



BB12000-FA Fully Automated Biodiesel Processor

The fully automated BB12000-FA processor delivers 12,000L per day of high quality biodiesel that meet ATSM D6751 and EN14214 specifications.

Process description

When the unit is turned on the PLC asks the number of reactions and the methoxide quantity wanted. These data are important because values can change with the feedstock type and quality.

After data introduction, the unit fills in 1000 Litre of oil and heats it up to the 60°C in the transesterification reactor. Then, in a completely automatic process, methoxide is added to the oil in a stochiometric proportion. The methoxide quantity is controlled by the according to the initial data introduced by the operator.

With the oil heated and the methoxide inside the processor, the transesterification process will take place during one hour under strong agitation by means of a triple mixing system incorporated in the processor. When the transesterification time is over the quality biodiesel and glycerine are discharged to the separator unit (not included).

In case of damage or fail feedstock shortage, the processor stops all operations and shows a message on the PLC display with the specific type of error.

For safety reasons, all the process steps are automated and run in inert atmosphere. Please mind that nitrogen / argon line must be connected to the BB12000IL-FA unit.



BB12000-FA

BB12000-FA specifications:

- Automatic feedstock fills;
- Automatic heating
- Automatic methoxide fills;
- Automatic transesterification;
- Automatic discharge;
- Reactions number regulation;
- Operating time regulation;
- PLC synchronized system;
- Automatic process restart;
- Independent control panel;
- Electric power: 22,000W,
- All ATEX Explosion Proof certified electric components;
- Double wall insulated transesterification reactor;
- Transesterification reactor builds in high quality SS304
- All parts in contact with methoxide and methylate are built in quality SS316
- Built confirm CE regulations;
- Electronic and mechanical safety systems that prevents operating fails;
- Batch reaction process;
- Skid mounted unit;
- All components are standard and easily replaceable;
- Turn-key plant – No assembling needed.

Production:

BB12000-FA – products	
Products	
Biodiesel	1000 Litres
Glycerine with methanol per batch	230 Litres

NOTICE: These values can change with type and quality of feedstock.

Feedstock:

BB12000-FA – feedstock consumption	
Oil per batch	1000 Litres
Methanol per batch	230 Litres
NaOH per batch	3500g – 6500g Litres (depending on titration)
Nitrogen per batch	1500 Litres
Air per batch	15 m ³

NOTICE: Max. values. These values can change with type and quantity of feedstock.



BB12000-FA

Efficiency:

BB12000-FA - efficiency	
Biodiesel per batch	1000 Litres
Oil heating (20°C to 60°C)	50 minutes
Reaction time per batch	60 minutes
Fill time	5 minutes
Discharge time	5 minutes
Total time	120 minutes

Energy consumption:

BB12000-FA – energy	Values per 1000L of produced biodiesel
Electric power	
Oil admission	75W
Methanol and methylate admission	20W
Heating (20°C – 60°C)	17900W (heaters + recirculation pump)
Reaction	1100W
Command unit and electrovalves	105W
Total electric consumption	19200W
Advised electric power	22KW

Equipment description

-> Transesterification reactor

The transesterification reactor has an advanced mixing system and PLC controlled temperature, pressure, feed, discharge and transesterification operations. All components are standard and easily replaceable. Built according CE and ATEX standards to industrial and ambient safety, all pumps and sensors have ATEX certification.



BB12000-FA

Transesterification reactor specifications:

Equipment	Specification	Material
High performance transesterification reactor	Cylindrical vertical 1500L vessel Insulated double wall High performance mixing system.	Stainless steel 304
Centrifugal pumps	Flow: 300 Litre per minute Electric power: 1,1KW ATEX certified	Body: AISI 316L Impeller: AISI 316
Electric heaters	Electric power: 18000 Watt ATEX certified	Heating element: AISI 304 Wetted parts: AISI 304 External body: Aluminium
Pressure safety valves	Type: pressure relief valve	Body: AISI 316 Seal: PTFE
Vacuum safety valves	Type: vacuum relief valve	Body: AISI 316 Seal: PTFE
Security manual valves	Type: ball valve G1½", G1, G½	Body: AISI 316 Seal: PTFE
Pneumatic actuated valves	Type: angular G1½", G1, G½ Action de 2 ways	AISI 316 Vedante: PTFE
High performance level transmitters	Type: vibrating fork ATEX certified	External parts: Aluminium Wetted parts: PTFE
High performance pressure transmitters	Type: 0 – 4 bar Power: 24V DC, M12 connector ATEX certified	Body: AISI 316S Inlet: AISI 316
High performance temperature transmitters	Type PT 100 ATEX certified	Body: AISI320 Cable: silicone
Analogical pressure gauge	Type: 0 - 5 bar	Body: AISI 316 Inlet: AISI 316
Analogical temperature gauge	Type: 0 – 150°C	Body: AISI 316 Horn: AISI 316
Methylate tubing	All 316 stainless steel construction	
Methoxide tubing	All 316 stainless steel construction	
Biodiesel tubing	All 304 stainless steel construction	

-> Methoxide reactor:

Methoxide reactor and associated tubing are all stainless steel 316 made to prevent any type of chemical effect. The solid catalyst solution is guaranteed by the explosion proof pneumatic double diaphragm pump, all sensors have ATEX certification and the valves are pneumatic actuated.



Methoxide reactor specifications:

Equipment	Specification	Material
High performance methoxide reactor	Cylindrical vertical 1300L vessel High performance mixing system.	AISI 316
Mixing pump	Type: pneumatic double diaphragm Flow: 60 L/min Work pressure: 1,35 bar Air consumption: 14 m3/hr	Body: PP Wetted: PP Elastomers: PTFE Valves: PTFE
Pressure safety valves	Type: pressure relief valve	Body: AISI 316 Seal: PTFE
Vacuum safety valves	Type: vacuum relief valve	Body: AISI 316 Seal: PTFE
Security manual valves	Type: ball valve G1½", G1, G½	Body: AISI 316 Seal: PTFE
Pneumatic actuated valves	Type: angular G1, G½ Action: 2 ways	Body: AISI 316 Seal: PTFE
Control level sensors	Type: vibrating fork ATEX certified	Non wetted parts: Aluminum Wetted parts: AISI 316
Analogical pressure gauge	Type: 0 - 5 bar	Body: AISI 316 Inlet: AISI 316

-> Command unit

The command unit controls all the BB12000-FA operations, allowing the production sequence, methoxide concentration, number of reactions and operating time. The watch dog provided software enhance operation extra security level and processor lifetime.

Command unit specifications:

- Control of all streams;
- Heating control;
- Pressure control
- Pneumatic valves control;
- Visual and sound alarms;
- Specific error messages;
- Continuous watch dog operations;
- Easy operating software;
- Stand alone unit;
- Components are standard and easily replaceable.



BB12000-FA

Command unit specifications:

Instrument	Specification
Industrial modular PLC	Type: 12 I / 8 O Platform Telemecanique Modibus
PLC module	Type: 16 O Platform Telemecanique Medebus
Alphanumeric display	Type: Modibus 232 RJ Operating status indications
Serial bus	Type: Modibus 232 RJ Platform Telemecanique
Solenoid electrovalves	Type: diaphragm cervo - assisted, 2/2 ways Connection: G3/4" Air flow: 8,3 m³/hora Actuation pressure: 0,5 – 10 bar Response time: 600 - 350 ms (open – close)
Electrovalves connectors	Type: industrial standard Certification: DIN 43650 B
Command relays	Electric tension 24V DC, mono-phase, three-phase
Signal transducers	Type: 0 – 10 Volt 4 – 20 mA
Control software	Type: specific control software Platform: Telemecanique
Unit connections	Signal and electric power connections Cables and plugs
Command panel	304 stainless steel skid mounted

The methanol and methylate storage must be done in a fresh and well-ventilated place and the storage tanks should have inert atmosphere system and drain retention vessels.

Biodiesel must be stored in constant temperature to avoid condensing. If that is not possible or if a long storage period is needed, provide a nitrogen or argon atmosphere.

Thank you for your time reading this paper,

BB-DIESEL

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