



**Technical
Specification
MTU 20V4000 GS
GG20V4000A1**

I. System Description

Product type	GG20V4000A1 MTU 20V4000 GS
Application Group	3A - Heavy duty service, unrestricted

Power values

	Unit	Nominal
Electrical power, 100% CP	kWel	1948
Power factor (cos f)	-	1.0
Frequency	Hz	50
Voltage	V	400
Engine rated speed	rpm	1500
Thermal output, engine (Engine block, engine lube oil, 1st stage intercooler) – 100% CP (± 8%)	kW	1035
Thermal output, engine (Engine block, engine lube oil) – 100% CP (±8%)	kW	1035
Thermal Output in exhaust gas cooled (to reference temperature in °C) – 100% CP (± 8%)	kW	1101
Reference temperature, cooling, exhaust gas	°C	120
Thermal output, 2. stage mixture cooler – 100% CP (± 8%)	kW	78
Output, thermal, total – 100% CP (± 8%)	kW	1035
Energy input in accordance with ISO 3046 - 100% (± 5%)	kW	4577
Intake air temperature	°C	35
Site altitude above sea level	m	100
Relative air humidity	%	60
Gas type: natural gas	-	X
Methane number (MN), min.	-	80
Cooling water temperature, inlet	°C	78
Cooling water temperature, outlet	°C	90
Mixture cooler, 2. stage water inlet temperature	°C	53
Nitrogen oxides (NOx), emissions (dry, referred to reference value residual oxygen)	mg/m ³ n	500
Carbon monoxide (CO) Emission (dry, referred to reference value residual oxygen)	mg/m ³ n	1000
Reference value residual Oxygen	%	5

Technical Data:

1. DATA-RELEVANT DESIGN

Technical data sheet	-	93800050093
Technical description	-	MS61016
Planning drawing plant	-	93406008005
Planning drawing heat recovery unit	-	-
Flow chart (Piping and Instruments) German	-	93200008621
Fuel, fluid and lubricants specification	-	A001067
Load step diagram	-	-
Methane number derating diagram	-	DK-DR-0003
Combustion air derating diagram	-	DK-DR-0005
Foundation requirement	-	93800050093BI
Island mode capability	-	X
Extraction 1st stage intercooler (high temperature circuit)	-	-
Extraction 1st stage intercooler (connection in series 2. stage intercooler)	-	-
Built type	-	GB
Maintenance schedule	-	MS50198
Overhaul schedule	-	MS50198
Flow chart (Piping and Instruments) English	-	93200008622

2. POWER-RELATED DATA, ELECTRICAL

Voltage		V	400
Frequency		Hz	50
Grid regulations		-	-
Electrical power, 100% CP		kWel	1948
Electrical power, 75% CP		kWel	1461
Electrical power, 50% CP		kWel	974
Engine power ISO 3046-1 – 100% CP	A	kW	2000
Engine power ISO 3046-1 – 75% CP	A	kW	1499
Engine power ISO 3046-1 – 50% CP	A	kW	1003
Power factor (cos f)		-	1.0
Generator efficiency at cos f = 1 – 100% CP		%	97.4
Generator efficiency at cos f = 1 – 75% CP		%	97.4
Generator efficiency at cos f = 1 – 50% CP		%	97.1
Electrical efficiency, 100%		%	42.6
Electrical efficiency, 75%		%	41.5
Electrical efficiency, 50%		%	39.2
Total efficiency incl. thermal output from exhaust, 100%		%	89.2
Total efficiency incl. thermal output from exhaust, 75%		%	89.3
Total efficiency incl. thermal output from exhaust, 50%		%	88.6

3. POWER-RELATED DATA, THERMAL

Thermal output, engine (Engine block, engine lube oil, 1st stage intercooler) – 100% CP ($\pm 8\%$)	A	kW	1035
Thermal output, engine (Engine block, engine lube oil, 1st stage intercooler) – 75% CP ($\pm 8\%$)	A	kW	788
Thermal output, engine (Engine block, engine lube oil, 1st stage intercooler) – 50% CP ($\pm 8\%$)	A	kW	561
Thermal output, engine (Engine block, engine lube oil) – 100% CP ($\pm 8\%$)	A	kW	1035
Thermal output, engine (Engine block, engine lube oil) – 75% CP ($\pm 8\%$)	A	kW	788
Thermal output, engine (Engine block, engine lube oil) – 50% CP ($\pm 8\%$)	A	kW	561
Thermal Output in exhaust gas cooled (to reference temperature in °C) – 100% CP ($\pm 8\%$)	A	kW	1101

Thermal Output in exhaust gas cooled(to reference temperature in °C) – 75% CP (± 8%)	A	kW	891
Thermal Output in exhaust gas cooled (to reference temperature in °C) – 50% CP (± 8%)	A	kW	667
Reference temperature, cooling, exhaust gas	A	°C	120
Output, thermal, total – 100% CP (± 8%)	A	kW	1035
Output, thermal, total – 75% CP (± 8%)	A	kW	788
Output, thermal, total – 50% CP (± 8%)	A	kW	561
Thermal output, 1. stage mixture cooler – 100% CP (± 8%)	A	kW	-
Thermal output, 1. stage mixture cooler – 75% CP (± 8%)	A	kW	-
Thermal output, 1. stage mixture cooler – 50% CP (± 8%)	A	kW	-
Thermal output, 2. stage mixture cooler – 100% CP (± 8%)	A	kW	78
Thermal output, 2. stage mixture cooler – 75% CP (± 8%)	A	kW	50
Thermal output, 2. stage mixture cooler – 50% CP (± 8%)	A	kW	32

4. CONSUMPTION

Energy input in accordance with ISO 3046 - 100% (± 5%)	A	kW	4577
Energy input in accordance with ISO 3046 - 75% (± 5%)	A	kW	3517
Energy input in accordance with ISO 3046 - 50% (± 5%)	A	kW	2486
Lube oil consumption	R	dm ³ /h	0.68

5. COMBUSTION AIR / EXHAUST GAS

Combustion air volume flow – 100% CP – at Reference heating value		m ³ n/h	7594
Combustion air volume flow – 75% CP – at Reference heating value		m ³ n/h	5716
Combustion air volume flow – 50% CP – at Reference heating value		m ³ n/h	3922
Combustion air mass flow - 100% CP – at Reference heating value		kg/h	9807
Combustion air mass flow - 75% CP – at Reference heating value		kg/h	7382
Combustion air mass flow - 50% CP – at Reference heating value		kg/h	5065
Reference heating value fuel for combustion air		kWh/m ³ n	10.10
Exhaust volume flow, wet - 100 % CP		m ³ n/h	7848
Exhaust volume flow, wet - 75 % CP		m ³ n/h	5912
Exhaust volume flow, wet - 50 % CP		m ³ n/h	4062
Exhaust volume flow, dry - 100 % CP		m ³ n/h	7243
Exhaust volume flow, dry - 75 % CP		m ³ n/h	5448
Exhaust volume flow, dry - 50 % CP		m ³ n/h	3732
Exhaust mass flow, wet - 100 % CP		kg/h	10144
Exhaust mass flow, wet - 75 % CP		kg/h	7641
Exhaust mass flow, wet - 50 % CP		kg/h	5249
Exhaust temperature after turbocharger - 100 % CP		°C	472
Exhaust temperature after turbocharger - 75 % CP		°C	497
Exhaust temperature after turbocharger - 50 % CP		°C	529

6. GENERAL CONDITIONS AND FUELS

Relative air humidity	A	%	60
Intake air temperature	A	°C	35
Site altitude above sea level	A	m	100
Barometric pressure	A	mbar	1000
Gas type: natural gas		-	X
Gas type: biogas		-	-
Methane number (MN), min.	L	-	80
Gas type: Sewage gas		-	-

Gas type: Landfill gas		-	-
Range of heating value: design min.	L	kWh/m ³ n	10.0
Range of heating value: design max.	L	kWh/m ³ n	10.5
Range of heating value: operation range min.	L	kWh/m ³ n	8.0
Range of heating value: operation range max.	L	kWh/m ³ n	11.0

7. EXHAUST EMISSIONS

Nitrogen oxides (NO _x), emissions (dry, referred to reference value residual oxygen)	L	mg/m ³ n	500
Carbon monoxide (CO) Emission (dry, referred to reference value residual oxygen)	L	mg/m ³ n	1000
Reference value residual Oxygen	A	%	5

8. OTTO GAS ENGINE

Engine type		-	20V4000L32
Engine rated speed	A	rpm	1500
Number of cylinders		-	20
Cylinder configuration: V angle		degrees (°)	90
Cylinder configuration: in-line vertical		-	-
Bore		mm	170
Stroke		mm	210
Displacement, total		liter	95.3
Compression ratio		-	12.1
Mean piston speed		m/s	10.5
Mean effective pressure (MEP) (at peak torque engine speed)		bar	16.8
Exhaust back pressure, min.	L	mbar	30
Exhaust back pressure, max.	L	mbar	60

9. GEARBOX

Transmission ratio		-	-
Geabox heat output (water cooled)		kW	-
Efficiency – 100% CL		-	-
Efficiency – 75% CL		-	-
Efficiency – 50% CL		-	-

10. GENERATOR

Manufacturer		-	CU
Type		-	LVSI804S2Wdg12
Rating power (temperature rise class F)		kVA	2560
Temperature rise class		-	F
Insulation class		-	H
Winding pitch		-	2/3
Protection		-	IP 23
Max. admissible cos φ inductive (overexcited)	L	-	0.80
Max. admissible cos φ capacitive (underexcited)	L	-	1.00
Voltage tolerance		%	+/- 5
Frequency tolerance		%	+/- 5
Alternator specification		-	93231006264

11. COOLANT SYSTEM ENGINE (HIGH-TEMPERATURE CIRCUIT)

Cooling water temperature, inlet	A	°C	78
Cooling water temperature, outlet	A	°C	90
Cooling equipment: coolant flow rate	A	m ³ /h	80.4
Coolant pressure after engine, max. (based on P _{max} = 1.5 bar before coolant pump)	L	bar	2.23

Flow coefficient value (CV value)	A	m ³ /h	54.7
Pressure in cooling system, max.	L	bar	6.0

12. COOLANT SYSTEM (MIDDLE-TEMPERATURE CIRCUIT)

Mixture cooler, 1. stage water inlet temperature	A	°C	-
Intercooler 1nd stage: Water temperature (outlet)	A	°C	-
Intercooler 1nd stage: Coolant volumetric flow	A	m ³ /h	-
Intercooler 1nd stage: Coolant volumetric flow, min	L	m ³ /h	-
Intercooler 1nd stage: Pressure drop	A	bar	-
Intercooler 1nd stage: Flow coefficient value (CV value)	A	m ³ /h	-
Intercooler 1nd stage: Operation pressure, min	L	bar	-
Intercooler 1nd stage: Operation pressure, max (outlet)	L	bar	-

13. COOLANT SYSTEM (LOW-TEMPERATURE CIRCUIT)

Mixture cooler, 2. stage water inlet temperature	A	°C	53
Intercooler 2nd stage: Water temperature (outlet)	A	°C	55.1
Intercooler 2nd stage: Coolant volumetric flow	A	m ³ /h	34.3
Intercooler 2nd stage: Pressure drop	A	bar	0.60
Intercooler 2nd stage: Flow coefficient value (CV value)	A	m ³ /h	45.3
Intercooler 2nd stage: Operation pressure, max (outlet)	L	bar	6.0

14. EXHAUST GAS HEAT EXCHANGER

Exhaust gas heat exchanger: Cooling water temperature (inlet)		°C	-
Exhaust gas heat exchanger: Cooling water temperature (outlet)		°C	-
Exhaust gas heat exchanger: Coolant volumetric flow		m ³ /h	-
Exhaust gas heat exchanger: Coolant volumetric flow, min	L	m ³ /h	-
Exhaust gas heat exchanger: Pressure drop	A	bar	-
Exhaust gas heat exchanger: Flow coefficient value (CV value)	A	m ³ /h	-
Exhaust gas heat exchanger: Operation pressure, min	L	bar	-
Exhaust gas heat exchanger: Operation pressure, max.	L	bar	-
Exhaust gas temperature downstream of exhaust heat exchanger – 100% CP		°C	-

15. HEATING CIRCUIT INTERFACE

Heating circuit: engine coolant temperature, inlet	A	°C	-
Heating circuit: engine coolant temperature, outlet	A	°C	-
Heating water temperature, return	A	°C	-
Heating water temperature, feed side	A	°C	-
Heating water flow rate		m ³ /h	-
Heating circuit: Pressure Drop	A	bar	-
Heating circuit: Flow coefficient value (CV value)	A	m ³ /h	-
Heating circuit: Max. operation gauge pressure (heating water)	L	bar	-

16. ROOM VENTILATION

Room ventilation: Genset ventilation heat – 100% CL		kW	113
Room ventilation: Combustion air temperature	A	°C	35
Room ventilation: Combustion air temperature, min.	L	°C	30
Room ventilation: Combustion air temperature, max.	L	°C	40
Engine room temperature, min.	L	°C	15
Engine room: Temperature difference ventilation air (inlet/outlet),	L	K	20

max.			
Supply air volume flow rate (combustion+ventilation), max.	L	m ³ /h	23500
17. STARTING (ELECTRIC)			
Starter, rated voltage (standard design)	R	V=	24
Starter, rated power (standard design)	R	kW	18
18. CAPACITIES			
Engine coolant (without external cooling system)	R	liter	310
On-engine cooling water capacity, mixture-cooler side (without cooling equipment)	R	liter	23
Engine oil capacity, initial filling (standard oil system)	R	liter	350
Gear oil filling capacity	R	liter	-
Heating water filling capacity	R	liter	-
19. GAS TRAIN			
Gas train - normal size		DN	100
Gas pressure at inlet of gas train, min	L	mbar	180
Gas pressure at inlet of gas train, max.	L	mbar	250
20. ACOUSTICS			
Engine sound level – 63 Hz (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB	84.6
Engine sound level – 125 Hz (free-field sound-pressure level Lp, 1m distance,ISO 6798)	R	dB	91.9
Engine sound level – 250 Hz (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB	88.9
Engine sound level – 500 Hz (free-field sound-pressure level Lp, 1m distance, ISO 8528-10)	R	dB	92.4
Engine sound level – 1000 Hz (free-field sound-pressure level Lp, 1m distance, ISO 8528-10)	R	dB	92.9
Engine sound level – 2000 Hz (free-field sound-pressure level Lp, 1m distance, ISO 8528-10)	R	dB	89.8
Engine sound level – 4000 Hz (free-field sound-pressure level Lp, 1m distance, ISO 8528-10)	R	dB	84.6
Engine sound level – 8000 Hz (free-field sound-pressure level Lp, 1m distance, ISO 8528-10)	R	dB	92.9
Sum of pressure levels	R	dB	99.8
Sum of pressure levels	R	dB(A)	98.1
Sound power level	R	dB(A)	118.0
Undampened exhaust noise – 63 Hz (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB	109.0
Undampened exhaust noise – 125 Hz (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB	110.2
Undampened exhaust noise – 250 Hz (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB	104.2
Undampened exhaust noise – 500 Hz (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB	98.1
Undampened exhaust noise – 1000 Hz (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB	92.5
Undampened exhaust noise – 2000 Hz (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB	89.1
Undampened exhaust noise – 4000 Hz (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB	84.6
Undampened exhaust noise – 8000 Hz (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB	72.3

Sum of pressure Levels exhaust noise	R	dB	113.5
Sum of pressure Levels exhaust noise	R	dB(A)	101.1
Sound power Level exhaust noise	R	dB(A)	113.1

21. MASSES / DIMENSIONS

Plant length (with standard accessories)	R	mm	5900
Plant width (with standard accessories)	R	mm	2000
Plant height (with standard accessories)	R	mm	2400
System dry mass (with Standard accessories)	R	kg	18000
System mass, wet, (with standard accessories)	R	kg	18700
Length heat recovery unit	R	mm	-
Width heat recovery unit	R	mm	-
Height heat recovery unit	R	mm	-
Gross mass (dry mass) heat recovery unit	R	kg	-
Gross mass (wet mass) heat recovery unit	R	kg	-

* = contract value, L = limit value, G = guaranteed value, R = guideline value