CHP Technical Data Sheet for

Quanto D1200 Natural Gas Indoor Canopy

Quanto Series

Power Therm

Standard Features

- High performance electrical efficiency
- Fully modulating output
- 3 packages – Open frame, Indoor Canopy, Outdoor Container
- Sophisticated web remote monitoring
- Digital engine management
- Long service intervals
- 27 month warranty
- Standby power options
- Low noise options

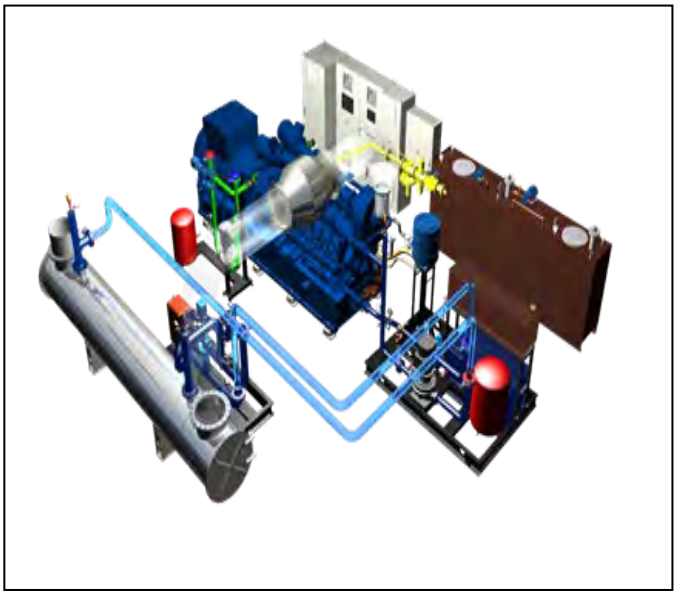
The Quanto series benefits from having MWM's high performance gas engines. Available to run on a variety of gas fuels. Multiple units can be run in synch, and high-end digital controllers make synchronising with the mains simple.

ELECTRICITY OUTPUT	THERMAL OUTPUT	ELECTRIC EFFICIENCY	THERMAL EFFICIENCY	TOTAL EFFICIENCY
1200kWE	1245kWt	42.6%	44.2%	86.8%

shenton**group** has the exclusive distributorship for Tedom products in the UK, Ireland and Channel Islands.

We provide dedicated services for CHP projects, ranging from design assistance, through project management, to commissioning and long-life support.

Tedom is a global CHP manufacturer with 600 employees. There are over 2,000 Tedom CHP units in service in over 35 countries worldwide.



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TEDOM

Quanto 1200, Natural Gas, Indoor Canopy

Basic Technical Data

nominal electrical output			1200	kW
maximum heat output[1)]			1245	kW

load	50	75	100	%
maximum heat output	731	991	1245	kW
fuel input	1529	2175	2818	kW
electrical efficiency	39.2	41.4	42.6	%
heat efficiency	47.8	45.6	44.2	%
total efficiency (fuel utilization)	87.0	87.0	86.8	%
gas consumption	162	230	298	m^3/hr

	EKO[2)]	PE/I[3)]	
nominal electrical output	1200	1484[4)]	kW/kVA
maximum heat output	1428	1355	kW
fuel input	2818	2818	kW
electrical efficiency	42.6	42.1	%
heat efficiency	50.7	48.1	%
total efficiency (fuel utilization)	93.3	90.2	%
fuel consumption at 100% output	298	298	m^3/hr

The Basic Technical Data are applicable for the standard conditions pursuant to the "Technical instructions" document.
The minimum permanent electrical output must not drop below 50 % of the nominal output.
Gas consumption is expressed under the invoicing conditions (15°C, 101.325 kPa).
Gas consumption tolerance, or fuel input tolerance, at 100% load is +5%.
Tolerances of other parameters are mentioned in "Technical Instructions-Validity of Technical Data" document.
1) Maximum heat output is a sum of heat outputs of secondary circuit with exhaust gas cooled to 120°C and aftercooler circuit
2) Technical parameters of CHP unit with economizer (an option). Heat output indicated is based on inlet water temperature 70°C into additional exhaust gas exchanger and with exhaust gas coled to 85°C.
3) Technical parameters of CHP unit for emergency / island mode (an option).
4) It is non-overload able output for cos φ = 0,8.

Emissions

emissions [1)]	NOx	CO	
with 5% of O_2 in exhaust gases	250	300	mg/Nm^3

1) Indicated emission values of NOx are possible to decrease below 100mg/Nm^3 (option).

Generator

type	MJB 500 MB4	
producer	MARELLI	
cos φ	0.8/1.0	
efficiency in the working point	96.2/97.0	%
voltage	400	V
frequency	50	Hz

Engine

type	TCG 2020 V12	
producer	MWM	
number of cylinders	12	
arrangement of cylinders	V	
bore × stroke	170/195	mm
displacement	53	dm^3
compression ratio	13.0 : 1	
speed	1500	rpm
nominal oil consumption	0.2	g/kWh
max. engine output	1232	kW

TCG2020V12 250NOx 400V natural gas250NOx; 26.01.2018

Thermal System

Secondary Circuit

heat carrier	water	
circuit's heat output	1245	kW
nominal water temperature, input / output	70/90	°C
return water temperature, min / max	40/70	°C
nominal flow rate	894	l/min
max. working pressure	600	kPa
min. pressure in system	100	kPa
water volume in CHP unit circuit[1)]	1310	dm^3
pressure loss at the nominal flow rate[1)]	90	kPa
nominal temperature drop	20	°C

1) total value (engine-generator in sound enclosure and exhaust gas module without connecting pipeline)

Utilization of exhaust gas output for other purposes

heat output of exhaust gases (cooling to 120°C)	613	kW
exhaust gas temperature	415	°C

Primary Circuit

heat carrier	water + ethylene glycol	
ethylene glycol's concentration	35	%
circuit's heat output	632	kW
max. working pressure	300	kPa
water volume in CHP unit circuit	250	dm^3

Aftercooler Circuit

heat carrier	water + ethylene glycol	
ethylene glycol's concentration	35	%
circuit's heat output	110	kW
coolant temperature (outlet from CHP unit – informative)	43.0	°C
coolant temperature (inlet into CHP unit) max	40.0	°C
nominal flow rate	582	l/min
pressure reserve at the nominal flow rate [1)]	70	kPa
highest allowed maximal hydrostatic height of system	10	m
maximal connect-able volume of system outside the module of CHP unit [3)]	175	dm^3
max. working pressure	300	kPa
min. working pressure	50	kPa
water volume in CHP unit circuit	50	dm^3

1) pressure reserve of internal part for covering pressure losses of external parts of circuit (interconnection pipeline and dry cooler)
2) if connected volume overstep mentioned value, it is necessary to install into system additional expansion vessel

Fuel, Gas Inlet

low heat value	34	MJ/m^3
min. methane number	80	
gas pressure	8 - 15	kPa
max. pressure change under varying consumption	10	%
max. gas temperature	35	°C

Combustion and Ventilation Air

unused heat removed by the ventilation air	76	kW
air temperature at the ventilation inlet min / max	20 - 35	°C
air temperature at the ventilation recommended	25	°C
amount of combustion air	5165	Nm^3/hr
max. amount of ventilation air at the outlet flange	28700	m^3/hr
max. air temperature at the outlet flange	50	°C
max. counter-pressure on flanges of ventilation air [1)]	120	Pa

1) total sum of pressure losses of connected ventilation pipeline without necessity of using additional fun

Exhaust Gas and Condensate Outlet

amount of exhaust gases	5335	Nm^3/hr
exhaust gas temperature between engine-generator set and exhaust exchanger nominal / max	415/550	°C
exhaust gas temperature, nominal / max	120/150	°C
permissible pressure loss of the interconnecting and following exhaust piping	10	mbar
speed of exhaust gases at the outlet (DN 500)	17	m/s

Lubricant Charges

amount of lubrication oil in the engine	205	dm^3
volume of engine additional oil tank	510	dm^3
replenishment oil tank volume	350	dm^3

Noise Parameters

version	standard	option[1)]	
sound enclosure of CHP unit at 1m	80		dB(A)
ventilation inlet and outlet at 1m from the silencer	80	65	dB(A)
exhaust gas outlet at 1m from the silencer flange	80	60	dB(A)

1) noise parameters can be reduced by optimizing components to the required acoustic pressure level

Electrical Parameters

nominal voltage	230/400	V
nominal frequency	50	Hz
power factor[1)]	0.87	
nominal current at cos φ=0.8	2000	A
generator circuit breaker	NW25 H1 3P	
short-circuit resistance of switchboard R1	40	kA
short-circuit resistance of switchboards R2, R3, R4 and R5	10	kA
contribution of the actual source to the short-circuit current	< 20	kA
protection of power switchboard R1 closed/open	IP 31/00	
protection of control switchboard R2 closed/open	IP 31/00	
protection of frequency changers' switchboard R3 closed/open	IP 31/00	
protection of engine switchboard R4 closed/open	IP 31/00	
protection of cooling switchboard R5 closed/open	IP 66/00	
recommended superior protection	2250	A
recommended connection cable [2)] (l< 50m, at t<35°C)	5×NYY (3×240+120)	

1) Power factor adjustable from 0,87C ÷ 1 ÷ 0,87 (range from 0.87C ÷ 1 must be verified according to the various types of generators).
L = inductive load - overexcited
C = capacitive load - underexcited
Operation of the generator with a power factor of less than 0.95 causes a power limitation sets the following table:

power factor [-]	1	0.95	0,87
output [% Pnom]	100	100	99

2) The stated cables are for information only. A check calculation for temperature rise and voltage drop must be made according to the actual length, placement and type of the cable (maximum allowed voltage drop is 10 V)

Colour Version

engine and generator	RAL 5010 (blue)
base frame	RAL 9017 (black)
sound enclosure	RAL 5013 (blue)

Unit Dimensions and Weights

	Engine generator set	Exhaust gas module	
length	7100	5600	mm
width	2500	1300	mm
height	4010	2680	mm
service weight	19620	4210	kg

Ventilation silencer		
length	1580	mm
width	1580	mm
height	2500	mm
service weight	1100	kg

Exhaust silencer		
length	4800	mm
diameter	ø 900	mm
installation position	horizontal	mm
service weight	1000	kg

Switchboards	height [mm]	width [mm]	depth [mm]
R1	2100	800/1000	800/1000
R2	2100	1600	400
R3[(1)]	2100	600-1200	500
R4[(2)]	1200	800	300
R5[(3)]	430-1060	330-855	200-350
overall service weight		900 kg	

1) Dimensions depend on direction of power outlets:
Passing through switchboard = 2100x800x800 mm
One direction = 2100x800x1000 mm
Width of switchboard R1 may be extended in special cases.
2) Switchboard's width depends on size of frequency changers.
3) Switchboard's height depends on MWM. Standard is 1200 mm.
4) Switchboard's dimension depends on number of dry coolers' fans.

Caution

Manufacturer reserves the right to alter this document and the linked source materials.

General Description of CHP Unit

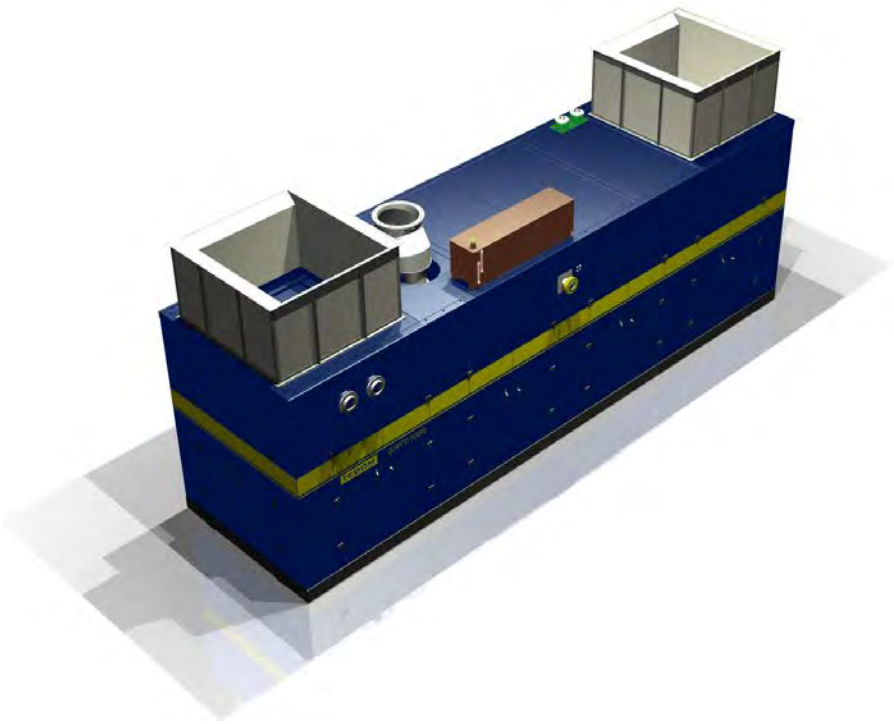
The Quanto D series TEDOM Combined Heat and Power Generation Units (hereinafter CHP units) are the high-performance machines within a range from 400 to 2000kWel, in which industrial engines of renowned producers are used. The block arrangement of these units contains the motor-generator set, heat installation and control system securing all operational and safety functions. CHP unit's heat system is formed by engine-generator set, placed on basic frame and equipped with sound enclosure, and exhaust gas module. The loose delivery includes exhaust silencer, gas train and free-standing electric switchboards. CHP units are equipped with the synchronous generators. CHP unit is intended to be operated on the gas fuels. CHP unit is in sound enclosure version, which is intended for installation into the housed machine room. You will find specific parameters of individual Quanto D400 to D2000 output series CHP units in relevant Datasheets.

version	sound enclosure
power series	Quanto: D400, D600, D800, D1200, D1600, D2000
fuel	natural gas, biogas

Advantages of TEDOM CHP unit

- automatic air-fuel ratio control – the way to cut down emissions belongs to the standard equipment of CHP unit
- CHP unit forms an easily attachable compact whole
- CHP unit shows low noise level by using the sound enclosure
- possibility to adapt to various temperature drops of the heating systems
- owing to the modular arrangement of the control system, the number of binary and analogue inputs to monitor and control the follow-up plants can be extended easily
- the basic signals for the CHP unit control (external emergency stop, external activation) can be connected to the customer's terminal box
- TEDOM CHP units are unceasingly innovated on the basis of the knowledge from the already realized job orders

As enacted by the Notified Body 1015*, the " E-30-01001-10“ Certificate was issued to confirm the compliance of the Quanto series products with the requirements of Directive 2009/142/EC (Government Decree No. 22/2003 Coll.). TEDOM is also the holder of the QMS and EMS Quality Management Certificates. On the basis of the tests performed on the control switchboard, the Electro-technical Testing Institute, Certification Body No. 3018, accredited by the Czech Accreditation Institute, Public Service Company, granted Certificate according to ČSN EN 45011. Among others, the product is certified for EAC states and Ukraine.
** Machinery Testing Institute in Brno*



Illustrative picture

Thermal System

In terms of the heat output extraction, the CHP unit's heat system is formed by secondary and aftercooler circuit. The maximum heat output of the unit is a sum of the heat outputs of both circuits when they are utilized to their full capacity.

Secondary circuit

It represents a circuit which is used to deliver the main heat output of CHP unit to the heating system. Secondary circuit transfers heat output from primary circuit's plate exchanger and from exhaust gas exchanger. Observance of the maximum permissible return water temperature is an absolute prerequisite for the CHP unit to operate flawlessly. The circuit is not equipped with circulating pump. Circuit is equipped with three-way valve with actuator (including control) for achievement temperature stabilization of water returning into secondary circuit. Components of secondary circuit are fitted on engine-generator set in sound enclosure and also on exhaust gas module. During CHP unit installation, pipe connection of them has to be performed.

If it is not possible to remove heat output of circuit, heat output of circuit is led out by cooling unit for emergency cooling, which can be delivered.

The heating water to charge the hydraulic circuits must be treated; its composition must correspond to the "Technical instructions".

Primary circuit

It represents inner enclosed pressure circuit that takes off the heat from engine jacket water to pass it into the secondary circuit.

Aftercooler circuit

It represents the filling mixture cooling circuit. The utilization level of the heat power from this circuit and its cooling both influences immediately the attainment of the basic technical data. The circuit is equipped with expansion vessel, pressure relief valve, three-way valve and circulating pump.

The aftercooler circuit's heat power can be used in the low-temperature circuits (hot service water pre-heating, heating of water in swimming pools or other engineering units). If this heat cannot be utilized if the attainment of permanent rated electrical output is required, it must be wasted in the outer dry cooler (water-air heat exchanger). This dry cooler can be supplied individually.

Fuel, Gas Inlet

T CHP units can be operated on natural gas, biogas, landfill gas (the fuels can be further modified as agreed upon with the Technical Office. The limit parameters of biogas and other fuels that limit their fitness for use are given in the "Technical instructions" document. The CHP unit's gas train is constructed in conformity with TPG 811 01 and it contains a ball valve, gas filter, set of two independent quick-acting electromagnetic valves with de-aeration of spacer to shut off the gas inlet when the CHP unit is turned off.
This set is loose-delivered with engine-generator set (intended for installation into gas train). Internal part of gas train, in engine-generator set, contains the gas pressure zero governor and expansion joint for connection to mixer. Gas fixture of suitable size with adequate accumulation volume is required for the correct operation of CHP unit to avoid gas pressure drop in the distribution system at the moment of incremental gas offtake. The gas fixture will be terminated with a manual gas stop and fitted with a pressure gauge. Then, it is necessary to connect outlet of electromagnetic valves spacer de-aeration with de-aeration pipeline of machine room.

Combustion and Ventilation Air

Non-usable heat (radiated from hot parts of the CHP unit) is removed from unit by ventilation air, which enters and leaves the unit by ventilation holes on the sound enclosure roof. It is possible to connect ventilation pipeline on flanges. Flow of ventilation air is secured by fans on the roof of sound enclosure. Inlet and outlet ventilation silencer is included in loose-delivery for installation in ventilation system of machine room.

Exhaust Gas and Condensate Outlet

Exhaust gas outlet from engine-generator set is ended by flange. This flange has to be connected by pipe system with exhaust gas module. Exhaust gas module is formed by frame construction, on which catalytic converter, exhaust gas exchanger and three-way valve of secondary circuit is placed.
An exhaust silencer has to be installed into exhaust gas line after the module. From exhaust silencer exhaust gas are led into chimney.
Material of the exhaust piping and heat insulation of piping between engine-generator and exhaust gas module must be resistant up to temperatures 700°C, between the module and chimney up do 200°C. During unit start, or at low temperature of inlet water into CHP unit, condensate rises in exhaust gas line (behind exhaust gas exchanger). It has to be led. Condensate is suitable to be led out through condensate separator (possible to deliver with CHP unit). Elimination of condensate is necessary to negotiate with manager of canalization in local installation.

Noise Parameters

Noise parameters indicate the acoustic pressure level measured in a free acoustic field. The measuring point determination and the evaluation method both comply with ČSN 09 0862, ČSN EN ISO 3746. The noise may contain a tone component.

Power Switchboard

Electrical part of CHP unit is placed in three separate iron-plate switchboard cabinets (R1, R2 and R3), in switchboard of engine control (R4) and in switchboard of cooling (R5) if needed

Switchboard K01, K02 (HV) contains:

- generator circuit breaker, which protects generator and part of power line against over-current and works like contacting component for synchronizing generator to mains.
- current measuring transformers
- voltage measuring transformers
- electrometers are fitted here if required

Switchboard R2 (control) contains:

- central part of control system, eventually extension modules
- control panel of TEM-EVO engine control system and extension I/O modules
- protecting and switching components
- controlling components for maintenance purposes
- power supply 24VDC
- terminals for connecting of analogous sensors, binary switches, controlled devices, remote communication etc.
- X4 customer terminal

Switchboard R3 contains:

- frequency changers based on needs (aftercooler circuit fans, emergency cooling fans)

Switchboard R4 contains:

- engine control system TEM-EVO

Switchboard R5 contains:

- controlling and starting components for aftercooler and emergency cooling fans

Control system

Control of the unit provides control system ProCon Sight, which allows fully automated operation. It is multiprocessor modular system, consisting from control unit, display unit and extension modules with analogous and binary inputs and outputs.

Display unit

Thanks to colour display with high resolution, context and navigation buttons provides this display unit easy accessibility of all data about gen-set, measured values and time trends of these values. ProCon Sight display unit can contain up to seven languages, one of them can be graphical (e.g. Chinese, Korean).

Main features of display unit:

- large 8“ colour TFT display with resolution of 800 x 600 pixels
- simpler, faster and more intuitive control by context buttons
- continuous display of status bar
- TRENDS monitoring screen of selected values - diagrams
- clear history display
- Windows CE operating system

Display unit of TEM EVO control system

Main features of display unit:

- large 15" colour TFT display
- simpler, faster and more intuitive control by context buttons
- continuous display of status bar
- TRENDS monitoring screen of selected values - diagrams

Measured values

Control system measures and evaluates following values.

Electrical values:

- 3×generator voltage
- 3×generator current
- 3×mains voltage

Listed electrical values are used for:

- mains parameters evaluating
- automatic synchronization of generator to mains
- calculations and evaluation of needed electrical values

Technological values:

CHP unit is equipped with set of analogous and binary sensors for monitoring of all needed processes to optimize them. Optimization is performed by appropriate self-consumption outputs.

Ways of control

Local:

- by buttons located on control system or on display unit

Remote (at request):

- by voltage-free contacts (external timer, superior control system etc.)
- according object consumption level or to requested power level
- from local or remote PC
- via SMS messaging

Regulation according to object consumption (at request):

- information about object consumption is provided to controller by power transducer, which evaluates direction and quantity of import /export from/to mains

Regulation to required power (at request):

- by analogous signal – e.g. 0/4÷20mA
- via data communication – e.g. protocol MODBUS-RTU

Gen-set operation monitoring

From local PC – connection possibilities:

- RS232
- RS485
- USB

From remote PC – connection possibilities:

- analogous modem
- GSM modem
- internet

Via SMS messaging

Linked Source Materials

- Datasheet
- dimensional drawing
- diagram
- offered accessories for CHP unit at request (options)
- generally binding source materials according to the "Technical instructions" document

Caution

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