

This document gives a complete list of technical data with some detailed explanations of the main systems, subsystems and performance of our generators, in order to support local sales documentation, tenders or even technical doubts.

While every effort has been made to ensure that the information in this manual is correct Atlas Copco does not assume responsibility for possible errors. Atlas Copco reserves the right to make changes without prior notice.



Standard Model Scope

Applying insights gained from industrial customers, rental companies, public utilities and other end users QAS generators are designed to withstand the most demanding on-site conditions and environments.

Considering their impressive performance at full capacity, the QAS line of generators includes excellent features for noise reduction and environmental protection.

QAS generators are purpose built for quick, easy and safe transport and on-site handling. Built to last, a QAS generator will provide years of dependable service for your electrical power generation needs.

All members of the widely appreciated QAS family are intelligent multi-task units managing to power a wide range of electrical equipment in different applications.

Their superior component configuration offers a wide range of control modules, electrical settings and mechanical options, in order to guarantee superior quality at efficient operating costs.

Conceived for 100% prime power operation in the most severe outdoor conditions, ready to work in sensitive areas, QAS generators are designed and configured for safe operation with minimal downtime under any circumstance.

Features

- Carefully selected components, accurately developed and tested configuration
- Superior standard configuration and extensive option list
- 500 hours service interval and superior accessibility to all service points
- Compact and safe concept and sturdy design
- Designed and built to last

Benefits

- Accurate and stable power regardless of the conditions
- Ability to power a wide range of applications
- Service efficiency: increased up-time
- Increased transport efficiency
- Superior resale value / longer life time

Manufacturing and Environmental Standards

The QAS range 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 QAS range complies with the latest noise emission directives.

Declaration of Conformity

Our QAS EC falls under the provisions of the article 12.2 of the EC Directive 2005/42/EC on the approximation of the laws of the Member States relating to machinery, is in conformity with, the relevant Essential Health and Safety Requirements of this directive:

MACHINERY SAFETY (2006/42/EC): EN ISO 12100-1, EN ISO 12100-2, UNE EN 12601

ELECTROMAGNETIC COMPATIBILITY (2004/108/EC): EN 61000-6-5, EN 61000-6-4

LOW VOLTAGE EQUIPMENT (2006/95/EC): EN 60034, EN60204-1, EN 60439

OUTDOOR NOISE EMISSION (2000/14/EC): ISO 3744

ISO 8528: QAS generators are design to comply with ISO 8528 regulation



1. Performance Data

Generator		QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
Rated speed	rpm	1500	1800	1500	1800
Rated power factor (lagging)		0,8	0,8	0,8	0,8
Rated Prime Power, PRP	kVA	200	225,0	200	220,0
	kW	160	180,0	160	176,0
Limited Time Power, ESP (Stand-by)	kVA	220	247,5	220	242,0
	kW	176	198,0	176	193,6
Continuous Operation Power, COP (Continuous)	kVA	140	157,5	140	154,0
	kW	112	126,0	112	123,2
Rated voltage (3ph. line to line)	V	400	480	400	480
Rated voltage (1ph. line to neutral)	V	230	277	230	277
Rated current 3ph. (PRP)	A	288,7	270,6	288,7	264,6
Rated current 3ph. (ESP)	A	317,5	297,7	317,5	291,1
Maximum sound power level (LWA) complies with 2000/14/EC	dB(A)	97	99	97	99
Maximum sound pressure level (LPA) at 7 m	dB(A)	69	71	69	71
Coupling engine/alternator		Direct		Direct	
Capacity fuel tank (total)	l	469		469	
Fuel tank specifications		Metal		Metal	
Fuel Autonomy at full load (Considering full capacity)	h	11,3	9,6	11,1	9,0
Single step load acceptance (within G2, acc. ISO 8528-5:1993)	%	80	95	50	55
Frequency drop (lower than % isochronous)	%	≤0,25	≤0,25	≤0,25	≤0,25
Maxim oil consumption 100% load	l/h	0,08	0,09	0,08	0,09

Derating Table (%)

	0°C	5 °C	10 °C	15 °C	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
0 m	100	100	100	100	100	100	100	100	100	85	75
500 m	100	100	100	100	100	100	100	100	100	85	75
1000 m	100	100	100	100	100	100	100	100	100	85	75
1500 m	95	95	95	95	95	95	95	95	90	85	75
2000 m	90	90	90	90	90	90	90	90	85	80	75
2500 m	85	85	85	85	85	85	85	85	80	NA	NA
3000 m	80	80	80	80	80	80	80	80	75	NA	NA
3500 m	75	75	75	75	75	75	75	NA	NA	NA	NA
4000 m	70	70	70	70	70	70	70	NA	NA	NA	NA

Limitations

Limitations		QAS 200 Vod Stage 3A	QAS 200 Vod Stage 2
Maximum ambient temperature	°C	50	50
Altitude capability	m	4000	4000
Relative air humidity maximum	%	85	85
Minimum running temperature	°C	-15	-15
Minimum running temperature, with coldstart equipment and opened breather*	°C	-25	-25

* on high humidity regions freezing may occur on the breather pipes

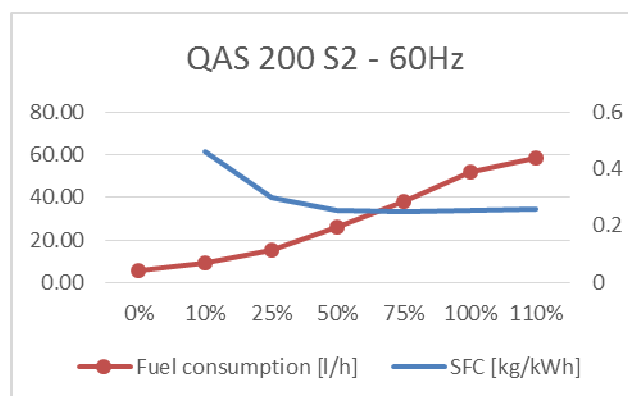
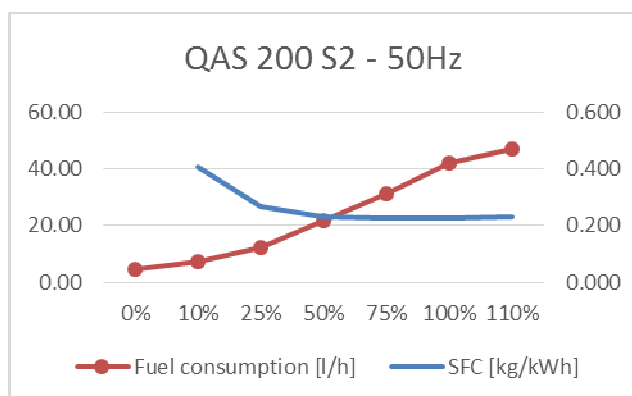
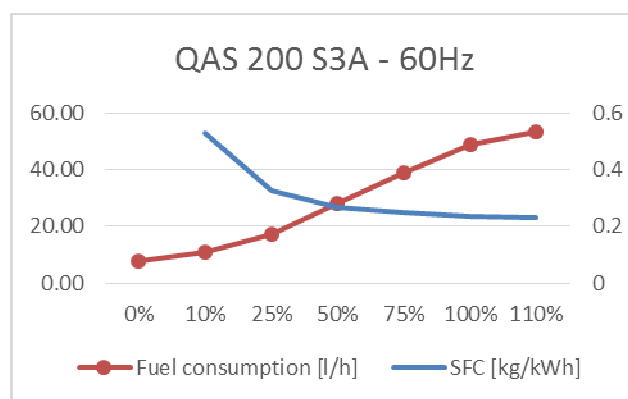
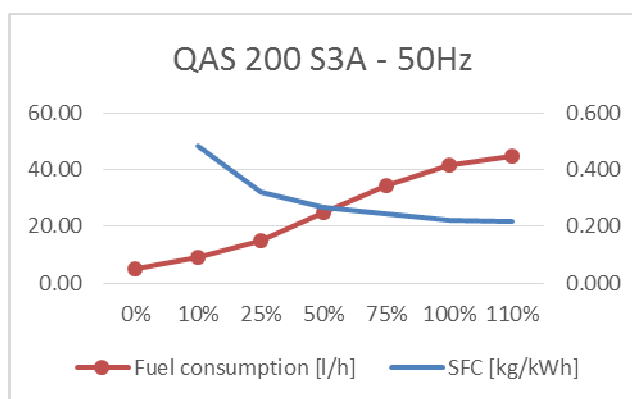
Application Data

Application Data		QAS 200 Vod Stage 3A	QAS 200 Vod Stage 2
Mode of operation		PRP	PRP
Max. Inclination		+/- 10°	+/- 10°
Operation		single / parallel	single / parallel
Start-up and control mode		manual / auto	manual / auto
Climatic exposure		open air	open air



	rpm	QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
		1500	1800	1500	1800
Fuel Consumption at*:					
0% Load	l/h	5,10	7,70	4,83	5,78
10% Load	l/h	9,00	11,10	7,55	9,46
25% Load	l/h	14,90	17,10	12,50	15,28
50% Load	l/h	24,80	28,00	21,63	26,10
75% Load	l/h	34,30	38,80	31,33	38,23
100% Load	l/h	41,40	49,00	42,30	51,92
110% Load	l/h	44,90	53,50	47,00	58,23
Specific Fuel Consumption at:					
0% Load	kg/kWh	NA	NA	NA	NA
10% Load	kg/kWh	0,484	0,530	0,406	0,462
25% Load	kg/kWh	0,320	0,327	0,269	0,299
50% Load	kg/kWh	0,267	0,268	0,233	0,255
75% Load	kg/kWh	0,246	0,247	0,225	0,249
100% Load	kg/kWh	0,223	0,234	0,227	0,254
110% Load	kg/kWh	0,219	0,232	0,230	0,259

*Diesel fuel type No. 2 diesel or a fuel corresponding to ASTM D2. Density: 0,86 kg/l



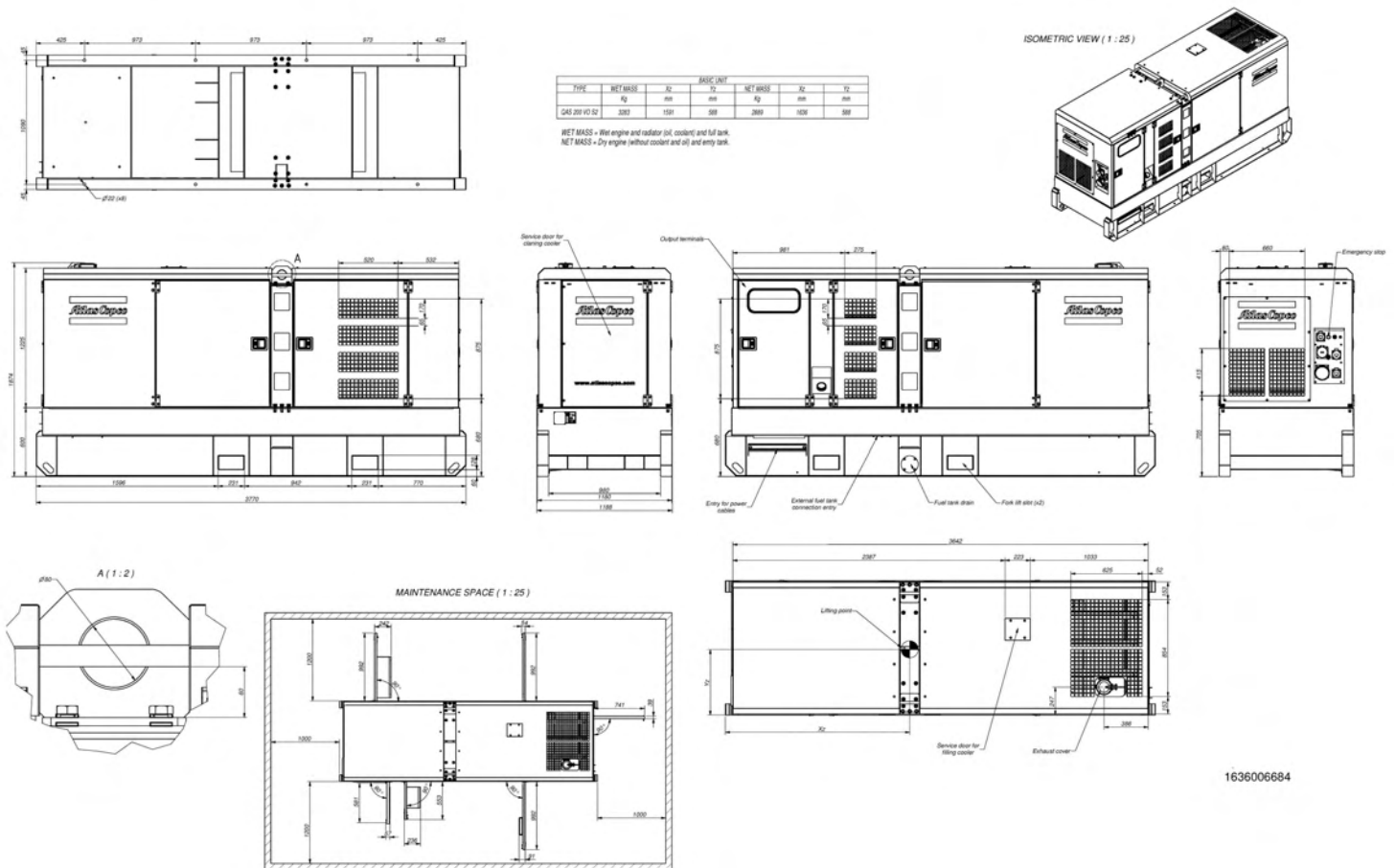
(Reference conditions at 25°C Air Inlet Temperature, 60% Relative Humidity, 1bar Absolute inlet pressure, for different conditions or limitations contact Atlas Copco technical support).



2. Box

		QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
	rpm	1500	1800	1500	1800
Dimensions (L x W x H)	m	3,77 x 1,2 x 1,87		3,77 x 1,2 x 1,87	
Weight					
Net mass	Kg	2889		2889	
Wet mass	Kg	3283		3283	
Capacity of spillage free frame	l	564.3		564.08	
Dimensions Long autonomy Fuel tank					
		3,77 x 1,2 x 2,2		3,77 x 1,2 x 2,2	
Weight					
Net mass	Kg	3129		3129	
Wet mass	Kg	4364		4364	
Foam silencer					
Thickness	mm	50		50	
Temperature	°C	Min -30 Max 120		Min -30 Max 120	

Our canopies are made from galvanized steel and painted with powder coating paint. To improve the protection in the most exposed parts as frame and lifting beam, it is also primed with a special paint before coating.



3. Engine

	rpm	QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
		1500	1800	1500	1800
General					
Manufacturer		Volvo		Volvo	
Model		TAD 753 GE		TAD 733 GE	
Standard		ISO 3046 / ISO 8528-2		ISO 3046 / ISO 8528-2	
Number of cylinders	u.	6		6	
Configuration		6 in line		6 in line	
Aspiration		Turbocharged		Turbocharged	
Speed governor		Volvo Penta EMS-2		Volvo Penta EMS-2	
Bore	mm	108		108	
Stroke	mm	130		130	
Electrical system (DC)	V	24		24	
Compression ratio		18:01		18:01	
Displacement (swept volume)	l	7,15		7,15	
Piston speed	m/s	6,5	7,8	6,5	7,8
Combustion system		Direct injection		Direct injection	
Charged air cooling system		Intercooled		Intercooled	
Maximum permissible load factor of PRP during 24h	%	70		70	
Lubrication system					
Type		PAROIL E (Mineral)		PAROIL E (Mineral)	
Capacity of oil system (including filters + sump)	l	34		34	
Oil pressure at rated speed	kPa	300 - 500		480 - 520	
Maximum Lubrication oil temperature	°C	125		125	
Air intake system					
Air consumption 25°C (PRP)	m³/min	11,5	14	11,5	14,2
Air consumption 25°C (ESP)	m³/min	12	15	12,4	15,8
Max allowable air intake restriction	kPa	5		3,5	
Air filter cleaning efficiency	%	75%		75%	
Air filter capacity	m³/min	18 - 30		18 - 30	
Cooling system					
Coolant		Parcool		Parcool	
Capacity of engine	l	10		9,8	
Total capacity (radiator, hoses...)	l	34		28,6	
Fan power consumption at nominal speed	kW	11,3	18,5	6,1	10,5
Fan material		Plastic		Plastic	
Coolant flow	l/s	4,08	4,92	3	3,6
Air mass flow (60°C)	m³/s	3,6	4,1	(55°C) 3,1	3,7
(65°C)	m³/s	4,2	4,7	(64°C) 3,9	4,9
Fuel filter					
		Water Separator		Water Separator	
Max pressure	bar	1,03		1,03	
Temperature	°C	-		-	
Volume	l	-		-	
Flow Rate	l/h	454		454	
Emission compliance					
		EU STAGE 3A	EU STAGE 3A	EU STAGE 2	EU STAGE 2
No X + HC	g/kWh	3,37 + 0,09	3,41 + 0,08	1950	1950
CO	g/kWh	0,39	0,33	400	400
PM	g/kWh	0.046	0.067	NA	NA
SO2	g/kWh	NA	NA	50	50
CO2 (at optimal working point)	%	NA	NA	NA	NA

*These values are extracted from official engine datasheet.



4. Alternator

	rpm	QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
		1500	1800	1500	1800
General					
Manufacturer		Leroy Somer		Leroy Somer	
Model		LSA 46.2 M5		LSA 46.2 M5	
Standard		IEC 34-1 / ISO 8528-3		IEC 34-1 / ISO 8528-3	
Rated net power (ESP: 50Hz 27°C / 60 Hz 40°C)	kVA	223	262	223	262
Number of bearings		1		1	
Number of wires		12		12	
Voltage regulator accuracy		+/- 0.5%		+/- 0.5%	
Degree of protection / Insulation class		IP 23/H		IP 23/H	
Environment Protection		System 2 (Humid atmosphere)		System 2 (Humid atmosphere)	
Number of poles		4		4	
Number phases		3		3	
Over speed	rpm	2250		2250	
Air flow	m³/s	0,43	0,51	0,43	0,51
Total Harmonic Distortion THD		no load < 2,5%- on load < 2,5%		no load < 2,5%- on load < 2,5%	
Waveform: NEMA = TIF		< 50		< 50	
Xd Direct axis synchro reactance unsaturated	%	301	314	301	314
X'd Direct axis transient reactance saturated	%	14,7	15,3	14,7	15,3
X''d Direct axis subtransient reactance saturated	%	8,8	9,2	8,8	9,2
Excitation system		Shunt		Shunt	
Sustained short-circuit current	%	180% (1,8x In)		180% (1,8x In)	
Time sustained short-circuit current	s	20		20	
AVR					
Model		R 250		R 250	
Sensing		1 phase		1 phase	
Voltage regulation	%	±0.5		±0.5	
Voltage sensing	V	≤ 139V		≤ 139V	

The Leroy Somer LSA alternators are designed for heavy duty continuous applications:

- System 2 protection (relative humidity >95%) for tropical environment (except coastal areas). With high performance dielectric varnish and reinforced over-coating on main stator and rotor
- 4 pole brushless design with single bearing, Class H insulation and IP23 rating
- Voltage regulation +/- 0.5%
- Full Load acceptance of prime power rating
- Standard excitation system is SHUNT (Self excited). As option (check *Electrical options*) you can have additional excitation system as:
 - PMG
 - Auxiliary winding



5. Generator

	rpm	QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
		1500	1800	1500	1800
Energy Balance					
Engine					
Heat rejection to exhaust	kW	121	149	142	168
Heat rejection to coolant	kW	144	123	87	99
Heat rejection to radiation	kW	18	21	19	22
Alternator					
Efficiency at full load	%	92.30%	93.00%	92.30%	93.00%

Genset Efficiency



Exhaust System

Flow (PRP)	m ³ /min	31,9	38,8	31,8	40,4
Flow (ESP)	m ³ /min	33,5	42,7	37,2	44,4
Exhaust gas temperature "after turbine" (PRP)	°C	465	496	510	509
Exhaust gas temperature "after turbine" (ESP)	°C	505	550	530	530
Max. Backpressure (Without / with spark arrestor)	kPa	7 / TBD	7 / TBD	3 / TBD	5 / TBD
Output pipe diameter	mm	114		114	

Battery

Quantity		2	2
Voltage	V	12	12
Capacity	Ah	143	143
Connection		Serie	Serie
Dimensions (L x W x H)	mm	514x218x210	514x218x210



	rpm	QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
		1500	1800	1500	1800
Cold cranking current	A(EN) / A(DIN)	1000 / 540		1000 / 540	
Starting power	kW	7,5		7,5	
Weight (wet)	kg	43,4		43,4	
Sensor					
Oil (temp, pressure & level)		STD		STD	
Coolant (temp & level)		STD		STD	
Fuel (feed pressure)		STD		STD	
Charge air (temp & pressure)		STD		STD	
Fuel Level		STD		STD	
Water in Fuel		STD		STD	
Generator Voltage		STD		STD	
Mains Voltage		OP		OP	
Generator Current transformer		STD		STD	
Transformer Maintenance Changeover feedback		OP		OP	
Reply: Mains CB opened/closed		OP		OP	
Reply: Generator CB opened/closed		OP		OP	
Air Inlet Pressure Switch		STD		STD	
Low Coolant Level Shutdown/Warning		STD		STD	

6. Power Output

	rpm	QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
		1500	1800	1500	1800
Circuit Breaker					
Brand		Schneider		Schneider	
Model		CVS400F		CVS400F	
Poles		4		4	
Rated current (In)	A	320 - 400		320 - 400	
Thermal release, regulated (It)	A	400		400	
CB tripping point	A	288,7	270,6	288,7	264,6
Overload protection (Ir)	A	3,5 x In		3,5 x In	
Fault current protection, residual current release (I _{dn})	A	0,03-30		0,03-30	
Motor Driven DC voltage	V	24		24	
Motorized		Standard with Qc4003		Standard with Qc4003	
Life operating cycles without maintenance		15000		15000	
Terminal Board					
Bolts diameter	mm	15		15	
Terminal type		Platen		Platen	
Sockets Available*					
Sockets 1 Phase					
PIN Domestic (1x) 2p + E 16 A/230 V		OP		OP	
RIN Domestic (1x) 2p + E 16 A/230 V		OP		OP	
CE Domestic (1x) 2p + E 16 A/230 V		OP		OP	
Sockets 3 Phase					
		OP		OP	
Configuration Remarks**		CEE form 3p + N + PE 16 A/400 V		CEE form 3p + N + PE 16 A/400 V	
		CEE form 3p + N + PE 32 A/400 V		CEE form 3p + N + PE 32 A/400 V	
		CEE form 3p + N + PE 63 A/400 V		CEE form 3p + N + PE 63 A/400 V	
		CEE form 3p + N + PE 125 A/400 V		CEE form 3p + N + PE 125 A/400 V	

*Sockets are enable for 50Hz and disable for 60Hz

**For a different configuration/scope contact Atlas Copco support

STD – Standard; OP – Option; NA – Not Available



7. Options

		QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
		1500	1800	1500	1800
Mechanical Options					
Special Equipment					
Spark arrestor		OP		OP	
Material		S235 JR G2		S235 JR G2	
Inlet shutdown valve		OP		OP	
Design pressure		bar	13,8	bar	13,8
Max/Min Temperature		°C	93	°C	93

Spark arrestor is a device that is designed to trap any exhaust particles or combustible materials, such as sparks or other flaming debris, from escaping into hazardous areas where they might cause fires. Exhaust particles are centrifuged in the spark arrestor, then collected and stored in a reservoir until emptied by an operator. An air shut-off valve serves to stop the engine by closing the air intake once the controller detects an over speed in the engine.

Fuel System					
External fuel tank connection		STD		STD	
Material		Brass 0011 5204 03		Brass 0011 5204 03	
Test pressure		bar	1	bar	1
Overpressure		bar	2	bar	2
Open pressure		bar	1±0,1	bar	1±0,1
Max/Min Temperature		°C	-30 to +80	°C	-30 to +80
External fuel tank connection with quick coupling		OP		OP	

The EFT enable the generator to run for long periods of time on an external fuel supply without having to refuel. We can also provide quick couplings to enable easy and fast connection to the fuel tank

AFT Automatic fuel transfer		NA		NA	
Additional fuel filter		STD		STD	
Design pressure		bar	1,2	bar	1,2
Test pressure		bar	1,8	bar	1,8
Volume		l	2,6	l	2,6
Max/Min Temperature		°C	-40 to 121	°C	-40 to 121
Max flow rate		g/h	90	g/h	90
Skid fuel tank (long autonomy)		OP		OP	
Capacity		l	1470	l	1470
Material		Metal		Metal	
Fuel level sender (*Changes automatically for different fuel tank)		STD		STD	
Oil level maintainer		NA		NA	
Capacity of oil tank		-		-	
Cold start synthetic first oil filling		STD		STD	
Type		PAROIL Extra		PAROIL Extra	
Temperature (min / max)		°C	-15 to 40°C	°C	-15 to 40°C
Density (Ambient temperature)		g / cc	0,86 (15°C)	g / cc	0,86 (15°C)
Cold flow		Antifreeze fuel additives in 0,2% composition			



		QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
	rpm	1500	1800	1500	1800
Mechanical Options					
Undercarriage option					
Undercarriage adjustable towbar with brakes		NA		NA	
Number of axles					
Permissible mass on each axle		kg			
Maximum speed		km/h			
Dimensions (L x W x H)		mm			
Brake connections					
Wheel		r			
Loose ball coupling		NA		NA	
Adapter 24V road signalization		NA		NA	
Towing eye					
Towing eye DIN		NA		NA	
Towing eye NATO		NA		NA	
Towing eye BALL coupling		NA		NA	
Towing eye ITA		NA		NA	
Towing eye AFR		NA		NA	

Depending on the size, units have a two-wheeled, single axle trailer, or a double axel with 4 wheels. Both types of trailer have an adjustable towbar and road signalization.

Special options					
Special color undercarriage		NA		NA	
Special color wheels		NA		NA	
Special color canopy		OP		OP	
Special color frame		OP		OP	
Witness test		OP		OP	

Guided and face to face testing of the machine. Including Transient test and Heat Run Test.

Electrical Options

		QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
Coolant Heater					
Electric driven coolant heater		OP		OP	
Voltage		V		240	
Power		kW		1	
Current		A		4,2	
Thermostat Range		°C		38 / 49	
Fuel driven coolant heater		NA		NA	
Electrical power		W			
Rated voltage		V			
Operating pressure		bar			
Flow rate at 0,1 bar		l/h			

Its main mission is heat the coolant so that the temperature of the engine is always high enough to start straight away, even in temperatures as low as minus 25 degrees Celsius. Not for all models but a fuel powered version is available, which is ideal for remote areas without mains supply.

Frequency and Voltage configuration					
Frequency/Voltage/Phases		50 Hz / 400V / 3ph		NA	
Dual frequency switch		50Hz-60Hz		STD	

*If the unit is dual frequency, DV and MV versions are NA

Dedicated frequency		50 Hz 230V 1ph		NA	
Dual voltage		50 Hz 400 V 3ph - 230V 3ph (Norway)		NA	
Dual voltage		50 Hz 400 3ph - 230V 1ph		NA	



		QAS 200 Vod Stage 3A		QAS 200 Vod Stage 2	
	rpm	1500	1800	1500	1800
Electrical Options					
Battery					
Battery charger*		OP		OP	
Temperature	°C	-20 to 70		-20 to 70	
Input frequency	Hz	47.....63		47.....63	
Output voltage	V	24		24	
Output current	A	10		10	
Output power	W	240		240	
Dimensions (L x W x H)	mm	205 x 123 x 86		205 x 123 x 86	
<i>Recommendable with Qc2103 and Qc4003</i>					
Battery cut off switch		OP		OP	
Operations	V / A	24 / 1500		24 / 1500	
Battery charger is necessary for stand-by applications because the controller is always on, ready to start at any time. Battery cut off switch allows the battery to be disconnected when storing the unit, thus preventing the battery from becoming drained.					
Electronic speed regulator (Governor)		STD		STD	
Model		Engine Management System (EMS 2)		Engine Management System (EMS 2)	
Connection to engine		CAN SAE J1939		CAN SAE J1939	
Sensors/Switch	°C and kPa	Lubrication, cooling and fuel system		Lubrication, cooling and fuel system	
Earth Protection					
Neutral TNS		STD		STD	
Neutral EDF (TT)		OP		OP	
Neutral IT		NA		NA	
Earth leakage detection Relay (ELR)		STD		STD	
	mA	30		30	
Insulation Monitoring Relay		OP		OP	
Earth PIN		OP		STD	
Length	mm	950		950	
Alternator excitation system					
Permanent magnet (PMG)		OP		OP	
AVR		R 450 M		R 450 M	
Sustained short-circuit current	%	300% (3x In)		300% (3x In)	
Time sustained short-circuit current	s	10		10	
Operating temperature	°C	-20°C to +70°C		-20°C to +70°C	
No load voltage	V	125	150	125	150
Stator Phase/Phase resistance (20°C)	Ω	2,1		2,1	
Auxiliary winding		NA		NA	
AVR					
Sustained short-circuit current	%				
Time sustained short-circuit current	s				
The PMG or Permanent Magnet Generator is a separate device to power the AVR and is ideal for motor starting and distorted loads as provides the generator 3 times its nominal current during 10 seconds. Auxiliary winding system is an extra winding layer in the alternator that provides same benefits than the PMG.					
Controllers					
Qc1103		STD		STD	
Qc2103		OP		OP	
Qc4003*		OP		OP	
*with Qc4003+ PMS Atlas Copco recommends: Battery charger + Coolant heater					
*Just 1 ph socket available					
*Qc4003 includes always communication cables and needed adaptors					
Qc1103: is the controller dedicated for island operation or remote start					
Qc2103: has in addition the possibility of detect a mains failure					
Qc4003: is the high spec controller prepared to work synchronized with several units (IPP) and/or the mains					



CONTROLLERS KEY FEATURES QC 1103 & 2103 CONTROLLERS

Auto start or automatic mains failure applications

Monitoring of electronic or non-electronic engines

J1939 as standard

Gen-set and busbar control & protection

Improved inputs/outputs

Up to 11 digital inputs, 5 analogue inputs and 8 relay outputs

Modbus communication rs485

Configurable for other applications

PARUS configurable

Graphical display

Multi-language



CONTROLLERS KEY FEATURES QC 4003 CONTROLLER

Controllers key features Qc 4003

Paralleling between generators and mains power supply

Full engine monitoring

CAN communication J1939

Gen-set and busbar control & protection

Multiple configurable inputs/outputs

Modbus communication RTU/RS485

Easy software with m-logic

programation

PARUS 3

PARALLELING APPLICATIONS

Load Take Over, Mains Export/Import, AMF, Peak Shaving, Transformer Maintenance, Fix power and PMS (CAN)

