

# EPH 100

## Mobile Hybrid Generator



### Standard Scope of Supply

The Atlas Copco ECOpower Hybrid 100 (EPH 100) is a modular hybrid generator perfect for increase fleet utilization as well as reduce fuel consumption and CO2 emissions. Both, state of the art, QAS Stage V and ZBP ranges integrated into a 15 feet container frame and driven by ease of use 1 click solution.

Based in lithium-ion batteries and Stage V technology, EPH 100 is designed to supply power on a vast variety of hybrid applications, such as rental, construction, events and telecom. 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.

These hybrid generator features an innovative design that meets the strictest environmental regulations and helps end-users to optimize their operational performance. Thanks to their high resilience in fast and easy connection, these models are unrivaled when it comes to flexibility. The EPH range is "Plug-and-Play" (multiple sockets, power locks, terminal board), features easy fast connections for fuel and urea (fuel valve, automatic refueling system, automatic urea transfer system), Fleetlink Telemetry.

### Standard Features

- ECO controller
- Compact, sound attenuated, corrosion resistant, with single point lifting and 110% fluid containment
- Heavy Duty alternator with AREP+ excitation, 3-phase Digital AVR D350 and additional grade protection
- Easy service with long run filters and 600-hour service intervals
- FPT F34 Stage V engine, DOC + SCRoF + CUC exhaust after treatment
- Earth Leakage Relay
- Emergency Stop
- Dual Frequency (only on generator)
- Remote signal Start / Stop
- External Fuel Tank Connections
- Coolant heater
- Battery Charger
- Cold weather
- Auxiliary input socket 230V

### Benefits

- Ease of use 1 click solution
- Extremely durable and environmentally sensitive, designed to be used for everything from the oil field to special event power
- Start-up power for the most demanding sites with 270% overload starting capabilities
- Heavy duty oil, air and fuel filters, extend maintenance interval to 600 hours for reduced total cost of ownership
- Proven engine platform, high reliability and durability
- Indirect contact protection for user safety
- External, recessed emergency stop for increased safety
- Improve genset versatility with possibility of 60Hz application
- Allows connection as a critical back-up unit via a 2-wire dry contact connection in the distribution panel
- Ability to provide extended running hours with external fuel tank
- Maintain engine temperature at optimal level to improve load acceptance.
- Ensures the batteries are always ready for starting
- Allows to use the generator in lower temperature condition
- 230V external feeding for both coolant heater and battery charger

## Technical Data

Hybrid Generator	Units	EPH 100					
Rated frequency	Hz	50					
Rated voltage	V	400					
Maximum hybrid power 25°C	kVA/kW	100/84					
Maximum hybrid power 40°C	kVA/kW	96/81					
Battery pack capacity	kWh	60					
Instantaneous* Fuel Consumption 0% 10% 25% 50% 75% 100%**	l/kWh	-	0.301	0.301	0.271	0.278	0.284
Instantaneous* Fuel Consumption 0% 10% 25% 50% 75% 100%**	l/h	0	0.0	6.4	11.4	13.0	13.0
Equivalent* Fuel Consumption 0% 10% 25% 50% 75% 100%**	l/h	0	2.5	6.3	11.4	17.5	23.9
Energy Autonomy 0% 10% 25% 50% 75% 100%**	h	-	78.2	36.8	20.6	3.6	1.5
Power factor cos φ		0.84					

\* Instantaneous Fuel Consumption considers external power source for battery recharging

Equivalent Fuel Consumption considers only QAS power source for battery recharging

\*\*Considering Maximum hybrid power as 100%, @25°C and energy fully charged

Energy Storage System	Units	Only ZBP45-60
Rated frequency	Hz	50
Rated voltage	VAC	400 / 230
Rated power 25°C	kVA/kW	45/36
Rated power 40°C	kVA/kW	41/33
Rated energy storage capacity	kWh	57.6
Net energy storage capacity <sup>1</sup>	kWh	53.57
Battery rated voltage	VDC	48
Rated current discharge	A	52
Recharge time 100% rated power	h	2.3
Depth of discharge (DoD%)	%	95%
End of Life (EoL%)	%	70%
Battery type		Lithium Iron phosphate LiFePO4
Operating temperature <sup>2</sup>	°C	-10 to 50
Dimensions (L x W x H)	mm	1450 x 1160 x 1865
Weight	kg	1292
Sound pressure level (7 meter)	dB(A)	<70

Generator	Units	Only QAS 60 S5
Rated frequency	Hz	50   60
Rated voltage	V	400   480
Prime power (PRP)	kVA / kW	60/48   59/47
Rated standby power (ESP)	kVA / kW	60/48   59/47
Power factor cos φ		0,8
Rated current (PRP)	A	86   71
Single step load capability (G3) acc. ISO-8528/5	%	100   100
Operating temperature (min/max) (with cold weather equipment)	°C	-25/50
Alternator Model		LEROY SOMER TAL 042H
Rated output (ESP 27°C   40°C)	kVA	66   80
Degree of protection / insulation class		IP 23 / H
Excitation type / AVR model		AREP+ / D350
Sound power level (LwA)	dB(A)	89
Sound pressure level (LpA) at 7m	dB(A)	61

Engine	Units	Only QAS 60 S5
Model		FPT F34TEVP01
Emission compliance		Stage V
Speed	rpm	1500   1800
Rated net power (with fan)	kW <sub>m</sub>	54   53,6
Aspiration		Turbocharged and air-to-air aftercooled
Speed control		Electronic
Number of cylinders		4L
Coolant		Parcool
Swept volume	l	3,4
Exhaust gas after treatment system <sup>6</sup>		EGR+DOC+DPF
Combustion system		Direct Injection
Capacity of oil sump : - Initial fill	l	8
Capacity of cooling system	l	58
Maximum permissible load factor during 24h period	%	70
Electrical system (DC)	V	12

Fuel System (data only for QAS 60 S5)	Units	Only QAS 60 S5
Fuel Consumption @ 0% load	l/h	1.9
Fuel Consumption @ 50% load	l/h	7.1
Fuel Consumption @ 75% load	l/h	9.8
Fuel Consumption @ 100% load	l/h	13.0
Fuel Type		Diesel
Fuel Tank Capacity: daily	l	220
Fuel Autonomy @ 75% load <sup>7</sup>	h	22
Fuel Autonomy @ 100% load <sup>7</sup>	h	17

The standard reference conditions are: 0' altitude, 25 °C, 100 kPa and 30% relative humidity. For nominal values efficiencies, deratings and DoD are not considered and tested parameter related to PF=1.

EN-IEC 61000, EN-IEC 60335, EN-IEC 60335, EN-IEC 62109, EN 55014, UL1741, IEEE1547, UL1741, UL9540, NEMA250, ADR class 9, UN 3536, CE, NEN3140, NEN3840, ISO9001, ISO14001, Low Voltage Directive 2014/35/EU, EMC directive 2014/30/EU

1 Due to use this may decrease

2 Options for Cold weather (heaters) might be needed. Atlas Copco will keep the rights to change any data when necessary due to any reason.

2 Please see receptacle voltage configuration in Power Distribution section

3 Engine oil to meet CJ-4 (low ash oil)

4 Please see "Derate Table" for altitude and temperature calculations on

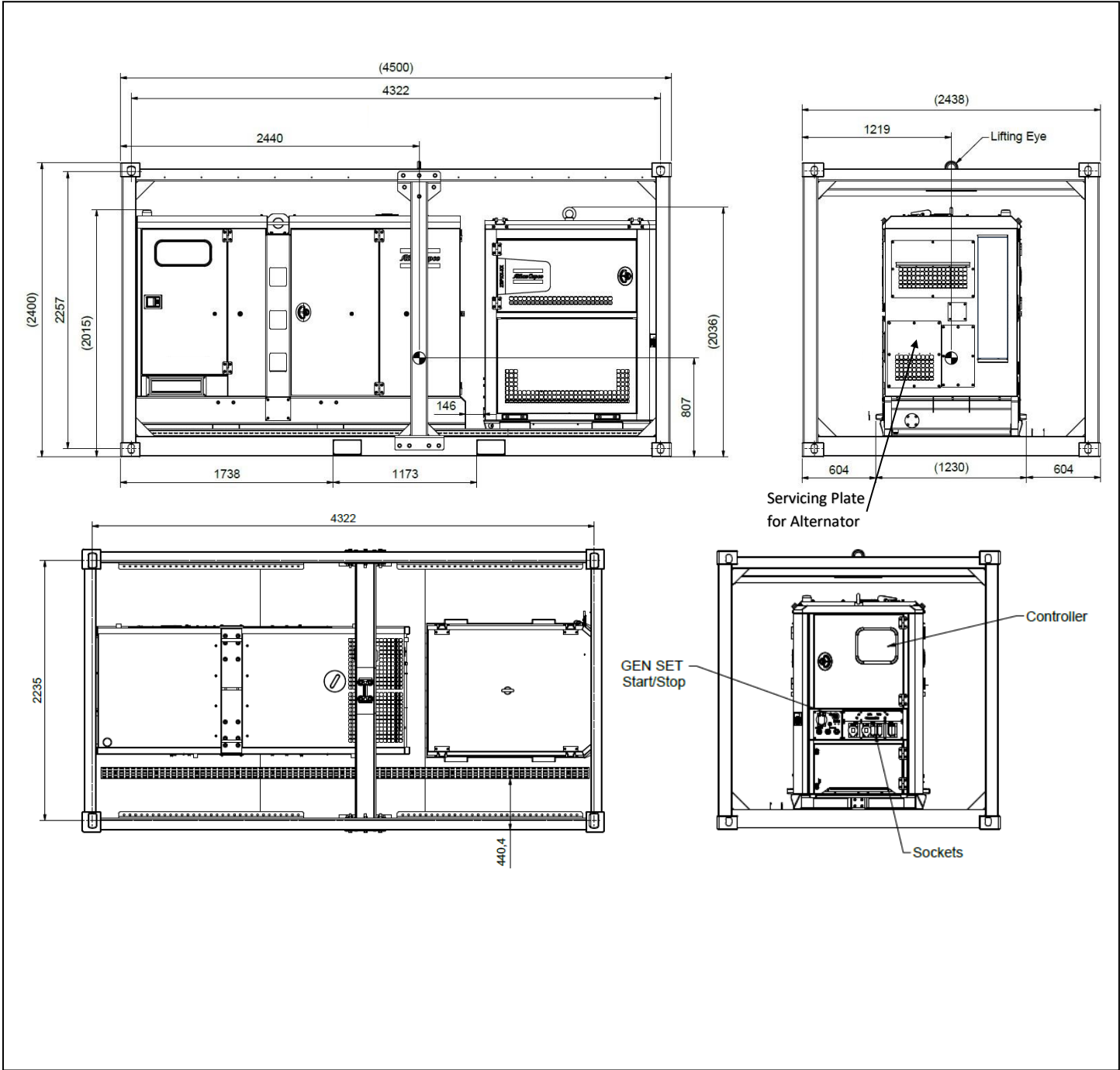
5 Engine and emissions require the use of Ultra Low Sulfur Diesel in accordance to ASTM-D975 Grade No.1-D S15 & No.2-D S15

6 DOC = Diesel Oxidation Catalyst | SCRoF = Selective Catalytic Reduction on Filter | CUC = Clean Up Catalyst

7 Diesel density used 0.86 kg/l

Dimensions

Drawing



**Weight - Wet (ready to operate)**  
Net / Wet mass (with standard daily fuel tank)

**Units**  
kg

**EPH 100**  
4680 / 4880

**Dimensions**  
Standard fuel tank (L x W x H)

m

4.5 x 2.44 x 2.4

## Main Data

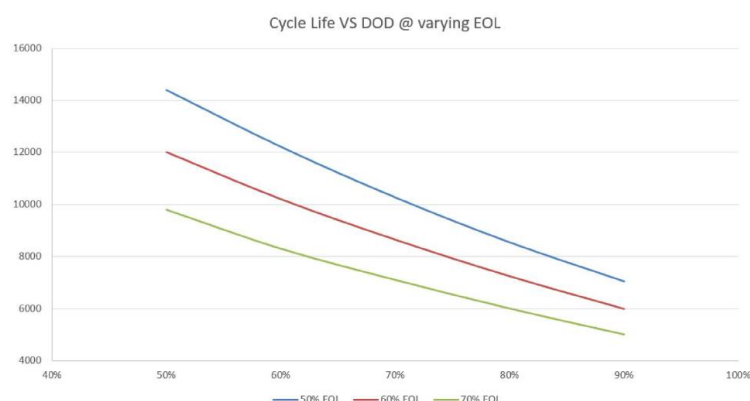
### Batteries

Lithium-iron-phosphate (LiFePO<sub>4</sub> or LFP) is the safest of its family. Also does not need to be fully charged to perform correctly. 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

Quantity	12	C-rate discharge	1 C
Rated voltage (VDC)	48	Weight (kg)	39
Rated capacity* (Ah)	100	Expected cycle life (@DoD,EOL,25°C)	6000
Rated capacity* (Wh)	4800	Standards	IEC62619, IEC63056, CE, UN38.3, UL1973, UKCA

\*@25°C



#### Terms:

**SOC%:** State of Charge, measures the remaining energy content in a battery

**SOH%:** State of Health, ratio of the recharging capacity, compared to a new battery

**DOD%:** Depth of discharge, defines the energy consumed in the battery

**Cycle:** Complete charge and discharge of its usable energy stored (DoD%)

**EoL%:** End of life, SOH is at this value

### Inverter

Power electronics that combine 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.

Quantity	3	Peak efficiency %	96%
Input DC voltage range (VDC)	38-66	Peak power %	150%
Rated apparent power (kVA)	15	Maximum power time (min)	1
Rated active power (kW)	12	Power factor	0.8

Nominal values for standard conditions and performance

### Engine: FPT

FPT Stage V, turbo charged, intercooled, six-cylinder, liquid-cooled diesel engine provides ample power to operate the generator continuously at full-load.

The engine has Diesel Oxidation Catalyst, Selective Catalytic Reduction on filter with an Ad-Blue tank and Clean Up Catalyst to meet with European Stage V emission directive. All functionality of the engine is monitored automatically on the controller.

The engine has the capability to start the generator at -15°C with standard scope of supply. Cold weather option is available for machine starting for down to -25°C.

The engine operates on a 12V negative ground electrical system with a charging alternator and lockable battery cut-off switch.

The cooling system is suitably designed for continuous operation in ambient conditions up to 40°C with canopy door closed.

## Fuel System

The fuel tank provides safe diesel storage while eliminating tank corrosion contaminants from being introduced to your fuel system. With integrated fuel water separator and filter, the system is designed to help maintain clean and trouble-free diesel supply to the engine for reliable trouble-free operation.

- ✓ Pad-lockable diesel fill cap
- ✓ Fuel / Water separator
- ✓ Fuel pre-filter
- ✓ Fuel level sensor
- ✓ Low fuel shut down feature
- ✓ External fuel connections w/3-way valve and quick couplings

## Scheduled maintenance

Standard equipped with filters sized and designed to allow 600-hour service intervals under normal operating conditions. Extended time between services reduces down time and total cost of ownership of the unit over its lifetime.

### 600 Hour Service Interval:

- ✓ Oil filter
- ✓ Fuel filter
- ✓ Fuel / water separator

### 1200 Hour Service Interval:

- ✓ Air filter
- ✓ Oil filter
- ✓ Fuel filter
- ✓ Fuel / water separator

NOTE: Site specific operating conditions such as; poor fuel quality and low load profile may require more frequent service intervals.

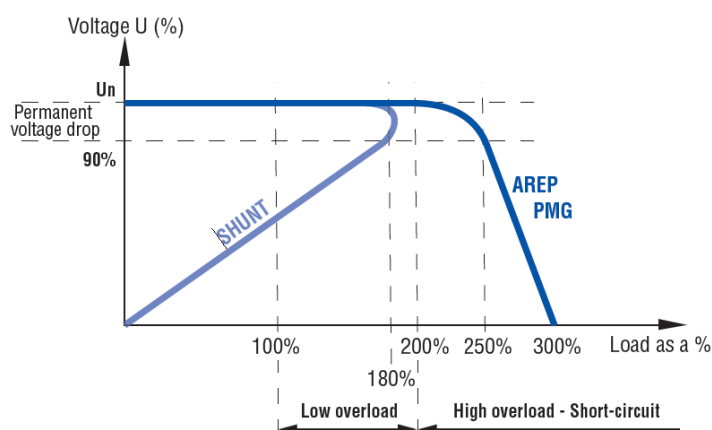
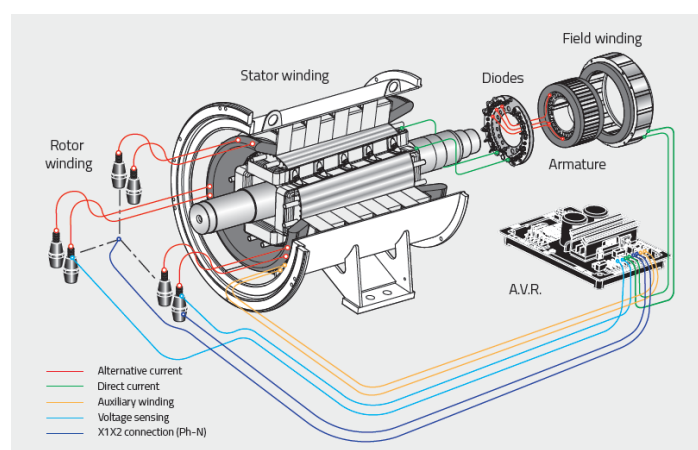
## Alternator

The Leroy Somer TAL alternators are designed for heavy duty continuous applications, with system 2 winding protection and Leroy Somer's AREP+ excitation system.

- AREP+ Excitation for superior motor starting capabilities
- System 2 (relative humidity >95%) protection
- 4 pole brushless design with single bearing, Class H insulation and IP23 rating
- Voltage regulation +/- 1%
- Full Load acceptance of prime power rating

The new AREP+ system by Leroy-Somer uses the output voltage of the main stator as supply voltage and a single auxiliary winding inserted in selected slots of the main stator for booster effect. The combination of these two sources is then used to power the regulator, thus combining the power of a traditional SHUNT system with the reliability and control level of an AREP system. Under the same conditions, more power is taken to supply the regulator, which improves the excitation capabilities.

The AREP+ system improves the electrical performance of equipped machines, especially during transient short circuit, load shedding or load impact phases. As a result, the starting kVA performances are improved by up to 30% depending on generator model (vs a standard AREP system). This level of performance is decisive when generators are used to start electric motors. The AREP+ system gives the alternator a high short circuit capability.



## Performance @ Altitude and High Ambient Conditions and for 50 and 60Hz. Data valid only for QAS 60 S5

When using at altitude and high ambient conditions the engine and alternator will de-rate as per chart below.

Derating factor %		temperature (°C)										
height (m)		0	5	10	15	20	25	30	35	40	45	50
	0	100	100	100	100	100	100	100	100	100	97	95
	500	100	100	100	100	100	100	100	100	100	97	95
	1000	100	100	100	100	100	100	100	100	100	97	95
	1500	97	97	97	97	97	97	97	97	97	97	95
	2000	94	94	94	94	94	94	94	94	94	94	94
	2500	91	91	91	91	91	91	91	91	91	91	91
	3000	88	88	88	88	88	88	88	88	88	88	88

## Enclosure & Frame

The generator enclosure is designed for extreme applications to provide superior performance and reliability.

The enclosure is fabricated from galvanized steel which is powder coated for corrosion resistance. The enclosure and frame are fully sealed providing a true 110% containment of the maximum fluid tank.

- ✓ Galvanized steel powder coated enclosure for both QAS 60 S5 and ZBP 45-60
- ✓ Heavy duty base frame with standard ISO 15 feet container dimensions. ISO corners and C5M painting treatment
- ✓ 110% fluid containment
- ✓ Superior level of rain ingress protection and design features
- ✓ Pad-lockable doors and fuel cap
- ✓ Engine fluid plumbed to exterior of frame for ease of service
- ✓ Central lifting point
- ✓ Sound dampening material and design to allow quiet operation

## Noise level and noise map

EPH 100 S5 generator delivers a significant reduction in operating noise levels and is quieter than comparable generators.

Sound power level (LwA)	dB(A)	89
Sound pressure level (LpA) at 7m	dB(A)	61

Data valid for QAS 60 S5 operation only.

## Power Distribution

QAS 60 S5 is connected to the power input of the ZBP 45-60 and it works in passthrough mode. The cubicle incorporates all power distribution, controls, sensing and protection devices.

- ✓ Current transformer x 3 (1 each leg)
- ✓ Single output main breaker w/shunt trip 160A
- ✓ Single input main breaker w/shunt trip 100A
- ✓ Individual breakers for each socket
- ✓ Sockets panel located on outside of unit for easy access
- ✓ Terminal board for hard wiring
- ✓ PowerLocks external quick connect
- ✓ External emergency stop switch (recessed)
- ✓ Neutral bonded to Ground with a removable bonding link accessible in the control cubicle



Circuit breaker-OUTPUT	Units	QAS 60 S5
Circuit-breaker 3ph: Number of poles		4
Circuit-breaker 3ph: Thermal release (It)	A	100
Circuit-breaker 3ph: Magnetic release (Im)	A	3,5 x In
Fault current protection, Insulation resistance	kΩ	1-160
Fault current protection, residual current release, I <sub>dn</sub>	A	0,03-30

Circuit breaker-INPUT	Units	ZBP 45-60
Circuit-breaker 3ph: Number of poles		4
Circuit-breaker 3ph: Thermal release (It)	A	100
Circuit-breaker 3ph: Magnetic release (Im)	A	Courve C. 5-10xIn
Fault current protection, Insulation resistance	kΩ	1-160
Fault current protection, residual current release, I <sub>dn</sub>	A	0,03-30

Circuit breaker-OUTPUT	Units	ZBP 45-60
Circuit-breaker 3ph: Number of poles		4
Circuit-breaker 3ph: Thermal release (It)	A	160
Circuit-breaker 3ph: Magnetic release (Im)	A	600
Fault current protection, Insulation resistance	kΩ	1-160
Fault current protection, residual current release, I <sub>dn</sub>	A	0,03-30

## Sockets and Power Locks panel

Two input/output options are available on the ZBP 45-60.

Option 1:

Input:

1x row of Power Locks 400A

Output:

1x row of Power Locks 400A

CEE 5P 63A 400V

CEE 5P 32A 400V

2x Single phase socket out of:

Single phase 3P 16A CEE 230V

Single phase 3P 16A PIN 230V

Single phase 3P 16A RIM 230V

Option 2:

Input:

CEE 5P 125A 400V

Output:

CEE 5P 125A 400V

CEE 5P 63A 400V

CEE 5P 32A 400V

2x Single phase socket out of:

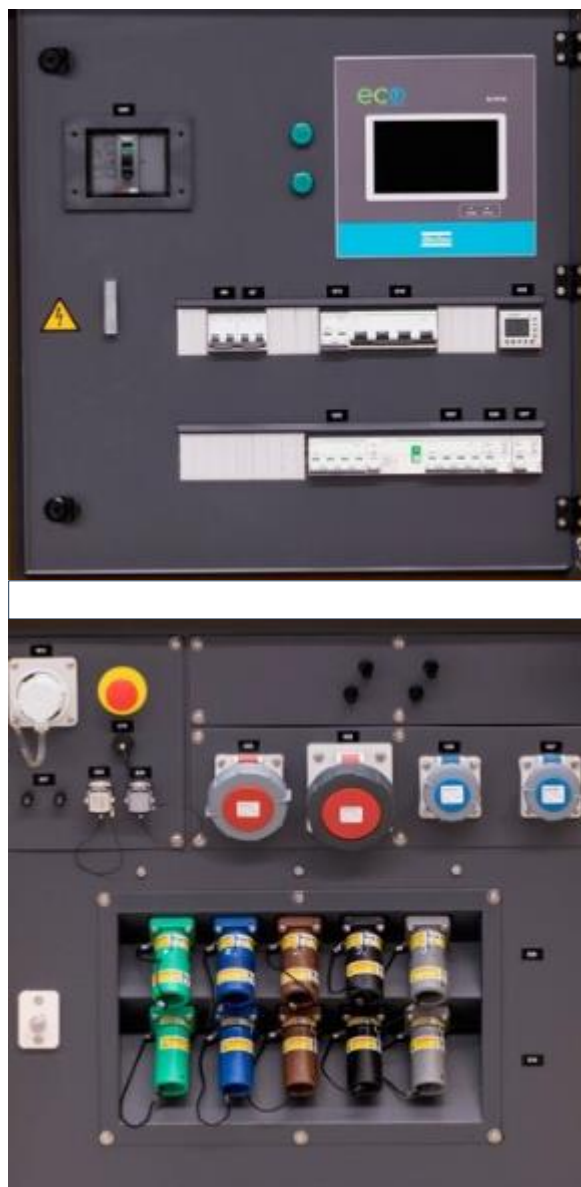
Single phase 3P 16A CEE 230V

Single phase 3P 16A PIN 230V

Single phase 3P 16A RIM 230V

It is also available an individual earth leakage protection per socket or type A or type B.

EPH 100 can include both, Earth Leakage Relay, type A, type B or Insulation Monitoring Relay.





## Controller - Standard

ECO Energy controller optimizer, provides intuitive control and monitoring for all batteries and power electronics integrated in the battery pack. A highly customizable start/stop system. Use state of charge, voltage, load and other parameters. Define a special set of rules for quiet times, and optionally a monthly test run.

Discharge autonomy 100% / 75% rate power (h)	1,3 / 1,8	Generator size recommended	45-120 kVA
Discharge autonomy 50% / 25% rated power (h)	2,7 / 5,3	Derating Temperature	> 25 °C
Maximum auxiliary consumption (kW)	5,4	Heating & Cooling	Heaters* / Air cooled
Maximum passthrough current (A)	100	Monitoring & GPS	Yes

Nominal values for standard conditions and performance



### Functionality:

- ✓ Easy operation. 1 click solution
- ✓ Applications easy setup: including live co-piloted setup procedure
- ✓ Troubleshooting guidelines inside
- ✓ Components self-testing

The QAS 60 S5 comes equipped with a Qc1212 control module. This is a diagnostic ECU controller with large 3" display that is intuitive and easy to operate with all functions conveniently at your fingertips. The controller also manages the engine ECU operating system, and several safety warnings and shut downs on various parameters (listed below). The controller is powered by a main On/Off switch located next to display.

### Qc1212 Controller Functionality:

#### Home Page (displayed while running, scrolling every 3seconds)

- ✓ Generator voltage (ph-ph)

#### Status Page

- ✓ Generator voltage (ph-N)
- ✓ Generator voltage (ph-ph)
- ✓ Generator frequency
- ✓ Generator kw
- ✓ Generator power factor
- ✓ Generator amperage

#### Generator Page

- ✓ Generator current (A)
- ✓ Generator earth current
- ✓ Generator load (kW)
- ✓ Generator load (kVA)
- ✓ Generator power factor
- ✓ Generator load (kVAr)
- ✓ Generator load (kWh, kVAh, kVArh)
- ✓ Generator phase sequence
- ✓ Dual mutual status

#### Event Page

- ✓ Displays the last 15 events

#### Info Page

- ✓ Model number
- ✓ USB identification number
- ✓ Configured engine type
- ✓ Module's date and time
- ✓ Scheduler setting

#### Engine Page

- ✓ Engine speed
- ✓ Oil pressure
- ✓ Coolant temperature
- ✓ Engine battery volts
- ✓ Run Time
- ✓ Oil Temperature
- ✓ Fuel Temperature
- ✓ Turbo Pressure
- ✓ Fuel Pressure
- ✓ Fuel Consumption
- ✓ Fuel Used
- ✓ Fuel Level
- ✓ Auxiliary Sensors
- ✓ Engine Maintenance Due
- ✓ Engine ECU Link

## Remote Start/Stop

- ✓ Automatic start/stop via 2 wire dry contact connection

## Operational Buttons

- ✓ Start button
- ✓ Stop button
- ✓ Automatic mode (external remote start)
- ✓ Up/Down arrows

## Engine DTC Page

- ✓ This page contains any active Diagnostic Trouble Codes that the engine ECU is currently generating. These alarms are conditions detected by the engine ECU and displayed on the DSE controller.



## Options available

- Power input/output connections: see Sockets and Power Locks panel chapter
- External Fuel Tank Connections
- Automatic fuel refueling system

## Benefits

- Maximize the use of the generator granting versatility through different power input/output connections.
- Ability to provide extended running hours with external fuel tank
- Ability to provide extended running hours maintaining the day tank at optimal level with external fuel tank

## Manufacturing & Environmental Standards

The **EPH 100** is manufactured following stringent ISO 9001 regulations, and by a fully implemented Environmental Management System fulfilling ISO 14001 requirements.

Attention has been given to ensure minimum negative impact to the environment.

The **EPH 100** meets current European Stage V directive.

## Supplied Documentation

The unit is delivered with documentation regarding:

- Hard copies of the Engine Manual, alternator manual, wiring diagram in English, Atlas Copco Operators Safety and Instruction Manual
- CE certificate and Test certificate