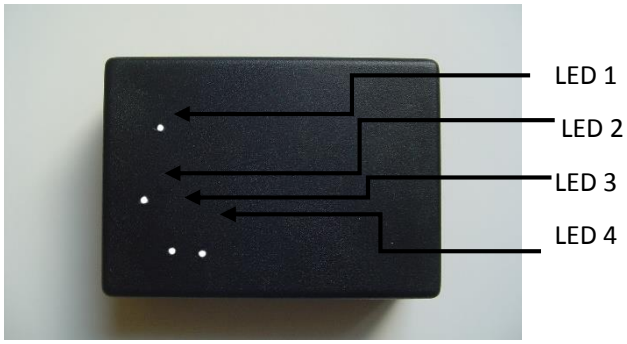
Mercedes Actros MP3 Euro4/5 multifunctional SCR system testing device “Gudraks 3 in 1”

<u>Purpose: the device can perform 3 different functions:</u>

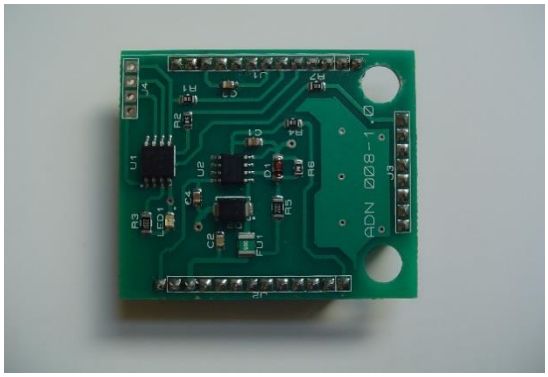
1. To save AdBlue liquid,
2. to replace the faulty NOX sensor,
3. To replace the faulty AdBlue pump.

1, 2 and 3 positions may be connected.

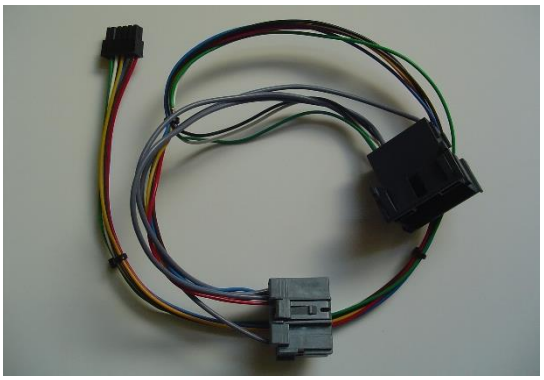
1. General view of the device:



2. Add-on PCB:



3. Cable with connectors



4. LPT cable (Connecting cable with jumper)

5. Resistance:

Definitions:

SCR – selective catalytic converter

Full_mode – The machine works "NOX" NOX + savings, pump + NOX "test mode, add on PCB motherboard built

Saver_mode – The machine works AdBlue liquid-saving mode, the add on PCB motherboard built

Sleep_mode – the device is in power-saving mode (sleeping)

Trimmed CAN – the device is inserted into the CAN line sequentially

Untrimmed CAN – the device is connected in parallel CAN line

Mainboard (further main PCB), - the main device board

Additional board, (further add-on PCB), - the optional device board

Cable with connectors, (further, Cable with connectors) - It is a device cable with connectors designed to mount device in a cab / chassis connector box

Simple cable + jumper (further PLT cable) connector with cable for device installation near Starpoint.

Starpoint – CAN bifurcation point

CoTel interface – FMS, tracking system data, fleet board data....

Device selection / arrangements guide:

The device has 2 modes of fulfilment and 3 standard mounting options.

Tips for selecting the installation method:

1. If you plan to move the system to another vehicle always, use Cable with connectors mounting method.

2. When installing for the first time in the car, we recommend to choose the method noted in bold type.

3. Expanding the possibilities device if the device has already been installed in a consistent way of merger, switch to parallel mode is not necessary

Table 1

Purpose / problem	Device package	Operating mode	Mounting way	Installation instructions file	Note
Stop the use of liquid	Main PCB	Saver_mode	**Cable with connectors (N)****	***Saver_pyne_Mont***	
			PLT cable (N)*	*Saver_PLT_ Mont*	
NOX sensor fault	Main PCB + add-on PCB	Full_mode	Cable with connectors (N)*	*Full_pyne_Mont*	Cotel interface must be activated.
			PLT cable (L)**	***Full_PLT_Mont_L***	
NOX sensor fault + stop the use of liquid	Main PCB + add-on PCB	Full_mode	**Cable with connectors (N)****	***Full_pyne_Mont***	Cotel interface must be activated.
			PLT cable (N)*	*Full_PLT_ Mont_N*	

Pump malfunction	Main PCB + add-on PCB	Full_mode	Cable with connectors (N)*	*Full_pyne_Mont*	Lying cable to a pressure sensor and mounted pump load. Cotel interface must be activated.
			PLT cable (L)**	**Full_PLT_Mont_L**	

* **Note:** N-consistent method of installation, L-parallel mounting method

** Note: recommended installation method is marked bolded font.

Operating modes, device installation, operation and description of the problem solving methods:

In which mode at the time is the device indicates according to LED1 indicator readings:

Table 2. LED 1 values

Action	Value	Desirable mode		Ignition is on	Solution
		Saver mode	**Full mode**		
Flashing 20ms intervals, the same rhythm	The device works in SCN mode error	X	X	X	Main_PCB or addon_PCB malfunction. The device does not work, for repairs ask the distributor Additional feature: exactly the same rhythm all the flashing LEDs.
Flashing 50 ms interval	The device operates in saver mode	**X**		**X**	***This is a normal mode.***
			X	X	Main_PCB or addon_PCB malfunction. The device does not work, for repairs ask the distributor
Flashing 1000 ms interval	The device operates in Full mode		**X**	**X**	***This is a normal mode.***
		X		X	Check Addon_PCB installation. Main_PCB or addon_PCB malfunction. The device does not work, for repairs ask the distributor.
Lights steadily	The device operates in sleep mode	X	X	X	Main_PCB or addon_PCB malfunction. The device does not work, for repairs ask the distributor.
		X	**X**		***This is a normal mode.***
Does not light		it does not matter	it does not matter	it does not matter	Main_PCB or addon_PCB malfunction. The device does not work, for repairs ask the distributor.

Saver mode: the device is used in saving mode to stop the AdBlue liquid dosage. The device not simulate in any way does not change the original SCR system than the physical or programmatic level while it is working in AdBlue fluid saving mode. Does not distort the data, so by testing a car with a diagnostic tool, you'll see the real, undistorted information with full pressure, temperature, fluid consumption and the operation data of SCR components.

The main product installation rule – **while device operative in saving mode, the SCR system to be fully operational!**

The device can work with built-in and without add-on PCB in a Saver mode

Table 3.

add-on PCB	NOX sensor	AdBlue pump	Note
Not installed	real	real	
Installed	virtual	real	Original NOx sensor not necessary to disconnect if it is does not block the CAN line, otherwise the NOX sensor must be disconnected

The device can be installed in 2 ways: using a cable with connectors or PLT cable. Select the installation method according to Table 1.

LED indicator values:

LED1-> See Table 2.

LED2-> unused

Table 4. LED 3 values

Color	*Action*	*Value*	*Connection method*		*Ignition on*	*Solution*
			PLT cable	*Cable with connectors*		
Green	Flashing	Everything is connected correctly	X	X	X	***This is normal***
Red	Flashing	Incorrect connection	X		X	If the LED3 blinks in red only one (4 LED flashes green) it shows that the device is connected in the wrong place or not receiving data from the engine control unit (PLD) If the flashing red LED 3 and LED 4 means the device does not receive data nor the PLD neither the SCR, most likely that the CAN1 and CAN2 wires sides is mixed.
				X	X	The device does not receive data from the engine control unit (PLD). Check the connection with the PLD.
It does not matter	Does not light / lights steadily	CAN communication does not take place on CAN1 side	X	X		Sleep mode -> this is normal
					X	Ignition On -> fault Check the connection cables, device, diagnose car. Check CAN line performance. If CAN line work is disturbed, first restore the CAN line work, disconnect the device and connect the jumper or change back swapped connections

Table 5. LED4 values

Color	*Action*	*Value*	*Connection method*		*Ignition on*	*Solution*
			PLT cable	*Cable with connectors*		

Green	Flashing	Everything is connected correctly	X	X	X	***This is normal***
Red	Flashing	Incorrect connection	X		X	If only the LED4 flashes in red (3 LED flashes green) it shows that the device is plugged in the wrong place, or does not receive data from the SCR control unit If the flashing red LED 3 and LED 4 means the device does not receive data nor the PLD neither the SCR, most likely that the CAN1 and CAN2 wires sides is mixed.
				X	X	The device does not receive data from the SCR control unit. Check the connection with the SCR control unit
It does not matter	Does not light / lights steadily	CAN communication does not take place on CAN2 side	X	X		Sleep mode -> this is normal
					X	Ignition On -> fault Check the connection cables, device, diagnose car. Check CAN line performance. If CAN line work is disturbed, first restore the CAN line work, disconnect the device and connect the jumper or change back swapped connections

Recommendations and findings:

In case of problems on the CAN communication is desirable to disconnect device, connect jumper or to change back connectors positions in connection section and further diagnose the machine using a normal car repair schemes, technologies and equipment, and only after verifying that the SCR system is fully operational again, connect the device back.

CAN communication fault symptoms:

Lost AdBlue tank reading on dashboard.

It is impossible to connect a diagnostic device to the car.

In these cases offer begin look for a fault after turning off the device.

Full_mode: Device working in **NOX, NOX + Save mode or NOX + Pump mode** does not simulate in any way does not change the original SCR system neither the physical neither programmatic level, with the exception of the pump and / or NOX sensor. Does not distort the data, so by testing a car with a diagnostic tool, you'll see the real, undistorted information with full pressure, temperature, fluid consumption and the operation data of SCR components.

The main device installation rule: Before installing the device in Full mode, the SCR system must be fully operational with the exception of NOX sensor and / or pump.

Full Mode mode is activated by installing an add-on PCB.

CAUTION!!!! Before installing the device in Full mode, it is necessary to activate FMS (Cotel, the tracking system data) interface using the diagnostic tool, otherwise possible device malfunctions. Or device receives FMS data can be judged by the LED2 indicator readings.

The device features description

The device can only work in Full mode with the built-in add-on PCB.

Table 6.

Add-on PCB	Purpose / Problem	NOX sensor	AdBlue pump	Connection way	Note
BUILT-IN	NOX fault	Virtual	Real	Paralel	It is necessary to disconnect the original NOX sensor
	Save mode+ NOX fault	Virtual	Real	Consecutive	It is not necessary to disconnect the original NOX sensor if it not blocking the CAN line, otherwise the NOx sensor must be disconnected
	Pump fault+ NOX fault	Virtual	Virtual	Consecutive	
				Paralel	It is necessary to disconnect the original NOX sensor, the cable is led to a pressure sensor and mounted pump resistance.

The device can be mounted in 3 different ways: using a cable with connectors or PLT cable. Select the installation method according to Table 1.

LED indicator values:
LED1-> See Table 2.

Table 7. LED2 values

Color	*Action*	*Value*	*Ignition On*	*Solution*
Blue	Flashes	Everything is connected correctly, FMS data are obtained	X	This is the normal state, the FMS interface is activated, the data are obtained.
Blue	Does not light / lights steadily	Incorrect connection or FMS data are not obtained	X	If LED2 is constantly lights / not lights that indicates: 1. The wrong device connection. 2. The not activated FMS interface Solutions: Check the device connection, the CAN line performance, FMS interface activation. If CAN line does not work, first restore the work of the CAN line.

Table 8. LED3 values

Color	*Action*	*Value*	*Connection method*		*Ignition On*	*Solution*
			PLT Cable	*Cable with connectors*		
Green	Flashing	Everyrhing connected correctly	X	X	X	**This is normal**

Red	Flashing	Incorrect connection	X		X	If the LED3 blinks in red only one (4 LED flashes green) it shows that the device is connected in the wrong place or not receiving data from the engine control unit (PLD) If the flashing red LED 3 and LED 4 means the device does not receive data nor the PLD neither the SCR, most likely that the CAN1 and CAN2 wires sides is mixed.
				X	X	The device does not receive data from the engine control unit (OLD). Check connection with PLD.
It does not matter	Does not light / lights steadily	CAN communication does not take place on CAN1 side	X	X		Sleep mode -> this is normal
					X	Ignition On -> fault Check the connection cables, device, diagnose car. Check CAN line performance. If CAN line work is disturbed, first restore the CAN line work, disconnect the device and connect the jumper or change back swapped connections

Table 9. LED4 values

Color	***Action***	***value***	***Connection method***		***Ignition On***	***Solution***
			PLT Cable	***Cable with connectors***		
Green	Flashing	Everything is connected corectly	X	X	X	**This is normal**
Red	Flashing	Incorrect connection	X		X	If only the LED4 flashes in red (3 LED flashes green) it shows that the device is plugged in the wrong place, or does not receive data from the SCR control unit If the flashing red LED 3 and LED 4 means the device does not receive data nor the PLD neither the SCR, most likely that the CAN1 and CAN2 wires sides is mixed.
				X	X	The device does not receive data from the SCR control unit. Check the connection with the SCR control unit
It does not matter	Does not light / lights steadily	CAN communication does not take place on CAN2 side	X	X		Sleep mode -> this is normal
					X	Ignition On -> fault Check the connection cables, device, diagnose car. Check CAN line performance. If CAN line work is disturbed, first restore the CAN line work, disconnect the device and connect the jumper or change back swapped connections

Recommendations and findings:

In case of problems on the CAN communication is desirable to disconnect device, connect jumper or to change back connectors positions in connection section and further diagnose the machine using a normal car repair schemes, technologies and equipment, and only after verifying that the SCR system is fully operational again except NOX sensor and/or AdBlue pump, connect the device back.

CAN communication fault symptoms:

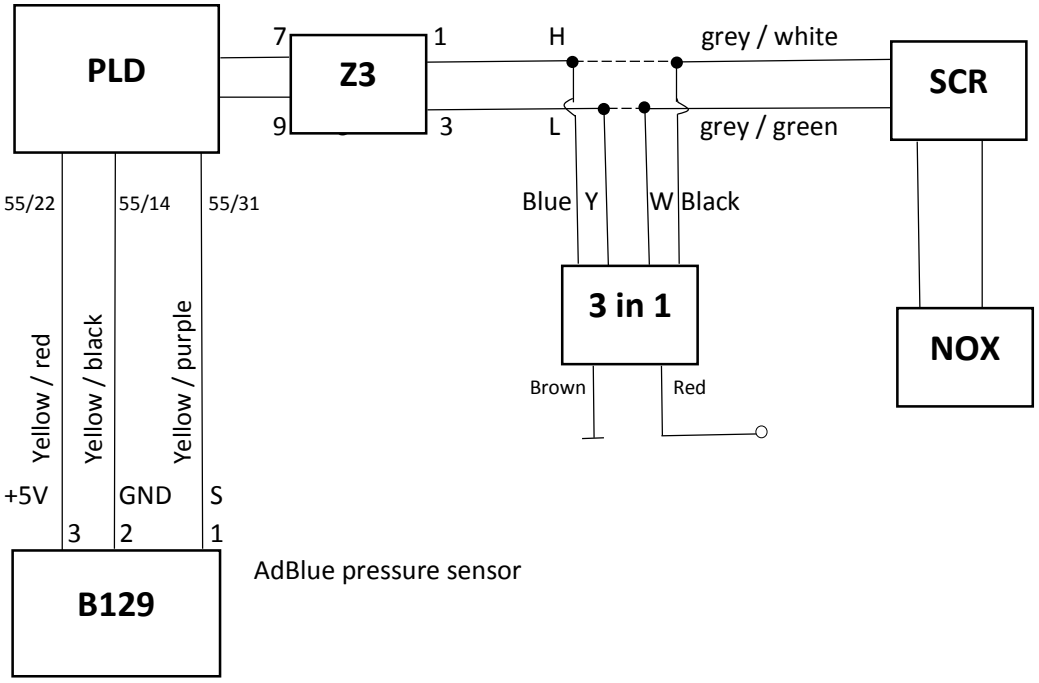
Lost AdBlue tank reading on dashboard.

It is impossible to connect a diagnostic device to the car.

In these cases offer begin look for a fault after turning off the device.

1 appendix.

Device circuit diagram illustrating the series connection.



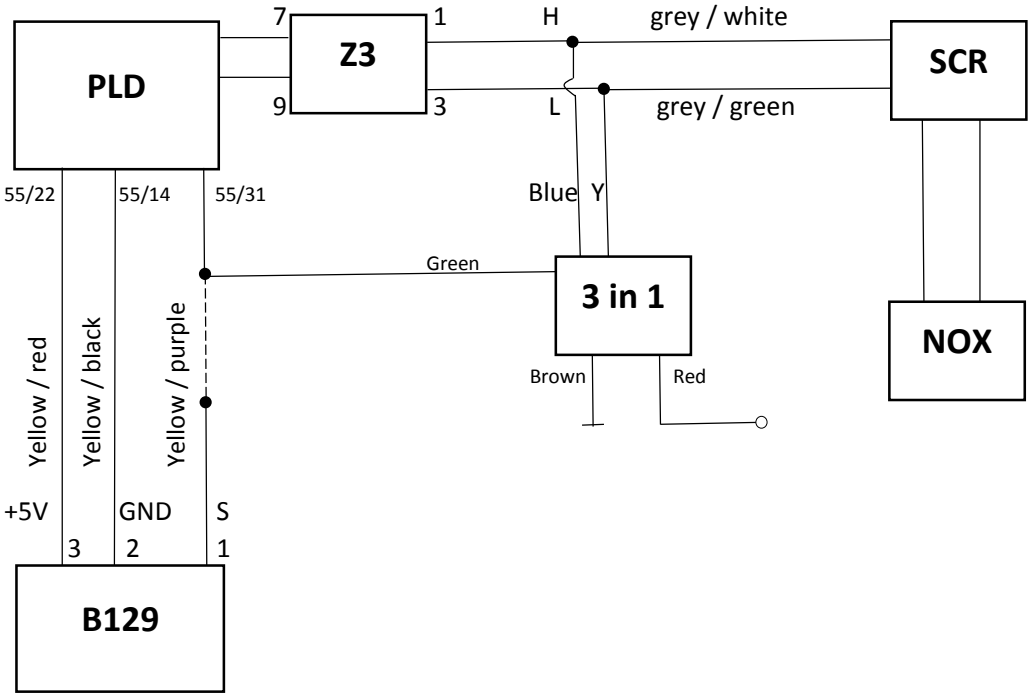
B129 – AdBlue pressure sensor
PLD – an engine control unit
Z3 – CAN bifurcation point (starpoint)
3 in 1 – Gudraks 3 in 1 device
SCR – SCR control unit
NOX – NOX sensor

Table: Cable connection by a cable color.

Gudraks 3 in1	**Connection place**	**Note**
Brown	OBD connector, brown cable	31 kl., frame
Red	OBD connector, red/blue cable	30 kl., constant "plus"
Yellow	Z3, 3 contact, connector side	CAN1_L, PLD side
Blue	Z3, 1 contact, connector side	CAN1_H, PLD side
White	Z3, 3 contact, vehicle side	CAN2_L, SCR side
Black	Z3, 1 contact, vehicle side	CAN2_H, SCR side

Green	PLD unit, yellow/purple, 31 contact, big connector	Adblue pressure sensor out

1. Parallel scheme:



AdBlue pressure sensor

B129 – AdBlue pressure sensor
PLD – an engine control unit
Z3 – CAN bifurcation point (starpoint)
3 in 1 – Gudraks 3 in 1 device
SCR – SCR control unit
NOX – NOX sensor

Device 3 in1	**Connection place**	**Note**
Brown	OBD connector, brown cable	31 kl., frame
Red	OBD connector, red/blue cable	30 kl., constant "plus"
Yellow	Z3, 3 contact, connector side	CAN1_L, PLD side
Blue	Z3, 1 contact, connector side	CAN1_H, PLD side
White	Unused	CAN2_L, SCR side
Black	Unused	CAN2_H, SCR side
Green	PLD unit, yellow/purple, 31 contact, big connector	Adblue pressure sensor out