



# Biogas Combined Heat and Power Unit

## ENERGIN® M12 GEN+ B400

### Datasheet, 250 mg NO<sub>x</sub>

The ENERGIN® GEN+ combined heat and power unit simultaneously generates electricity and uses the heat from the engine jacket water to heat water. It can be operated in parallel with the public network or with an isolated load. As an option, automatic emergency operation and/or island-parallel operation with other generators is possible.

The unit is supplied as a compact, fully functional unit, with or without a sound attenuating enclosure. The engine, generator, heat exchangers for oil and jacket water as well as the control and power panel are mounted, ready for operation on the vibration-decoupled base frame. A lubrication oil system, which allows operation of up to 2000 hours without manual lube oil refilling, is integrated on the unit.

The electrical control system provides protection and control functions for automatic or manual operation. A 12" touch panel informs about operating conditions and allows the operation and parameterization of the system. Various interfaces are available for communication with other power generators and an overhead control system. An Ethernet interface allows connection to the Internet for remote monitoring and remote maintenance.

The entire system is certified according to the BDEW medium voltage directive (Grid code).

#### TECHNICAL DATA

|                                    |    |                   |
|------------------------------------|----|-------------------|
| Manufacturer                       |    | R Schmitt Enertec |
| ENERGIN® Type                      |    | M12 GEN+ B400     |
| Electrical power <sup>1</sup>      | kW | 400               |
| Thermal power <sup>2</sup>         | kW | 249               |
| Gas consumption <sup>3</sup> (LHV) | kW | 981               |
| Self consumption <sup>4</sup>      | kW | 5,7               |

#### DESIGN

|                                    |                     |           |
|------------------------------------|---------------------|-----------|
| Fuel type                          |                     | Biogas    |
| Lower heating value LHV            | kWh/Nm <sup>3</sup> | 5,0       |
| Gas flow pressure <sup>5</sup>     | kPa                 | 3,5 - 5,0 |
| Inlet air temperature              | °C                  | 20        |
| Exhaust temperature                | °C                  | 489       |
| Hot water temperature <sup>6</sup> | °C                  | 70 / 85   |
| Hot water flow rate                | m <sup>3</sup> /h   | 14,8      |

#### EXHAUST EMISSIONS<sup>7</sup> WITHOUT CATALYST

|                 |                    |      |
|-----------------|--------------------|------|
| NO <sub>x</sub> | mg/Nm <sup>3</sup> | 250  |
| CO              | mg/Nm <sup>3</sup> | 1500 |
| Formaldehyde    | mg/Nm <sup>3</sup> | 100  |

#### ENGINE

|                        |     |                   |
|------------------------|-----|-------------------|
| Manufacturer           |     | R Schmitt Enertec |
| ENERGIN® Type          |     | M12-BTID41        |
| Working principle      |     | 4-stroke          |
| Cylinder configuration |     | 12 in V / 90°     |
| Valves per cylinder    |     | 4                 |
| Aspiration             |     | turbocharged      |
| Mixture cooling        |     | internal          |
| Displacement           | ltr | 22,6              |

#### LUBE OIL

|                     |        |      |
|---------------------|--------|------|
| Lube oil volume     | ltr    | 205  |
| Make up tank volume | ltr    | 170  |
| Consumption         | ltr/OH | 0,13 |

#### ALTERNATOR

|              |        |             |
|--------------|--------|-------------|
| Manufacturer |        | Leroy Somer |
| Type         |        | LSA 47.2 M8 |
| Voltage      | V / Hz | 400 / 50    |
| Speed        | 1/min  | 1.500       |
| Efficiency   | %      | 96,2        |



#### PERFORMANCE<sup>8</sup>

| Load                          |                    | 100 % | 75 %  | 50 %  |
|-------------------------------|--------------------|-------|-------|-------|
| Electrical power              | kW                 | 400   | 300   | 200   |
| Thermal power                 | kW                 | 249   | 189   | 143   |
| Fuel consumption              | kW                 | 981   | 752   | 538   |
| Gas flow at LHV               | Nm <sup>3</sup> /h | 197   | 151   | 108   |
| Electrical efficiency         | %                  | 40,8  | 39,9  | 37,2  |
| Thermal efficiency            | %                  | 25,4  | 25,1  | 26,6  |
| Total efficiency              | %                  | 66,2  | 65,0  | 63,8  |
| Exhaust gas flow <sup>9</sup> | m <sup>3</sup> /h  | 4.134 | 3.154 | 2.242 |
| Air requirement               | m <sup>3</sup> /h  | 9.762 | 7.762 | 6.104 |
| Exhaust air <sup>10</sup>     | m <sup>3</sup> /h  | 8.176 | 6.593 | 5.300 |

#### DIMENSIONS AND WEIGHTS WITH SOUND ENCLOSURE

|                       |    |       |
|-----------------------|----|-------|
| Length <sup>11</sup>  | mm | 4.380 |
| Height                | mm | 2.030 |
| Height with 90° elbow | mm | 3.190 |
| Width                 | mm | 1.440 |
| Dry weight            | kg | 4.860 |
| Operational weight    | kg | 5.270 |

#### CONNECTIONS

|                    |         |           |
|--------------------|---------|-----------|
| Exhaust            | DN / PN | 150 / 10  |
| Fuel gas           | DN / PN | 65 / 16   |
| Exhaust air        | mm      | 850 x 850 |
| Emergency cooling  | DN / PN | 65 / 16   |
| Process water      | DN / PN | 65 / 16   |
| Exhaust condensate | DN / PN | Rp 1/2"   |

<sup>1</sup> +0 % tolerance on electrical power output

<sup>2</sup> - 3/+ 8 % tolerance for thermal power @ 489 °C

<sup>3</sup> +5 % tolerance on fuel consumption

<sup>4</sup> average self consumption without emergency cooling

<sup>5</sup> maximum variation of 10 % for set value

<sup>6</sup> Return/flow temperature

<sup>7</sup> Exhaust emissions related to 5 % oxygen in dry exhaust

<sup>8</sup> at standard conditions according to ISO 3046-1; cos φ = 1

<sup>9</sup> wet exhaust gas at 489 °C

<sup>10</sup> ΔT = 15 K

<sup>11</sup> without optional heating water pump group



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