4. Technical Data

4.1. PowerBloc EG (43-104) Technical Data

PowerBloc			EG-43	EG-50	EG-70	EG-104
Electrical output		kW	26 - 43	30 - 50	42 - 70	62 - 104
Thermal output +/-5%		kW	45 - 65	59 - 81	75 - 114	90 - 142
Fuel input +/-5%		kW	87 - 129	103 - 145	136 - 204	178 - 282
Electrical efficiency	100%	%	33.3	34.5	34.3	36.9
	75%	%	30.8	31.1	33.3	35.9
	60%	%	29.9	29.1	30.9	34.8
Thermal efficiency	100%	%	50.4	55.8	55.9	50.3
	75%	%	51.0	56.3	55.3	50.2
	60%	%	51.7	57.3	55.1	50.6
Total efficiency	100%	%	83.7	90.3	90.2	86.8
	75%	%	81.8	87.4	88.6	86.1
	60%	%	81.6	86.4	86.0	85.4
CHP coefficient at full load			0.66	0.62	0.61	0.73
Heating system						
Working temperature max		°C	88	90	90	90
Return temperature min/max		°C	50 - 70	50 - 70	50 - 70	50 - 70
Volumetric heating flow		m³/h	3.1	3.5	4.9	6.1
Working pressure min/max [1]		bar	1 - 2.5	1 - 2.5	1 - 2.5	1 - 2.5
Hydraulic resistance		mbar	50 - 60	50 - 60	50 - 60	50 - 60
Natural gas pressure min/max		mbar	18 - 100	18 - 100	18 - 100	18 - 100
Natural gas consumption		m³/h	12.94	14.54	20.46	28.28
Exhaust gas temperature		°C	120	120	120	120
Maximum exhaust back pressure		kPa	1.5	1.5	1.5	1.5
Exhaust gas flow - wet		kg/h	159	192	272	594
Exhaust gas flow - dry		Nm³/h	129	156	221	474
Standard emission rate @5% O_2	Nitrogen Oxides	mg/Nm³	<125	<125	<250	<500
	Carbon monoxide	mg/Nm³	<150	<150	<300	<300
Upgraded emission rate[4]	Nitrogen Oxides	mg/Nm³	<50	<50	<50	-
	Carbon monoxide	mg/Nm³	<100	<100	<100	-
Useable overpressure		Pa	100	100	100	100
Supply air temperature		°C	10 - 30	10 - 30	10 - 30	10 - 30
Supply air flow		m³/h	2500	3000	4000	4200
Combustion air		m³/h	125	151	214	478
Extract air temperature max		°C	50	50	50	50
Extract air flow		m³/h	2375	2849	3786	3722
Radiation heat max		kW	12	15	20	19
Dimensions				See table of dimensions		
Weight	Dry	kg	1900	2000	2100	3200
	Flooded	kg	2000	2100	2200	3400
Acoustic level at 1m [2] [3]		dB(A)	62	62	70	70
Exhaust gas acoustic level at 10m [3]		dB(A)	60	60	70	70
As above with optional secondary silencer (type G)		dB(A)	40	40	45	45
Engine Manufacturer			MAN	MAN	MAN	MAN
Model			E0834 E312	E0834 E302	E0836 E302	E0836 LE202
ISO standard power		kW	47	54	75	110
Normal rotation speed		r/min	1500	1500	1500	1500
Fuel			Natural gas	Natural gas	Natural gas	Natural gas
Cylinders			4R	4R	6R	6R
Lubricating oil consumption		kg/h	0.075	0.075	0.1	0.125
Lubricating oil volume		dm³	9/13	9/13	24/34	24/34
Generator Manufacturer			Stamford	Stamford	Stamford	Stamford
Model			UCG224E	UCG224F	UCG274C	UCG274E
Mode			Synchronous	Synchronous	Synchronous	Synchronous
Continuous output		kVA	53	65	84	125
Rotating speed		r/min	1500	1500	1500	1500
Efficiency		%	92	92.8	93.5	94.5
Voltage		V	400	400	400	400
Current		A	62	72	101	150
Frequency		Hz	50	50	50	50

[1] High pressure model with 5.5bar maximum heating system working pressure available.
[2] Noise data recorded when complete with sound reduction housing.
[3] Sound pressure level +/- 3dB(A)
[4] With extended exhaust gas cleaning.

The above quoted data is based on Natural Gas with a calorific value of 36.0 MJ/Nm³ (10.0 kWh/Nm³) and a Methane value greater than 80
Efficiency data was obtained under standard atmospheric conditions: air pressure 100 kPa, air temperature 298°K, relative air moisture 30%

Clamp power at generator with cos φ = 1.0
Hoval follows a policy of continued improvement and reserves the right to change specifications without notice.

The motors used are designed for continuous operation at 100% nominal output.

Information about partial load operation can be found in the project planning guidelines.

4.5. PowerBloc EG (43-530) Cooler Technical Data

All coolers below at conditions:

- Installation altitude 200 metres above sea level
- Ambient temperature 35 °C
- Reserve surface area approx. 5-10%

All coolers equipped with:

- Terminal box
- Flange pairs
- support feet 600mm high

PowerBloc EG		(43)	(50)	(70)	(104)
Emergency cooler		S-GFH 050.2A/2-LD1N/8P	S-GFH 052A/2-L(D)-F3/6P	S-GFH 067A/2-S(D)-F4/8P	GFH 100.3A/1-LD1L/6P
Cooling capacity	kW	65	81	114	142
Ethylene glycol/water mixture		40 %-60 %	40 %-60 %	40 %-60 %	40 %-60 %
Sound pressure level at 10 m	dB(A)	42	42	42	41
Sound level	dB(A)	73	73	73	75
Mixture cooler		-	-	-	GFH 050.2A/1-NS1P/12P
Cooling capacity	kW	-	-	-	6
Ethylene glycol/water mixture		-	-	-	40 %-60 %
Sound pressure level at 10 m	dB(A)	-	-	-	43
Sound level	dB(A)	-	-	-	74

PowerBloc EG		(140)	(210)	(210/NOx)	(210/80)
Emergency cooler		GFH 100.3D/1-L(D)-F4/6P	GFH 100.3A/2-SD1Q/2P	GFH 100.3A/2-SD1Q/2P	GFH 100.3B/2-SD1Q/2P
Cooling capacity	kW	207	253	269	298
Ethylene glycol/water mixture		40 %-60 %	40 %-60 %	40 %-60 %	40 %-60 %
Sound pressure level at 10 m	dB(A)	43	43	43	43
Sound level	dB(A)	75	72	72	72
Mixture cooler		-	GFH 100.3A/1-S(S)-F4/8P	GFH 100.3A/1-S(S)-F4/8P	-
Recooling power	kW	-	19	21	-
Ethylene glycol/water mixture		-	40 %-60 %	40 %-60 %	-
Sound pressure level at 10 m	dB(A)	-	41	41	-
Sound level	dB(A)	-	75	75	-

PowerBloc EG		(240)	(250)	(320)	(355)
Emergency cooler		GFH 100.3A/3-L(S)-F3/2P	GFH 100.3A/3-L(S)-F3/2P	GFH 100.3C/3-L(S)-F3/2P	GFH 100.3C/3-L(S)-F3/2P
Cooling capacity	kW	365	321	431	426
Ethylene glycol/water mixture		40 %-60 %	40 %-60 %	40 %-60 %	40 %-60 %
Sound pressure level at 10 m	dB(A)	42	42	42	42
Sound level	dB(A)	74	74	74	75
Mixture cooler		-	GFH 052A/2-L(S)-F6/10P	-	GFH 052/2-L(S)-F6/10P
Cooling capacity	kW	-	21	-	17
Ethylene glycol/water mixture		-	40 %-60 %	-	40 %-60 %
Sound pressure level at 10 m	dB(A)	-	43	-	39
Sound level	dB(A)	-	75	-	70

PowerBloc EG		(404)	(460)	(530)	(530/NOx)
Emergency cooler		S-GFH 100.3B/4-L(S)-F3/2P	GFH-100.3C/4-LS1L/2P	GFH 100.3D/4-L(S)-F4/2P	GFH 100.3D/4-L(S)-F4/2P
Cooling capacity	kW	520	584	665	687
Ethylene glycol/water mixture		40 %-60 %	40 %-60 %	40 %-60 %	40 %-60 %
Sound pressure level at 10 m	dB(A)	42	43	42	42
Sound level	dB(A)	75	75	75	75
Mixture cooler		GFH 067B/1-S(D)-F6/8P	-	GFH 080.3A/1-MD1U/8P	GFH 080.3A/1-MD1U/8P
Cooling capacity	kW	16	-	38	38
Ethylene glycol/water mixture		40 %-60 %	-	40 %-60 %	40 %-60 %
Sound pressure level at 10 m	dB(A)	42	-	45	45
Sound level	dB(A)	73	-	73	73

Datenblatt / Data specification
Erdgas BHKW-Modul / Natural gas CHP unit
PowerBloc EG-43

www.hoval.com

Hoval Aktiengesellschaft / Austrasse 70 / 9490 Vaduz, Liechtenstein - Switzerland
phone +42 33 99 27 52

KWK- Betriebsdaten / CHP- operating data [2]				
Last / Load	%	100	75	50
Elektrische Leistung / Electrical power [1]	kW	43	32	22
Thermische Leistung / Thermal power +/-5%	kW	65	53	40
Feuerungswärmeleistung / Input +/-5%	kW	129	104	78
Elektrischer Wirkungsgrad / Electrical efficiency	%	33,3	30,8	28,2
Thermischer Wirkungsgrad / Thermal efficiency	%	50,4	51,0	51,3
Gesamtwirkungsgrad / Total efficiency	%	83,7	81,8	79,5
Emission - Abgas / Exhaust	mg/Nm³	NO_X < 125 / CO < 150 (bei 5% O_2 / at 5% O_2)		
Stromkennzahl / CHP coefficient		0,66 (bei 100% Last / at 100% Load)		

λ = 1,0 ZZP vor OT / IT BTDC = 16°

Motor / Engine [2]		
Hersteller / Manufacturer		MAN
Typ / Type		E0834 E312
ISO-Standard-Leistung / ISO standard power (COP)	kW	47
Nenndrehzahl / Nominal rotation speed	min^{-1}	1.500
Brennstoff / Fuel		Erdgas / Natural gas
Zylinder / Cylinder		4R
Hubraum / Swept volume	dm^3	4,58
Bohrung/Hub / Bore/Stroke	mm	108/125
Mittl. eff. Druck / Mean effective pressure	MPa	0,821
Mittl. Kolbengeschwindigkeit / Mean piston speed	m/s	6,3
Verdichtungsverhältnis / Compression ratio		13:1
Schmierölverbrauch / Lube oil consumption - ca.	kg/h	0,075
Füllmenge Motoröl / Lube oil filling quantity	dm^3	9/13
Motorgewicht, trocken / Engine weight, dry	kg	430

3~ Generator [2]		
Hersteller / Manufacturer		MarelliGenerators
Typ / Type (P.F. = 0,95 & Umin = 0,95)		MJB 200 MB 4
Art / Mode		synchron
Nennleistung / Nominal rating - @ P.F. = 0,8	kVA	55
Drehzahl / Rotation speed	min^{-1}	1.500
Wirkungsgrad / Efficiency - P.F. = 1,0	%	94,2
Spannung / Voltage	V	400
Strom / Current	A	62
Frequenz / Frequency	Hz	50
Isolationsklasse / Insulation system	IP	23
Erwärmungsklasse / Warming class		H
Schutzart / Protection class		F
Gewicht / Weight	kg	300

Abmessungen und Gewicht / Dimensions and weight		
inkl. Schaltschrank / incl. Electrical cabinet		
mit Schalldämmkapsel / with Sound reduction capsule		
Länge / Lenght	mm	2.460
Breite / Width	mm	920
Höhe / Height	mm	1.800
Gewicht ohne Befüllung / Weight without filling	kg	1.900
Gewicht mit Befüllung / Weight with filling	kg	2.000

Wärmeauskopplung / Heat extraction [2]		
Plattenwärmetauscher / Plate heat exchanger		
Kühlwasserwärme / Cooling water heat	kW	41
Material Heizflächen / Heating surfaces		AISI 316 (1.4401)
Rohrbündelwärmeübertrager / Tube bundle heat exchanger		
Abgaswärme bis / Exhaust heat up to - 120°C	kW	24
Material Heizflächen / Heating surfaces		AISI 316Ti (1.4571)
Gemischwärme / Mixture heat - HT (80°C)	kW	-
Gemischwärme / Mixture heat - NT / LT (50°C)	kW	-

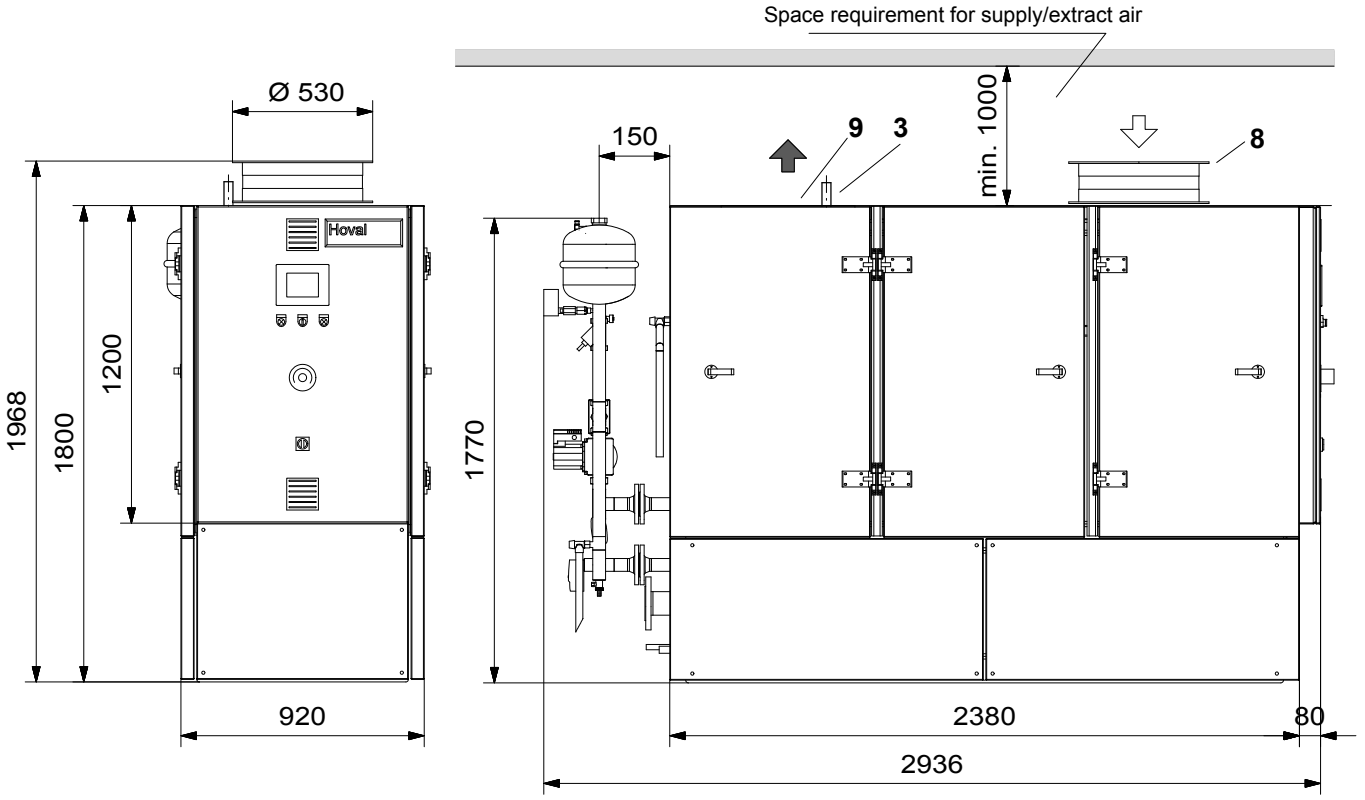
Anschlussdaten / Connection data [2]		
Heizwasser / Heating water (Modulaustritt / Module exit)		
Temperatur Vorlauf / Temperature flow line	°C	88
Temperatur Rücklauf / Temperature return line	°C	50-70
Volumenstrom / Volumetric current - Standard	m³/h	3,1
Abgas / Exhaust gas (Modulaustritt / Module exit)		
Temperatur / Temperature	°C	120
Abgasstrom, feucht / Gas flow, wet	kg/h	159
Abgasstrom, trocken / Gas flow, dry (273 K, 1.013 hPa)	Nm³/h	129
Gegendruck / Back pressure - max	kPa	1,5
Zuluft und Abluft / Supply air and exhaust air		
Zulufttemperatur / Supply air temperature	°C	10-30
Zuluftmenge / Supply airflow	m³/h	2.500
Verbrennungsluft / Combustion air	m³/h	125
Ablufttemperatur / Exhaust air temperature - max	°C	50
Abluftmenge / Exhaust airflow	m³/h	2.375
Strahlungswärme / Radiation heat - max	kW	12
Schalldruckpegel / Sound pressure level +/-3 dB(A)		
Modulgeräusch / Module noise - in 1 m	dB(A)	62
Abgas Restgeräusch / Residual noise exhaust gas - in 10 m		
mit 1. Schalldämpfer / whit 1st silencer	dB(A)	65
und 2. Schalldämpfer / and 2nd silencer (optional)	dB(A)	40 od./or 52
Anschlüsse / Connections		
Wärmeauskopplung / Heat extraction	DN/PN	1¼" IG/6
Gemischkühlkreis / Mixed cooling curcuit	DN/PN	-
Abgas / Exhaust gas	DN/PN	80/10
Brennstoff / Fuel	R/PN	1" IG/0,2
Elektro / Electrical	V/Hz	400/50
Luftkanal / Air duct (Zuluft/Supply air - Abluft/Exhaust air)	mm	Ø 451

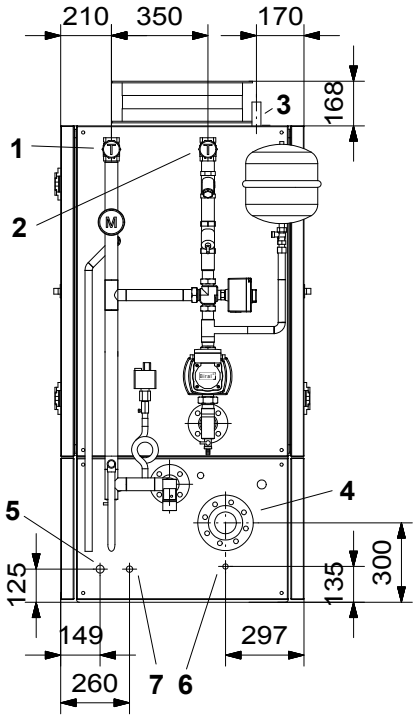
[1] Klemmenleistung am Generator bei cos phi = 1,0 / Clamp power at the generator with cos phi = 1,0

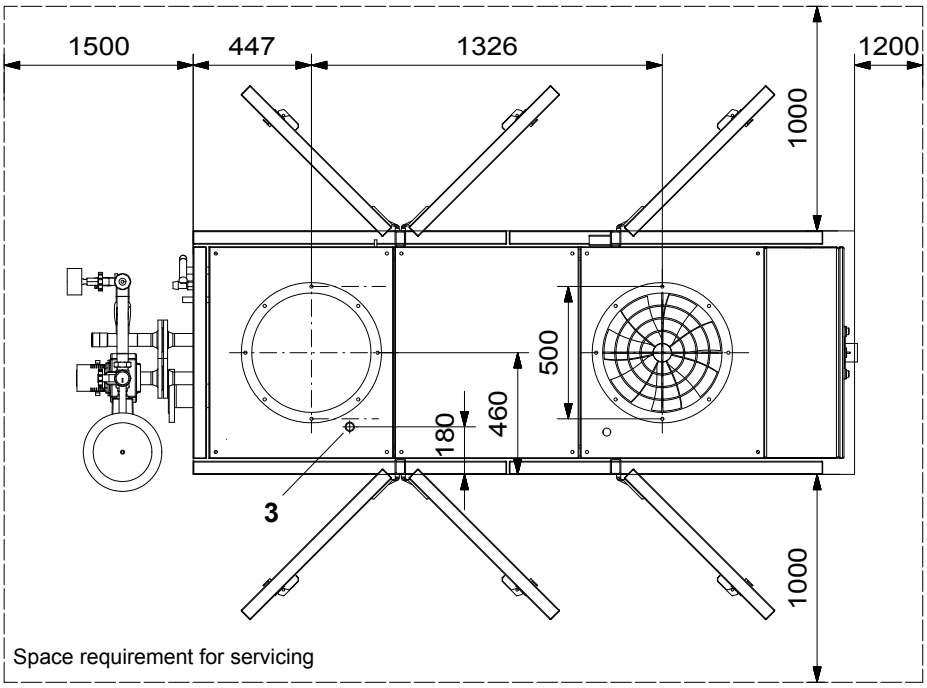
updated Nov 2013

[2] Alle Daten gelten bei Volllastbetrieb des Moduls und vorbehaltlich technischer Weiterentwicklungen.
Die BHKW- Daten sind bezogen auf Erdgas mit einem Heizwert (Hi) von 36,0 MJ/Nm³ (10,0 kWh/Nm³) und einer Methanzahl größer 80.
Leistungsangaben unter Normbezugsbedingungen: Luftdruck 1.000 hPa, Lufttemperatur 298 K, relative Luftfeuchte 30%.
All data apply with full load operation of the modules and subject to technical advancements.
The CHP basic data are based on natural gas with a calorific value of 36,0 MJ/Nm³ (10,0 kWh/Nm³) and a methane value greater than 80.
Efficiency data by standard conditions: air pressure 1.000 hPa, air temperature 298 K, relative air moisture 30%.

4.6. PowerBloc EG (43-50) Dimensions





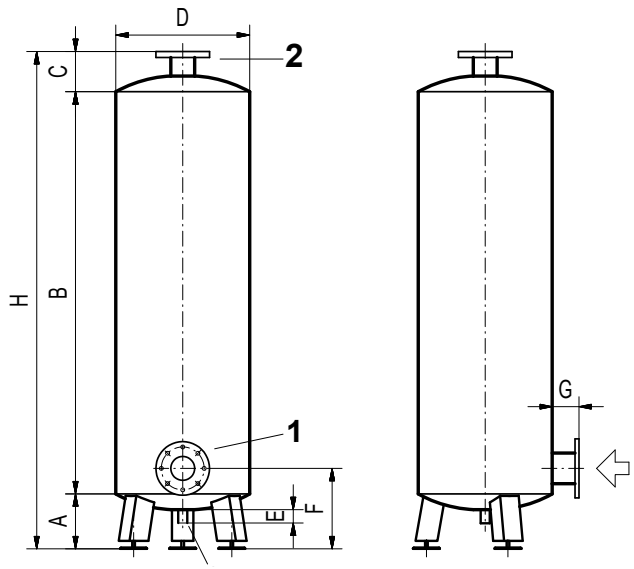


1	Heating flow	Rp 1¼"/PN 6
2	Heating return	Rp 1¼"/PN 6
3	Gas connection	Rp 1"
4	Exhaust gas connection	DN 80/PN 10
5	Condensate connection left (stainless steel)	28x1 mm
6	Condensate connection right (stainless steel)	18x1 mm
7	Drain	½"
8	Supply air	
9	Extract air	

4.15. Dimensions for secondary silencers (EG43-530)

Low-frequency silencer S

(Dimensions in mm)



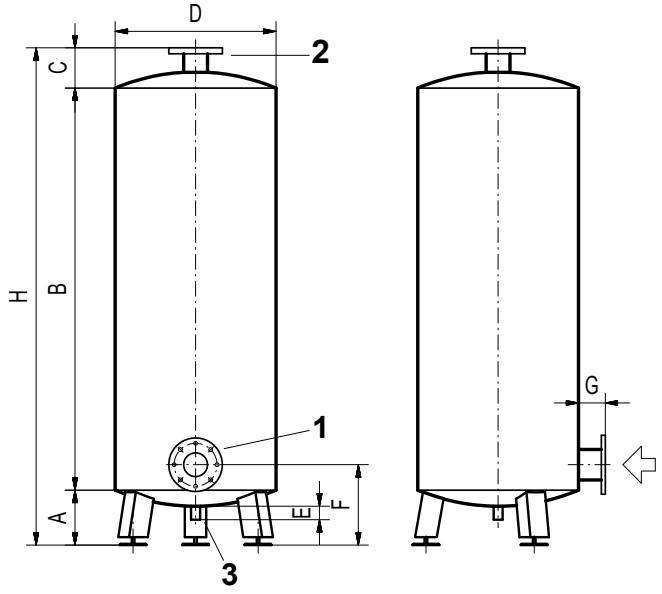
Pressure drop

PowerBloc EG type	Low-frequency silencer	Pressure drop Pa
(43)	(S-080)	33
(50)	(S-080)	45
(70)	(S-100)	25
(104)	(S-125)	53
(140)	(S-125)	59
(210)	(S-200)	23
(240)	(S-200)	12
(250)	(S-200)	46
(320)	(S-250)	23
(355)	(S-250)	31
(404)	(S-250)	23
(460)	(S-300)	20
(530, 530/NOx)	(S-300)	21

PowerBloc EG type	A	B	C	D	E	F	G	H	1 Exhaust inlet DN	1 Exhaust inlet PN	2 Exhaust outlet DN	2 Exhaust outlet PN	3 Condensate outlet	Weight kg
(43,50)	205	1500	150	500	50	300	100	1855	80	10	80	10	R 1″	58
(70)	210	1750	150	500	75	320	100	2110	100	10	100	10	R 1″	67
(104,140)	205	2000	150	500	95	325	100	2355	125	10	125	10	R 1″	75
(210,250)	300	2200	150	600	30	500	100	2650	200	10	200	10	R 1″	118
(320-404)	300	2250	150	650	30	500	100	2700	250	10	200	10	R 1″	131
(460,530, 530/NOx)	300	2500	150	650	30	520	100	2950	300	10	300	10	R 1″	148

Low-frequency silencer G

(Dimensions in mm)



Pressure drop

PowerBloc EG type	Low-frequency silencer	Pressure drop Pa
(43)	(G-080)	33
(50)	(G-080)	45
(70)	(G-100)	25
(104)	(G-125)	53
(140)	(G-125)	59
(210)	(G-200)	23
(240)	(G-200)	12
(250)	(G-200)	46
(320)	(G-250)	23
(355)	(G-250)	31
(404)	(G-250)	23
(460)	(G-300)	20
(530, 530/NOx)	(G-300)	21

PowerBloc EG type	A	B	C	D	E	F	G	H	1 Exhaust inlet DN	1 Exhaust inlet PN	2 Exhaust outlet DN	2 Exhaust outlet PN	3 Condensate outlet	Weight kg
(43,50)	205	1500	150	600	50	300	100	1855	80	10	80	10	R 1″	112
(70)	210	1750	150	600	75	320	100	2110	100	10	100	10	R 1″	123
(104,140)	205	2000	150	600	95	325	100	2355	125	10	125	10	R 1″	139
(210-250)	300	2200	150	700	30	500	100	2650	200	10	200	10	R 1″	182
(320-404)	300	2250	150	750	30	500	100	2700	250	10	250	10	R 1″	215
(460,530,530/NOx)	300	2500	150	800	30	520	100	2950	300	10	300	10	R 1″	254

16. Accessories

16.1 Flexible connections
Delivery, installation on-site for insulation against vibration and reverberation
Including:
- 2x heating hoses
- 1x gas hose
- 1x exhaust gas expansion joint
- 2x ventilation connections
- 2x mixture cooling circuit hoses (depending on the model)

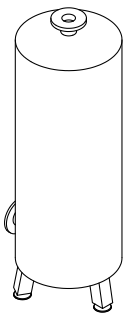
for PowerBloc EG	
(43)	7013 862
(50)	7013 863
(70)	7013 864
(104)	7013 865
(140)	7013 867
(210)	7013 868
(210/NOx)	7013 899
(210/80)	7013 900
(240)	7013 901
(250)	7013 902
(320)	7013 904
(355)	7013 905
(355/NOx)	7013 906
(404)	7013 907
(460)	7013 908
(530)	7013 909
(530/NOx)	7013 910

16.2 Extended exhaust gas purification
Nitrogen oxide (NOx) < 50 mg/m³
Carbon monoxide (CO): < 100 mg/m³
with 5% excess oxygen

for PowerBloc EG	
(43,50)	7011 586
(70)	7011 587
(140)	7011 588
(240)	7011 599

Interface
Connection to a building management system

Modbus	7011 656



16.3 Low-frequency silencer Type S
As 2nd exhaust gas silencer for further reduction of exhaust gas sound pressure level.
Sound pressure level: 52 or 55 db(A) at a distance of 10 m from the exhaust gas outlet.
The 1st exhaust gas silencer is contained in the CHP unit module.

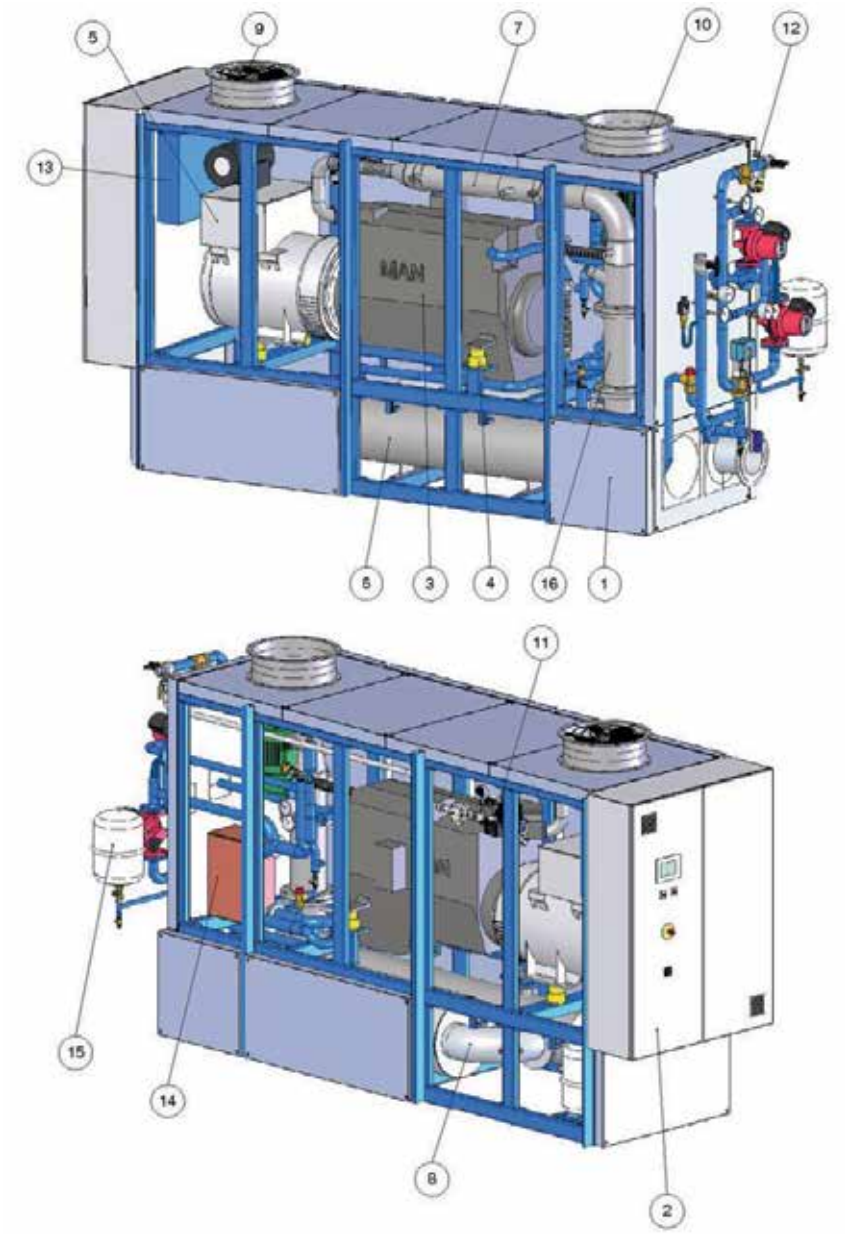
for PowerBloc EG	
(43,50)	7011 681
(70)	7011 682
(104,140)	7011 683
(210-250)	7011 685
(320-404)	7011 686
(460,530,530/NOx)	7012 200

9. Functional Description

9.1. Functional Description of the CHP Plant

The gas engine directly drives the generator which then generates a current that is fed out to the distribution main. Excess electricity can then be exported to the utility grid providing the relevant approvals (G59) are in place.

A by-product of this power generation is heat produced by the gas engine. This is absorbed into the heating circuit via engine coolant and an exhaust gas heat exchanger. This method of energy production is commonly known as co-generation or combined heat and power generation because it simultaneously generates electricity and useable heat.



1. Sound reduction capsule (covers not shown)
2. Control panel
3. MAN gas engine
4. Anti-vibration mounts
5. Electrical generator
6. Exhaust gas heat exchanger
7. Exhaust gas pipe
8. Exhaust silencer
9. Ventilation air intake fan
10. Ventilation extract air duct connection
11. Gas train
12. Heating system components
13. Lubricating oil tank
14. Engine coolant heat exchanger
15. Expansion vessel
16. Catalytic convertor