

Instruction book

ZenergiZe Energy Storage Systems (ESS)

ZBP15 - ZBP45 ESF

Atlas Copco

ZenergiZe Energy Storage Systems (ESS)

ZBP15 - ZBP45 ESF

Instruction book

Original instructions

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Table of contents

1	Safety precautions.....	5
1.1	INTRODUCTION.....	5
1.2	GENERAL SAFETY PRECAUTIONS.....	6
1.3	SAFETY DURING TRANSPORT AND INSTALLATION.....	7
1.4	SAFETY DURING USE AND OPERATION.....	8
1.5	SAFETY DURING MAINTENANCE AND REPAIR.....	9
1.6	TOOL APPLICATIONS SAFETY.....	10
1.7	BATTERY SAFETY PRECAUTIONS.....	10
2	Main parts.....	12
2.1	GENERAL DESCRIPTION.....	12
2.2	MARKINGS AND LABELS.....	13
2.3	MECHANICAL FEATURES.....	13
2.4	ELECTRICAL FEATURES.....	14
3	Installation and connection.....	20
3.1	LIFTING.....	20
3.2	POSITIONING AND TRANSPORT.....	20
3.3	INSTALLATION.....	22
3.4	CONNECTING THE ESS.....	22
4	Operating instructions.....	25
4.1	BEFORE STARTING.....	25
4.2	OPERATING THE ESS.....	25

5	Operating the ECO Controller.....	32
5.1	GENERAL.....	32
5.2	MAIN SIDE TABS.....	33
5.3	ADDITIONAL TABS.....	60
5.4	ADDITIONAL WORKING MODES.....	69
6	Maintenance.....	75
6.1	MAINTENANCE SCHEDULE.....	75
6.2	ADJUSTMENTS AND SERVICE PROCEDURES.....	76
7	Checks and troubleshooting.....	85
8	Storage of the ESS.....	90
8.1	STORAGE.....	90
8.2	PREPARING FOR OPERATION AFTER STORAGE.....	90
9	Disposal.....	91
9.1	GENERAL.....	91
9.2	DISPOSAL OF MATERIALS.....	91
9.3	DISPOSAL OF LI-ION BATTERIES.....	91
10	Available option.....	92
10.1	OVERVIEW OF THE ELECTRICAL OPTIONS.....	92
10.2	ELECTRICAL OPTIONS.....	92
10.3	OVERVIEW OF THE MECHANICAL OPTIONS.....	95
10.4	MECHANICAL OPTIONS.....	95

11	Technical specifications of the ESS.....	97
11.1	TECHNICAL SPECIFICATIONS OF THE ZBP15-ZBP45 UNIT.....	97
11.2	CRITICAL BOLT CONNECTIONS.....	100
11.3	DIMENSION DRAWING.....	102
11.4	CONVERSION LIST OF SI UNITS INTO BRITISH UNITS.....	103
11.5	DATA PLATE.....	103
12	Circuit diagrams.....	105

1 Safety precautions

To be read attentively and acted accordingly before towing, lifting, operating, performing maintenance, or repairing the ESS.

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 jewellery.
- 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 IP54 (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. A door should be kept open for a short period only e.g. for inspection or adjustment.
- 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 noisehazardous 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.
- ZBP 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. (hybridation 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, odour, 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 firerisk).
- Take safety precautions against toxic vapours 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 sounddamping material. Keep the material free of dirt and liquids such as cleansing agents. If any sounddamping 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. With the knowledge of correct tool use and knowing the limitations of tools, along with some common sense, many accidents can be prevented.

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 CO₂ 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.

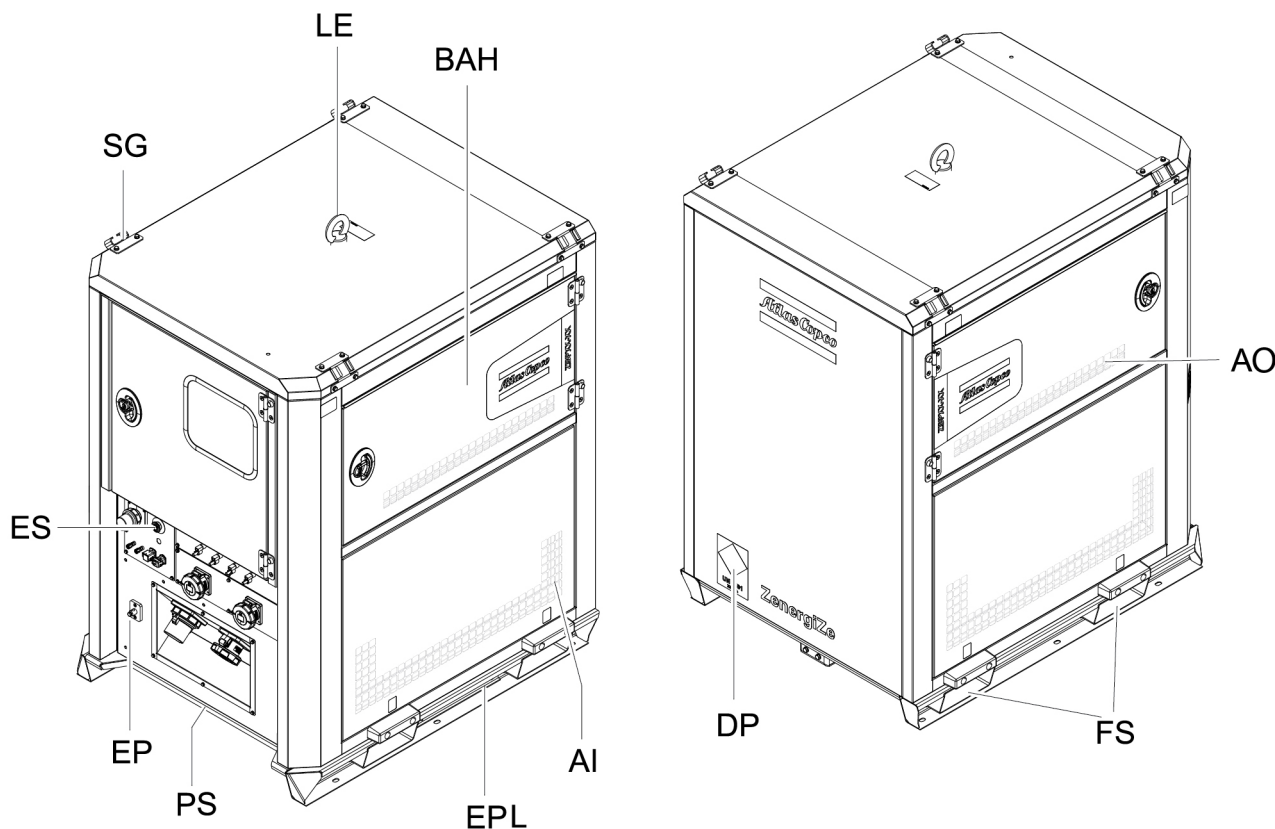
- Batteries are tested according to UN Handbook of Tests and Criteria, part III, sub section 38.3 (ST/SG/ AC.10/11/Rev.5).

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.









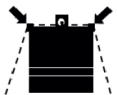




Reference	Description	Reference	Description
AI	Air inlets	ES	Emergency stop
AO	Air outlet	FS	Forklift slots
BAH	Batteries access hatch	LE	Lifting eye
DP	Data plate	PS	Pallet slot
EP	Earthing point	SG	Sling guides
EPL	Earth pin location		

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.
	Indicates the 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.

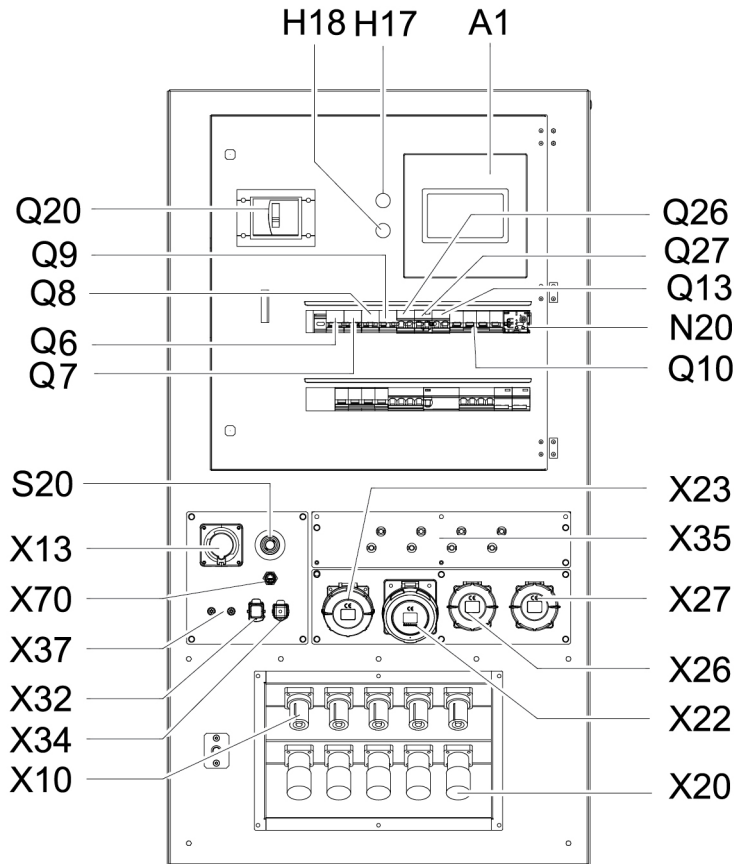
2.4.2 Inverter / battery charger

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

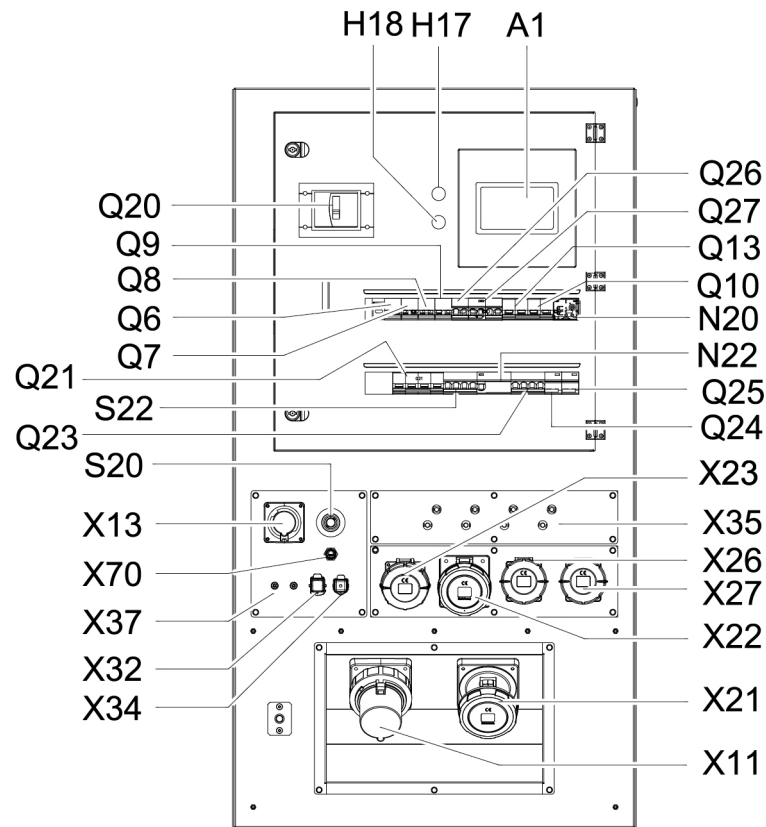
The control cubicle grouping the ESS controller, fuses, automatic switches sockets, etc., is accessible by opening the door at the front.

ZBP45-xx



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

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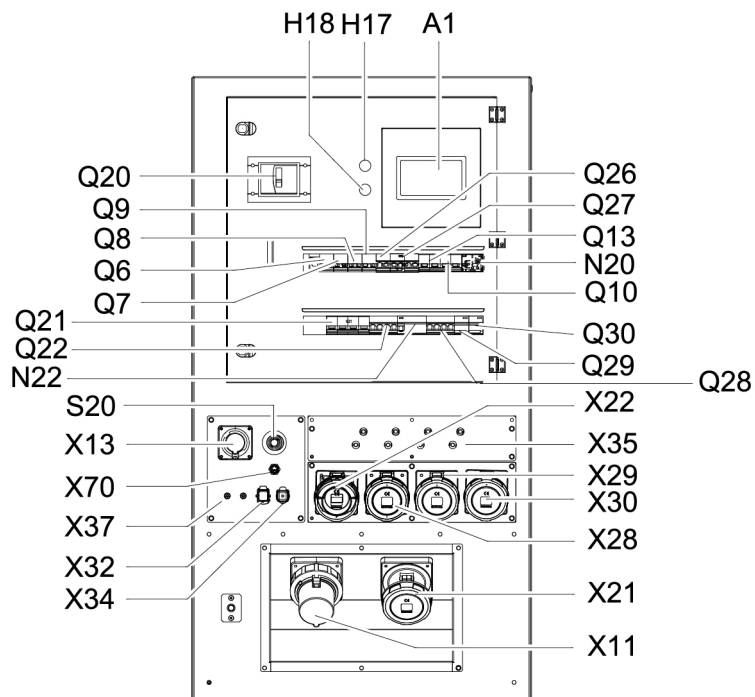


Reference	Description	Reference	Description
Q21	BREAKER 4P 125A	Q25	RCBO 2P 32A 30MA
Q22	BREAKER 4P 63A	N22	RCBO 4P 63A
Q23	BREAKER 4P 32A	X11	MALE 5P 125A SOCKET
Q24	RCBO 2P 32A 30MA	X21	FEMALE 5P 125A SOCKET



Note: Refer previous table for rest of the descriptions.

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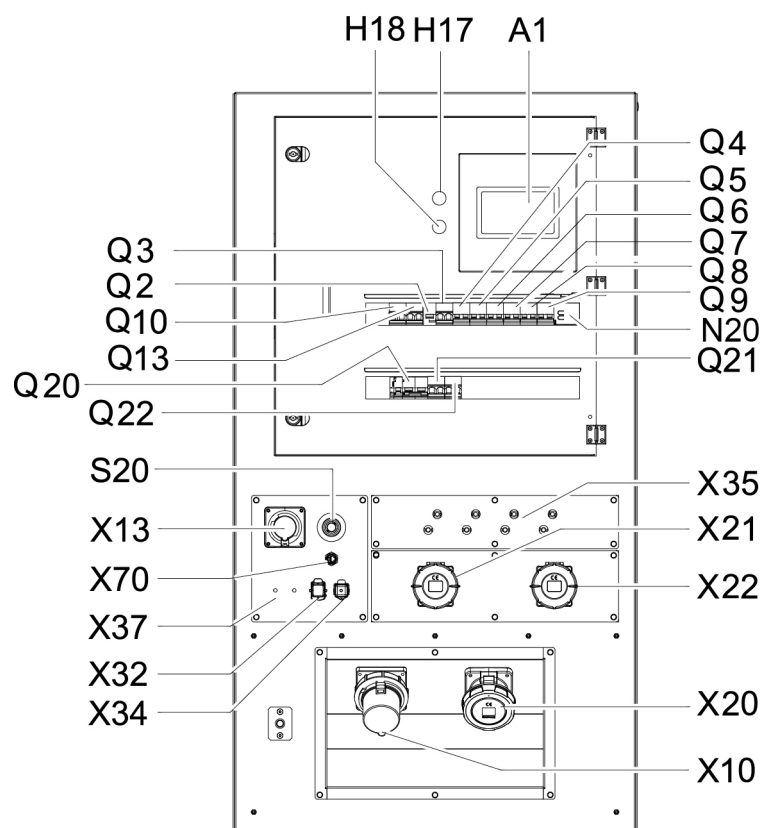


Reference	Description	Reference	Description
Q28	BREAKER 2P 63A	X28	FEMALE 3P 63A SOCKET
Q29		X29	
Q30		X30	



Note: Refer previous tables for rest of the descriptions.

ZBP15-60



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

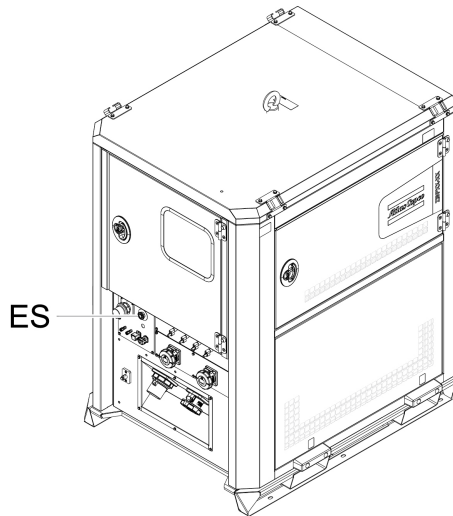
The ESS is provided with inlet and outlets sockets:

- 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.

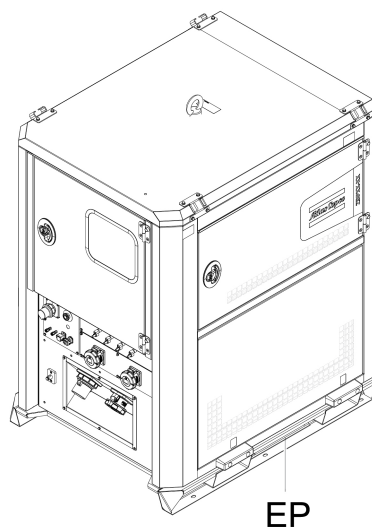


2.4.5 Earth leakage relay

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.2 g).

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 its sources 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.

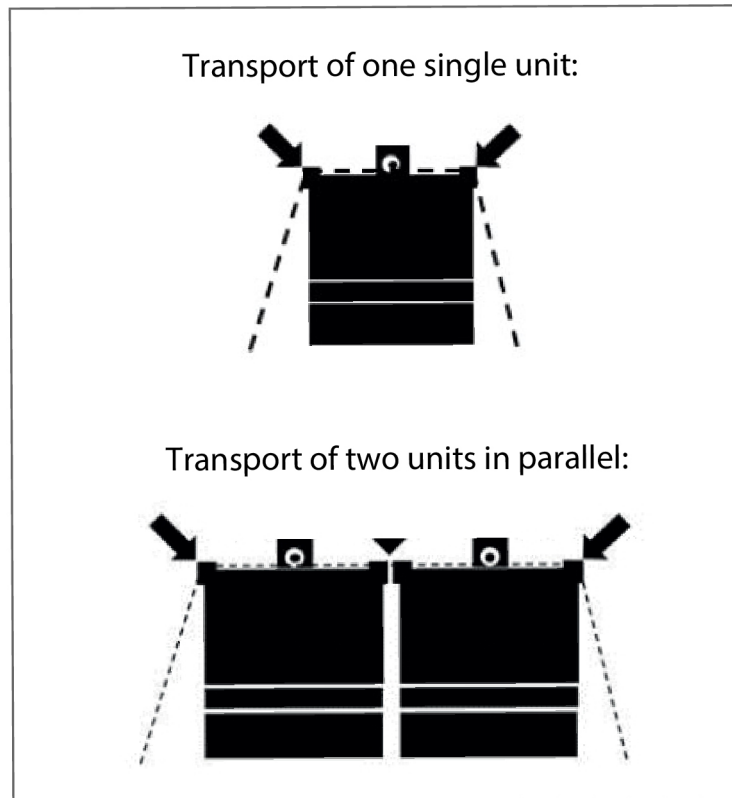
The forklift pockets and the lifting eye can also be used to place the ESS onto trucks for road transportation. For safe transport of the ESS on trucks or similar vehicles:

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 slings or other means of anchoring, provided that these do not affect the machine's safe transportation and integrity.

 **Notice:** Guide the slings 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.

Schemetic 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
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. Please 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. Please 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 or 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.

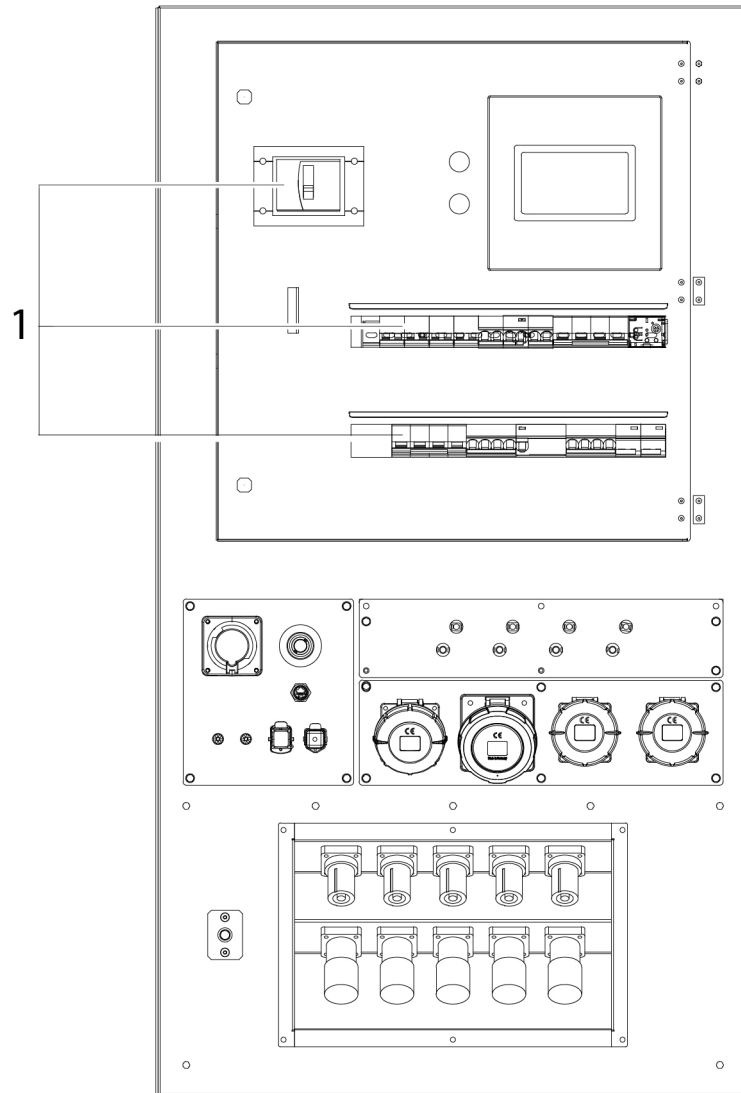
4.2 Operating the ESS



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

4.2.1 Before the ESS is started

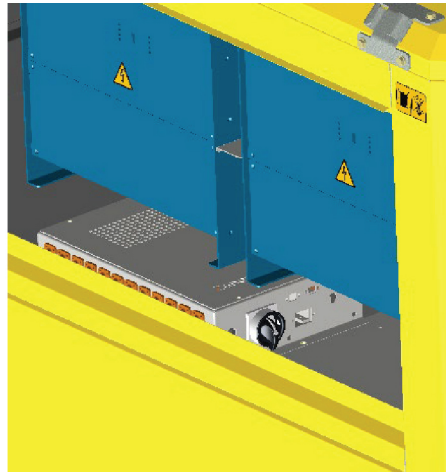
Before starting the system, check that all the automatic switches (general ELCB, sockets protections and main circuit breaker) are in the OFF position (1).



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).

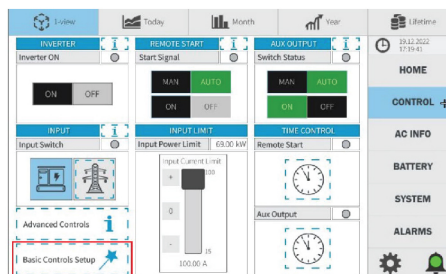
3. Make sure the switches from the inverter are in ON position.



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.

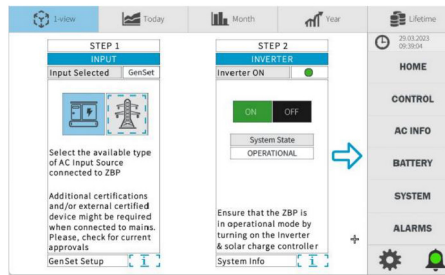


Note: Additional certifications and/or an external certified device might be required when connecting the ZBP to Mains. Check for current approvals.

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



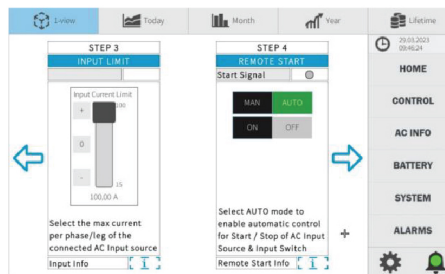
Note: It is recommended to check ZBP is successfully controlling the GenSet by following the instructions in the Remote Start info tab, which is accessible from the info button located at the bottom of this table. Refer section *Remote Start Info*.



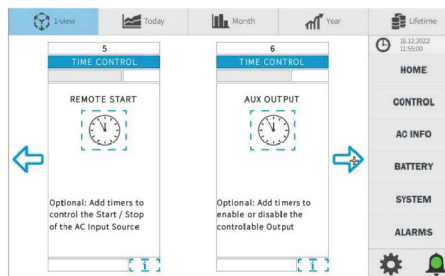
8. Set the ZBP in operational mode by turning ON Inverter.
9. Select the size of the AC Input Source to avoid exceeding its maximum power.



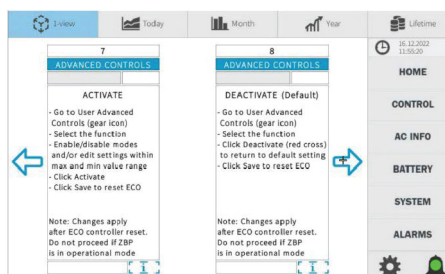
Note: The selected size will be the maximum amperage per phase that ZBP will request to the Input source.



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.

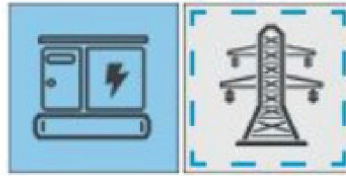
Application mode - Island mode

1. Plug the load to the output socket or output powerlocks.

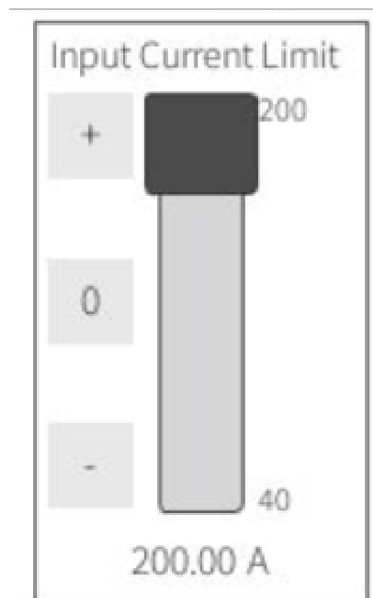
2. Close the Q20 output breaker.

Hybrid mode with generator

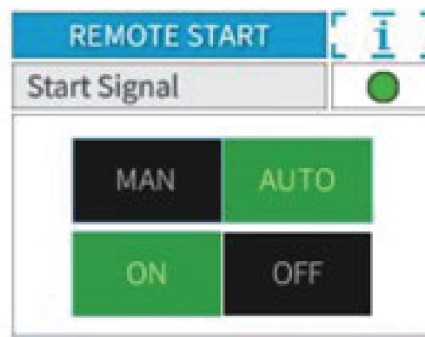
1. Select on the controller the input type as generator.



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: $I_{gen} \cdot 0.8$.



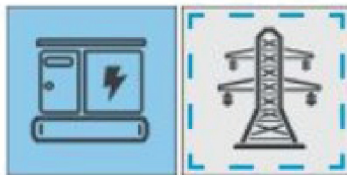
6. Set the remote start signal in Auto.



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

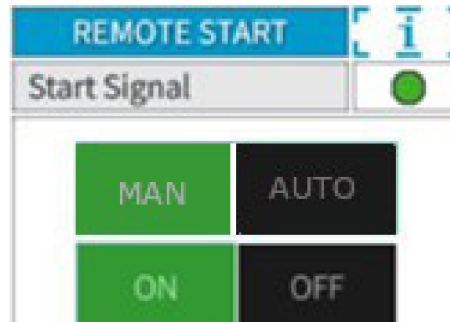
Standard mode allows to charge the ESS using the main input (400/230V 3Ph+N).

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.



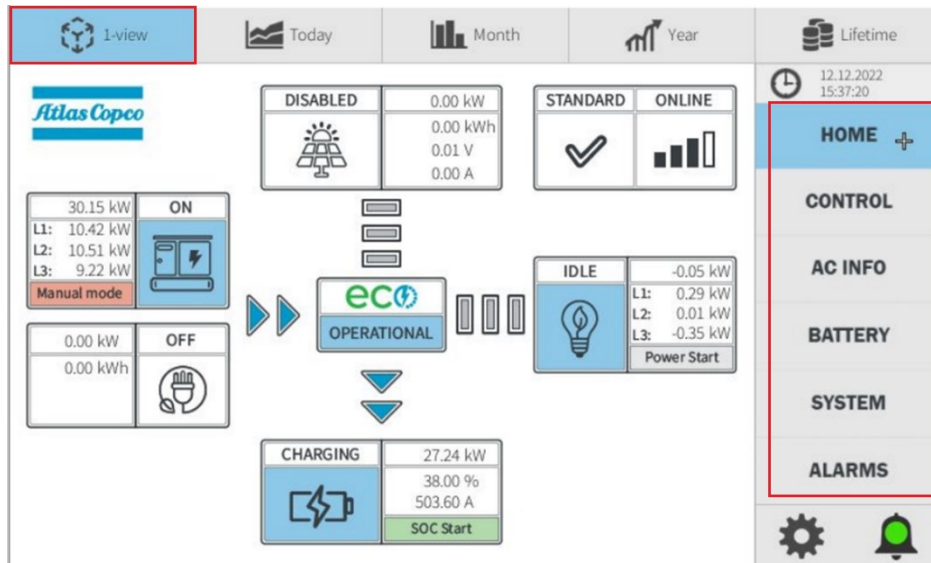
Important: Should an emergency arise, it is also possible to stop the machine by pressing the EMERGENCY 'STOP' button. If the ESS has been stopped in this way, the emergency stop button must be released by rotating it clockwise, for next operation.

5 Operating the ECO Controller

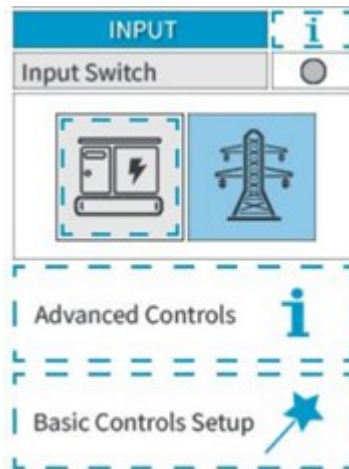
5.1 General

View

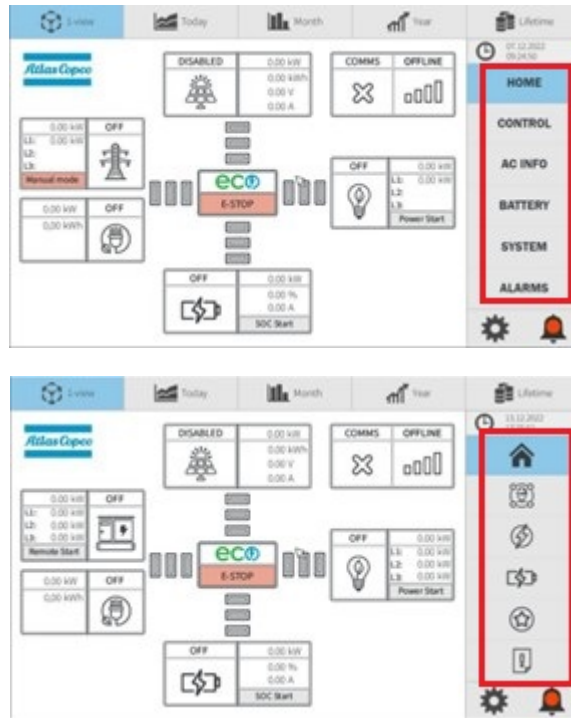
It provides the access to main side tabs which contains data, controls, and information of the ECO Controller User Interface.



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



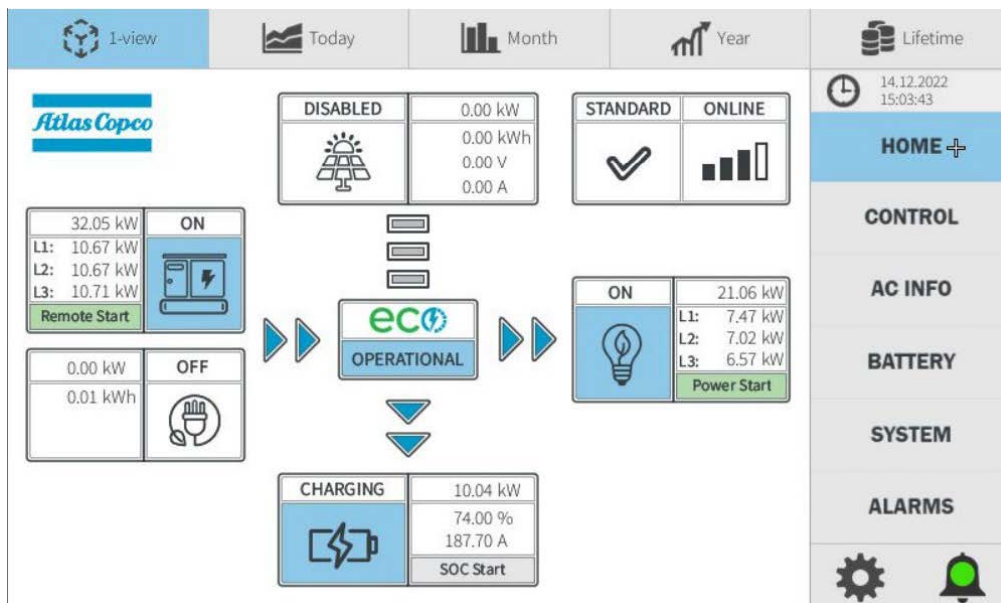
- Main side tabs can be displayed with texts or icons. Refer section *Side Tabs with Icons*.



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

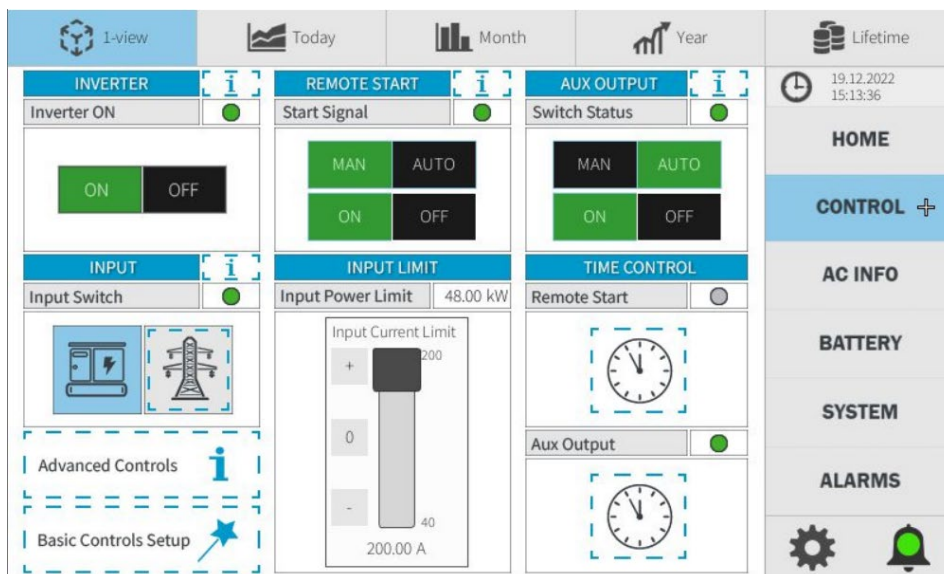
- Status: Operational, Parking, Stand-by & OFF. Refer section *Systeme states*.
- AC Input Source (Generator or Mains)
 - Data: Instantaneous Total Power & Power per phase/leg.
 - Status: ON, Idle or OFF.
 - Indicators:
 - Manual mode: When Remote Start is in MAN mode allowing manual control of the Input 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.
- 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 and 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

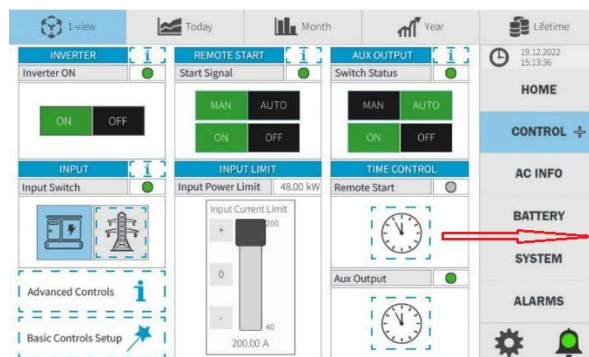
- MAN mode.
 - ON: Aux Output Enabled
 - OFF: Aux Output Disabled
- AUTO mode. Status ON or OFF based on configurable timer by pressing the Clock Icon on Time Control.
- Indicator
 - Switch Status in Green: Aux Output is Enabled
 - Switch Status in Grey: Aux Output is Disabled
- Additional tab:
 - Auxiliary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

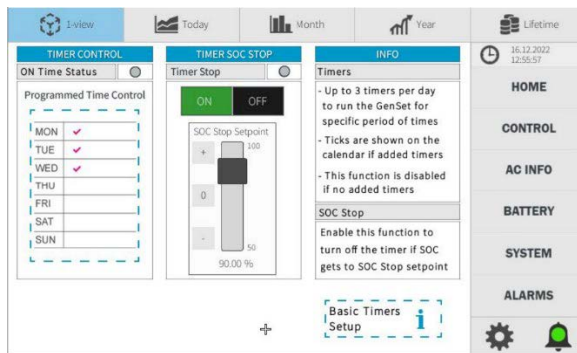
Time Control

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.



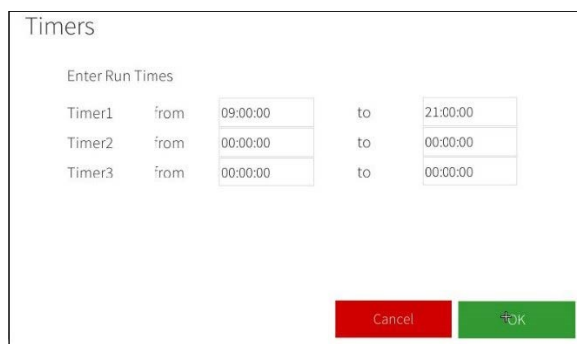


- **Programmed Time Control**

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.



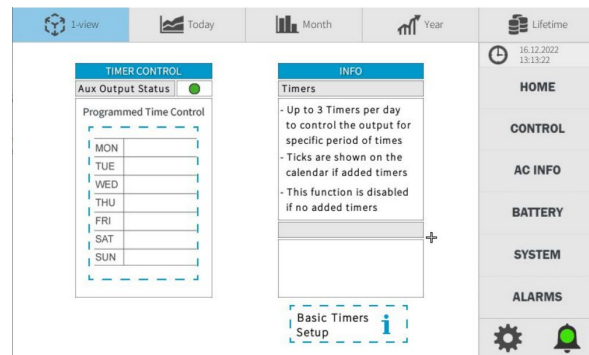
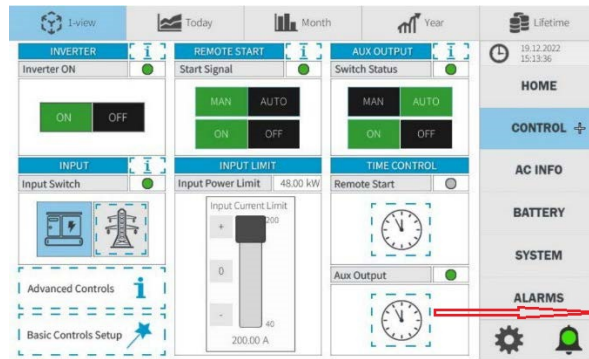
- **Timer SOC Stop**

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.



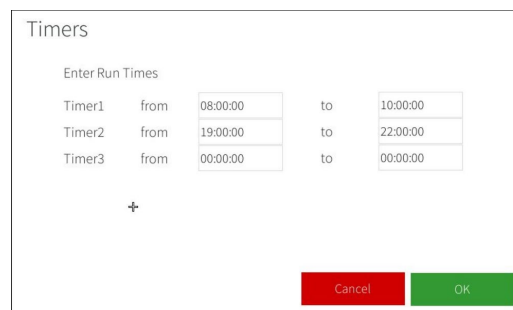
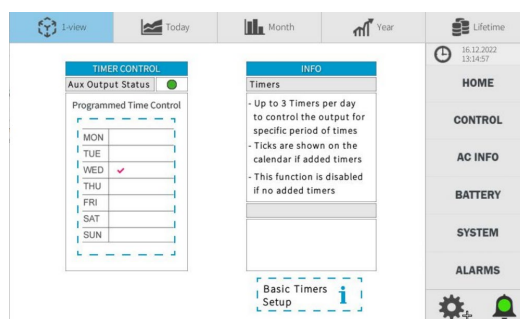
- **Programmed Time Control**

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:

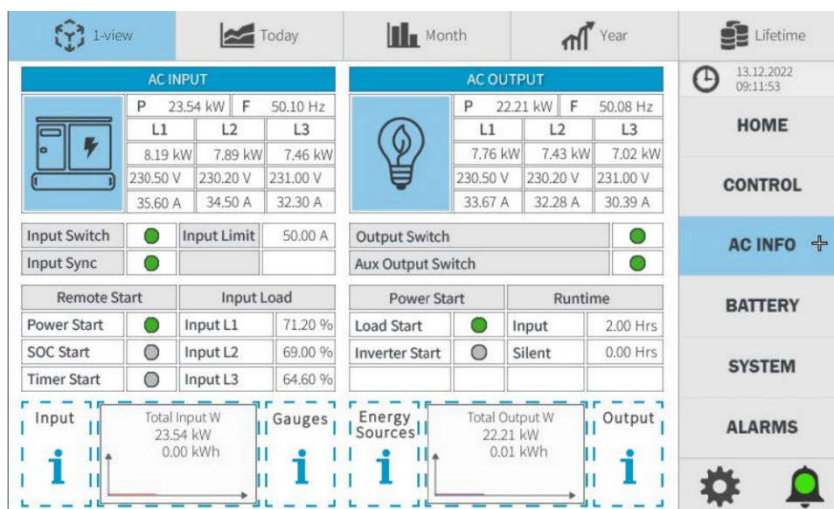


- **Wednesday:**

- 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*

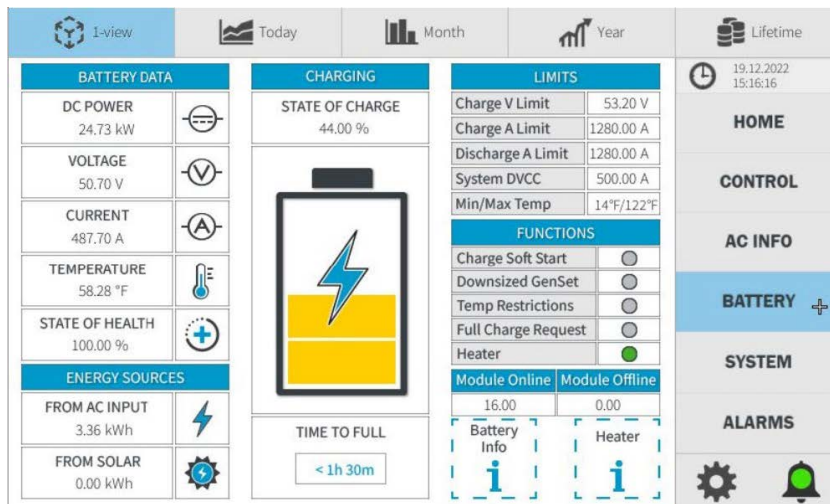
AC Output Information

- Data: Instantaneous Total AC INPUT 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.

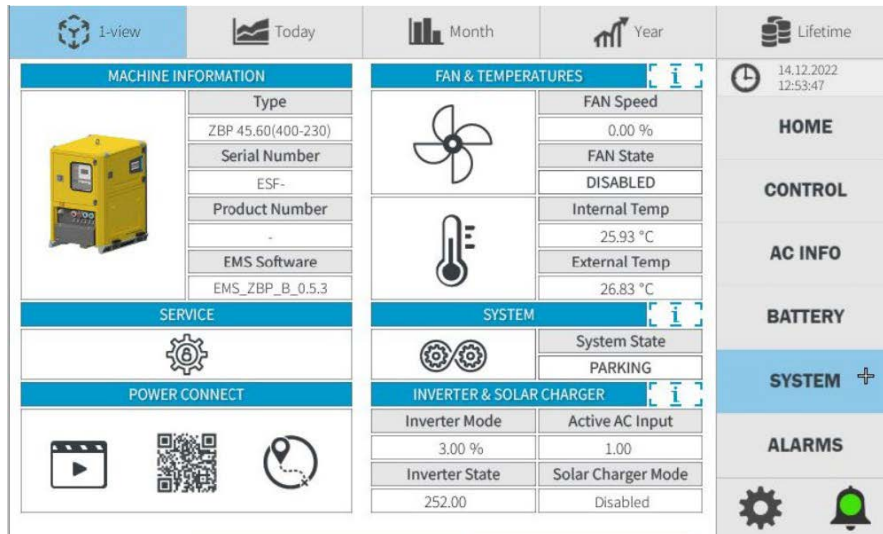


- Battery Data
 - DC Power (+ charging / - discharging)
 - Voltage: Battery DC bus voltage (V)
 - Current: Battery DC bus current (+ charging/- discharging)
 - Temperature: Average battery bank temperature (°C or °F).
 - State of Health: It is a measurement that indicates the level of degradation and 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
 - 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.

Time	Location	Element	Message
02.11.2022 09:52	Batterystorage	INV_192.168.1.100	VICTRON INV_192.168.1.100 Error No Errors / Warnings (8015)
02.11.2022 09:52	Alerts	Battery Critically Low	Alert: Battery Critically Low (alert_1652689609) (800)
02.11.2022 09:52	Alerts	Battery Low	Alert: Battery Low (alert_1652689756) (800)
02.11.2022 09:52	Alerts	Smartbox Offline	Alert: Smartbox Offline (alert_1653995064) (800)
02.11.2022 09:52	Alerts	Overdischarge Protection	Alert: Overdischarge Protection (alert_1652690580) (800)
02.11.2022 09:52	Alerts	Parking mode Disabled	Alert: Parking mode Disabled (alert_1652689585) (800)
02.11.2022 09:52	Batterystorage	INV_192.168.1.100	VICTRON INV_192.168.1.100 Error Low Battery Warning - L1 Low Battery Warning - L2
02.11.2022 09:51	Batterystorage	INV_192.168.1.100	VICTRON INV_192.168.1.100 Error No Errors / Warnings (8015)
02.11.2022 09:51	Batterystorage	INV_192.168.1.100	VICTRON INV_192.168.1.100 Status: Inverter-Status:0 - Battery-Status:0 - VEbus-Statu
02.11.2022 09:51	Alerts	Battery BMS Offline	Alert: Battery BMS Offline (alert_1652689963) (800)
02.11.2022 09:51	Batterystorage	INV_192.168.1.100	Inverter Error: Timeout (INV_192.168.1.100) (8001)
01.11.2022 00:33	Alerts	Battery Critically Low	Alert: Battery Critically Low (alert_1652689609) (800)
31.10.2022 10:13	Alerts	Overdischarge Protection	Alert: Overdischarge Protection (alert_1652690580) (800)

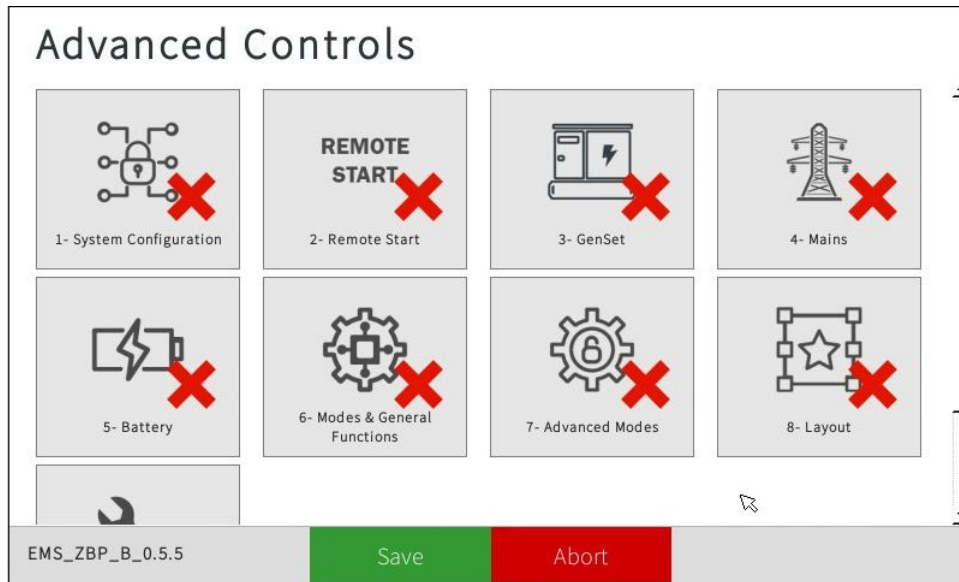
Advanced Controls

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

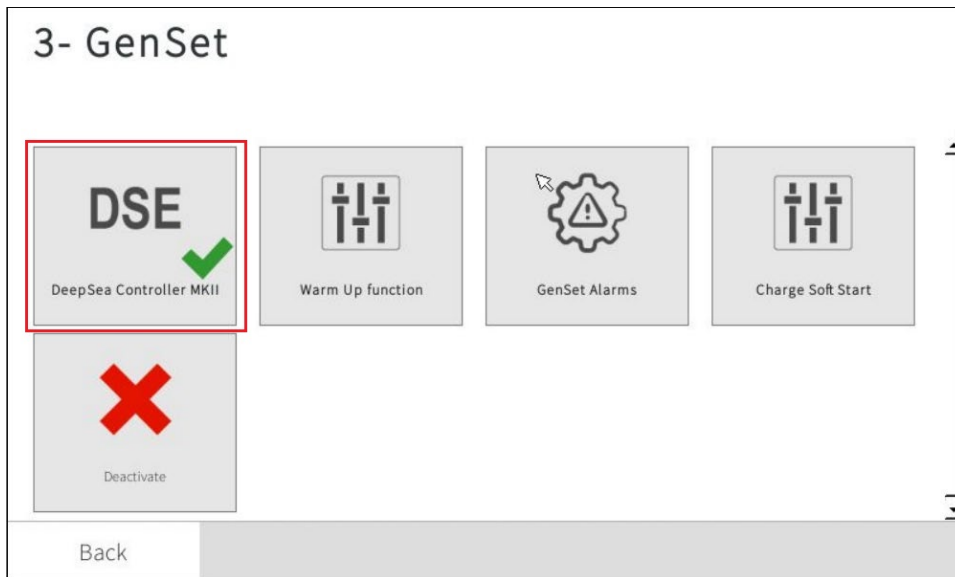
Each function of the Advanced Controls tab can be activated or deactivated to apply the new changes or restore the default settings.

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

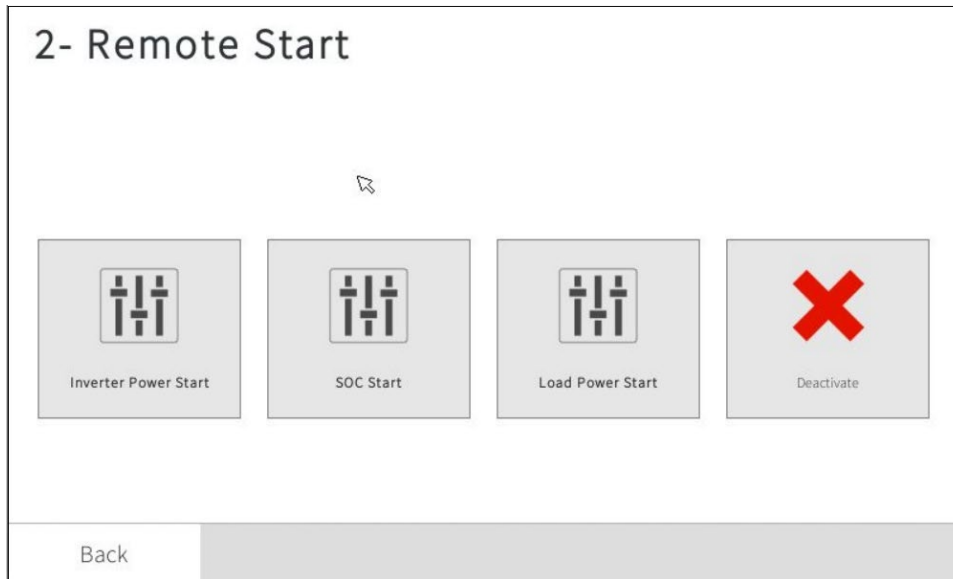
- Restore to default all functions from a specific module
 - Select the module and click on Deactivate.



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

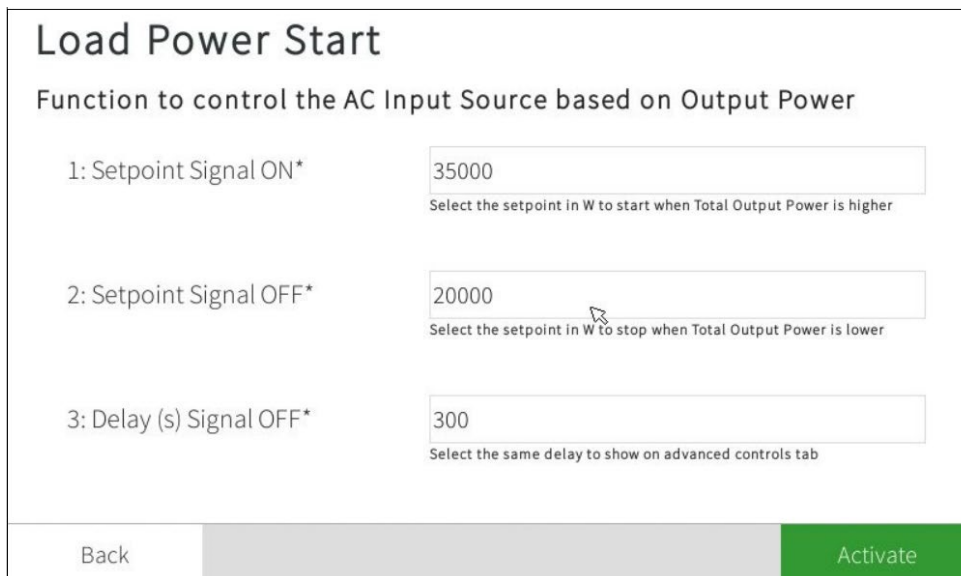
Remote Start

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.

Inverter Power Start

Function to control the AC Input Source based on nominal power per phase

1: Power - Start Setpoint*	<input style="width: 90%;" type="text" value="0.85"/> <small>Select the Start Setpoint (Nominal W per phase*%)</small>
2: Stop - Power Setpoint*	<input style="width: 90%;" type="text" value="0.75"/> <small>Select the Stop Setpoint (Nominal W per phase*%)</small>
3: Stop - Delay Setpoint*	<input style="width: 90%;" type="text" value="300"/> <small>Select the stop delay (min=300s, max= 1500s)</small>
4: Stop - Show Delay on UI*	<input style="width: 90%;" type="text" value="300"/> <small>Enter same delay value to update the UI (min=300s, max= 1500s)</small>

Back
Activate

SOC Start

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

SOC Start

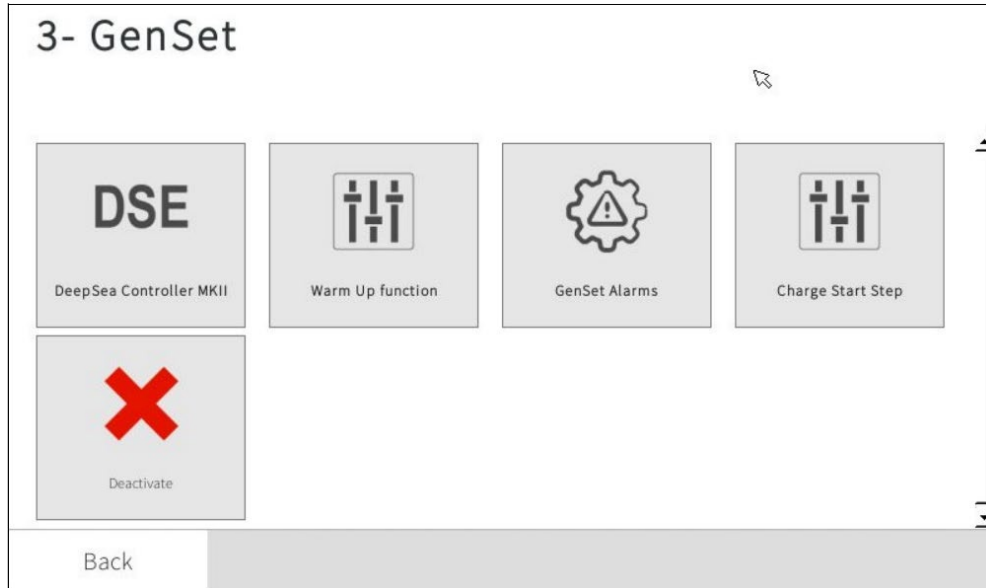
Condition to control the AC Input Source based on Battery SOC

1: Signal ON - Setpoint*	<input style="width: 90%;" type="text" value="10"/> <small>Select the Start Setpoint (min= 10%, max= 90%)</small>
2: Signal OFF - Setpoint*	<input style="width: 90%;" type="text" value="100"/> <small>Select the Stop Setpoint (min= 40%, max= 100%)</small>
3: Signal OFF - Delay*	<input style="width: 90%;" type="text" value="120"/> <small>Select the stop delay (min= 60s, max= 1800s)</small>

Back
Activate

GenSet

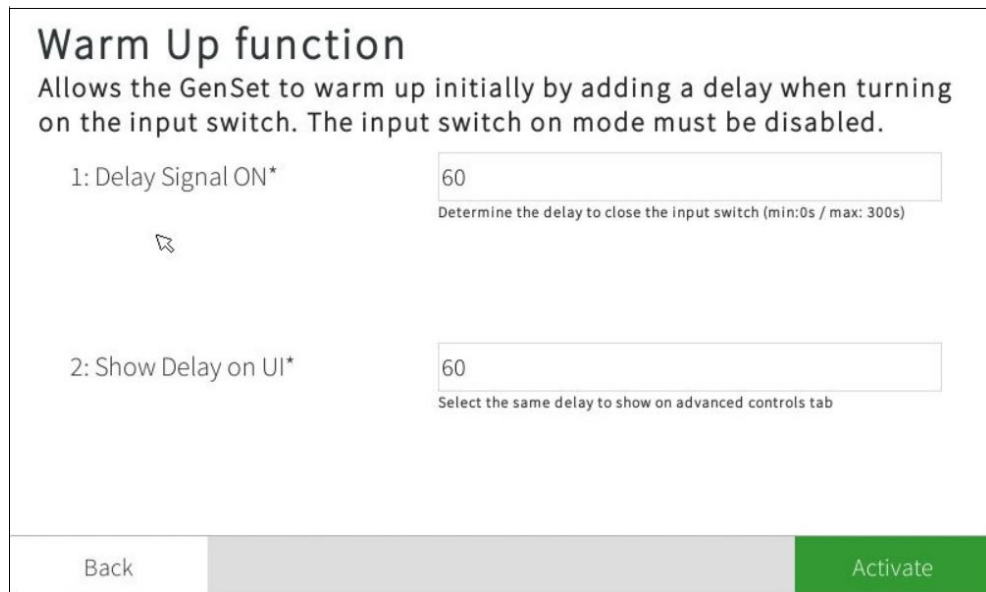
Provide the customizable settings when GenSet is selected as main AC Input Source.



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*.

Charge Soft Start

Charge battery at minimum power when starting the GenSet. Input switch on mode must be disabled.

Delay Setpoint*

Select the initial slow charge period (min: 0s, max: 600s)

Back Activate

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*.

DeepSea Controller MKII

Enable communication with Deepsea controllers that support modbus rs485

Fuel Low - Alarm setpoint (%)*

Select the value to trigger the alarm when fuel level is below (0% / 50%)

Back Activate

GenSet Alarms

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

Alarms

Active alarms when GenSet is selected as AC Input Source

GenSet Fail to Start - Delay*
Select the delay to trigger this alarm (min=60s, max 600s)

GenSet Fail to Stop - Delay*
Select the delay to trigger this alarm (min=60s, max 600s)

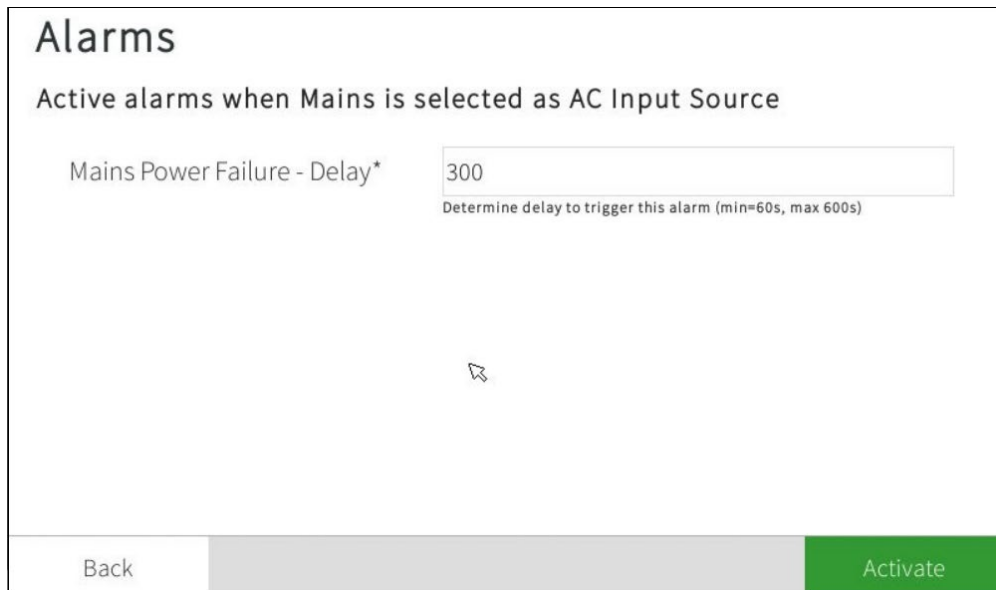
Mains

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

4- Mains

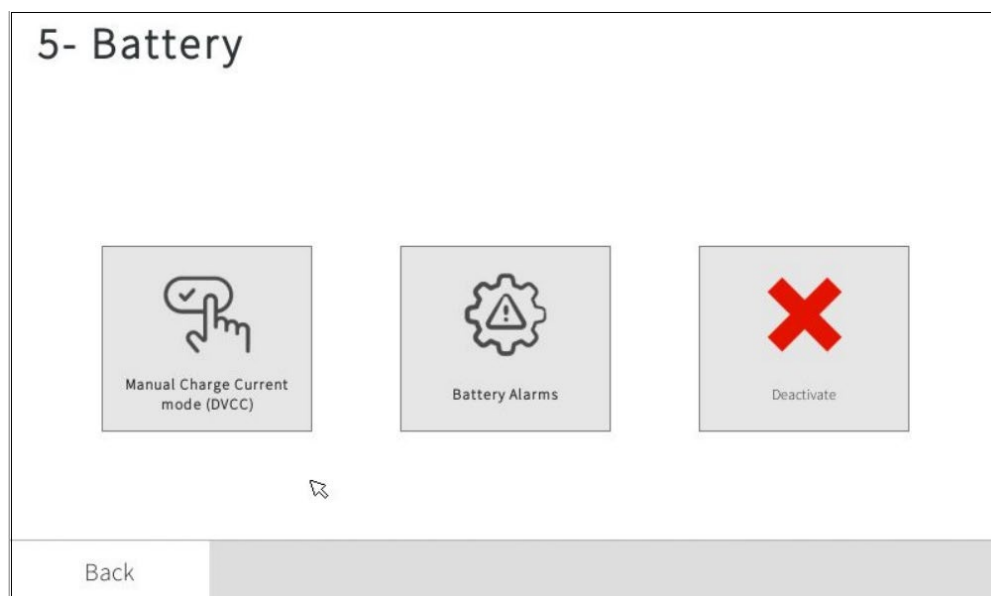
Mains Alarms

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.

Manual Charge Current mode (DVCC)

Manually select a fixed battery max charge current. If enabled, Charge Start Step and Downsized GenSet functions are deactivated

Manual Setpoint*

Determine the setpoint to limit the max charge current

Back Activate

Battery Alarms

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

Battery Alarms

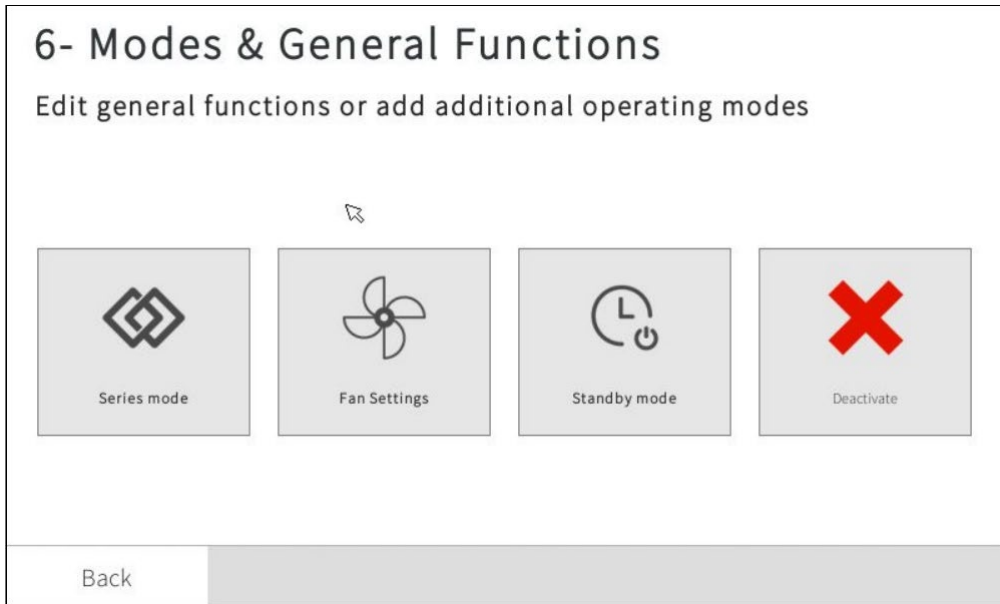
Battery Low - Setpoint*

Determine setpoint to trigger this alarm (min:9% / max: 60%)

Back Activate

Modes & General Functions

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



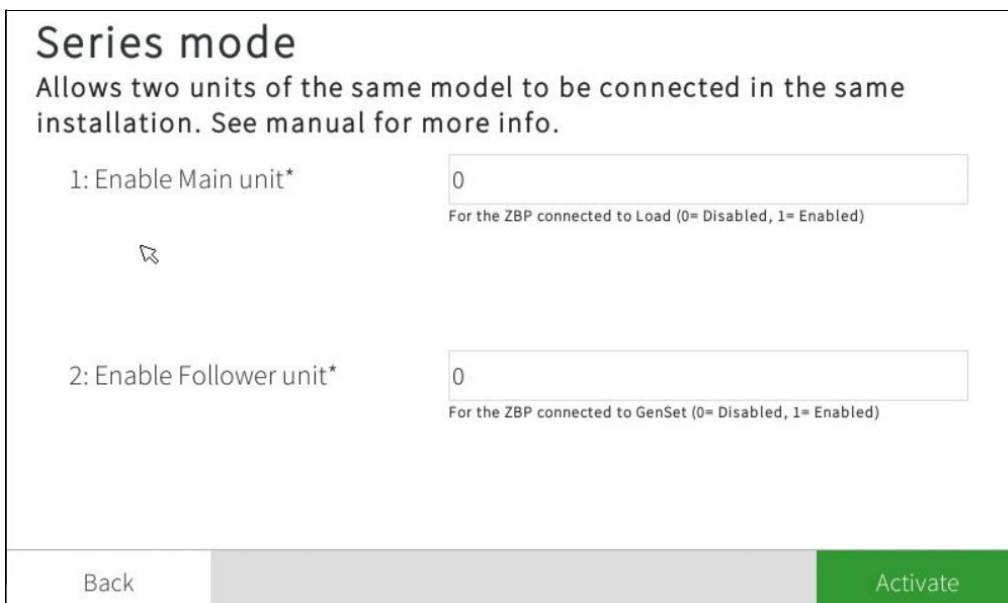
Series mode

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.

Standby mode

Automatic shutdown of inverters to save energy if the ZBP is idle for a predefined period of time

IDLE mode duration*

Select for how long ZBP remains in Operation before switching to Standby

Back Activate

IDLE mode duration*

- 1 day
- 2 days
- 3 days
- 5 days
- Standby OFF

Cancel OK

Fan Settings

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

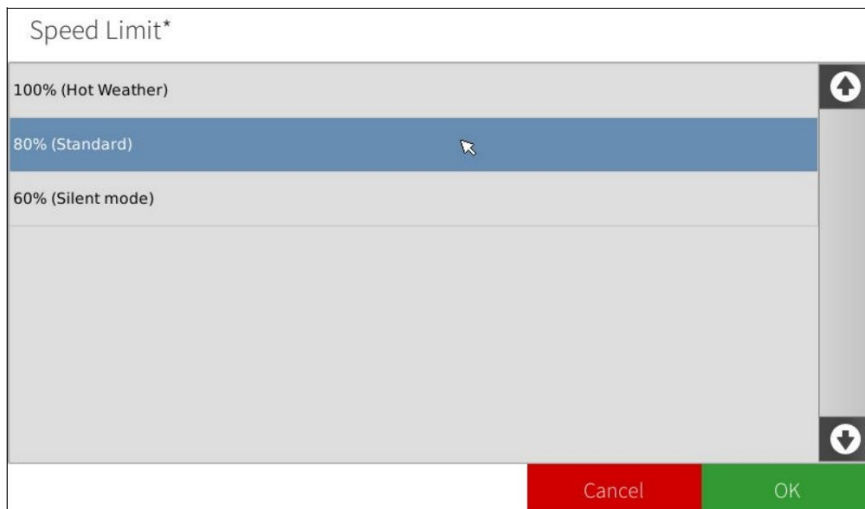
Fan Settings

Speed Limit*

Select the max speed of the fan

Back Activate

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



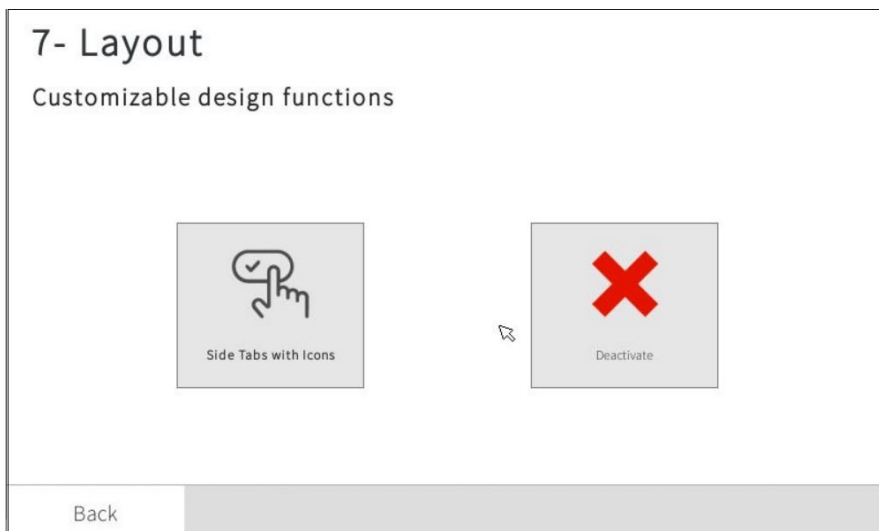
The selected max speed is shown on the Fan and Heater Test tab. Refer section *Fan & Heater Test*.

Layout

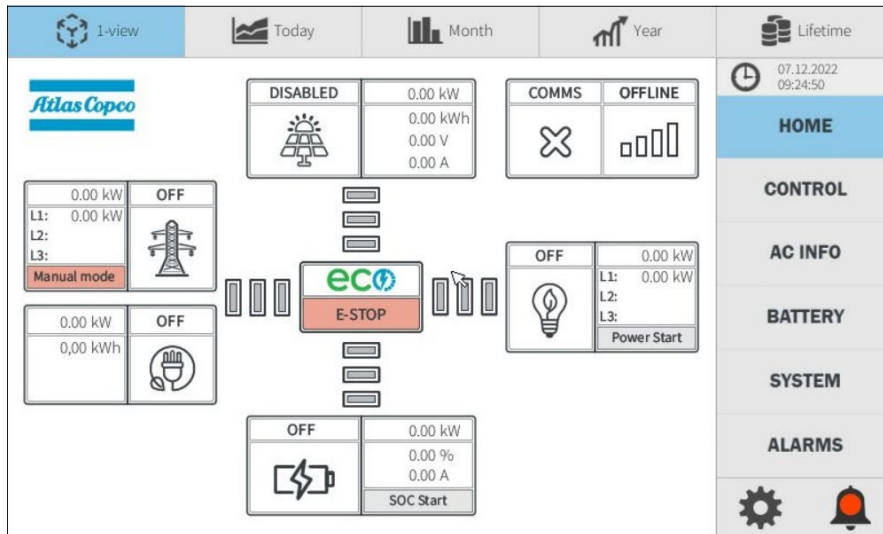
Provide functions to change the design of the user interface.

Side Tabs with Icons

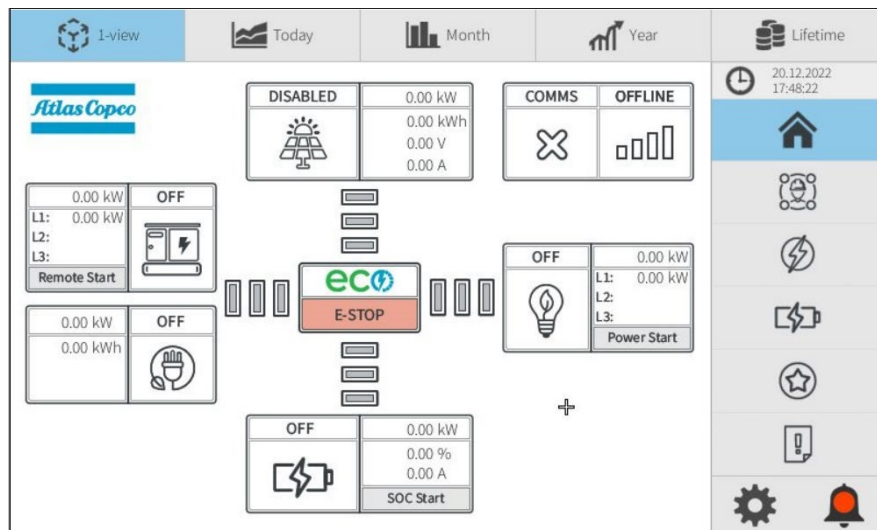
Allow the user to change the design of the main side tabs displaying icons instead of texts.



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

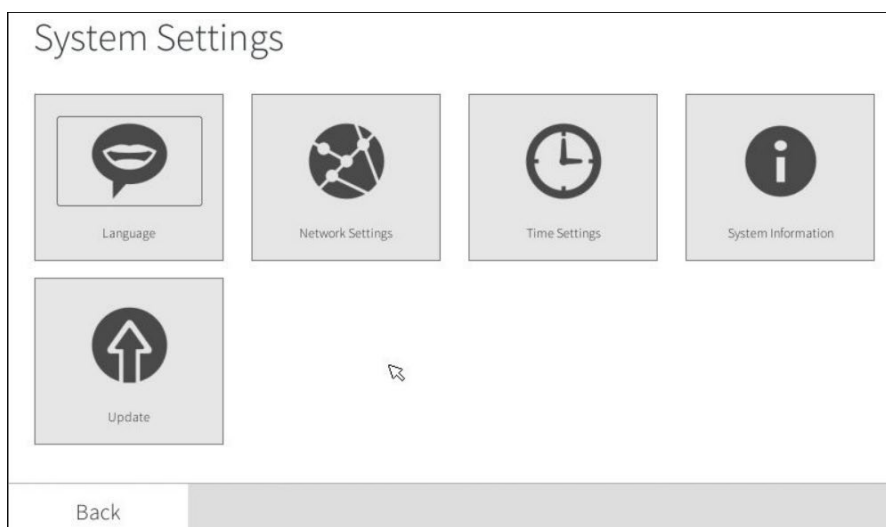


If Side Tabs with Icons is activated, the side tabs are visualized with icons as shown below.



System Settings

Edit some of the internal settings of the ECO Controller.



Time Settings

Modify the default time settings

Clock Settings

Time Format: 12h or 24h

Timezone: GMT+1

Current Time: Tue 13.12.2022, 16:32:00

Daylight Saving: Turn Off

Disable Internet Time

Currency: €

Back
Next

Timezone:

(GMT-02:00) Mid-Atlantic

(GMT-01:00) Azores, Cape Verde Is.

(GMT) Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London, Casablanca, Monrovia

(GMT+01:00) CENTRAL EUROPE, Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna, Belgrade, Bratislava, Budapest, Ljubljana, Prague, Brussels, Copenhagen, Madrid, Paris, Sarajevo, Skopje, Warsa...

(GMT+02:00) Athens, Beirut, Istanbul, Minsk, Bucharest, Cairo, Harare, Pretoria, Helsinki, Kyiv, Riga, Sofia, Tallinn, Vilnius, Jerusalem

(GMT+03:00) Baghdad, Kuwait, Riyadh, Moscow, St. Petersburg, Volgograd, Nairobi, Tehran

(GMT+04:00) Abu Dhabi, Muscat, Baku, Tbilisi, Yerevan, Kabul

Cancel
OK

Update

Update the ECO Controller firmware.

Updates

Press the Start Search button to search for Updates

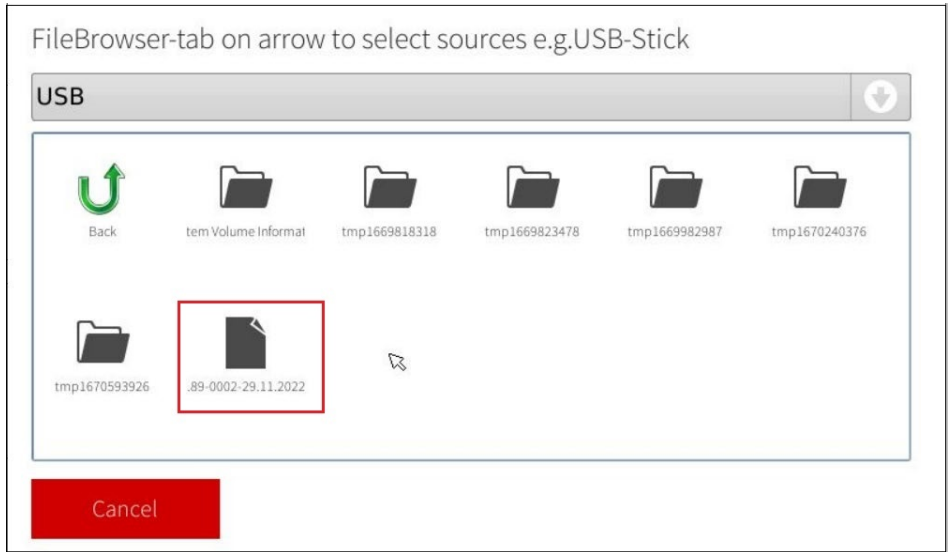
Automatic Updates: On/Off

Start Search Select from USB

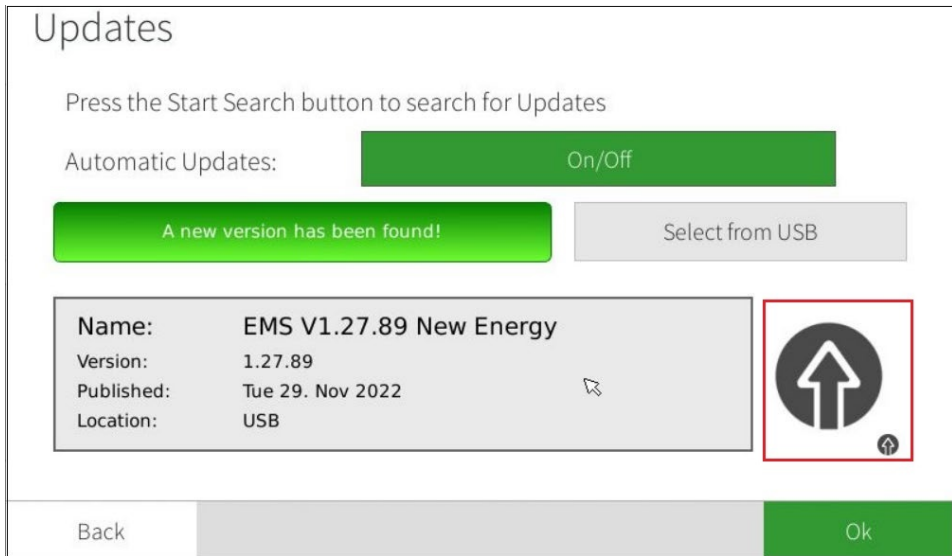
Back
Ok

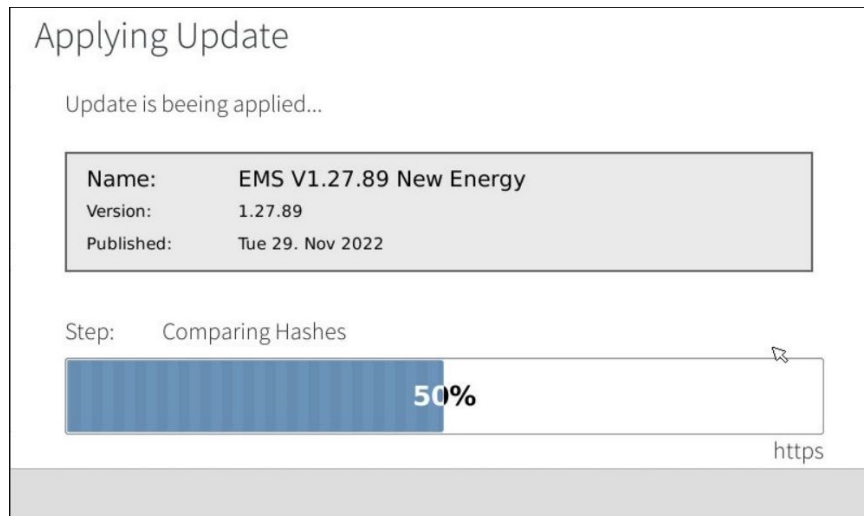
Procedure to update the Firmware:

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.

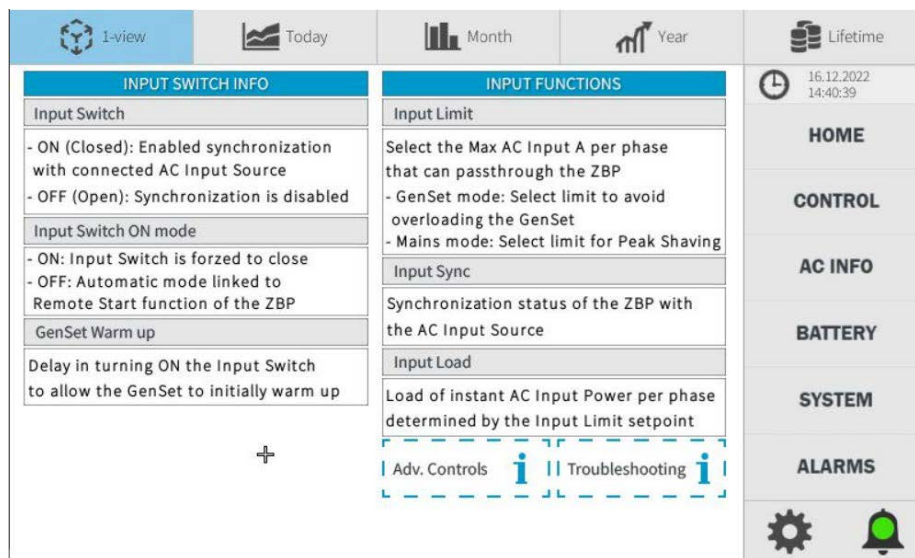




5.3 Additional tabs

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*

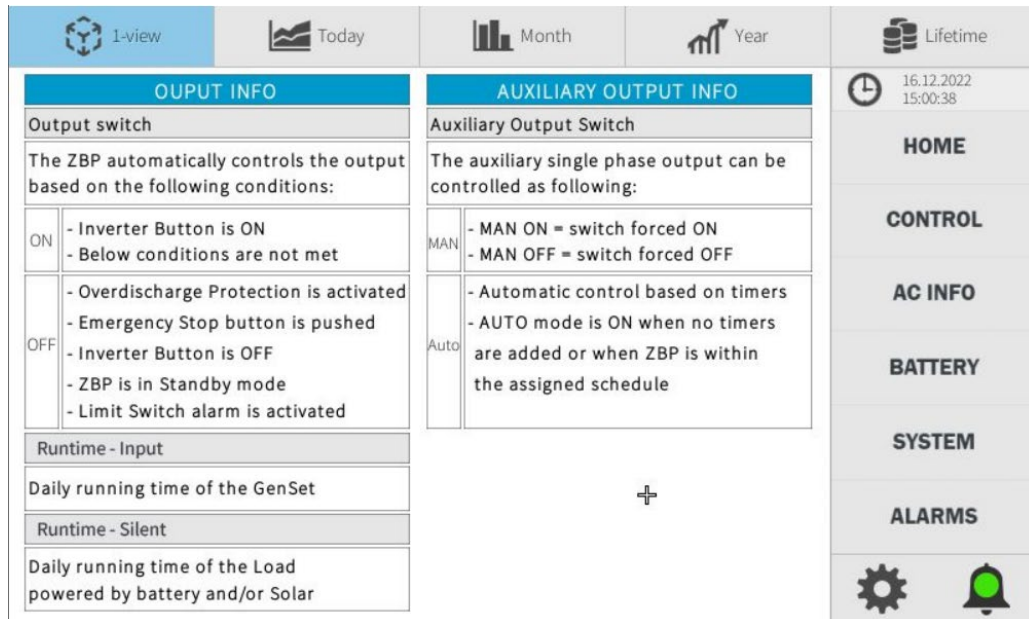
Remote Start Info

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.

GENSET COMMUNICATION SETUP		REMOTE START INFO	
1	Connect Remote Start signal wires	Status	
2	Set GenSet controller to AUTO mode	- MAN ON: Force Start AC Input Source	
3	Check manual control	- MAN OFF: Force Stop AC Input Source	
	- Turn ON GenSet => Rem Start MAN ON	- AUTO: ZBP controls AC Input Source	
	- Turn OFF GenSet => Rem Start MAN OFF	Load Power Start	
4	Set Remote Start to AUTO mode	- ON/OFF based on Total Output Load	
		Inverter Power Start	
		- ON: If any output phase > ON setpoint	
		- OFF: If ALL output phases	
		SOC Start	
		- ON: If Battery SOC is below Signal ON	
		- OFF: If Battery SOC gets to Signal OFF	
		Timer Start	
		- ON: If Timer is ON	
		- OFF: End of timer or Battery SOC gets to SOC Stop setpoint if enabled	

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

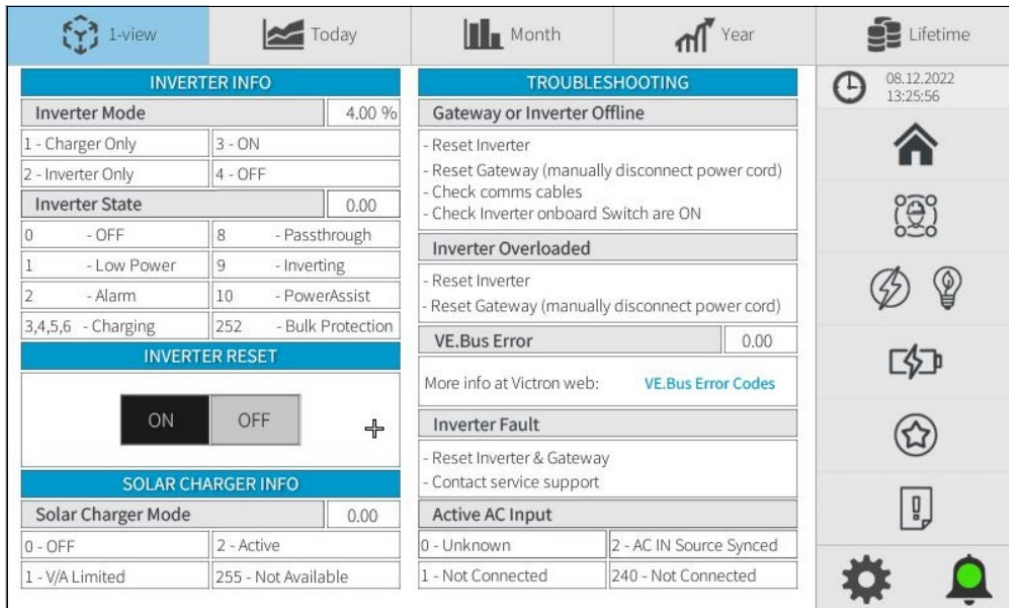
Daily running time of the GenSet when powering a load and or charging the batteries.

- 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*.

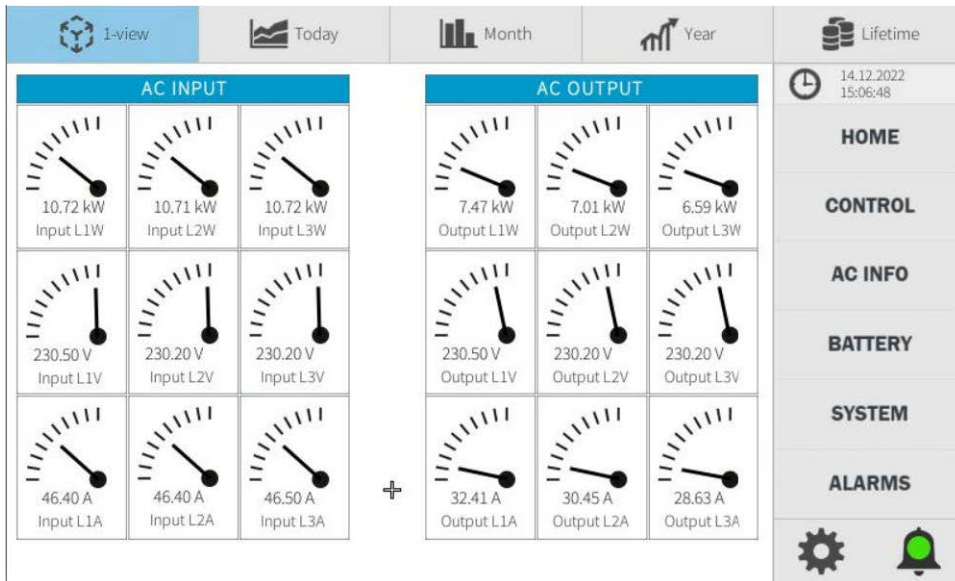
Questions such as what is the maximum power the ZBP can deliver before starting the AC Input Source or how long it will be charging the battery at minimum power can be easily answered on this tab.

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.

MODES		REMOTE START	
Series mode	<input type="radio"/>	Load Power Start	
AC Coupled mode	<input type="radio"/>	Signal ON >	35.00 kW Delay (s) 5
Manual Charge Current mode	<input type="radio"/>	Signal OFF <	20.00 kW Delay (s) 300
Input Switch ON mode	<input type="radio"/>	Inverter Power Start	
+		ON: one phase >	10.20 kW Delay (s) 5
INPUT		OFF: all phases <	9.00 kW Delay (s) 300
GenSet Warm up	Delay (s) 60	SOC Start	
BATTERY		Signal ON @	10.00 % Delay (s) 45
Charge Soft Start	Delay (s) 120	Signal OFF @	100.00 % Delay (s) 120
Max DVCC	540.00 A	Timer Start	
Full Charge Required	30.00 Days	Signal ON	Delay (s) 0
ALARMS		Signal OFF	Delay (s) 0
GenSet Fail to Start	Delay (s) 300	Series mode: Combined Power Start	
GenSet Fail to Stop	Delay (s) 300	ON: one phase >	18.36 kW Delay (s) 5
Mains Power Failure	Delay (s) 300	OFF: all phases <	10.20 kW Delay (s) 300
Battery Low SOC	9.00 % Delay (s) 60	SYSTEM	
		Stand-by	Delay (days) 2.00 Days

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.

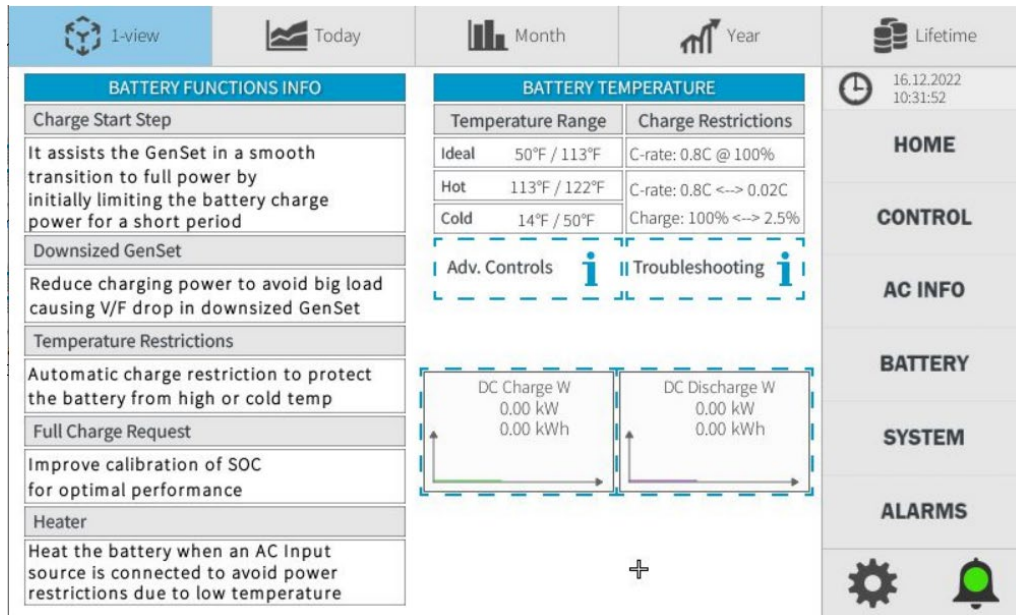
The power data displayed is instantaneous and the energy data is daily, meaning that they reset to zero at the end of the day.

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

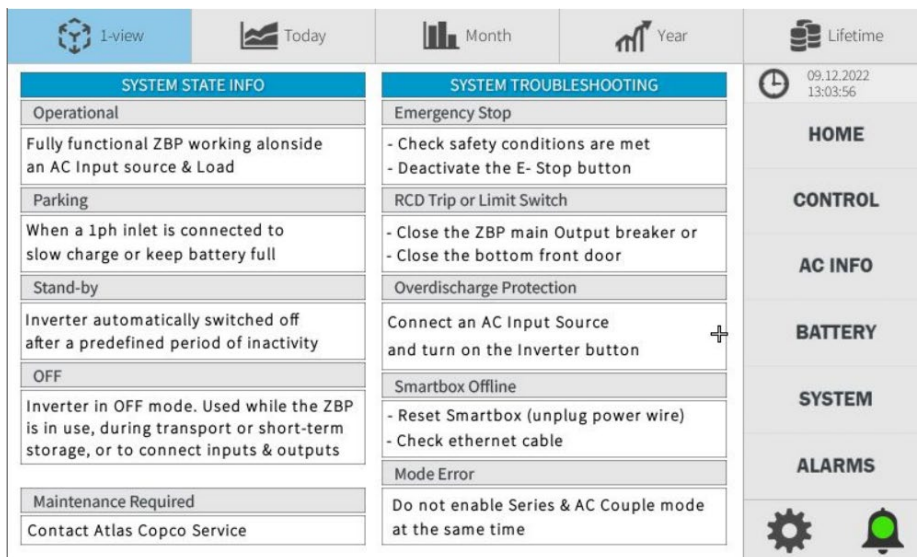
Description of the functions related to the Battery as well as other important information is displayed on this tab with direct access to advanced controls info tab to check internal settings of the battery functions and battery troubleshooting guide.



- **Battery functions:** described on the image above. Refer section *Battery*.
- **Battery temperature:** charge restrictions based on battery temperature (°C or °F).
- **DC Charge W:** instantaneous dc charge power and daily stored energy with access to legacy charge data.
- **DC Discharge W:** instantaneous dc discharge power and daily discharge energy with access to legacy discharge data.

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.

FAN INFO & TEST		HEATER INFO & TEST	
- FAN is enabled when the ZBP is used in operational mode			
- FAN speed is controlled to efficiently run based on conditions below			
Internal Temp	32.00 °F	Battery Temp	32.00 °F
- Temp @ Min Speed	77 °F	Input powered setpoint	53,6 °F
- Temp @ Max Speed	90 °F	Battery powered setpoint	23°F
Max Speed Limit	80%	Enabled	NO

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.

	Input to Load	DC Discharge W	Solar to Load
02:00	0W	0W	0W
02:10	0W	0W	0W
02:20	0W	0W	0W
02:30	0W	284W	0W
02:40	0W	284W	0W
02:50	0W	284W	0W
03:00	0W	284W	0W
03:10	0W	284W	0W
03:20	0W	284W	0W
03:30	0W	284W	0W
03:40	0W	284W	0W
03:50	0W	284W	0W
04:00	0W	284W	0W
04:10	0W	284W	0W

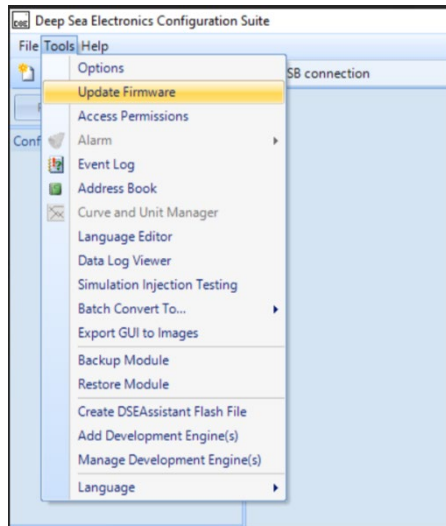
5.4 Additional working modes

External GenSet Controllers – Deep Sea

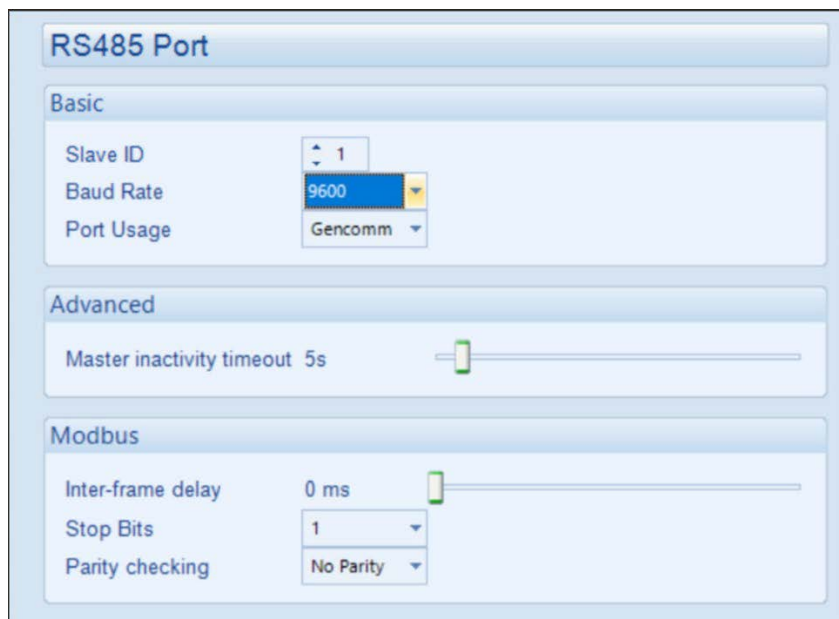
Communication with a Deep Sea MKII controller via rs485 provides deeper control and information of the device from the ECO Controller.

Installation

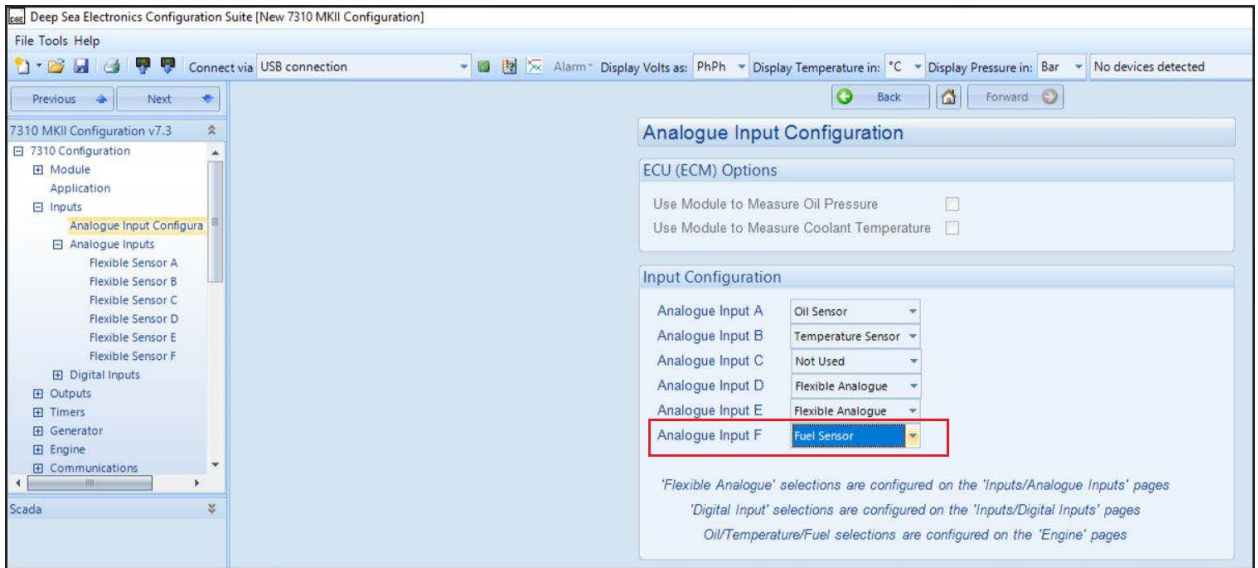
- The communication is only possible with Deep Sea Controllers that provide rs485 interfaz such as the DSE7310 MKII or DSE7410 MKII.
- Ensure the Deep Sea Controller is updated with latest firmware.



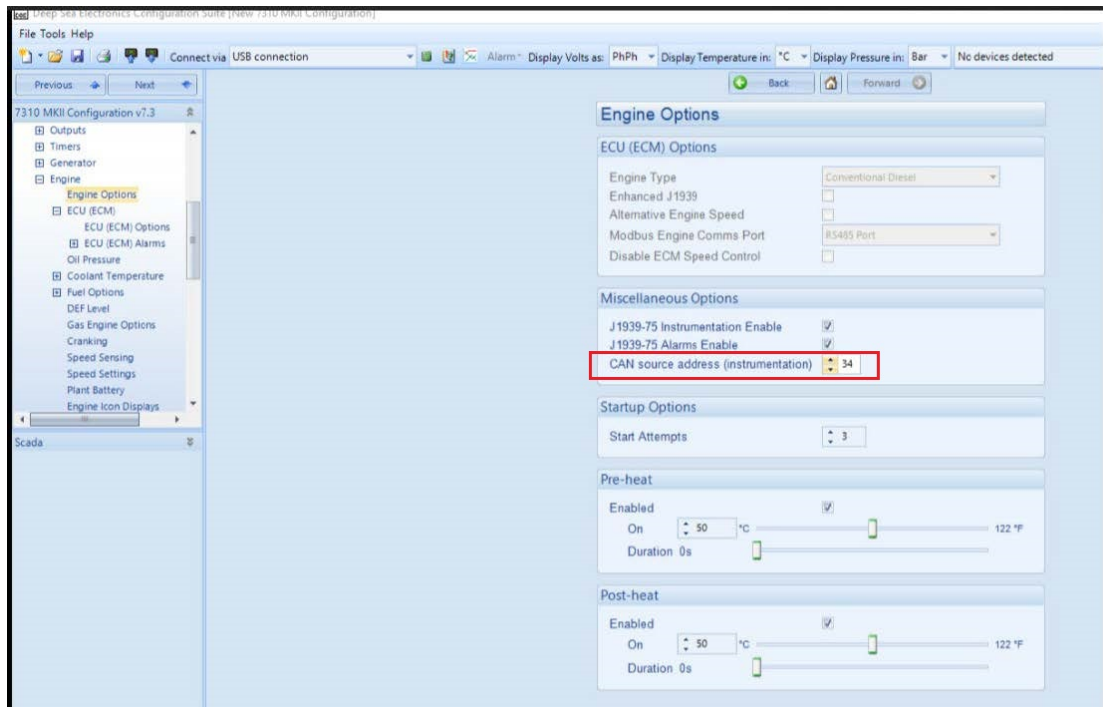
- Baud rate: 9600
- Slave ID: 1
- Stop Bits: 1
- Parity Checking: No Parity



- Select the Fuel Sensor to show the fuel level.



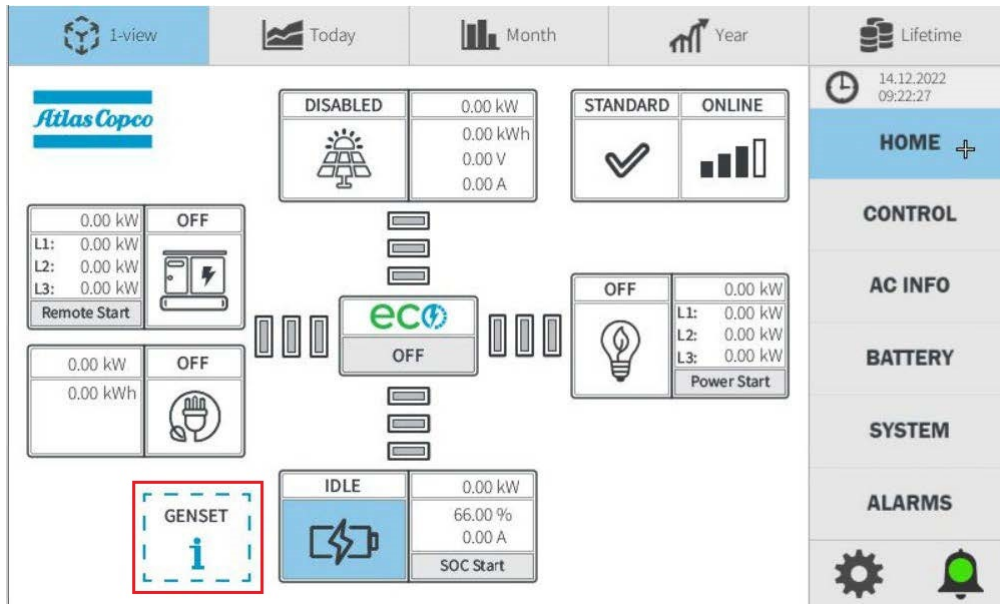
- Ensure the Deep Sea Controller is communicating with the Engine via CAN by adding the corresponding address code.



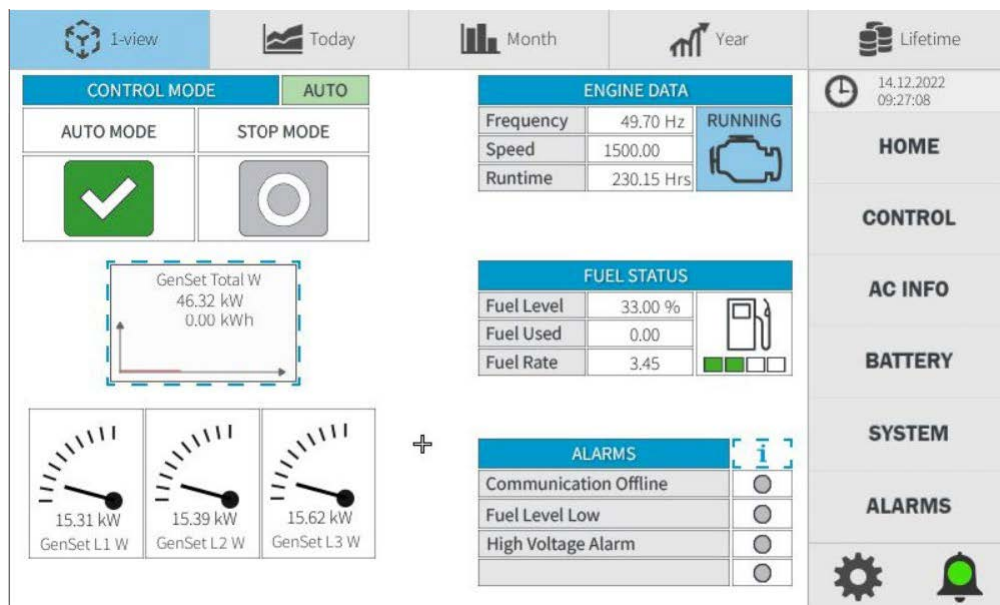
- Ensure the Remote Start of ZBP hurting connector is connected to the GenSet and the Deep Sea Controller is wired up.
- Activate the Deep Sea communication on the ECO Controller. Refer section *Deep Sea Controller MKII*.

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:



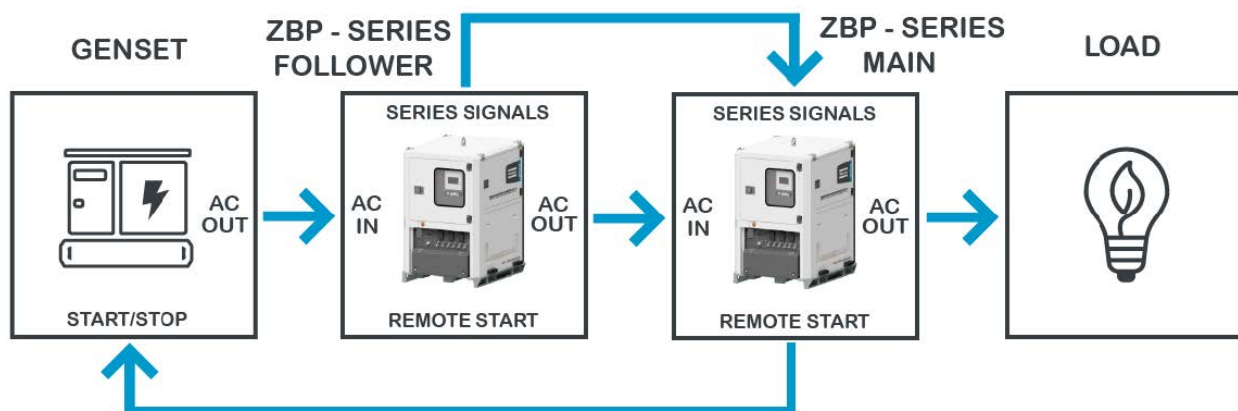
- Control Mode:
 - Current status of the Deep Sea controller: Auto, Stop or Manual.
 - Auto mode button => ON (green) / OFF (grey)
 - Stop mode button => ON (red) / OFF (grey)
- Engine Data
 - Instantaneous frequency, speed and runtime of the engine.
 - Engine status: running, stop & communication error.
- 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

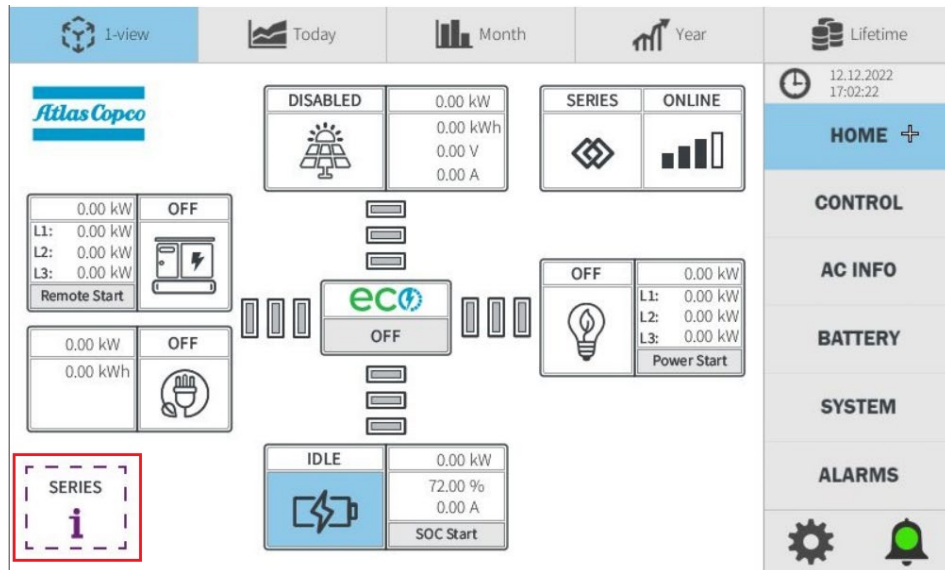
Enable this mode to connect two ZBP of same model type in series to provide greater autonomy on the same installation.

Installation



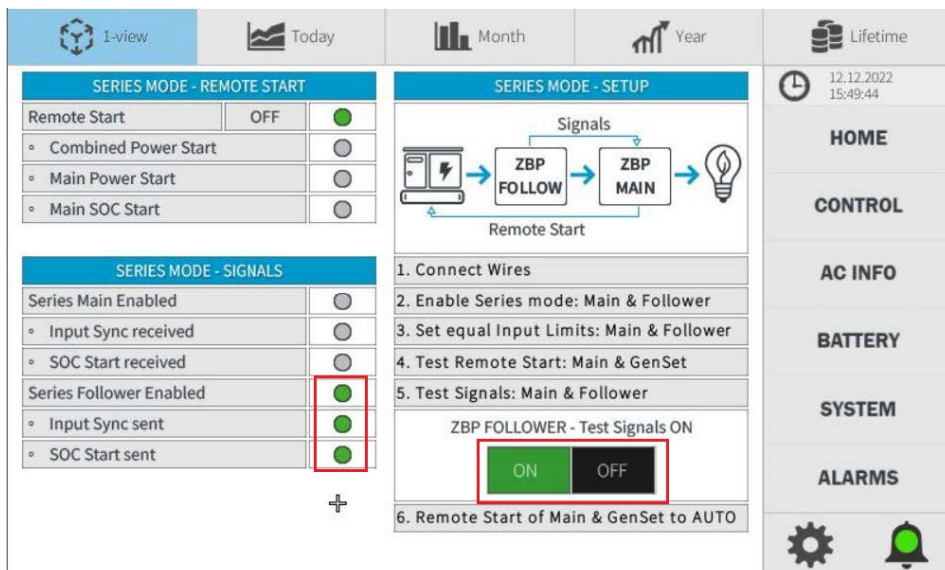
1. Ensure no more than two ZBP of same model type are available.
2. Select a suitable GenSet.
 - ZBP 15.60.230 → Recommended Size 24kVA
 - ZBP 30.30.400 → Recommended Size 112kVA
 - ZBP 30.60.208 & 30.75.208 → Recommended Size 112kVA
 - ZBP 40.60.208 & 40.75.240 → Recommended Size 72kVA
 - ZBP 45.60.400 & 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.

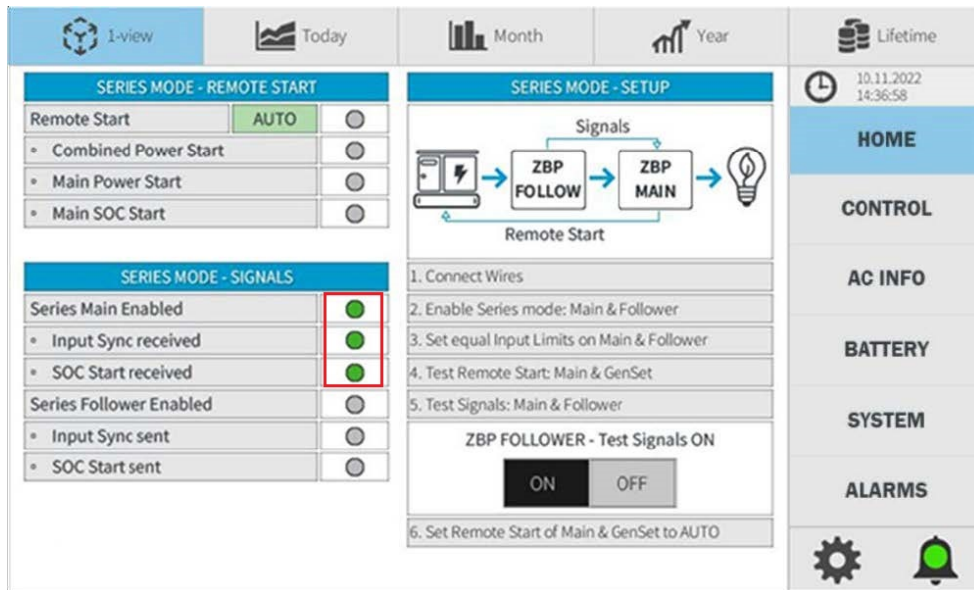


5. Turn ON Inverters and select the same Input Limit in both Main and Follower according to the GenSet Size. Check Input Limit alarm is not triggered after turning on Inverters in both units.
6. Test Remote Start in ZBP Main unit to ensure successful communication to control the Genset.
 - Remote Start 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.



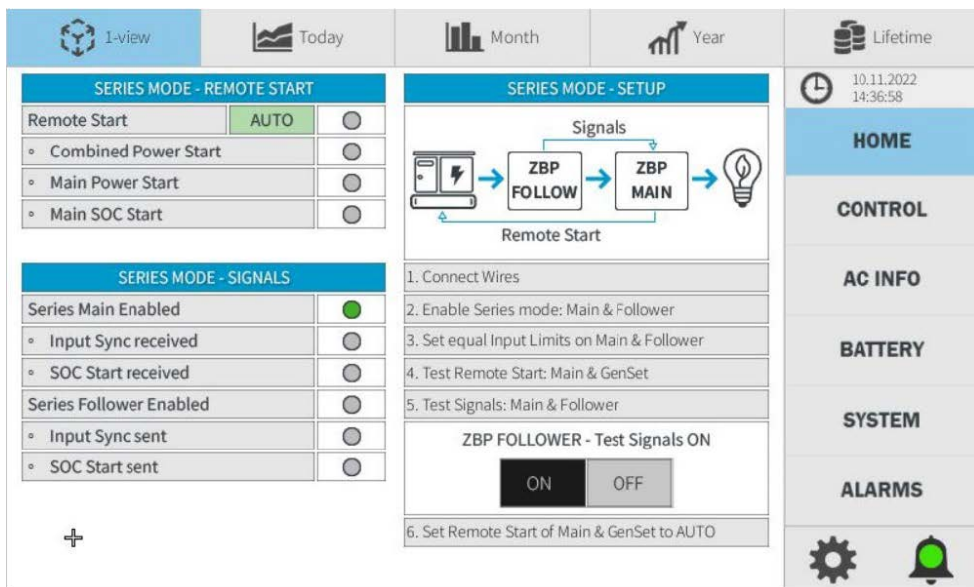
- Go to ZBP in Series Main mode and check the statuses of Input Sync and Start signals. If both are displayed as received, meaning the indicators are in green as shown below, the signals between both ZBPs are successfully connected.



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 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)	Daily	Weekly	Monthly	Trimester	Yearly
General	Check/test emergency stop (3)		x			
	Check torque on critical bolt connections (2)					x
	Grease locks and hinges					x
	Check all electrical connections					x
	Replace the air filters (1)					x
	Check earth connection	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		
Batteries	If stored check the SOC of the ZBP45 and fully charge if needed				x	
	Fully charge the batteries to 100%			x		

Category	Maintenance schedule (km)	Every 500 km	Yearly
Undercarriage	Check tyre pressure 2,5 bars	x	x
	Check tyres for uneven wear	x	x
	Check torque of wheel nuts 120 Nm	x	x
	Check torque of coupling head 82 Nm	x	x
	Check towbar handbrake lever spring actuator, reversing lever, linkage and all movable parts for ease of movement 83 Nm	x	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	x
	Check electrical cable towards road signalisation		x
	Check brake pads wear		x
	Change wheel hub bearing grease		x



Note:

1. More frequently when operating in a dusty environment.
2. See section *Critical bolt connections*.
3. The function of this protection should be tested minimum on every new installation.

6.1.1 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.

6.1.2 Use of service packs

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

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

6.2 Adjustments and service procedures

6.2.1 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 CO2 fire extinguisher.

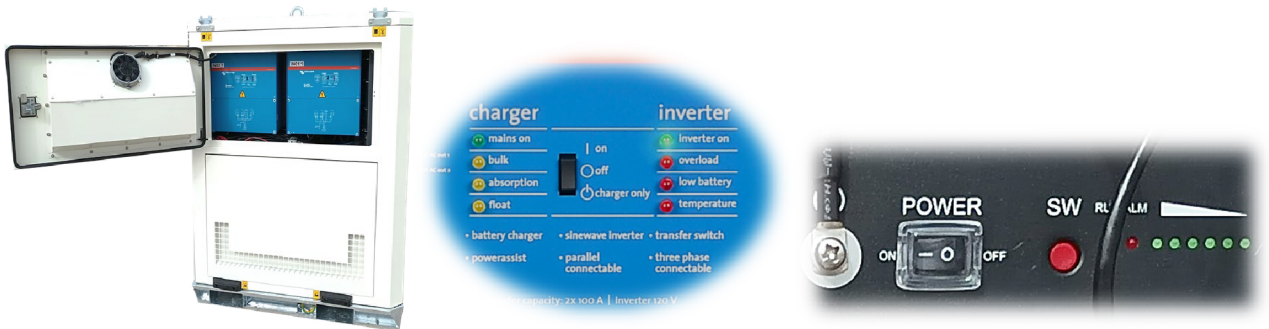
! Caution: While working on the Li-ion battery wear protective eyeglasses and clothing.

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.

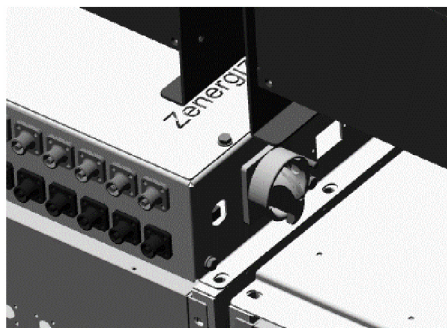
6.2.2 Commissioning & starting

Follow the below steps to start the ESS:

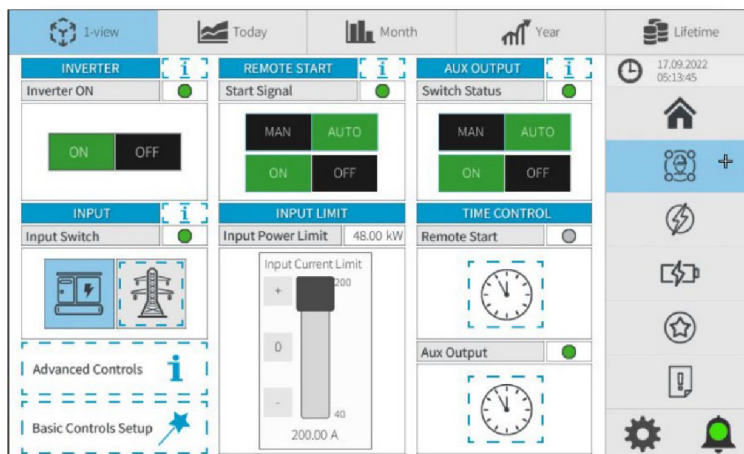
1. Unpack the ESS.
2. Open the upper and lower doors and turn on inverters and batteries from the front switch of the devices.




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.



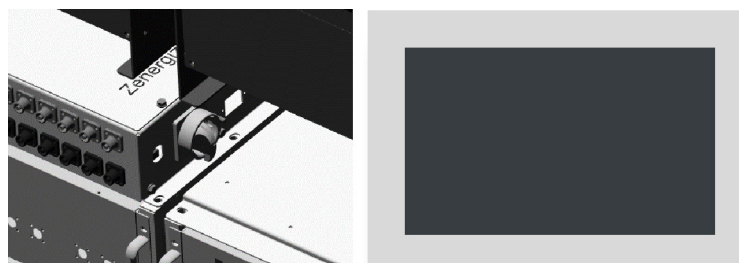
6.2.3 Storage & long time stop

 **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 months, and fully charge it, if necessary.

6.2.4 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.

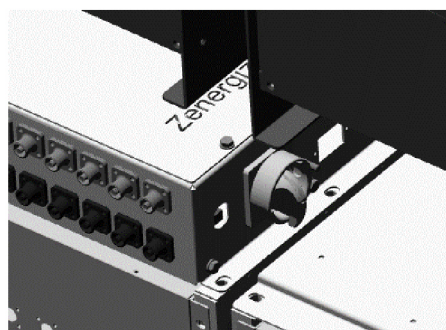


-  **Note:** Increasing the number of batteries of the ESS is not allowed without Atlas Copco authorization.

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.

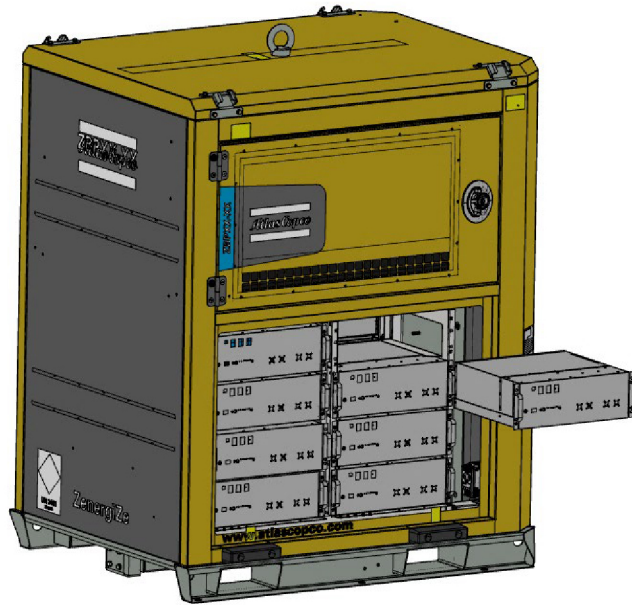
6. Remove the damaged battery from the ESS.



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.

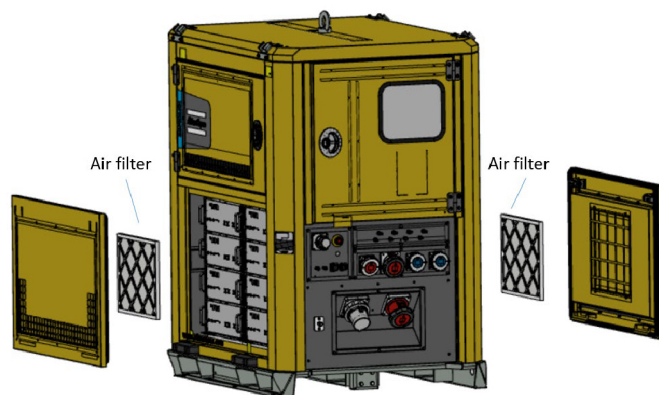
6.2.5 Cooling system

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

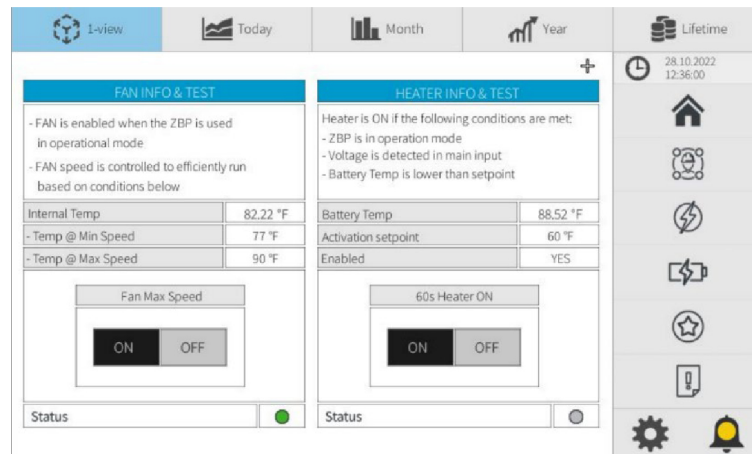
Clean airflow inside the canopy is possible thanks to the 2 filters that are on both inferior panels. These filters have to be replaced according to maintenance schedule.



Checking the cooling fans

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

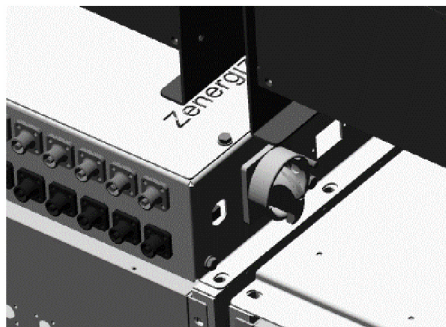
To check the correct operation go to the controller and test them from the following screen.



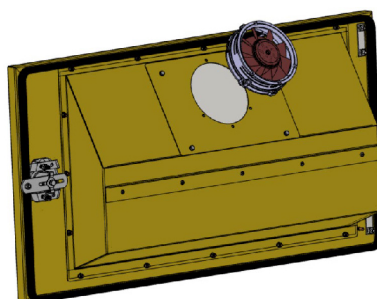
6.2.6 Cooling fan replacement

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

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



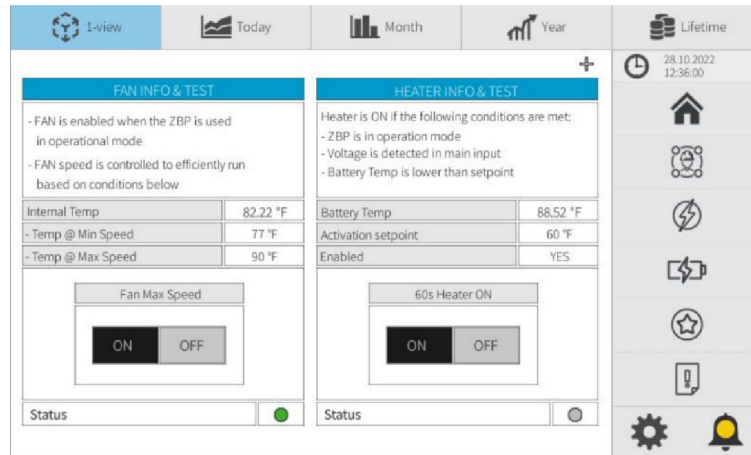
2. Remove all the electrical connections from the fans.
3. Unscrew the fan from the door.



6.2.7 Heaters checking and replacement

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

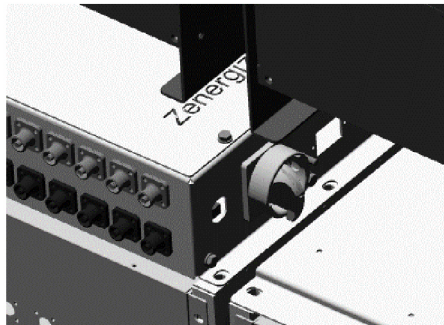
Check the correct operation of the heaters by activating them from the following screen.



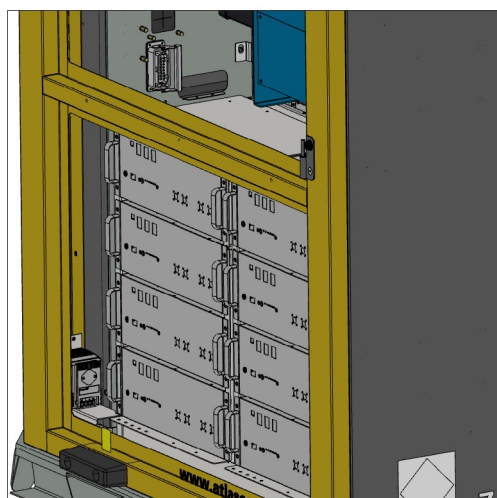
Replacing the heaters

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

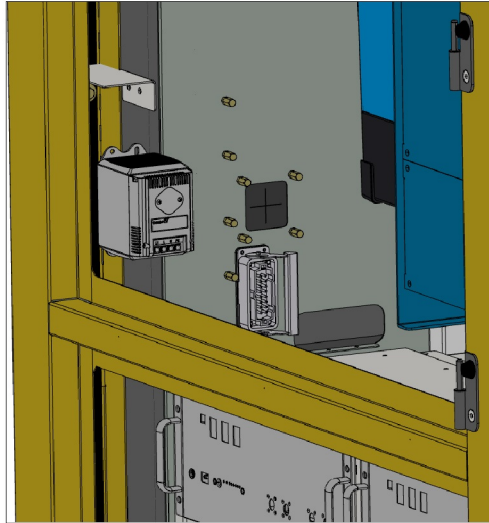
1. Turn the ESS off using the battery switch located on the DC cubicle.



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

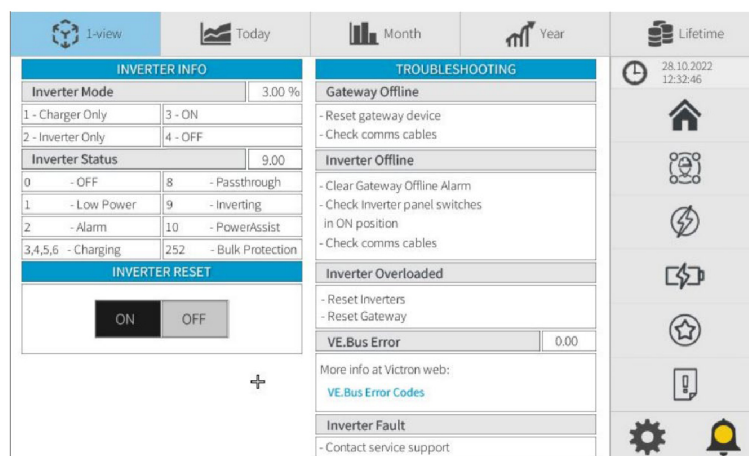
Warning: Never perform a test run with connected power cables. Never touch an electrical connector without a voltage check.

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, odours, 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.

Disorder	Possible cause/solution
Load is not working despite the batteries are recharged or the power inlet is supplied by mains or running genset	<ul style="list-style-type: none"> • 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	<p>PV module defective or PV fuse fallen. Solution: Determine the cause of the electrical load and replace the PV fuse(s) if necessary.</p>
GenSet fail to start	<p>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.</p> <ul style="list-style-type: none"> • 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	<p>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.</p> <ul style="list-style-type: none"> • 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	<p>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.</p>
Phase rotation	<p>Activated if the AC Input Source wires are connected to the wrong ESS phase input connection.</p>
Mains power failure	<p>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.</p> <ul style="list-style-type: none"> • Check breaker in both Mains and ESS. • Ensure availability status of the Mains.

Disorder	Possible cause/solution
Input Limit Conflict	<p>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.</p> <ul style="list-style-type: none"> • 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.
Gateway or Inverter Offline	<p>Activated if communication failure with Gateway or Inverter.</p> <ul style="list-style-type: none"> • 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	<p>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</p> <ul style="list-style-type: none"> • Proceed to reset the Inverter • Proceed to reset the Gateway device (Victron Cerbo GX) by manually unplugging its power terminal.
VE.Bus Error	<p>Activated if Inverter internal system displays an error code. Check the following website to know the issue and solution related to the error code. https://www.victronenergy.com/live/ve.bus:ve.bus_error_codes</p>
Inverter Fault	<p>Activated if Inverter internal alarm is detected.</p> <ul style="list-style-type: none"> • 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	<p>Activated if Battery SOC is below default or assigned setpoint. Connect an AC Input Source to charge the battery.</p>
BMS Offline	<p>Activated if communication failure with Battery BMS.</p> <ul style="list-style-type: none"> • Often activated if Gateway Offline alarm is triggered. • Proceed to reset the ESS by doing the sleep and wake procedures.

Disorder	Possible cause/solution
Battery Module Offline	<p>Activated if battery BMS detects a failure with the communication of one or more battery modules.</p> <ul style="list-style-type: none"> • 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	<p>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.</p>
Unauthorized Battery	<p>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.</p> <ul style="list-style-type: none"> • Contact Atlas Copco Service in case this alarm is activated.
Extreme Cold Temperature	<p>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.</p> <p>In case the ESS contain heaters, connect an AC Input Source to power the heaters and accelerate the heating process of the batteries.</p>
Emergency Stop	<p>Activated if communication the emergency stop button is pushed.</p> <ul style="list-style-type: none"> • Ensure safety conditions are met. • Release the emergency stop button.
RCD Trip or Limit Switch	<p>Activated if communication one of these devices is triggered. RCD is only available in 50 Hz models.</p> <ul style="list-style-type: none"> • Close the ZBP main output breaker to clear the RCD trip alarm • Close the ZBP bottom front door to clear the Limit Switch alarm

Disorder	Possible cause/solution
Overdischarge Protection	Battery protection, which is activated to prevent battery from discharging when low SOC. <ul style="list-style-type: none"><li data-bbox="639 367 1442 439">• Connect an AC Input Source and ensure batteries can be charged.
Smartbox Offline	Activated if communication failure with the smartbox device. <ul style="list-style-type: none"><li data-bbox="639 495 1406 562">• Proceed to reset the smartbox by unplugging its power terminal.<li data-bbox="639 568 1474 636">• 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.

		ZBP15-60	ZBP45-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		

		Solar Charger 5,8kW	Solar Charger 11,5kW	Solar Charger 17,3kW
Start-up voltage	V	120		
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	°C	-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:

		ZBP15-60 230V	ZBP45-xx 400/230V			
IN	Terminal board					1
	Power Locks 400A				1	
	CEE 400V 5P 125A		1	1		
	CEE 400V 5P 63A					
	CEE 230V 3P 63A	1				
OUT	Terminal board					1
	Power Locks 400A				1	
	CEE 400V 5P 125A		1	1		
	CEE 400V 5P 63A		1	1	1	1
	CEE 400V 5P 32A		1		1	1
	CEE 230V 3P 63A	1		3		

		ZBP15-60 230V	ZBP45-xx 400/230V			
	CEE 230V 3P 32A	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 of 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 CEE	5P 63A CEE	5P 32A CEE	3P 63A CEE	3P 32A CEE	3P 16A (*)
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

		General / PowerLock	5P 125A CEE	5P 63A CEE	5P 32A CEE	3P 63A CEE	3P 32A CEE	3P 16A (*)
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 0°C. 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 ZBP15-ZBP45 unit

	Standard Unit	ZBP15-60	ZBP45-60	ZBP45-75
Referenc conditions				
Generator service duty			NA	
Absolute inlet pressure	bar		1	
Relative air humidity	%		30	
Air inlet temperature	°C		22	
Performance data				
Model name		ZBP15-60	ZBP45-60	ZBP45-75
Rated frequency	HZ		50	
Rated voltage	VAC	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	36	
Rated apparent power	kVA	15	45	
Rated voltage line to line (V)	VAC	230	400	
Input voltage range	VAC	180-270	315-465	
Output voltage range (1)	VAC	230 (Adjustable 210-245)	400 (Adjustable 365 - 426)	
Rated current	A		52	
Passthrough	A		100	
Nominal Energy	kWh	57.60		76.80
Net Energy	kWh	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		16
Life Time N° Cycles (@25°C, 80% DoD, 0.5C, 70%EOL)	cycles		6000	
Maximum Deep Of Discharge (DoD)	%		95.0	
DischARGE autonomy 100% (100 -- 7% SOC) fdp = 1 (C1)	h	3.98	1.3	1.8

	Standard Unit	ZBP15-60	ZBP45-60	ZBP45-75
Discharge autonomy 75% (100 -- 7% SOC) fdp = 1	h	5.3	1.8	2.4
Discharge autonomy 50% (100 -- 7% SOC) fdp = 1	h	8.0	2.7	3.5
Discharge autonomy 25% (100 -- 7% SOC) fdp = 1	h	15.9	5.3	7.1
Recharging Time (SOC 10 to 100%)	h	6.9	2.3	3.1
Recharging Time - Parking mode (SOC 7 to 100%)	h	24.9		33.2
Battery type		LFP (LiFePO4)		
Operational Dimensions				
Operational length	mm	1450		
Operational width	mm	1230		
Operational height	mm	1865		
Weight	kg	1285	1511	1618
Transport Dimensions				
Transport length	mm	1450		
Transport width	mm	1160		
Transport height	mm	1865		

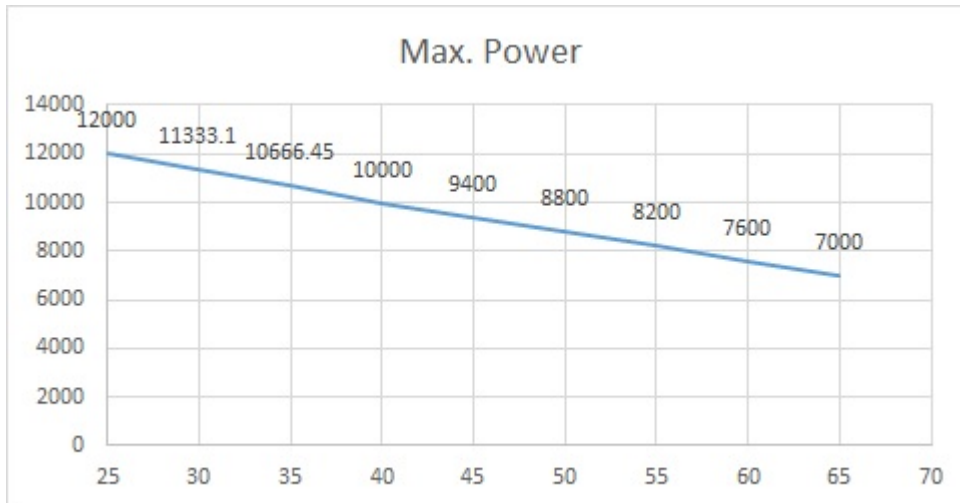


Note: When AC source is available, Output voltage is synchronised with input

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

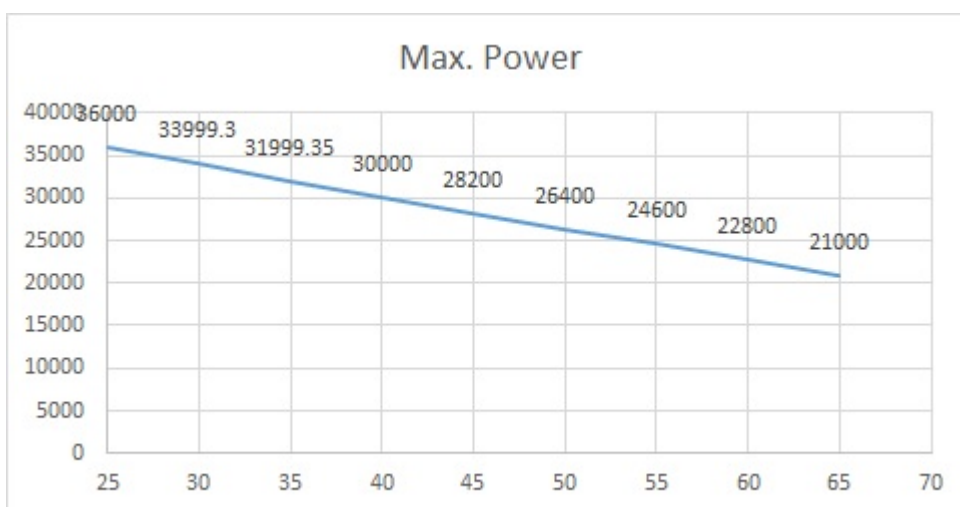
Derating table - 230V

Ambient T (°C)	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 - 400/230V

Ambient T (°C)	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

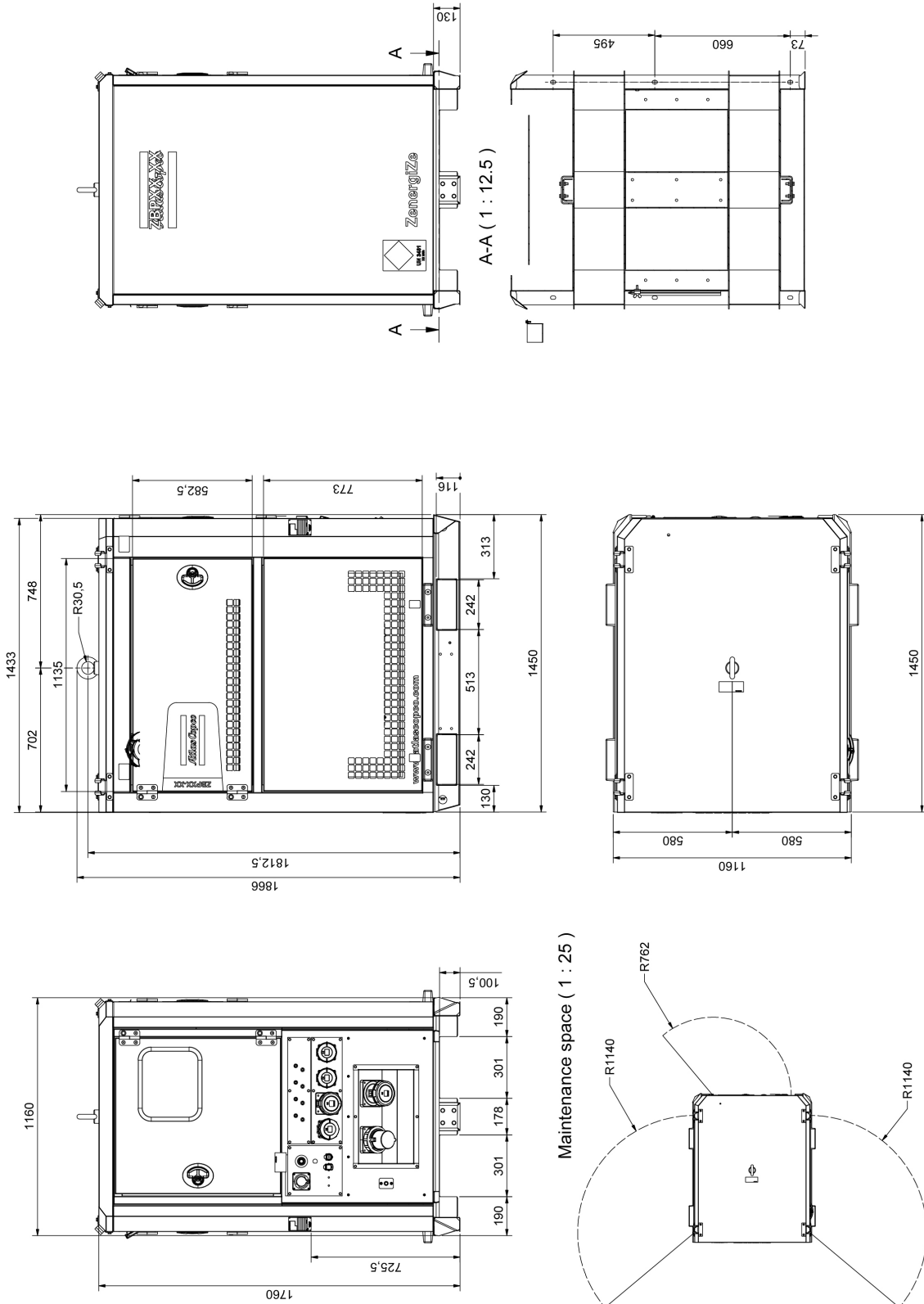
Standard torques for metric bolted joints		M12	75%	8.8	69	± 17	AC- STD 4369
Standard torques for metric bolted joints		M14	75%	8.8	109	± 28	AC- STD 4369

Additional treatment if any;

Remarks:

11.3 Dimension drawing

ZBP 15-60, ZBP 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 m ³ /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

GRUPOS ELECTRÓGENOS EUROPA S.A.U.

CE



1 1325 Kg

2 ENERGY STORAGE SYSTEM	3 ZBP45-75
4 INPUT	5 UN 400/230V
6 FN 50HZ	7 IN 100A (MAX.)
8 OUTPUT ISLAND	9 UN 400/230V
10 FN 50HZ	11 IN 65A
12 PN 36KW	13 SN 45kVA
14 ES 76,8kWh	
15 OUTPUT HYBRID	16 UN 400/230V
17 FN 50HZ	18 IN 160A (MAX.)
19 PV INPUT	20 Umax 450V
21 I _{max} 72A	22 P _{max} 11.5kWp
23 AMBIENT	24 IP55
25 S/N	26 ESF081497
27 MANUF. DATE	28 01/2020

1636003850

Made in Spain

GRUPOS ELECTRÓGENOS EUROPA S.A.
Polígono Pitarco II, Parcela 20
50450 Muel (Zaragoza) SPAIN

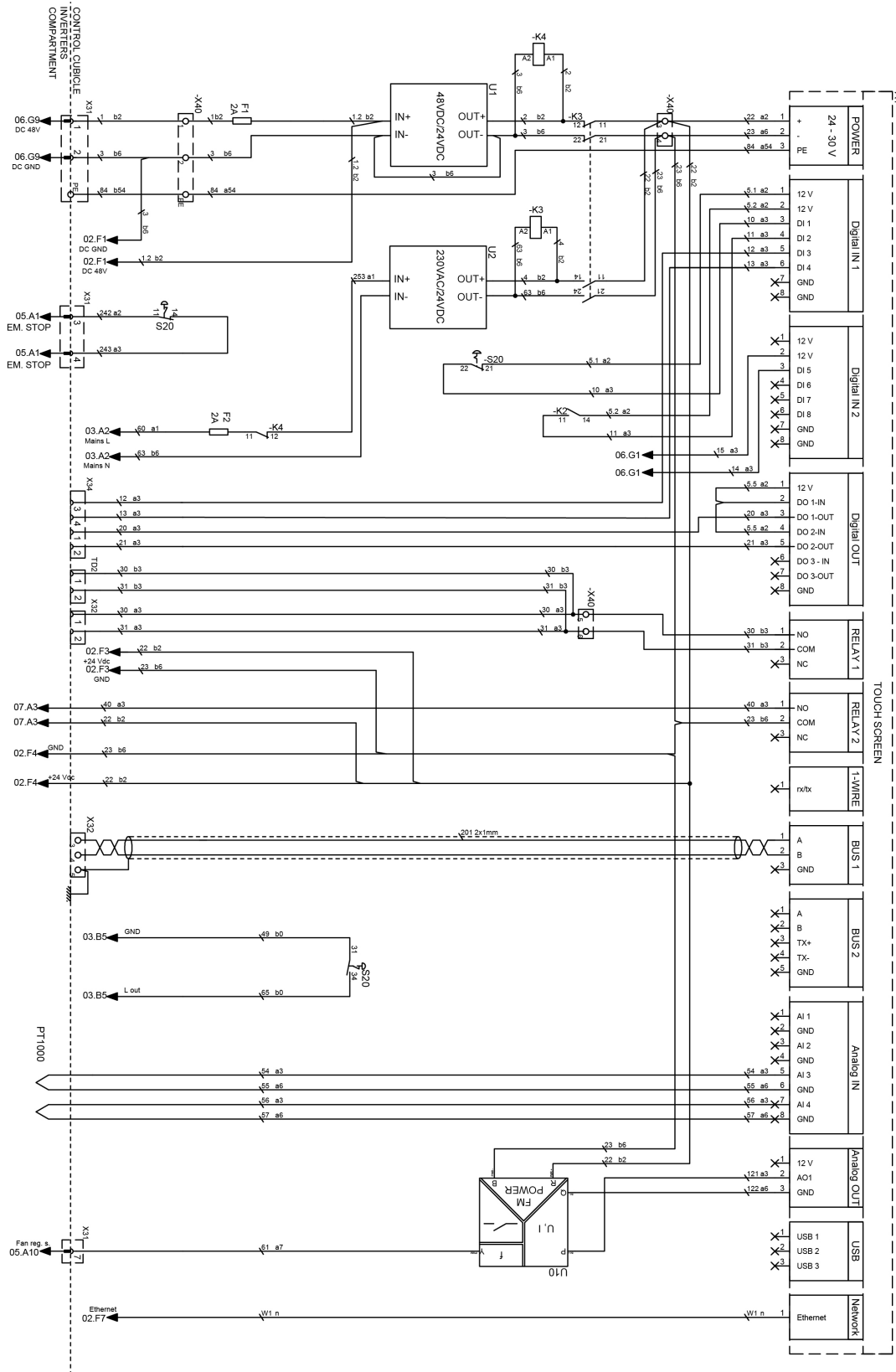
EAC

Reference	Description	Reference	Description
1	Weight	15	Output hybrid value

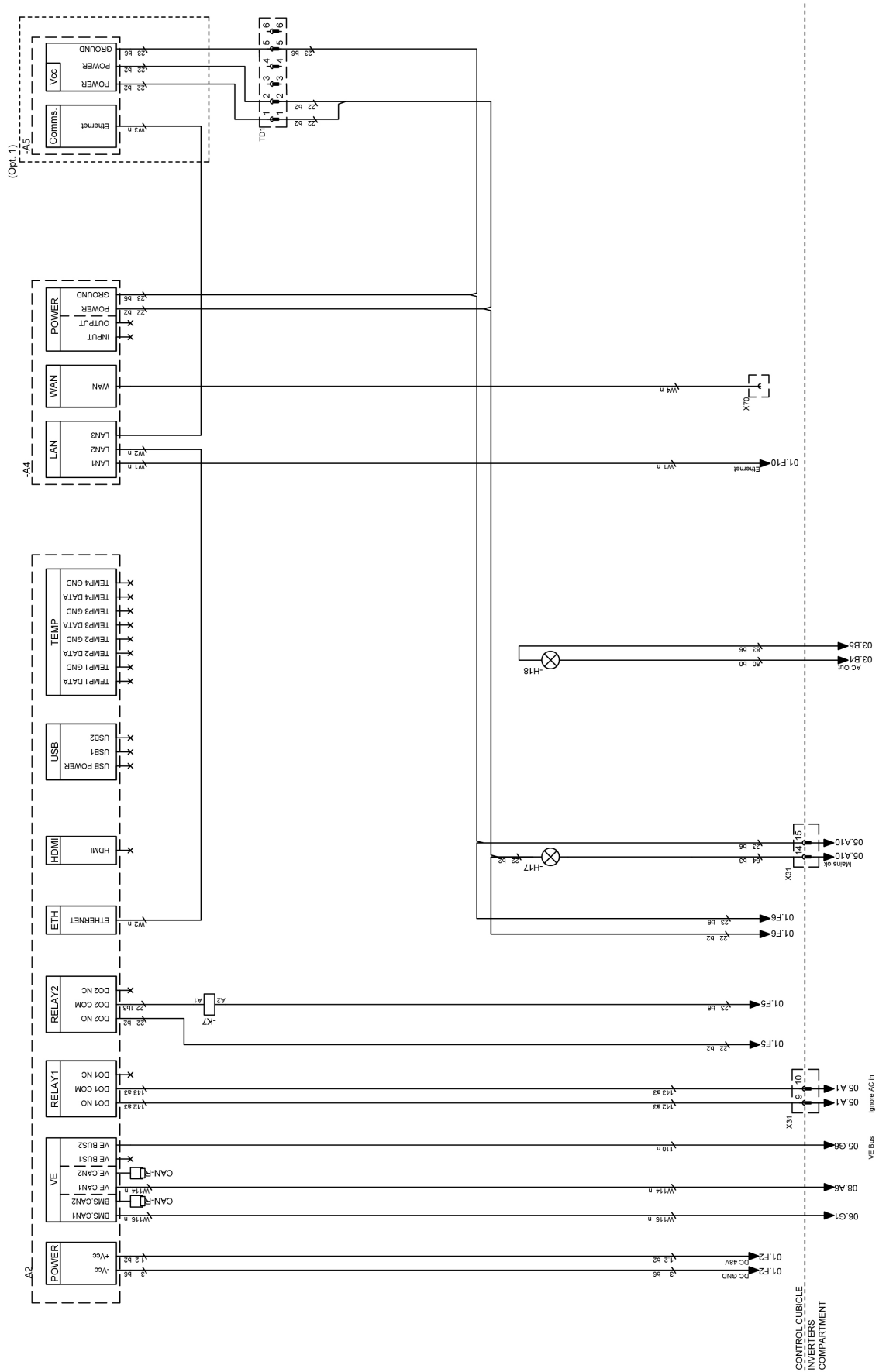
Reference	Description	Reference	Description
2	Range	16	Nominal voltage
3	Model	17	Nominal frequency
4	Input value	18	Maximum nominal current
5	Nominal voltage	19	PV input value
6	Nominal frequency	20	Maximum voltage
7	Maximum nominal current	21	Maximum current
8	Output island value	22	Maximum peak power
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

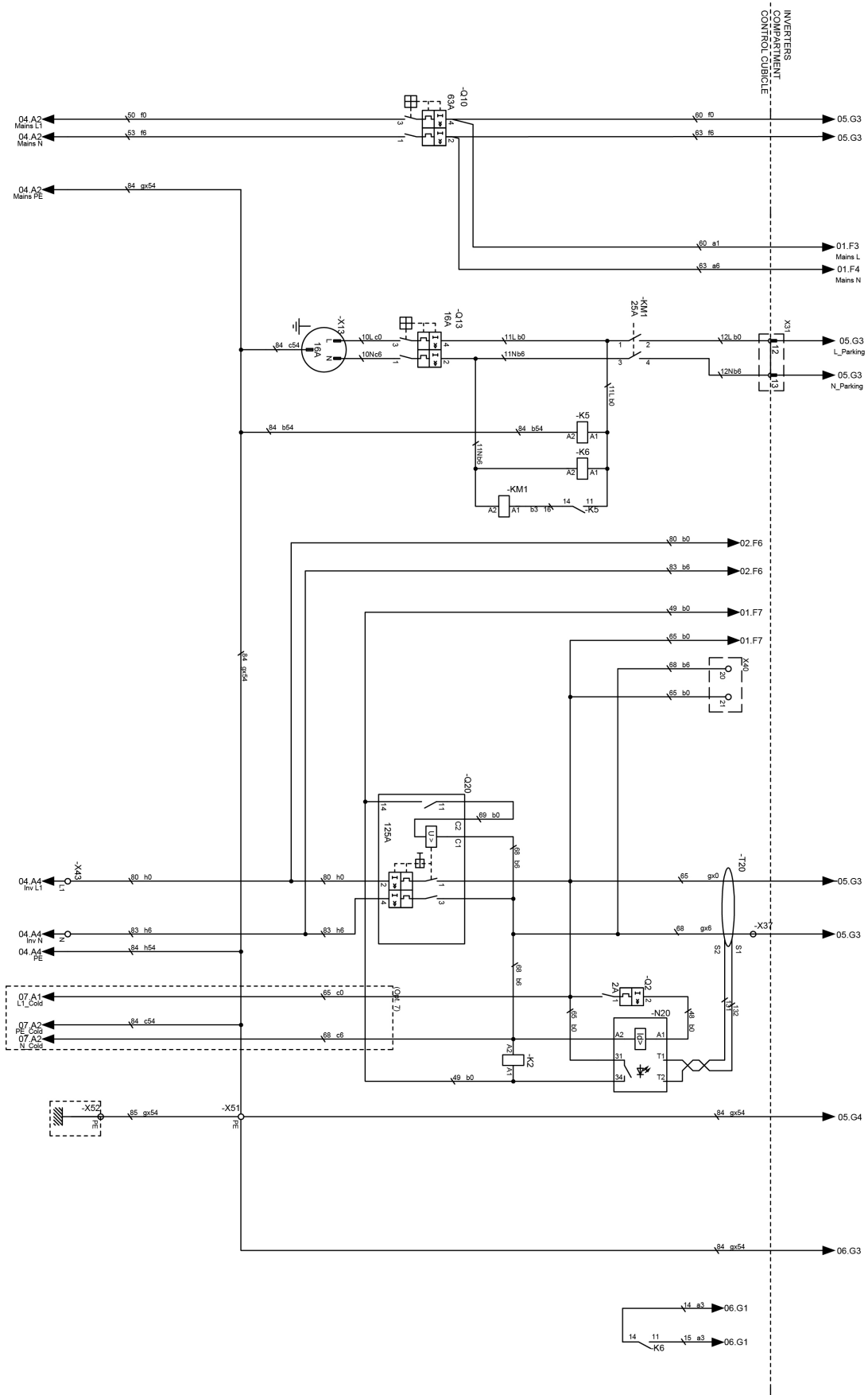
Circuit diagram ZBP15-60 - 1636039002 Sheet 1 of 9



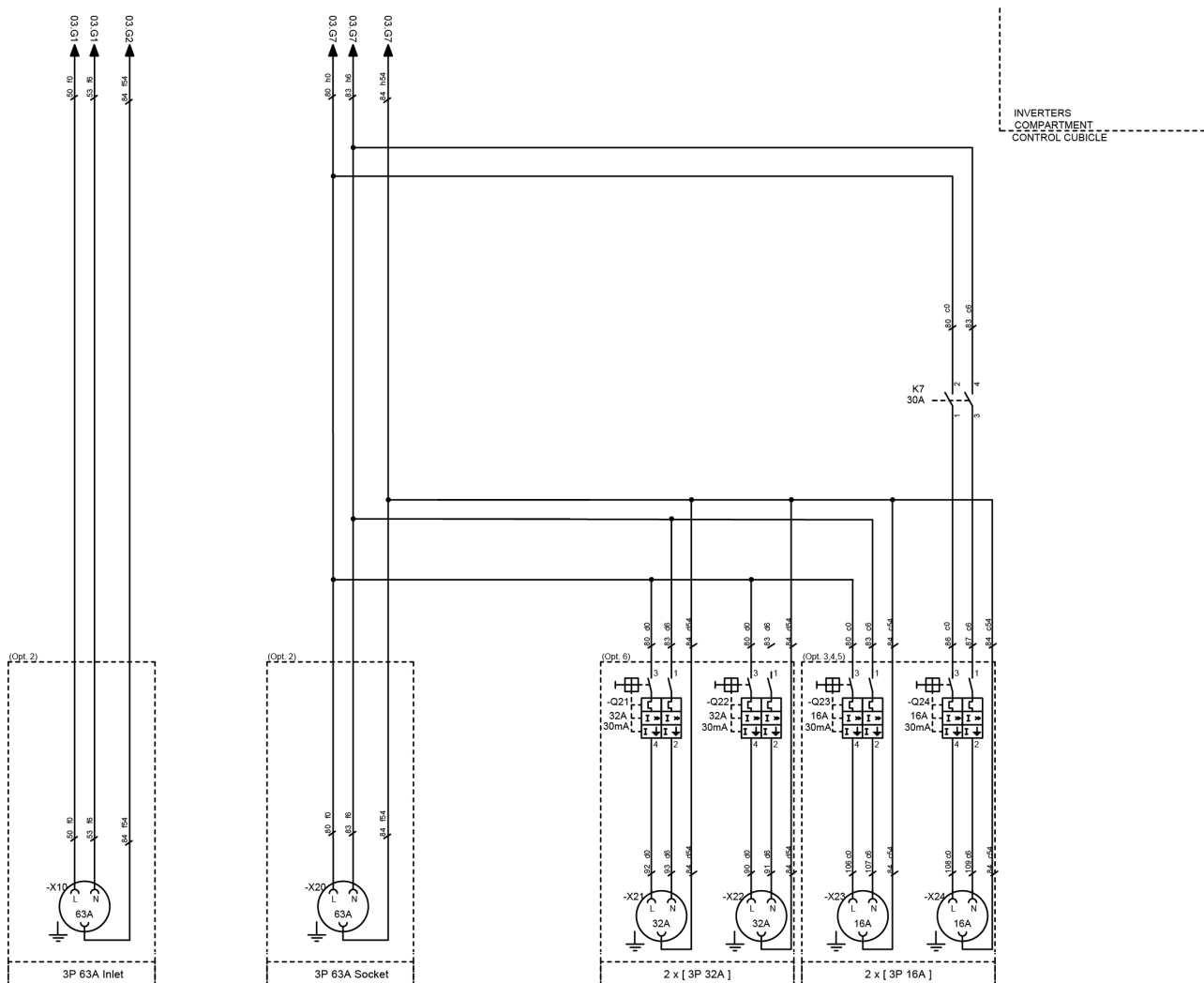
Sheet 2 of 9

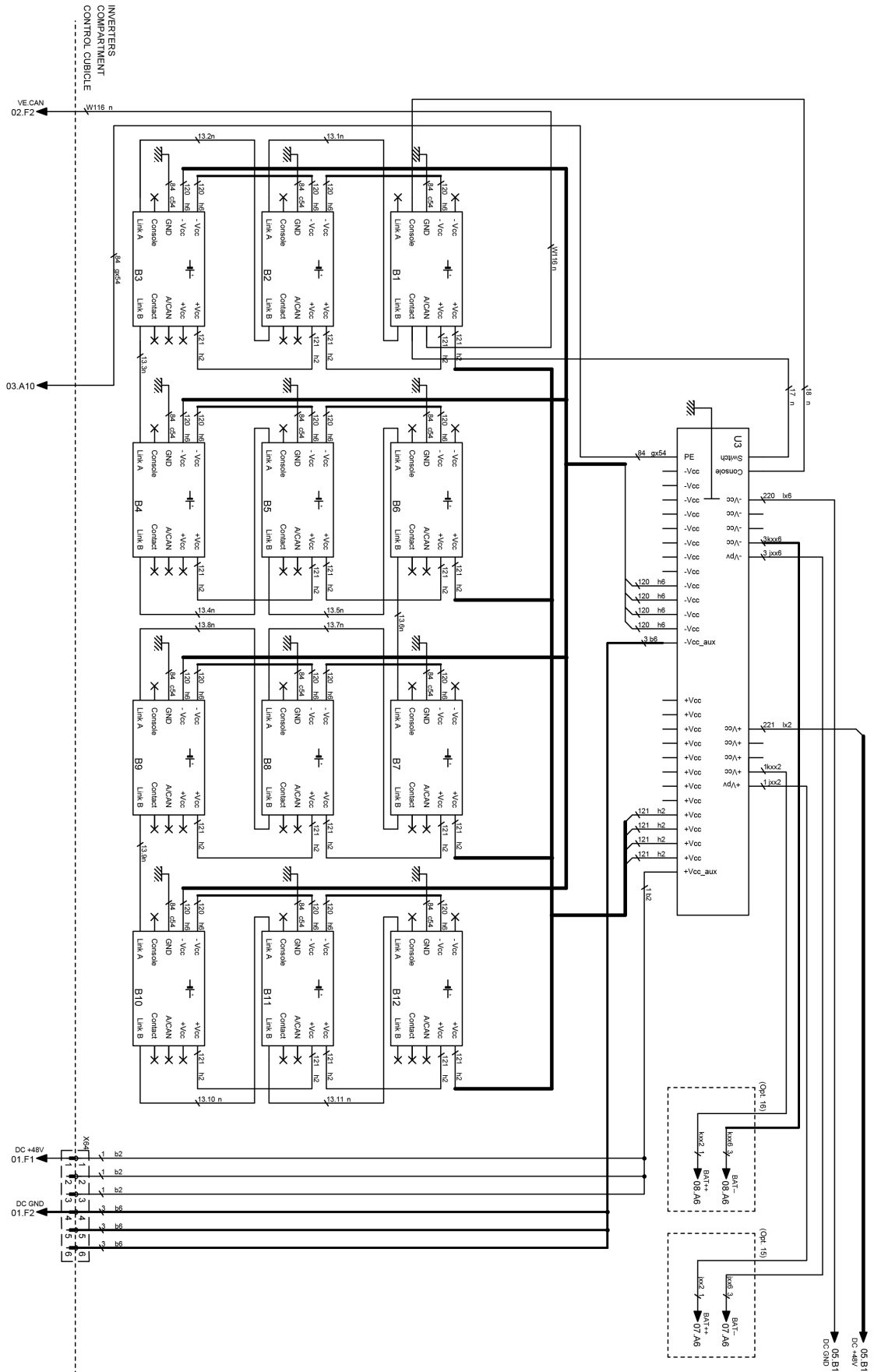


Sheet 3 of 9

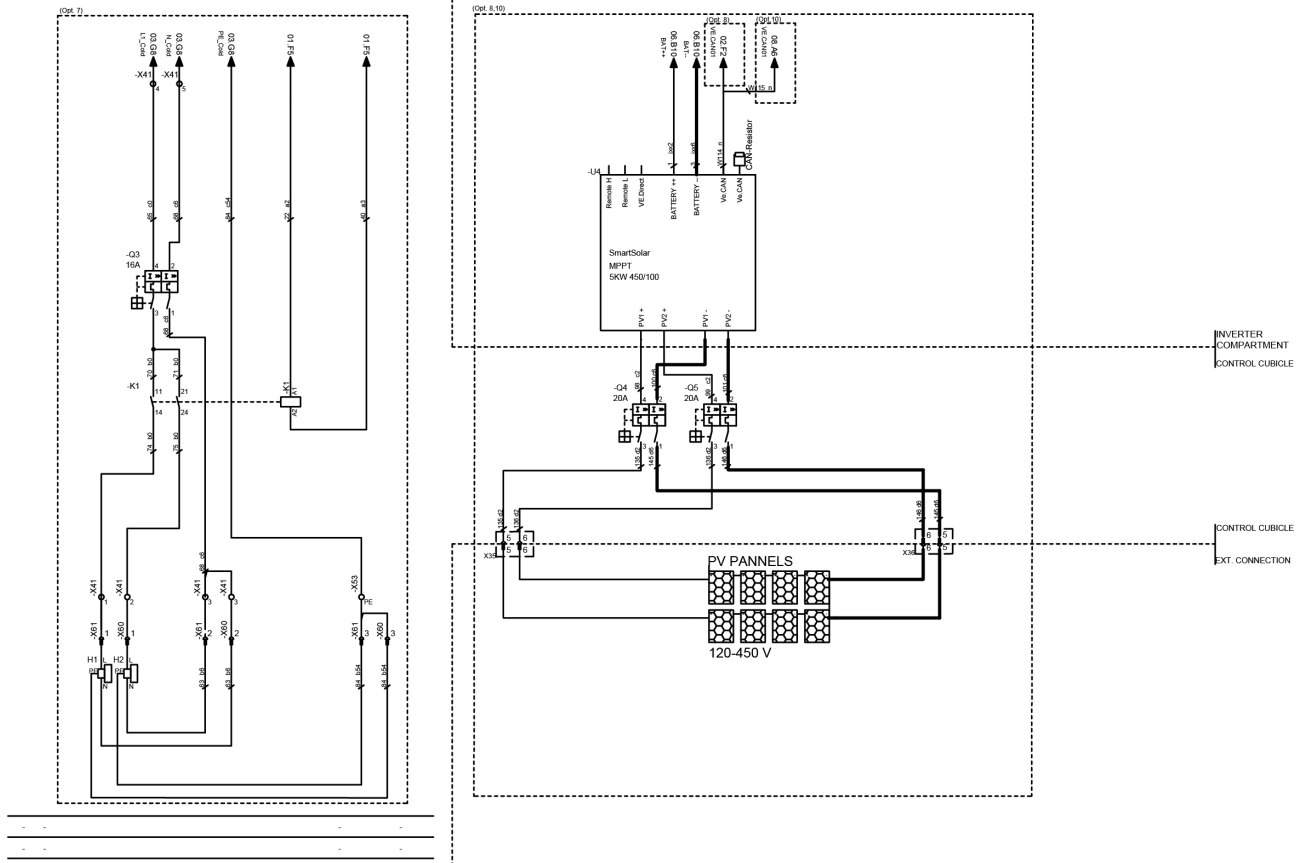


Sheet 4 of 9

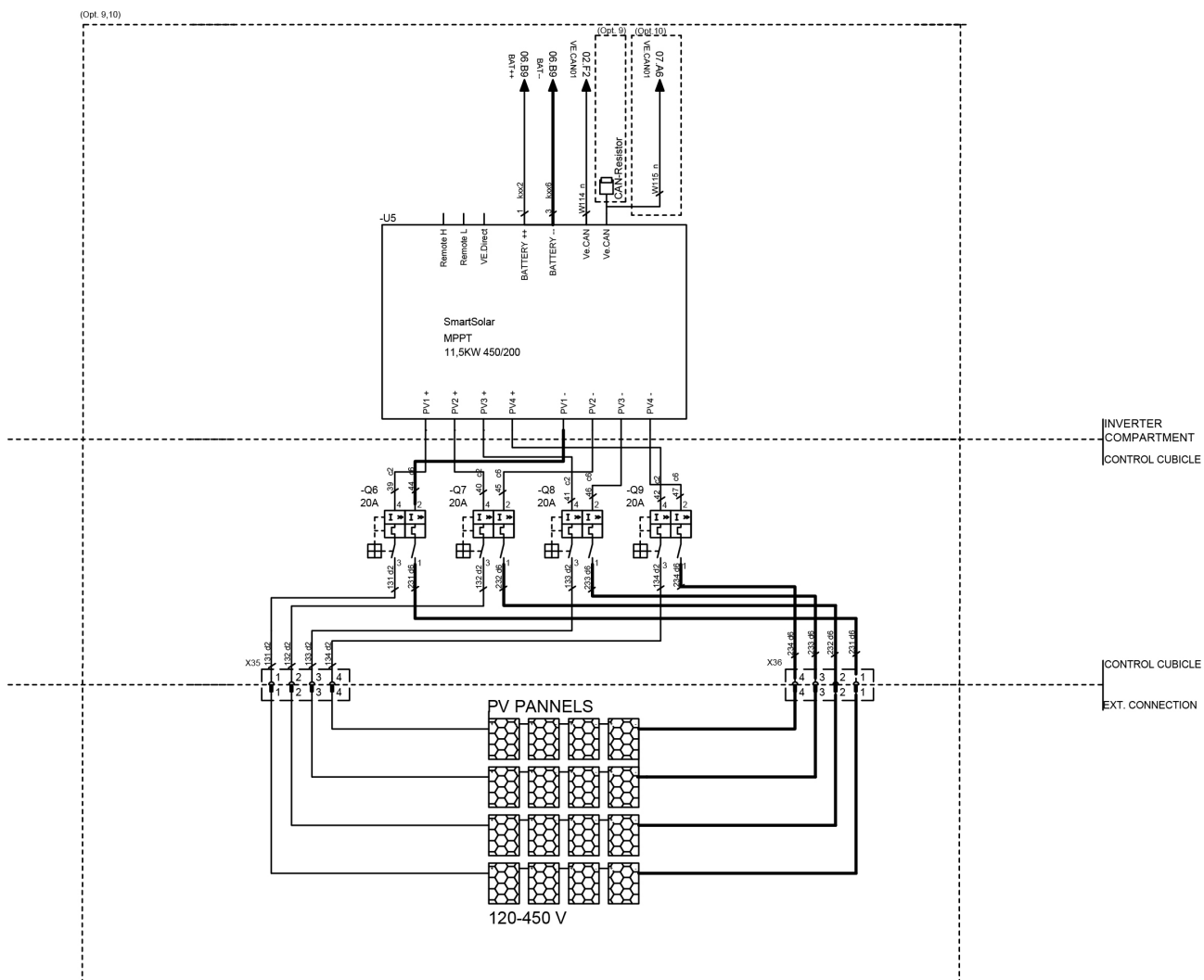




Sheet 7 of 9



Sheet 8 of 9



Sheet 9 of 9

B.O.M.		B.O.M.	
TAG	DESCRIPTION	TAG	DESCRIPTION
X20	FEMALE 3P 63A SOCKET	X20	FEMALE 3P 63A SOCKET
X21	FEMALE 3P 32A SOCKET	X21	FEMALE 3P 32A SOCKET
X22	FEMALE 3P 32A SOCKET	X22	FEMALE 3P 32A SOCKET
X23	FEMALE 3P 16A SOCKET	X23	FEMALE 3P 16A SOCKET
X24	FEMALE 3P 16A SOCKET	X24	FEMALE 3P 16A SOCKET
X31	HARTING CONNECTOR 16P	X31	HARTING CONNECTOR 16P
X32	HARTING CONNECTOR 7P	X32	HARTING CONNECTOR 7P
X34	HARTING CONNECTOR 4P	X34	HARTING CONNECTOR 4P
X35	SOLAR CONNECTORS +	X35	SOLAR CONNECTORS +
X36	SOLAR CONNECTORS -	X36	SOLAR CONNECTORS -
X37	TERMINAL STRIP	X37	TERMINAL STRIP
X40	TERMINAL STRIP	X40	TERMINAL STRIP
X41	TERMINAL STRIP	X41	TERMINAL STRIP
X43	TERMINAL STRIP	X43	TERMINAL STRIP
X51	PE	X51	PE
X52	PE	X52	PE
X53	PE	X53	PE
X60	3P CONNECTOR	X60	3P CONNECTOR
X61	3P CONNECTOR	X61	3P CONNECTOR
X62	4P CONNECTOR	X62	4P CONNECTOR
X63	4P CONNECTOR	X63	4P CONNECTOR
X64	6P CONNECTOR	X64	6P CONNECTOR
X70	RJ45	X70	RJ45
T20	TOROID	T20	TOROID
TD1	FAST CONNECTOR	TD1	FAST CONNECTOR
TD2	BANANA CONNECTOR	TD2	BANANA CONNECTOR

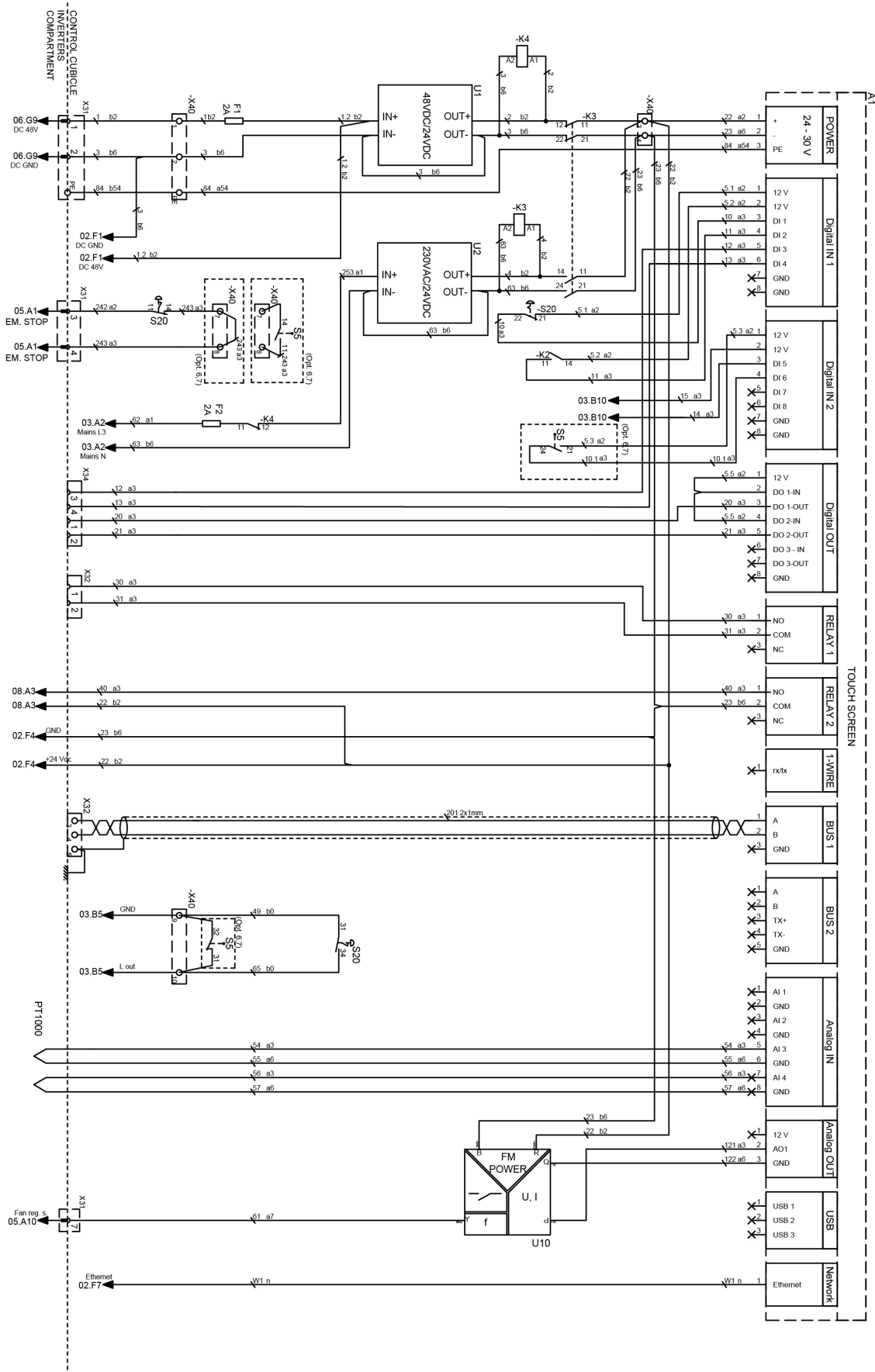
B.O.M.		B.O.M.	
TAG	DESCRIPTION	TAG	DESCRIPTION
A1	EMS 1	A1	EMS 1
A2	CERBO	A2	CERBO
A4	ROUTER	A4	ROUTER
A5	SMART BOX	A5	SMART BOX
B1..12	BATTERY	B1..12	BATTERY
F1	FUSE 2A	F1	FUSE 2A
F2	FUSE 2A	F2	FUSE 2A
H1	HEATER	H1	HEATER
H2	HEATER	H2	HEATER
IN1	INVERTER	IN1	INVERTER
H17	GREEN LAMP 24VDC	H17	GREEN LAMP 24VDC
H18	GREEN LAMP 230VAC	H18	GREEN LAMP 230VAC
K1	RELAY 24V 15A 2NO	K1	RELAY 24V 15A 2NO
K2	RELAY 230V SPDT	K2	RELAY 230V SPDT
K3	RELAY 24V 2NC - 2NO	K3	RELAY 24V 2NC - 2NO
K4	RELAY 24V	K4	RELAY 24V
K5	RELAY 230V SPDT	K5	RELAY 230V SPDT
K6	RELAY 230V SPDT	K6	RELAY 230V SPDT
K7	RELAY 24V 30A 2NA	K7	RELAY 24V 30A 2NA
KM1	CONTACTOR 2P 25A	KM1	CONTACTOR 2P 25A
M1	FAN 48VDC	M1	FAN 48VDC
M2	FAN 48VDC	M2	FAN 48VDC
N20	ELR 30-300mA	N20	ELR 30-300mA
Q2	BREAKER 1P 2A	Q2	BREAKER 1P 2A
Q3	BREAKER 2P 16A	Q3	BREAKER 2P 16A
Q4	BREAKER 2P 20A DC	Q4	BREAKER 2P 20A DC
Q5	BREAKER 2P 20A DC	Q5	BREAKER 2P 20A DC
Q6	BREAKER 2P 20A DC	Q6	BREAKER 2P 20A DC
Q7	BREAKER 2P 20A DC	Q7	BREAKER 2P 20A DC
Q8	BREAKER 2P 20A DC	Q8	BREAKER 2P 20A DC
Q9	BREAKER 2P 20A DC	Q9	BREAKER 2P 20A DC
Q10	BREAKER 2P 63A	Q10	BREAKER 2P 63A
Q13	BREAKER 2P 16A	Q13	BREAKER 2P 16A
Q20	BREAKER 2P 125A	Q20	BREAKER 2P 125A
Q21	RCBO 2P 32A 30MA	Q21	RCBO 2P 32A 30MA
Q22	RCBO 2P 32A 30MA	Q22	RCBO 2P 32A 30MA
Q23	RCBO C16 30MA	Q23	RCBO C16 30MA
Q24	RCBO C16 30MA	Q24	RCBO C16 30MA
S20	EMERGENCY STOP	S20	EMERGENCY STOP
U1	DC-DC CONVERTER 48VDC/24VDC	U1	DC-DC CONVERTER 48VDC/24VDC
U2	AC-DC CONVERTER 230VAC/24VDC	U2	AC-DC CONVERTER 230VAC/24VDC
U3	BATTERIES DC BOX	U3	BATTERIES DC BOX
U4	SOLAR CHARGER 450-100 (MPPT)	U4	SOLAR CHARGER 450-100 (MPPT)
U5	SOLAR CHARGER 450 - 200 (MPPT)	U5	SOLAR CHARGER 450 - 200 (MPPT)
U10	ANALOG TO PWM CONVERTER	U10	ANALOG TO PWM CONVERTER
X10	MALE 3P 63A SOCKET	X10	MALE 3P 63A SOCKET
X13	MALE 3P 16A SOCKET	X13	MALE 3P 16A SOCKET

WIRE SECTION		
COD.	SECTION	INSULATION CLASS
aa	0.5mm ²	H07V-K
ab	0.75mm ²	H07V-K
a	1mm ²	H07V-K
b	1.5mm ²	H07V-K
c	2.5mm ²	H07V-K
d	4mm ²	H07V-K
e	6mm ²	H07V-K
f	10mm ²	H07V-K
gx	16mm ²	EPR
h	25mm ²	H07V-K
ix	25mm ²	EPR
hxx	25mm ²	H07V-K TRI-RATED
ix	35mm ²	EPR
jxx	50mm ²	H07V-K TRI-RATED
kx	70mm ²	EPR
kxx	70mm ²	H07V-K TRI-RATED
lx	95mm ²	EPR
n	Ethernet	NA

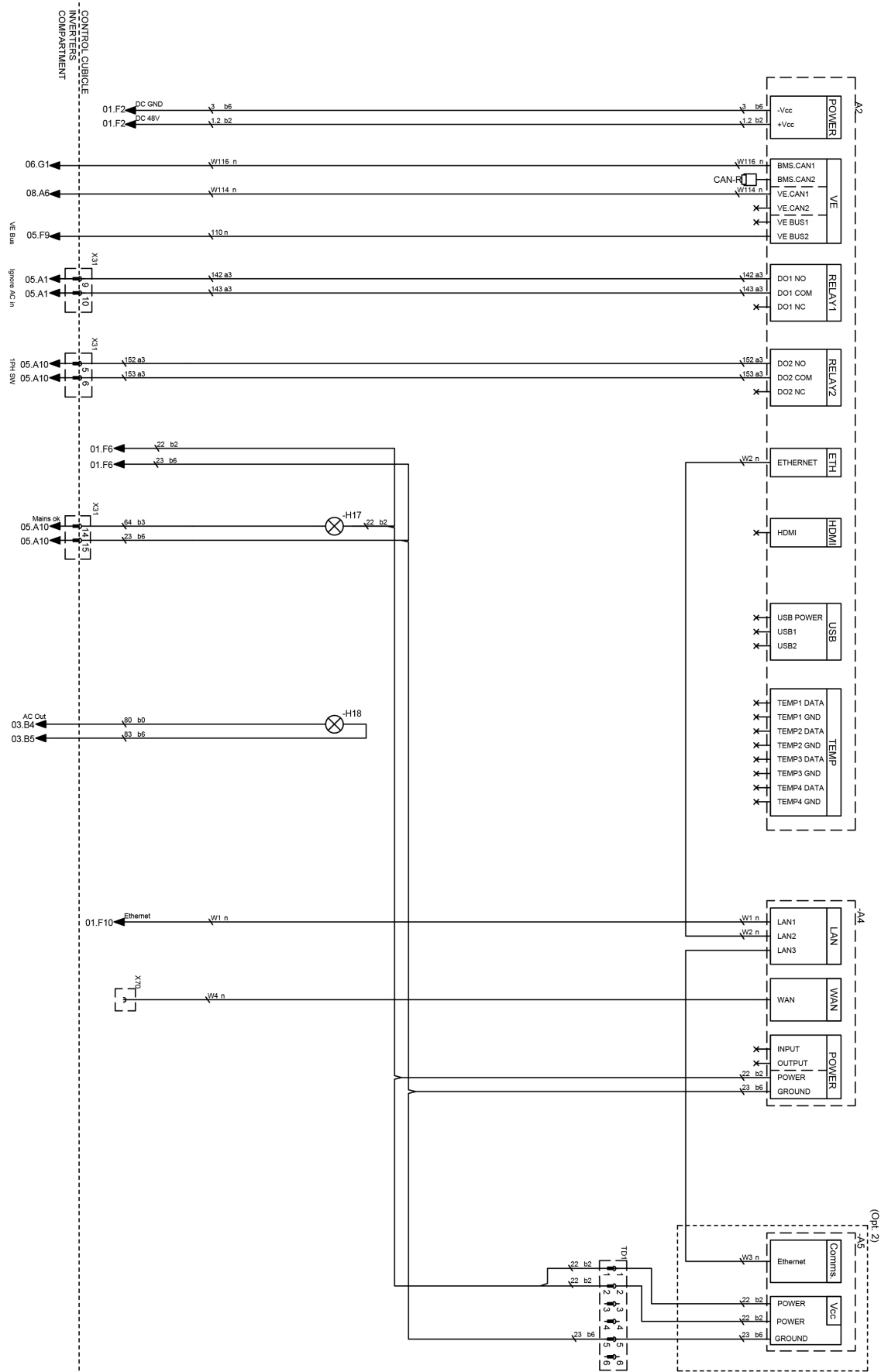
WIRE COLOR	
COD.	COLOR
0	BLACK
1	BROWN
2	RED
3	ORANGE
4	YELLOW
5	GREEN
6	BLUE
7	PURPLE
8	GREY
9	WHITE
54	GREEN/YELLOW

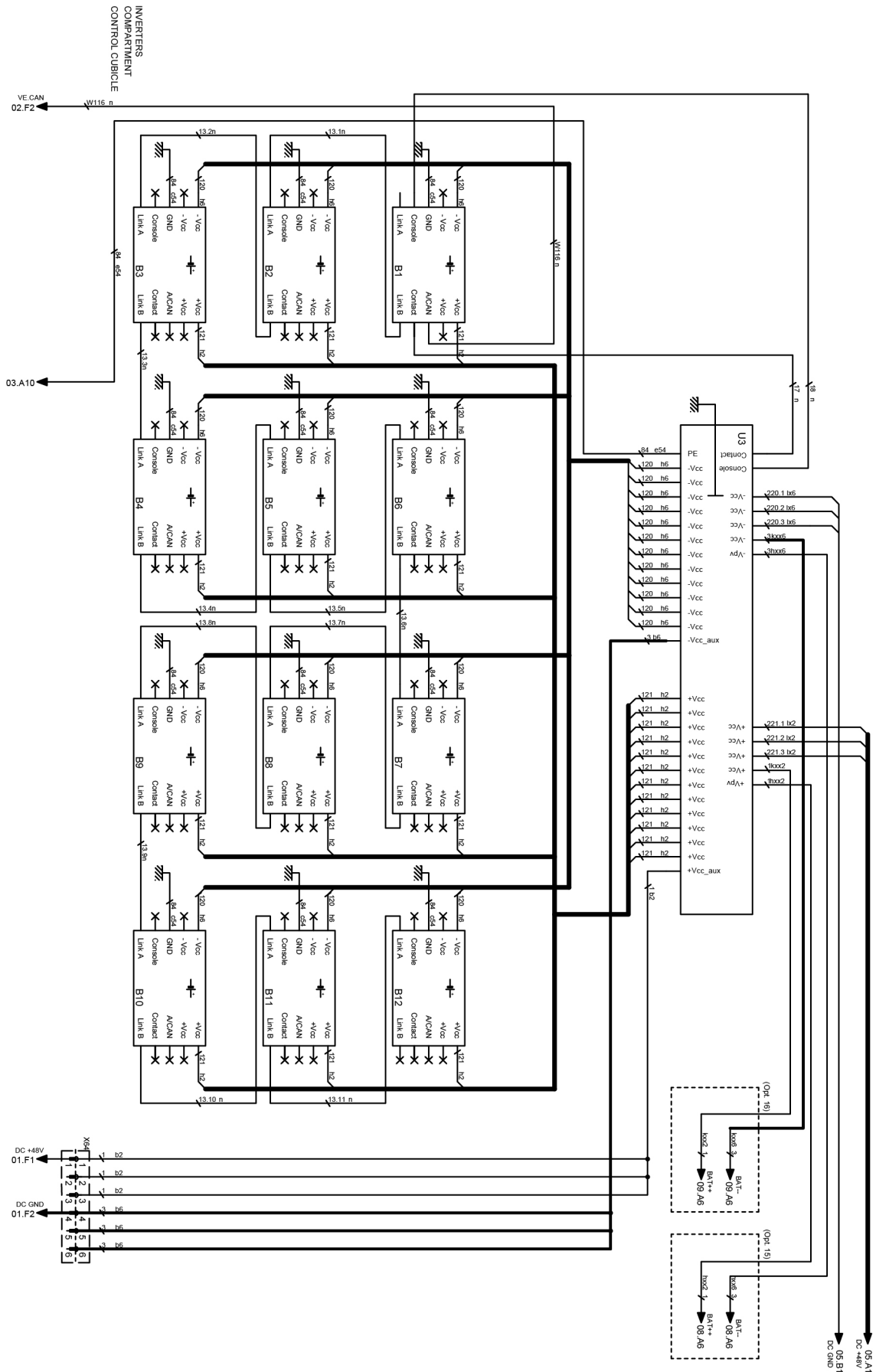
OPTIONS	
1	SMART BOX
2	IN/OUT 3P63/3P63
3	DOMESTIC SOCKET-CEE 3P 16A ELP
4	DOMESTIC SOCKET-RIM 3P 16A ELP
5	DOMESTIC SOCKET-PIN 3P 16A ELP
6	DOMESTIC SOCKET-CEE 3P 32A ELP
7	COLD WEATHER
8	SOLAR 450 - 100
9	SOLAR 450 - 200
10	SOLAR MAXIMUM

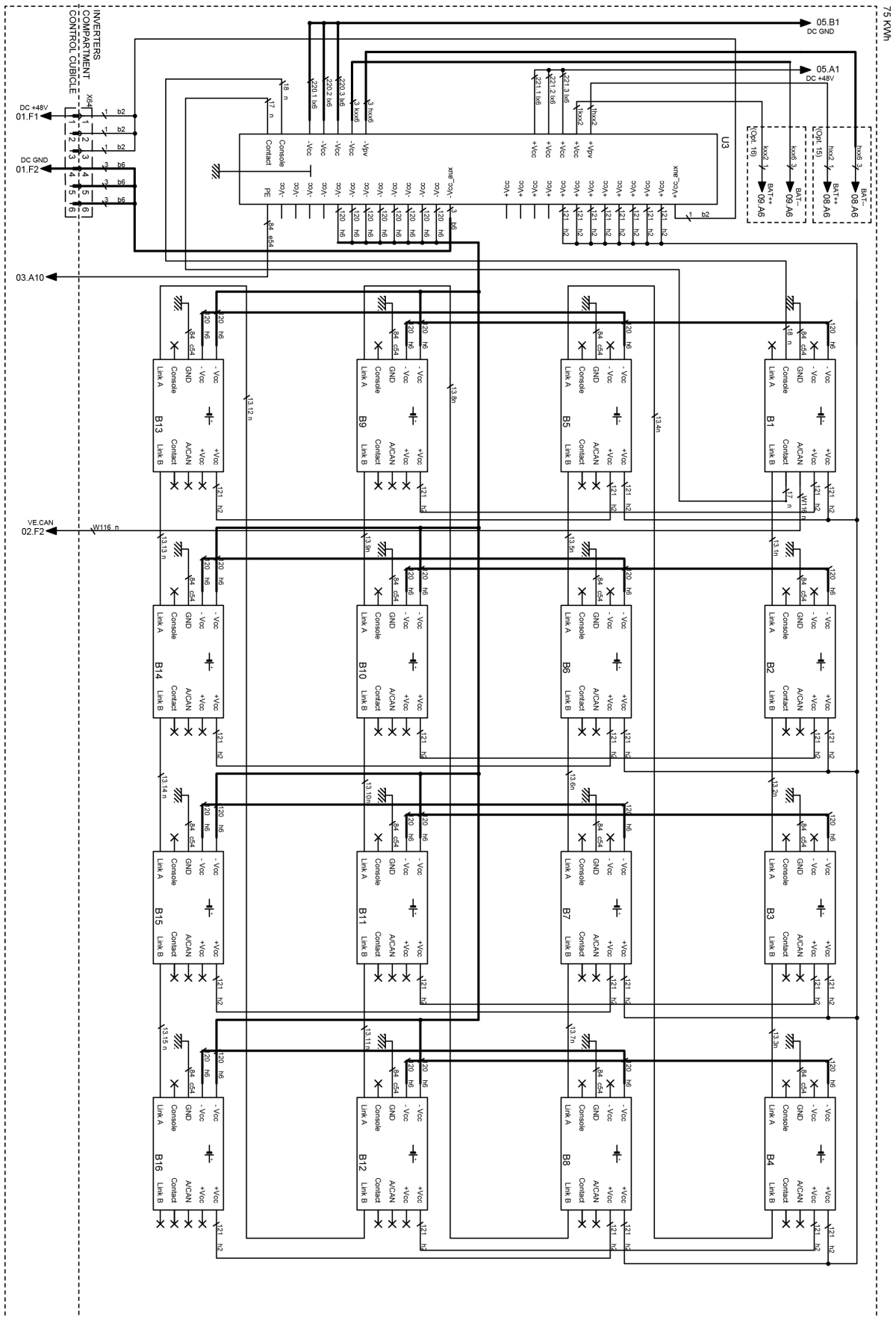
Circuit diagram ZBP45-60 & ZBP45-75 - 1636040976 Sheet 1 of 10



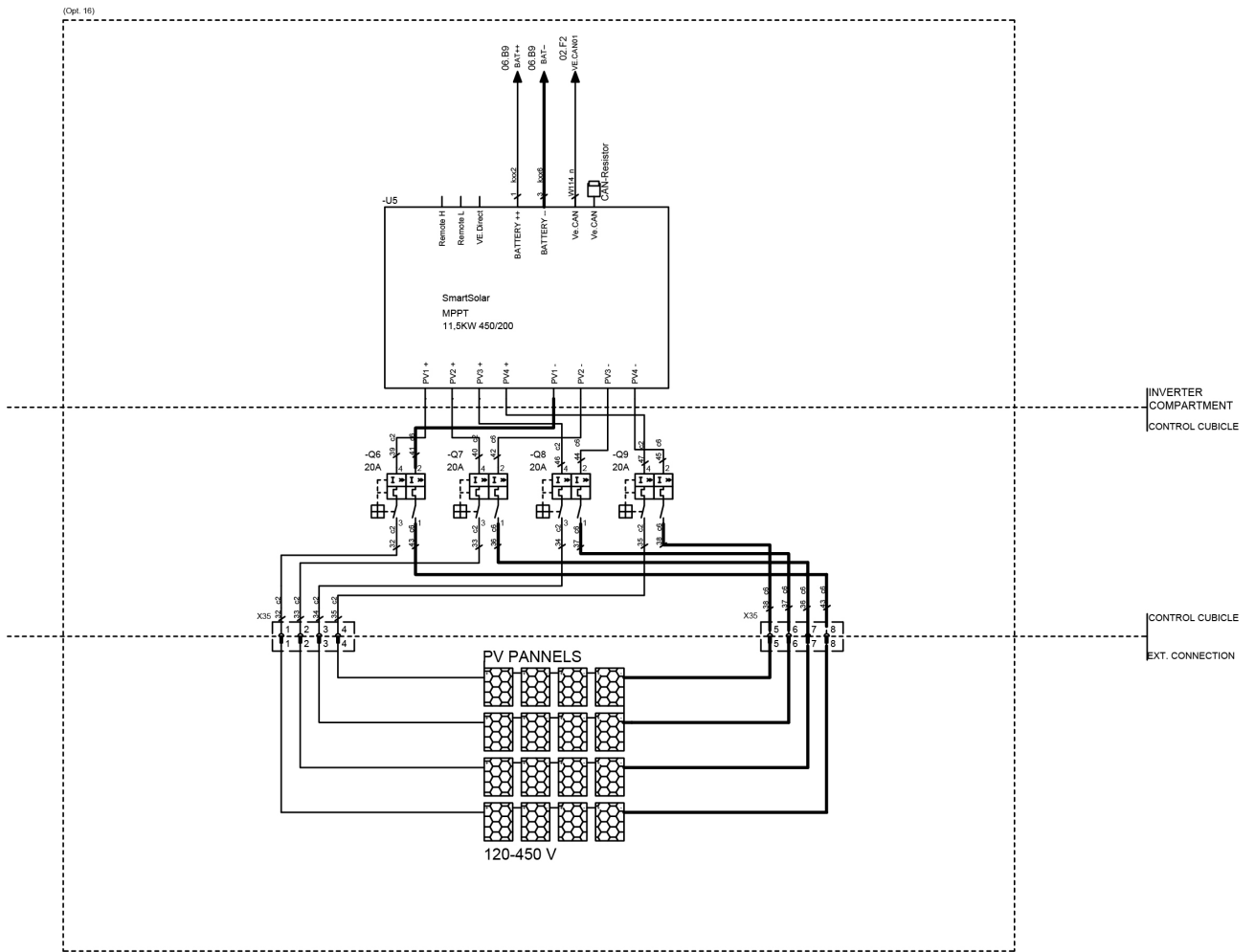
Sheet 2 of 10







Sheet 9 of 10



Sheet 10 of 10

WIRE SECTION		
SECTION	INSULATION CLASS	
0.5mm ²	H07V-K	aa
0.75mm ²	H07V-K	ab
1mm ²	H07V-K	a
1.5mm ²	H07V-K	b
2.5mm ²	H07V-K	c
4mm ²	H07V-K	d
6mm ²	H07V-K	e
10mm ²	H07V-K	f
16mm ²	EPR	gx
25mm ²	H07V-K	h
25mm ²	EPR	hx
25mm ²	H07V-K TRI-RATED	
35mm ²	EPR	ix
50mm ²	EPR	jx
70mm ²	EPR	kx
70mm ²	H07V-K TRI-RATED	
95mm ²	H07V-K TRI-RATED	
Ethernet	NA	n

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

OPTIONS		
SMART BOX		2
GPS 5P125A/5P125A-5P63A-3X3R63A		3
IN/OUT TB/TB EU		4
IN/OUT 5P125/ 5P125		5
IN/OUT PL/PL EU		6
IN/OUT PL/PL AUS		7
IN/OUT 5P63A/5P125A		8
OUT 5P63-32A		9
DOMESTIC SOCKET-CEE 3P 16A ELP		10
DOMESTIC SOCKET-RIM 3P 16A ELP		11
DOMESTIC SOCKET-PIN 3P 16A ELP		12
DOMESTIC SOCKET-CEE 3P 32A ELP		13
COLD WEATHER		14
SOLAR 450 - 100		15
SOLAR 450 - 200		16
ELP-A		17
ELP-B		18

B.O.M.	
TAG	DESCRIPCION
A1	EMS 1
A2	CERBO
A4	ROUTER
A5	SMART LINK
B1..16	BATTERY
F1	FUSE 2A
F2	FUSE 2A
H1	HEATER
H2	HEATER
IN1	INVERTER 1
IN2	INVERTER 2
IN3	INVERTER 3
H17	GREEN LAMP 24VDC
H18	GREEN LAMP 230VAC
K1	RELAY 24V 15A 2NO
K2	RELAY 230V SPDT
K3	RELAY 24V 2NC - 2NO
K4	RELAY 24V
K5	RELAY 230V SPDT
K6	RELAY 230V SPDT
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
Q26	RCBO C16 30MA
Q27	RCBO C16 30MA
Q28	BREAKER 2P 63A
Q29	BREAKER 2P 63A
Q30	BREAKER 2P 63A
S20	EMERGENCY STOP
S5	DOOR ENDSTOP
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 POWER LOCKS
X11	MALE 5P 125A SOCKET
X12	MALE 5P 63A SOCKET
X13	MALE 3P 16A SOCKET
X20	FEMALE POWER LOCKS
X21	FEMALE 5P 125A SOCKET
X22	FEMALE 5P 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
X34	HARTING CONNECTOR 4P
X35	SOLAR CONNECTORS
X37	TERMINAL STRIP
X38	TERMINAL STRIP
X40	TERMINAL STRIP
X41	TERMINAL STRIP
X43	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
TD1	FAST CONNECTOR

Following documents are provided with this unit"

EC Declaration of conformity

Following documents are provided with this unit"

EC Declaration of conformity

EC DECLARATION OF CONFORMITY

1 We, Grupos Electrógenos Europa S.A., declare under our sole responsibility, that the product

2 Machine name : **Energy Storage System**

3 Commercial name :



4 Serial number :

5 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	Amendment
6	Electromagnetic compatibility	2014/30/EU EN 61000-6-1 EN 61000-6-2 EN 61000-6-3	
7	Low voltage equipment	2014/35/EU EN 60204-1 EN-IEC 62040-1 IEC 62619	
8	Ecodesign, energy-related products	2009/125/EC	
9	Radio equipment	2014/53/EU	X
10	ROHS Directive	2011/65/EU	
11	WEEE Directive	2012/19/EU	
12	Batteries Directive	2006/66/EC	

13 The harmonized and the technical standards used are identified in the attachments hereafter

14 Grupos Electrógenos Europa, S.A. is authorized to compile the technical file

15	Conformity of the specification to the Directives	Conformity of the product to the specification and by implication to the directives
16	Product Engineering	Manufacturing
17	Name Jesus Maza	Name Stefan Isberg
18	Signature 	Signature 
19	Place , Date	Muel (Zaragoza), Spain

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

Postal address: Polígono Pitarco II, Parcela 20
50450 Muel ZARAGOZA
Spain
www.atlas-copco.com

Phone: +34 902 110 310
Fax: +34 902 110 318

V.A.T #50024660

For info, please contact your local Atlas Copco representative

Form 1 (2009) 199
ed. 03, 2009-03-12

p. 1 (5)

Radio equipment 2014/53/EU

1. Description

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

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

2. Harmonized standards used :

- See table
- See front page of Declaration

3. National technical standards and specifications used : see table

GRUPOS Electrónicos Europa, S.A.

A company within the Atlas Copco Group

Form 1 630385-222
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Postal address
Polígono Pitarco II, Parcela 20
50450 Ibañeta ZARAGOZA
Spain
www.atlas-copco.com

Phone: +34 903 110 318
Fax: +34 903 110 318

V.A.T A50304660

For info, please contact your local Atlas Copco representative

