Diesel Generator Set

MTU 12V4000 DS1650

380V – 11 kV/50 Hz/data center continuous power/
NOx emission optimized/12V4000G14F/water charge air cooling

Optional equipment and finishing shown. Standard may vary.

Product highlights

Benefits
— Low fuel consumption
— Optimized system integration ability
— High reliability
— High availability of power
— Long maintenance intervals

Support
— Global product support offered

Standards
— Engine-generator set is designed and manufactured in facilities certified to standards ISO 2008:9001 and ISO 2004:14001
— Generator set complies to ISO 8528
— Generator meets NEMA MG1, BS5000, ISO, DIN EN and IEC standards
— NFPA 110

Power rating
— System ratings: 1490 kVA - 1600 kVA
— Accepts rated load in one step per NFPA 110
— Generator set complies to G3 according to ISO 8528-5
— Generator set exceeds load steps according to ISO 8528-5

Performance assurance certification (PAC)
— Engine-generator set tested to ISO 8528-5 for transient response
— 100% load factor
— Verified product design, quality and performance integrity
— All engine systems are prototype and factory tested

Complete range of accessories available
— Control panel
— Power panel
— Circuit breaker/power distribution
— Fuel system
— Fuel connections with shut-off valve mounted to base frame
— Starting/charging system
— Exhaust system
— Mechanical and electrical driven radiators
— Medium and oversized voltage alternators

Emissions
— NOx emission optimized

Certifications
— CE certification option
— Unit certificate acc. to BDEW (German Grid-Code)
### Application data

**Engine**
- Manufacturer: MTU
- Model: 12V4000G14F
- Type: 4-cycle
- Arrangement: 12V
- Displacement: 57.2 l
- Bore: 170 mm
- Stroke: 210 mm
- Compression ratio: 1500:1
- Rated speed: 1420 rpm
- Engine governor: ECU 9
- Max power: 1420 kW
- Air cleaner: dry

**Fuel system**
- Maximum fuel lift: 5 bar
- Total fuel flow: 16 l/min

**Fuel consumption**
1. At 100% of power rating:
   - Liquid capacity (lubrication)
     - Total oil system capacity: 260 l
     - Engine jacket water capacity: 160 l
     - Intercooler coolant capacity: 40 l
   - Combustion air requirements
     - Combustion air volume: 218 m³/s
     - Max. air intake restriction: 50 mbar
   - Cooling/radiator system
     - Coolant flow rate (HT circuit): 21 m³/hr
     - Coolant flow rate (LT circuit): 30 m³/hr
     - Heat rejection to coolant: 590 kW
     - Heat radiated to charge air cooling: 360 kW
     - Heat radiated to ambient: 75 kW
     - Fan power for electr. radiator (40°C): 70 kW
   - Exhaust system
     - Exhaust gas temp. (after turbocharger): 470°C
     - Exhaust gas volume: 5.2 m³/s
     - Maximum allowable back pressure: 85 mbar
     - Minimum allowable back pressure: 30 mbar

2. At 75% of power rating:
   - Liquid capacity (lubrication)
   - Combustion air requirements
   - Cooling/radiator system
   - Exhaust system

3. At 50% of power rating:
   - Liquid capacity (lubrication)
   - Combustion air requirements
   - Cooling/radiator system
   - Exhaust system

**System ratings (kW/kVA)**

<table>
<thead>
<tr>
<th>Generator model</th>
<th>Voltage</th>
<th>Engine</th>
<th>NOx emission optimized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Manufacturer</td>
<td>Model</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MTU 12V4000G14F</td>
<td>4-cycle</td>
</tr>
<tr>
<td>Leroy Somer LSA52.3 S5 (Low voltage Leroy Somer standard)</td>
<td>380 V</td>
<td>1280</td>
<td>1600</td>
</tr>
<tr>
<td></td>
<td>400 V</td>
<td>1280</td>
<td>1600</td>
</tr>
<tr>
<td></td>
<td>415 V</td>
<td>1280</td>
<td>1600</td>
</tr>
<tr>
<td>Marathon 743RSL7090 (Low voltage Marathon)</td>
<td>380 V</td>
<td>1272</td>
<td>1590</td>
</tr>
<tr>
<td></td>
<td>400 V</td>
<td>1264</td>
<td>1580</td>
</tr>
<tr>
<td></td>
<td>415 V</td>
<td>1192</td>
<td>1490</td>
</tr>
<tr>
<td>Marathon 744RSL7091 (Low voltage Marathon oversized)</td>
<td>380 V</td>
<td>1272</td>
<td>1590</td>
</tr>
<tr>
<td></td>
<td>400 V</td>
<td>1264</td>
<td>1580</td>
</tr>
<tr>
<td></td>
<td>415 V</td>
<td>1192</td>
<td>1490</td>
</tr>
<tr>
<td>Marathon 1020FDH7095 (Medium volt. marathon)</td>
<td>11 kV</td>
<td>1272</td>
<td>1590</td>
</tr>
<tr>
<td></td>
<td>11 kV</td>
<td>1272</td>
<td>1590</td>
</tr>
</tbody>
</table>

* cos phi = 0.8

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1. All data refers only to the engine and is based on ISO standard conditions (25°C and 100 m above sea level).
2. Values referenced are in accordance with ISO 3046-1. Conversion calculated with fuel density of 0.83 g/ml. All fuel consumption values refer to rated engine power.
Standard and optional features

Engine
- 4-cycle
- Standard single stage air filter
- Oil drain extension & shut-off valve
- Closed crankcase ventilation
- Governor-electronic isochronous
- Common rail fuel injection
- NOx emission optimized engine
- Centrifugal oil filter

Generator
- 4 pole three-phase synchronous generator
- Brushless, self-excited, self-regulating, self-ventilated
- Digital voltage regulator
- Anti condensation heater
- Stator winding Y-connected, accessible neutral (brought out)
- Protection IP23
- Insulation class H, utilization acc. to H
- Radio suppression EN55011, group I, cl. B
- Short circuit capability 3xIn for 10 sec
- Winding and bearing RTDs (without monitoring)
- Excitation by AREP
- Mounting of CT’s: 2 core CT’s
- Winding pitch: 2/3 winding
- Voltage setpoint adjustment ± 10%
- Meets NEMA MG-1, BS 5000, IEC 60034-1, VDE 0530, DIN EN 12601, AS1359 and ISO 8528 requirements
- Leroy Somer low voltage generator
- Marathon low voltage generator
- Oversized generator
- Medium voltage generator

Cooling system
- Jacket water pump
- Thermostat(s)
- Water charge air cooling
- □ Mechanical radiator
- □ Electrical driven front-end cooler
- □ Jacket water heater

Control panel
- Pre-wired control cabinet for easy application of customized controller (V1+)
- Island operation (V2)
- Automatic mains failure operation with ATS (V3a)
- Automatic mains failure operation incl. control of generator and mains breaker (V3b)
- Island parallel operation of multiple gensets (V4)
- Automatic mains failure operation with short (< 10s) mains parallel overlap synchronization (V5)
- Mains parallel operation of a single genset (V6)
- □ Mains parallel operation of multiple gensets (V7)
- □ Basler controller
- □ Deif controller
- □ Complete system metering
- □ Digital metering
- □ Engine parameters
- □ Generator Protection Functions
- □ Engine protection
- □ SAE J1939 engine ECU communications
- □ Parametrisation software
- □ Multilingual capability
- □ Multiple programmable contact inputs
- □ Multiple contact outputs
- □ Event recording
- □ IP 54 front panel rating with integrated gasket
- □ Different expansion modules
- □ Remote annunciator
- □ Daytank control
- □ Generator winding temperature monitoring
- □ Generator bearing temperature monitoring
- □ Modbus TCP-IP

Power panel
- Available in 600x600 and 600x1000
- Phase monitoring relay 230V/400V
- Supply for battery charger
- □ Supply for anti condensation heating
- □ Plug socket cabinet for 230V compatible Euro/USA
- □ Supply electrical driven radiator from 45kW – 75kW (PP 600x1000)

- Represents standard features
- Represents optional features
Standard and optional features

Circuit breaker/power distribution

- 3-pole circuit breaker
- 4-pole circuit breaker
- Manual-actuated circuit breaker
- Electrical-actuated circuit breaker
- Stand-alone solution in separate cabinet

Fuel system

- Flexible fuel connectors mounted to base frame
- Fuel filter with water separator
- Fuel filter with water separator heavy-duty
- Switchable fuel filter with water separator
- Switchable fuel filter with water separator heavy-duty
- Separate fuel cooler
- Fuel cooler integrated into cooling equipment

Starting/charging system

- 24V starter
- Starter batteries, cables, rack, disconnect switch
- Battery charger

Mounting system

- Welded base frame
- Resilient engine and generator mounting
- Modular base frame design

Exhaust system

- Exhaust bellows with connection flange
- Exhaust silencer with 10 dB(A) sound attenuation
- Exhaust silencer with 30 dB(A) sound attenuation
- Exhaust silencer with 40 dB(A) sound attenuation
- Y-connection-pipe
Weights and dimensions

<table>
<thead>
<tr>
<th>System</th>
<th>Dimensions (L x W x H)</th>
<th>Weight (dry/less tank)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open power unit (OPU)</td>
<td>4059 x 1810 x 2330 mm</td>
<td>10654 kg</td>
</tr>
</tbody>
</table>

Weights and dimensions are based on open power units and are estimates only. Consult the factory for accurate weights and dimensions for your specific engine-generator set.

Sound data

— Consult your local MTU distributor for sound data.

Emissions data

<table>
<thead>
<tr>
<th>NOx + NMHC</th>
<th>CO</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1700</td>
<td>300</td>
<td>50</td>
</tr>
</tbody>
</table>

All units are in mg/Nm³

Emission levels of the engine may vary as a function of ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data provided refers to ISO standard ambient conditions (25°C and 100m above sea level). The data provided are laboratory results from one engine representing this rating. The data was obtained under controlled environmental conditions with calibrated instrumentation.

Rating definitions and conditions

— Data center continuous power ratings apply to data center installations where a reliable utility power is available and comply with Uptime Institute Tier III and IV requirements. At constant or varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO 8528-1, ISO 3046-1, BS 5514 and AS 2789. Average load factor: ≤ 100%.

— Consult your local MTU distributor for derating information.