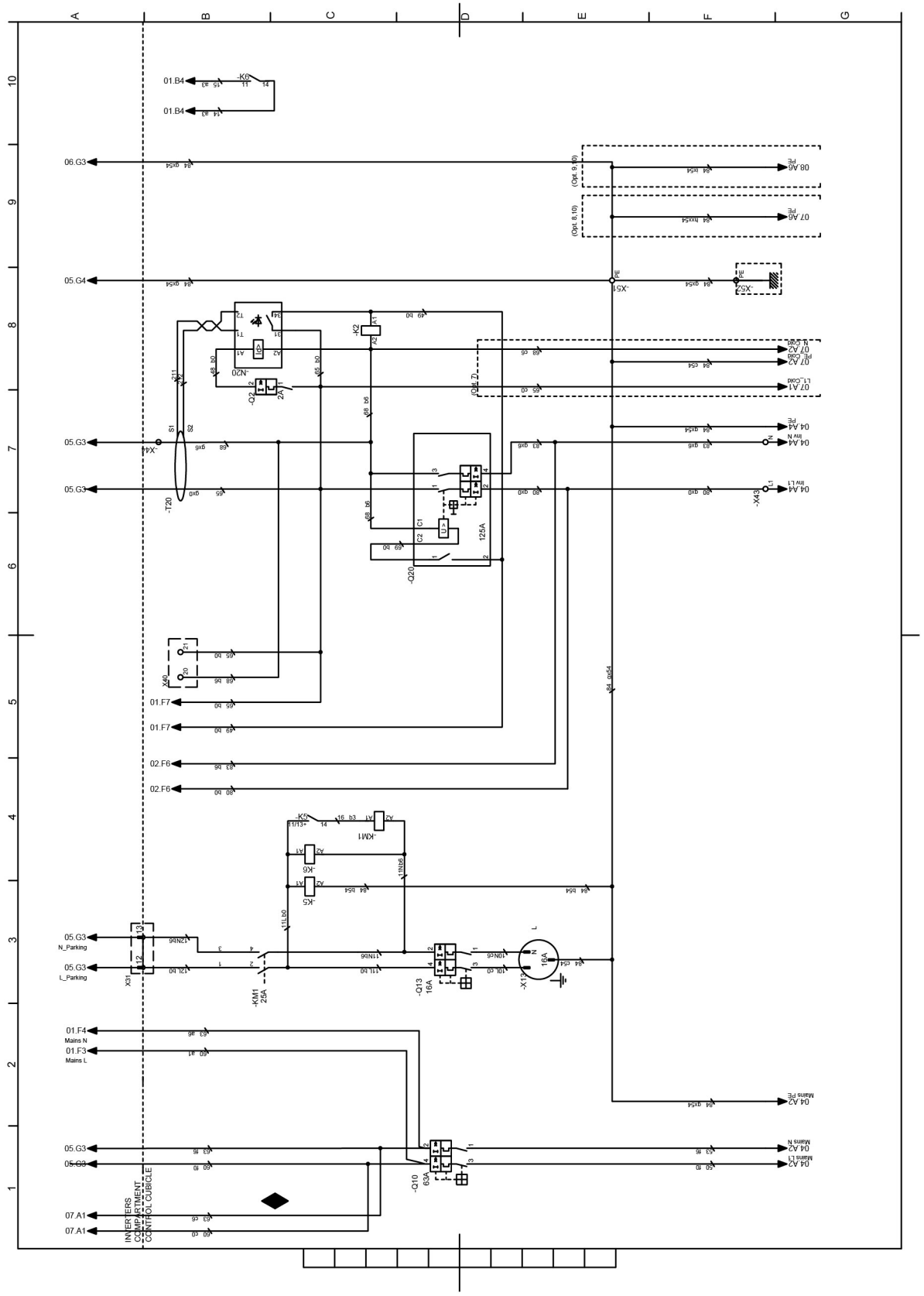


Sheet 2 of 10

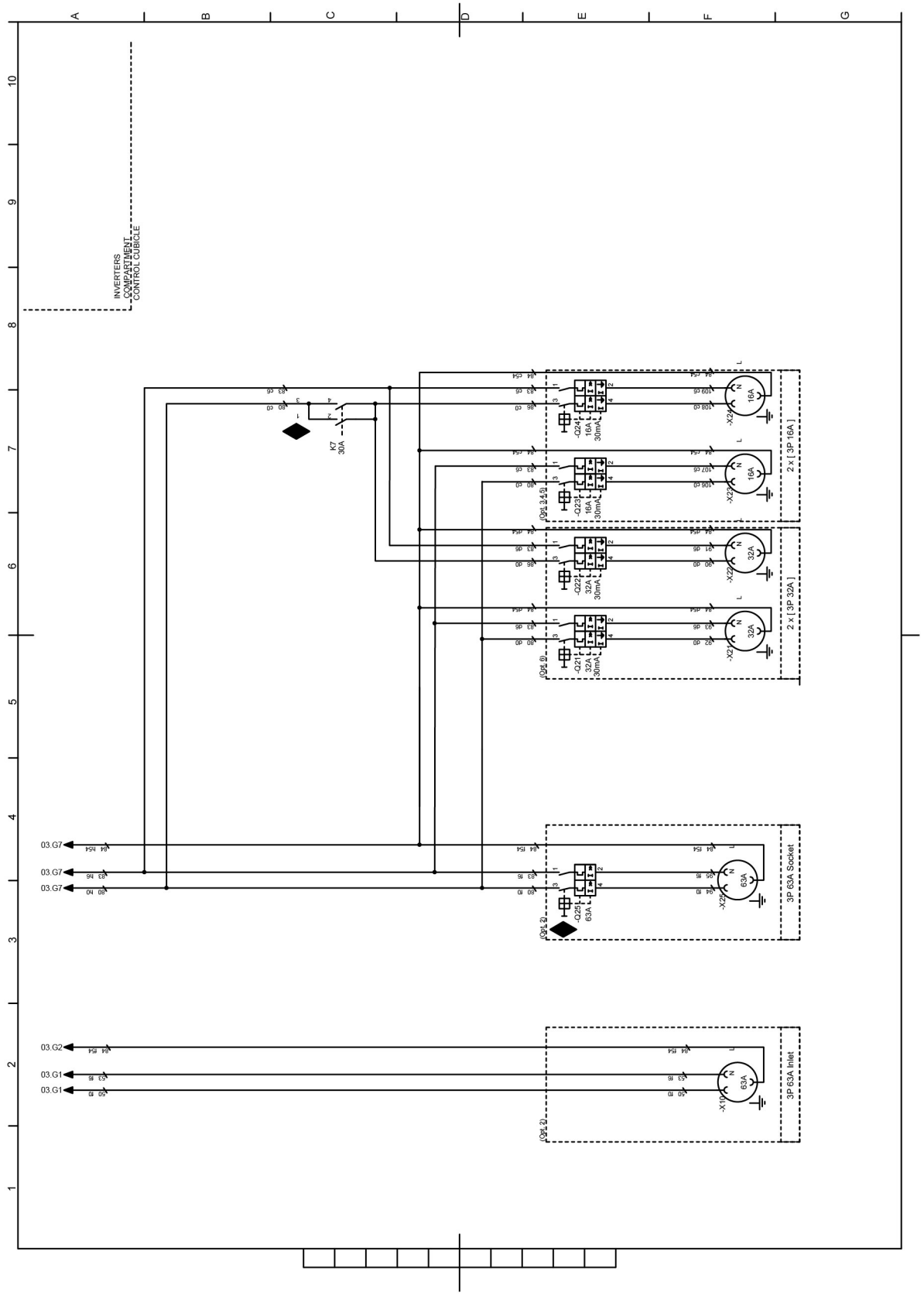


(Opt. 1)
-A5
Comms
Vcc
X32
-A4
POWER
WAN
LAN
X70
TEMP
USB
HDMI
ETH
RELAY2
RELAY1
VE
A2
-H18
-H17
X31
-K7
F3
3.15A
CAN-R

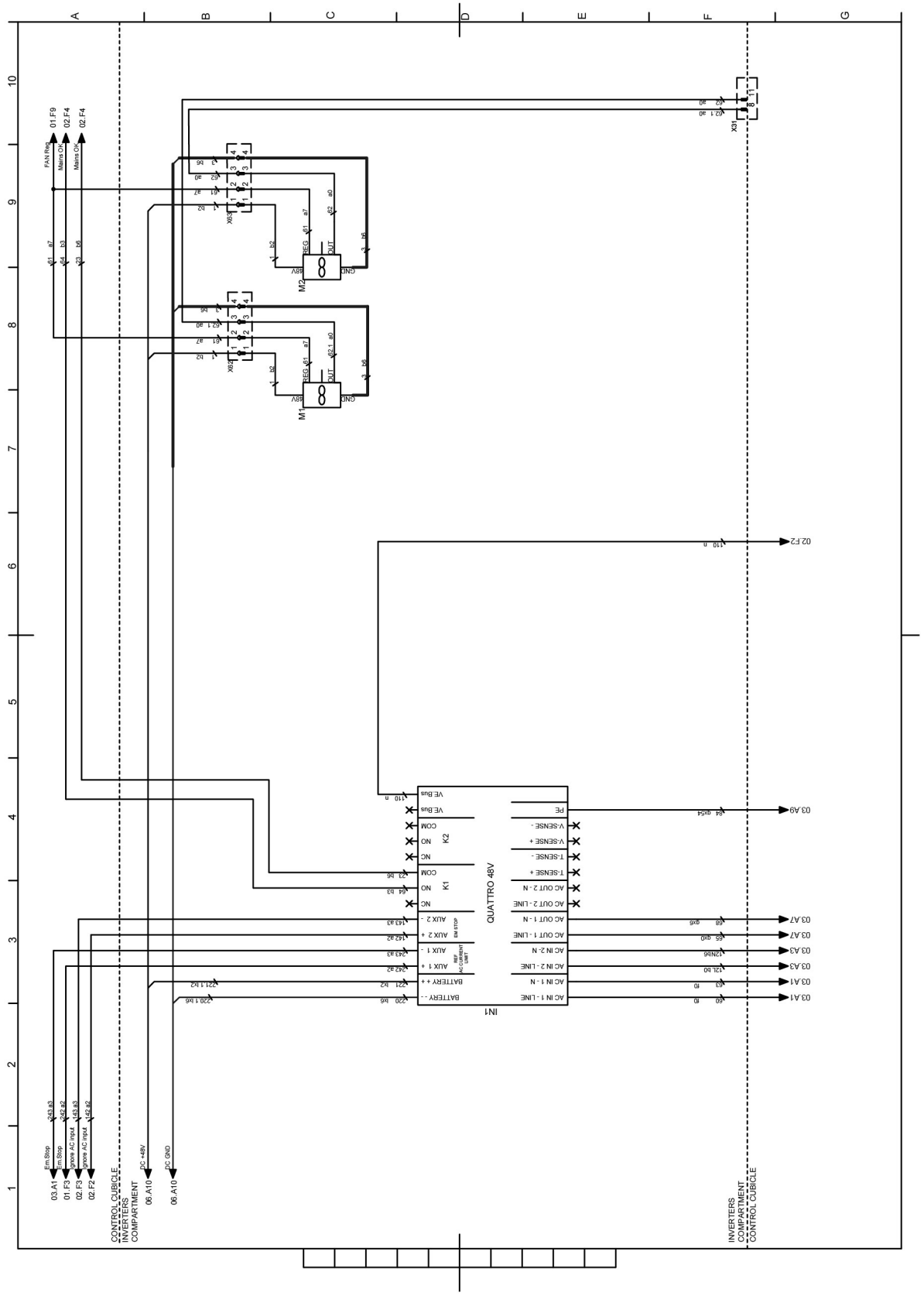
Sheet 3 of 10


A
B
C
D
E
F
G
01.B4
-K0
06.G3
08.A6 PE
07.A6 PE
(Opt. 9,10)
(Opt. 8,10)
05.G4
-X51
-X52
-K2
-N20
-Q2
2A
(Opt. 7)
07.A2 PE_Cond
07.A2 L_Cond
07.A1 L_Cond
05.G3
-X44
-T20
04.A4 PE
04.A4 Inv N
04.A4 Inv L1
-X43
-Q20
125A
-X40
01.F7
02.F6
-K5
-KM1
-K6
-K5
-Q13
16A
-X13
05.G3
N_Parking
05.G3
L_Parking
-KM1
25A
01.F4
Mains N
01.F3
Mains L
04.A2 Mains PE
-Q10
63A
04.A2 Mains N
04.A2 Mains L
05.G3
05.G3
07.A1
07.A1
INVERTERS COMPARTMENT CONTROL CUBICLE

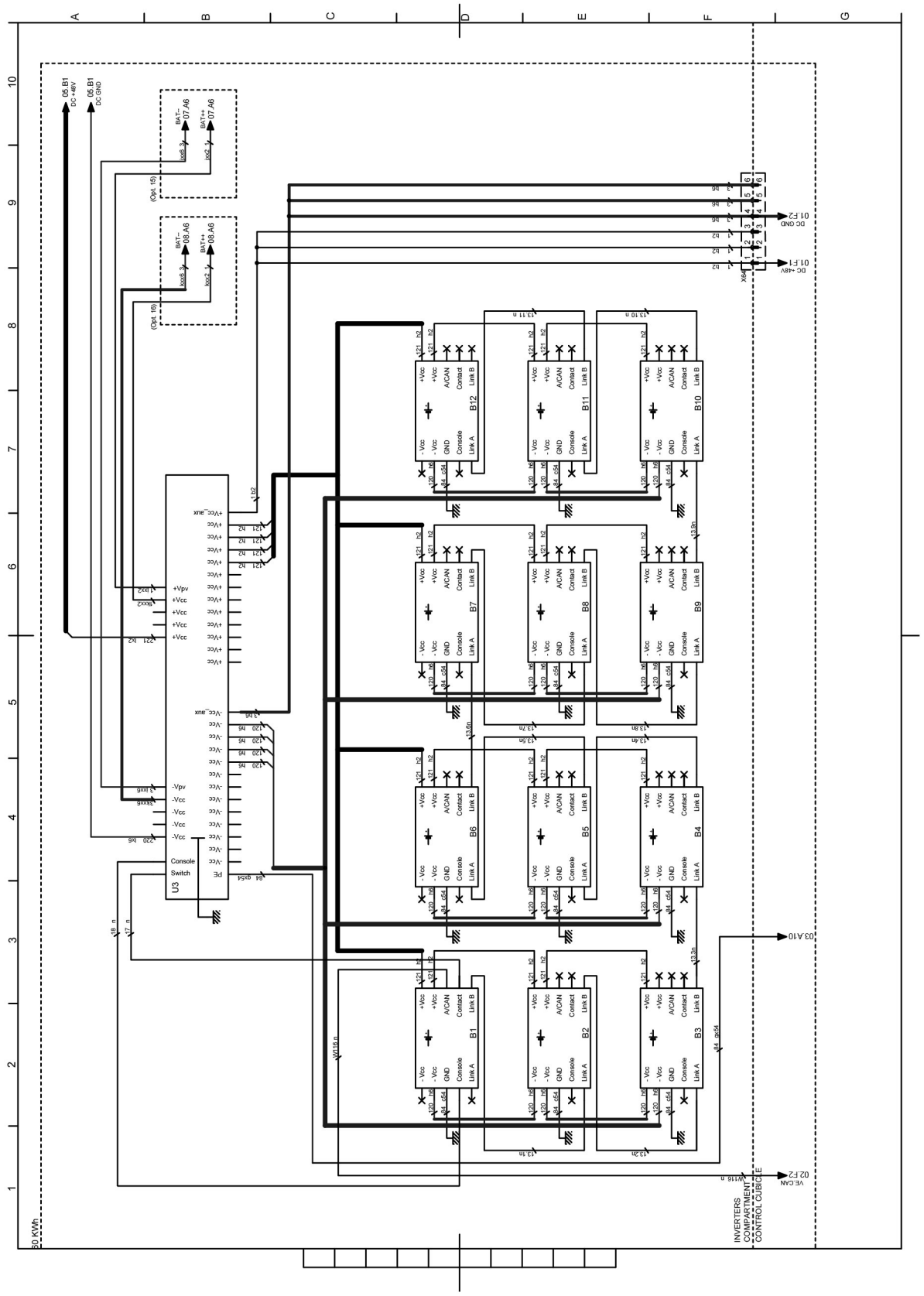
Sheet 4 of 10


A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
10
INVERTERS
COMPARTMENT
CONTROL CUBICLE
K7
30A
-Q24
16A
30mA
-X24
16A
2 x [3P 16A]
-Q23
16A
30mA
-X23
16A
-Q22
32A
30mA
-X22
32A
2 x [3P 32A]
-Q21
32A
30mA
-X21
32A
-Q25
63A
-X25
63A
3P 3A Socket
-X19
63A
3P 63A Inlet
03.G7
03.G7
03.G7
03.G2
03.G1
03.G1

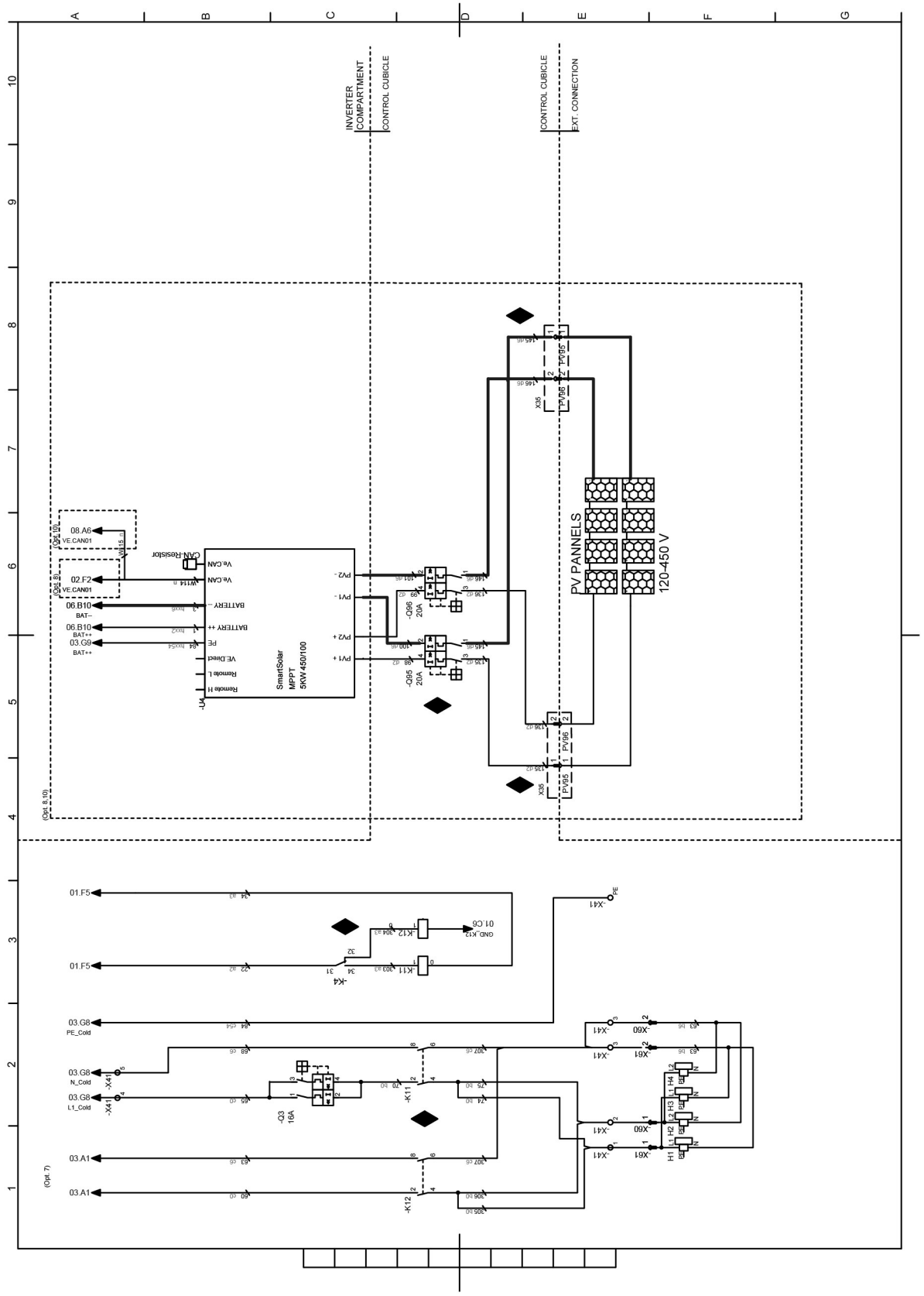
Sheet 5 of 10


A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
10
01.F9
02.F4
02.F4
FAN Req
Mains OK
Mains OK
X31
X63
X64
M2
M1
18V
GND
DIAG
OUT
02.F2
03.A9
03.A7
03.A7
03.A3
03.A3
03.A1
03.A1
IN1
QUATTRO 48V
K2
K1
VE.Bus
COM
NO
NC
PE
V-SENSE -
V-SENSE +
T-SENSE -
T-SENSE +
AC OUT 2 - N
AC OUT 2 - LINE
AC OUT 1 - N
AC OUT 1 - LINE
AC IN 2 - N
AC IN 2 - LINE
AC IN 1 - N
AC IN 1 - LINE
AUX 2 -
AUX 2 +
AUX 1 -
AUX 1 +
BATTERY -
BATTERY +
REF AC-CURRENT LIMIT
EM STOP
03.A1
01.F3
02.F3
02.F2
Em.Stop
Em.Stop
ignore AC input
ignore AC input
06.A10
06.A10
DC +48V
DC GND
CONTROL CUBICLE
INVERTERS
COMPARTMENT
INVERTERS
COMPARTMENT
CONTROL CUBICLE

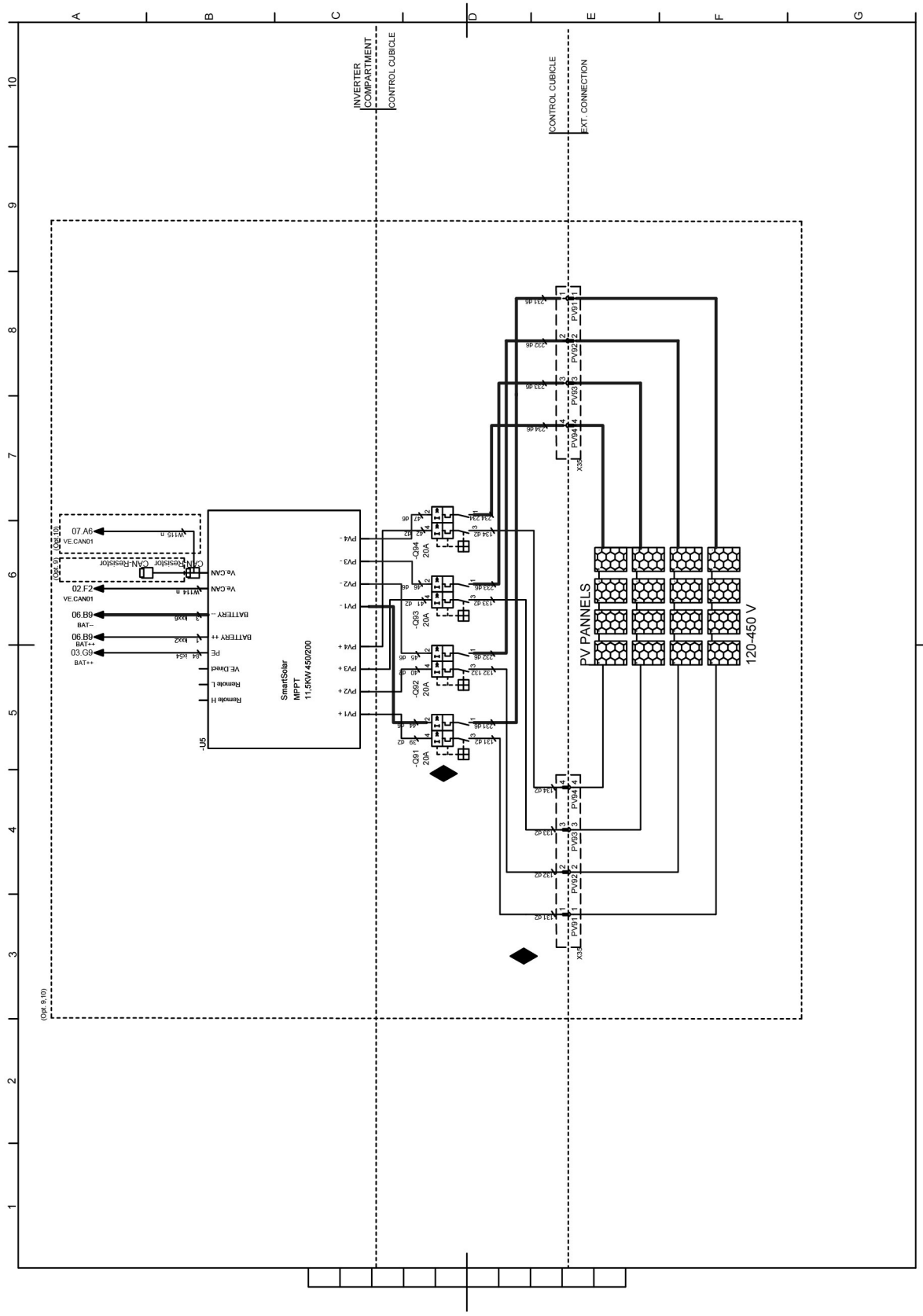
Sheet 6 of 10


05.B1
DC +48V
05.B1
DC GND
BAT-
07.A6
BAT+
07.A6
(Opt. 15)
BAT-
08.A6
BAT+
08.A6
(Opt. 16)
01.F2
DC GND
01.F1
DC +48V
B12
B11
B10
B7
B8
B9
B6
B5
B4
B1
B2
B3
U3
Console
Switch
03.A10
02.F2
VE.CAN
INVERTERS
COMPARTMENT
CONTROL CUBICLE
30 KWh

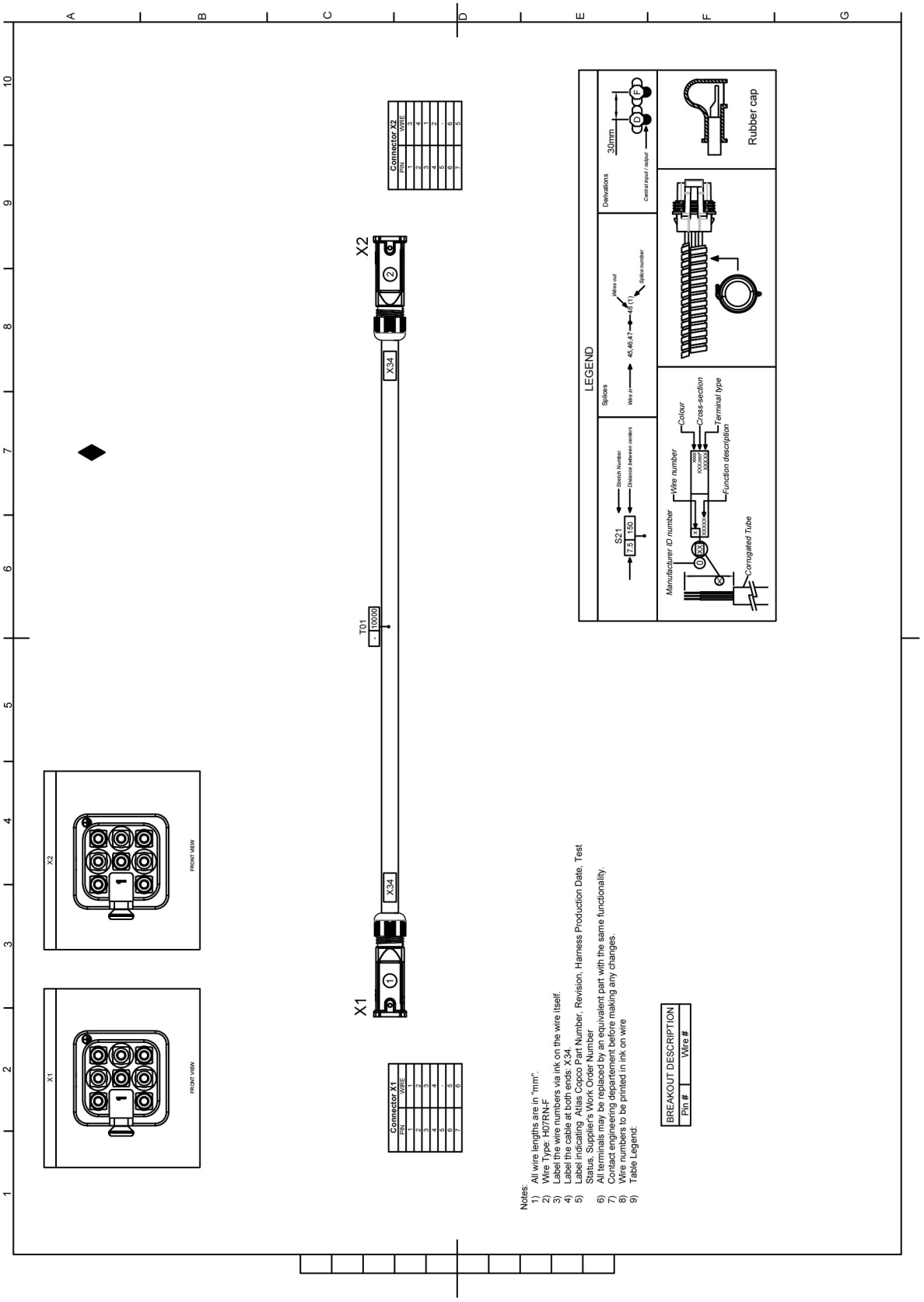
Sheet 7 of 10


INVERTER COMPARTMENT
CONTROL CUBICLE
CONTROL CUBICLE
EXT. CONNECTION
PV PANNELS
120-450 V
SmartSolar MPPT 5KW 450/100
-U4
-Q95 20A
-Q96 20A
-Q3 16A
-K4
-K11
-K12
-X41
-X60
-X61
PE
PE_Cold
N_Cold
L1_Cold
(Opt. 7)
(Opt. 8,10)
(Opt. 10)
(Opt. 8)

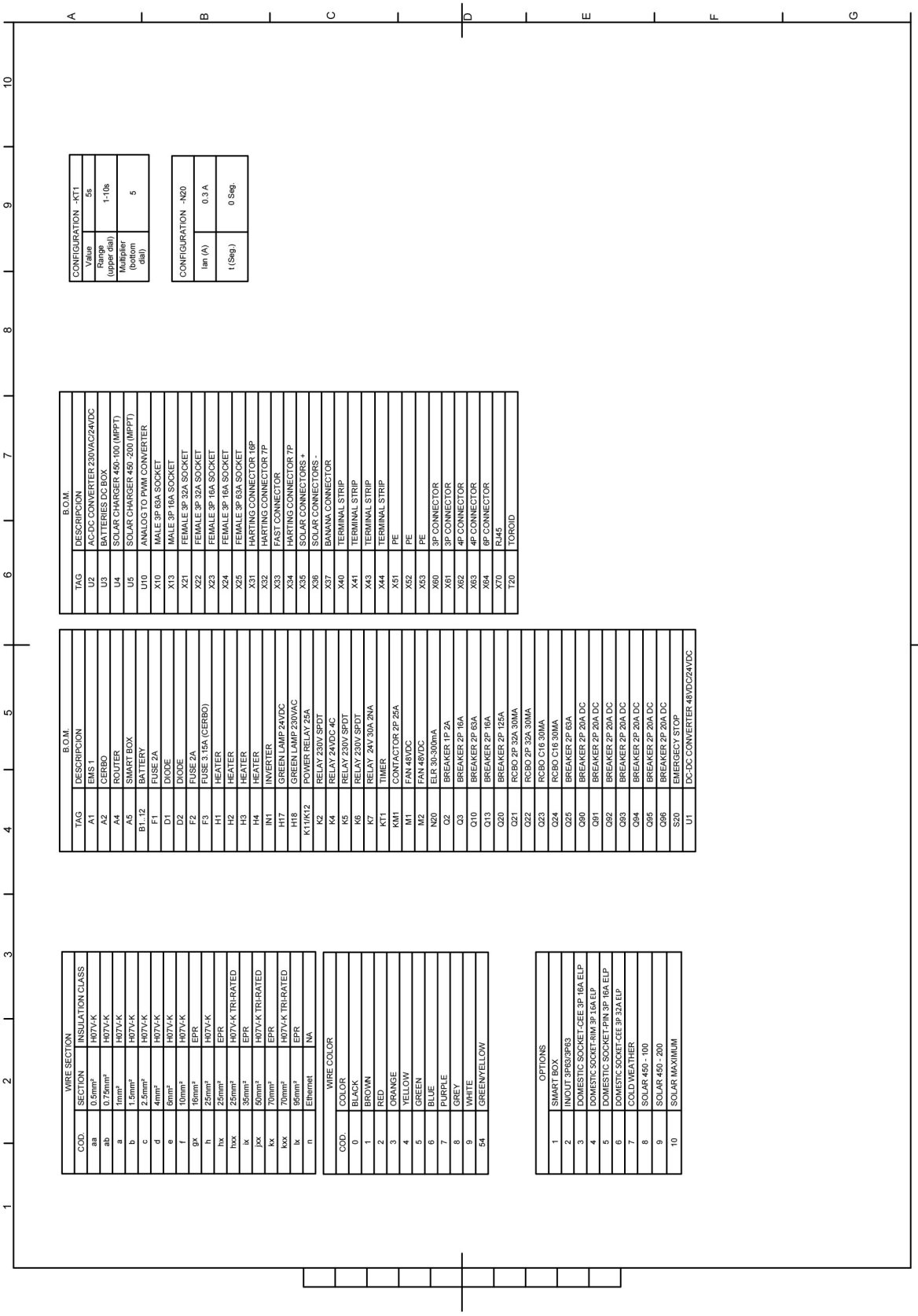
Sheet 8 of 10


INVERTER COMPARTMENT
CONTROL CUBICLE
CONTROL CUBICLE
EXT. CONNECTION
SmartSolar MPPT 11.5KW 450/200
-U5
PV1 -
PV2 -
PV3 -
PV4 -
PV1 +
PV2 +
PV3 +
PV4 +
-Q91 20A
-Q92 20A
-Q93 20A
-Q94 20A
PV PANNELS
120-450 V
07.A6
VE.CAN01
02.F2
VE.CAN01
06.B9
BAT-
06.B9
BAT++
03.G9
BAT++
CAN-Resistor
Ve.CAN
Ve.CAN
BATTERY -
BATTERY +
PE
VE.Direct
Remote L
Remote H
(Opt. 9,10)

Sheet 9 of 10


X1
X2
X34
T01
10000
Connector X1
Connector X2
WIRE
PIN
FRONT VIEW
LEGEND
Splices
Derivations
30mm
Rubber cap
Wire number
Colour
Cross-section
Terminal type
Function description
Manufacturer ID number
Corrugated Tube
S21
7.5
150
BREAKOUT DESCRIPTION
Pin #
Wire #
Notes:
1) All wire lengths are in "mm".
2) Wire Type H07RN-F
3) Label the wire numbers via ink on the wire itself.
4) Label the cable at both ends: X34
5) Label indicating Atlas Copco Part Number, Revision, Harness Production Date, Test Status, Supplier's Work Order Number
6) All terminals may be replaced by an equivalent part with the same functionality.
7) Contact engineering department before making any changes.
8) Wire numbers to be printed in ink on wire
9) Table Legend.

Sheet 10 of 10



WIRE SECTION		
COD.	SECTION	INSULATION CLASS
aa	0.5mm²	H07V-K
ab	0.75mm²	H07V-K
a	1mm²	H07V-K
b	1.5mm²	H07V-K
c	2.5mm²	H07V-K
d	4mm²	H07V-K
e	6mm²	H07V-K
f	10mm²	H07V-K
gx	16mm²	EPR
h	25mm²	H07V-K
hx	25mm²	EPR
hxx	25mm²	H07V-K TRI-RATED
ix	35mm²	EPR
jxx	50mm²	H07V-K TRI-RATED
kx	70mm²	EPR
kxx	70mm²	H07V-K TRI-RATED
lx	95mm²	EPR
n	Ethernet	NA

WIRE COLOR	
COD.	COLOR
0	BLACK
1	BROWN
2	RED
3	ORANGE
4	YELLOW
5	GREEN
6	BLUE
7	PURPLE
8	GREY
9	WHITE
54	GREENYELLOW

OPTIONS	
1	SMART BOX
2	IN/OUT 3P63/3P63
3	DOMESTIC SOCKET-CEE 3P 16A ELP
4	DOMESTIC SOCKET-RIM 3P 16A ELP
5	DOMESTIC SOCKET-PIN 3P 16A ELP
6	DOMESTIC SOCKET-CEE 3P 32A ELP
7	COLD WEATHER
8	SOLAR 450 - 100
9	SOLAR 450 - 200
10	SOLAR MAXIMUM

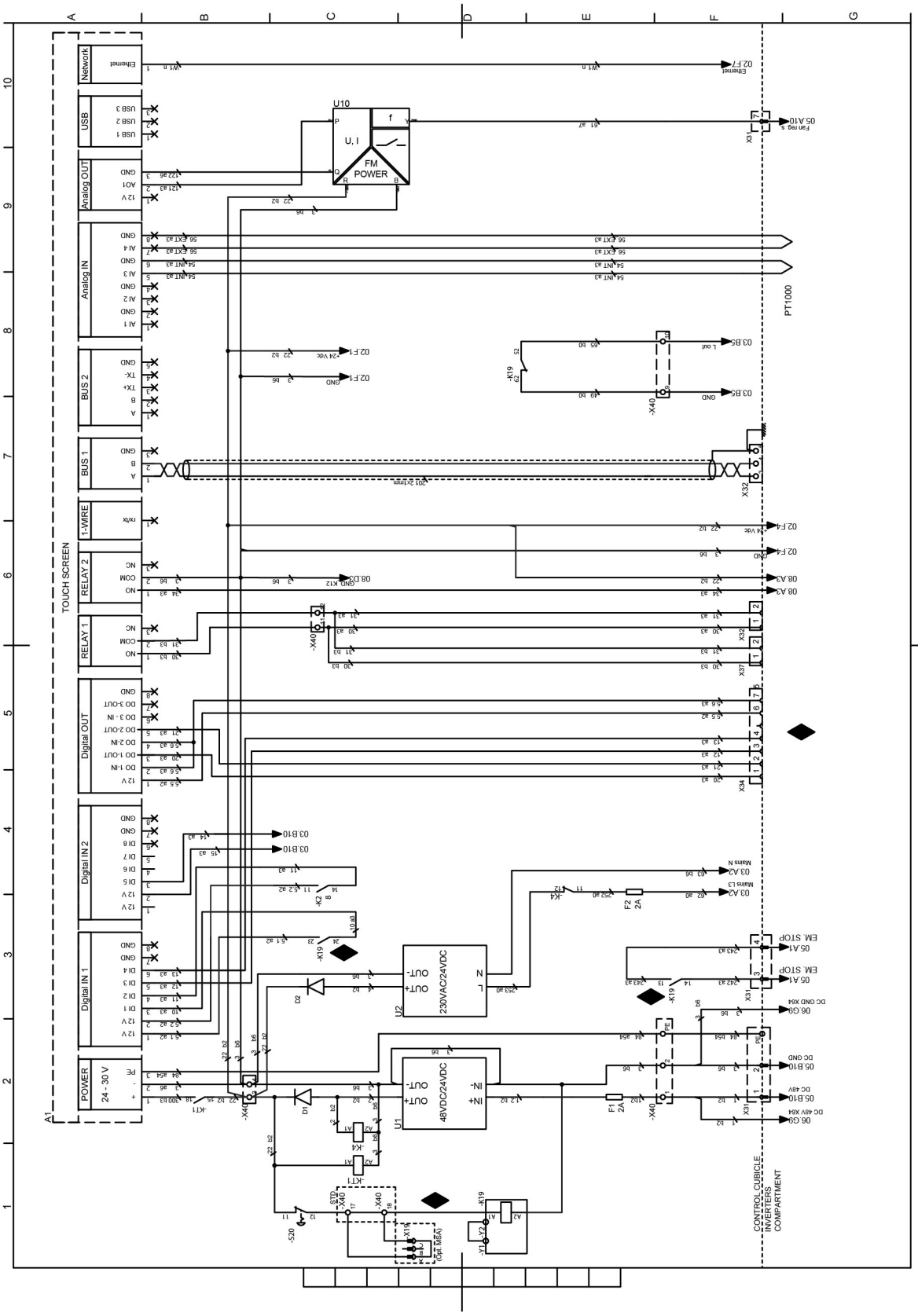
B.O.M.		
TAG	DESCRIPCION	
A1	EMS 1	
A2	CERBO	
A4	ROUTER	
A5	SMART BOX	
B1..12	BATTERY	
F1	FUSE 2A	
D1	DIODE	
D2	DIODE	
F2	FUSE 2A	
F3	FUSE 3.15A (CERBO)	
H1	HEATER	
H2	HEATER	
H3	HEATER	
H4	HEATER	
IN1	INVERTER	
H17	GREEN LAMP 24VDC	
H18	GREEN LAMP 230VAC	
K11/K12	POWER RELAY 25A	
K2	RELAY 230V SPDT	
K4	RELAY 24VDC 4C	
K5	RELAY 230V SPDT	
K6	RELAY 230V SPDT	
K7	RELAY 24V 30A 2NA	
KT1	TIMER	
KM1	CONTACTOR 2P 25A	
M1	FAN 48VDC	
M2	FAN 48VDC	
N20	ELR 30-300mA	
Q2	BREAKER 1P 2A	
Q3	BREAKER 2P 16A	
Q10	BREAKER 2P 63A	
Q13	BREAKER 2P 16A	
Q20	BREAKER 2P 125A	
Q21	RCBO 2P 32A 30MA	
Q22	RCBO 2P 32A 30MA	
Q23	RCBO C16 30MA	
Q24	RCBO C16 30MA	
Q25	BREAKER 2P 63A	
Q90	BREAKER 2P 20A DC	
Q91	BREAKER 2P 20A DC	
Q92	BREAKER 2P 20A DC	
Q93	BREAKER 2P 20A DC	
Q94	BREAKER 2P 20A DC	
Q95	BREAKER 2P 20A DC	
Q96	BREAKER 2P 20A DC	
S20	EMERGECY STOP	
U1	DC-DC CONVERTER 48VDC/24VDC	

B.O.M.	
TAG	DESCRIPCION
U2	AC-DC CONVERTER 230VAC/24VDC
U3	BATTERIES DC BOX
U4	SOLAR CHARGER 450-100 (MPPT)
U5	SOLAR CHARGER 450 -200 (MPPT)
U10	ANALOG TO PWM CONVERTER
X10	MALE 3P 63A SOCKET
X13	MALE 3P 16A SOCKET
X21	FEMALE 3P 32A SOCKET
X22	FEMALE 3P 32A SOCKET
X23	FEMALE 3P 16A SOCKET
X24	FEMALE 3P 16A SOCKET
X25	FEMALE 3P 63A SOCKET
X31	HARTING CONNECTOR 16P
X32	HARTING CONNECTOR 7P
X33	FAST CONNECTOR
X34	HARTING CONNECTOR 7P
X35	SOLAR CONNECTORS +
X36	SOLAR CONNECTORS -
X37	BANANA CONNECTOR
X40	TERMINAL STRIP
X41	TERMINAL STRIP
X43	TERMINAL STRIP
X44	TERMINAL STRIP
X51	PE
X52	PE
X53	PE
X60	3P CONNECTOR
X61	3P CONNECTOR
X62	4P CONNECTOR
X63	4P CONNECTOR
X64	6P CONNECTOR
X70	RJ45
T20	TOROID

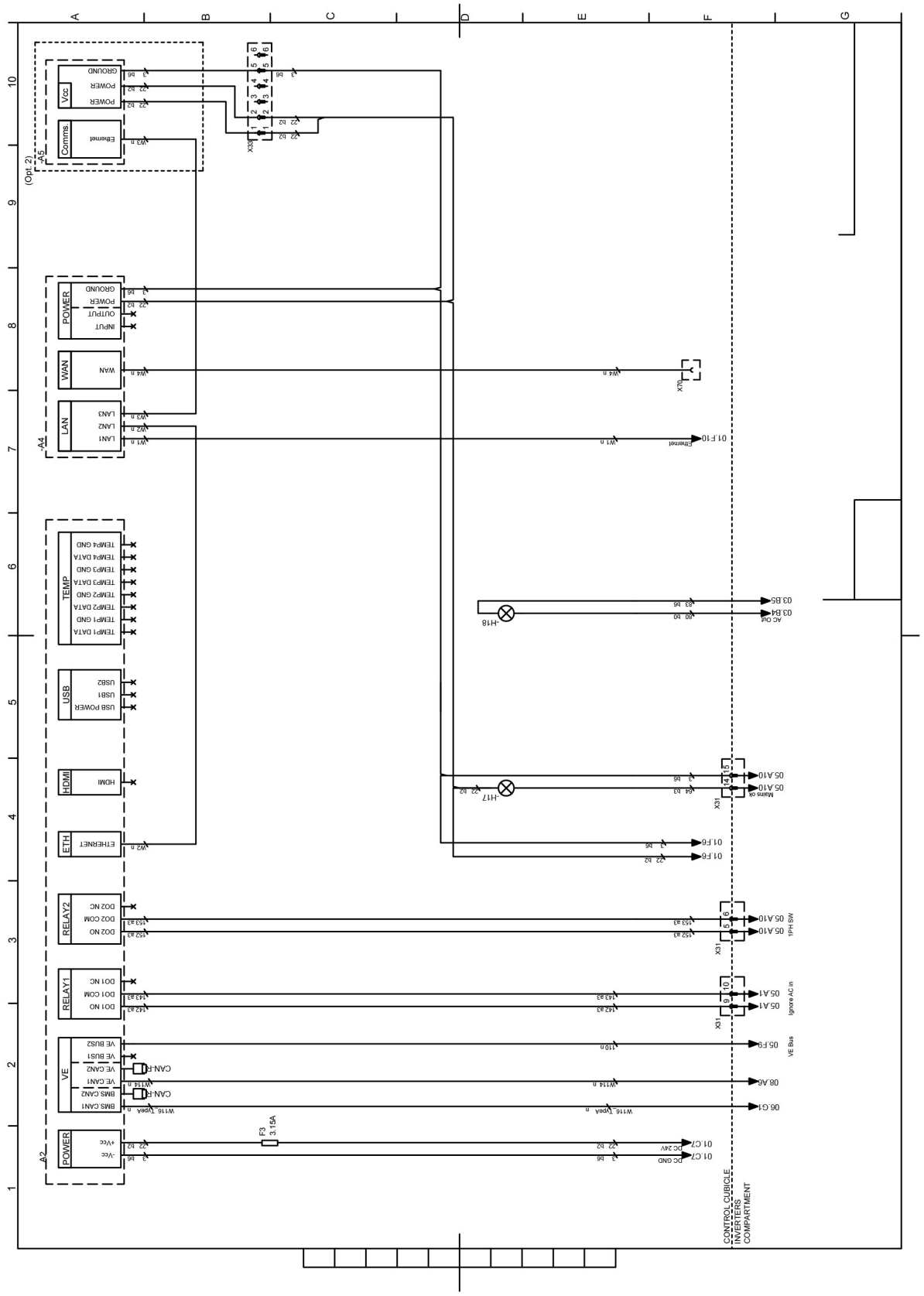
CONFIGURATION -KT1	
Value	5s
Range (upper dial)	1-10s
Multiplier (bottom dial)	5

CONFIGURATION -N20	
Ian (A)	0.3 A
t (Seg.)	0 Seg.

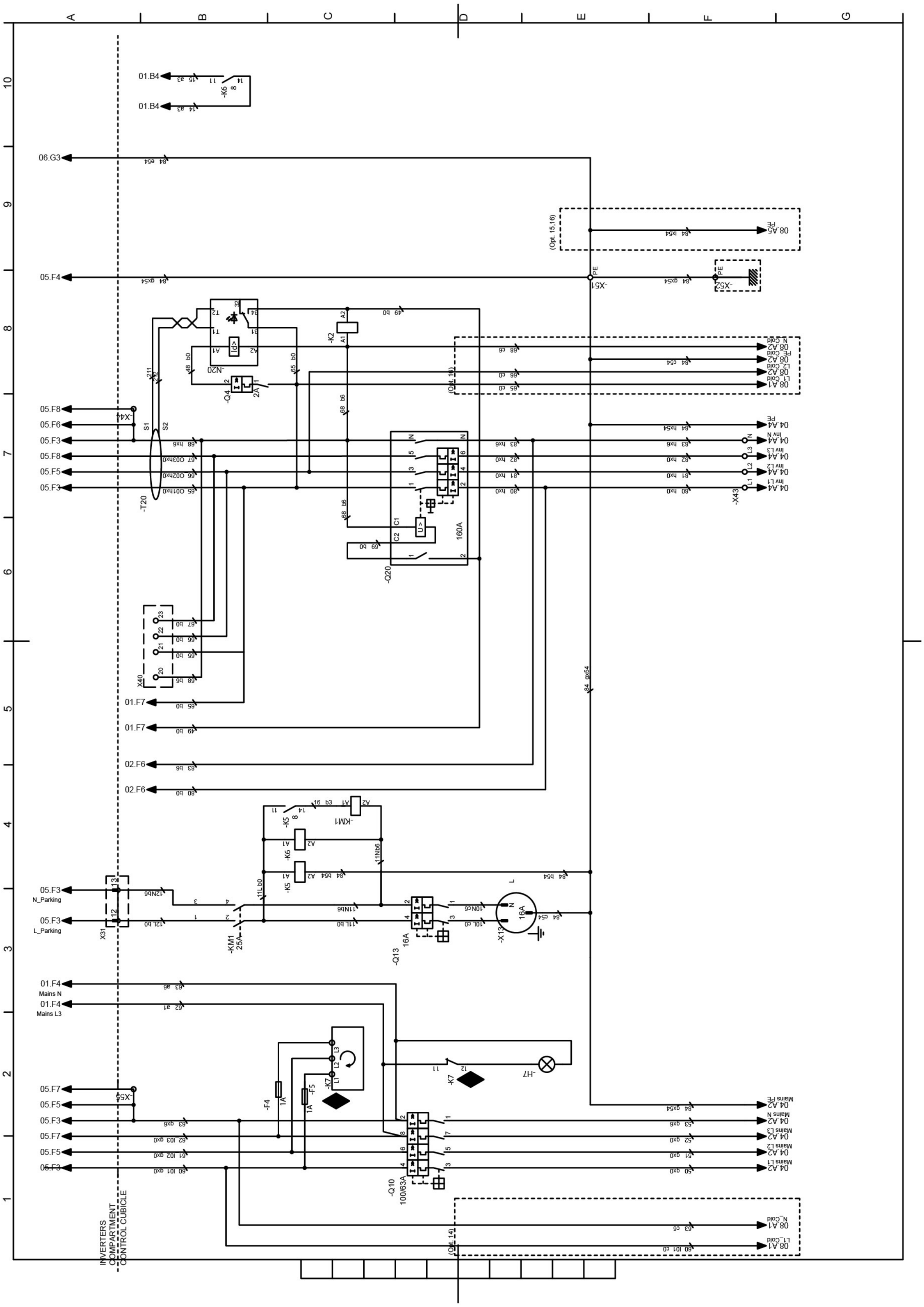
Circuit diagram ZBP 35-40, ZBP 45-60 & ZBP 45-75 - 1636058721 Sheet 1 of 11



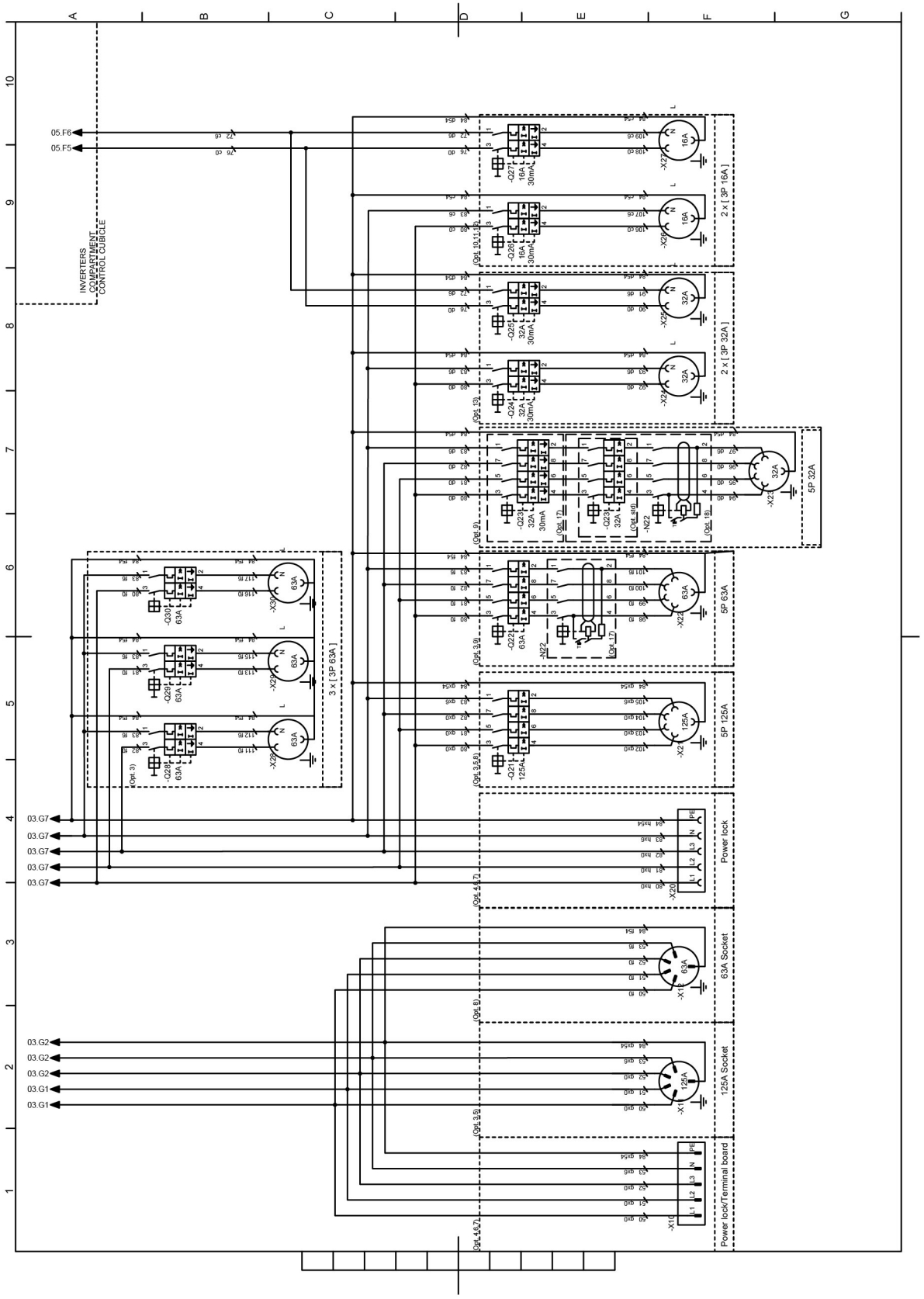
Sheet 2 of 11


A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
10
(Opt 2)
A5
Vcc
Comms.
GROUND
POWER
Ethernet
X33
A4
POWER
OUTPUT
INPUT
WAN
LAN
LAN3
LAN2
LAN1
TEMP
TEMP4 GND
TEMP4 DATA
TEMP3 GND
TEMP3 DATA
TEMP2 GND
TEMP2 DATA
TEMP1 GND
TEMP1 DATA
USB
USB POWER
USB1
USB2
HDMI
ETH
ETHERNET
RELAY2
DO2 NC
DO2 COM
DO2 NO
RELAY1
DO1 NC
DO1 COM
DO1 NO
VE
VE BUS2
VE BUS1
VE CAN2
VE CAN1
BMS CAN2
BMS CAN1
CAN-R
A2
+Vcc
-Vcc
F3
3.15A
+H18
+H17
X31
X4
Mains ok
1PH SW
Ignore AC in
VE Bus
CONTROL CUBICLE
INVERTERS
COMPARTMENT

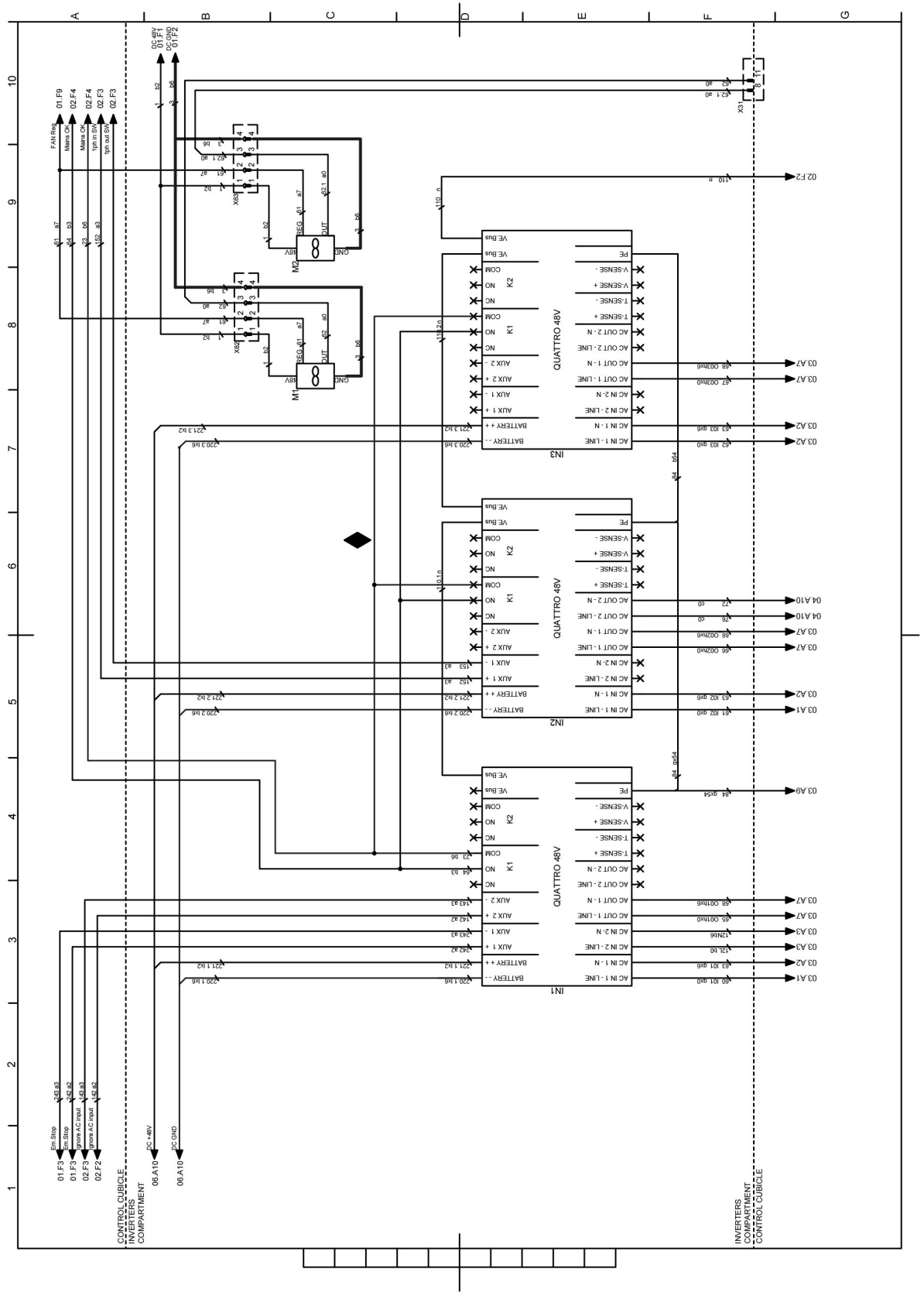
Sheet 3 of 11


INVERTERS COMPARTMENT
CONTROL CUBICLE
N_Parking
L_Parking
Mains N
Mains L3
160A
16A
100/63A
250A

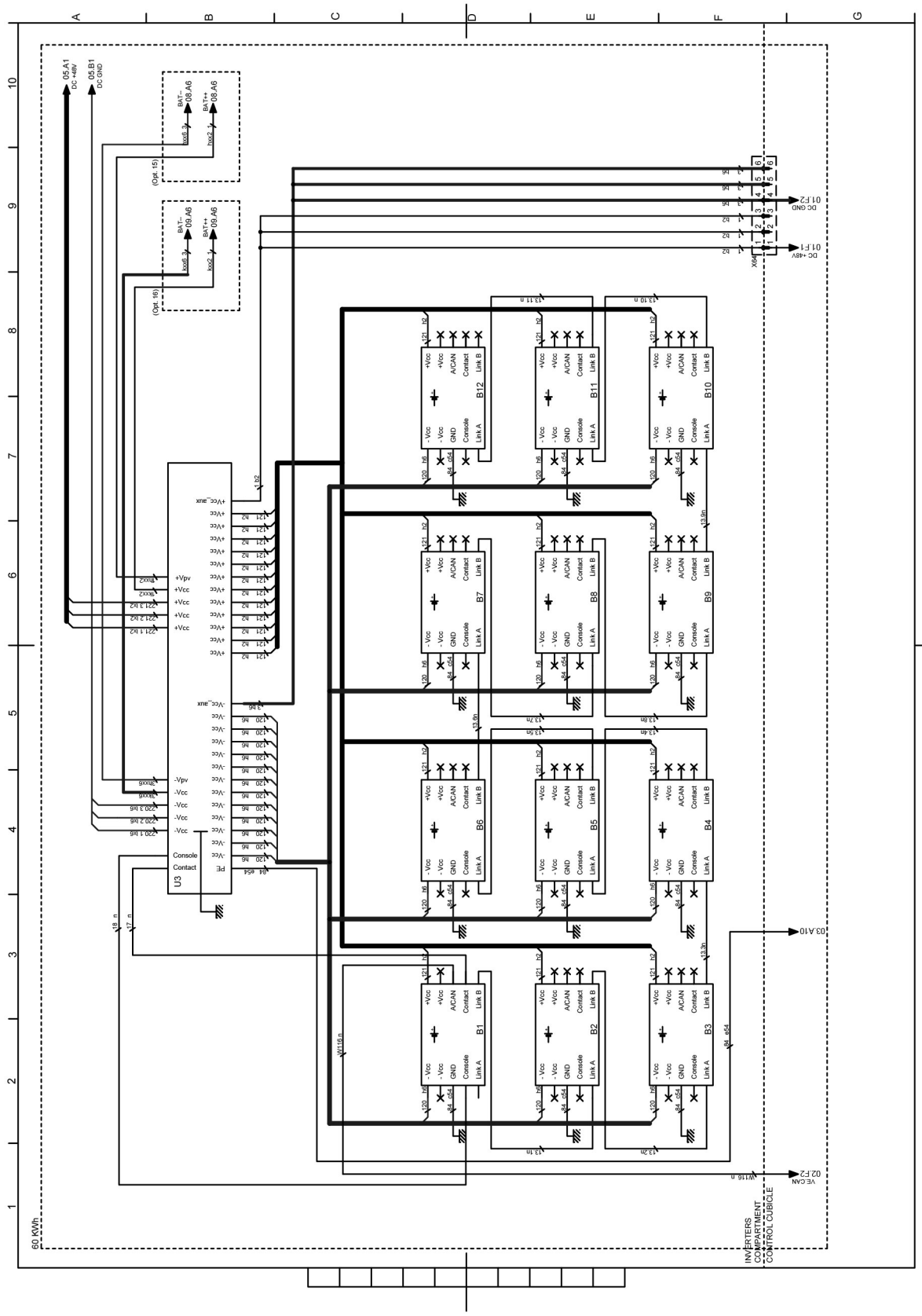
Sheet 4 of 11


INVERTERS COMPARTMENT CONTROL CUBICLE
05.F6
05.F5
2 x [3P 16A]
2 x [3P 32A]
5P 32A
5P 63A
5P 125A
3 x [3P 63A]
Power lock
63A Socket
125A Socket
Power lock/Terminal board
03.G7
03.G2
03.G1

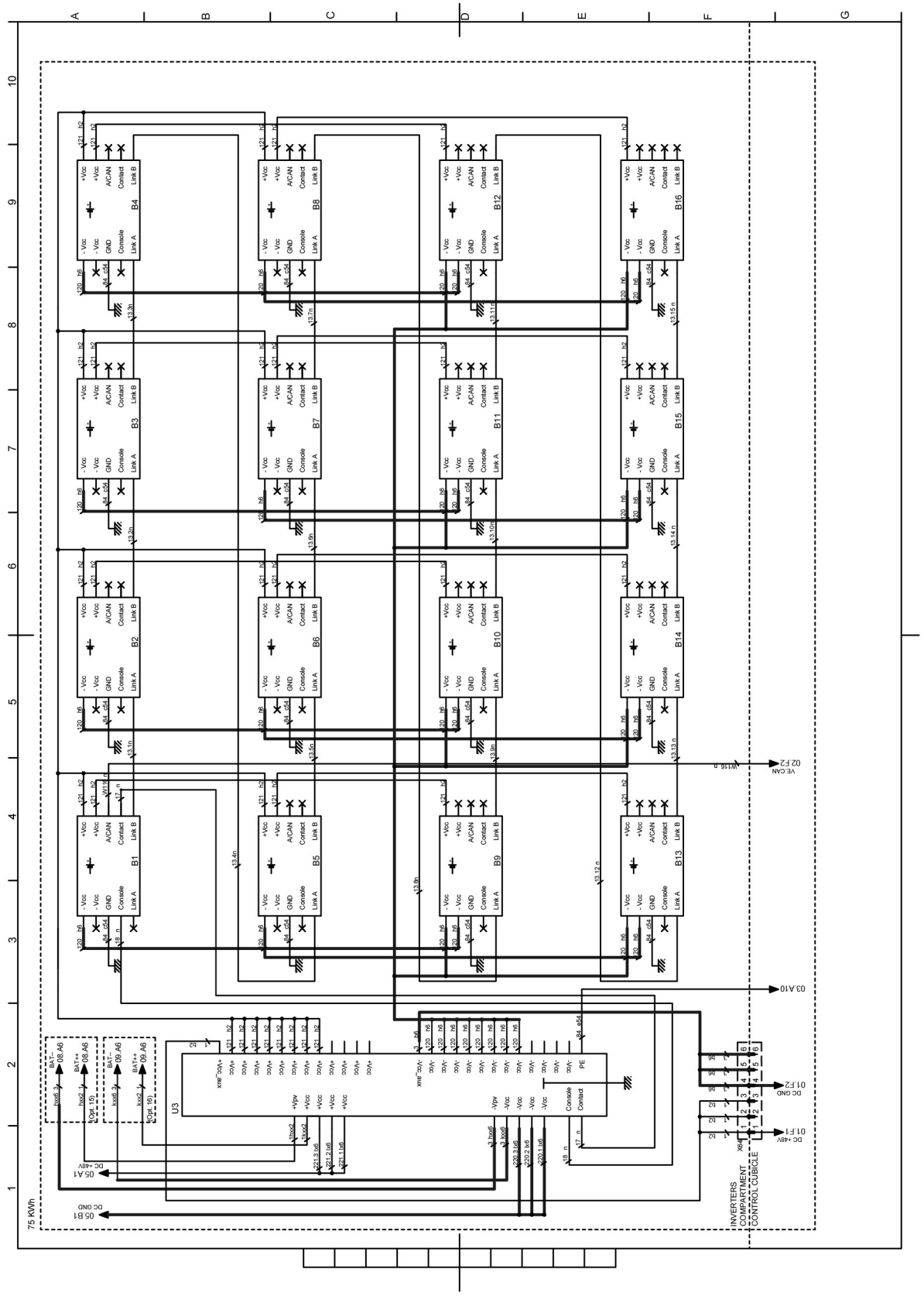
Sheet 5 of 11


QUATTRO 48V
IN1
IN2
IN3
CONTROL CUBICLE
INVERTERS
COMPARTMENT
INVERTERS
COMPARTMENT
CONTROL CUBICLE

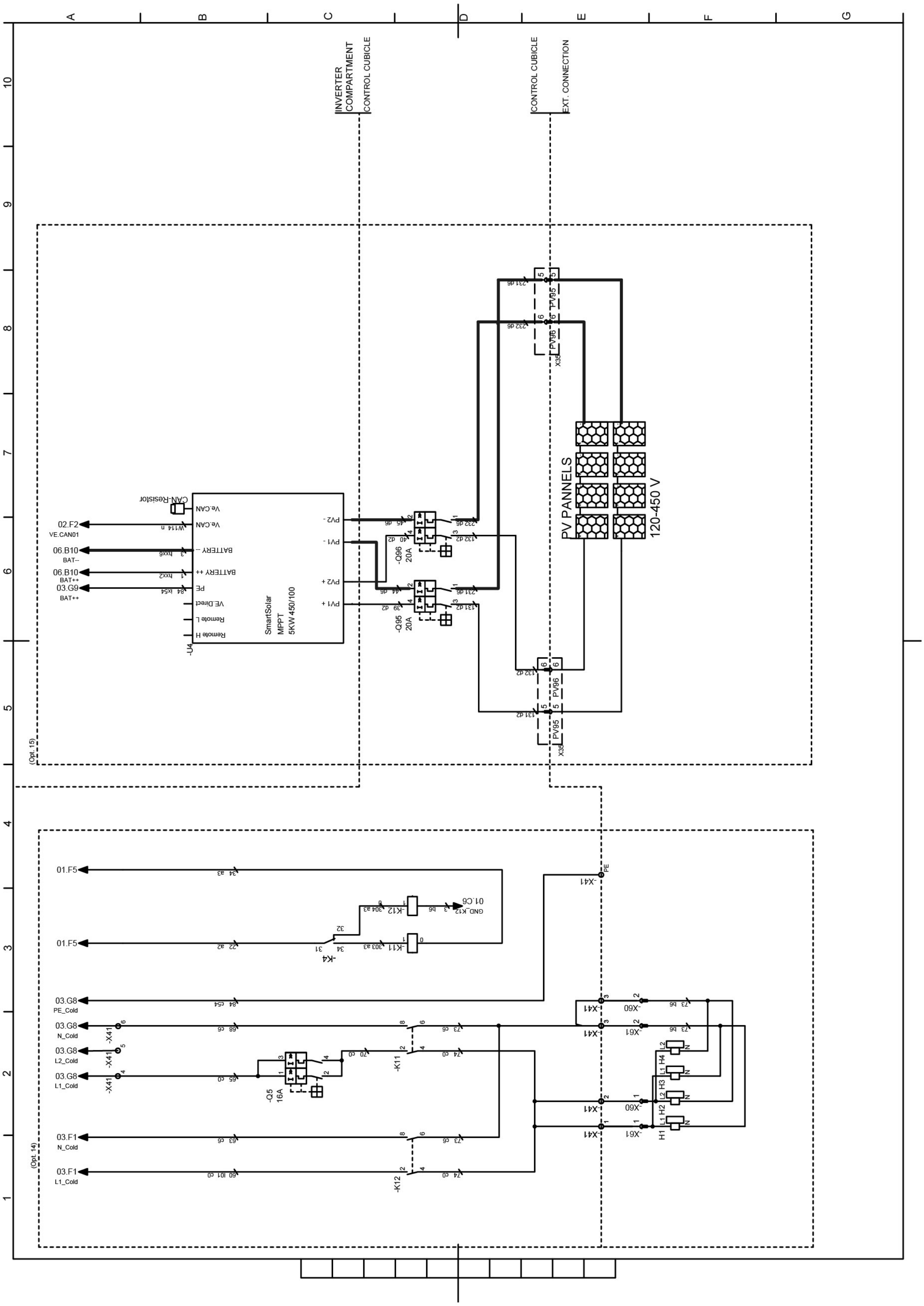
Sheet 6 of 11


60 KWh
INVERTERS COMPARTMENT CONTROL CUBICLE
05.A1 DC +48V
05.B1 DC GND
BAT+ 08.A6
BAT- 08.A6
(Opt. 15)
(Opt. 16)
01.F1 DC +48V
01.F2 DC GND
03.A10
02.F2 VE.CAN
U3
Console
Contact
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
+Vcc
-Vcc
A/CAN
Contact
Console
Link A
Link B
GND

Sheet 7 of 11

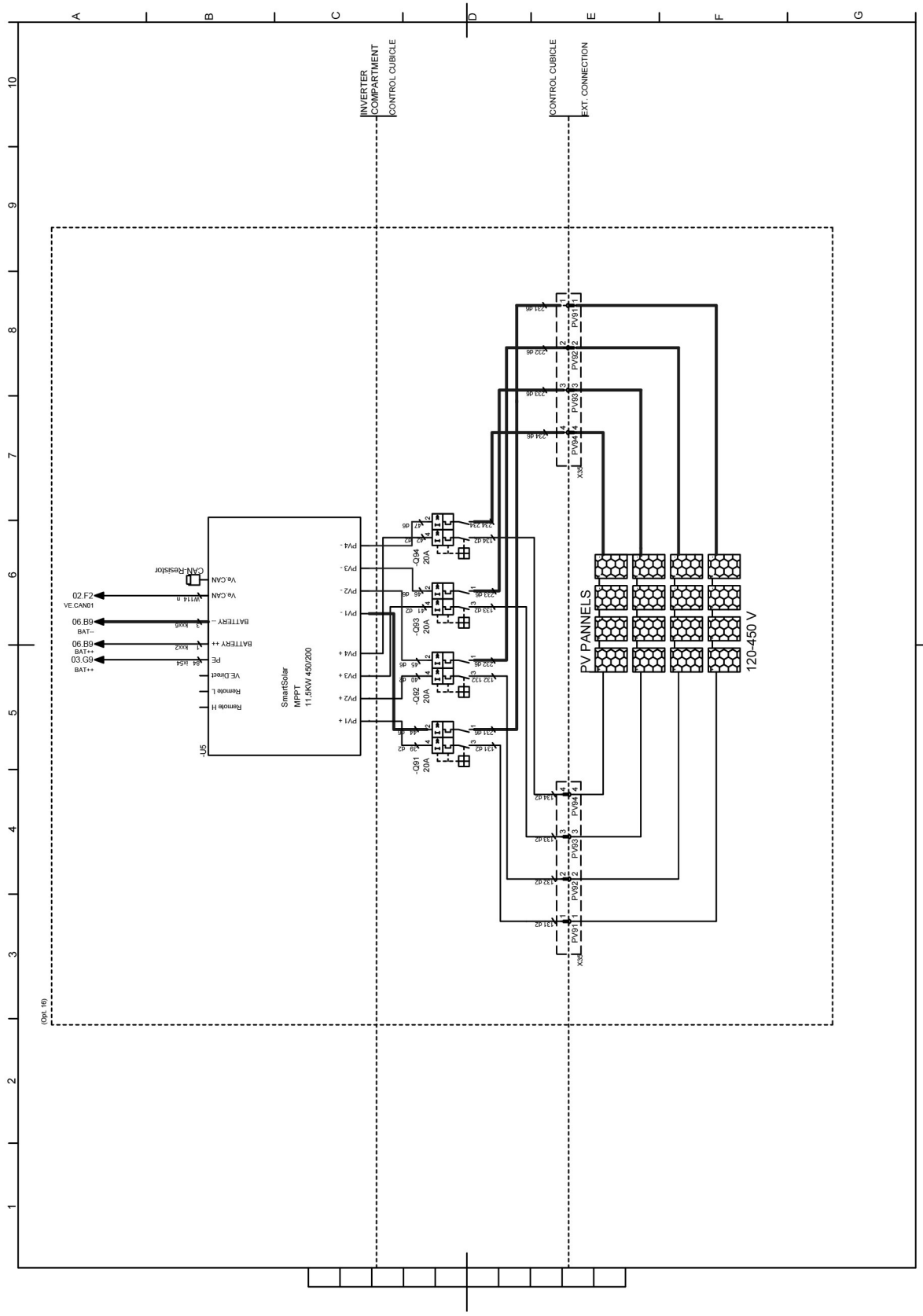

75 kWh
INVERTERS
CONTAINMENT
CONTROL CUBICLE
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
B13
B14
B15
B16
U3
05.A1
05.B1
03.A10
01.F2
01.F1
02.F2

Sheet 8 of 11

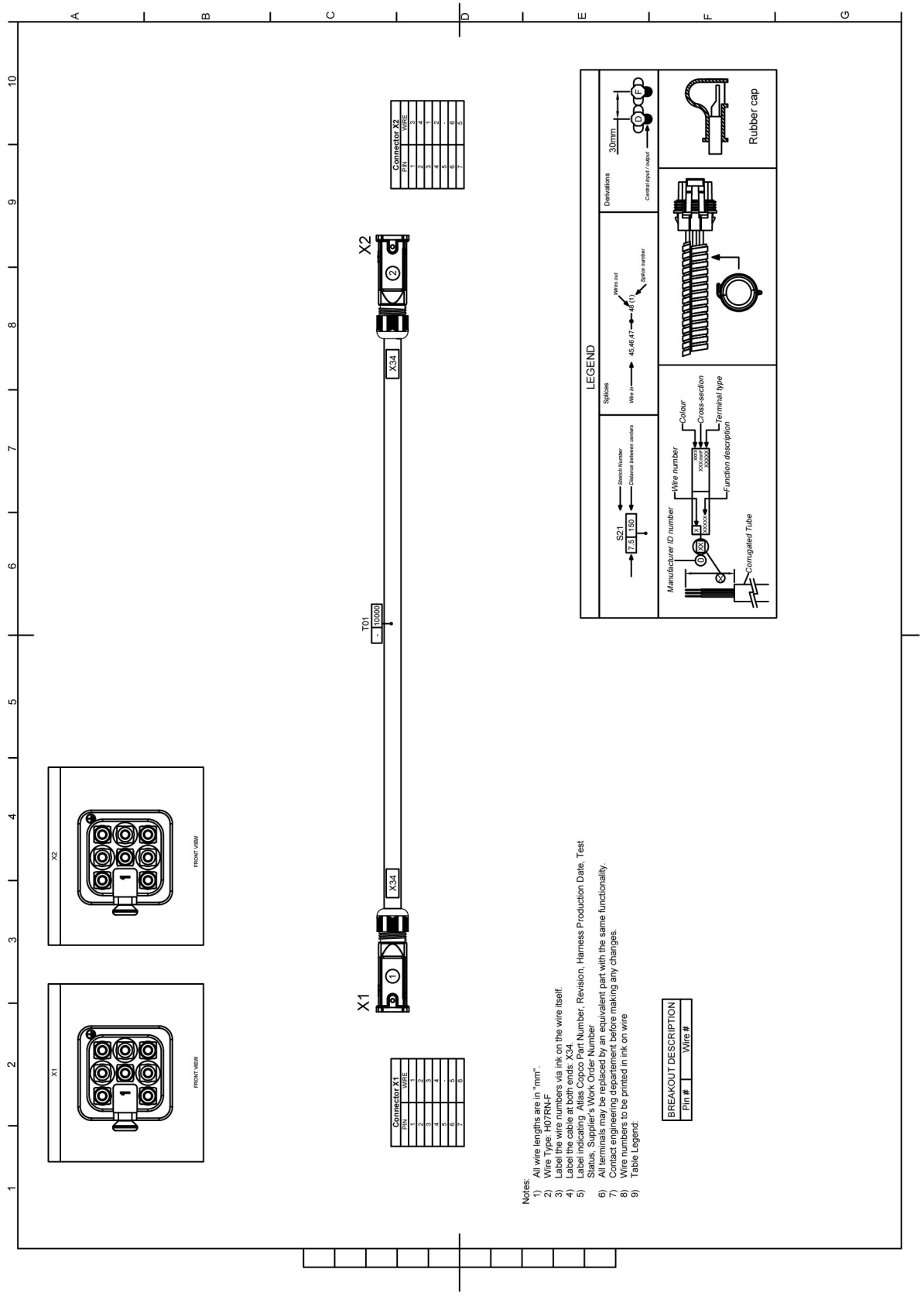


INVERTER COMPARTMENT
CONTROL CUBICLE
EXT. CONNECTION
PV PANNELS
120-450 V
SmartSolar MPPT 5KW 450/100
CAN-Resistor
-Q96 20A
-Q95 20A
-Q5 16A
-K4
-K11
-K12
-X41
-X60
-X61
H1
H2
H3
H4
(Opt. 15)
(Opt. 14)

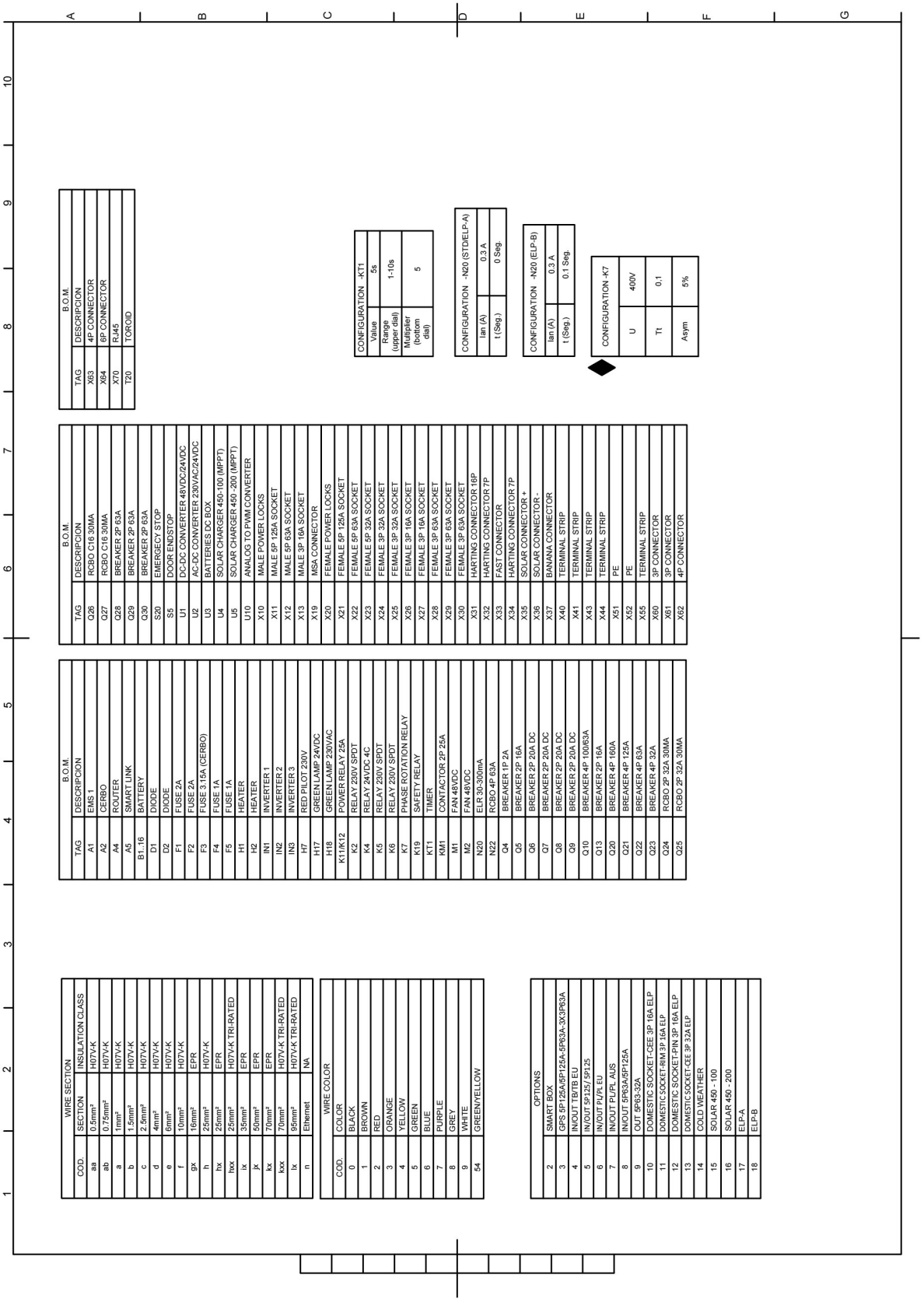
Sheet 9 of 11


INVERTER COMPARTMENT
CONTROL CUBICLE
CONTROL CUBICLE
EXT. CONNECTION
PV PANNELS
120-450 V
SmartSolar
MPPT
11.5KW 450/200
CAN-Resistor
02.F2
VE.CAN01
06.B9
BAT--
06.B9
BAT++
03.G9
BAT++
-Q94
-Q93
-Q92
-Q91
20A
(Opt. 16)

Sheet 10 of 11



Sheet 11 of 11



WIRE SECTION	
COD.	SECTION
aa	0.5mm²
ab	0.75mm²
a	1mm²
b	1.5mm²
c	2.5mm²
d	4mm²
e	6mm²
f	10mm²
gx	16mm²
h	25mm²
hx	25mm²
hxx	25mm²
ix	35mm²
jx	50mm²
kx	70mm²
kxx	70mm²
lx	95mm²
n	Ethernet

WIRE SECTION	
COD.	INSULATION CLASS
aa	H07V-K
ab	H07V-K
a	H07V-K
b	H07V-K
c	H07V-K
d	H07V-K
e	H07V-K
f	H07V-K
gx	EPR
h	H07V-K
hx	EPR
hxx	H07V-K TRI-RATED
ix	EPR
jx	EPR
kx	EPR
kxx	H07V-K TRI-RATED
lx	H07V-K TRI-RATED
n	NA

WIRE COLOR	
COD.	COLOR
0	BLACK
1	BROWN
2	RED
3	ORANGE
4	YELLOW
5	GREEN
6	BLUE
7	PURPLE
8	GREY
9	WHITE
54	GREEN/YELLOW

OPTIONS	
2	SMART BOX
3	GPS 5P125A/5P125A-5P63A-3X3P63A
4	IN/OUT TB/TB EU
5	IN/OUT 5P125/ 5P125
6	IN/OUT PL/PL EU
7	IN/OUT PL/PL AUS
8	IN/OUT 5P63A/6P125A
9	OUT 5P63-32A
10	DOMESTIC SOCKET-CEE 3P 16A ELP
11	DOMESTIC SOCKET-RIM 3P 16A ELP
12	DOMESTIC SOCKET-PIN 3P 16A ELP
13	DOMESTIC SOCKET-CEE 3P 32A ELP
14	COLD WEATHER
15	SOLAR 450 - 100
16	SOLAR 450 - 200
17	ELP-A
18	ELP-B

B.O.M.	
TAG	DESCRIPCION
A1	EMS 1
A2	CERBO
A4	ROUTER
A5	SMART UNK
B1_16	BATTERY
D1	DIODE
D2	DIODE
F1	FUSE 2A
F2	FUSE 2A
F3	FUSE 3.15A (CERBO)
F4	FUSE 1A
F5	FUSE 1A
H1	HEATER
H2	HEATER
IN1	INVERTER 1
IN2	INVERTER 2
IN3	INVERTER 3
H7	RED PILOT 230V
H17	GREEN LAMP 24VDC
H18	GREEN LAMP 230VAC
K11/K12	POWER RELAY 25A
K2	RELAY 230V SPDT
K4	RELAY 24VDC 4C
K5	RELAY 230V SPDT
K6	RELAY 230V SPDT
K7	PHASE ROTATION RELAY
K19	SAFETY RELAY
KT1	TIMER
KM1	CONTACTOR 2P 25A
M1	FAN 48VDC
M2	FAN 48VDC
N20	ELR 30-300mA
N22	RCBO 4P 63A
Q4	BREAKER 1P 2A
Q5	BREAKER 2P 16A
Q6	BREAKER 2P 20A DC
Q7	BREAKER 2P 20A DC
Q8	BREAKER 2P 20A DC
Q9	BREAKER 2P 20A DC
Q10	BREAKER 4P 100/63A
Q13	BREAKER 2P 16A
Q20	BREAKER 4P 160A
Q21	BREAKER 4P 125A
Q22	BREAKER 4P 63A
Q23	BREAKER 4P 32A
Q24	RCBO 2P 32A 30MA
Q25	RCBO 2P 32A 30MA

B.O.M.	
TAG	DESCRIPCION
Q26	RCBO C16 30MA
Q27	RCBO C16 30MA
Q28	BREAKER 2P 63A
Q29	BREAKER 2P 63A
Q30	EMERGECY STOP
S5	DOOR ENDSTOP
U1	DC-DC CONVERTER 48VDC/24VDC
U2	AC-DC CONVERTER 230VAC/24VDC
U3	BATTERIES DC BOX
U4	SOLAR CHARGER 450-100 (MPPT)
U5	SOLAR CHARGER 450 -200 (MPPT)
U10	ANALOG TO PWM CONVERTER
X10	MALE POWER LOCKS
X11	MALE 5P 125A SOCKET
X12	MALE 6P 63A SOCKET
X13	MALE 3P 16A SOCKET
X19	MSA CONNECTOR
X20	FEMALE POWER LOCKS
X21	FEMALE 5P 125A SOCKET
X22	FEMALE 6P 63A SOCKET
X23	FEMALE 5P 32A SOCKET
X24	FEMALE 3P 32A SOCKET
X25	FEMALE 3P 32A SOCKET
X26	FEMALE 3P 16A SOCKET
X27	FEMALE 3P 16A SOCKET
X28	FEMALE 3P 63A SOCKET
X29	FEMALE 3P 63A SOCKET
X30	FEMALE 3P 63A SOCKET
X31	HARTING CONNECTOR 16P
X32	HARTING CONNECTOR 7P
X33	FAST CONNECTOR
X34	HARTING CONNECTOR 7P
X35	SOLAR CONNECTOR +
X36	SOLAR CONNECTOR -
X37	BANANA CONNECTOR
X40	TERMINAL STRIP
X41	TERMINAL STRIP
X43	TERMINAL STRIP
X44	TERMINAL STRIP
X51	PE
X52	PE
X55	TERMINAL STRIP
X60	3P CONNECTOR
X61	3P CONNECTOR
X62	4P CONNECTOR

B.O.M.	
TAG	DESCRIPCION
X63	4P CONNECTOR
X64	6P CONNECTOR
X70	RJ45
T20	TOROID

CONFIGURATION -KT1	
Value	5s
Range (upper dial)	1-10s
Multiplier (bottom dial)	5

CONFIGURATION -N20 (STD/ELP-A)	
Ian (A)	0.3 A
t (Seg.)	0 Seg.

CONFIGURATION -N20 (ELP-B)	
Ian (A)	0.3 A
t (Seg.)	0.1 Seg.

CONFIGURATION -K7	
U	400V
Tt	0.1
Asym	5%

Following documents are provided with this unit"

EC Declaration of conformity

EC DECLARATION OF CONFORMITY

We, Grupos Electrogenos Europa S.A., declare under our sole responsibility, that the product
Machine name : **Energy Storage System**
Commercial name :
Serial number :

The equipment complies with the requirements of the following directives and their amendments as indicated.

Directive on the approximation of laws of the Member States relating to		Harmonized and/or Technical Standards used	Att' mnt
Electromagnetic compatibility	2014/30/EU	EN 61000-6-1 EN 61000-6-2 EN 61000-6-3	
Low voltage equipment	2014/35/EU	EN 60204-1 EN-IEC 62040-1 IEC 62619	
Ecodesign, energy-related products	2009/125/EC		
Radio equipment	2014/53/EU		X
ROHS Directive	2011/65/EU		
WEEE Directive	2012/19/EU		
Batteries Directive	2006/66/EC		

The harmonized and the technical standards used are identified in the attachments hereafter
Grupos Electrógenos Europa, S.A. is authorized to compile the technical file

	Conformity of the specification to the Directives	Conformity of the product to the specification and by implication to the directives
Issued by	Product Engineering	Manufacturing
Name	*Jesus Mazo*	*Stefan Isberg*
Signature		

Place , Date *Muel (Zaragoza), Spain*

Grupos Electrógenos Europa, S.A. A company within the Atlas Copco Group

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V.A.T A50024680

Form 1 6980061 98
ed. 03, 2020-02-12

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Radio equipment 2014/53/EU

1. **Description**

Only applicable when the machine is equipped with optional device to transmit machine status data.

a. Component b. Description and/or c. Part number	d. Declaration of conformity attached (including conformity assessment procedure followed, identification of standards)
Smart Box (Fleet link)	

2. **Harmonized standards used :**
   - See table
   - See front page of Declaration

3. **National technical standards and specifications used :** see table

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ed 02, 2021-05-01

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