Planning documentation

for neoTower® cogeneration units
and power storage units

GHP HELLAS
AIR CONDITIONING WITH NATURAL GAS

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Regulations and standards

1 Regulations and standards

The following laws, ordinances and technical regulations must be observed to ensure correct planning and construction of cogeneration systems!

Building Energy Act (GEG)

In 2020 the Energy Conservation Act (EnEG), the Energy Conservation Ordinance (EnEV) and the Renewable Energies Heat Act (EEWärmeG) were merged into a new "Building Energy Act". Its goal is to ensure that as little energy as possible is consumed in buildings as well as increasing the use of renewable energies.

Energy Tax Act (EnergieStG)

The economic efficiency of the CHP module is significantly improved if tax-exempt natural gas in compliance with Articles 3 and 53 of the EnergieStG can be used. This is possible by applying for tax relief in compliance with Article 53 of the EnergieStG. The prerequisite for this is a fuel utilisation rate of 70 %, which is easily achieved by the CHP module, unless a significant portion of the heat is carried away by an emergency cooler. Proof of the degree of utilisation is made much easier by suitable meters for gas, electricity and the heat discharged into the connected heating system. The application must be re-submitted annually, stating the amount of gas consumed.

LBO – state building regulations of the respective federal states

The building regulations of the respective federal states are applicable for structural installations and building products. These must be arranged, constructed, modified and maintained in such a way that they do not endanger public safety or order, in particular life, health or the natural environment.

In addition, the generally recognised codes of good engineering practice must be observed. The technical regulations introduced by the highest building supervisory authority as technical building regulations by public notice also apply as generally recognised codes of good engineering practice. Particular consideration must be given to clearance areas, combustibility of building materials, thermal insulation, sound insulation and vibration protection.

Electricity Tax Act (StromStG)

All electricity generators are subject to taxation. The legal regulations that serve as a basis for this are the Electricity Tax Act (StromStG) and the Electricity Tax Implementation Ordinance (StromStV).

However, systems installed solely to cover domestic requirements up to an electrical power of 2000 kW are exempt from the electricity tax. This applies if the electricity is used for the decentralised supply of properties in the immediate vicinity of the CHP system (Article 9 StromStG). A separate application is not necessary.

Boiler room regulations

The Fire Installations Ordinance (FeuVO) must be complied with in particular. It applies to all combustion systems, heat and fuel supply plants. For heating systems, heat pumps and cogeneration units the ordinance applies only if these systems serve to heat rooms or supply hot water.

TRGI – Technical Regulations for Gas and Water Installations

The Technical Regulations for Gas Installations apply for the planning, construction, modification and maintenance of gas installations in buildings and on properties that are supplied with 1st, 2nd and 4th family gases and that are operated with pressures of up to 100 mbar (low pressure) or from 100 mbar up to 1 bar (medium pressure). For gases of the 3rd gas family (liquefied petroleum gas), the TRF (Technical Regulations for Liquefied Petroleum Gas) apply. The TRGI begins behind the main shut-off device and ends at the outlet of the flue gas routing to the outside.

Requirement from the TRGI G600:

Additional requirements for flue gas systems in positive pressure operation:

Gas appliances type B14P, B22P, B23P, B44P, B52P, B53P, the flue gases of which are discharged with a positive pressure in relation to the room where they are installed, must be installed in rooms which have an opening leading directly outdoors with a free cross-section of at least 150 cm^2 or two openings of 75 cm^2 each.

With gas appliances with a total rated output of more than 100 kW th the rooms must have two openings leading directly outdoors (one lower and one upper opening with the greatest possible vertical spacing) with a free cross-section of at least 150 cm^2 each. They must also have an additional 1 cm^2 for each kW above 100 kW.

If these rooms do not have an exterior wall, ventilation can also be provided using the measures described in the following sections. These openings can be included in the combustion air supply calculation.

- Ventilation of the installation room by means of a supply air pipe and an exhaust air shaft.
- Ventilation of the installation room by means of a supply air pipe with a mechanical supply air device (electric fan) and an exhaust air pipe.

BImSchV – Federal Immission Control Act

The First Ordinance on the Implementation of the Federal Immission Control Act (Ordinance for Small and Medium-Sized Combustion Plants of January 26, 2010) specifies the nitrogen dioxide limits that may not be exceeded depending on the nominal heat output of

a combustion plant.

DIN 4708-1-3 – Central water heating installations

Part 1: Terms and basis for calculation

Part 2: Regulations for determining the heat requirements for heating drinking water in residential buildings

Part 3: Regulations for performance testing of water heaters for residential buildings

DIN EN 12831 – Heating systems in buildings - Method for calculation of the design heat load

The standard describes a calculation method for determining the heat input required under standard design conditions to ensure that the required standard internal temperature is achieved in the usable spaces of the buildings.

DIN 12828 – Heating systems in buildings – Design for water-based heating systems

EN 12828 specifies the design criteria for water based heating systems in buildings with a maximum operating temperature of up to 105 °C. It deals with the design of: Heat generation systems, heat distribution systems, heat dispersal systems, control systems and takes the heat requirements of connected systems into account.

DIN VDE 0100 – Installation of low voltage systems

This compact and easily comprehensible standard contains the most important data and facts for the installation of electrical systems for planning, installation and maintenance of safe and reliable electrical systems,

- for correct selection and implementation of protective measures.
- for the selection and use of materials and equipment.
- for the requirements at operating sites, in rooms and facilities of a special nature.
- for the tests as certificates before commissioning and for recurring inspections.

VDI 2035 – Water quality

The technical standard VDI 2035, sheet 1 and sheet 2, specifies the requirements for planners, installation engineers and the operators to prevent stone/corrosion damage and deposits in closed heating circuits.

TA-Lärm – German Noise Prevention Code

The German Noise Prevention Code is a general administrative regulation that covers the following:

- Harmful environmental effects caused by noise
- Area affected by a plant
- Relevant place of immission
- Pre-load, additional load and total load
- Extraneous noise
- State of the art for noise reduction
- Sound pressure level LAF(t)

DIN 4109 – Sound insulation in buildings

DIN 4109 regulates the requirements for protection against noise from building services equipment.

The requirements of DIN 4109 for permissible rating levels in rooms requiring protection are consistent with the requirements of the German Noise Prevention Code (TA-Lärm) and are considered to be recognised good engineering practice.

DIN 4701 – Heat requirement calculation

When calculating the heat requirements as laid out in DIN 4701, the standard heat requirement of a room is defined as the heat output that must be supplied to the room under standard weather conditions in order to achieve the required standard indoor conditions.
DIN 4807 – Expansion vessels; terminology, relevant legal regulations; testing and marking.

Chimney Sweep Law

According to the "German Chimney Sweeping and Inspection Act (Kehr- und Überprüfungsordnung)", the approval and inspection of flue gas systems for CHP modules is regulated by state law. In some federal states there is an approval or inspection requirement. Notification of the responsible district chimney sweep during the planning phase.

VDE-AR-N 4105: 2018 - 11

Power generation plants on the low-voltage network
Minimum technical requirements for connection and parallel operation of power generation plants on the low-voltage network.

VDE-AR-N 4110: 2018 - 11

Power generation plants on the medium-voltage network
Minimum technical requirements for connection and parallel operation of power generation plants on the medium-voltage network.

DIN EN 13384 – Chimney cross-section calculation

DIN EN 13384 is a standard for chimney calculation that applies throughout Europe. A complex calculation formula is used to calculate and coordinate the correct height and ideal cross-section of the chimney, whether it is constructed of masonry or stainless steel.
It is not permitted to use chimneys that do not comply with this DIN standard.

Technical data

2 Technical data

2.1 neoTower® Living 2.0, 3.3, 4.0

Product designation		LIVING 2.0	LIVING 3.3	LIVING 4.0
			Technical data	
Rated output - electrical [1]	kW_{el}	2,0	3,3	4,0
Rated output - thermal [2]	kW_{th}	5,2	8,2	8,8
Power modulation - electrical	kW_{el}	1,1 - 2,0	2,0 - 3,3	2,0 - 4,0
Power modulation - thermal	kW_{th}	3,8 - 5,2	5,9 - 8,2	5,9 - 8,8
Energy input	kWh_{HI}	7,19	11,20	12,60
Liquefied Petroleum gas input	kg/h	0,56	n.a.	0,98
Liquefied Petroleum gas input	l/h	1,04	n.a.	1,81
CHP coefficient		0,38	0,40	0,45
f Primary energy factor [3]		0,445	0,378	0,302
PES	%	28,3	30,5	31,3
ErP energy efficiency label [4]		A+	A++	A++
Sound pressure level L_{pA} [5]	dB(A)	45	50	54
Sound power level L_{wA}	dB(A)	60	65	69
Maintenance interval	op. hrs.	15.000	13.000	13.000
Oil interval	op. hrs.	7.500	6.500	6.500
			Efficiency ratios	
Electrical efficiency ratio η_{el}	%	27,8	29,5	31,8
Thermal efficiency ratio η_{th}	%	72,3	73,0	69,8
Total efficiency ratio η_{total}	%	100,1	102,5	101,6
			Heat extraction	
Flow temperature ± 5 °C	°C	75	75	75
Return flow temperature ± 5 °C	°C	25-65	25-65	25-65
min./max. ambient temperature	°C	5/30	5/30	5/30
Pressure rating - water side	PN	3	3	3
			Electrical energy generation	
Nominal voltage	V	400	400	400
Frequency	Hz	50	50	50
Nominal effective power PnG	kW_{el}	2,0	3,3	4,0
Apparent power $S_{E\ max}$	kVA	2,1	3,5	4,2
Nominal voltage UnG	V	400	400	400
Frequency	Hz	50	50	50
Cos ϕ uncompensated		-	-	-
Reactive power compensation [6]	kVar	1,36	2,11	2,11
Number of steps		1	1	1
Degree of choking or resonance frequency		-	-	-
Cos ϕ acc. to VDE-AR-N 4105 quadrants II, III [6]		0,95	0,95	0,95
Rated alternating current Ir	A	3,04	5,02	6,08
Rated alternating current Ir cos ϕ 1	A	2,9	4,8	5,8
Rated apparent power SrE	kVA	2,1	3,5	4,2
Short-circuit alternating current Alternator Ik"	A	29,5	46,7	46,7
Grid short circuit power with UnG Sk“	kVA	20,3	32,2	32,2
Start-up current Ik approx.	A	26	39	39
			Motor	
Motor manufacturer		YANMAR	YANMAR	YANMAR
Number of cylinders		3	3	3
Displacement	l	0,7	0,7	0,7
Air-fuel ratio λ		1,6	1,6	1,6
Engine oil - RMB/ENGINE Oil	l	15	15	15

Product designation		LIVING 2.0	LIVING 3.3	LIVING 4.0
			Generator	
Generator manufacturer		EMOD	EMOD	EMOD
Generator type		asynchronous	asynchronous	asynchronous
Motor start-up		provided	provided	provided
Speed	rpm	1.020	1.540	1.540
			Supply and exhaust air	
Combustion air requirement	m³/h	14,70	24,48	25,75
Module ventilation flow rate	m³/h	100,00	100,00	100,00
Total air requirement of module	m³/h	114,70	124,48	125,75
Permissible counter-pressure of exhaust air system max. (7)	Pa	150	150	150
min./max. intake air temperature	°C	5/30	5/30	5/30
Min. cross section without hydraulic resistance	cm²	150	150	150
			Flue gas	
Flue gas temperature (8) / max.	°C	50 / < 110	50 / < 110	50 / < 110
Flue gas mass flow rate - damp	kg/h	16	26	27
Flue gas volume flow - dry	Nm³/h	13	21	22
Delivery pressure flue gas max.	Pa	150	150	150
Delivery pressure flue gas cascades max.	Pa	150	150	150
Delivery pressure max. for flue gas and exhaust air combination	Pa	150	150	150
Emissions Nox	mg/kWh	< 240	< 240	< 240
			Dimensions & weight	
Dimensions of module L x W x H	mm	1.093x613x1.100	1.093x613x1.100	1.093x613x1.100
Weight approx. (including operating resources)	kg	425	426	426
			ErP-Label	
ErP energy efficiency label (4)		A+	A++	A++
ErP energy input (4)	kWh_{Hs}	7,99	12,43	13,99
ErP efficiency ratio - electrical $\eta_{el,HS}$ (4)	%	25,0	26,6	28,6
ErP efficiency ratio - thermal $\eta_{th,HS}$ (4)	%	65,1	65,8	62,9
ErP efficiency ratio - total $\eta_{total,HS}$ (4)	%	90,2	92,3	91,5
Room controller category (4)		2	2	2
$P_{designh}$ (4)	kW_{el}	2,0	3,2	3,4
Q_{HE} (4)	kWh	3.377	5.014	4.986
P_{SB} electrical power requirement - standby (4)	kW_{el}	0,02	0,02	0,02
Electrical power requirement - partial load (4)	kW_{el}	0,05	0,16	0,16
$P\ el_{max}$ Electrical power requirement - full load (4)	kW_{el}	0,05	0,16	0,16
P_{stby_CHP} Thermal standing losses (4)	kW_{th}	0,20	0,20	0,20
Electrical power requirement - standby (4)	kW_{el}	0,01	0,01	0,01
η S =ηson -Σ(F1-F5) (4)		123,2	130,8	141,2
Net output - electrical	kW_{el}	1,95	3,14	3,84

1) Performance data in accordance with ISO 3046/I-2002, tolerance 5% (when operating with LPG tolerance +5% / -20%)

2) Thermal performance data tolerance 8%

3) f_{pe}-current = 2.8 displacement mix per DIN V 1859, DIN V 4701-10, GEG (attachment 4 to § 22 section 1) vaild from 11.2020

4) In accordance with EU Regulation 811/2013; 813/2013

5) Test bench measurement at 1 m interval in front of the CHP

6) Only when using the optional compensation (integrated in neoTower® 2.0, 3.3 and 4.0 / not required for neoTower® 50.0)

7) Exhaust air (without flue gas) does not have to be extracted “via the roof”

8) At a return temperature of 35 ° C and optimum operating conditions, tolerance 5%

Technical data

2.2 neoTower® 5.0, 7.2

Product designation		5.0	7.2
		Technical data	
Rated output - electrical [1]	kW_{el}	5,0	7,2
Rated output - thermal [2]	kW_{th}	12,0	18,1
Power modulation - electrical	kW_{el}	2,9 - 5,0	3,9 - 7,2
Power modulation - thermal	kW_{th}	9,2 - 12,0	12,7 - 18,1
Energy input	kWh_{HI}	15,82	23,08
Liquefied Petroleum gas input	kg/h	1,23	1,79
Liquefied Petroleum gas input	l/h	2,28	3,32
CHP coefficient		0,42	0,40
f Primary energy factor [3]		0,286	0,290
PES	%	34,0	34,8
ErP energy efficiency label [4]		A++	A++
Sound pressure level L_{pA} [5]	dB(A)	52	53
Sound power level L_{wA}	dB(A)	67	68
Maintenance interval	op. hrs.	15.000	13.000
Oil interval	op. hrs.	7.500	6.500
		Efficiency ratios	
Electrical efficiency ratio η_{el}	%	31,6	31,2
Thermal efficiency ratio η_{th}	%	75,7	78,3
Total efficiency ratio η_{total}	%	107,3	109,5
		Heat extraction	
Flow temperature ± 5 °C	°C	80	80
Return flow temperature ± 5 °C	°C	25-65	25-65
min./max. ambient temperature	°C	5/30	5/30
Pressure rating - water side	PN	3	3
		Electrical energy generation	
Nominal voltage	V	400	400
Frequency	Hz	50	50
Nominal effective power PnG	kW_{el}	5,0	7,2
Apparent power $S_{E\ max}$	kVA	6,4	9,2
Nominal voltage UnG	V	400	400
Frequency	Hz	50	50
Cos ϕ uncompensated		0,78	0,78
Reactive power compensation [6]	kVar	2,87	3,47
Number of steps		1	1
Degree of choking or resonance frequency		-	-
Cos ϕ acc. to VDE-AR-N 4105 quadrants II, III [6]		0,95	0,95
Rated alternating current Ir	A	9,3	13,3
Rated alternating current Ir cos ϕ 1	A	7,2	10,4
Rated apparent power SrE	kVA	6,4	9,2
Short-circuit alternating current Alternator Ik"	A	72,5	72,5
Grid short circuit power with UnG Sk“	kVA	76,9	76,9
Start-up current Ik approx.	A	45	45
		Motor	
Motor manufacturer		Toyota	Toyota
Number of cylinders		3	3
Displacement	l	1	1
Air-fuel ratio λ		1,6	1,0
Engine oil - RMB/ENGINE Oil	l	24	24

Product designation		5.0	7.2
		Generator	
Generator manufacturer		EMOD	EMOD
Generator type		asynchron	asynchron
Motor start-up		provided	provided
Speed	rpm	1.550	1.550
		Supply and exhaust air	
Combustion air requirement	m³/h	32,34	29,48
Module ventilation flow rate	m³/h	100,00	100,00
Total air requirement of module	m³/h	132,34	129,48
Permissible counter-pressure of exhaust air system max. (7)	Pa	150	150
min./max. intake air temperature	°C	5/30	5/30
Min. cross section without hydraulic resistance	cm²	250	250
		Flue gas	
Flue gas temperature (8) / max.	°C	50 / < 110	50 / < 110
Flue gas mass flow rate - damp	kg/h	34	31
Flue gas volume flow - dry	Nm³/h	28	25
Delivery pressure flue gas max.	Pa	500	500
Delivery pressure flue gas cascades max.	Pa	500	500
Delivery pressure max. for flue gas and exhaust air combination	Pa	150	150
Emissions Nox	mg/kWh	< 240	< 240
		Dimensions & weight	
Dimensions of module L x W x H	mm	1.205x613x1.102	1.205x613x1.102
Weight approx. (including operating resources)	kg	444	444
		ErP-Label	
ErP energy efficiency label (4)		A++	A++
ErP energy input (4)	kWh_{Hs}	17,56	25,62
ErP efficiency ratio - electrical $\eta_{el,HS}$ (4)	%	28,5	28,1
ErP efficiency ratio - thermal $\eta_{th,HS}$ (4)	%	68,2	70,5
ErP efficiency ratio - total $\eta_{total,HS}$ (4)	%	96,7	98,6
Room controller category (4)		2	2
$P_{designh}$ (4)	kW_{el}	4,6	7,0
Q_{HE} (4)	kWh	6.814	10.454
P_{SB} electrical power requirement - standby (4)	kW_{el}	0,03	0,03
Electrical power requirement - partial load (4)	kW_{el}	0,20	0,19
$P\ el_{max}$ Electrical power requirement - full load (4)	kW_{el}	0,20	0,19
P_{stby_CHP} Thermal standing losses (4)	kW_{th}	0,24	0,24
Electrical power requirement - standby (4)	kW_{el}	0,03	0,03
η S =ηson -Σ(F1-F5) (4)		140,3	138,5
Net output - electrical	kW_{el}	4,80	7,01

1) Performance data in accordance with ISO 3046/I-2002, tolerance 5%

2) Thermal performance data tolerance 8%

3) f_{pe}-current = 2.8 displacement mix per DIN V 1859, DIN V 4701-10, GEG (attachment 4 to § 22 section 1) vaild from 11.2020

4) In accordance with EU Regulation 811/2013; 813/2013

5) Test bench measurement at 1 m interval in front of the CHP

6) Only when using the optional compensation (integrated in neoTower® 2.0, 3.3 and 4.0 / not required for neoTower® 50.0)

7) Exhaust air (without flue gas) does not have to be extracted “via the roof”

8) At a return temperature of 35 ° C and optimum operating conditions, tolerance 5%

Technical data

2.3 neoTower® 9.5, 12.5

2.3.1 Natural gas

Product designation		9.5	12.5
		Technical data	
Rated output - electrical [1]	kW_{el}	9,5	12,5
Rated output - thermal [2]	kW_{th}	22,7	27,6
Power modulation - electrical	kW_{el}	5,0 - 9,5	6,0 - 12,5
Power modulation - thermal	kW_{th}	12,0 - 22,7	13,3 - 27,6
Energy input	kWh_{HI}	30,00	37,30
Liquefied Petroleum gas input	kg/h	n.a.	n.a.
Liquefied Petroleum gas input	l/h	n.a.	n.a.
CHP coefficient		0,42	0,45
f Primary energy factor [3]		0,282	0,220
PES	%	34,0	34,9
ErP energy efficiency label [4]		A++	A++
Sound pressure level L_{pA} [5]	dB(A)	55	57
Sound power level L_{wA}	dB(A)	71	73
Maintenance interval	op. hrs.	13.000	13.000
Oil interval	op. hrs.	6.500	6.500
		Efficiency ratios	
Electrical efficiency ratio η_{el}	%	31,7	33,5
Thermal efficiency ratio η_{th}	%	75,6	73,9
Total efficiency ratio η_{total}	%	107,3	107,4
		Heat extraction	
Flow temperature ± 5 °C	°C	80	80
Return flow temperature ± 5 °C	°C	25-65	25-65
min./max. ambient temperature	°C	5/30	5/30
Pressure rating - water side	PN	3	3
		Electrical energy generation	
Nominal voltage	V	400	400
Frequency	Hz	50	50
Nominal effective power PnG	kW_{el}	9,5	12,5
Apparent power $S_{E\ max}$	kVA	12,2	16,0
Nominal voltage UnG	V	400	400
Frequency	Hz	50	50
Cos ϕ uncompensated		0,78	0,78
Reactive power compensation [6]	kVar	4,07	5,73
Number of steps		1	1
Degree of choking or resonance frequency		-	-
Cos ϕ acc. to VDE-AR-N 4105 quadrants II, III [6]		0,95	0,95
Rated alternating current Ir	A	17,6	23,1
Rated alternating current Ir cos ϕ 1	A	13,7	18,0
Rated apparent power SrE	kVA	12,2	16,0
Short-circuit alternating current Alternator Ik"	A	191	191
Grid short circuit power with UnG Sk“	kVA	117,6	117,6
Start-up current Ik approx.	A	59	59
		Motor	
Motor manufacturer		YANMAR	YANMAR
Number of cylinders		3	3
Displacement	l	1,7	1,7
Air-fuel ratio λ		1,0	1,0
Engine oil - RMB/ENGINE Oil	l	45	45

Product designation		9.5	12.5
		Generator	
Generator manufacturer		Weier	Weier
Generator type		asynchron	asynchron
Motor start-up		provided	provided
Speed	rpm	1.540	1.540
		Supply and exhaust air	
Combustion air requirement	m³/h	32,50	39,60
Module ventilation flow rate	m³/h	100,00	100,00
Total air requirement of module	m³/h	132,50	139,60
Permissible counter-pressure of exhaust air system max. (7)	Pa	150	150
min./max. intake air temperature	°C	5/30	5/30
Min. cross section without hydraulic resistance	cm²	300	0
		Flue gas	
Flue gas temperature (8) / max.	°C	50 / < 110	50 / < 110
Flue gas mass flow rate - damp	kg/h	37	45
Flue gas volume flow - dry	Nm³/h	30	37
Delivery pressure flue gas max.	Pa	500	500
Delivery pressure flue gas cascades max.	Pa	500	500
Delivery pressure max. for flue gas and exhaust air combination	Pa	150	150
Emissions Nox	mg/kWh	< 240	< 240
		Dimensions & weight	
Dimensions of module L x W x H	mm	1.566x687x1.386	1.566x687x1.386
Weight approx. (including operating resources)	kg	818	818
		ErP-Label	
ErP energy efficiency label (4)		A++	A++
ErP energy input (4)	kWh_{Hs}	33,30	41,40
ErP efficiency ratio - electrical $\eta_{el,HS}$ (4)	%	28,6	30,2
ErP efficiency ratio - thermal $\eta_{th,HS}$ (4)	%	68,1	66,6
ErP efficiency ratio - total $\eta_{total,HS}$ (4)	%	96,7	96,8
Room controller category (4)		2	2
$P_{designh}$ (4)	kW_{el}	8,8	10,7
Q_{HE} (4)	kWh	12.904	14.833
P_{SB} electrical power requirement - standby (4)	kW_{el}	0,05	0,05
Electrical power requirement - partial load (4)	kW_{el}	0,50	0,40
$P\ el_{max}$ Electrical power requirement - full load (4)	kW_{el}	0,50	0,40
P_{stby_CHP} Thermal standing losses (4)	kW_{th}	0,36	0,36
Electrical power requirement - standby (4)	kW_{el}	0,05	0,05
η S =ηson -Σ(F1-F5) (4)		140,7	148,9
Net output - electrical	kW_{el}	9,00	12,10

1) Performance data in accordance with ISO 3046/I-2002, tolerance 5%

2) Thermal performance data tolerance 8%

3) f_{pe}-current = 2.8 displacement mix per DIN V 1859, DIN V 4701-10, GEG (attachment 4 to § 22 section 1) vaild from 11.2020

4) In accordance with EU Regulation 811/2013; 813/2013

5) Test bench measurement at 1 m interval in front of the CHP

6) Only when using the optional compensation (integrated in neoTower® 2.0, 3.3 and 4.0 / not required for neoTower® 50.0)

7) Exhaust air (without flue gas) does not have to be extracted “via the roof”

8) At a return temperature of 35 ° C and optimum operating conditions, tolerance 5%

Technical data

2.3.2 Liquefied petroleum gas

Product designation		9.5	12.5
		Technical data	
Rated output - electrical [1]	kW_{el}	9,5	12,5
Rated output - thermal [2]	kW_{th}	23,1	28,6
Power modulation - electrical	kW_{el}	5,0 - 9,5	6,0 - 12,5
Power modulation - thermal	kW_{th}	16,1 - 23,1	18,1 - 28,6
Energy input	kWh_{HI}	32,76	41,52
Liquefied Petroleum gas input	kg/h	2,55	3,23
Liquefied Petroleum gas input	l/h	4,71	5,97
CHP coefficient		0,41	0,44
f Primary energy factor [3]		0,410	0,373
PES	%	28,6	29,0
ErP energy efficiency label [4]		A++	A++
Sound pressure level L_{pA} [5]	dB(A)	55	57
Sound power level L_{wA}	dB(A)	71	73
Maintenance interval	op. hrs.	13.000	13.000
Oil interval	op. hrs.	6.500	6.500
		Efficiency ratios	
Electrical efficiency ratio η_{el}	%	29,0	30,1
Thermal efficiency ratio η_{th}	%	70,4	68,9
Total efficiency ratio η_{total}	%	99,4	99,0
		Heat extraction	
Flow temperature ± 5 °C	°C	80	80
Return flow temperature ± 5 °C	°C	25-65	25-65
min./max. ambient temperature	°C	5/30	5/30
Pressure rating - water side	PN	3	3
		Electrical energy generation	
Nominal voltage	V	400	400
Frequency	Hz	50	50
Nominal effective power PnG	kW_{el}	9,5	12,5
Apparent power $S_{E\ max}$	kVA	12,2	16,0
Nominal voltage UnG	V	400	400
Frequency	Hz	50	50
Cos ϕ uncompensated		0,78	0,78
Reactive power compensation [6]	kVar	4,07	5,73
Number of steps		1	1
Degree of choking or resonance frequency		-	-
Cos ϕ acc. to VDE-AR-N 4105 quadrants II, III [6]		0,95	0,95
Rated alternating current Ir	A	17,6	23,1
Rated alternating current Ir cos ϕ 1	A	13,7	18,0
Rated apparent power SrE	kVA	12,2	16,0
Short-circuit alternating current Alternator Ik"	A	191	191
Grid short circuit power with UnG Sk“	kVA	117,6	117,6
Start-up current Ik approx.	A	59	59
		Motor	
Motor manufacturer		YANMAR	YANMAR
Number of cylinders		3	3
Displacement	l	1,7	1,7
Air-fuel ratio λ		1,0	1,0
Engine oil - RMB/ENGINE Oil	l	45	45

Product designation		9.5	12.5
		Generator	
Generator manufacturer		Weier	Weier
Generator type		asynchron	asynchron
Motor start-up		provided	provided
Speed	rpm	1.540	1.540
		Supply and exhaust air	
Combustion air requirement	m³/h	32,50	39,60
Module ventilation flow rate	m³/h	100,00	100,00
Total air requirement of module	m³/h	132,50	139,60
Permissible counter-pressure of exhaust air system max. (7)	Pa	150	150
min./max. intake air temperature	°C	5/30	5/30
Min. cross section without hydraulic resistance	cm²	300	0
		Flue gas	
Flue gas temperature (8) / max.	°C	50 / < 110	50 / < 110
Flue gas mass flow rate - damp	kg/h	37	45
Flue gas volume flow - dry	Nm³/h	30	37
Delivery pressure flue gas max.	Pa	500	500
Delivery pressure flue gas cascades max.	Pa	500	500
Delivery pressure max. for flue gas and exhaust air combination	Pa	150	150
Emissions Nox	mg/kWh	< 240	< 240
		Dimensions & weight	
Dimensions of module L x W x H	mm	1.566x687x1.386	1.566x687x1.386
Weight approx. (including operating resources)	kg	818	818
		ErP-Label	
ErP energy efficiency label (4)		A++	A++
ErP energy input (4)	kWh_{Hs}	36,36	46,09
ErP efficiency ratio - electrical $\eta_{el,HS}$ (4)	%	26,1	27,1
ErP efficiency ratio - thermal $\eta_{th,HS}$ (4)	%	63,4	62,1
ErP efficiency ratio - total $\eta_{total,HS}$ (4)	%	89,6	89,2
Room controller category (4)		2	2
$P_{designh}$ (4)	kW_{el}	8,9	11,1
Q_{HE} (4)	kWh	14.349	17.127
P_{SB} electrical power requirement - standby (4)	kW_{el}	0,05	0,05
Electrical power requirement - partial load (4)	kW_{el}	0,50	0,40
$P\ el_{max}$ Electrical power requirement - full load (4)	kW_{el}	0,50	0,40
P_{stby_CHP} Thermal standing losses (4)	kW_{th}	0,36	0,36
Electrical power requirement - standby (4)	kW_{el}	0,05	0,05
η S =ηson -Σ(F1-F5) (4)		128,6	133,6
Net output - electrical	kW_{el}	9,00	12,10

1) Performance data in accordance with ISO 3046/I-2002, tolerance tolerance +5% / -20%

2) Thermal performance data tolerance 8%

3) f_{pe}-current = 2.8 displacement mix per DIN V 1859, DIN V 4701-10, GEG (attachment 4 to § 22 section 1) vaild from 11.2020

4) In accordance with EU Regulation 811/2013; 813/2013

5) Test bench measurement at 1 m interval in front of the CHP

6) Only when using the optional compensation (integrated in neoTower® 2.0, 3.3 and 4.0 / not required for neoTower® 50.0)

7) Exhaust air (without flue gas) does not have to be extracted “via the roof”

8) At a return temperature of 35 ° C and optimum operating conditions, tolerance 5%

Technical data

2.4 neoTower® 11.0, 16.0, 20.0

Product designation		11.0	16.0	20.0
			Technical data	
Rated output - electrical [1]	kW_{el}	11,0	16,0	20,0
Rated output - thermal [2]	kW_{th}	25,3	37,9	45,8
Power modulation - electrical	kW_{el}	7,5 - 11,0	9,5 - 16,0	10,7 - 20,0
Power modulation - thermal	kW_{th}	20,6 - 25,3	26,4 - 37,9	29,1 - 45,8
Energy input	kWh_{HI}	34,38	49,86	60,24
Liquefied Petroleum gas input	kg/h	2,67	3,87	4,68
Liquefied Petroleum gas input	l/h	4,95	7,17	8,67
CHP coefficient		0,43	0,42	0,44
f Primary energy factor [3]		0,279	0,266	0,224
PES	%	33,3	34,5	35,6
ErP energy efficiency label [4]		A++	A++	A++
Sound pressure level L_{pA} [5]	dB(A)	55	55	58
Sound power level L_{wA}	dB(A)	70	70	73
Maintenance interval	op. hrs.	10.000	6.000	6.000
			Efficiency ratios	
Electrical efficiency ratio η_{el}	%	32,0	32,1	33,2
Thermal efficiency ratio η_{th}	%	73,5	75,9	76,0
Total efficiency ratio η_{total}	%	105,5	108,0	109,2
			Heat extraction	
Flow temperature ± 5 °C	°C	80	80	80
Return flow temperature ± 5 °C	°C	25-65	25-65	25-65
min./max. ambient temperature	°C	5/30	5/30	5/30
Pressure rating - water side	PN	3	3	3
			Electrical energy generation	
Nominal voltage	V	400	400	400
Frequency	Hz	50	50	50
Nominal effective power PnG	kW_{el}	11	16	20
Apparent power $S_{E\ max}$	kVA	14,1	20,5	25,6
Nominal voltage UnG	V	400	400	400
Frequency	Hz	50	50	50
Cos ϕ uncompensated		0,78	0,78	0,78
Reactive power compensation [6]	kVar	8,29	8,75	8,75
Number of steps		1	1	1
Degree of choking or resonance frequency		-	-	-
Cos ϕ acc. to VDE-AR-N 4105 quadrants II, III [6]		0,95	0,95	0,95
Rated alternating current Ir	A	20,4	29,6	37,0
Rated alternating current Ir cos ϕ 1	A	15,9	23,1	28,9
Rated apparent power SrE	kVA	14,1	20,5	25,6
Short-circuit alternating current Alternator Ik"	A	156	156	156
Grid short circuit power with UnG Sk“	kVA	108,1	108,1	108,1
Start-up current Ik approx.	A	59	59	59
			Motor	
Motor manufacturer		Toyota	Toyota	Toyota
Number of cylinders		4	4	4
Displacement	l	2,2	2,2	2,2
Air-fuel ratio λ		1,6	1,0	1,0
Engine oil - RMB/ENGINE Oil	l	55	55	55

Product designation		11.0	16.0	20.0
			Generator	
Generator manufacturer		EMOD	EMOD	EMOD
Generator type		asynchron	asynchron	asynchron
Motor start-up		provided	provided	provided
Speed	rpm	1.540	1.540	1.540
			Supply and exhaust air	
Combustion air requirement	m³/h	70,25	63,69	76,95
Module ventilation flow rate	m³/h	100,00	100,00	100,00
Total air requirement of module	m³/h	170,25	163,69	176,95
Permissible counter-pressure of exhaust air system max. (7)	Pa	150,00	150,00	150,00
min./max. intake air temperature	°C	5/30	5/30	5/30
Min. cross section without hydraulic resistance	cm²	300	350	350
			Flue gas	
Flue gas temperature (8) / max.	°C	50 / < 110	50 / < 110	50 / < 110
Flue gas mass flow rate - damp	kg/h	74	67	81
Flue gas volume flow - dry	Nm³/h	60	54	66
Delivery pressure flue gas max.	Pa	500	500	500
Delivery pressure flue gas cascades max.	Pa	500	500	500
Delivery pressure max. for flue gas and exhaust air combination	Pa	150	150	150
Emissions Nox	mg/kWh	< 240	< 240	< 240
			Dimensions & weight	
Dimensions of module L x W x H	mm	1.464x687x1.236	1.464x687x1.236	1.464x687x1.236
Weight approx. (including operating resources)	kg	719	719	719
			ErP-Label	
ErP energy efficiency label (4)		A++	A++	A++
ErP energy input (4)	kWh_{Hs}	38,16	55,34	66,87
ErP efficiency ratio - electrical $\eta_{el,HS}$ (4)	%	28,8	28,9	29,9
ErP efficiency ratio - thermal $\eta_{th,HS}$ (4)	%	66,2	68,4	68,5
ErP efficiency ratio - total $\eta_{total,HS}$ (4)	%	95,0	97,3	98,4
Room controller category (4)		2	2	2
$P_{designh}$ (4)	kW_{el}	9,8	14,7	17,7
Q_{HE} (4)	kWh	14.243	21.275	24.812
P_{SB} electrical power requirement - standby (4)	kW_{el}	0,05	0,05	0,05
Electrical power requirement - partial load (4)	kW_{el}	0,31	0,47	0,70
$P\ el_{max}$ Electrical power requirement - full load (4)	kW_{el}	0,31	0,47	0,70
P_{stby_CHP} Thermal standing losses (4)	kW_{th}	0,36	0,36	0,36
Electrical power requirement - standby (4)	kW_{el}	0,05	0,05	0,05
η S =ηson -Σ(F1-F5) (4)		142,1	142,5	147,5
Net output - electrical	kW_{el}	10,69	15,53	19,30

1) Performance data in accordance with ISO 3046/I-2002, tolerance 5%

2) Thermal performance data tolerance 8%

3) f_{pe}-current = 2.8 displacement mix per DIN V 1859, DIN V 4701-10, GEG (attachment 4 to § 22 section 1) vaild from 11.2020

4) In accordance with EU Regulation 811/2013; 813/2013

5) Test bench measurement at 1 m interval in front of the CHP

6) Only when using the optional compensation (integrated in neoTower® 2.0, 3.3 and 4.0 / not required for neoTower® 50.0)

7) Exhaust air (without flue gas) does not have to be extracted “via the roof”

8) At a return temperature of 35 ° C and optimum operating conditions, tolerance 5%

Technical data

2.5 neoTower® 25.0, 30.0

2.5.1 Natural gas

Product designation		25.0	30.0
		Technical data	
Rated output - electrical [1]	kW_{el}	25,0	30,0
Rated output - thermal [2]	kW_{th}	54,9	63,1
Power modulation - electrical	kW_{el}	12,5 - 25,0	15,0 - 30,0
Power modulation - thermal	kW_{th}	34,8 - 54,9	40,9 - 63,1
Energy input	kWh_{HI}	76,92	89,55
Liquefied Petroleum gas input	kg/h	n.a.	n.a.
Liquefied Petroleum gas input	l/h	n.a.	n.a.
CHP coefficient		0,46	0,48
f Primary energy factor [3]		0,266	0,229
PES	%	32,8	33,3
ErP energy efficiency label [4]		A++	A++
Sound pressure level L_{pA} [5]	dB(A)	57	59
Sound power level L_{wA}	dB(A)	72	75
Maintenance interval	op. hrs.	8.000	8.000
		Efficiency ratios	
Electrical efficiency ratio η_{el}	%	32,5	33,5
Thermal efficiency ratio η_{th}	%	71,4	70,5
Total efficiency ratio η_{total}	%	103,9	104,0
		Heat extraction	
Flow temperature ± 5 °C	°C	80	80
Return flow temperature ± 5 °C	°C	25-65	25-65
min./max. ambient temperature	°C	5/30	5/30
Pressure rating - water side	PN	3	3
		Electrical energy generation	
Nominal voltage	V	400	400
Frequency	Hz	50	50
Nominal effective power PnG	kW_{el}	25,0	30,0
Apparent power $S_{E\ max}$	kVA	31,3	37,5
Nominal voltage UnG	V	400	400
Frequency	Hz	50	50
Cos ϕ uncompensated		0,80	0,80
Reactive power compensation [6]	kVar	13,87	13,87
Number of steps		1	1
Degree of choking or resonance frequency		-	-
Cos ϕ acc. to VDE-AR-N 4105 quadrants II, III [6]		0,95	0,95
Rated alternating current Ir	A	45,1	54,1
Rated alternating current Ir cos ϕ 1	A	36,1	43,3
Rated apparent power SrE	kVA	31,3	37,5
Short-circuit alternating current Alternator Ik"	A	358,1	358,1
Grid short circuit power with UnG Sk“	kVA	185,0	185,0
Start-up current Ik approx.	A	59	59
		Motor	
Motor manufacturer		YANMAR	YANMAR
Number of cylinders		4	4
Displacement	l	3,3	3,3
Air-fuel ratio λ		1,0	1,0
Engine oil - RMB/ENGINE Oil	l	90	90

Product designation		25.0	30.0
		Generator	
Generator manufacturer		Weier	Weier
Generator type		asynchron	asynchron
Motor start-up		provided	provided
Speed	rpm	1.530	1.530
		Supply and exhaust air	
Combustion air requirement	m³/h	98,25	114,38
Module ventilation flow rate	m³/h	260,00	260,00
Total air requirement of module	m³/h	358,25	374,38
Permissible counter-pressure of exhaust air system max. (7)	Pa	150	150
min./max. intake air temperature	°C	5/30	5/30
Min. cross section without hydraulic resistance	cm²	650	650
		Flue gas	
Flue gas temperature (8) / max.	°C	55 / < 110	55 / < 110
Flue gas mass flow rate - damp	kg/h	104	121
Flue gas volume flow - dry	Nm³/h	84	98
Delivery pressure flue gas max.	Pa	500	500
Delivery pressure flue gas cascades max.	Pa	500	500
Delivery pressure max. for flue gas and exhaust air combination	Pa	150	150
Emissions Nox	mg/kWh	< 240	< 240
		Dimensions & weight	
Dimensions of module L x W x H	mm	1.778x759x1.403	1.778x759x1.403
Weight approx. (including operating resources)	kg	1.038	1.038
		ErP-Label	
ErP energy efficiency label (4)		A++	A++
ErP energy input (4)	kWh_{Hs}	85,38	99,40
ErP efficiency ratio - electrical $\eta_{el,HS}$ (4)	%	29,3	30,2
ErP efficiency ratio - thermal $\eta_{th,HS}$ (4)	%	64,3	63,5
ErP efficiency ratio - total $\eta_{total,HS}$ (4)	%	93,6	93,7
Room controller category (4)		2	2
$P_{designh}$ (4)	kW_{el}	21,3	24,4
Q_{HE} (4)	kWh	30.423	33.908
P_{SB} electrical power requirement - standby (4)	kW_{el}	0,05	0,05
Electrical power requirement - partial load (4)	kW_{el}	0,74	0,74
$P\ el_{max}$ Electrical power requirement - full load (4)	kW_{el}	0,74	0,74
P_{stby_CHP} Thermal standing losses (4)	kW_{th}	0,53	0,53
Electrical power requirement - standby (4)	kW_{el}	0,05	0,05
η S =ηson -Σ(F1-F5) (4)		144,4	148,9
Net output - electrical	kW_{el}	24,26	29,26

1) Performance data in accordance with ISO 3046/I-2002, tolerance 5%

2) Thermal performance data tolerance 8%

3) f_{pe}-current = 2.8 displacement mix per DIN V 1859, DIN V 4701-10, GEG (attachment 4 to § 22 section 1) vaild from 11.2020

4) In accordance with EU Regulation 811/2013; 813/2013

5) Test bench measurement at 1 m interval in front of the CHP

6) Only when using the optional compensation (integrated in neoTower® 2.0, 3.3 and 4.0 / not required for neoTower® 50.0)

7) Exhaust air (without flue gas) does not have to be extracted “via the roof”

8) At a return temperature of 35 ° C and optimum operating conditions, tolerance 5%

Technical data

2.5.2 Liquefied petroleum gas

Product designation		25.0	30.0
		Technical data	
Rated output - electrical [1]	kW_{el}	25,0	30,0
Rated output - thermal [2]	kW_{th}	51,8	57,8
Power modulation - electrical	kW_{el}	12,5 - 25,0	15,0 - 30,0
Power modulation - thermal	kW_{th}	33,4 - 51,8	37,3 - 57,8
Energy input	kWh_{HI}	80,29	95,59
Liquefied Petroleum gas input	kg/h	6,24	7,43
Liquefied Petroleum gas input	l/h	11,55	13,75
CHP coefficient		0,48	0,52
f Primary energy factor [3]		0,353	0,366
PES	%	27,7	25,6
ErP energy efficiency label [4]		A++	A++
Sound pressure level L_{pA} [5]	dB(A)	57	59
Sound power level L_{wA}	dB(A)	72	75
Maintenance interval	op. hrs.	8.000	8.000
		Efficiency ratios	
Electrical efficiency ratio η_{el}	%	31,1	31,4
Thermal efficiency ratio η_{th}	%	64,6	60,5
Total efficiency ratio η_{total}	%	95,7	91,8
		Heat extraction	
Flow temperature ± 5 °C	°C	80	80
Return flow temperature ± 5 °C	°C	25-65	25-65
min./max. ambient temperature	°C	5/30	5/30
Pressure rating - water side	PN	3	3
		Electrical energy generation	
Nominal voltage	V	400	400
Frequency	Hz	50	50
Nominal effective power PnG	kW_{el}	25,0	30,0
Apparent power $S_{E\ max}$	kVA	31,3	37,5
Nominal voltage UnG	V	400	400
Frequency	Hz	50	50
Cos ϕ uncompensated		0,80	0,80
Reactive power compensation [6]	kVar	13,87	13,87
Number of steps		1	1
Degree of choking or resonance frequency		-	-
Cos ϕ acc. to VDE-AR-N 4105 quadrants II, III [6]		0,95	0,95
Rated alternating current Ir	A	45,1	54,1
Rated alternating current Ir cos ϕ 1	A	36,1	43,3
Rated apparent power SrE	kVA	31,3	37,5
Short-circuit alternating current Alternator Ik"	A	358,1	358,1
Grid short circuit power with UnG Sk“	kVA	185,0	185,0
Start-up current Ik approx.	A	59	59
		Motor	
Motor manufacturer		YANMAR	YANMAR
Number of cylinders		4	4
Displacement	l	3,3	3,3
Air-fuel ratio λ		1,0	1,0
Engine oil - RMB/ENGINE Oil	l	90	90

Product designation		25.0	30.0
		Generator	
Generator manufacturer		Weier	Weier
Generator type		asynchron	asynchron
Motor start-up		provided	provided
Speed	rpm	1.530	1.530
		Supply and exhaust air	
Combustion air requirement	m³/h	98,25	114,38
Module ventilation flow rate	m³/h	260,00	260,00
Total air requirement of module	m³/h	358,25	374,38
Permissible counter-pressure of exhaust air system max. (7)	Pa	150	150
min./max. intake air temperature	°C	5/30	5/30
Min. cross section without hydraulic resistance	cm²	650	650
		Flue gas	
Flue gas temperature (8) / max.	°C	55 / < 110	55 / < 110
Flue gas mass flow rate - damp	kg/h	104	121
Flue gas volume flow - dry	Nm³/h	84	98
Delivery pressure flue gas max.	Pa	500	500
Delivery pressure flue gas cascades max.	Pa	500	500
Delivery pressure max. for flue gas and exhaust air combination	Pa	150	150
Emissions Nox	mg/kWh	< 240	< 240
		Dimensions & weight	
Dimensions of module L x W x H	mm	1.778x759x1.403	1.778x759x1.403
Weight approx. (including operating resources)	kg	1.038	1.038
		ErP-Label	
ErP energy efficiency label (4)		A++	A++
ErP energy input (4)	kWh_{Hs}	89,12	106,10
ErP efficiency ratio - electrical $\eta_{el,HS}$ (4)	%	28,1	28,3
ErP efficiency ratio - thermal $\eta_{th,HS}$ (4)	%	58,2	54,5
ErP efficiency ratio - total $\eta_{total,HS}$ (4)	%	86,2	82,7
Room controller category (4)		2	2
$P_{designh}$ (4)	kW_{el}	20,1	22,4
Q_{HE} (4)	kWh	29.995	33.184
P_{SB} electrical power requirement - standby (4)	kW_{el}	0,05	0,05
Electrical power requirement - partial load (4)	kW_{el}	0,74	0,74
$P\ el_{max}$ Electrical power requirement - full load (4)	kW_{el}	0,74	0,74
P_{stby_CHP} Thermal standing losses (4)	kW_{th}	0,53	0,53
Electrical power requirement - standby (4)	kW_{el}	0,05	0,05
η S =ηson -Σ(F1-F5) (4)		138,2	139,3
Net output - electrical	kW_{el}	24,26	29,26

1) Performance data in accordance with ISO 3046/I-2002, tolerance +5% / -20%

2) Thermal performance data tolerance 8%

3) f_{pe}-current = 2.8 displacement mix per DIN V 1859, DIN V 4701-10, GEG (attachment 4 to § 22 section 1) vaild from 11.2020

4) In accordance with EU Regulation 811/2013; 813/2013

5) Test bench measurement at 1 m interval in front of the CHP

6) Only when using the optional compensation (integrated in neoTower® 2.0, 3.3 and 4.0 / not required for neoTower® 50.0)

7) Exhaust air (without flue gas) does not have to be extracted “via the roof”

8) At a return temperature of 35 ° C and optimum operating conditions, tolerance 5%

Technical data

2.6 neoTower® 50.0

2.6.1 Natural gas

Product designation		50.0 Standard	50.0 High Temperature	50.0 Caloric Value
		Technical data		
Rated output - electrical [1]	kW_{el}	50,0	50,0	50,0
Rated output - thermal [2]	kW_{th}	85,0	80,0	100,0
Power modulation - electrical	kW_{el}	25,0 - 50,0	25,0 - 50,0	25,0 - 50,0
Power modulation - thermal	kW_{th}	52,6 - 85,0	49,5 - 80,0	60,2 - 100,0
Energy input	kWh_{HI}	143,00	143,00	143,00
Liquefied Petroleum gas input	kg/h	n.a.	n.a.	n.a.
Liquefied Petroleum gas input	l/h	n.a.	n.a.	n.a.
CHP coefficient		0,59	0,63	0,50
f Primary energy factor [3]		0,203	0,216	0,172
PES	%	29,2	27,2	34,5
ErP energy efficiency label [4]		n.a.	n.a.	n.a.
Sound pressure level L_{pA} [5]	dB(A)	65	65	65
Sound power level L_{wA}	dB(A)	83	83	83
Maintenance interval	op. hrs.	3.000	3.000	3.000
		Efficiency ratios		
Electrical efficiency ratio η_{el}	%	35,0	35,0	35,0
Thermal efficiency ratio η_{th}	%	59,4	55,9	69,9
Total efficiency ratio η_{total}	%	94,4	90,9	104,9
		Heat extraction		
Flow temperature ± 5 °C	°C	80	93	80
Return flow temperature ± 5 °C	°C	25-65	35-83	25-65
min./max. ambient temperature	°C	5/30	5/30	5/30
Pressure rating - water side	PN	6	6	6
		Electrical energy generation		
Nominal voltage	V	400	400	400
Frequency	Hz	50	50	50
Nominal effective power PnG	kW_{el}	50,0	50,0	50,0
Apparent power $S_{E\ max}$	kVA	62,5	62,5	62,5
Nominal voltage UnG	V	400	400	400
Frequency	Hz	50	50	50
Cos ϕ uncompensated		synchronous	synchronous	synchronous
Reactive power compensation [6]	kVar	synchronous	synchronous	synchronous
Number of steps		synchronous	synchronous	synchronous
Degree of choking or resonance frequency		synchronous	synchronous	synchronous
Cos ϕ acc. to VDE-AR-N 4105 quadrants II, III [6]		0,80 - 1,00	0,80 - 1,00	0,80 - 1,00
Rated alternating current Ir	A	90,2	90,2	90,2
Rated alternating current Ir cos ϕ 1	A	72,2	72,2	72,2
Rated apparent power SrE	kVA	62,5	62,5	62,5
Short-circuit alternating current Alternator Ik"	A	1.170,0	1.170,0	1.170,0
Grid short circuit power with UnG Sk“	kVA	1.060,0	1.060,0	1.060,0
Start-up current Ik approx.	A	no start-up-current: Battery starter system		
		Motor		
Motor manufacturer		MAN	MAN	MAN
Number of cylinders		4	4	4
Displacement	l	4,6	4,6	4,6
Air-fuel ratio λ		1,0	1,0	1,0
Engine oil - RMB/ENGINE Oil	l	175	175	175

Product designation		50.0 Standard	50.0 High Temperature	50.0 Caloric Value
		Generator		
Generator manufacturer		MARELLI	MARELLI	MARELLI
Generator type		synchronous	synchronous	synchronous
Motor start-up		not provided	not provided	not provided
Speed	rpm	1.500	1.500	1.500
		Supply and exhaust air		
Combustion air requirement	m³/h	183,00	183,00	183,00
Module ventilation flow rate	m³/h	1100,00	1100,00	1100,00
Total air requirement of module	m³/h	1283,00	1283,00	1283,00
Permissible counter-pressure of exhaust air system max. (7)	Pa	150	150	150
min./max. intake air temperature	°C	5/30	5/30	5/30
Min. cross section without hydraulic resistance	cm²	2.000	2.000	2.000
		Flue gas		
Flue gas temperature (8) / max.	°C	95 / < 150	95 / < 150	60 / < 110
Flue gas mass flow rate - damp	kg/h	193	193	193
Flue gas volume flow - dry	Nm³/h	156	156	156
Delivery pressure flue gas max.	Pa	500	500	500
Delivery pressure flue gas cascades max.	Pa	500	500	500
Emissions Nox	mg/kWh	< 240	< 240	< 240
		Dimensions & weight (50.0 Caloric Value without condensing module)		
Dimensions of module L x W x H	mm	2.531x800x1.961	2.531x800x1.961	2.531x800x1.961
Weight approx. (including operating resources)	kg	2.250	2.250	2.250
		ErP-Label		
ErP energy efficiency label (4)		n.a.	n.a.	n.a.
ErP energy input (4)	kWh_{Hs}	158,73	158,73	158,73
ErP efficiency ratio - electrical $\eta_{el,HS}$ (4)	%	31,5	31,5	31,5
ErP efficiency ratio - thermal $\eta_{th,HS}$ (4)	%	53,6	50,4	63,0
ErP efficiency ratio - total $\eta_{total,HS}$ (4)	%	85,1	81,9	94,5
Room controller category (4)		2	2	2
$P_{designh}$ (4)	kW_{el}	32,9	31,0	38,7
Q_{HE} (4)	kWh	43.738	41.165	51.454
P_{SB} electrical power requirement - standby (4)	kW_{el}	0,07	0,07	0,07
Electrical power requirement - partial load (4)	kW_{el}	0,66	0,66	0,66
$P\ el_{max}$ Electrical power requirement - full load (4)	kW_{el}	0,96	0,96	0,96
P_{stby_CHP} Thermal standing losses (4)	kW_{th}	0,87	0,87	0,87
Electrical power requirement - standby (4)	kW_{el}	0,07	0,07	0,07
η S =ηson -Σ(F1-F5) (4)		155,5	155,5	155,5
Net output - electrical	kW_{el}	49,04	49,04	49,04

1) Performance data in accordance with ISO 3046/I-2002, tolerance 5%

2) Thermal performance data tolerance 8%

3) f_{pe}-current = 2.8 displacement mix per DIN V 1859, DIN V 4701-10, GEG (attachment 4 to § 22 section 1) vaild from 11.2020

4) In accordance with EU Regulation 811/2013; 813/2013

5) Test bench measurement at 1 m interval in front of the CHP

6) Only when using the optional compensation (integrated in neoTower® 2.0, 3.3 and 4.0 / not required for neoTower® 50.0)

7) Exhaust air (without flue gas) does not have to be extracted “via the roof”

8) At a return temperature of 35 ° C and optimum operating conditions, tolerance 5%

Technical data

2.6.2 Liquefied petroleum gas

Product designation		50.0 Standard	50.0 High Temperature	50.0 Caloric Value
		Technical data		
Rated output - electrical [1]	kW_{el}	50,0	50,0	50,0
Rated output - thermal [2]	kW_{th}	87,0	77,3	95,3
Power modulation - electrical	kW_{el}	25,0 - 50,0	25,0 - 50,0	25,0 - 50,0
Power modulation - thermal	kW_{th}	55,1 - 87,0	52,7 - 77,3	61,4 - 95,3
Energy input	kWh_{HI}	149,11	151,86	153,60
Liquefied Petroleum gas input	kg/h	11,59	11,80	11,93
Liquefied Petroleum gas input	l/h	21,46	21,85	22,10
CHP coefficient		0,57	0,65	0,52
f Primary energy factor [3]		0,276	0,349	0,304
PES	%	26,9	21,5	27,9
ErP energy efficiency label [4]		n.a.	n.a.	n.a.
Sound pressure level L_{pA} [5]	dB(A)	65	65	65
Sound power level L_{wA}	dB(A)	83	83	83
Maintenance interval	op. hrs.	3.000	3.000	3.000
		Efficiency ratios		
Electrical efficiency ratio η_{el}	%	33,5	32,9	32,6
Thermal efficiency ratio η_{th}	%	58,4	50,9	62,0
Total efficiency ratio η_{total}	%	91,9	83,9	94,6
		Heat extraction		
Flow temperature ± 5 °C	°C	80	93	80
Return flow temperature ± 5 °C	°C	25-65	35-83	25-65
min./max. ambient temperature	°C	5/30	5/30	5/30
Pressure rating - water side	PN	6	6	6
		Electrical energy generation		
Nominal voltage	V	400	400	400
Frequency	Hz	50	50	50
Nominal effective power PnG	kW_{el}	50,0	50,0	50,0
Apparent power $S_{E\ max}$	kVA	62,5	62,5	62,5
Nominal voltage UnG	V	400	400	400
Frequency	Hz	50	50	50
Cos ϕ uncompensated		synchronous	synchronous	synchronous
Reactive power compensation [6]	kVar	synchronous	synchronous	synchronous
Number of steps		synchronous	synchronous	synchronous
Degree of choking or resonance frequency		synchronous	synchronous	synchronous
Cos ϕ acc. to VDE-AR-N 4105 quadrants II, III [6]		0,80 - 1,00	0,80 - 1,00	0,80 - 1,00
Rated alternating current Ir	A	90,2	90,2	90,2
Rated alternating current Ir cos ϕ 1	A	72,2	72,2	72,2
Rated apparent power SrE	kVA	62,5	62,5	62,5
Short-circuit alternating current Alternator Ik"	A	1.170,0	1.170,0	1.170,0
Grid short circuit power with UnG Sk“	kVA	1.060,0	1.060,0	1.060,0
Start-up current Ik approx.	A	no start-up-current: Battery starter system		
		Motor		
Motor manufacturer		MAN	MAN	MAN
Number of cylinders		4	4	4
Displacement	l	4,6	4,6	4,6
Air-fuel ratio λ		1,0	1,0	1,0
Engine oil - RMB/ENGINE Oil	l	175	175	175

Product designation		50.0 Standard	50.0 High Temperature	50.0 Caloric Value
		Generator		
Generator manufacturer		MARELLI	MARELLI	MARELLI
Generator type		synchronous	synchronous	synchronous
Motor start-up		not provided	not provided	not provided
Speed	rpm	1.500	1.500	1.500
		Supply and exhaust air		
Combustion air requirement	m³/h	183,00	183,00	183,00
Module ventilation flow rate	m³/h	1100,00	1100,00	1100,00
Total air requirement of module	m³/h	1283,00	1283,00	1283,00
Permissible counter-pressure of exhaust air system max. (7)	Pa	150	150	150
min./max. intake air temperature	°C	5/30	5/30	5/30
Min. cross section without hydraulic resistance	cm²	2.000	2.000	2.000
		Flue gas		
Flue gas temperature (8) / max.	°C	95 / < 150	95 / < 150	60 / < 110
Flue gas mass flow rate - damp	kg/h	193	193	193
Flue gas volume flow - dry	Nm³/h	156	156	156
Delivery pressure flue gas max.	Pa	500	500	500
Delivery pressure flue gas cascades max.	Pa	500	500	500
Emissions Nox	mg/kWh	< 240	< 240	< 240
		Dimensions & weight (50.0 Caloric Value without condensing module)		
Dimensions of module L x W x H	mm	2.531x800x1.961	2.531x800x1.961	2.531x800x1.961
Weight approx. (including operating resources)	kg	2.250	2.250	2.250
		ErP-Label		
ErP energy efficiency label (4)		n.a.	n.a.	n.a.
ErP energy input (4)	kWh_{Hs}	165,51	168,56	170,50
ErP efficiency ratio - electrical $\eta_{el,HS}$ (4)	%	30,2	29,7	29,3
ErP efficiency ratio - thermal $\eta_{th,HS}$ (4)	%	52,6	45,9	55,9
ErP efficiency ratio - total $\eta_{total,HS}$ (4)	%	82,8	75,5	85,2
Room controller category (4)		2	2	2
$P_{designh}$ (4)	kW_{el}	33,7	29,9	36,9
Q_{HE} (4)	kWh	46.734	42.291	52.704
P_{SB} electrical power requirement - standby (4)	kW_{el}	0,07	0,07	0,07
Electrical power requirement - partial load (4)	kW_{el}	0,66	0,66	0,66
$P\ el_{max}$ Electrical power requirement - full load (4)	kW_{el}	0,96	0,96	0,96
P_{stby_CHP} Thermal standing losses (4)	kW_{th}	0,87	0,87	0,87
Electrical power requirement - standby (4)	kW_{el}	0,07	0,07	0,07
η S =ηson -Σ(F1-F5) (4)		149,0	146,3	144,6
Net output - electrical	kW_{el}	49,04	49,04	49,04

1) Performance data in accordance with ISO 3046/I-2002, tolerance 5%

2) Thermal performance data tolerance 8%

3) f_{pe}-current = 2.8 displacement mix per DIN V 1859, DIN V 4701-10, GEG (attachment 4 to § 22 section 1) vaild from 11.2020

4) In accordance with EU Regulation 811/2013; 813/2013

5) Test bench measurement at 1 m interval in front of the CHP

6) Only when using the optional compensation (integrated in neoTower® 2.0, 3.3 and 4.0 / not required for neoTower® 50.0)

7) Exhaust air (without flue gas) does not have to be extracted “via the roof”

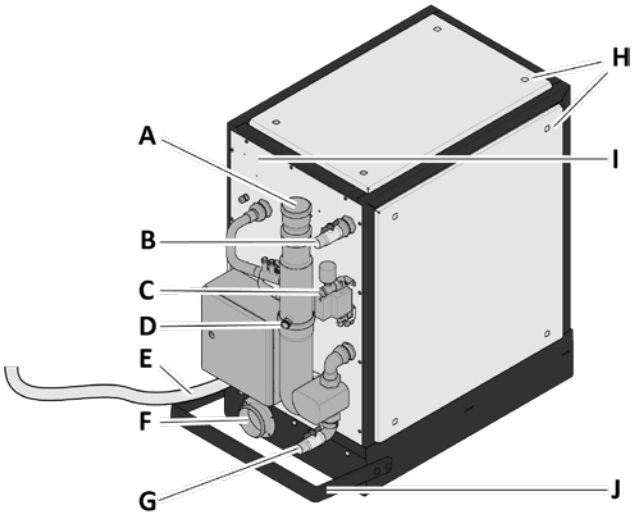
8) At a return temperature of 35 ° C and optimum operating conditions, tolerance 5%

3 Product overview

3.1 neoTower®

Under the case cover is the cogeneration unit with the combustion engine, the alternator unit and the heat exchangers. The generation unit is the central piece of equipment in the production of electricity and heat.

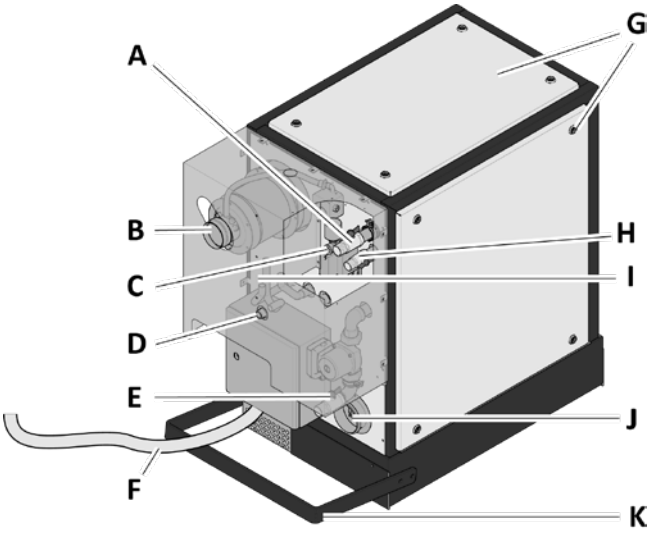
neoTower® 2.0, 3.3, 4.0



A “Flue gas" connection
B “Buffer water supply" connection
C “Gas" connection [1]
D “Condensate" connection
E Control cabinet wiring harness
F “Supply air" connection (room air dependent)
G “Buffer water return" connection
H Housing cover
I Type plate
J Protection bracket

[1] Systems for natural gas are not suitable for use with liquefied gas and vice versa.

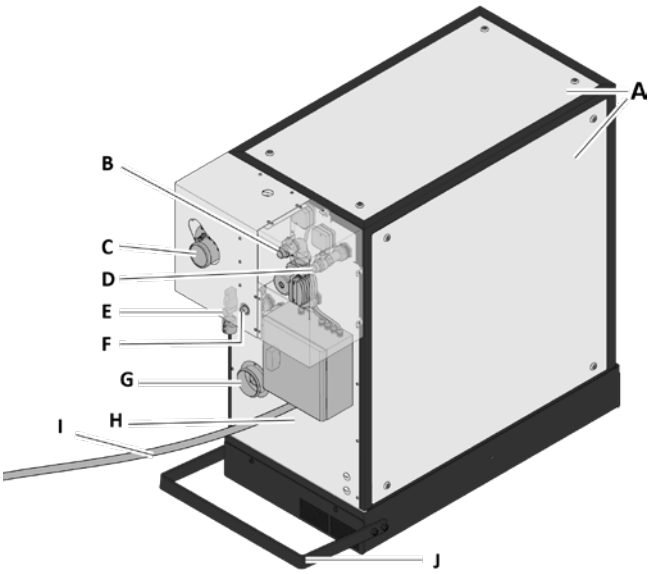
neoTower® 5.0, 7.2



A “Buffer water supply" connection
B “Flue gas" connection
C “Gas" connection [1]
D “Condensate" connection
E “Buffer water return" connection
F Control cabinet wiring harness
G Housing cover
H “Expansion tank" connection
I Type plate
J “Exhaust air” connection (room air dependent)
K Protection bracket

[1] Systems for natural gas are not suitable for use with liquefied gas and vice versa.

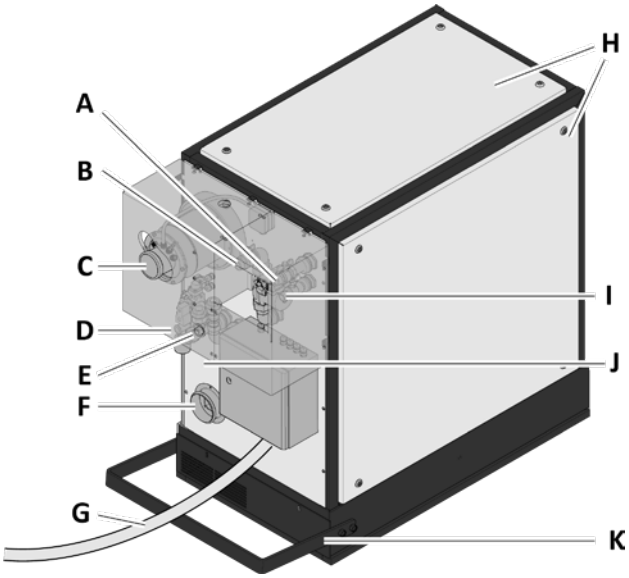
neoTower® 9.5, 12.5



A Housing cover
B “Buffer water return" connection
C “Flue gas" connection
D “Buffer water supply" connection
E “Gas" connection [1]
F “Condensate" connection
G “Exhaust air” connection
H Type plate
I Control cabinet wiring harness
J Protection bracket

[1] Systems for natural gas are not suitable for use with liquefied gas and vice versa.

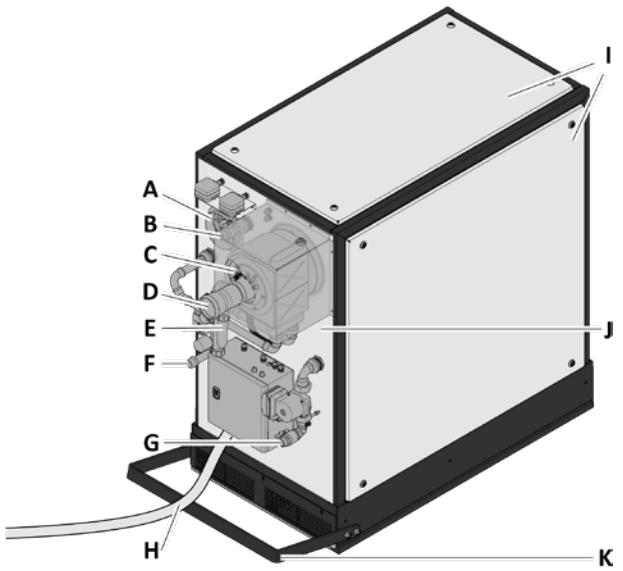
neoTower® 11.0, 16.0, 20.0



A “Buffer water supply" connection
B “Buffer water return" connection
C “Flue gas" connection
D “Gas" connection [1]
E “Condensate" connection
F “Exhaust air” connection (room air dependent)
G Control cabinet wiring harness
H Housing cover
I “Expansion tank" connection
J Type plate
K Protection bracket

[1] Systems for natural gas are not suitable for use with liquefied gas and vice versa.

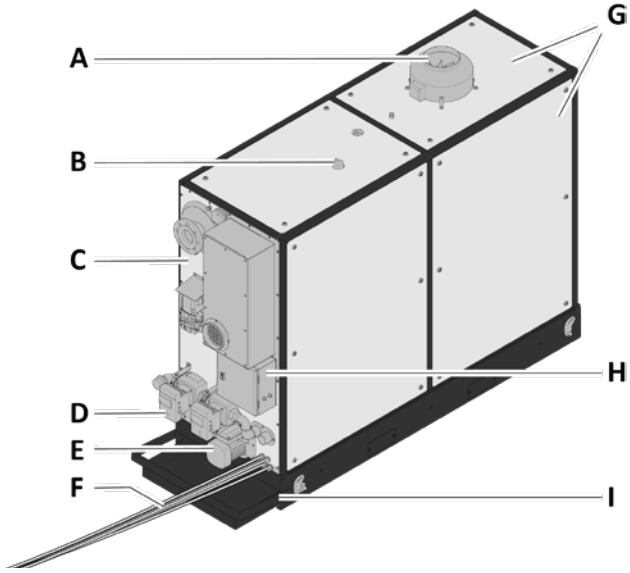
neoTower® 25.0, 30.0



A “Exhaust air” connection (room air dependent)
B “Buffer water supply" connection
C “Expansion tank" connection
D “Flue gas" connection
E “Condensate" connection
F “Gas" connection [1]
G “Buffer water return" connection
H Control cabinet wiring harness
I Housing cover
J Type plate
K Protection bracket

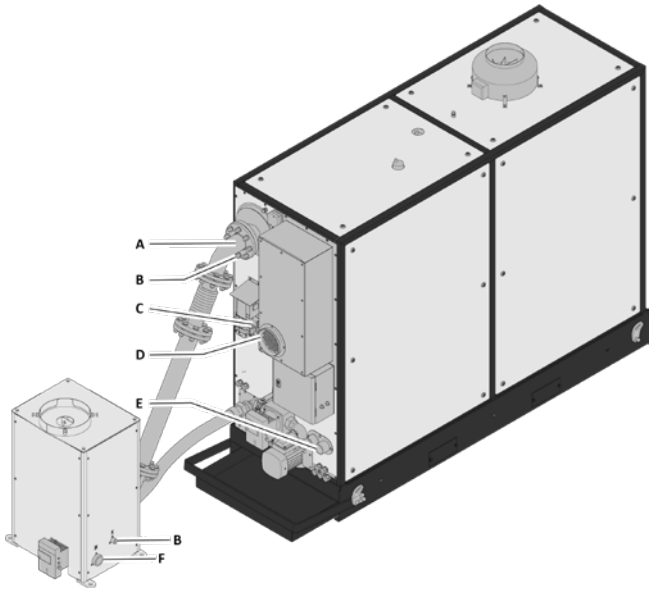
[1] Systems for natural gas are not suitable for use with liquefied gas and vice versa.

neoTower® 50.0 Standard and High Temperature



A “Exhaust air” connection (room air dependent)
B Ventilation
C Type plate
D Secondary pump
E Primary pump
F Control cabinet wiring harness
G Housing cover
H Connection cabinet
I Protection bracket

neoTower® 50.0 Calorific Value



A “Flue gas" connection
B “Condensate" connection
C “Gas" connection [1]
D “Combustion air” intake
E “Buffer water supply" connection
F “Buffer water return" connection

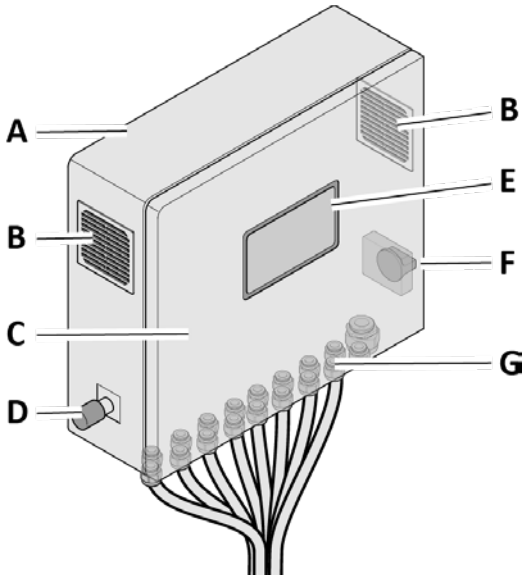
[1] Systems for natural gas are not suitable for use with liquefied gas and vice versa.

3.2 Control cabinet

The control cabinet contains all the components necessary to control the system. When the system is delivered, the control cabinet is permanently connected to the neoTower®. It is possible to extend the connection cable between the control cabinet and neoTower®.

When ordering, specify the required length.
- Standard length neoTower® 2.0 - 30.0 = 3 m
- Standard length neoTower® 50.0 = 4.5 m

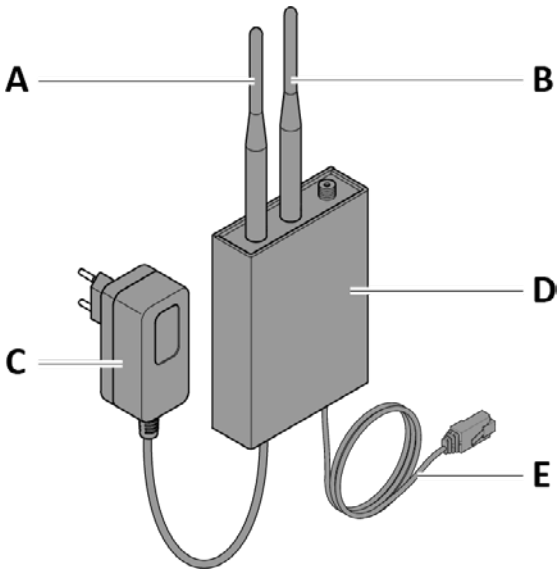
The maximum total length is 10 m



A Housing
B Aeration and ventilation
C Control cabinet door
D Emergency stop switch
E Operating display
F Main switch
G Cable bushings

3.3 Modem

The modem makes it possible to monitor the system remotely and read data through the mobile communications network.



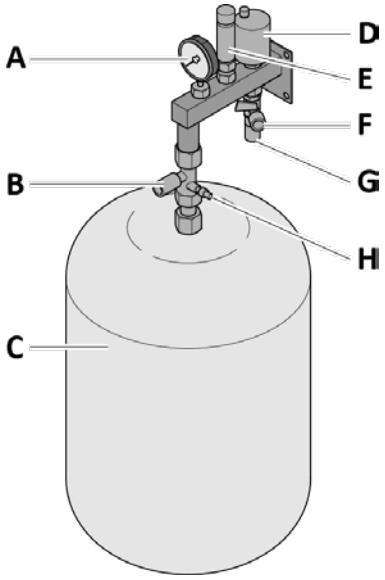
A Antenna (“mobile” slot)
B Antenna (“mobile” slot)
C Power supply unit
D LTE modem
E Connection cable ("LAN 1” slot)

If necessary the reception performance can be improved by the following optional accessories:
- Outdoor antenna (up to 15 m away)
- Patch cable (max. length 100 m)

A socket outlet must be provided at the site to provide power to the modem.
This must be separate from the system and the control cabinet.

3.4 Expansion tank connection group

The diaphragm expansion tank compensates any temperature-related volume fluctuations of the motor circuit (primary circuit).

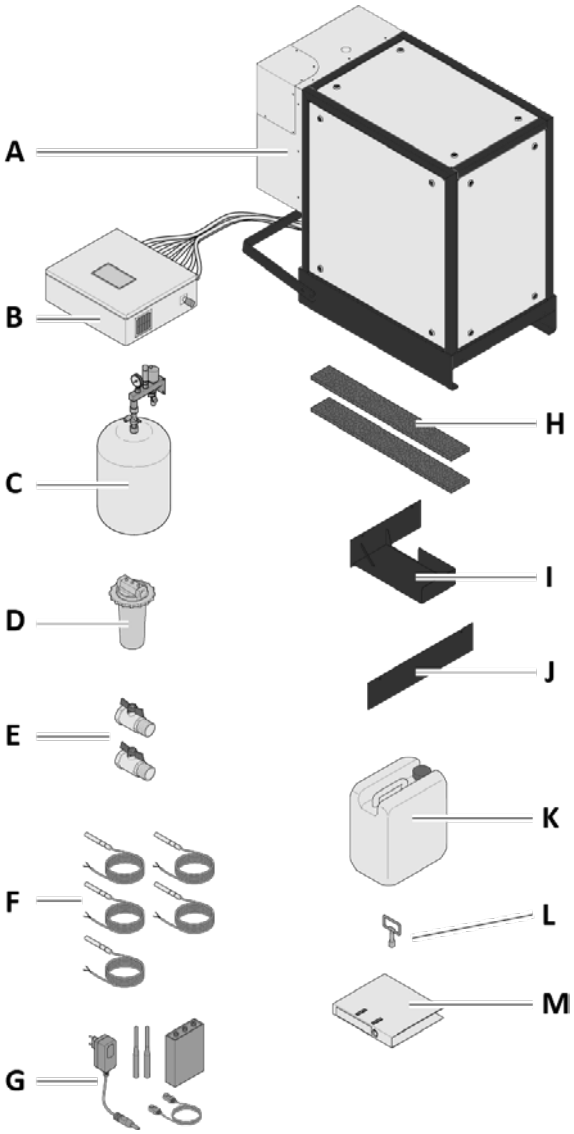


A Pressure gauge
B Cap valve
C Diaphragm expansion tank
D Self-ventilation
E Pressure relief valve
F Fill and drain valve (connection for replenishing water-glycol mixture 60:40)
G Generation unit connection
H Drain tap

The expansion tank connection group is installed internally in the neoTower® 2.0, 3.3, 4.0, 9.5, 12.5 and 50.0.

3.5 Scope of supply

The scope of supply may vary. The exact scope of supply is listed in the operating manual.



A Generation unit
B Control cabinet
C Expansion tank connection group (not with 2.0, 3.3, 4.0, 9.5, 12.5, 50.0)
D MSM filter
E Valve
F Temperature sensor
G Modem[1]
H Compensation strip
I Rear cover
J Front cover
K Cooling medium (water-glycol mixture 60:40)
L Square spanner
M Documentation (e.g. operating manual)

[1] including 24 months remote monitoring (effective from commissioning, can be extended subject to charge).

Storage and installation site

4 Storage
The system is prepared by the manufacturer for operation on delivery.
The system must be taken into operation within six months of delivery. If this is not possible, the system must be treated with preservatives.

WARNING!
Risk of damage due to improper storage!

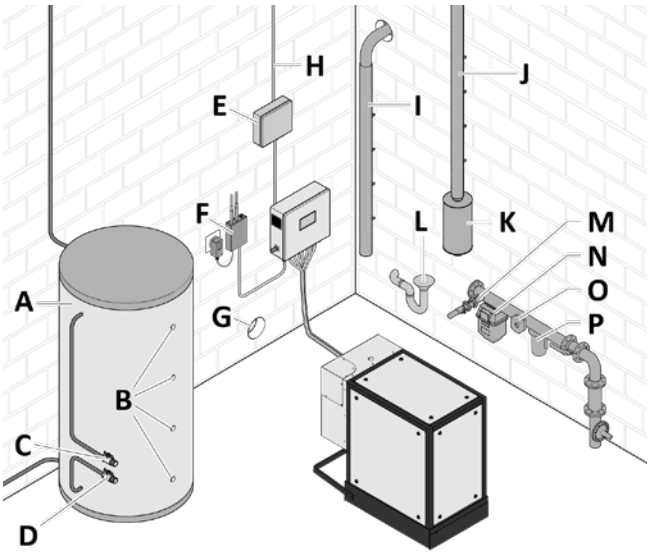
Prolonged downtimes cause lubricants and fluids to settle in the system. Frost and damp conditions can damage parts of the system.

- Store the unit in a frost-free and dry place.
- Arrange for the manufacturer to rust-proof the system if it is to be kept out of operation for more than six months. The shelf life of the preservative is 12 months.

When taking the system out of storage, the next steps must be discussed with the manufacturer.

5 Installation site
5.1 Requirements
Incorrect installation of the system can cause suffocation, gas explosion or material damage! Failure to comply with requirements may cause hazardous situations when handling electricity, gas or hot water.
- It must be ensured that all installation site requirements are met.

5.2 Overview
Some equipment must be available on site to enable operation of the system. The figure below shows an example of the components required.



A Buffer storage unit
B Temperature sensor fixture
C Buffer water supply connection
D Buffer water return connection
E Reactive current compensation
F Modem
G Supply air opening
H Power supply
I Exhaust air duct
J Flue gas routing
K Flue gas silencer
L Condensate drain
M Gas connection
N Gas meter
O Gas flow monitor
P Gas filter

The heating system also includes the peak load boiler and the piping system which are connected to the system via the buffer storage unit.

5.3 Installation room
The installation room must meet the following requirements:
- The installation room must comply with the applicable laws and regulations (e.g. in Germany the Fire Installations Ordinance (Feuerstättenverordnung).
- The substrate on which the generation unit is to be installed must be flat, even, solid, dry and load-bearing.
- The minimum ambient temperature is +5 °C. If the ambient temperature exceeds +30 °C, the system modulates down and at +37 °C the system switches off. As the temperature increases, the efficiency decreases.
- The system must be protected against frost and exposure to the weather.

The following are not permitted:
- Installation on floating screed.
- Operation of vented tumble dryers in the same room.
- Storage of explosive or highly flammable materials (e.g. paper, paints, petrol) at the installation site.
- Use of aggressive agents (e.g. sprays, solvents, chlorinated cleaners, paints, adhesives) near the system.

If the system is installed in vaulted cellars or bare smooth-walled rooms (hard-walled), there is a risk of noise and sound resonance.

The system must be positioned so that the following requirements are met:
- None of the system's ventilation or extraction devices may be blocked or closed.
- The emergency stop switch must always be accessible.

5.4 Bringing in the system

Access to the system installation room should be sufficiently dimensioned. For ground level transport, a lift truck is sufficient. Our systems have a width of 613 to 800 mm. This means that most doors are wide enough for the system to pass through.

Basic options for transporting the system to the installation site are:

- Use of a crane and straps (always observe the centre of gravity of the system).
- Use of suitable means of transport such as lift truck or forklift.
- The max. load capacity of the lifting equipment must be higher than or equal to the weight of the heaviest unit.

5.4.1 Dismantling for assembly

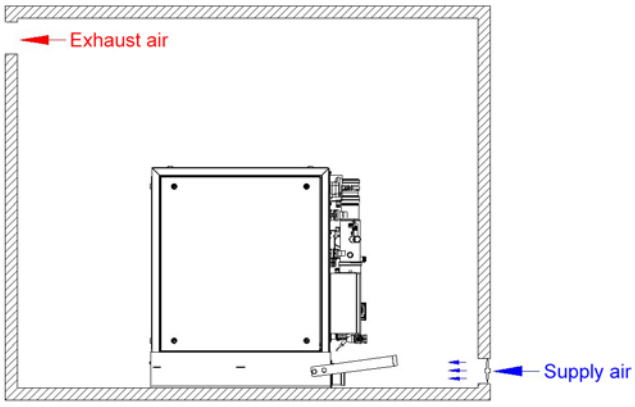
If access is too narrow or low, it may be necessary to dismantle parts of the generation unit to enable transport of the system to its installation site. Disassembly and reassembly may only be carried out by the manufacturer.
If you have any questions, please contact our Customer Service team.

5.5 Supply and exhaust air

There must be sufficient ventilation for the combustion process and for the ambient temperature:

- The total requirements of the heating system (e.g. for the peak load boiler) must be taken into account.
- The supply of air to the system must be sufficient.
- It is not permitted to route the supply air through a concentric pipe if the inner pipe is used for flue gas routing.
- If the ambient temperature in the installation room is constantly above 30 °C, an additional exchange of air through an exhaust air opening is recommended.

See example:



For details, please refer to the technical data sheet.

5.5.1 Hydraulically free cross-section, supply air opening

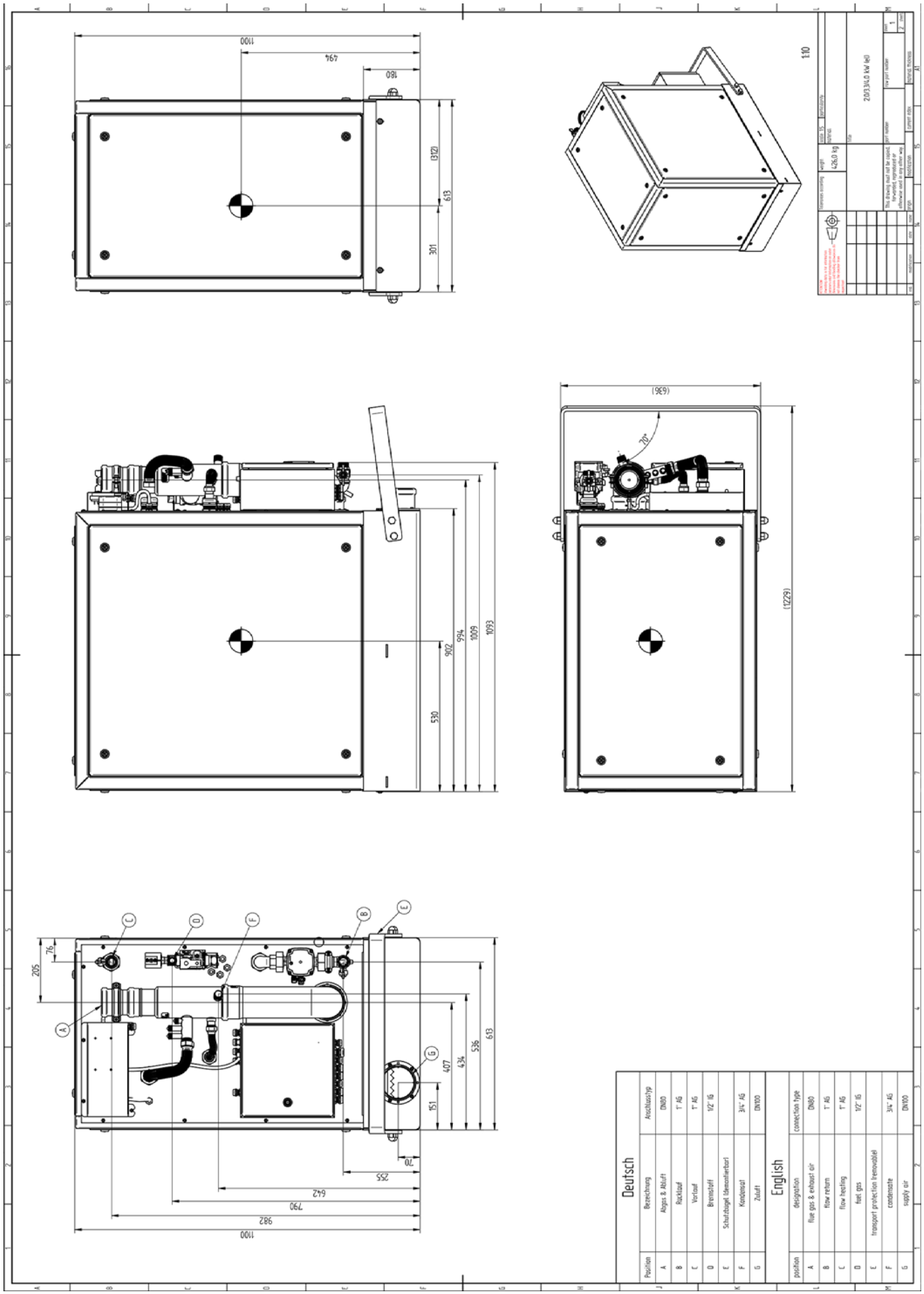
To ensure that the combustion air requirements of the system and the flow rate for module venting are met, a hydraulically free opening with the following dimensions is recommended:

neoTower®	min. cm²
2.0	150
3.3	150
4.0	150
5.0	250
7.2	250
9.5	300
11.0	300
12.5	300
16.0	350
20.0	350
25.0	650
30.0	650
50.0 S	2000
50.0 HT	2000
50.0 CV	2000

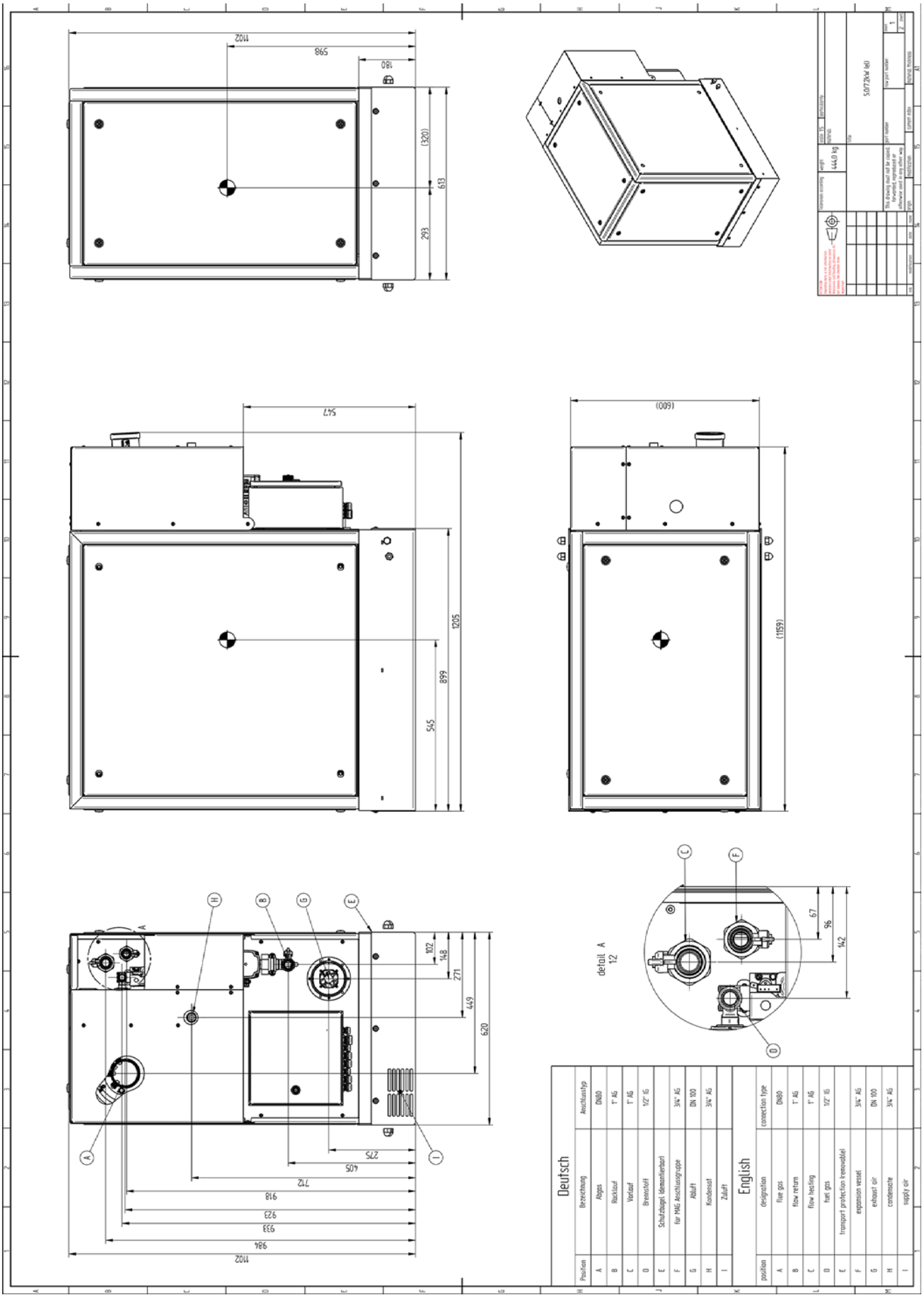
Installation dimensions

6 Installation dimensions

6.1 neoTower® Living 2.0, 3.3, 4.0

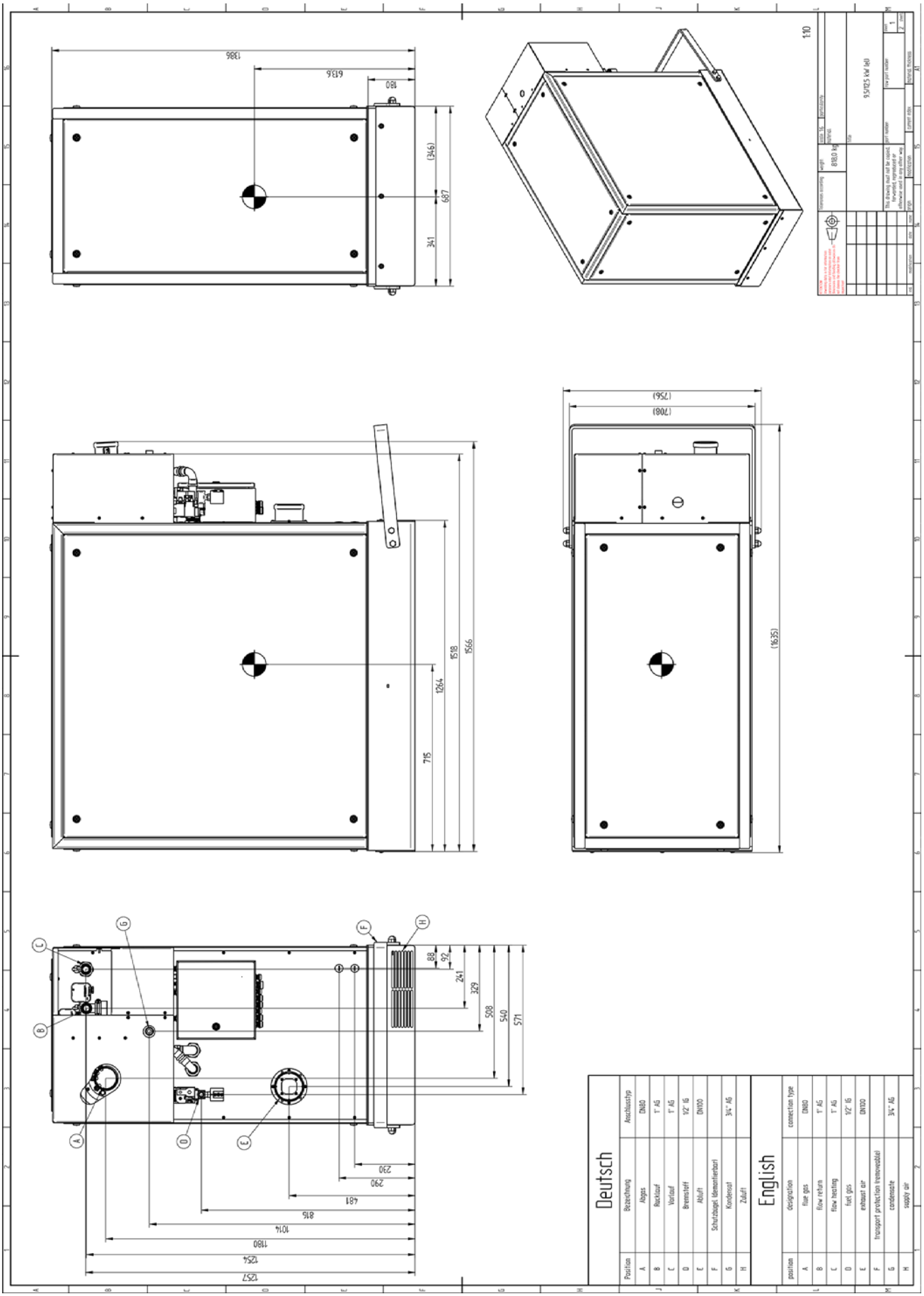


6.2 neoTower® 5.0, 7.2

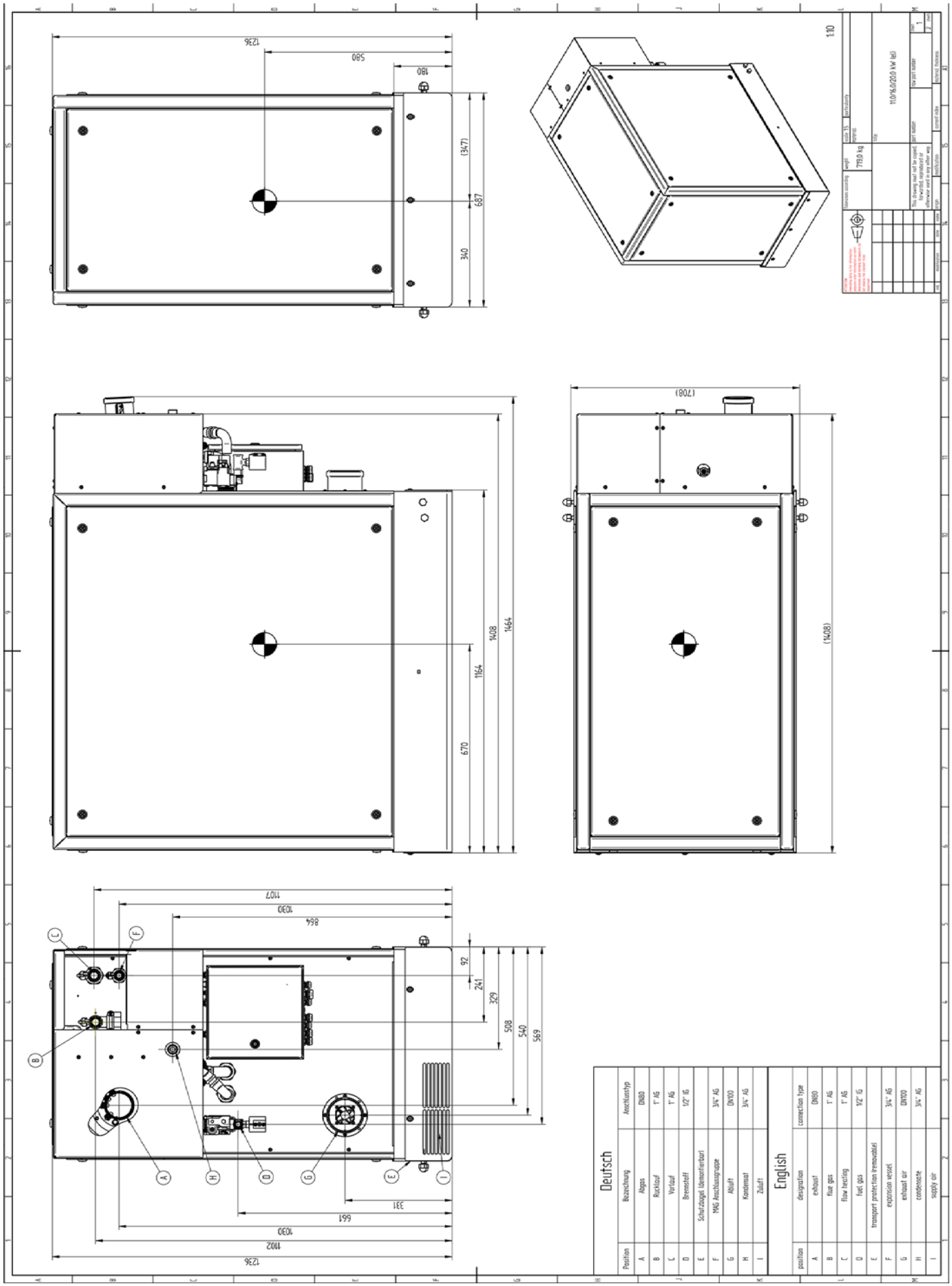


Installation dimensions

6.3 neoTower® 9.5, 12.5

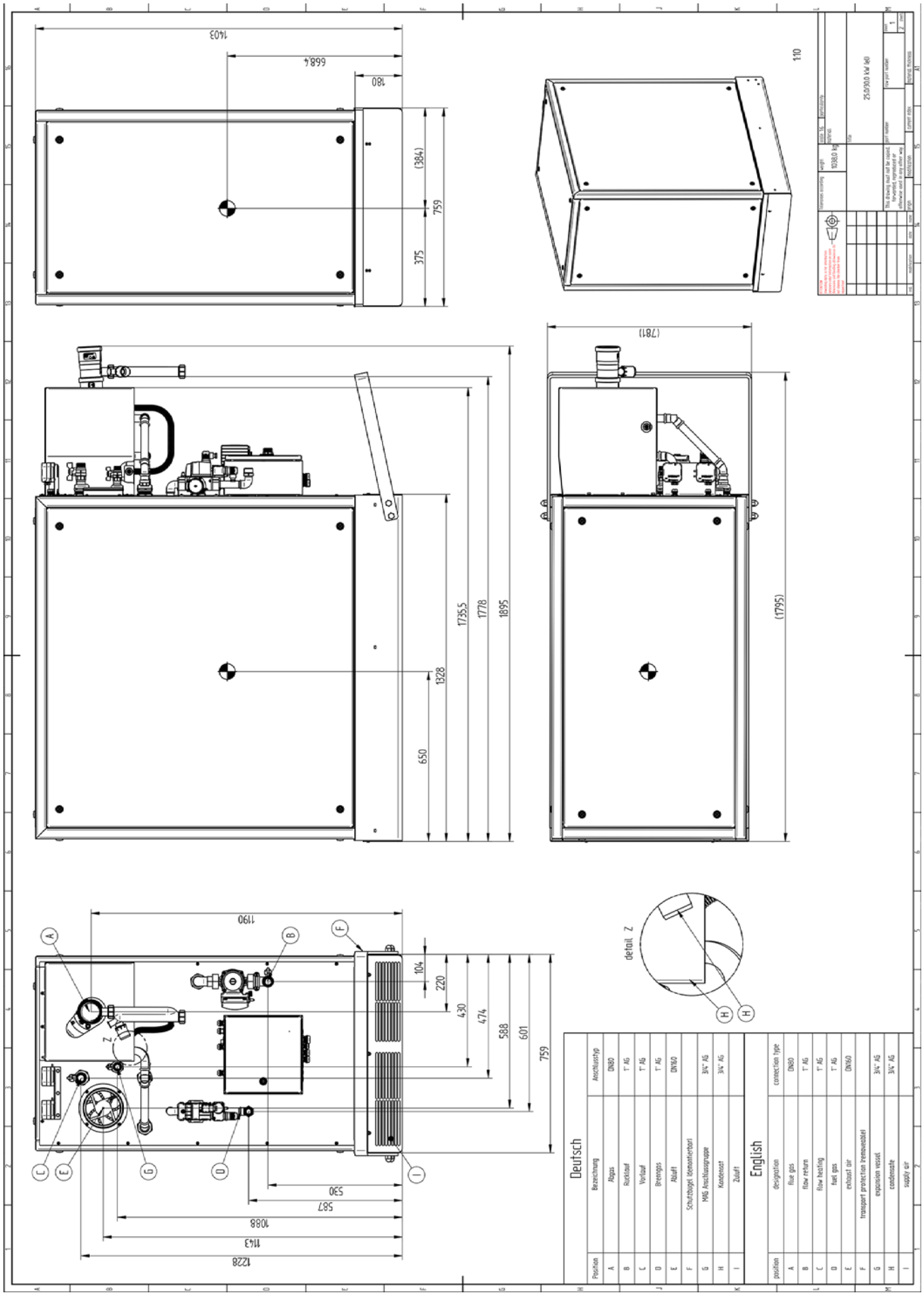


6.4 neoTower® 11.0, 16.0, 20.0

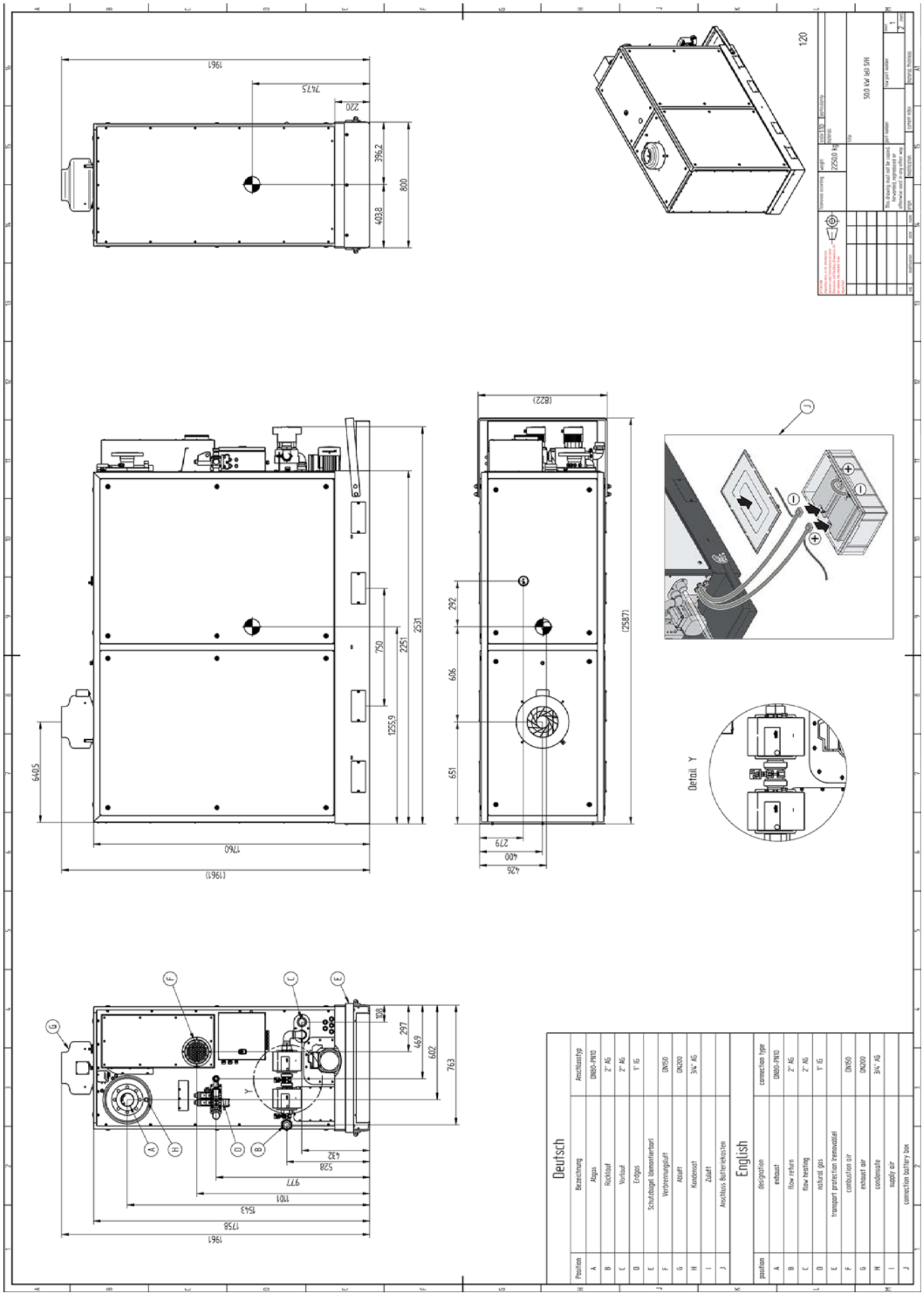


Installation dimensions

6.5 neoTower® 25.0, 30.0

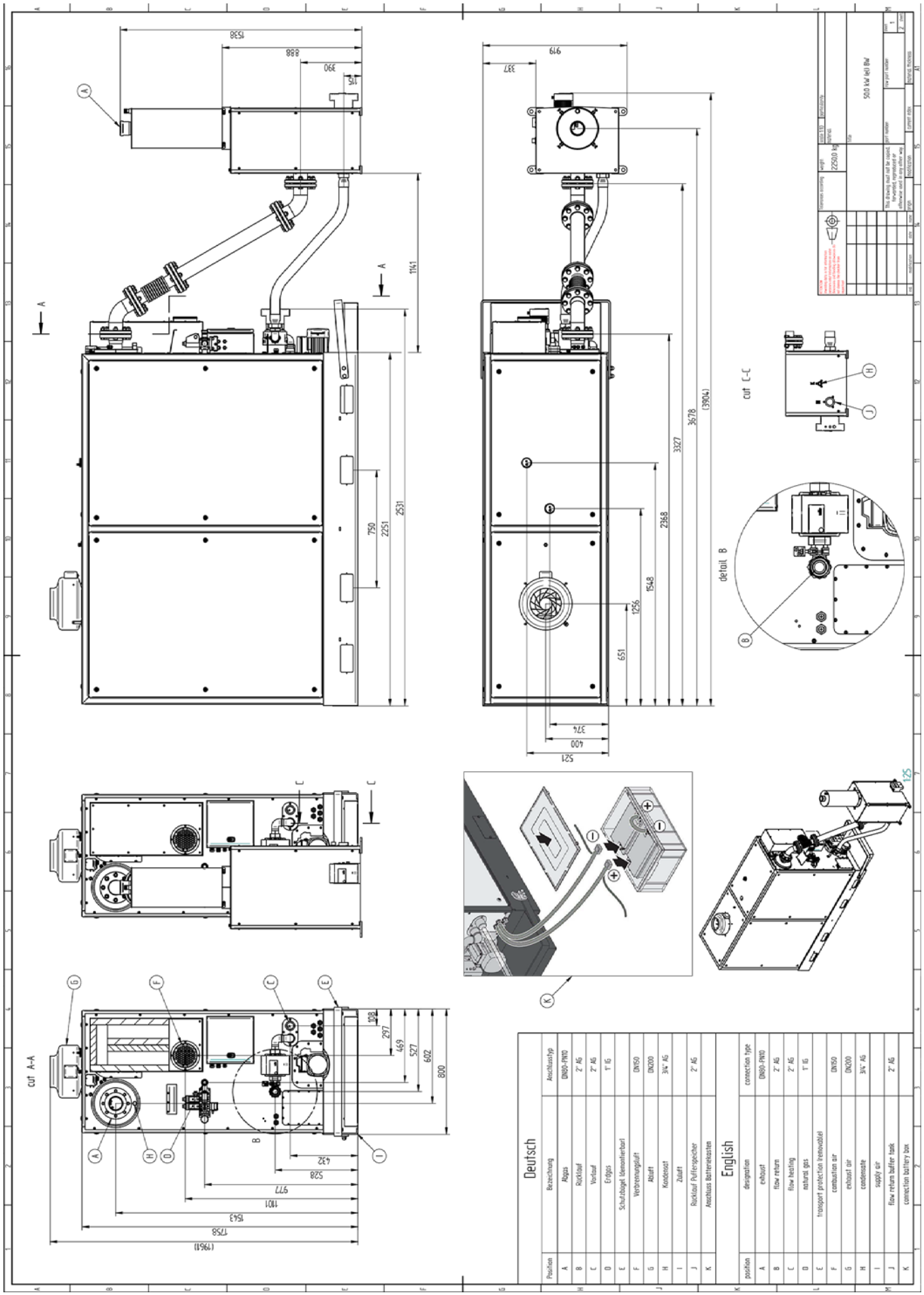


6.6 neoTower® 50.0 Standard and High Temperature



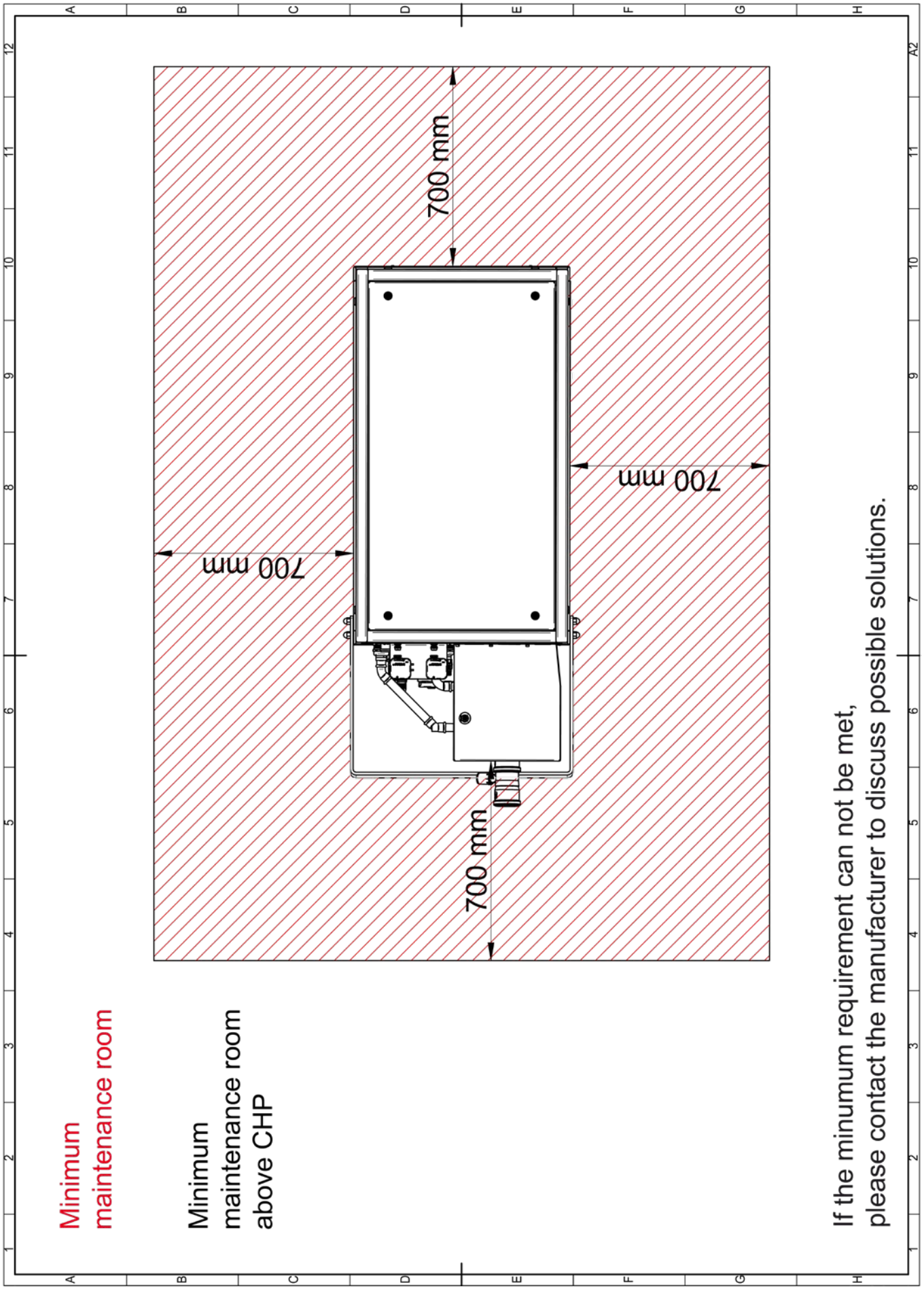
Installation dimensions

6.7 neoTower® 50.0 Calorific Value



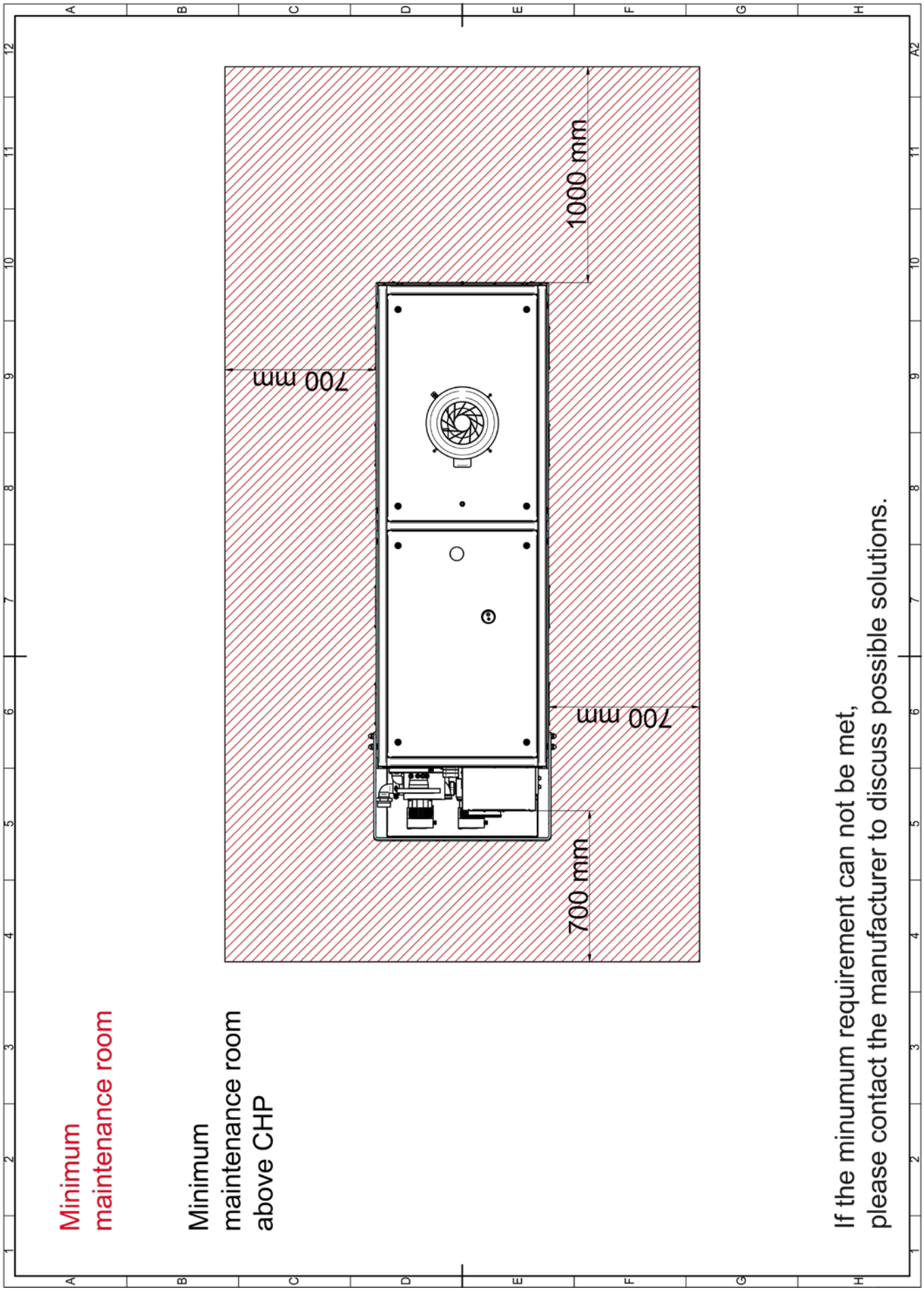
6.8 Maintenance room

6.8.1 neoTower® 2.0 - 30.0

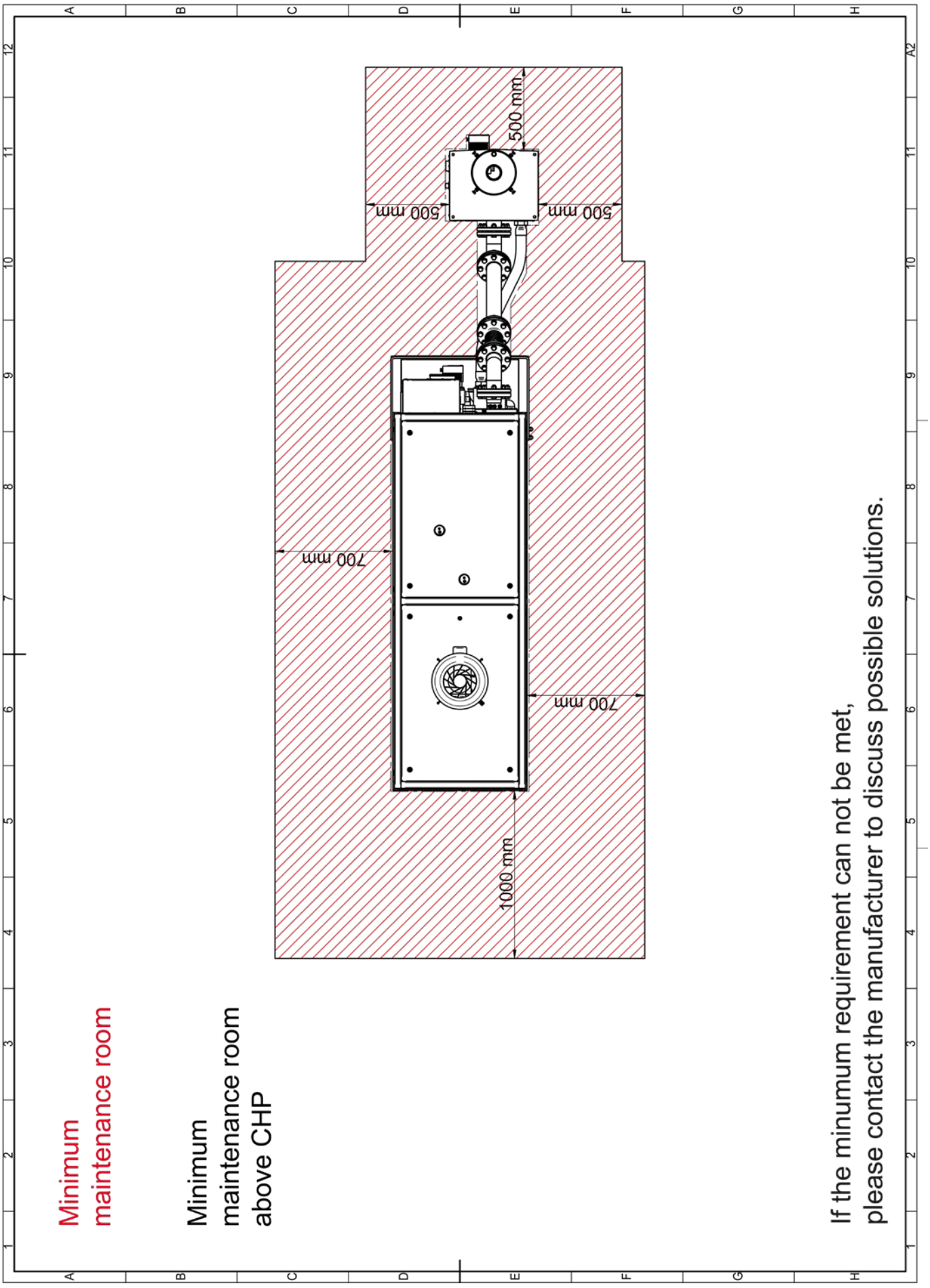


Installation dimensions

6.8.2 neoTower® 50.0 Standard and High Temperature



6.8.3 neoTower® 50.0 Calorific Value



7 Sound

- **Structure-borne sound**
- **Room sound**
- **Flue gas sound**

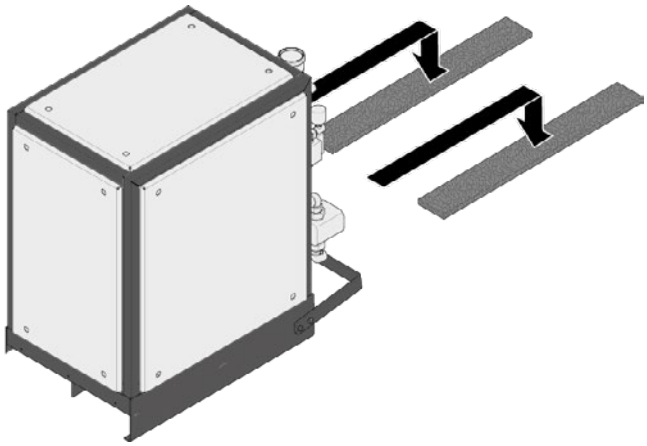
We recommend using the most effective sound insulation measures possible. The following points should be considered when planning the system:

- Compliance with applicable regulations and standards
- Location of the rooms requiring protection
- The soundproofing of the building
- Location of the chimney and the flue gas opening

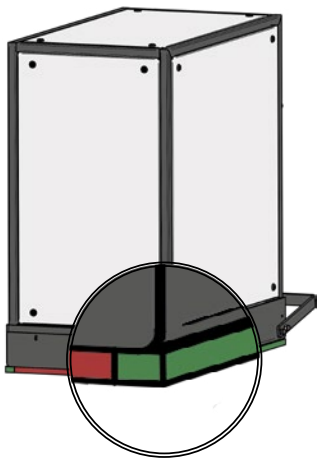
7.1 Structure-borne sound

There are various installation options to ensure the most effective structure-borne sound insulation:

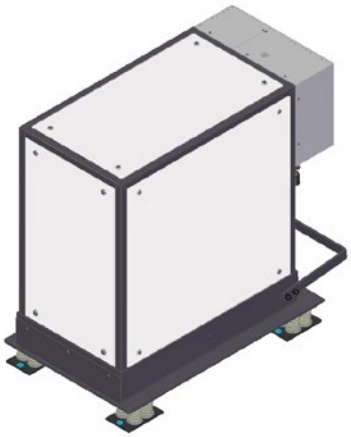
1) Low acoustic requirements / compensation strips
   For low acoustic requirements, such as in industrial environments, compensation strips are sufficient. These compensation strips are included in the scope of supply.

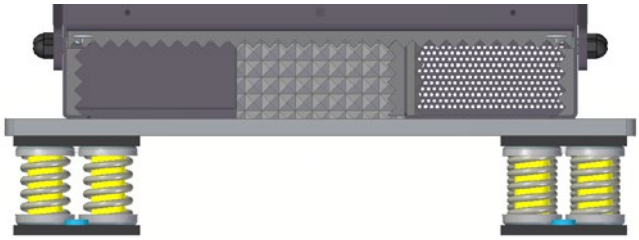


2) Medium acoustic requirements / Sylodyn strips
   Sylodyn strips are recommended for medium acoustic requirements, such as in old buildings without adjacent bedrooms or living areas. The Sylodyn strips are designed specifically for the frequency of the machine.



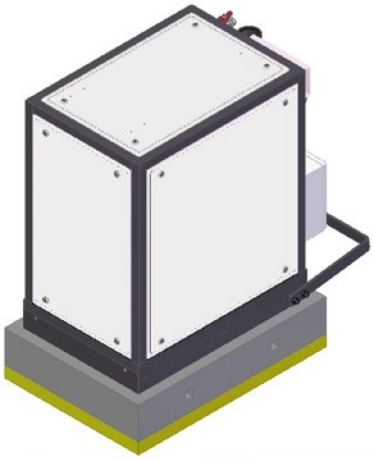
3) High acoustic requirements / spring block element set
   In sensitive residential areas and in new buildings we recommend the spring block elements for damping structure-borne sound and vibration.





4) High acoustic requirements / foundation construction
   Alternatively, a foundation can also be used. In this case we recommend contacting a specialist company which can check the foundation structure and provide individual solutions.

   A specialist company or the architect/planner should be consulted for the design and construction of the foundation. Data on the foundation load from the CHP unit as well as the unit frequency can be provided for design purposes.



To achieve the best possible structure-borne sound insulation for your building, please contact your planner or architect.

7.2 Room sound

7.2.1 Sound measurement 1 m in front of the CHP unit

neoTower®	2.0	3.3	4.0	5.0	7.2	9.5	11.0	12.5	16.0	20.0	25.0	30.0	50.0 CV	50.0 S/HT
Frequency	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
25 Hz	17	16	11	24	27	15	6	17	6	6	5	8	9	24
31.5 Hz	17	21	19	17	18	16	5	21	6	7	13	15	17	21
40 Hz	12	35	34	31	33	29	15	27	12	22	28	30	32	39
50 Hz	31	13	21	28	31	37	36	37	27	44	47	50	50	59
63 Hz	23	22	35	20	19	23	29	28	33	37	28	32	31	39
80 Hz	32	33	51	33	24	26	37	33	37	37	26	30	42	41
100 Hz	24	36	38	22	25	32	47	34	47	52	40	46	53	44
125 Hz	35	41	44	28	32	39	36	38	40	45	48	48	45	47
160 Hz	31	36	35	39	38	38	39	39	43	47	44	46	51	54
200 Hz	39	37	36	35	36	46	46	46	48	50	47	48	58	60
250 Hz	35	35	41	32	36	48	49	49	46	45	46	47	53	49
315 Hz	33	37	34	42	46	41	41	39	41	43	45	50	58	48
400 Hz	33	42	36	39	40	41	37	42	39	43	43	48	53	57
500 Hz	26	32	34	37	36	41	37	42	43	47	47	51	49	52
630 Hz	28	34	34	35	35	46	37	49	41	47	48	51	49	47
800 Hz	30	36	34	35	36	37	38	43	40	42	41	41	48	45
1 kHz	31	39	38	42	41	40	42	43	39	43	38	40	50	47
1.25 kHz	36	40	40	38	42	41	40	46	39	40	40	39	48	49
1.6 kHz	30	36	38	39	39	44	42	46	40	42	41	42	51	49
2 kHz	31	37	39	41	38	44	40	44	39	41	38	40	45	46
2.5 kHz	28	36	41	41	42	41	44	40	41	44	35	38	44	45
3.15 kHz	27	34	36	43	42	41	42	42	40	41	32	33	46	43
4 kHz	27	32	34	39	42	36	44	36	42	41	32	34	43	40
5 kHz	24	31	31	36	38	35	39	33	38	38	31	31	42	36
6.3 kHz	19	26	27	33	33	31	35	30	35	36	30	31	41	33
8 kHz	16	24	24	32	33	28	34	25	33	34	25	27	34	29
Total level in DB(A)	45	50	54	52	53	55	55	57	55	58	57	59	64	65

The full series of measurements and evaluations are available upon request from:
technischer_vertrieb_rmb@yanmar.com

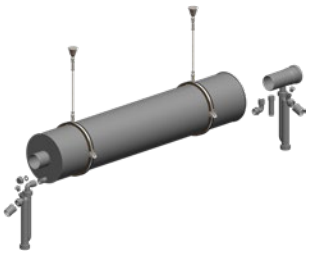
Sound

7.3 Flue gas sound

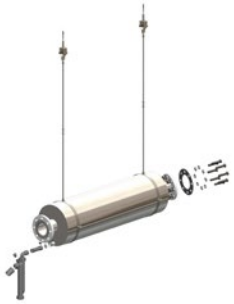
Reflection (RXS), double-tube reflection (DXS) and absorption silencers (ASD) in various attenuation classes.

ASD

RXS-1136 / DXS-1135

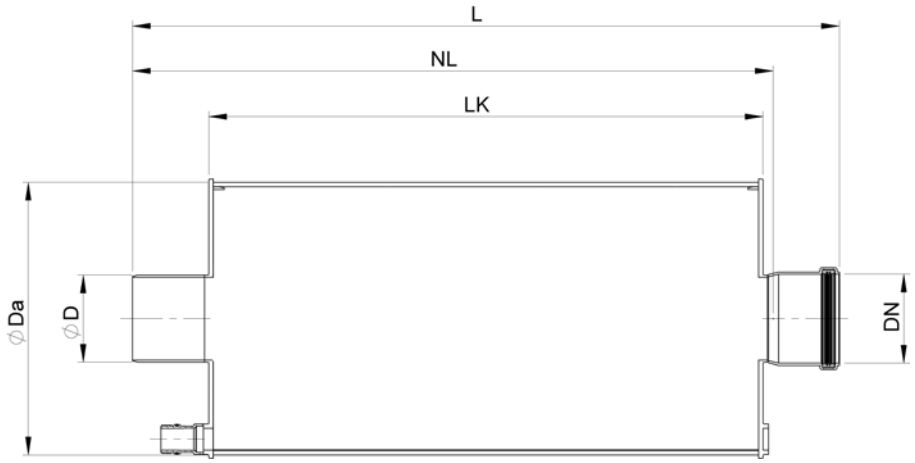


ASD-FL 25



Silencer type	ASD-15*	ASD-17	RXS-1136	DXS-1135	ASD-FL 25[2]
Item no.	3080175	3080174	3080176	3080230	3020270
Technical data					
Material	PP	PP	PP	PP	ES
Attenuation class in dB (DK)	25	35	-	-	25
Length of attenuation element in mm (LK)	500	750	1300	1300	1000
Effective length in mm (NL)	588	838	1380	1380	1220
Total length in mm (L)	648	898	1440	1440	1220
Outer diameter in mm (Da)	250	250	250	250	300
Flue gas inlet in mm (D)	80	80	80	80	80
Flue gas outlet in mm (DN)	80	80	80	80	80
Total weight in kg	5.9	7.7	5.5	5.5	25
Resistance coefficient	0.1	0.1	22.4	11.2	0.2
Suitable for neoTower®	2.0 - 50.0 CV[1]	2.0 - 50.0 CV[1]	2.0 - 20.0	25.0 - 30.0	50.0 S/HT

* Special solution
(1) Not suitable for neoTower® 50.0 S/HT!



Note:
For more information, please contact: technischer_vertrieb_rmb@yanmar.com

ASD, RXS & DXS:

- Silencer made of polypropylene plastic (PP) black
- Hydrophobic rock wool filling with ASD
- Standard DN 80 connections suitable for ATEC PolyTop
- Max. flue gas temperature 100°C
- Overpressure tight up to 5000 Pa
- Mounting position horizontal or vertical
- Ball siphon 200 mm seal water height
- Siphon outlet D40 HT
- Additional condensate drain incl. siphon included (RXS/DXS)
- Mounting set included

ASD-FL 25 / KL 25:

- Material stainless steel (ES 1.4404)
- Filling hydrophobic rock wool
- Connections aluminium loose flange PN 10 (DIN 2642)
- Max. flue gas temperature 200°C
- Overpressure tight up to 5000 Pa
- Condensate drain ¾" OT incl. screw plug
- Mounting position horizontal or vertical
- 1 flange gasket DN80 PN 10-40 2 mm
- 8 hexagonal screws M16 galvanised DIN 93
- 8 washers M16 galvanised DIN 125
- 8 spring washers M16 galvanised DIN 127
- 8 hexagonal nuts M16 galvanised DIN 934
- Order the siphon separately for horizontal installation position
- Mounting set not included

Insertion loss De in dB(A) in the individual third octave frequencies F [Hz]

Type	ASD-15	ASD-17	RXS-1136	RXS-1136 + ASD-17	DXS-1135	DXS-1135 + ASD-17	ASD-FL 25
F [Hz]	De dB(A)	De dB(A)	De dB(A)	De dB(A)	De dB(A)	De dB(A)	De dB(A)
25	3	3	-	6	7	9	1
31.5	3	4	-	8	7	10	2
40	4	5	3	14	14	16	3
50	4	6	16	19	22	25	5
63	6	7	1	18	15	17	6
80	7	10	11	26	14	16	9
100	9	13	29	41	29	32	12
125	12	16	18	28	14	16	16
160	15	21	15	27	17	20	21
200	18	26	12	32	12	15	26
250	22	32	9	29	11	14	31
315	27	39	13	29	6	9	36
400	32	45	12	30	8	10	42
500	39	45	6	30	11	14	45
630	45	45	4	24	11	14	45
800	45	45	7	18	9	11	45
1000	45	45	6	25	13	16	45
1250	45	45	5	29	14	18	45
1600	45	45	-	18	10	14	45
2000	45	45	-	18	7	10	45
2500	45	45	-	15	6	10	45
3150	45	45	-	10	6	10	45
4000	45	45	-	10	11	14	45
5000	45	45	-	9	11	13	45
6300	40	45	-	9	11	12	45
8000	22	35	-	6	12	12	45

Note:
The limiting attenuation limits the maximum achievable insertion loss. This is because at high levels, instead of being reduced in the attenuating material, the sound is partly emitted via secondary paths, such as the silencer housing or the connection pipe. Limiting attenuation here at least 45 dB(A).

Flue gas and exhaust air

8 Flue gas and exhaust air
Depending on the planning results, the exhaust systems on our neoTower® combined heat and power units made of plastic in accordance with DIN EN 14471 or metal in accordance with DIN EN 1856-1, 2 must comply with at least pressure class P1 (200 Pa) up to a maximum of M1 (1,500 Pa) in accordance with DIN EN 13384-2.

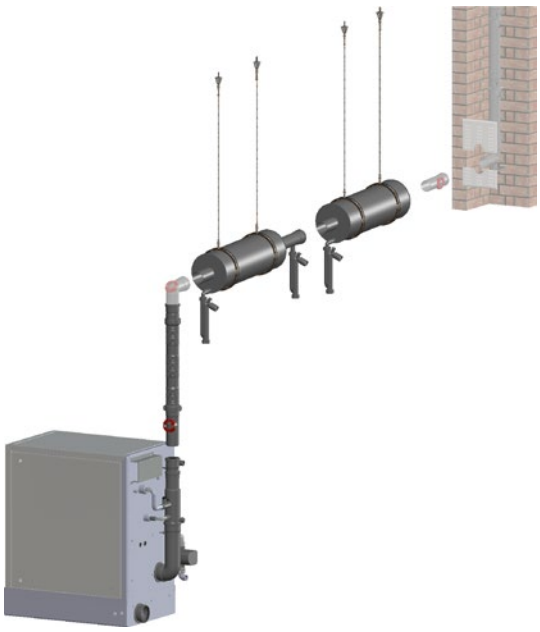
The installed exhaust system must be marked with regard to the pressure class by means of an exhaust pipe product label CE or for M1 according to DIN V 18160 / EN1443.

8.1 Flue gas routing
A chimney that meets the following requirements is required on site for system operation:

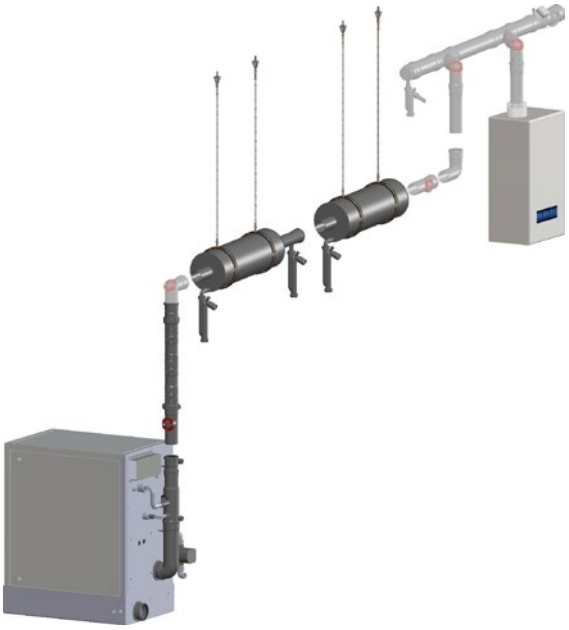
- Local laws and regulations must be complied with (e.g. in Germany according to the Bauordnung (Building Regulations)).
- The flue gas routing must comply with local regulations (e.g. in Germany in compliance with DIN 18160).
- The flue gases must be discharged through a chimney.
- The chimney must discharge the flue gases through the roof.
- Each system must be calculated and verified individually in accordance with the cross-section dimensioning stipulated in EN 13384-1 and based on EN 13384-2.
- The gradient of the horizontal section must be 5 cm per metre towards the system.
- The chimney must be inspected and approved for operation (e.g. by a master chimney sweep).
- There must be an flue gas silencer installed in the flue gas routing. The flue gas silencer (available as an option) must be mounted close to the generation unit.
- The flue gas routing must have a siphon filled with water at the lowest point.

8.2 Connection variants
The flue gases and cabin exhaust air can be discharged in a wide variety of ways, but they must be discharged outside of the building.
The following figures provide a brief overview of the possible options:

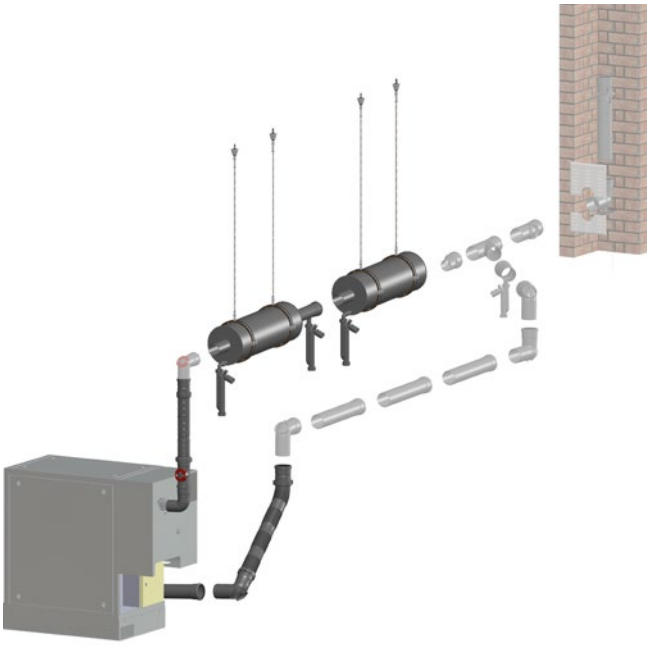
- **Single assignment with one or two silencers**



- **Cascade with one or two silencers**



- **Flue gas exhaust air collector with one or two silencers**



For further details and instructions please refer to the planning and installation instructions for flue gas and exhaust air systems. The documents can be downloaded from:
www.rmbenergie.com/en/downloads/documents/

8.3 Condensate drain

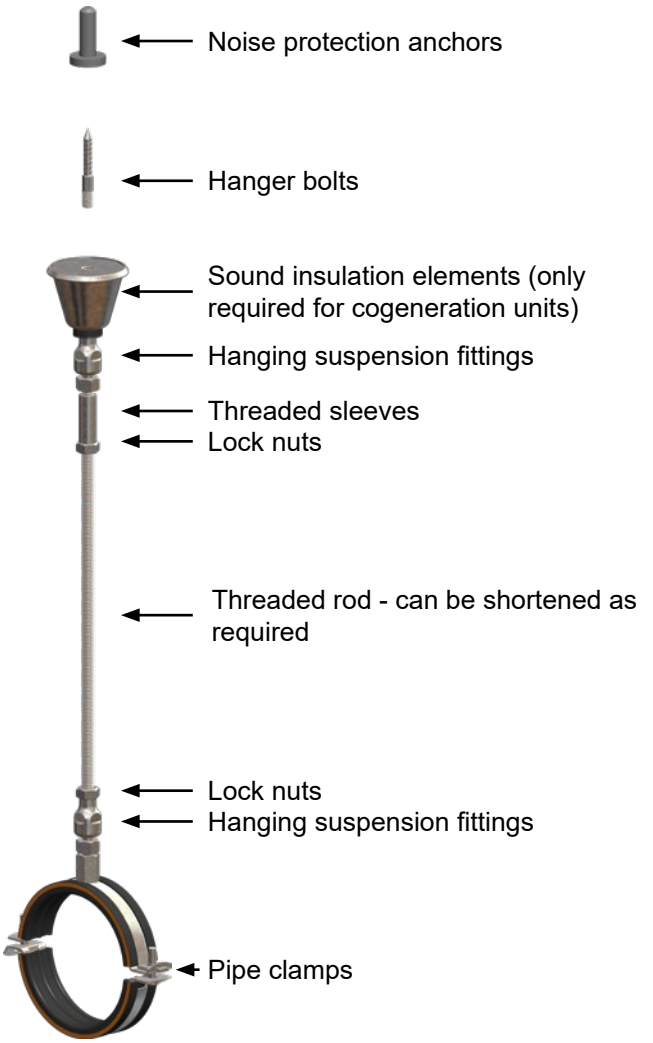
For the operation of the system an on-site condensate drain is required which must meet the following requirements:

- The condensate drain must be non-pressurised.
- It is not permitted to reduce the inner diameter of the condensate drain.
- A neutralisation unit is recommended for each system to collect oily condensate.
- The siphon must be made of corrosion-resistant, acid-resistant material (e.g. plastic or stainless steel).
- The siphon of the drain must be regularly filled with water to prevent it drying out.
- The siphon must also be filled with water if operation of the system is interrupted.
- Local regulations on water disposal must be complied with.
- The general discharge conditions are contained in the ATV data sheet M251.

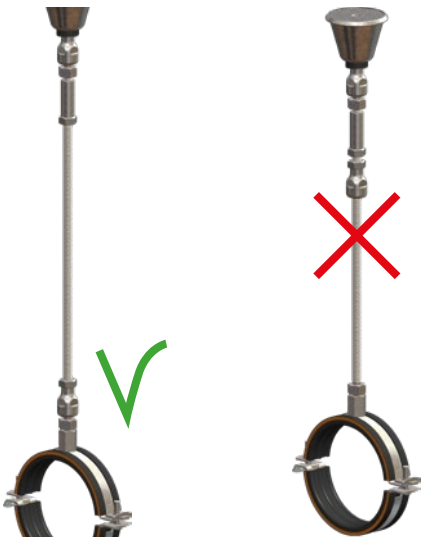
8.4 Mounting

8.4.1 Mounting sets

To minimise the transmission of structure-borne noise and vibration to the buildings and allow expansion of the connection pipes. For use with ATEC silencers and polypropylene (PP) connection pipes.
High sound reduction up to 26 dB(A).



If possible the hanging suspension fittings should be placed at the ends, i.e. at the top and bottom:

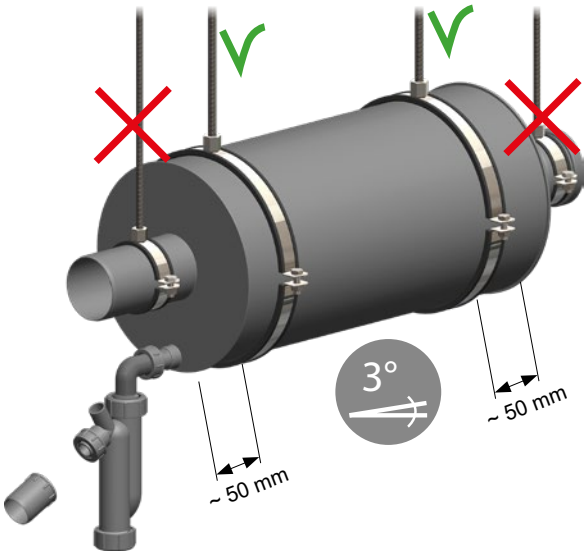


8.4.2 Suspension

⚠ For silencers, always attach two pipe clamps to the silencer housing, not to the nozzles!

☞ Distance from the side edge of the silencer approx. 50mm.

☞ Silencers, as well as the connection pipes, must be installed with a gradient of 3 degrees!

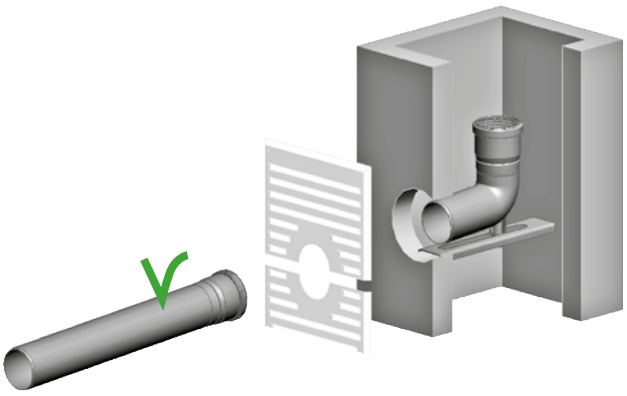


☞ For an optimum insulating function, only tighten the clamping screws of the pipe clamps by hand (tightening torque 2 Nm)!

8.4.3 Connection pipe

⚠ Never wall in the connection pipe due to the transmission of structure-borne sound!

☞ Use wall panels.



9 Heating system

The heating system in the building mainly includes the peak load boiler, the buffer storage unit and the piping system with the radiators.
The peak load boiler provides the required residual heat when the heating energy demand exceeds the capacity of the system.

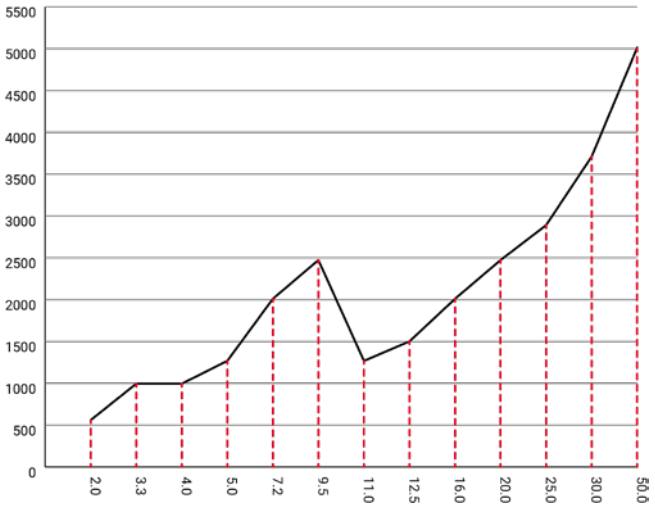
Dimensioning of the piping system must be calculated to meet the following requirements:

- Maximum heat demand of the building.
- Maximum thermal power of the system.

A buffer storage unit that meets the following requirements is required on site to operate the system:

- The buffer storage unit must have fixtures for the temperature sensors.
- The buffer storage unit must be equipped with shut-off devices at the connections to the system.
- The buffer storage unit must be designed to suit the requirements of the system.
  Reference values:
  - At least 100 l per kW thermal for systems < 10 kWth
  - At least 50 l per kW thermal for systems > 10 kWth

neoTower®	Thermal power	Minimum buffer storage unit size
2.0	5.2	560
3.3	8.2	995
4.0	8.8	995
5.0	12.0	1268
7.2	18.1	2010
9.5	22.7	2473
11.0	25.3	1268
12.5	27.6	1501
16.0	37.9	2010
20.0	45.8	2473
25.0	54.9	2890
30.0	63.1	3710
50.0	85.0	5012



Dimensioning for each specific project should always be carried out in collaboration with the planner or manufacturer. If there are no other criteria for dimensioning the storage unit, the buffer storage unit should have a minimum operating time of approx. one hour. The effective differential pressure of the storage unit contents is included in calculations.

The size of the buffer storage unit is normally determined during the economic analysis with the BHKW Ultimate software, depending on the thermal output of the system. Depending on the design, additional settings can be made.

9.1 Water quality

Motor circuit (primary):

Use of a contaminated or incorrect cooling medium damages the cooling system of the generation unit. Only use the original cooling medium supplied by the manufacturer.

- 40 % glycol, 60 % water in compliance with the VDI regulation 2035.
- Operating pressure warm: 2.0 bar.
  Operating pressure cold: 1.8 bar.
- Pre-pressure expansion tank operating pressure cold
  neoTower® 2.0 - 4.0, 9.5 and 12.5: 0.3 bar.
  Pre-pressure expansion tank operating pressure cold
  neoTower® 5.0 - 7.2, 11.0, 16.0 - 50.0: 1.0 bar.

Heating circuit (secondary):

Excessive levels of suspended solids and magnetite as well as incorrect water hardness can cause damage to the generation unit or shorten its service life.

Always pay attention to the following:

- Check the water quality regularly.
- Insert the supplied magnetite separator (MSM filter) (not included with the neoTower® 50.0).
- The water quality must meet the requirements of the applicable standards and guidelines (e.g. in Germany as specified in VDI regulation 2035).
- The water from the heating system must be free from mechanical impurities.
- Hardness of the water < 1 °dH.
- Conductivity < 100 µS/cm.
- pH value > 8.2 and < 9.0.
- Operating pressure up to neoTower® 30.0: 3.0 bar.
  Operating pressure neoTower® 50.0: 6.0 bar.
  For higher system pressures, please plan system separation.

9.2 Hydraulic integration

The respective hydraulic diagram must be complied with for integration of the system into the heating system. The hydraulic system may only be connected by

authorised specialist personnel.

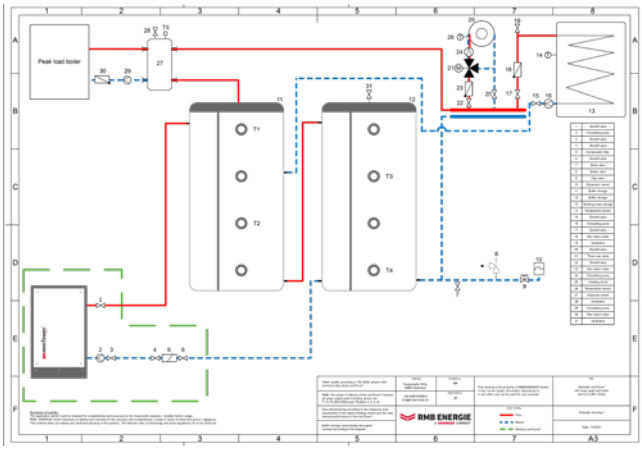
The following principles must be complied with in a heating system:

- The return temperatures should not exceed the specifications in the data sheet (CHP unit).
- The flow rate of generators (CHP/PLB) and consumers (heating circuits) should be separated.

The hydraulic diagram applicable for the heating system must be checked to ensure that it is correct and complete.

It is essential to observe the requirements to be met by the installation site:

- Existing heating system at the site.
- Water quality. The hydraulic diagram below shows an example of how the system can be integrated into a heating system. This hydraulic diagram does not serve as a replacement for professional planning of the heating system.



Additional hydraulic diagrams are available in the download area at:
www.rmbenergie.com/en/downloads/documents/

10 Gas supply

A gas connection that meets the following requirements is required on site to operate the system:

- The gas connection must comply with the applicable laws and regulations (e.g. in Germany the TRGI (Technical Regulations for Gas and Water Installations)).
- The specifications of the system(e.g. type and composition of the gas) must be complied with.
- The on-site system must be equipped with a gas flow monitor, gas meter and a gas filter.
- The gas flow monitor must comply with the system specifications.
- Connection through a gas appliance socket is not permitted under any circumstances.

10.1 Gas meter and gas flow monitor

neoTower®	Energy consumption [kWhHi]	Gas meter*	Gas flow monitor*
2.0	7.19	G4	GS2.5
3.3	11.43	G4	GS2.5
4.0	12.62	G4	GS2.5
5.0	15.82	G4	GS4
7.2	23.08	G4	GS6
9.5	31.67	G6	GS6
11.0	34.38	G6	GS10
12.5	37.3	G6	GS10
16.0	49.86	G6	GS10
20.0	60.24	G6	GS10
25.0	76.92	G10	GS16
30.0	89.55	G10	GS16
50.0 S	143.00	G16	-
50.0 HT	143.00	G16	-
50.0 CV	143.00	G16	-

* This information is provided as non-binding reference data and shows empirical values. Design and inspection in compliance with the recognised codes of good engineering practice and standards must be carried out by a specialist.

11 Electrical integration

11.1 Power supply

A site connection to the power supply that meets the following requirements is required for system operation:

- VDE-AR-N 4105 standard "Generators connected to the low-voltage distribution network – Technical requirements for the connection to and parallel operation with low-voltage distribution networks" must be observed.
- The regulations and the technical connection conditions of the energy supplier must be taken into account (e.g. electricity meter).
- The cable cross-sections must be calculated by a qualified electrician, taking the starting power and the cable lengths into account.
- The mains power supply must meet the specifications of the system.

11.2 Electrical connection

All systems are suitable for connection to the low-voltage network in compliance with VDE-AR-N 4105.

The neoTower® 2.0 - 30.0 may also be connected to the medium-voltage network in compliance with VDE-AR-N 4105. The neoTower® 50.0 is connected to the medium-voltage network in compliance with VDE-AR-N 4110; the optionally available standard certificate is required in this case.

Compliance with all other locally applicable regulations required for installation in accordance with the

recognised codes of good engineering practice must be observed.

11.3 Reactive current compensation

Reactive current compensation in compliance with VDE-AR-N 4105:2018 and VDE-AR-N 4110 is mandatory for standard-compliant operation of the system.

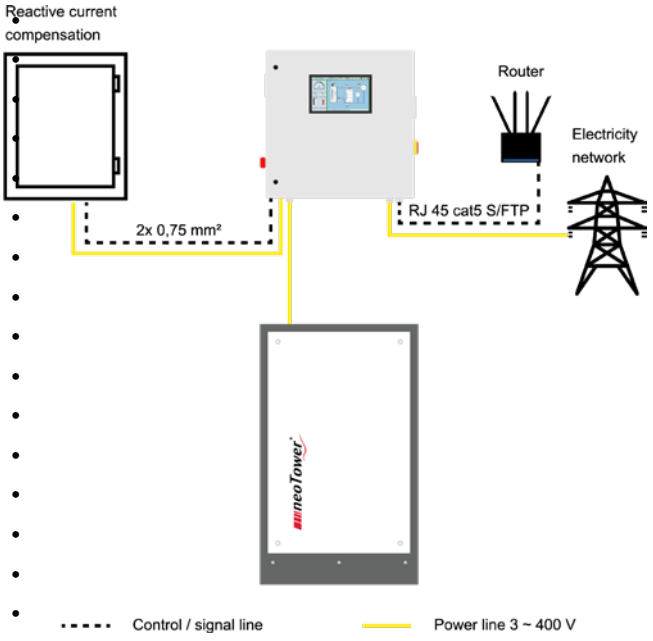
Reactive current compensation reduces the reactive current generated by the system and relieves the load on the supply network. The reactive current compensation must meet the specifications of the system. The respective connection diagram is located in the control cabinet or is available upon request from the Technical Sales Department.

Reactive current compensation is already installed as a standard feature in the neoTower® 2.0, 3.3 and 4.0. This is not necessary for the neoTower® 50.0. The specifications of the local network operators must be observed.

11.3.1 Connection options

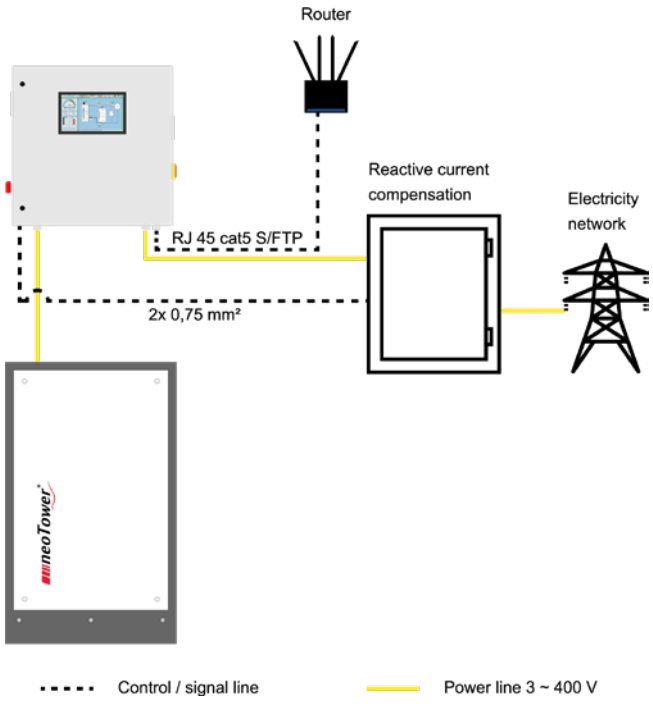
Connection of the reactive current compensation system in the control cabinet of the combined heat and power units for the following neoTower®:

- 9.5, 12.5
- 25.0, 30.0 ab ID 3200



Connection of the reactive current compensation system on supply line of the combined heat and power units for the following neoTower®:

- 5.0, 7.2
- 11.0, 16.0, 20.0
- 25.0, 30.0 bis ID 3199



11.4 Energy discharge

The cable cross-section for the power cable must be specified or inspected by the installation company in compliance with VDE 298 Part 1 - 4 (type of installation, clusters...) or IEC 364 - 5 - 523. In addition, country-specific requirements must be taken into account.

neoTower®	Cable cross section Control cabinet Cu up to max. 50m	Fuse	Max. terminal area
2.0	5x2.5mm²	16 A slow-blow	4mm²
3.3	5x2.5mm²	16 A slow-blow	4mm²
4.0	5x2.5mm²	16 A slow-blow	4mm²
5.0	5x4mm²	25 A slow-blow	16mm²
7.2	5x4mm²	25 A slow-blow	16mm²
9.5	5x6mm²	32 A slow-blow	16mm²
11.0	5x10mm²	50 A slow-blow	16mm²
12.5	5x6mm²	32 A slow-blow	16mm²
16.0	5x10mm²	50 A slow-blow	16mm²
20.0	5x10mm²	50 A slow-blow	16mm²

25.0	5x16mm²	63 A slow-blow	35mm²
30.0	5x16mm²	63 A slow-blow	35mm²
50.0 S	5x35mm²	100 A slow-blow	50mm²
50.0 HT	5x35mm²	100 A slow-blow	50mm²
50.0 CV	5x35mm²	100 A slow-blow	50mm²

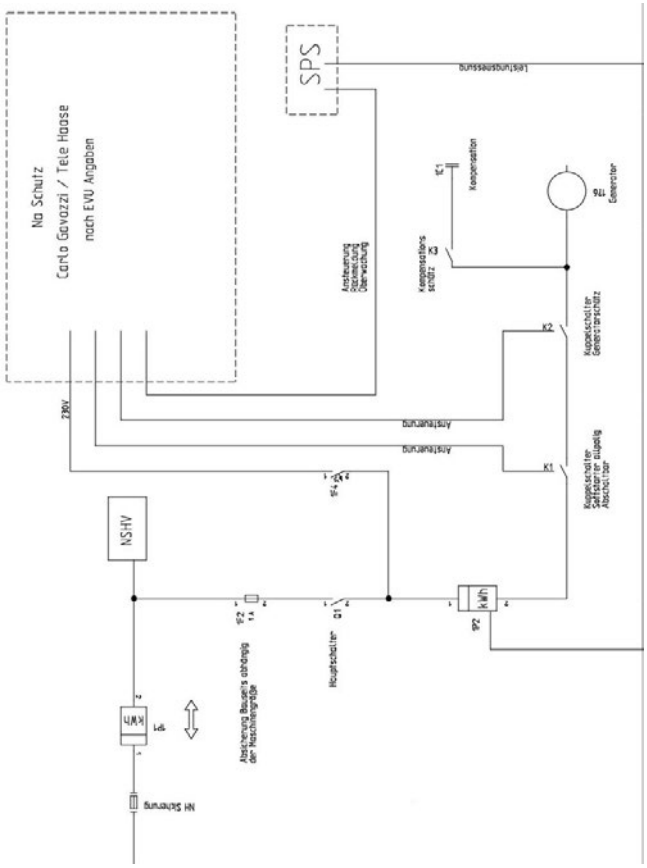
This information is provided as non-binding reference data and shows empirical values. Design and inspection in compliance with the recognised codes of good engineering practice and standards must be carried out by a specialist.

11.5 Mains monitoring

Tripping is initiated within the limits of the VDEW guideline for parallel operation of decentralised generation systems on the low-voltage network. The tripping thresholds are set at the works, but can be adjusted in accordance with the local connection conditions of the power supplier.

11.5.1 Single line circuit diagram

The control cabinet of the system contains the circuit diagram, which includes the single line circuit diagram. It is also available from the Technical Sales Department upon request.



(Figure shown as an example)

11.5.2 Energy supply company lock

The energy supply company reserves the right to temporarily shut off the system.

12 Operating modes

The system can be run in four modes (including shutdown). The operating modes are set on the operating display.

12.1 Ready for EV charge button

Special mode for charging electric vehicles ("EV"). In this mode electricity can also be produced when the storage unit charge has reached the maximum value.

12.2 Summer operation

In summer mode the system only operates at minimum capacity. The system only starts if the storage charge level is insufficient.

12.3 Heat optimised

The system starts if a temperature requirement has been set. When the storage unit charge reaches a certain percentage, the system starts to continuously shut down.

12.4 Electricity optimised

The system adjusts the electrical power to the building requirements as long as the set buffer storage unit charge has not been reached.

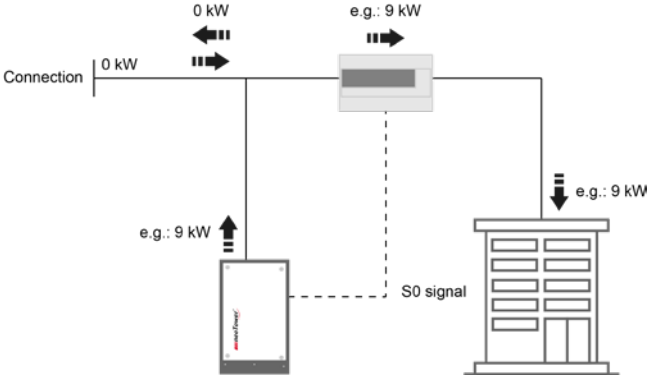
12.4.1 Electricity optimised power modulation

The system registers the total building consumption through the direct or transformer meter. The meter is mounted between the system and the consumer.

This information enables the system to control the output power so that no unnecessary energy is discharged into the power grid.

A direct or transformer meter from RMB/ENERGIE GmbH must always be installed to ensure correct communication between the system control and the energy meter.

Communication via S0 signal (pulse), e.g.: 1,000 pulses per kWh.



12.4.2 Zero reference control

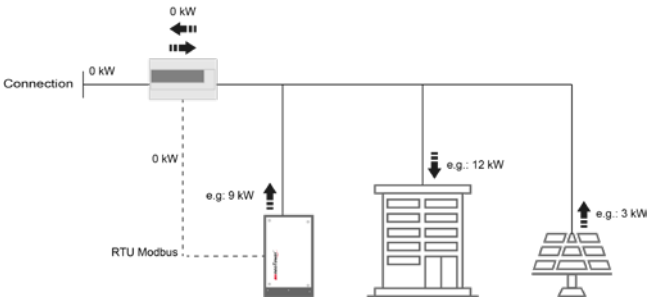
The system registers the drawn power of the consumers in the building via the direct or transformer meter. The meter is mounted at the feed point.

This information enables the system to control the output power so that no unnecessary energy is discharged into the power grid.

In contrast to the electricity optimised power modulation, it is also possible with this control to detect other systems supplying power into the network and to adjust the power of the system.

A direct or transformer meter from RMB/ENERGIE GmbH must always be installed to ensure correct communication between the system control and the energy meter.

Communication via Modbus RTU (RS485).



13 Data interface – building control system

With a communication module available as an accessory, the systems can be connected to an on-site building control system or other digital devices.

The following protocols are optionally available for data communication:

- Modbus TCP/IP
- Modbus RTU
- BACnet/IP

Other communication protocols are available upon request.

14 Maintenance

An internal combustion engine and a generator are the central piece of equipment of the system. During operation, the moving and rotating components are subject to natural wear, ageing, corrosion as well as thermal and mechanical stress. This means that the system requires servicing and repair work.

The system indicates the pending maintenance requirements 300 hours before the end of the maintenance interval. If the maintenance work is not performed, the system will run for another 200 hours at minimum capacity after the interval has expired.

When the 200 hours have elapsed, the system switches off. The system can only be taken into operation once more when the maintenance work has been performed.

Maintenance work must be performed and documented in compliance with the items of the maintenance log.

In order to maintain the guarantee or warranty claims, maintenance work must be carried out in accordance with the maintenance schedule by an authorised specialist partner or by the manufacturer.

15 Guarantee

RMB/ENERGIE GmbH offers a 24-month manufacturer's warranty on all systems from the date of delivery.

16 ATEC planning service for flue gas systems

Flue gas systems must be designed and installed in accordance with EN13384. To ensure a trouble-free subsequent approval process, we recommend coordinating the results in advance with the district chimney sweep.

RMB/ENERGIE GmbH together with ATEC GmbH & Co. KG has compiled planning and installation instructions for the neoTower cogeneration units with a flue gas system made of stainless steel and plastic. An EN 13384 compliant design can be requested from ATEC free of charge using the registration form or the online tool.

For more information, please visit:
www.rmbenergie.com/support/dienstleistungspartner/

Power storage unit

17. neoTower® power storage unit

17.1 Product overview

17.1.1 Principle of operation

The use of a specially developed power storage system increases the share of decentralised electricity generation. The excess electricity produced is stored in high-quality batteries.

In addition, a blackout start system can secure supply in the event of a blackout of the public power network. In the event of a power failure, the system supplies power to the connected consumers. Switching takes place within milliseconds, ensuring uninterrupted operation of electronic devices. The systems are modular and can be designed for the desired storage capacity.

17.1.2 Product variants

Our neoTower® power storage units are modular and can be adapted to the respective requirements by combining several modules.

Batteriespeichersystem (BSS)

- 7, 11, 21, 25, 28, 32, 36, 39, 43, 46

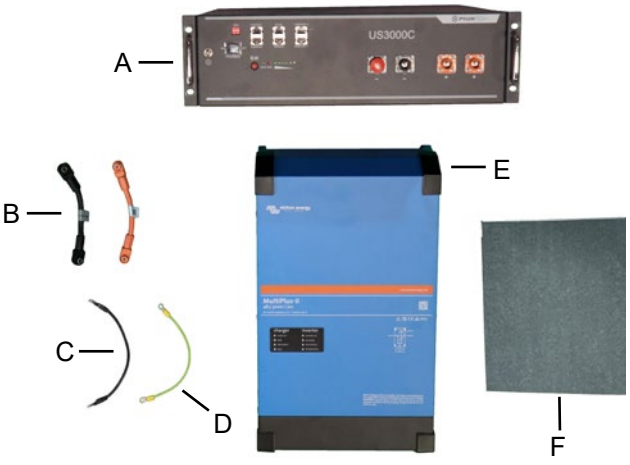
Blackout-Start (BOS)

- 18, 21, 25, 28, 32, 36, 39, 43, 46, 50, 53, 57 64, 71, 75, 78, 85, 89, 92, 96, 100, 107, 114

17.1.3 Scope of supply

The scope of supply may vary depending on the size of the system.

Figure: neoTower® power storage unit BOS 21



A Battery
B Battery connection kit (RED/BLACK)
C Patch cable
D Grounding cable
E Inverter
F Documentation

The inverters and batteries must be installed in the system cabinets at the site. The installation instructions can be found in the manual of the power storage unit.

17.1.4 Dimensions

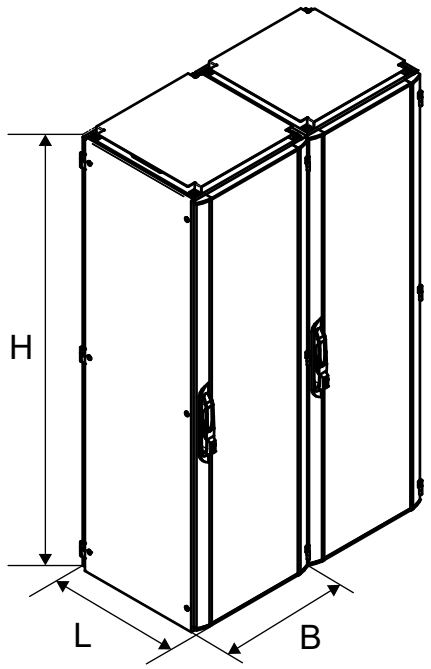


Figure: System cabinet

System cabinet	L (mm)	W (mm)	H (mm)
Variant 1	911	802	2.080
Variant 2	911	802	1.880

18.2 Installation site

The system may only be installed in compliance with the following structural requirements:

Fire protection:

- The system must be installed in fire-protected rooms that are free from fire loads.
- It is not permitted to install the system in hazardous areas.

Floor conditions:

- The floor must have a solid surface.
- The floor must be level and clean.

Spacing:

The following distances must be maintained to ensure correct ventilation:

- Space at rear: 10 cm min.
- Space at top: 10 cm min.
- Space at side: 10 cm min.
- Space at bottom: Determined by the dimensions of the supports

18.3 Maintenance

18.3.1 Monitoring the system function

Regular monitoring of the system function and cleaning of the storage system are necessary for trouble-free operation, operational safety, reliability and durability of the storage system.

Maintenance of the battery modules installed in the storage system is not necessary.

Every 2 weeks:

- Check whether there is a fault in the storage system.

Every 6 months:

- Check for any change in the charge level.

18.3.2 Cleaning

Damage to equipment caused by scratched surfaces and/or internal damage due to ingress of water!

- Do not use any abrasive cloths, sponges or cleaning agents.
- Do not use any water jets.
- Carefully clean the outside of the storage system with a clean, soft cloth.
- Check the air filter for soiling. Replace if necessary.

Technical data

17.4 Technical data

17.4.1 BSS (Battery Storage System)

Version		BSS 7	BSS 11
		General	
Power Storage size (gross)	kWh	7,1	10,7
Max. output power	VA	3000	5000
Max. total efficiency	%	n.a.	
Continuous charging power	VA	1700	3400
Connections		1x 230 V (AC in) 1x 230 V (AC out) 1x 48 V (DC)	
Cable cross section (max. 50m)	mm²	2,5	4
Fuse	A	16	25
PV connection		Grid parallel	
Storage function		Zero reference regulation via CHP	
Cooling		Fan ventilation	
Operating modes		Grid replacement, grid-forming isolated operation	
Measurements		Per phase current- and power measurement	
Display		LED display on the unit	
Protection class		IP 20	
Operating temperature	°C	5-30	
Humidity	%	max. 95	
Unit consumption	W	11	18
Visualisation		Panel CHP	
Weight	kg	237,15	281,31
Number of cabinets [Variant 1 I Variant 2][(1)]		1	
Dimensions per cabinet (LxBxH) [Variant 1]	mm	706x602x2080	
Dimensions per cabinet (LxBxH) [Variant 2]	mm	706x602x1880	
Tilt dimension (front I lateral) [Variant 1]	mm	2185 I 2153	
Tilt dimension (front I lateral) [Variant 2]	mm	1996 I 1962	
		Inverter	
Manufacturer		Victron	
Power	kW	3	5
		Battery modules	
Manufacturer		Pylontech	
Gross capacity	Wh	2x 3552	3x 3552
Operating voltage	V	48	
Cell type		LiFePo4	
Efficiency	%	90-95	
		Standards and directives	
Safety		VDE-AR-N 4105:2018-11 EN-IEC 60335-1, EN-IEC 60335-2-29 EN-IEC 62109-1, EN-IEC 62109-2	
Emissions		EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3	

(1) The cabinets are available in 2 variants and differ in dimensions. The cabinets must always be positioned side by side.

Deviating values depending on ambient and operating conditions.

Subject to technical modifications, design variations and errors.

Version		BSS 21	BSS 25	BSS 28	BSS 32
		General			
Power Storage size (gross)	kWh	21,3	24,9	28,4	32,0
Max. output power	VA	10000			
Max. total efficiency	%	n.a.			
Continuous charging power	VA	6700			
Connections		2x 230 V (AC in) 2x 230 V (AC out) 1x 48 V (DC)			
Cable cross section (max. 50m)	mm²	4			
Fuse	A	25			
PV connection		Grid parallel			
Storage function		Zero reference regulation via CHP			
Cooling		Fan ventilation			
Operating modes		Grid replacement, grid-forming isolated operation			
Measurements		Per phase current- and power measurement			
Display		LED display on the unit			
Protection class		IP 20			
Operating temperature	°C	5-30			
Humidity	%	max. 95			
Unit consumption	W	36			
Visualisation		Panel CHP			
Weight	kg	499,36	532,42	565,48	598,54
Number of cabinets [Variant 1 I Variant 2] (1)		2 | 2	2 | 2	2 | 2	2 | 3
Dimensions per cabinet (LxBxH) [Variant 1]	mm	706x602x2080			
Dimensions per cabinet (LxBxH) [Variant 2]	mm	706x602x1880			
Tilt dimension (front I lateral) [Variant 1]	mm	2185 I 2153			
Tilt dimension (front I lateral) [Variant 2]	mm	1996 I 1962			
		Inverter			
Manufacturer		Victron			
Power	kW	10			
		Battery modules			
Manufacturer		Pylontech			
Gross capacity	Wh	6x 3552	7x 3552	8x 3552	9x 3552
Operating voltage	V	48			
Cell type		LiFePo4			
Efficiency	%	90-95			
		Standards and directives			
Safety		VDE-AR-N 4105:2018-11 EN-IEC 60335-1, EN-IEC 60335-2-29 EN-IEC 62109-1, EN-IEC 62109-2			
Emissions		EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3			

(1) The cabinets are available in 2 variants and differ in dimensions. The cabinets must always be positioned side by side.

Deviating values depending on ambient and operating conditions.

Subject to technical modifications, design variations and errors.

Technical data

Version		BSS 36	BSS 39	BSS 43	BSS 46
		General			
Power Storage size (gross)	kWh	35,5	39,1	42,6	46,2
Max. output power	VA	10000			
Max. total efficiency	%	n.a			
Continuous charging power	VA	6700			
Connections		2x 230 V (AC in) 2x 230 V (AC out) 1x 48 V (DC)			
Cable cross section (max. 50m)	mm²	4			
Fuse	A	25			
PV connection		Grid parallel			
Storage function		Zero reference regulation via CHP			
Cooling		Fan ventilation			
Operating modes		Grid replacement, grid-forming isolated operation			
Measurements		Per phase current- and power measurement			
Display		LED display on the unit			
Protection class		IP 20			
Operating temperature	°C	5-30			
Humidity	%	max. 95			
Unit consumption	W	36			
Visualisation		Panel CHP			
Weight	kg	631,60	767,33	800,39	833,45
Number of cabinets [Variant 1 I Variant 2][(1)]		2 | 3	3 | 3	3 | 3	3 | 3
Dimensions per cabinet (LxBxH) [Variant 1]	mm	706x602x2080			
Dimensions per cabinet (LxBxH) [Variant 2]	mm	706x602x1880			
Tilt dimension (front I lateral) [Variant 1]	mm	2185 I 2153			
Tilt dimension (front I lateral) [Variant 2]	mm	1996 I 1962			
		Inverter			
Manufacturer		Victron			
Power	kW	10			
		Battery modules			
Manufacturer		Pylontech			
Gross capacity	Wh	10x 3552	11x 3552	12x 3552	13x 3552
Operating voltage	V	48			
Cell type		LiFePo4			
Efficiency	%	90-95			
		Standards and directives			
Safety		VDE-AR-N 4105:2018-11 EN-IEC 60335-1, EN-IEC 60335-2-29 EN-IEC 62109-1, EN-IEC 62109-2			
Emissions		EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3			

(1) The cabinets are available in 2 variants and differ in dimensions. The cabinets must always be positioned side by side.

Deviating values depending on ambient and operating conditions.

Subject to technical modifications, design variations and errors.

17.4.2 BOS (Blackout-Start)

Version		BOS 18	BOS 21	BOS 25	BOS 28
		General			
Power Storage size (gross)	kWh	17,8	21,3	24,9	28,4
Max. output power	VA	9000	15000	15000	15000
Max. total efficiency	%	n.a.			
Continuous charging power	VA	5000	10000	10000	10000
Connections		3x 230 V (AC in) 3x 230 V (AC out) 1x 48 V (DC)			
Cable cross section (max. 50m)	mm²	6	10	10	10
Fuse	A	32	50	50	50
Suitable CHP unit power size [1]	kW_{el}	2.0 - 4.0	2.0 - 4.0, 9.5		
PV connection		Grid parallel			
Storage function		Zero reference regulation via CHP			
Cooling		Fan ventilation			
Operating modes		Grid replacement, grid-forming isolated operation			
Measurements		Per phase current- and power measurement			
Display		LED display on the unit			
Protection class		IP 20			
Operating temperature	°C	5-30			
Humidity	%	max. 95			
Unit consumption	W	33	54	54	54
Visualisation		Panel CHP			
Weight	kg	517,04	583,40	616,46	649,52
Number of cabinets [Variant 1 I Variant 2] [2]		2			
Dimensions per cabinet (LxBxH) [Variant 1]	mm	706x602x2080			
Dimensions per cabinet (LxBxH) [Variant 2]	mm	706x602x1880			
Tilt dimension (front I lateral) [Variant 1]	mm	2185 I 2153			
Tilt dimension (front I lateral) [Variant 2]	mm	1996 I 1962			
		Inverter			
Manufacturer		Victron			
Power	kW	9	15	15	15
		Battery modules			
Manufacturer		Pylontech			
Gross capacity	Wh	5x 3552	6x 3552	7x 3552	8x 3552
Operating voltage	V	48			
Cell type		LiFePo4			
Efficiency	%	90-95			
		Standards and directives			
Safety		VDE-AR-N 4105:2018-11 EN-IEC 60335-1, EN-IEC 60335-2-29 EN-IEC 62109-1, EN-IEC 62109-2			
Emissions		EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3			

(1) Technical inspection by the manufacturer required

(2) The cabinets are available in 2 variants and differ in dimensions. The cabinets must always be positioned side by side.

Deviating values depending on ambient and operating conditions.

Subject to technical modifications, design variations and errors.

Technical data

Version		BOS 32	BOS 36	BOS 39
			General	
Power Storage size (gross)	kWh	32,0	35,5	39,1
Max. output power	VA	15000	24000	24000
Max. total efficiency	%		n.a.	
Continuous charging power	VA	10000	15800	15800
Connections		3x 230 V (AC in) 3x 230 V (AC out) 1x 48 V (DC)		
Cable cross section (max. 50m)	mm²	10	16	16
Fuse	A	50	63	63
Suitable CHP unit power size [1]	kW_{el}	2.0 - 4.0, 9.5	2.0 - 9.5, 12.5	
PV connection		Grid parallel		
Storage function		Zero reference regulation via CHP		
Cooling		Fan ventilation		
Operating modes		Grid replacement, grid-forming isolated operation		
Measurements		Per phase current- and power measurement		
Display		LED display on the unit		
Protection class		IP 20		
Operating temperature	°C	5-30		
Humidity	%	max.95		
Unit consumption	W	54	150	150
Visualisation		Panel CHP		
Weight	kg	682,58	749,93	924,14
Number of cabinets [Variant 1 I Variant 2] [2]		2	2 I 3	3
Dimensions per cabinet (LxBxH) [Variant 1]	mm	706x602x2080		
Dimensions per cabinet (LxBxH) [Variant 2]	mm	706x602x1880		
Tilt dimension (front I lateral) [Variant 1]	mm	2185 I 2153		
Tilt dimension (front I lateral) [Variant 2]	mm	1996 I 1962		
			Inverter	
Manufacturer		Victron		
Power	kW	15	24	24
			Battery modules	
Manufacturer			Pylontech	
Gross capacity	Wh	9x 3552	10x 3552	11x 3552
Operating voltage	V	48		
Cell type		LiFePo4		
Efficiency	%	90-95		
			Standards and directives	
Safety		VDE-AR-N 4105:2018-11 EN-IEC 60335-1, EN-IEC 60335-2-29 EN-IEC 62109-1, EN-IEC 62109-2		
Emissions		EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3		

(1) Technical inspection by the manufacturer required

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Deviating values depending on ambient and operating conditions.

Subject to technical modifications, design variations and errors.

Version		BOS 43	BOS 46	BOS 50	BOS 53
		General			
Power Storage size (gross)	kWh	42,6	46,2	49,7	53,3
Max. output power	VA	24000			
Max. total efficiency	%	n.a			
Continuous charging power	VA	15800			
Connections		3x 230 V (AC in) 3x 230 V (AC out) 1x 48 V (DC)			
Cable cross section (max. 50m)	mm²	16			
Fuse	A	63			
Suitable CHP unit power size [1]	kW_{el}	2.0 - 9.5, 12.5			
PV connection		Grid parallel			
Storage function		Zero reference regulation via CHP			
Cooling		Fan ventilation			
Operating modes		Grid replacement, grid-forming isolated operation			
Measurements		Per phase current- and power measurement			
Display		LED display on the unit			
Protection class		IP 20			
Operating temperature	°C	5-30			
Humidity	%	max. 95			
Unit consumption	W	150			
Visualisation		Panel CHP			
Weight	kg	957,20	990,26	1023,32	1056,38
Number of cabinets [Variant 1 I Variant 2][2]		3	3 I 4		
Dimensions per cabinet (LxBxH) [Variant 1]]	mm	706x602x2080			
Dimensions per cabinet (LxBxH) [Variant 2]	mm	706x602x1880			
Tilt dimension (front I lateral) [Variant 1]	mm	2185 I 2153			
Tilt dimension (front I lateral) [Variant 2]	mm	1996 I 1962			
		Inverter			
Manufacturer		Victron			
Power	kW	24	24	24	24
		Battery modules			
Manufacturer		Pylontech			
Gross capacity	Wh	12x 3552	13x 3552	14x 3552	15x 3552
Operating voltage	V	48			
Cell type		LiFePo4			
Efficiency	%	90-95			
		Standards and directives			
Safety		VDE-AR-N 4105:2018-11 EN-IEC 60335-1, EN-IEC 60335-2-29 EN-IEC 62109-1, EN-IEC 62109-2			
Emissions		EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3			

(1) Technical inspection by the manufacturer required

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Deviating values depending on ambient and operating conditions.

Subject to technical modifications, design variations and errors.

Technical data

Version		BOS 57	BOS 64
		General	
Power Storage size (gross)	kWh	56,8	63,9
Max. output power	VA	45000	
Max. total efficiency	%	n.a.	
Continuous charging power	VA	28800	
Connections		3x 230 V (AC in) 3x 230 V (AC out) 1x 48 V (DC)	
Cable cross section (max. 50m)	mm²	35	
Fuse	A	80	
Suitable CHP unit power size [1]	kW_{el}	2.0 - 30.0	
PV connection		Grid parallel	
Storage function		Zero reference regulation via CHP	
Cooling		Fan ventilation	
Operating modes		Grid replacement, grid-forming isolated operation	
Measurements		Per phase current- and power measurement	
Display		LED display on the unit	
Protection class		IP 20	
Operating temperature	°C	5-30	
Humidity	%	max. 95	
Unit consumption	W	240	
Visualisation		Panel CHP	
Weight	kg	1719,24	1785,36
Number of cabinets [Variant 1 I Variant 2] [2]		4	4 I 5
Dimensions per cabinet (LxBxH) [Variant 1]	mm	911x802x2080	
Dimensions per cabinet (LxBxH) [Variant 2]	mm	911x802x1880	
Tilt dimension (front I lateral) [Variant 1]	mm	2259 I 2217	
Tilt dimension (front I lateral) [Variant 2]	mm	2078 I 2033	
		Inverter	
Manufacturer		Victron	
Power	kW	45	
		Battery modules	
Manufacturer		Pylontech	
Gross capacity	Wh	16x 3552	18x 3552
Operating voltage	V	48	
Cell type		LiFePo4	
Efficiency	%	90-95	
		Standards and directives	
Safety		VDE-AR-N 4105:2018-11 EN-IEC 60335-1, EN-IEC 60335-2-29 EN-IEC 62109-1, EN-IEC 62109-2	
Emissions		EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3	

(1) Technical inspection by the manufacturer required

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Deviating values depending on ambient and operating conditions.

Subject to technical modifications, design variations and errors.

Version		BOS 71	BOS 75	BOS 78
		General		
Power Storage size (gross)	kWh	71,0	74,6	78,1
Max. output power	VA	45000		
Max. total efficiency	%	n.a		
Continuous charging power	VA	28800		
Connections		3x 230 V (AC in) 3x 230 V (AC out) 1x 48 V (DC)		
Cable cross section (max. 50m)	mm²	35		
Fuse	A	80		
Suitable CHP unit power size [1]	kW_{el}	2.0 - 30.0		
PV connection		Grid parallel		
Storage function		Zero reference regulation via CHP		
Cooling		Fan ventilation		
Operating modes		Grid replacement, grid-forming isolated operation		
Measurements		Per phase current- and power measurement		
Display		LED display on the unit		
Protection class		IP 20		
Operating temperature	°C	5-30		
Humidity	%	max. 95		
Unit consumption	W	240		
Visualisation		Panel CHP		
Weight	kg	1851,48	2118,63	2151,69
Number of cabinets [Variant 1 I Variant 2] [2]		4 I 5	5	5
Dimensions per cabinet (LxBxH) [Variant 1]	mm	911x802x2080		
Dimensions per cabinet (LxBxH) [Variant 2]	mm	911x802x1880		
Tilt dimension (front I lateral) [Variant 1]	mm	2259 I 2217		
Tilt dimension (front I lateral) [Variant 2]	mm	2078 I 2033		
		Inverter		
Manufacturer		Victron		
Power	kW	15	15	15
		Battery modules		
Manufacturer		Pylontech		
Gross capacity	Wh	20x 3552	21x 3552	22x 3552
Operating voltage	V	48		
Cell type		LiFePo4		
Efficiency	%	90-95		
		Standards and directives		
Safety		VDE-AR-N 4105:2018-11 EN-IEC 60335-1, EN-IEC 60335-2-29 EN-IEC 62109-1, EN-IEC 62109-2		
Emissions		EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3		

(1) Technical inspection by the manufacturer required

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Deviating values depending on ambient and operating conditions.

Subject to technical modifications, design variations and errors.

Technical data

Version		BOS 85	BOS 89	BOS 92
		General		
Power Storage size (gross)	kWh	85,2	88,8	92,4
Max. output power	VA	45000		
Max. total efficiency	%	n.a		
Continuous charging power	VA	28800		
Connections		3x 230 V (AC in) 3x 230 V (AC out) 1x 48 V (DC)		
Cable cross section (max. 50m)	mm²	35		
Fuse	A	80		
Suitable CHP unit power size [1]	kW_{el}	2.0 - 30.0		
PV connection		Grid parallel		
Storage function		Zero reference regulation via CHP		
Cooling		Fan ventilation		
Operating modes		Grid replacement, grid-forming isolated operation		
Measurements		Per phase current- and power measurement		
Display		LED display on the unit		
Protection class		IP 20		
Operating temperature	°C	5-30		
Humidity	%	max. 95		
Unit consumption	W	240		
Visualisation		Panel CHP		
Weight	kg	2217,81	2250,87	2283,11
Number of cabinets [Variant 1 I Variant 2] [2]		5	5 I 6	
Dimensions per cabinet (LxBxH) [Variant 1]	mm	911x802x2080		
Dimensions per cabinet (LxBxH) [Variant 2]	mm	911x802x1880		
Tilt dimension (front I lateral) [Variant 1]	mm	2259 I 2217		
Tilt dimension (front I lateral) [Variant 2]	mm	2078 I 2033		
		Inverter		
Manufacturer		Victron		
Power	kW	45		
		Battery modules		
Manufacturer		Pylontech		
Gross capacity	Wh	24x 3552	25x 3552	26x 3552
Operating voltage	V	48		
Cell type		LiFePo4		
Efficiency	%	90-95		
		Standards and directives		
Safety		VDE-AR-N 4105:2018-11 EN-IEC 60335-1, EN-IEC 60335-2-29 EN-IEC 62109-1, EN-IEC 62109-2		
Emissions		EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3		

(1) Technical inspection by the manufacturer required

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Deviating values depending on ambient and operating conditions.

Subject to technical modifications, design variations and errors.

Version		BOS 96	BOS 100
		General	
Power Storage size (gross)	kWh	95,9	99,5
Max. output power	VA	45000	
Max. total efficiency	%	n.a	
Continuous charging power	VA	28800	
Connections		3x 230 V (AC in) 3x 230 V (AC out) 1x 48 V (DC)	
Cable cross section (max. 50m)	mm²	35	
Fuse	A	80	
Suitable CHP unit power size [(1)]	kW_{el}	2.0 - 30.0	
PV connection		Grid parallel	
Storage function		Zero reference regulation via CHP	
Cooling		Fan ventilation	
Operating modes		Grid replacement, grid-forming isolated operation	
Measurements		Per phase current- and power measurement	
Display		LED display on the unit	
Protection class		IP 20	
Operating temperature	°C	5-30	
Humidity	%	max. 95	
Unit consumption	W	240	
Visualisation		Panel CHP	
Weight	kg	2316,99	2350,05
Number of cabinets [Variant 1 I Variant 2][(2)]		5 I 6	
Dimensions per cabinet (LxBxH) [Variant 1]	mm	911x802x2080	
Dimensions per cabinet (LxBxH) [Variant 2]	mm	911x802x1880	
Tilt dimension (front I lateral) [Variant 1]	mm	2259 I 2217	
Tilt dimension (front I lateral) [Variant 2]	mm	2078 I 2033	
		Inverter	
Manufacturer		Victron	
Power	kW	45	
		Battery modules	
Manufacturer		Pylontech	
Gross capacity	Wh	27x 3552	28x 3552
Operating voltage	V	48	
Cell type		LiFePo4	
Efficiency	%	90-95	
		Standards and directives	
Safety		VDE-AR-N 4105:2018-11 EN-IEC 60335-1, EN-IEC 60335-2-29 EN-IEC 62109-1, EN-IEC 62109-2	
Emissions		EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3	

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Technical data

Version		BOS 107	BOS 114
		General	
Power Storage size (gross)	kWh	106,6	113,7
Max. output power	VA	45000	90000
Max. total efficiency	%	n.a.	
Continuous charging power	VA	28800	57600
Connections		3x 230 V (AC in) 3x 230 V (AC out) 1x 48 V (DC)	
Cable cross section (max. 50m)	mm²	35	95
Fuse	A	80	160
Suitable CHP unit power size [1]	kW_{el}	2.0 - 30.0	2.0 - 50.0
PV connection		Grid parallel	
Storage function		Zero reference regulation via CHP	
Cooling		Fan ventilation	
Operating modes		Grid replacement, grid-forming isolated operation	
Measurements		Per phase current- and power measurement	
Display		LED display on the unit	
Protection class		IP 20	
Operating temperature	°C	5-30	
Humidity	%	max. 95	
Unit consumption	W	240	480
Visualisation		Panel CHP	
Weight	kg	2416,17	3115,61
Number of cabinets [Variant 1 I Variant 2] [2]		5 I 6	7 I 8
Dimensions per cabinet (LxBxH) [Variant 1]	mm	911x802x2080	
Dimensions per cabinet (LxBxH) [Variant 2]		911x802x1880	
Tilt dimension (front I lateral) [Variant 1]		2259 I 2217	
Tilt dimension (front I lateral) [Variant 2]	mm	2078 I 2033	
		Inverter	
Manufacturer		Victron	
Power	kW	45	90
		Battery modules	
Manufacturer		Pylontech	
Gross capacity	Wh	30x 3552	32x 3552
Operating voltage	V	48	
Cell type		LiFePo4	
Efficiency	%	90-95	
		Standards and directives	
Safety		VDE-AR-N 4105:2018-11 EN-IEC 60335-1, EN-IEC 60335-2-29 EN-IEC 62109-1, EN-IEC 62109-2	
Emissions		EN 55014-1, EN 55014-2 EN-IEC 61000-3-2, EN-IEC 61000-3-3 IEC 61000-6-1, IEC 61000-6-2, IEC 61000-6-3	

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(2) The cabinets are available in 2 variants and differ in dimensions. The cabinets must always be positioned side by side.

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