bioltec®
systems

Fuel Efficiency Management

Systems
for operating diesel engines with alternative fuels

Operating instructions **bioltec®** ultra-line, giant-line, vario-line

Safety instructions

It is essential to read all these operating instructions thoroughly before putting the **bioltec® systems** into operation.

The **bioltec® system** may only be installed by service centres authorized by the Licensor (**bioltec® quality partners**) and their specially trained employees, or by the Licensor itself. Make certain that installation of the **bioltec® system** in your vehicle is documented by a **bioltec® installation record** since this is essential in case of any warranty claims against the **bioltec® quality partner** or the Licensor itself.

Installation by persons not authorized for **bioltec® systems** or without filling in an installation record, and installation of parts not recognized by the Licensor, will render any warranty invalid. The same applies for repairs performed inexpertly or not using original spare parts. Please note the further information in the operating instructions and in the technical documentation of your vehicle.
The **bioltec® system** is intended exclusively for the operation of diesel engines and generator sets and may be used only with the stipulated type of electrical connection.

The **bioltec® system** is operated by your vehicle's power supply system. The power supply must therefore not be interrupted. This also applies to the operating/display console.

The **bioltec® system** is operated entirely via the operating/display console. Any tampering with one of the system components can lead to system failure resulting in permanent damage to your vehicle's engine or fuel injection system.

In manual **B100 mode** the engine can be operated with 100% alternative fuels even in unsuitable operating states. For this reason, operation of your vehicle in manual **B100 mode** is entirely at your own risk and to the exclusion of any warranty issued by the Licensor.
In an emergency the **bioltec® system** must therefore only be run in manual **mode diesel only**.

List of contents

You will find the following symbols in this manual:

Warning:
This warning alerts you of potential dangers to your vehicle.

! Action:
This message encourages you to take action.

Note:
This tip will provide advice or further information.

Congratulations on purchasing a **bioltec® system** for operating diesel engines with alternative fuels. The **bioltec® system** thus allows for economic and ecological optimization through efficient fuel management (Fuel Efficiency Management).

The concept:

The **bioltec® system** is based on a dual oil principle for load- and state-dependent use of diesel fuel and alternative fuels in hybrid operation. The system ensures that the engine is supplied with the optimum fuel for every operating situation.
In doing this, **bioltec®** does not intervene in the engine or existing electronics and control systems. Instead, the **bioltec®** system detects the operating state during vehicle operation - using suitable measured values - and adjusts the fuel supply individually to your engine according to its load state.
The microcomputer control system manages the fuel fully automatically. The detected operating data can be displayed on the operating console's digital display or read out via the **bioltec® Communicator** connected to the console or via the USB interface to the control unit. This ensures continuous monitoring and optimization of fuel consumption.

The components:

The **bioltec® system** consists of the following system components and modules:

1. Operating / display console
This is mounted in the driver's cab of the vehicle and is used for system operation and for the driver's information.

2. Control unit
The control unit is installed in the vicinity of the vehicle's central electric system. Only the authorized **bioltec®** service engineers of the quality partners carry out work on the control unit.

3. Fuel control module
This is integrated in the fuel supply and is usually mounted from behind on the rear wall of the driver's cab. It serves the processing of the fuels dependent on operating condition. You can also find the fuel filter of the **bioltec® system** there.

4. Cable set
It combines fuel control module, control unit, and operating display console and is used to power the **bioltec® system** via the vehicle electrical system.

5. Coarse filter stage (only **bioltec®-giantline** and **varioline range)**
It is used for pre-filtering and preheating of the alternative fuel and prevents dirt from entering the fuel control module.

6. Pre-feed module (only **bioltec®-ultimate plus** and **giant plus range)**
It has an additional electric fuel pump and a heated filter for alternative fuel.

7. Tank heating module (only with **bioltec®-varioline range)**
The tank heating module is integrated into the tank for alternative fuel. It warms up the alternative fuel in the tank.

8. Coax-flexible tubing system (only with **bioltec®-varioline range)**
It is used to heat the fuel lines and prevents the fuel with high pour point from solidifying in the lines.

Installation and operation:
The **bioltec® system** is handed over to the vehicle operator fully assembled, programmed with custom settings and accepted ready for operation and accepted by the latter (installation record).

The **bioltec® system** operates fully automatically in your vehicle. Control options and further instructions can be found in the following chapters.
In an emergency the **bioltec® system** must therefore only be run in manual diesel mode.

Automatic operation:
The **bioltec® system** operates fully automatically. The necessary system settings have been made by your **bioltec® quality partner** and/or the Licensor during installation. The automatic operation is the standard operation mode of the **bioltec®-system**.

The operating modes:
Apart from automatic operation (default operating mode) manual operation of the **bioltec® system** is also possible with one of the two fuels, i.e. manual **B100 operation** (100% alternative fuel supply) as well as manual **diesel operation** (100% diesel supply).

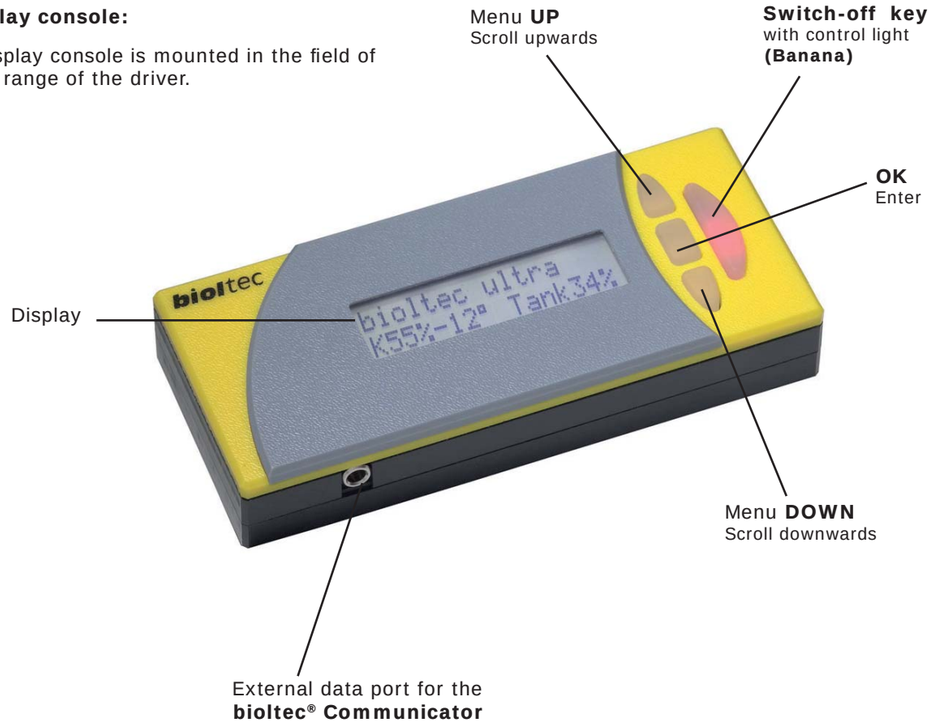
Some operating states of the engine are unsuitable for **B100 operation**. The possibility of engine damage can only be ruled out in manual **diesel operation**.
The operating console can display many system states and can be used to implement diagnostic and service functions.

Necessary operation - press key before switching off vehicle engine:
The only operation required in automatic mode is to press the switch-off key before shutting down the engine for longer periods. This feeds diesel fuel to the injection system, thereby ensuring that the engine starts with diesel fuel.

! Action:
Briefly press the **switch-off key (banana)** once before shutting down the engine.

Operating / display console:

The operating/display console is mounted in the field of vision and within range of the driver.



Display:

two-line, illuminated display, e.g.

```
bioltec systems
*happy motoring*
```

or

```
bioltec auto
 0%  5° tank93%
```

Switch-off key with control light (Banana):

- Press before shutting down the engine
- (green) B100 (alternative fuel)
- (orange) diesel
- (red) warning or manual operation

Menu UP (scroll upwards):

- Illuminated key
- Scrolls upwards in the menu

Menu DOWN (scroll downwards):

- Illuminated key
- Scrolls downwards in the menu

OK:

- Confirmation of the menu entry
- Select the operating state

External data port:

Connection for the **bioltec® Communicator** for acquisition and analysis of operating data (Fuel Efficiency Management) by the Licensor or a specially trained employee of an authorized **bioltec® quality partner**. Readout of the error memory.

Starting the vehicle:
Start the vehicle in the usual way. When you turn on the ignition the **bioltec® system** ultimate is automatically put into standby mode.

Self-test:
After turning on the ignition the **bioltec® system** reacts with the welcome message and information concerning the product range (Ultra, giant, vario...):

```
bioltec systems
*happy motoring*
```

The control unit now carries out a test of basic functions of the **bioltec® system**.

At the beginning of this automatic **self-test** the software versions of operating console and control unit are shown:

```
bioltec systems
BT 8.2   ST8.2
```

All keys light up red in standby mode. The system now waits for the engine to be started.

! Action:
Wait, with switched on ignition, until the **bioltec® system** has finished the **self-test** (approx. 4 sec). Start the engine only then.

When the engine starts up the **bioltec® system** starts controlling the fuel supply.

Status display:
After starting the engine the keys change colour from red to green and/or orange.
Indication of the status now appears in the display, e.g.:

```
bioltec auto
10%  25° tank35%
```

The operating mode is displayed in the first line, e.g. **bioltec auto**. The second line shows the operating data, i.e. the proportion of alternative fuels, e.g. 10% and the temperature, e.g. 25 of the fuel provided by the **bioltec® system** (flow temperature to injection system). The level of the additional tank is also displayed, e.g Tank 35%.

Tank display:
The original fuel gauge can still read in the cockpit and/or combination instrument. Make sure that the allocation of the fuel gauges is correct for your specific case (also see chapter **Filling the fuel tanks**).

For the **bioltec® system vario plus**, there are two tanks with alternative fuel. These are indicated in the display as tank A and tank B, alternating by 10 second intervals.

```
bioltec auto
10%  25° tankA35%
```

after 10 seconds:

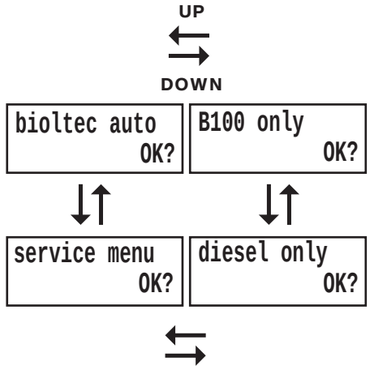
```
bioltec auto
10% 25° tankB95%
```


Automatic dual fuel operation:
The colour of the **switch-off** key shows the type of fuel being fed to the engine:
Green signifies alternative fuel
Orange signifies diesel

The percentage at the beginning of the second line merely shows the mixing ratio currently available for injection (0% signifies diesel only, 100% signifies alternative fuel only).

! Action:
Before you start a journey make sure that both tanks are adequately filled, especially that there is enough alternative fuel in the (larger) tank provided for this. Without sufficient alternative fuel stock, there must be a changeover to the more expensive **diesel operation**.

Navigation through the menu:
At the main menu level, you can see the following entries:



The **bioltec® system** runs in the last selected operating mode until you select another operating mode in the menu and confirm it with the **OK** key.
The new operating mode is not active until the associated operating data are displayed.

E.g. the **diesel only operating mode** is accessed via this sub-item of the main menu:

Then press **OK** key.

```
diesel only
          OK?
```

The operating mode appears:

```
diesel only
 3% 29° tank 70%
```

Diesel only mode is selected.

ⓘ Note:
The selected operating mode is not activated until the operating data is displayed in the status line. Press the **OK** key again to close a sub-menu and return to the main menu of the display and/or return to the menu. Use the **UP** and **DOWN** keys to navigate in the main menu to find the wanted operating mode and confirm with the **OK** key.

Automatic mode:
No operation at all is needed during vehicle operation. The **bioltec® system** operates fully automatically.

The system is designed for operating with the highest possible proportion of alternative fuel. Only when necessary is diesel added or the engine run on diesel only.

This is only the case when:

- The engine is cold
- The engine is running under a low load
- The alternative fuel feed pressure drops (Message: critical pressure)
- Too little alternative fuel is fed from the tank
- The alternative fuel filter is fouled
- The user has pressed the **switch-off** key **(Banana)**
- The user has selected manual diesel mode
- A fixed time (**latent time**) for **diesel operation** after restarting has been set
- the **self-test** has automatically arranged the change to a safe mode of operation (see chapter **Self-test and Diagnostic messages**)

The mixing ratio of alternative fuel and diesel is varied continuously and constantly adjusted to the requirements.

The automatic control reacts very sensitively and promptly to changes in the operating state, and continuously supports optimum engine operation.

Manual operation:
Manual operation is only permissible in an emergency. If the **bioltec® system** is operated manually and exclusively with alternative fuel this is expressly at the user's own risk and to the exclusion of any liability on the part of the Licensor, since the measured values are no longer taken into account and the **bioltec® system** can no longer match fuel type and fuel supply to the requirements of the engine.
Only manual diesel mode with 100% **diesel fuel** and no added alternative fuels is absolutely safe.

Warning:
Every selection of a manual mode of operation which does not allow the supply of diesel anymore is logged in the **bioltec®- error memory**.

The **bioltec® system** therefore only allows manual operation for exceptional situations.

All measured values and control functions for determining the operating state are ignored in manual mode. Manual operation with alternative fuel is therefore at the user's own risk and is recorded in the data memory of the control unit.

A manual mode is selected via the individual sub-items in the main menu. One of the possible operating modes of the **bioltec® system** appears in the display in each case.

Scroll through to the wanted point. Confirm the selected operating mode by clicking the **OK** key once.

```
diesel only
 0% 29° tank 70%
```

Your vehicle is operating with 100% diesel fuel.

! Action:
Note that your range is reduced in 100% **diesel mode**. Refill in good time.

```
B100 only
100% 65° tank70%
```

Your vehicle is operating with 100% alternative fuel.

Warning:
You may possibly damage the engine of the vehicle.

! Action:
Avoid working conditions of low load, in particular „idle speed operation". Please adhere to the information in the chapter **Shut-off** and **Interruption of journey**.

```
service menu
           OK?
```

Confirm with the **OK**-key.

The **bioltec® system** performs diagnostic and service functions (see chapter **Service and diagnostic functions**)

```
bioltec auto
50% 55° tank 35%
```

Your vehicle is operating in automatic mode again.

Manual **diesel operation** must always be selected when there is no alternative fuel available or the driver has been informed that it is not advisable to operate the engine with alternative fuels at the present time.

Also if you notice any ”abnormal“ behaviour of the engine (e.g. inadequate power, unusual noises, excessive smoke in the exhaust gas), switch to manual **diesel operation** as a safety precaution.

Basically, manual **diesel operation** is recommended if the vehicle is only driven for a short distance and after that will not be started up again for a long time, for example:

- Changing parking position or moving about in the yard
- Changing from one loading platform to another
- Travelling from the washing bay to the parking place
- Short journey to covered parking, e.g. for the weekend, in winter, etc.

ⓘ Note:

Manual switchover to diesel operation is the exception. In case of doubt, have the parameter settings of your bioltec® system checked by your bioltec® quality partner and inform him of your driving profile and the type of deployment of your vehicle (also see Latent time).

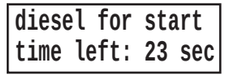
Switch-off procedure:
Before any long interruption of operation you must press the **switch-off key (banana)** before switching off the engine

! Action:

Before shutoff of the engine briefly press the **shutoff key** once **(banana)**.

The **bioltec® system** now supplies the engine with 100% diesel fuel and the alternative fuel in the injection system is replaced completely by diesel fuel.

This process takes about 1 to 2 minutes. The display on the operating/display console shows the time needed in seconds until completion of the process (remaining time). The required time for each process is recalculated with the help of the measured values. So the time span is not always equal.



The **switch-off process** will be finished in 23 seconds. The engine can then be shut down safely.

Warning:

The **shutoff process** is a rinsing process. Within the indicated time span a larger amount of diesel is supplied to the injection system. The fuel located in the injection system is pumped into the tank of the alternative fuel.

! Action:

Always make sure that there is enough free volume in the tank for alternative fuel before you start the shutoff process.

Continuing operation after the switch-off process:
If you carry on driving after pressing the **switch-off key** and after the remaining time has elapsed, the **bioltec® system** remains in **diesel mode** until the engine is shut down. Whenever the engine is restarted the control unit of the **bioltec® system** automatically decides on the choice of fuel. You do not need to carry out any operations on the system.

Latent time:
In the standard settings of your **bioltec® system**, it is possible for your **bioltec® quality partner** to enter a latent time for switching to automatic operation. When this is done, the **bioltec® system**, after every restart, initially switches to **diesel operation** for the set duration (Specified for 1 to 8 minutes and/or endlessly). It is only at the end of this time that the **bioltec® system** will automatically switch to **bioltec®auto** mode.

In particular for travel profiles with a high proportion of very short trips (e.g. city distribution operations), unnecessarily frequent flushing can therefore be avoided and diesel consumption is reduced.

A manual transition to **bioltec® auto** mode is possible at any time through the menu.
Shutoff process was not carried out:

! Action:

If you do not wait until the end of the remaining time you must restart the engine immediately and press the switch-off key (banana).

If the vehicle is switched off without pressing the **switch-off key** (or before the remaining time has elapsed) the **switch-off key** flashes red (warning signal) and a warning tone sounds. The warning signal also remains visible when the ignition is switched off and does not disappear until:

- the journey is continued
- the **switch-off procedure** has been carried out properly
- automatic **emergency flushing** process is in progress or has already been completed

While the **switch-off key** flashes red the following prompts appear alternately on the display:

The warning signal does not go out until the **bioltec® system** has completed the change to diesel fuel.

If you forget to press the **switch-off key** you must therefore restart the engine and press the **switch-off key**. With the engine running, wait until the remaining time has elapsed and the **switch-off key** stops flashing.

Automatic emergency rinse:
If the abovementioned rinse request lights up with switched off ignition, the **bioltec® system** is ready for the execution of the automatic **emergency flushing** process.
If the fuel temperature drops down to below a preset value, the **bioltec® system** independently begins, by means of the electric fuel pump (or also optionally: additional rinsing pump), to at least stock up the low pressure department of the injection system with diesel. This process starts automatically and is limited to twice the time of the at maximum set regular rinsing time.

Switching off and interruption of operation

ⓘ Note:

Depending on the alternative fuel and vehicle used, the **shutoff process** can be done without for very short stopovers. Speak to your responsible vehicle fleet manager concerning this, or talk to your **bioltec® - quality partner**.

For short trips with a lot of restarts, in connection with long stretches, your **bioltec® system** can be configured for automatic **diesel operation** especially for the short stretch (see **latent time**).

Talk to your **bioltec® quality partner** about your driving profile. You can also obtain more detailed information for your vehicle and your application from your **bioltec® quality partner.**

Warning:

An automatic **emergency flushing** on no account substitutes for the regular **shutoff process**, because the high-pressure system cannot be supplied without starting diesel if the engine is not running.
Every **emergency flushing** is permanently filed in the error memory. The operating console shows the **emergency flushing** even when the ignition is switched off, up to the next start.

Tank equipment:

Your vehicle is equipped with two separate tanks for diesel and alternative fuel.

- All tanks must be clearly marked for the particular fuel.
- The filled amount should be noted in the tank filling list.
- You should always fill up both tanks simultaneously in order to avoid unnecessary additional filling stops.
- Diesel can be filled in the alternative fuel tank if, for example, there is no alternative fuel available.
- Adding diesel to the alternative fuel tank is only partly permissible and sensible. Please talk to your vehicle fleet manager or **bioltec® - quality partner** about this.

Warning:

Alternative fuel must never get into the diesel tank. The alternative fuel tank should not be filled absolutely full since when switching off the engine excess fuel from the injection system (alternative fuel - diesel mixture) is fed into the alternative fuel tank. If the alternative fuel tank is filled completely shortly before switching off, there is a risk of the tank overflowing.

Diesel tank:
D Diesel
(usually the smaller tank)
Fill only with diesel fuel

Tank for alternative fuel:
B100
(usually the larger tank)
Refuel with alternative fuel
In exceptional cases fill empty tank with diesel

Tank state check:
Make sure that there is enough fuel in both tanks before starting a journey. Adequate filling of the diesel tank is especially important since the vehicle cannot be driven in manual **B100 mode** without the risk of serious damage.

Consumption (in litres per 100 km) and range (in km/litres) are approximately the same for both alternative fuel and diesel fuel. However, the proportion of alternative fuel actually fed to the engine by the **bioltec® system** is not always the same but depends on the following conditions:

- The specific parameters set on the **bioltec® system**
- The selected mode of operation
- The route profile
- The loading states of the engine and the individual driving style
- The condition of filter and injection system
- The number of switch-off operations
- The temperature
- Loaded weight of the vehicle

The present level of the supplementary tank is displayed continuously on the operating/ display console.

```
bioltec auto
 10% 20° tank99%
```

Example: There is still 99% of the maximum filling quan- tity in the diesel tank. You can read off the filling level of the alternative fuel tank (main tank) on the vehicle's original gauges.

Note:

If the consumption figures in **automatic mode** are unsatisfactory (e.g. excessively high diesel consumption) the **bioltec® system** must be checked by an authorized **bioltec® quality partner**.
If the proportion of diesel used is high, this may be attributable to a fouled alternative fuel filter. Carry out a **filter test** (see chapter **Filter test**) and change the filter if necessary.

! Action:

The driver is therefore obliged:

- through the assignment of the tank displays to the respective tanks
- to be informed of the total capacity of the diesel and alternative fuel tanks in litres and to note the values for the tank level check
- tracking all tank displays continuously
- refill with sufficient fuel in good time

We recommend you record figures for future reference by keeping a tank filling list similar to the below example:

Tank filling list no.: _____ Vehicle Registration no: _____

Date	Total mileage	km	Litres diesel filled	Litres alternative fuel filled	Comments	Signature Name

For the **bioltec® system vario plus**, there are two tanks with alternative fuel. These are indicated in the display as tank A and tank B, alternating by 10 second intervals.

```
bioltec auto
10% 25° tankA35%
```

after 10 seconds

```
bioltec auto
10% 25° tankB95%
```

Example: In tank A, there is still 35% of the maximum filling level left. However, the filling capacity of tank B is still at 95%. The level of the diesel tank is shown at the vehicle‘s original instrument.

ⓘ Note:

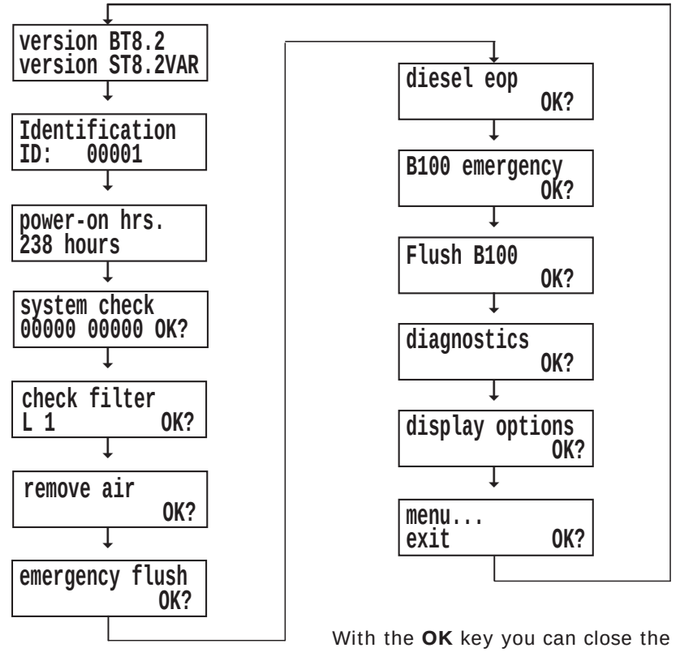
The **bioltec® system vario plus** works according to a special scheme of tank management, which is based on alternating withdrawal from both tanks for alternative fuel. If anything is unclear or if there are problems with the withdrawal from one of the tanks, please talk to your **bioltec® quality partner.**

Navigating through the service menu:

In the main menu select the option:

```
service menu
            OK?
```

And confirm with the **OK** key.



With the **OK** key you can close the Service submenu again and continue scrolling at main menu level.

Functions:
The Service and Diagnostics menu comprises the following functions:

Setting **version, identification, hours of operation, filtering, air separation, flushing cycle, emergency flushing and diesel emergency operation, B100 emergency, bleed engine, diagnostics** and **display option.**

The software version numbers of operating/display console and control unit are shown first in the Service submenu. This is followed by the respective identification number.

Operating hours:
Press the **DOWN** key until you reach the operating hours counter. This provides information about the total operating time of your **bioltec® system**. This can only be reset by your **bioltec® quality partner**.

Filter test:
(see chapter **Filter test**)

Air separation:
The **bioltec® system** has an automatic air separation function in case there is any air in the system (e.g. after changing the filter).

Warning:
Air separation does not bleed the injection system, but merely the **bioltec® system.**

During the **air separation** process, the engine supplies itself from the diesel tank.
This procedure should be carried out with the engine off. The fuel control module must have a temperature of at least 50 degrees and the alternative fuel must be liquid. Fuel is pumped into the **bioltec® system** from the alternative fuel tank and air is forced out via the return circuit.

In the Service menu choose the option:

```
remove air
                OK?
```

and confirm with the **OK** key.

```
removing air
150cB 35°tank72%
```

Leave this process running for at least 20 seconds, and for a maximum of 2 minutes. As soon as the pressure value (e.g. 160kPa) in the display at the beginning of the second line stops fluctuating there is no air left in the **bioltec® system** and you can end the procedure. Terminate the air separation function with the **OK** key.

Warning:
If the pressure value has not increased within 20 seconds, **air separation** must be terminated immediately. There is the danger that the electric fuel pump on the fuel control module may run dry and get damaged as a result.

! Action:
Then, in between and for the duration of about 10 seconds, execute the process **emergency flushing** in order to fill the electric fuel pump with fuel. Then, repeat the **air separation** process. The **air separation** process is essential after every filter change at the fuel control module, and also when the tank for alternative fuel has been emptied.

Emergency flushing:
In the Service menu choose the option:

```
emergency flush
                OK?
```

and confirm with the **OK** key.

```
emergency flush
160cB 35°tank72%
```

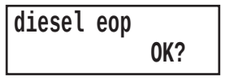
With ignition turned on but **engine not running** the fuel hoses and the **bioltec® system** are filled with diesel.

This facilitates restarting of the engine if you have forgotten to carry out the **switch-off procedure** and the engine can no longer be started (e.g. on a ferry or in the workshop).

! Action:
When you carry out **emergency flushing**, fuel is sucked out of the diesel tank and pumped through the injection system into the alternative fuel tank. The alternative fuel tank must therefore not be completely full. The **emergency flushing** process should be ended after a maximum of 2 minutes.

ⓘ Note:
By concurrent pressing of the manual pump for diesel (provided that it is present on the vehicle-side) you can support the **emergency flushing** process.

Diesel emergency operation:
In **diesel emergency operation** all actuators and sensors of the **bioltec® system** are switched off (no current). 100% diesel is fed to the engine directly from the diesel tank without preheating. The return circuit from the injection system goes back into the diesel tank.



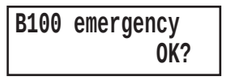
Confirm with the **OK** key.

Diesel eop flashes.

B100 eop:
In the **B100 emergency mode**, all actuators and sensors of the **bioltec® system** are switched on (all connected to power supply). The engine is exclusively supplied with alternative fuel directly from the tank for alternative fuel. The return flow from the injection system leads back to the tank for alternative fuel.

! Action:
Make sure that, when in **B100 eop mode**, the engine is at operating temperature, that temperature at the fuel control module exceeds 60 ° and that the alternative fuel has completely liquified inside the tank.

Warning:
You might damage the engine of the vehicle, definitely avoid low load working conditions and running on idle speed for too long.

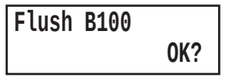


Confirm with the **OK** key.

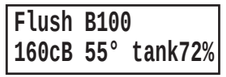
Warning:
Before shutting off the engine, flush with diesel; otherwise , there is no guarantee that the engine will start up again after cooling down.

Bleed engine B100 - only if diesel tank has been driven to dry state:
The menu item **Bleed engine B100** is exclusively intended to supply fuel to the injection system if the diesel tank has been driven empty and air has therefore gotten into the fuel injection system. With **bleed engine B100 active**, alternative fuel is forced into the fuel injection system. Some seconds later, it is sucked in at the return flow of the engine and the air is forced out through the return flow, into the tank for alternative fuel. This happens in alternation.

Warning:
With **bleed engine B100 active**, alternative fuel is forced into the fuel injection system.
The engine must be operating temperature. The temperature in the control module should be at least 50° and the alternative fuel inside the tank must be liquid.



Confirm with the **OK** key.



After approx. 1 minute you can try to simultaneously start the engine. Execute the starting process for a maximum of 10 seconds; if the engine fails to start, turn off the ignition, after waiting for 20 seconds, try once more to execute the starting process for a maximum of 10 seconds.

! Action:
When trying to start up, please absolutely do observe the instructions of the vehicle manufacturer in order to avoid starter overload in particular. Please also take note of the charging state of the battery, do not needlessly waste energy from the battery for vain startup attempts.
Get in contact early on with your vehicle fleet manager or your assigned **bioltec® quality partner** workshop and get their advice. Emergency callout service is expensive!

Once the engine is running, leave the **service menu** and select the operating mode **B100 only**.

Warning:
You might damage the engine of the vehicle, definately avoid low load working conditions and running on idle speed for too long.

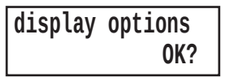
! Action:
The diesel tank should be immediately filled up with diesel!

Diagnostics menu:
In the **diagnostics menu**, you can see the error memory entries, e.g.:

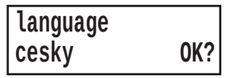
- Number of **emergency rinses**
- Number of hours driven in **B100 mode**
- State **Filter test** etc.

This information helps your service partner during troubleshooting and documents irregularities during operation and handling.

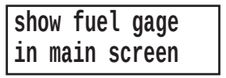
Setting the display options:
This menu item allows you to adjust the language, fill level display/ hours of operation display and the brightness level of the display.

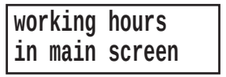


Language:
With the **DOWN** key, you can scroll down until the desired language appears. Confirm with the **OK** key. This will take some seconds, then the language will have been changed. The display jumps back to **display options**.

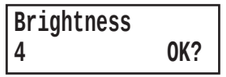


Display in the main display:
Here, you can configure whether the tank level or the operating time is indicated in the main display. Use the **DOWN** key to scroll down until **fuel gage in the main screen** or **working hours** appears. Confirm with the **OK** key.





Adjusting brightness level:
This is where you can adjust the brightness level.
With the **DOWN** key, you can scroll down until **adjust brightness level** appears.

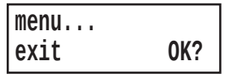


Confirm with the **OK** key.

Use the **DOWN** or **UP** key to adjust the desired brightness level. 4 is the brightest setting and 1 means there is no lighting. Confirm your choice with the **OK** key.

Scroll the **DOWN** key down to get to the **service menu** again.

Closing the service menu:



This closes the Service submenu and you can now continue scrolling in the main menu.

Filtertest:
The Filter test function of the **bioltec® system** automatically tests the condition (fouling) of the filter.
With every filter test, the **bioltec® system** adjusts to the pollution level of the filter again. Only the filter directly at the fuel control module is measured.

Test procedure:
The permeability of the filter for diesel fuel under specified pressure and temperature conditions is measured and displayed.

! Action:
When carrying out the filter test, the motor must be
- at operating temperature
- flushed with diesel and
- **running at low revs** and without loading

From the Service menu select the option **Filter test** and confirm with the **OK** key.

Observe the number after L in the second line in the display.

The **Filter test** automatically ends after approx. 2 minutes.

After a successful **Filter test** the display shows:

The number after L shows the current pollution level (level example L3). L 1 means clean. Up to L 10, the filter can still be used.

End the **Filter test** with the **UP** or **DOWN** key.

With values above L10, the **bioltec® system** requires a filter change.

Change request:

Change the filter immediately. See subsequent chapter.

After changing the **bioltec® filter**, go to menu item **Air separation** (cf. chapter **Service and diagnostic functions**)

After completion of **air separations** process, you carry out a **filter test** once more. Doing so, the **bioltec® system** can adjust to the new filter.

ⓘ Note:
You can acknowledge a request for filter replacement with the **OK** key and exit the filter test afterwards with the **UP** or **DOWN**-key (cf. chapter **Changing the bioltec® filter**).

Warning:
The request for the **filter test** appears only after switching off the ignition. This is generated, e.g. if the **bioltec® system** has identified a change of the pressure ratios in the fuel supply during the journey.

! Action:
The request for the **filter test** does **not necessarily require a change** of the filter.

Always execute the **filter test** first and act according to the result. Take note of the requirements for the **filter test** (see **test process**).

Warning:
Use only original filters recommended by **bioltec®**. (Make: MANN filters) Common filter types are usually not tested for use with alternative fuel and may therefore be unsuitable. This also applies for transcoded replacement types of other manufacturers.

If the **filter test** (see **Service and diagnostic functions**) indicates that the filter needs changing, stop as soon as possible and change the filter in the **bioltec® fuel control module**.

Warning:
The most frequent cause of faults in **B100 operating mode** is contaminated or unsuitable alternative fuel. The quality may vary considerably. The **bioltec® system** therefore feeds the alternative fuel separately through a filter before it reaches the original injection system of the vehicle.

The procedure for changing the filter consists of several operations:

Removing the old filter:
Have a new filter at the ready. The installation position of the fuel control module is noted in the assembly record. Unscrew the filter by turning it to the left - note that there is considerable resistance initially. Use a filter spanner to help if necessary.

! Action:
- The filter is filled with alternative fuel and residues; therefore always keep the opening upwards.
- The alternative fuel in the filter can be hot (> 60° C). If necessary wait until the system has cooled down.

Fitting a new filter:
Apply a little alternative fuel to the seal and make sure that the flange is clean and mechanically undamaged in order to guarantee an oil-tight seal. Insert the new filter by screwing in carefully. Tighten firmly by hand.

! Action:
Depending on product range and design your **bioltec® system** might be equipped with a **pressure accumulator**.
In that case, you will be able to make out a cylindrical aluminium object of the same diameter as the filter and at a height of about 5 cm above the filter at the fuel control module. Make sure that also the gasket of this **pressure accumulator** is intact where it seals off the fuel control module and that the latter has a tight fit.

Air separation, Filter test:
The **air separation** procedure must then be carried out, as well as a new filter test (See chapter **Service and diagnostic functions**).

Disposal of the fuel filter:
Since the fuel filter may contain small amounts of diesel fuel, it must be disposed of via the service centre return system.

Warning:
Make sure that the filter is firmly in position otherwise alternative fuel can escape. If alternative fuel or diesel fuel comes in contact with hot surfaces there is a risk of fire!

Replacement of the coarse / prefilter:
If the fuel injection system, in spite of a successful **filter test**, is supplied with insufficient alternative fuel, the coarse filter must be changed at the coarse filter level (only with type giantline and varioline) or the prefilter on the pre-feed module (only with type ultimate plus and giant plus)

The filter change is carried out in three steps:

Removing the old filter:
Keep a new filter ready. The installation position of the prefilter is recorded in the installation record. There will be high initial resistance to overcome - rotate the filter to the left to unscrew it. If necessary, use a filter wrench for help.

! Action:

- The filter is filled with alternative fuel and residues, therefore, you must always hold the opening facing upwards.
- The alternative fuel in the filter may be hot (> 60°C). Wait, if need be, until the system has cooled off.

Installation of a new filter:
Put a little alternative fuel onto the gasket and make sure that the flange is clean and mechanically intact, so that the sealing function is guaranteed. Insert the new filter by careful turning and manual tightening.

Air separation:
The **air separation** procedure must then be carried out (See chapter **Service and diagnostic functions**).

Disposal of the coarse filter / prefilter:
Because the coarse filter / prefilter may contain small quantities of diesel oil, it is to be disposed of through the return system of the workshops.

Warning:
Make sure that the filter is firmly in position otherwise alternative fuel can escape. If alternative fuel comes in contact with hot surfaces there is a risk of fire!

Spare parts and maintenance:
The **bioltec®** filter is the only part of the **bioltec® system** that can be changed by the driver. A spare filter should always be carried in the vehicle.

You can obtain suitable filters approved for use with the **bioltec® system** from your authorized **bioltec® quality partner**.

The use of non-approved filters, and attempting to dismantle, exchange or modify other parts and components of the **bioltec® system** will result directly in the exclusion of any warranty on the part of the Licensor for the installed **bioltec® system** and for possible consequential damage to the vehicle, engine or fuel injection system.

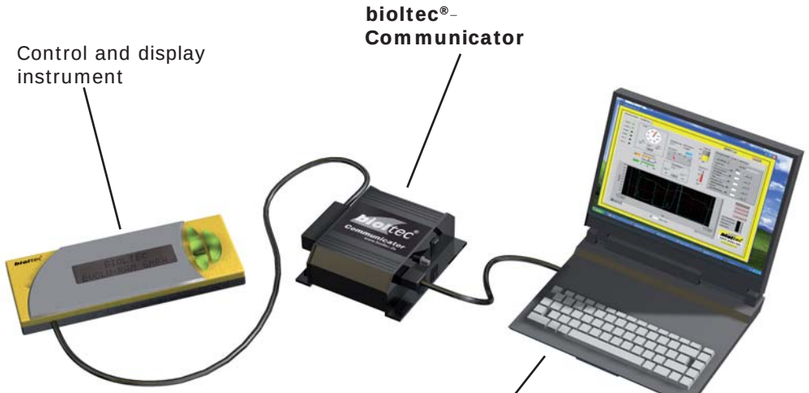
Except for changing the **bioltec®** filter all maintenance work will be carried out exclusively by authorized **bioltec® quality partners** who keep a stock of all system components for exchange.

Warning:
Use only original filters recommended by **bioltec®**. (Make: MANN filters) Common filter types are usually not tested for use with alternative fuel and may therefore be unsuitable. This also applies for transcoded replacement types of other manufacturers.

Software Release:
The Licensor continuously develops the **bioltec® systems**. Changes of the system function may also be made to systems already installed.

These changes mostly take the form of release changes or software updates. New software is imported by authorized **bioltec® quality partners**.

Suitably qualified vehicle users can also be authorized by the Licensor to change software. In this case they receive the **software release** per email and can import it into the operating/display console or the control unit via the **bioltec® Communicator**.



The **bioltec® system** may only be operated subject to the following technical specifications.

Operating voltage:
24 V DC
12V DC when using the ET0015 transformer kit

Power consumption:
Standby: 5 mA
Operation without actuators: 160 mA
Operation at maximum: 5 A

Current carrying capacity of the optional output with separate fuse:
Maximum current: 8 A

Warning:
Depending on product range and version, the **bioltec® system** is connected to the electricity supply of your vehicle through 2 or 3 separately marked fuses.
For replacement, exclusively use fuses of the same type.
Fuses which permit a higher current must not be used under any circumstances.
The standard securing is with 7.5 amperes (brown), respectively.

Self-test:
After turning on the ignition the **bioltec® system** reacts with the welcome message and information concerning the product range (Ultra, giant, vario...):

```
bioltec systems
*happy motoring*
```

Now the control unit carries out a test of elementary functions of the **bioltec® system**.

At the beginning of the automatic **self-test**, the software versions of operating console and control unit are shown.

```
bioltec systems
BT 8.2  ST 8.2
```

All keys light up red in standby mode. The system now waits for the engine to be started.

! Action:
Wait, with switched on ignition, until the **bioltec® system** has finished the **self-test** (approx. 4 sec). Start the engine only then.

Diagnostic reports:
In the automatic **self-test**, errors can be identified that lead to a plain text message. These are directly shown to you. Also, codes are deposited in the error memory (special code ###).

Plain text messages refer to errors which are easy to rectify, e.g.:

```
please check
system fuses!
```

Cause: Permanent power supply is not reliably guaranteed.
Solution: The fuse for terminal 30 (continuous positive) is to be checked and, if necessary, must be replaced.

```
please check
pressure sensor!
```

Cause: The measured value of the fuel pressure on the **bioltec® system** is beyond the plausibility range.
A fuel line (mostly return circuit) is blocked or the pressure analysis is impaired. Solution: Patency check of the lines. Visit a workshop and, if necessary, have the pressure values checked.

! Action:
If a mistake is identified in the **self-test**, the **bioltec® system** automatically changes to a mode of operation that is safe for the respective cause. e.g., **diesel emergency operation**. Please note that this may, in particular, lead to an increase in diesel consumption. Contact your **bioltec® - quality partner** immediately if there are any doubts about the safety of the vehicle.

	Fault	Cause	Solution
!	Alternative fuel tank empty	• Forgotten to fill up	• Switch over manually to **diesel mode** • Fill up with alternative fuel • If no alternative fuel available for a long period: Fill up the (empty) alternative fuel tank with diesel • Fill up with diesel immediately (spare canister)
↯	Diesel tank empty	• Forgotten to fill up • Diesel consumption too high	• If necessary switch over manually to **alternative fuel mode** • Fill up with diesel at the next opportunity • Switch back to **automatic operation**
!	Diesel consumption increases "low pressure" error message	• Filter fouled • alternative fuel too viscous (cold) or not quite liquid • Poor quality oil	Carry out **filter test**, if necessary: • Change filter on the **bioltec® control modul** • **Vent air** • Continue operating in **automatic mode** • Carry out **filter test** again • Fault is stored in the error memory
!	Smoke in the exhaust gas or unpleasant smells	Incorrect combustion of the alternative fuel	• Do not operate in manual **B100 mode** • If fault occurs in **automatic mode** switch over by hand to **Diesel mode** • Get the settings checked at the workshop
!	Alternative fuel tank level rises / tank overflows	• Filled too full • Filter fouled	• Do not fill up completely just before carrying out the **switch-off procedure** • Carry out **filter test** • **bioltec®-Filter** no longer lets oil through, change filter (see above)
!	System runs on high diesel proportion	• Coarse filter dirty • Insufficient supply of alternative fuel • Solids in the alternative fuel hose or kink in the hose • Air in the hose	• Change coarse filter • Check fuel hoses for kinks • Carry out **air separation** procedure • Get fault checked at the service centre • Deactivate automatic diesel enrichment

If the problems continue, contact your authorized **bioltec® quality partner**.

	Fault	Cause	Solution
!	Diesel proportion too high following filter change	New filter not size-adjusted correctly	• After installation of a new filter, always carry out the function **air separations** and once more the **filter test**
✓	Wrong tank filled • Diesel inside the tank for alternative fuel	Wrong tank filled	• No problem, simply carry on driving
↯	Wrong tank filled • Alternative fuel inside the diesel tank	Wrong tank filled	• Do not switch on the stationary heating under any circumstances • On no account must you shut down the engine without flushing If possible: • Empty diesel tank • Refuel with diesel • Push switch-off key After consultation with your **bioltec®-quality partner:** On a long journey select **Diesel mode** and run the diesel tank nearly empty, then fill up with diesel, press **switch-off key** before ending operation. If the tank has enough room for alternative fuel: • by **emergency flushing with engine running**, repump the content of the diesel tank into the alternative fuel tank • then refuel with diesel • press **Switch-off** key again Warning: The system calculates the indicated mixing ratio from the amount of the two fuels fed from the two tanks. If you fill up with the incorrect fuel the indicated mixing ratio of the fuels differs from the actual mixing ratio.
		Tank inadequately marked	Mark tank as recommended or stipulated

	Fault	Cause	Solution
!	**Switch-off key** flashes red; when ignition is turned off	You have forgotten to press the **switch-off key (banana)**	Ideally carry out the following operations immediately: • Restart the engine • Press the **switch-off key** • Wait for the indicated time • Switch off engine
↯	Long standstill **Switch-off key** flashes red (more often at low temperatures, e.g. weekend in the winter)	You have forgotten to press the **switch-off key (banana)**	Carry out **emergency flushing** on your own responsibility: • Turn on ignition • Do not start engine to begin with • Carry out **emergency flushing** • Attempt to start The **emergency flushing** process merely replaces the alternative fuel in the fuel control module and in sections of the hoses with diesel fuel. This is not a substitute for the proper implementation of the prescribed **switch-off process**. **Emergency flushing** generates a fault message in the **bioltec® control unit**. Serious engine damage cannot be ruled out.
!	Display sticks or is permanently off	Vehicle electronics system produces interference	Remove all fuse from the **bioltec® system** at the same time, mostly secured with 7.5A (brown) check and replace with new ones if necessary. Consult your **bioltec®-quality partner**!
!	Display shows **idle state**	Voltage undersupply when starting or during running operation	Remove all fuse from the **bioltec® system** at the same time, mostly secured with 7.5A (brown) check and replace with new ones if necessary. Consult your **bioltec®-quality partner**!

! = Need for action ↯ = Danger ✓= No problem

Precautionary measures:
The most frequent sources of operating faults in **bioltec® systems** are the alternative fuel tank and the fuel supply and are caused by:

- Contaminated or alternative fuels
- Fouled or unsuitable filters
- Deposits in the tank
- Incorrect operation, especially running the tank empty

! Action:

Make the following checks at (regular) intervals:

- Make sure there is a coarse dirt filter or tank strainer in place at the tank connection (riser pipe). Check its condition and ensure that it lets fuel through.
- Check the inside walls of the alternative fuel tank, especially if coated or painted. This can flake off and obstruct the fuel supply.
- Check that the fuel hoses are free of kinks and that there are no high points where there's a risk of air bubbles collecting (siphons).
- Always keep an eye on the fuel level in the alternative fuel and diesel tanks.
- Only fill up with pure alternative fuel in perfect condition that meets the quality standards.
- Get in contact with your **bioltec®-quality partner** if you encounter problems with the alternative fuel supply despite of a filter change.

When operating the **bioltec® system** do not use any electronic equipment in your vehicle unless it has an approval symbol. Otherwise it could cause interference with the system electronics.

Contact your **bioltec® quality partner** before installing/mounting other work devices or equipment elements in the vehicle. Interference with the electronics of the **bioltec® system** cannot be ruled out especially if additional electrical and electronic systems are installed in the vehicle.

Warranty and liability:
The **bioltec® system** does not intervene in the control or functioning of other systems, for example, engines, generator sets or fuel injection systems.

Irrespective of this, the Licensor assumes absolutely no guarantee for faults, damage, or loss of functions affecting systems of other manufacturers.

This also includes their suitability for operating with specific fuels, especially with alternative fuels and the consequences of using fuels that are possibly unsuitable.

Similarly, any guarantee on the part of the Licensor for the quality, composition and purity of the fuels with which **bioltec® systems** and other systems, for example engines and generator sets are operated is also excluded.

The sensors and microprocessor control unit of the **bioltec® systems** are, however, suitable for reducing possible risks that may arise due to the use of alternative fuel under disadvantageous conditions (e.g. unsuitable operating state of an engine or generator set). However, any warranty is expressly excluded.

The operator of the vehicle or generator set shall have sole liability for the use of alternative fuel in the vehicle or generator set and for any damage that may possibly arise as a result.

The warranty provided by the Licencor is thus restricted expressly to the assured functions of the **bioltec® systems** themselves, and their components and parts, but only subject to compliance with the permissible operating conditions.

If components of third party companies are used without modification these companies are liable themselves for the properties of their products.

This warranty is subject to the condition that **bioltec®** components, parts, tools and materials - especially hoses and installation material - are used exclusively, all work operations and instructions described in the assembly instructions are followed and that the installation record is drawn up properly and completely and has been signed by the registered keeper of the vehicle and sent and/or faxed to the Licensor.

Notes

Your **bioltec® quality partner**:

www.bioltec.de

Version 8.2 / 10.2012
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bioltec® systems
Fuel Efficiency Management