

mephisto
CHP units

Product range **Natural gas | Liquified petroleum gas**

H2 ready

NG LPG

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Overview of Mephisto condensing combined heat and power units

All combined heat and power units in the Mephisto product line are equipped with condensing technology as standard. The ready-to-connect compact modules can be operated with natural gas or Liquefied petroleum gas.
The entire product line is exclusively suitable for parallel generation. The synchronous versions of the Mephisto G50 are capable of being used as a mains replacement. You will find Mephisto CHP units operated with biogas or digester gas in a separate product range.

High overall efficiency	➢ Thermodynamically optimised, corrosion-resistant cast aluminium-silicon condensing heat exchanger ➢ Water-cooled generator ➢ Fully enclosed design (no complex vent systems are required)
H2-ready	➢ Operated with up to 20% hydrogen content in a gas mix
Low emissions of pollutants	➢ Regulated three-way catalytic converter and lambda control
Low noise emissions	➢ Optimum sound insulation for flue gas and intake air thanks to combination between resonator mufflers and sound absorbers ➢ Enclosed/vibration-isolated design
Well-conceived, adapted sound insulation solutions, even for sensitive areas	➢ Additional resonator mufflers ➢ Elements providing structure-borne noise isolation, such as specifically designed base underlays and spring pendulums
User-friendly and easy to integrate into higher-level control technology and any existing hydraulic system	➢ Extensive control functions thanks to self-developed control technology hardware and software ➢ Communication with all common bus systems ➢ Complete remote control of modules in real time
Quick, uncomplicated evaluation of operating data	➢ Webgate and Webcontrol: manufacturer's own browser-based tools for viewing and evaluating current and historical technical and operation-relevant data

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Mephisto G8

Net electric output adjustment range	5,5 to 8 kW
Thermal output adjustment range	16,5 to 20,9 kW
Gas connection rating	20,9 to 28,3 kW_{Hi}
Electrical efficiency, effective	28,3 %
Electrical efficiency, ISO 3046	29,7 %
Overall efficiency (at 35°C return)	102,1 %
Sound pressure level (as per DIN EN 45635-11)	≤ 47,5 dB (A)
Energy efficiency class	A++
CHP coefficient	0,38
Primary energy factor	0,42
Fuels	Natural gas Biomethane Liquefied petroleum gas

Mephisto G22

Net electric output adjustment range	10 to 22 kW
Thermal output adjustment range	31,1 to 49,1 kW
Gas connection rating	38,5 to 67,9 kW_{Hi}
Electrical efficiency, effective	32,4 %
Electrical efficiency, ISO 3046	34,0 %
Overall efficiency (at 35°C return)	104,7 %
Sound pressure level (as per DIN EN 45635-11)	≤ 53,1 dB (A)
Energy efficiency class	A++
CHP coefficient	0,45
Primary energy factor	0,27
Fuels	Natural gas Biomethane Liquefied petroleum gas

Mephisto G34

Net electric output adjustment range	14 to 34 kW
Thermal output adjustment range	49 to 78 kW
Gas connection rating	58 to 107,9 kW_{Hi}
Electrical efficiency, effective	31,5 %
Electrical efficiency, ISO 3046	33,1 %
Overall efficiency (at 35°C return)	103,8 %
Sound pressure level (as per DIN EN 45635-11)	≤ 62,2 dB (A)
Energy efficiency class	A++
CHP coefficient	0,44
Primary energy factor	0,30
Fuels	Natural gas Biomethane Liquefied petroleum gas

Mephisto G50 Natural gas	
Net electric output adjustment range	20 to 50 kW
Thermal output adjustment range	63 to 100,7 kW
Gas connection rating	79,5 to 144,9 kW_{Hi}
Electrical efficiency, effective	34,5 %
Electrical efficiency, ISO 3046	36,2 %
Overall efficiency (at 35°C return)	104,0 %
Sound pressure level (as per DIN EN 45635-11)	≤ 60,0 dB (A)
Energy efficiency class	A++
CHP coefficient	0,50
Primary energy factor	0,19
Generator type	Asynchro-nous/syn-chronous

Mephisto G50 Liquefied petroleum gas	
Net electric output adjustment range	20 to 50 kW
Thermal output adjustment range	63,1 to 105,9 kW
Gas connection rating	80,5 to 151,5 kW_{Hi}
Electrical efficiency, effective	33,0 %
Electrical efficiency, ISO 3046	34,7 %
Overall efficiency (at 35°C return)	102,9 %
Sound pressure level (as per DIN EN 45635-11)	≤ 60,0 dB (A)
Energy efficiency class	A++
CHP coefficient	0,47
Primary energy factor	0,25
Generator type	asynchro-nous/syn-chronous

The technical information applies to the boundary conditions: **Return temperature t_{RL}**: 35 °C; **air temperature t_A**: 25 °C; **absolute air pressure p_A**: 1,013 mbar, **calorific value H_i**: natural gas 8,8 kWh/m³ i.N., liquefied petroleum gas 25,8 kWh/m³ i.N.; **methane number MN**: natural gas 96, Liquefied petroleum gas 35

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Mephisto G8 Asynchronous I Natural Gas, Liquefied petroleum gas

H2 ready

Model

Mephisto G8 A NG/LPG

with regulated three-way catalytic converter

Manufacturer

Kraftwerk

Kraft-Wärme-Kopplung GmbH
Am Lindener Hafen 30,
30453 Hannover, Germany

Net output (adjustable)

Electric, net	5,5 to 8 kW
Thermal	16,5 to 20,9 kW
Gas	20,9 to 28,3 kW_{Hi}

Net efficiency

Electric effective	28,3 %
Electric, ISO 3046	29,7 %
Thermal, effective	73,8 % (t_{Return} = 35 °C)
Overall, effective	102,1 % (t_{Return} = 35 °C)

Energy efficiency class

A++

Seasonal space heating energy efficiency

142 %

CHP coefficient

0,38

Primary energy factor

($f_{PE,WV}$ as per DIN SPEC 4701-10/A1:2016-05)

0,42

Primary energy saving

29,78 %

The high-efficiency criterion specified in EU Directive 2012/27/EU for CHP systems is met.

Fuel

Natural gas, Biomethane and Liquefied petroleum gas

Gas connection

- Gas connection rating: 28,3 kW_{Hi} = 31,4 kW_{Hs}
- Gas connection pressure: 20 - 100 mbar
- Gas flow pressure: ≥ 10 mbar
- Mating dimension: DN 20 (3/4" male thread)

Heating connection

- Heating circuit minimum pressure: 1,2 bar
- Permitted operating pressure: max. 4.0 bar (pressures up to 6 bar on request)
- Flow temperature: max. 90 °C
- Return temperature: max. 70 °C
- Mating dimension: 1" male thread
- Design flow rate: 0,92 m^3/h
- Residual head for net output: 6,3 mWS
- With 40 K spread:

  Design flow rate: 0,46 m^3/h
  Residual head for net output: 7,3 mWS

Electrical connection

- Pre-fuse NH00 35 A gL (gG) or SLS E-34A
- Supply line H07RN-F 5 x 6 mm^2, up to 40 m in length for installation types B to G

Plate heat exchanger

Soldered stainless steel compact heat exchanger for separating the heating system from the CHP engine water circuit

Pollutant emissions

Mephisto G8 A NG/LPG: mg/m_3 i.N.

(at 5 % by volume reference oxygen) CO 300, NO_x 250

Combustion intake air

Space-air-dependent operating mode

Flue gas connection

- Flue gas conduit D80, fire resistance class B1 plastic pipe made of PP, permitted as a flue gas conduit for condensing heat generators with flue gas temperature up to 120 °C
- Flue gas temperature limited to max. 90 °C on thermostat
- Safety thermal cut-out set to 100 °C
- Recommended flue gas counter-pressure: 500 Pa; maximum flue gas counter pressure 750 Pa
- Flue gas flow rate: 36 m^3/h i.N. in normal state is equivalent to 38,5 m^3/h at $T_{Flue\ gas}$ = 80 °C
- Maximum condensate quantity: 3,9 l/h

Flue gas heat exchanger

- Thermodynamically optimised cast aluminium-silicon heat exchanger
- Integrated catalytic converter

Utilisation of calorific value

- The flue gas temperature is a maximum of 15 K above the corresponding return temperature
- Calorific value used at a return temperature of about 55 °C and above

Engine

- Toyota industrial gas engine
- Model: 1 KS CHP
- 3-cylinder Otto engine, water-cooled
- Displacement: 953 cm^3

Coupling

Maintenance-free, plug-in, flexible metal/plastic coupling to compensate for radial, axial and angular misalignment

Generator

- Four-pole asynchronous machine for parallel operation on the public grid
- Manufacturer: Weier GmbH
- Model: DGA-F-132/L4 water-cooled
- 3 × 400 V, 50 Hz
- Start-up current: about 40 A
- Rated current: 14,8 A
- cos φ: 0,78 (inductive)
- Rated power: 8 kW
- Rated speed: 1.564 min^{-1}

Low voltage certification

Low voltage certification with unit certificate as per application guide VDE-AR-N 4105:2018.

Compensation

Due to the requirements in German code of practice VDE-AR-N 4105:2018-11, operating own generating systems without reactive power compensation is only permitted in exceptional cases. A cos φ of 0.95 is achieved with the standard fixed compensation.

Feed-in management

(as per Section 14 German Renewable Energy Law (EEG) 2021)

Reduction in feed-in power (0-10 V) possible by preselecting target value via analogue input, bus interface (optional) and digital inputs (to connect relay contacts on a ripple control receiver provided by customer).

Controller

- Industrial computer with powerful MPC555 microcontroller, 32-bit power PC with FPU
- Fully automatic operating control
- Remote monitoring/operation via LAN or optional mobile data connection
- Interfaces to higher-level DDC controls: digital and analogue inputs and outputs; optional CAN bus, RK512, Modbus, LON bus, Profibus DP, BACnet/IP, IEC 104, Profinet

Housing

- Sturdy, easily removable, frameless full thermo-acoustic enclosure
- Machine unit on four Asonator steel springs
- Optional base on two vibration dampers to isolate noise

Noise emissions

- Mean sound pressure level at 1 m distance ≤ 47,5 dB(A) as per DIN 45635-11
- Mean sound pressure level (standard equipment) at 1 m distance (10°) to chimney outlet ≤ 44,2 dB(A) as per DIN 45635-11

Third octave band spectra isolation can be provided on request

Dimensions

L × W × H in mm: 1.380 × 800 × 930
Without electrical enclosure.
Height with electrical enclosure: 1.580 mm

Required space

L × W × H in mm: 3.000 × 1.800 × 1.800
without sound insulation base.
Height of sound insulation base: 250 mm

Installation and base plans will be provided on request

Operating weight

530 kg

Delivery

- Machine unit, self-supporting:
  1.010 mm × 650 mm, 315 kg
- Panelling with accessories on pallet:
  1.200 mm x 800 mm, 260 kg

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Mephisto G22 Asynchronous I Natural Gas, Liquefied petroleum gas

H2 ready

Model

Mephisto G22 A NG/LPG

with regulated three-way catalytic converter

Manufacturer

Kraftwerk

Kraft-Wärme-Kopplung GmbH
Am Lindener Hafen 30,
30453 Hannover, Germany

Net output (adjustable)

Electric, net	10 to 22 kW
Thermal	31,1 to 49,1 kW
Gas	38,5 to 67,9 kW_{Hi}

Net efficiency

Electric effective	32,4 %
Electric, ISO 3046	34,0 %
Thermal, effective	72,3 % (t_{Return} = 35 °C)
Overall, effective	104,7 % (t_{Return} = 35 °C)

Energy efficiency class

A++

Seasonal space heating energy efficiency

151 %

CHP coefficient

0,45

Primary energy factor

($f_{PE,WV}$ as per DIN SPEC 4701-10/A1:2016-05)

0,27

Primary energy saving

31,8 %

The high-efficiency criterion specified in EU Directive 2012/27/EU for CHP systems is met.

Fuel

Natural gas, Biomethane and Liquefied petroleum gas

Gas connection

- Gas connection rating: 67,9 kW_{Hi} = 75,3 kW_{Hs}
- Gas connection pressure: 20 - 100 mbar
- Gas flow pressure: ≥ 10 mbar
- Mating dimension: DN 20 (3/4" male thread)

Heating connection

- Heating circuit minimum pressure: 1,2 bar
- Permitted operating pressure: max. 4.0 bar (pressures up to 6 bar on request)
- Flow temperature: max. 90 °C
- Return temperature: max. 70 °C
- Mating dimension: 1 1/4" male thread
- Design flow rate: 2,25 m^3/h
- Residual head for net output: 0,1 mWS
- With 40 K spread:
  Design flow rate: 1,12 m^3/h
  Residual head for net output: 4,4 mWS

Electrical connection

- Pre-fuse NH00 50 A gL (gG) or SLS E-50 A
- Supply line H07RN-F 5 x 16 mm^2, up to 50 m in length for installation types B to G

Plate heat exchanger

Soldered stainless steel compact heat exchanger for separating the heating system from the CHP engine water circuit

Pollutant emissions

Mephisto G22 A NG/LPG: mg/m3 i.N.

(at 5 % by volume reference oxygen) CO 150, NOx 125

Combustion intake air

Space-air-dependent operating mode

Flue gas connection

- Flue gas conduit D80, fire resistance class B1 plastic pipe made of PP, permitted as a flue gas conduit for condensing heat generators with flue gas temperature up to 120 °C
- Flue gas temperature limited to max. 90 °C on thermostat
- Safety thermal cut-out set to 100 °C
- Recommended flue gas counter-pressure: 500 Pa; maximum flue gas counter pressure 800 Pa
- Flue gas flow rate: 75,8 m^3/h i.N. in normal state is equivalent to 98 m^3/h at $T_{Flue\ gas}$ = 80 °C
- Maximum condensate quantity: 9,7 l/h

Flue gas heat exchanger

- Thermodynamically optimised cast aluminium-silicon heat exchanger
- Integrated catalytic converter

Utilisation of calorific value

- The flue gas temperature is a maximum of 15 K above the corresponding return temperature
- Calorific value used at a return temperature of about 55 °C and above

Engine

- Ford Industrial gas engine
- Model: MSG 425
- 4-cylinder Otto engine, water-cooled
- Displacement: 2.489 cm^3

Coupling

- Maintenance-free, plug-in, flexible metal/plastic coupling to compensate for radial, axial and angular misalignment

Generator

- Four-pole asynchronous machine for parallel operation on the public grid
- Manufacturer: Weier GmbH
- Model: DASGM 160/L 4 water-cooled
- 3 × 400 V, 50 Hz
- Start-up current: about 60 A
- Rated current: 41,2 A
- cos φ: 0,77 (inductive)
- Rated power: 20 kW
- Rated speed: 1.538 min^{-1}

Low voltage certification

Low voltage certification with unit certificate as per application guide VDE-AR-N 4105:2018.

Compensation

Due to the requirements in German code of practice VDE-AR-N 4105:2018-11, operating own generating systems without reactive power compensation is only permitted in exceptional cases. A cos φ of 0.95 is achieved with the standard fixed compensation.

Feed-in management

(as per Section 14 German Renewable Energy Law (EEG) 2021)

Reduction in feed-in power (0-10 V) possible by preselecting target value via analogue input, bus interface (optional) and digital inputs (to connect relay contacts on a ripple control receiver provided by customer).

Controller

- Industrial computer with powerful MPC555 microcontroller, 32-bit power PC with FPU
- Fully automatic operating control
- Remote monitoring/operation via LAN or optional mobile data connection
- Interfaces to higher-level DDC controls: digital and analogue inputs and outputs; optional CAN bus, RK512, Modbus, LON bus, Profibus DP, BACnet/IP, IEC 104, Profinet

Housing

- Sturdy, easily removable, frameless full thermo-acoustic enclosure
- Machine unit on four Asonator steel springs
- Optional base on two vibration dampers to isolate noise

Noise emissions

- Mean sound pressure level at 1 m distance ≤ 53,1 dB(A) as per DIN 45635-11
- Mean sound pressure level (standard equipment) at 1 m distance (10°) to chimney outlet ≤ 41,1 dB(A) as per DIN 45635-11

Third octave band spectra isolation can be provided on request

Dimensions

L × W × H in mm: 1.450 × 1.020 × 1.010
Without electrical enclosure.
Height with electrical enclosure: 1.660 mm

Required space

L × W × H in mm: 3.240 × 2.020 × 1.850
without sound insulation base.
Height of sound insulation base: 250 mm

Installation and base plans will be provided on request

Operating weight

810 kg

Delivery

- Machine unit, self-supporting:
  1.300 mm × 800 mm, 485 kg
- Panelling with accessories on pallet:
  1.600 mm × 1.200 mm, 315 kg

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Mephisto G34 Asynchronous I Natural Gas, Liquefied petroleum gas

H2 ready

Model

Mephisto G34 A NG/LPG

with regulated three-way catalytic converter

Manufacturer

Kraftwerk

Kraft-Wärme-Kopplung GmbH
Am Lindener Hafen 30,
30453 Hannover, Germany

Net output (adjustable)

Electric, net	14 to 34 kW
Thermal	49 to 78 kW
Gas	58 to 107,9 kW_{Hi}

Net efficiency

Electric Effective	31,5 %
Electric, ISO 3046	33,1 %
Thermal, effective	72,3 % (t_{Return} = 35 °C)
Overall, effective	103,8 % (t_{Return} = 35 °C)

Energy efficiency class

A++

Seasonal space heating energy efficiency

149 %

CHP coefficient

0,44

Primary energy factor

($f_{PE,WV}$ as per DIN SPEC 4701-10/A1:2016-05)

0,30

Primary energy saving

30,93 %

The high-efficiency criterion specified in EU Directive 2012/27/EU for CHP systems is met.

Fuel

Natural gas, biomethane and Liquefied petroleum gas

Gas connection

- Gas connection rating: 107,9 kW_{Hi} = 119,7 kW_{Hs}
- Gas connection pressure: 20 - 100 mbar
- Gas flow pressure: ≥ 10 mbar
- Mating dimension: DN 25 (1" male thread)

Heating connection

- Heating circuit minimum pressure: 1,2 bar
- Permitted operating pressure: max. 4.0 bar (pressures up to 6 bar on request)
- Flow temperature: max. 90 °C
- Return temperature: max. 70 °C
- Mating dimension: 1 1/4" male thread
- Design flow rate: 3,42 m³/h
- Residual head for net output: 5,0 mWS
- With 40 K spread:
  Design flow rate: 1,71 m³/h
  Residual head for net output: 8,9 mWS

Electrical connection

- Pre-fuse NH00 80 A gL (gG) or SLS E-80 A
- Supply line H07RN-F 5 x 25 mm², up to 50 m in length for installation types B to G

Plate heat exchanger

Soldered stainless steel compact heat exchanger for separating the heating system from the CHP engine water circuit

Pollutant emissions

Mephisto G34 A NG/LPG: mg/m3 i.N.

(at 5 % by volume reference oxygen) CO 150, NOx 125

Combustion intake air

Space-air-dependent operating mode

Flue gas connection

- Flue gas conduit D110, fire resistance class B1 plastic pipe made of PP, permitted as a flue gas conduit for condensing heat generators with flue gas temperature up to 120 °C
- Flue gas temperature limited to max. 90 °C on thermostat
- Safety thermal cut-out set to 100 °C
- Recommended flue gas counter-pressure: 500 Pa; maximum flue gas counter pressure 800 Pa
- Flue gas flow rate 117 m³/h i.N. in normal state is equivalent to 151 m³/h at $T_{Flue\ gas}$ = 80 °C
- Maximum condensate quantity: 15 l/h

Flue gas heat exchanger

- Thermodynamically optimised cast aluminium-silicon heat exchanger
- Integrated catalytic converter

Utilisation of calorific value

- The flue gas temperature is a maximum of 15 K above the corresponding return temperature
- Calorific value used at a return temperature of about 55 °C and above

Engine

- Perkins Industrial gas engine
- Model: 1004 Si
- 4-cylinder Otto engine, water-cooled
- Displacement: 4.000 cm³

Coupling

- Maintenance-free, plug-in, flexible metal/plastic coupling to compensate for radial, axial and angular misalignment

Generator

- Four-pole asynchronous machine for parallel operation on the public grid
- water-cooled
- 3 x 400 V, 50 Hz
- cos φ: 0,85 (inductive)
- Rated power: 30 kW

Low voltage certification

Low voltage certification with unit certificate as per application guide VDE-AR-N 4105:2018.

Compensation

Due to the requirements in German code of practice VDE-AR-N 4105:2018-11, operating own generating systems without reactive power compensation is only permitted in exceptional cases. A cos φ of 0.95 is achieved with the standard fixed compensation.

Feed-in management

(as per Section 14 German Renewable Energy Law (EEG) 2021)

Reduction in feed-in power (0-10 V) possible by preselecting target value via analogue input, bus interface (optional) and digital inputs (to connect relay contacts on a ripple control receiver provided by customer).

Controller

- Industrial computer with powerful MPC555 microcontroller, 32-bit power PC with FPU
- Fully automatic operating control
- Remote monitoring/operation via LAN or optional mobile data connection
- Interfaces to higher-level DDC controls: digital and analogue inputs and outputs; optional CAN bus, RK512, Modbus, LON bus, Profibus DP, BACnet/IP, IEC 104, Profinet

Housing

- Sturdy, easily removable, frameless full thermo-acoustic enclosure
- Machine unit on four Asonator steel springs
- Optional base on two vibration dampers to isolate noise

Noise emissions

- Mean sound pressure level at 1 m distance ≤ 62,2 dB(A) as per DIN 45635-11
- Mean sound pressure level (standard equipment) at 1 m distance (10°) to chimney outlet ≤ 48,3 dB(A) as per DIN 45635-11

Third octave band spectra isolation can be provided on request

Dimensions

L x W x H in mm: 1.800 x 1.040 x 1.300
Without electrical enclosure.
Height with electrical enclosure: 1.910 mm

Required space

L × W × H in mm: 3.800 × 2.100 × 2.280
without sound insulation base.
Height of sound insulation base: 250 mm

Installation and base plans will be provided on request

Operating weight

1.350 kg

Delivery

- Machine unit, self-supporting:
  1.600 mm × 800 mm. 930 kg
- Panelling with accessories on pallet:
  2.000 mm × 1.200 mm. 400 kg

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Mephisto G50 Asynchronous I Natural Gas

H2 ready

Model

Mephisto G50 A NG

with regulated three-way catalytic converter

Manufacturer

Kraftwerk

Kraft-Wärme-Kopplung GmbH
Am Lindener Hafen 30,
30453 Hannover, Germany

Net output (adjustable)

Electric, net	20 to 50 kW
Thermal	63 to 100,7 kW
Gas	79,5 to 144,9 kW_{Hi}

Net efficiency

Electric effective	34,5 %
Electric, ISO 3046	36,2 %
Thermal, effective	69,5 % (t_{Return} = 35 °C)
Overall, effective	104,0 % (t_{Return} = 35 °C)

Energy efficiency class

A++

Seasonal space heating energy efficiency

153 %

CHP coefficient

0,50

Primary energy factor

($f_{PE,WV}$ as per DIN SPEC 4701-10/A1:2016-05)

0,19

Primary energy saving

32,40 %

The high-efficiency criterion specified in EU Directive 2012/27/EU for CHP systems is met.

Fuel

Natural gas, biomethane

Gas connection

- Gas connection rating: 144,9 kW_{Hi} = 160,7 kW_{Hs}
- Gas connection pressure: 20 - 100 mbar
- Gas flow pressure: ≥ 10 mbar
- Mating dimension: DN 32 (1 ¼" male thread)

Heating connection

- Heating circuit minimum pressure: 1,5 bar
- Permitted operating pressure: max. 6.0 bar
- Flow temperature: max. 90 °C
- Return temperature: max. 70 °C
- Mating dimension: 1 ½" male thread
- Design flow rate: 4,41 m³/h
- Residual head for net output: 6,1 mWS
- With 40 K spread:
  Design flow rate: 2,21 m³/h
  Residual head for net output: 10,3 mWS

Electrical connection

- Pre-fuse NH00 100 A gL (gG) or SLS E-100 A
- Supply line H07RN-F 5 x 35 mm², up to 50 m in length for installation types B to G; 35 mm² for all installation types

Plate heat exchanger

Soldered stainless steel compact heat exchanger for separating the heating system from the CHP engine water circuit

Pollutant emissions

Mephisto G50 A NG: mg/m3 i.N.

(at 5 % by volume reference oxygen) CO 150, NOx 125

Combustion intake air

Space-air-dependent operating mode

Flue gas connection

- Flue gas conduit D110, fire resistance class B1 plastic pipe made of PP, permitted as a flue gas conduit for condensing heat generators with flue gas temperature up to 120 °C
- Flue gas temperature limited to max. 90 °C on thermostat
- Safety thermal cut-out set to 100 °C
- Recommended flue gas counter-pressure:
  500 Pa; maximum flue gas counter pressure
  800 Pa
- Flue gas flow rate: 161 m³/h i.N. in normal state is equivalent to 208 m³/h at $T_{Flue\ gas}$ = 80 °C
- Maximum condensate quantity: 22 l/h

Flue gas heat exchanger

- Thermodynamically optimised cast aluminium-silicon heat exchanger
- Integrated catalytic converter

Utilisation of calorific value

- The flue gas temperature is a maximum of 15 K above the corresponding return temperature
- Calorific value used at a return temperature of about 55 °C and above

Engine

- Industrial gas engine
- Model: MAG 49.4 S 313/HMG 434 S 133
- 4-cylinder Otto engine, water-cooled
- Displacement: 4.900 cm^3

Coupling

- Maintenance-free, plug-in, flexible metal/plastic coupling to compensate for radial, axial and angular misalignment

Generator

- Four-pole asynchronous machine for parallel operation on the public grid
- Manufacturer: Weier GmbH
- Model: DASGM 250/4 L water-cooled
- 3 x 400 V, 50 Hz
- Start-up current: 52 A (FU frequency inverter fitted as standard)
- Rated current: 94 A
- cos φ: 0,86 (inductive)
- Rated power: 56 kW
- Rated speed: 1.514 min^{-1}

Low voltage certification

Low voltage certification with unit certificate as per application guide VDE-AR-N 4105:2018.

Compensation

Due to the requirements in German code of practice VDE-AR-N 4105:2018-11, operating own generating systems without reactive power compensation is only permitted in exceptional cases. A cos φ of 0.95 is achieved with the standard fixed compensation.

Feed-in management

(as per Section 14 German Renewable Energy Law (EEG) 2021)

Reduction in feed-in power (0-10 V) possible by preselecting target value via analogue input, bus interface (optional) and digital inputs (to connect relay contacts on a ripple control receiver provided by customer).

Controller

- Industrial computer with powerful MPC555 microcontroller, 32-bit power PC with FPU
- Fully automatic operating control
- Remote monitoring/operation via LAN or optional mobile data connection
- Interfaces to higher-level DDC controls: digital and analogue inputs and outputs; optional CAN bus, RK512, Modbus, LON bus, Profibus DP, BACnet/IP, IEC 104, Profinet

Housing

- Sturdy, easily removable, frameless full thermo-acoustic enclosure
- Machine unit on four Asonator steel springs
- Optional base on two vibration dampers to isolate noise

Noise emissions

- Mean sound pressure level at 1 m distance ≤ 60,0 dB(A) as per DIN 45635-11
- Mean sound pressure level (standard equipment) at 1 m distance (10°) to chimney outlet ≤ 51,2 dB(A) as per DIN 45635-11

Third octave band spectra isolation can be provided on request

Dimensions

L × W × H in mm: 2.235 × 1.020 × 1.930
with electrical enclosure:

Required space

L × W × H in mm: 4.500 × 2.000 × 2.100
without sound insulation base.
Height of sound insulation base: 250 mm

Installation and base plans will be provided on request

Operating weight

1.850 kg

Delivery

- Machine unit, self-supporting:
  1.640 mm × 785 mm, 1.240 kg
- Panelling with accessories on pallet:
  2.000 mm × 1.200 mm, 590 kg

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Mephisto G50 Asynchronous I Liquefied petroleum gas

Model

Mephisto G50 A LPG

with regulated three-way catalytic converter

Manufacturer

Kraftwerk

Kraft-Wärme-Kopplung GmbH
Am Lindener Hafen 30,
30453 Hannover, Germany

Net output (adjustable)

Electric, net	20 to 50 kW
Thermal	63,1 to 105,9 kW
Gas	80,5 to 151,5 kW_{Hi}

Net efficiency

Electric effective	33 %
Electric, ISO 3046	34,7 %
Thermal, effective	69,9 % (t_{Return} = 35 °C)
Overall, effective	102,9 % (t_{Return} = 35 °C)

Energy efficiency class

A++

Seasonal space heating energy efficiency

150 %

CHP coefficient

0,47

Primary energy factor

($f_{PE,WV}$ as per DIN SPEC 4701-10/A1:2016-05)

0,25

Primary energy saving

31,2 %

The high-efficiency criterion specified in EU Directive 2012/27/EU for CHP systems is met.

Fuel

Liquefied petroleum gas

Gas connection

- Gas connection rating: 151,5 kW_{Hi} = 163,5 kW_{Hs}
- Gas connection pressure: 20 - 100 mbar
- Gas flow pressure: ≥ 10 mbar
- Mating dimension: DN 32 (1 ¼" male thread)

Heating connection

- Heating circuit minimum pressure: 1,5 bar
- Permitted operating pressure: max. 6.0 bar
- Flow temperature: max. 90 °C
- Return temperature: max. 70 °C
- Mating dimension: 1 ½ male thread
- Design flow rate: 4,64 m^3/h
- Residual head for net output: 5,3 mWS
- With 40 K spread:
  Design flow rate: 2,32 m^3/h
  Residual head for net output: 10,1 mWS

Electrical connection

- Pre-fuse NH00 100 A gL (gG) or SLS E-100 A
- Supply line H07RN-F 5 x 35 mm^2, up to 50 m in length for installation types B to G; 35 mm^2 for all installation types

Plate heat exchanger

Soldered stainless steel compact heat exchanger for separating the heating system from the CHP engine water circuit

Pollutant emissions

Mephisto G50 A LPG: mg/m3 i.N.

(at 5 % by volume reference oxygen) CO 150, NOx 125

Combustion intake air

Space-air-dependent operating mode

Flue gas connection

- Flue gas conduit D110, fire resistance class B1 plastic pipe made of PP, permitted as a flue gas conduit for condensing heat generators with flue gas temperature up to 120 °C
- Flue gas temperature limited to max. 90 °C on thermostat
- Safety thermal cut-out set to 100 °C
- Recommended flue gas counter-pressure:
  500 Pa; maximum flue gas counter pressure
  800 Pa
- Flue gas flow rate: on request
- Maximum condensate quantity: on request

Flue gas heat exchanger

- Thermodynamically optimised cast aluminium-silicon heat exchanger
- Integrated catalytic converter

Utilisation of calorific value

- The flue gas temperature is a maximum of 15 K above the corresponding return temperature
- Calorific value used at a return temperature of about 55 °C and above

Engine

- Industrial gas engine
- Model: MAG 49.4 S 311/HMG 434 S 113
- 4-cylinder Otto engine, water-cooled
- Displacement: 4.900 cm^3

Coupling

- Maintenance-free, plug-in, flexible metal/plastic coupling to compensate for radial, axial and angular misalignment

Generator

- Four-pole asynchronous machine for parallel operation on the public grid
- Manufacturer: Weier GmbH
- Model: DASGM 250/4 L water-cooled
- 3 x 400 V, 50 Hz
- Start-up current: 52 A (FU frequency inverter fitted as standard)
- Rated current: 94 A
- cos φ: 0,86 (inductive)
- Rated power: 56 kW
- Rated speed: 1.514 min^{-1}

Low voltage certification

Low voltage certification with unit certificate as per application guide VDE-AR-N 4105:2018.

Compensation

Due to the requirements in German code of practice VDE-AR-N 4105:2018-11, operating own generating systems without reactive power compensation is only permitted in exceptional cases. A cos φ of 0.95 is achieved with the standard fixed compensation.

Feed-in management

(as per Section 14 German Renewable Energy Law (EEG) 2021)

Reduction in feed-in power (0-10 V) possible by preselecting target value via analogue input, bus interface (optional) and digital inputs (to connect relay contacts on a ripple control receiver provided by customer).

Controller

- Industrial computer with powerful MPC555 microcontroller, 32-bit power PC with FPU
- Fully automatic operating control
- Remote monitoring/operation via LAN or optional mobile data connection
- Interfaces to higher-level DDC controls: digital and analogue inputs and outputs; optional CAN bus, RK512, Modbus, LON bus, Profibus DP, BACnet/IP, IEC 104, Profinet

Housing

- Sturdy, easily removable, frameless full thermo-acoustic enclosure
- Machine unit on four Asonator steel springs
- Optional base on two vibration dampers to isolate noise

Noise emissions

- Mean sound pressure level at 1 m distance ≤ 60,0 dB(A) as per DIN 45635-11
- Mean sound pressure level (standard equipment) at 1 m distance (10°) to chimney outlet ≤ 51,2 dB(A) as per DIN 45635-11

Third octave band spectra isolation can be provided on request

Dimensions

L × W × H in mm: 2.235 × 1.020 × 1.930
with electrical enclosure

Required space

L × W × H in mm: 4.500 × 2.000 × 2.100
without sound insulation base.
Height of sound insulation base: 250 mm

Installation and base plans will be provided on request

Operating weight

1.850 kg

Delivery

- Machine unit, self-supporting:
  1.640 mm × 785 mm, 1.240 kg
- Panelling with accessories on pallet:
  2.000 mm × 1.200 mm, 590 kg

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Mephisto G50 Synchronous I Natural Gas

Model

Mephisto G50 S NG

with regulated three-way catalytic converter

Manufacturer

Kraftwerk

Kraft-Wärme-Kopplung GmbH
Am Lindener Hafen 30,
30453 Hannover, Germany

Net output (adjustable)

Electric, net	20 to 50 kW
Thermal	63 to 100,7 kW
Gas	79,5 to 144,9 kW_{Hi}

Net efficiency

Electric effective	34,5 %
Electric, ISO 3046	36,2 %
Thermal, effective	69,5 % (t_{Return} = 35 °C)
Overall, effective	104,0 % (t_{Return} = 35 °C)

Energy efficiency class

A++

Seasonal space heating energy efficiency

153 %

CHP coefficient

0,50

Primary energy factor

($f_{PE,WV}$ as per DIN SPEC 4701-10/A1:2016-05)

0,19

Primary energy saving

32,40 %

The high-efficiency criterion specified in EU Directive 2012/27/EU for CHP systems is met.

Fuel

Natural gas, biomethane

Gas connection

- Gas connection rating: 144,9 kW_{Hi} = 160,7 kW_{Hs}
- Gas connection pressure: 20 - 100 mbar
- Gas flow pressure: ≥ 10 mbar
- Mating dimension: DN 32 (1 ¼" male thread)

Heating connection

- Heating circuit minimum pressure: 1,5 bar
- Permitted operating pressure: max. 6.0 bar
- Flow temperature: max. 90 °C
- Return temperature: max. 70 °C
- Mating dimension: 1 ½" male thread
- Design flow rate: 4,41 m^3/h
- Residual head for net output: 6,2 mWS
- With 40 K spread:
  Design flow rate: 2,21 m^3/h
  Residual head for net output: 10,3 mWS

Electrical connection

- Pre-fuse NH00 100 A gL (gG) or SLS E-100 A
- Supply line H07RN-F-J 5 x 35 mm^2, up to 50 m in length for installation types B to G; 35 mm^2 for all installation types

Plate heat exchanger

Soldered stainless steel compact heat exchanger for separating the heating system from the CHP engine water circuit

Pollutant emissions

Mephisto G50 S NG: mg/m3 i.N.

(at 5 % by volume reference oxygen) CO 150, NOx 125

Combustion intake air

Space-air-dependent operating mode

Flue gas connection

- Flue gas conduit D110, fire resistance class B1 plastic pipe made of PP, permitted as a flue gas conduit for condensing heat generators with flue gas temperature up to 120 °C
- Flue gas temperature limited to max. 90 °C on thermostat
- Safety thermal cut-out set to 100 °C
- Recommended flue gas counter-pressure:
  500 Pa; maximum flue gas counter pressure
  800 Pa
- Flue gas flow rate: 161 m^3/h i.N. in normal state is equivalent to 208 m^3/h at $T_{Flue\ gas}$ = 80 °C
- Maximum condensate quantity: 22 l/h

Flue gas heat exchanger

- Thermodynamically optimised cast aluminium-silicon heat exchanger
- Integrated catalytic converter

Utilisation of calorific value

- The flue gas temperature is a maximum of 15 K above the corresponding return temperature
- Calorific value used at a return temperature of about 55 °C and above

Engine

- Industrial gas engine
- Model: MAG 49.4 S 313/HMG 434 S 133
- 4-cylinder Otto engine, water-cooled
- Displacement: 4.900 cm^3

Coupling

- Maintenance-free, plug-in, flexible metal/plastic coupling to compensate for radial, axial and angular misalignment

Generator

- four-pole synchronous machine for parallel operation on the public grid or emergency power supply
- Manufacturer: Weier GmbH
- Model: DGS-F-250L4 water-cooled
- 3 x 400 V, 50 Hz
- Start-up current: 55 A (FU frequency inverter fitted as standard)
- Rated current: 72 A / 80 A
- cos φ: 1...0,9 (inductive/capacitive)
- Rated power: 62,5 kW
- Rated speed: 1,500 min^{-1}

Low voltage certification

Low voltage certification with unit certificate as per application guide VDE-AR-N 4105:2018.

Reactive power control

Control of reactive power according to Q(U) characteristic curve, cos φ (P)-characteristic curve or fixed cos φ: 1... 0.9 (inductive/capacitive).

Feed-in management

(as per Section 14 German Renewable Energy Law (EEG) 2021)

Reduction in feed-in power (0-10 V) possible by preselecting target value via analogue input, bus interface (optional) and digital inputs (to connect relay contacts on a ripple control receiver provided by customer).

Controller

- Industrial computer with powerful MPC555 microcontroller, 32-bit power PC with FPU
- Fully automatic operating control
- Remote monitoring/operation via LAN or optional mobile data connection
- Interfaces to higher-level DDC controls: digital and analogue inputs and outputs; optional CAN bus, RK512, Modbus, LON bus, Profibus DP, BACnet/IP, IEC 104, Profinet

Housing

- Sturdy, easily removable, frameless full thermo-acoustic enclosure
- Machine unit on four Asonator steel springs
- Optional base on two vibration dampers to isolate noise

Noise emissions

- Mean sound pressure level at 1 m distance ≤ 60,0 dB(A) as per DIN 45635-11
- Mean sound pressure level (standard equipment) at 1 m distance (10°) to chimney outlet ≤ 51,2 dB(A) as per DIN 45635-11

Third octave band spectra isolation can be provided on request

Dimensions

L × W × H in mm: 2.235 × 1.020 × 1.930
with electrical enclosure:

Required space

L × W × H in mm: 4.500 × 2.000 × 2.100
without sound insulation base.
Height of sound insulation base: 250 mm

Installation and base plans will be provided on request

Operating weight

1.960 kg

Delivery

- Machine unit, self-supporting:
  1.640 mm × 785 mm, 1.350 kg
- Panelling with accessories on pallet:
  2.000 mm × 1.200 mm, 590 kg

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Mephisto G50 Synchronous I Liquefied petroleum gas

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Manufacturer

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Electric, ISO 3046	34,7 %
Thermal, effective	69,9 % (t_{Return} = 35 °C)
Overall, effective	102,9 % (t_{Return} = 35 °C)

Energy efficiency class

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Seasonal space heating energy efficiency

150 %

CHP coefficient

0,47

Primary energy factor

($f_{PE,WV}$ as per DIN SPEC 4701-10/A1:2016-05)

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Primary energy saving

31,2 %

The high-efficiency criterion specified in EU Directive 2012/27/EU for CHP systems is met.

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Gas connection

- Gas connection rating: 151,5 kW_{Hi} = 163,5 kW_{Hs}
- Gas connection pressure: 20 - 100 mbar
- Gas flow pressure: ≥ 10 mbar
- Mating dimension: DN 32 (1 ¼" male thread)

Heating connection

- Heating circuit minimum pressure: 1,5 bar
- Permitted operating pressure: max. 6.0 bar
- Flow temperature: max. 90 °C
- Return temperature: max. 70 °C
- Mating dimension: 1 ½ male thread
- Design flow rate: 4,64 m^3/h
- Residual head for net output: 5,5 mWS
- With 40 K spread:
  Design flow rate: 2,32 m^3/h
  Residual head for net output: 10,2 mWS

Electrical connection

- Pre-fuse NH00 100 A gL (gG) or SLS E-100 A
- Supply line H07RN-F-J 5 x 35 mm^2, up to 50 m in length for installation types B to G; 35 mm^2 for all installation types

Plate heat exchanger

Soldered stainless steel compact heat exchanger for separating the heating system from the CHP engine water circuit

Pollutant emissions

Mephisto G50 S LPG: mg/m3 i.N.

(at 5 % by volume reference oxygen) CO 150, NOx 125

Combustion intake air

Space-air-dependent operating mode

Flue gas connection

- Flue gas conduit D110, fire resistance class B1 plastic pipe made of PP, permitted as a flue gas conduit for condensing heat generators with flue gas temperature up to 120 °C
- Flue gas temperature limited to max. 90 °C on thermostat
- Safety thermal cut-out set to 100 °C
- Recommended flue gas counter-pressure:
  500 Pa; maximum flue gas counter pressure
  800 Pa
- Flue gas flow rate: on request
- Maximum condensate quantity: on request

Flue gas heat exchanger

- Thermodynamically optimised cast aluminium-silicon heat exchanger
- Integrated catalytic converter

Utilisation of calorific value

- The flue gas temperature is a maximum of 15 K above the corresponding return temperature
- Calorific value used at a return temperature of about 55 °C and above

Engine

- Industrial gas engine
- Model: MAG 49.4 S 311/HMG 434 S 113
- 4-cylinder Otto engine, water-cooled
- Displacement: 4.900 cm^3

Coupling

- Maintenance-free, plug-in, flexible metal/plastic coupling to compensate for radial, axial and angular misalignment

Generator

- four-pole synchronous machine for parallel operation on the public grid or emergency power supply
- Manufacturer: Weier GmbH
- Model: DGS-F-250L4 water-cooled
- 3 x 400 V, 50 Hz
- Start-up current: 55 A (frequency inverter fitted as standard)
- Rated current: 72 A / 80 A
- cos φ: 1...0,9 (inductive/capacitive)
- Rated power: 62,5 kW
- Rated speed: 1,500 min^{-1}

Low voltage certification

Low voltage certification with unit certificate as per application guide VDE-AR-N 4105:2018.

Reactive power control

Control of reactive power according to Q(U) characteristic curve, cos φ (P)-characteristic curve or fixed cos φ: 1... 0.9 (inductive/capacitive).

Feed-in management

(as per Section 14 German Renewable Energy Law (EEG) 2021)

Reduction in feed-in power (0-10 V) possible by preselecting target value via analogue input, bus interface (optional) and digital inputs (to connect relay contacts on a ripple control receiver provided by customer).

Controller

- Industrial computer with powerful MPC555 microcontroller, 32-bit power PC with FPU
- Fully automatic operating control
- Remote monitoring/operation via LAN or optional mobile data connection
- Interfaces to higher-level DDC controls: digital and analogue inputs and outputs; optional CAN bus, RK512, Modbus, LON bus, Profibus DP, BACnet/IP, IEC 104, Profinet

Housing

- Sturdy, easily removable, frameless full thermo-acoustic enclosure
- Machine unit on four Asonator steel springs
- Optional base on two vibration dampers to isolate noise

Noise emissions

- Mean sound pressure level at 1 m distance ≤ 60,0 dB(A) as per DIN 45635-11
- Mean sound pressure level (standard equipment) at 1 m distance (10°) to chimney outlet ≤ 51,2 dB(A) as per DIN 45635-11

Third octave band spectra isolation can be provided on request

Dimensions

L × W × H in mm: 2.235 × 1.020 × 1.930
with electrical enclosure

Required space

L × W × H in mm: 4.500 × 2.000 × 2.100
without sound insulation base.
Height of sound insulation base: 250 mm

Installation and base plans will be provided on request

Operating weight

1.960 kg

Delivery

- Machine unit, self-supporting:
  1.640 mm × 785 mm, 1.350 kg
- Panelling with accessories on pallet:
  2.000 mm × 1.200 mm, 590 kg

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Scope of delivery

Condensing CHP unit	Mephisto CHP modules consist of a machine set, sound insulation housing, gas line and electrical enclosure for module control and buffer tank management. All Mephisto CHP units are equipped with a condensing flue gas heat exchanger as standard.
Gas connection set	Consisting of 1 m stainless steel flexible hose, ball valve and TAS valve in the required dimensions.
Heating connection set	Consisting of 2 stainless steel flexible hoses (1 m each), flat-sealing with union nut in the required dimensions.
Reactive power compensation asynchronous CHP	Reactive power compensation to increase the power factor (cos φ). Consisting of automatic circuit breakers, capacitor contactors and power capacitor. The cos φ can be adjusted to network requirements ex works if necessary. Fully mounted in the CHP electrical enclosure or in a separate housing on the CHP electrical enclosure.
Reactive power compensation synchronous CHP	Control of the reactive power supply of the synchronous generator. Consists of excitation board, power supply and software reactive power controller. Depending on the requirements of the network operator, control of the reactive power according to Q(U) characteristic, cos φ (P) characteristic or fixed cos φ: 1...0,9 (inductive/capacitive). Completely installed in the CHP control cabinet.
Silencer	Intake silencer for fitting outside the sound proofing, flue gas reflection silencer in the module housing and flue gas resonator silencer (not for G8) and flue gas silencer for fitting outside the sound proofing.
Tools for evaluating the operating data + remote control of the CHP unit	Webgate Webgate displays the CHP unit's operation-relevant data, such as the operating hours or the electrical energy generated, over its entire service life. Historical data and the availability specified in full maintenance contracts in particular can thus be evaluated easily. Webcontrol The Webcontrol visualisation interface not only allows the user to fully control the CHP unit remotely in real time, but also view and evaluate current and historical technical measurement data (temperatures, currents, outputs, etc.). This provides a tool for project monitoring and system optimisation.
Mephisto Basic Control	Software module within the CHP unit controller system with the following functions: - CHP unit output and flow temperature control - Buffer tank loading determined by two temperature sensors - Communication with a DDC via a digital input for the CHP request and order - Analogue input for target output/temperature specification - Analogue output for current output reading - Three potential-free changeover contacts for operating signal, ready signal and fault signal Integrated in CHP unit controller. Five analogue inputs in the CHP unit for Pt1000 temperature sensors for control or evaluation purposes included.

Accessories

Safety component assemblies and filling device	On the heating side as specified in DIN EN 12828:2014-07; consisting of Pneumatex pressurised expansion tank, safety valve, pressure gauge, automatic bleeding device and boiler, filling and drain ball valve for filling and draining, fitted ready for operation on the CHP module rear wall.
Pump assembly G8	Consisting of Grundfos UPM3 high-efficiency wet running pump, electronically controlled, energy efficiency index (EEI) = 0.2, PWM signal (controlled by CHP unit module control), Shut-off valves, backflow preventer function with forced positioning, thermometers in the heating water return flow, flow sensor for displaying the volume flow in the CHP unit controls, fitted ready for operation on module connection plate.
Pump assembly G22, G34	Consisting of Grundfos MAGNA3 high-efficiency wet running pump, electronically controlled, energy efficiency index (EEI) = 0.19, GENIbus module (controlled by CHP unit module control), Three shut-off valves, (one with backflow preventer function and forced positioning), two thermometers, sludge separator in the heating water return flow and flow sensor for displaying the volume flow in the CHP unit controls, fitted ready for operation on module connection plate.
Pump assembly G50	Consisting of Grundfos MAGNA3 high-efficiency wet running pump, electronically controlled, energy efficiency index (EEI) = 0.19, GENIbus module (controlled by CHP unit module control), An electronically controlled shut-off valve for software-based heating circuit backflow protection, a shut-off valve, including thermometer and flow sensor for displaying the volume flow in the CHP unit controls, fitted ready for operation on module connection plate.
Mephisto remote monitoring module	OpenVPN gateway for remote monitoring and control of all CHP modules at a location via Ethernet LAN. A network connection with the necessary port releases as specified in the >Mephisto CHP Network Configuration< document must be provided by the customer. Remote monitoring can also be performed via a mobile data connection using LTE/HSPA+/GPRS (4G/3G/2G) as an option. Fitted ready for operation in the CHP control cabinet. Including access to the manufacturer's Webgate tool.
Communication interface Mephisto API	Standardized programming interface for directly retrieving the data points processed by the CHP control system using customer-side HTTP requests. The documentation of the Mephisto API follows the "OpenAPI" description standard and is made available via the Swagger UI. The API calls are protected by authentication.
Operating time schedule	Software module within the CHP control system for automated limitation of the CHP utilisation hours per year. Function selection: CHP unit interlock with notification or notification only. After interlocking, the CHP unit is displayed as not ready for operation in communication with a DDC.

Pressure monitoring on the heating side	Heating system pressure sensor with connection cable for monitoring the pressure in the heating system. Ready to connect to the CHP unit in the pump assembly return line and connected to the controller via an analogue input. The current status and the pressure evolution over time can be displayed in self-developed Webcontrol in combination with the remote monitoring module.
Extension module fault message	Additional terminals for five external fault messages (e.g. boiler fault, pump fault) with potential-free NO contact or NC contact, ready fitted in the CHP unit control cabinet. Software module for parametrizing, displaying and evaluating the fault statuses on the CHP unit controller touch display and in Webcontrol/Webgate. Forwarding of fault message emails in Kraftwerk Webgate freely configurable. In addition to external fault messages, the software module can also monitor the controller's analogue inputs (e.g. CHP unit return, boiler flow, cat on) and generate fault messages if adjustable limit values are exceeded or not reached. A total of up to eight analogue and/or digital signals can be processed.
CHP power generation measurement	Consisting of 3-phase energy meter 3 x 230/400 V, accuracy class B (1), MID approval module B and D for billing purposes, S0 pulse generator, optional M bus interface, LCD display for energy, apparent, active and reactive power, phase sequence and power direction (and 3 current transformers 100/5 A accuracy class 0.5S for G50). Fitted ready-to-use in the CHP module electrical enclosure.
M-Bus data logger	Software module within the CHP unit controller for data acquisition and storage for one or more meters (electricity, gas, heat and water meters) by M-bus. Graph display of the current and historical values (max. two years) on the CHP unit controller's touch display. Retrieval/download of recorded data via Webcontrol or API interface (optional). Setpoint query possible for current-controlled operation of the CHP unit. Data transfer rate: 2400 baud. Supports 5 bus devices. Increased to up to 50 meters on request. Connection option for star-shaped wiring in the CHP control cabinet: max. two meters. If there are more than two meters, wiring is installed outside the CHP unit electrical enclosure on site. Installation and configuration on site.

One-pipe diaphragm gas meter	Including calibration and certification fee. Supply certified gas meter for determining the amount of gas consumed by the CHP unit, with impulse output or with absolute encoder and M-bus interface, connection piece and seal; data transfer to manufacturer's own Webgate possible.
Sound-absorbing underlay	2 strips, Sylomer, for structure-borne vibration control in the base.
Flue gas resonator silencer 50Hz G22, G34, G50	Additional flue gas resonator silencer to further reduce flue gas noise emission in the 50 Hz range. Ø=200 mm (250 mm for G50), 2000 mm long, supply flue gas pipe connection DN80 on both sides (DN110 for G50), for horizontal installation.
Gas sensor	Supply, with 2 potential-free relay outputs (230 V/3.15 A) for general space air monitoring in power stations, for mounting on wall.
Extension island grid operation	Enables the CHP plant to operate on an existing island network. The island network operation is activated via a digital input on the CHP plant.
Set for black start capability	Enables the module to start without drawing power from the grid. Intended for operation of the CHP plant on an island grid. Consists of starter battery, charger, starter and connection cable. Control system integrated in the CHP plant.
Extension emergency power supply for CHP with synchronous generator	Software module within the CHP control system for the independent provision of an island network by the CHP after the customer system has been disconnected from the public grid. A switch box for automatically disconnecting the customer system from the public grid in the event of a power failure can be offered on request. Can only be used in combination with the set for black start capability.

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Control technology accessories

Mephisto heat generation control	Software module within the CHP unit controller to extend >Mephisto Basic Control< with the following functions: - Main circuit flow temperature control - Main circuit supply temperature increase on hot drinking water pipeline request - A boiler release and boiler setpoint power/temperature specification - Regulated buffer tank loading - Boiler bypass control - Control of a buffer discharge pump via GENIbus or control of a boiler circuit/local heat mixer using end position contacts Integrated in CHP unit controller. Functional range depends on the selected hydraulics (based on Kraftwerk's hydraulic recommendations). Five analogue inputs in the CHP unit included for Pt1000 temperature sensors used for control or evaluation purposes. Temperature sensors are not included in the price. Recommended if there is no higher-level controller.
Extension module for electricity-based operation	Software module for electricity-based mode of operation for CHP. A heat-based mode of operation, dependent on electricity demand, is also possible as an option. Integrated in CHP unit controller. A power meter, available separately, is required for the target power output (Possible interfaces: 0-10 V, 0(4)-20 mA or M-Bus).
Mephisto Cascade Manager	Software module within the CHP unit controller for optimising the operating behaviour of a CHP cascade consisting of up to four Mephisto modules. Range of functions: Start agreement between the CHP unit modules - Mutual start-up interlock to prevent simultaneous start-up processes as specified in VDE AR-N 4105:2018-11 - Alternate prioritisation/order of precedence the CHP units to align operating hours For buffer loading by Mephisto Basic Control - Alternating requirement of the modules based on order of precedence and buffer tank temperatures When requested externally by digital inputs - Evaluation of up to two inputs and approval depending on the set bits With external power target (0-10 V or bus) - Alternating/simultaneous request to the modules based on the power setting With Mephisto Heat Generation Control - Alternating/simultaneous request of the modules based on temperature/power setting The client installs the wiring between the CHP units or makes separate order for installation.

Communication module CAN	To communicate with higher-level heating control via CAN. Fitted ready for operation in the CHP control cabinet.
Communication module RK512	To communicate with higher-level heating via RK512. Fitted ready for operation in the CHP control cabinet.
Communication module Modbus	To communicate with higher-level heating control via Modbus TCP or Modbus RTU. Fitted ready for operation in the CHP control cabinet.
Communication module LON-Bus	To communicate with higher-level heating control via LON bus. Fitted ready for operation in the CHP control cabinet.
Communication module Profibus-DP	To communicate with higher-level heating control via Profibus-DP. Fitted ready for operation in the CHP control cabinet.
Communication module BACnet/IP	To communicate with higher-level heating control BACnet/IP. Fitted ready for operation in the CHP control cabinet.
Communication module IEC 104	To communicate with higher-level heating control via IEC 104. Fitted ready for operation in the CHP control cabinet.
Communication module Profinet	To communicate with higher-level heating control via Profinet. Fitted ready for operation in the CHP control cabinet.
Buffer tank control temperature sensor set	Supply; consisting of 2 immersion temperature sensors Pt1000 1/3 DIN B with 4 m connection cable and 2 x thermowell 400 mm MS nickel-plated, G1/2".
External temperature sensor	Supply; Pt1000 AGS54 1/3 DIN B, in plastic IP65 for mounting on external wall
Contact temperature sensor set	Supply; PT1000 1/3 DIN B, set includes fastener strap and conducting paste, for heating pipes up to 2".
Cable temperature sensor	Supply; Pt1000, 180° silicone cable, 1/3 DIN, 6 mm, 4 m cable, IP67 rolled.

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Delivery, installation, services Mephisto CHP

Here are some of the services offered by us or our licensed local partners:

Packaging and delivery	Packaging and delivery of one or more combined heat and power generation unit as per shipping requirements.
On-site delivery, positioning and installation of the CHP unit	Transport of the CHP unit from the unloading point to the installation location, positioning and installation at the installation location.
On-site delivery and positioning of a base	Transport of a base to provide acoustic decoupling for the CHP unit from the unloading point to the installation location, positioning at the installation location.
Flue gas system inside the boiler room	Consisting of a PPS D80 or D110 flue gas pipe; type B, 120 °C with type approval, including all moulded parts and assembly materials for everything from the CHP module to the chimney entry. Including flue gas measurement connection and condensate trap.
Structure-borne sound isolation measures for the flue gas system within the boiler room	Sound-isolated installation of the flue gas system and standard supplied silencer containing spring pendulums (max. 8 units) matched to the fundamental frequency, using framing if necessary.
Insertion of the flue gas pipe into the existing shaft	For a CHP unit module made of PPS D80 or D110; type B, 120 °C with type approval, including all moulded parts, cleaning opening and installation material.
Control integration	Supply, installation and connection of the electrical control cables (boiler enable, boiler switch, hot drinking water requirement, external temperature sensor, contact sensor or immersion temperature sensor) for commissioning the optional Mephisto Heat Generation Control position. Routing in existing cable duct or cable platform. Function check and adjustment of the controller. Cable lengths max. 15 m. Without wall penetrations, holes or similar. Customer carries out breaking and plaster work.
Commissioning	of a CHP module, setting of all machine parameters, adjustment of the gas line, control of all functions required for operation, emission measurement, test of safety systems (in particular of the grid and plant protection and shut-off devices), instruction of the operator, compilation of the commissioning protocol and handover of the operating and maintenance manual.
Module maintenance	Maintenance and repair by own servicing team or licensed partners.

Contact

We will provide you with extensive consultation on all technical and financial matters related to our entire product portfolio.

We will be happy to provide you with a project-specific quote. You can contact us by phone +49 511 262 9970 or by email **mail@kwk.info**. You will find other options to contact us on our website **www.kwk.info/en/contact**.

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