Communication interface with autonomous datalogger function

DLC-MUXDIAG-II / DLO-MUXDIAG-II

User guide

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SUMMARY

1. Document's purpose and bibliography

1.1.1. Purpose

The purpose of this document is to give the user the information required to install and set up the DLx-MUXDIAGII interface with datalogger function.

1.1.2. Bibliography

ISO 11898	Road vehicles – Interchange of digital information – Controller Area Network (CAN) for high-speed communication
ISO 11519-2	Road vehicles – Low-speed serial data communication – Part 2: low speed controller area network (CAN)
ISO 9141	Véhicules routiers – Systèmes de diagnostic – Caractéristiques de l'échange de données numériques
ISO 9141-2	Véhicules routiers – Systèmes de diagnostic – Caractéristiques CARB de l'échange de données numériques
ISO 14230-1	Véhicules routiers – Systèmes de diagnostic – Protocole KeyWord2000 – Partie 1: Couche physique
ISO 14230-2	Véhicules routiers – Systèmes de diagnostic – Protocole KeyWord2000 – Partie 2: Couche liaisons de données
ISO 14230-3	Véhicules routiers – Systèmes de diagnostic – Protocole KeyWord2000 – Partie 3: Couche application
ISO 15765-1	Road vehicles – diagnostics on CAN – Part 1: General information
ISO 15765-2	Road vehicles – diagnostics on CAN – Part 2: Network layer services
ISO 15765-3	Road vehicles – diagnostics on CAN – Part 2: Application layer
ISO 15765-4	Road vehicles – diagnostics on CAN – Part 4: Requirements for emission related systems
ISO 11519-4	Véhicules routiers – Communication en série de données à basse vitesse – Partie 4: interface de communication de données de type B (SAE J1850)
SAE J1979	E/E Diagnostic Test Modes (Décembre 1991)
SAE J1962	Diagnostic Connector (Juin 1992)
USB	Universal Serial Bus Specification, Version 1.1, Copyright © 1998 Universal Serial Bus Specification, Revision 2.0, Copyright © 2000

2. Presentation

2.1.1. General presentation

The DLx-MUXDIAGII allows to interface a PC (or a pocket PC) with the CAN and KWP2000 diagnostic channels of a vehicle using an USB link.

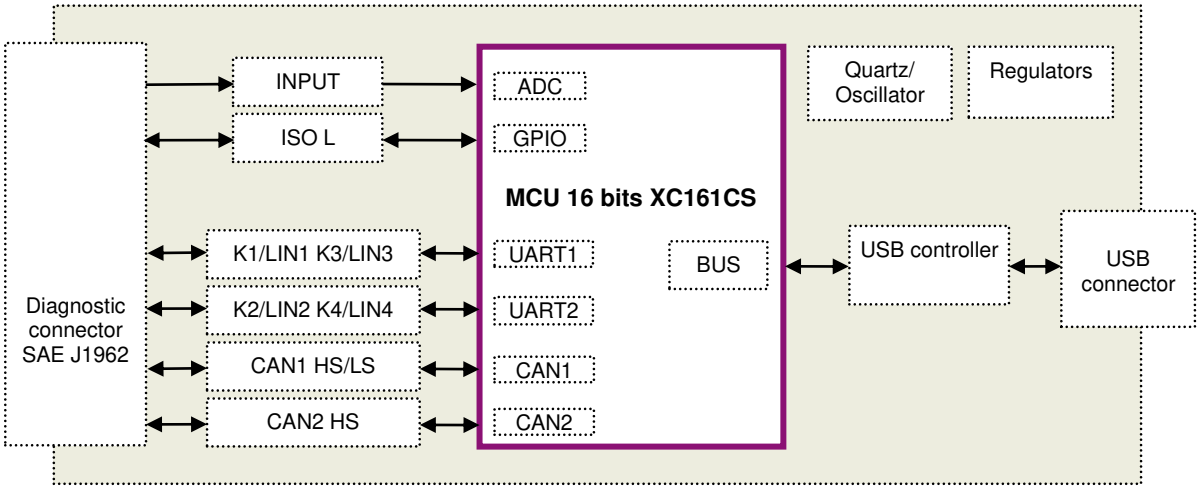
The interface has the following channels:

- 1 CAN high speed or CAN low speed – *fault tolerant* channel to be chosen through the software.
- 1 CAN high speed channel (Norme ISO 11898)
- 2 LIN channels master or slave or ISO9141 to be chosen through the software.
- 2 ISO9141 channels or LIN master to be chosen through the software.
- 2 analog inputs (1 is used for the power supply survey)
- 100 µ sec clock for events timing

The diagnostic channels are managed by the KWP2000 protocol (ISO14230) for K line communication, or by the DiagOnCAN protocol (ISO15765) for CAN communication.

The DLx-MUXDIAGII interface is powered by the USB port of the linked computer or by the linked vehicle's battery.

2.1.2. Synoptic



2.1.3. Main characteristics of the CAN channel

2.1.4. Protocol controller: INFINEON TWINCAN

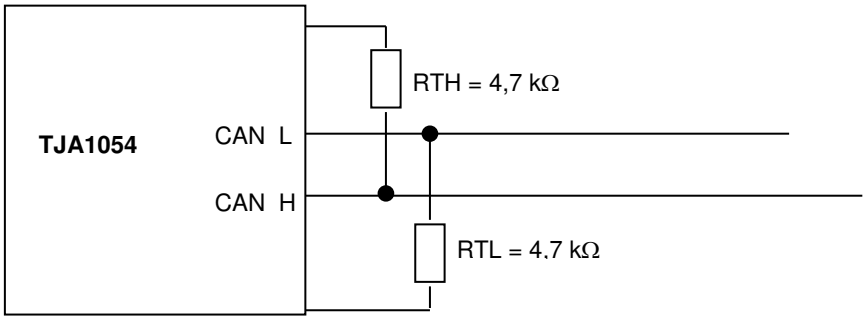
- Standard CAN 2.0B
- Standard identifier 11 bits; extended 29 bits
- Transmission / reception of data up to 8 bytes
- Request for distant transmission (RTR)
- Baud rate up to 1 Mbit/sec
- Spy mode (no acknowledgement or error frame)
- Reading of counters of internal errors
- Detailed information in case of bus error

2.1.5. High speed line interface: PHILIPS PCA82C251

- Standard ISO 11898–24V
- Baud rate up to 1 Mbit/sec
- Channel up to 110 stations on the bus
- Transmission in differential mode
- Short circuit to ground and > 24V battery

2.1.6. Low speed line interface: PHILIPS TJA1054

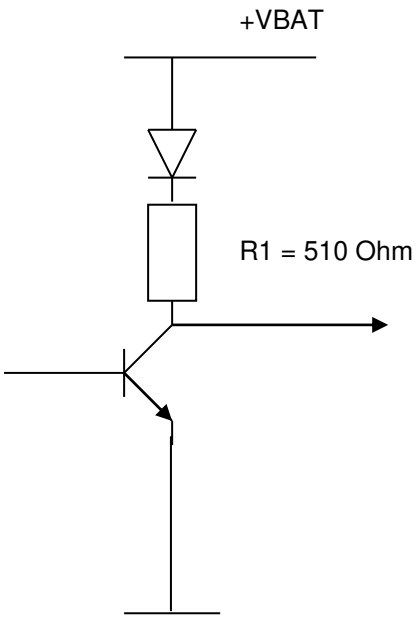
- Baud rate up to 125 Kbit/sec
- Channel up to 32 stations on the bus
- Transmission in differential mode
- Possibility to operate on 1 wire
- Detection and treatment of degraded modes
    - Short-circuit to ground
    - Short-circuit to VCC
    - Short-circuit to the battery
    - Short-circuit between CANH and CANL
    - Open circuit



2.1.7. Main characteristics of the LIN/ISO9141 channel

- Standard ISO 9141 or ISO 14230
- Baud rate of 9600, 10400, 62500 and 125000 Bauds

2.1.8. Line interface : tester mode

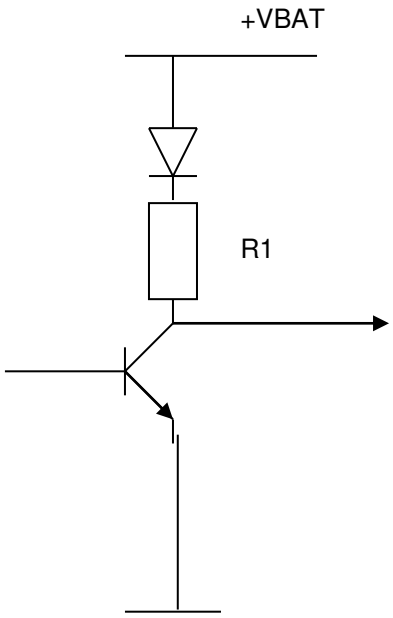


2.1.9. Main characteristics of the LIN channel

2.1.10. Line interface : MOTOROLA MC33661

- Specification LIN Rev 1.2, 1.3 and 2.0.
- Baud rate of 2400 bauds, 9600, 19200 and 20883 bauds
- Pull-up resistor configuration in master or salve to be chosen through the software

Line emitter / receiver



Configuration	R1
LIN master mode	1 K
LIN slave mode	30 K

3. Technical specifications

3.1.1. Characteristics

Presentation	PC interface case for USB bus including : - 2 CAN channels - 2 LIN/ISO channels - 2 ISO/LIN channels
Controller	CAN : 1 Infineon TWINCAN controller LIN/ISO : 2 UART
Line interface	- CAN high speed : TJA1040 - CAN low speed : TJA1054 - LIN/ISO: MC33661
Digital inputs / outputs	- 1 analog or digital input 0-16V - 1 analog or digital input power supply supervision (battery voltage measurement) – detection level 5 Volts ± 5%
Connector	16 pins diagnostic connector (SAE J1962)
PC/POCKET PC interface	USB bus 12 Mbit/sec
Dimensions	140 x 58 x 23 mm
Power supply	Provided by USB bus or vehicle (6-36V)
Consumption	Standby mode< 30 mA (12V) Active mode < 200 mA (12V)
Storage temperature	-40 to +85°c
Operating temperature	-20 to +70°c
Isolation	Not isolated

3.1.2. ECM Compatibility

- EN 55022 (98) + A1 (00) Mesures des perturbations rayonnées en cage full anéchoide
- EN 55022 (98) + A1 (00) Mesures des perturbations conduites Alimentation AC
- EN 61000-4-2 (95) + A1 (98) + A2 (01) Immunité aux décharges électrostatiques
- EN 61000-4-3 (02) + A1 (02) Immunité aux champs électromagnétiques rayonnés 2 faces
- ISO 7637 (02) Immunité aux perturbations conduites (pulse 1, 2a, 2b, 3a, 3b, 4, 5)

4. Connector

4.1.1. 16 pins J1962 connector

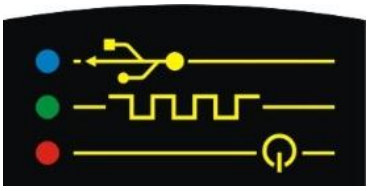
Pin	Name	Denomination
1	EANA	Analog input (+APC)
2	N.C.	Reserved
3	CANHS1_H	CANH line – bus CAN high speed n° 1
4	GND	Tester ground
5	GND	Signal ground
6	CANHS2_H	CANH line – bus CAN high speed n° 2 (EOBD)
7	KWP1	K line (KWP 1/LIN 1) (EOBD)
8	CANHS1_L	CANL line – bus CAN high speed n° 1
9	CANLS1_H	CANH line – bus CAN low speed n° 1
10	CANLS1_L	CANL line – bus CAN low speed n° 1
11	KWP2	K line (KWP 2/LIN 2)
12	KWP3	K line (LIN 3/KWP 3)
13	KWP4	K line (LIN 4/KWP 4)
14	CANHS2_L	CANL line – bus CAN high speed n° 2 (EOBD)
15	KWP1_L	L line – bus KWP n° 1 (EOBD)
16	VBAT	Analog input and power supply (vehicle's battery)

4.1.2. USB connector

Mini-B type USB connector

Pin	Name	Denomination
1	VBUS	Power supply : +5V
2	D-	Communication signal
2	D+	Communication signal
4	GND	Ground

4.1.3. LEDs



The LEDs indicate:

- Blue ON: correct link with the PC.
- Blue FLASHING: communication with the PC on the way.
- Bleu OFF: No more link with the PC, peripheral deactivated or in stand-by mode ; may also indicates a trouble with USB.

- Green ON: Problem with the embedded software.
- Green FLASHING (slow): correct execution of the embedded software.
- Green FLASHING (quick) : communication with the PC on the way.
- Green OFF: no embedded software, it is needed to reload the software (only if blue and red LEDs are ON).

- Red ON : Correct power supply of the interface.

All LEDs OFF: the interface is not powered or deactivated or in USB stand-by mode.

5. Datalogger function

Beyond a simple communication interface, the DLx-MUXDIAG-II proposes also an "autonomous datalogger" function

5.1. Versions

It exists in 2 versions:

DLO, Data Logger Open, specific "open" box offering a direct access to the memory card. The card can then be easily removed for data extraction using an external CF card reader or simply for its replacement by a higher capacity memory.

DLC, Data Logger Close, specific "close" box preventing access the access to the memory card or its exchange.

5.2. Memory card

The memory card which is delivered with your datalogger has a 4Gio capacity. This capacity can be extended to 8, 16 or 32Gio.

Warning, it is strongly recommended to use exclusively memory cards validated by us.
We do not guarantee the data writing integrity on cards which have not previously being delivered or approved by us.

5.3. « DLC » PC application

The DLx-MUXDIAG-II datalogger function requires the use of a specific PC application allowing the creation of triggers and the configuration of the start and stop conditions, and the recovery of logged data.

This PC application named « DLC » (Data Logger Control) is at your disposal on your « Kit_CD_MUX » as well as on the downloading area of our website www.exxotest.com

A specific documentation is devoted to this application.

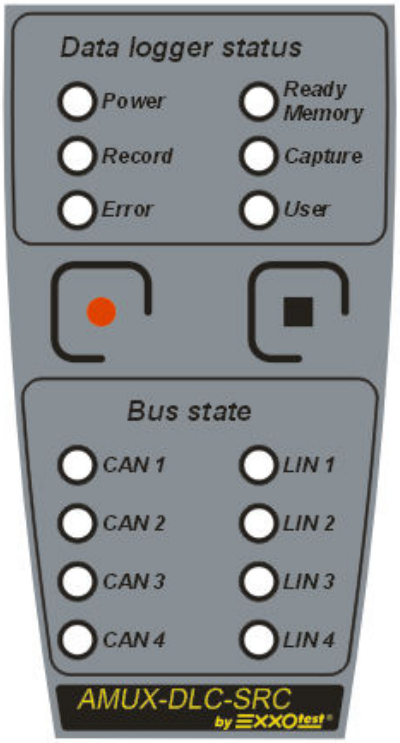
5.4. Remote control

A dedicated remote control is systematically delivered with your datalogger.
The use of this remote control is not essential but it allows, beyond manual logging start and stop, to clearly visualize the working status of the datalogger.

5.4.1. Characteristics

Working temperature	-0°C- to +65°C (1)
Storage temperature	-20°C- to 65°C
Power supply	3.8V
Consumption	Lower than 1.5 mA
Connectors	Mini-USB

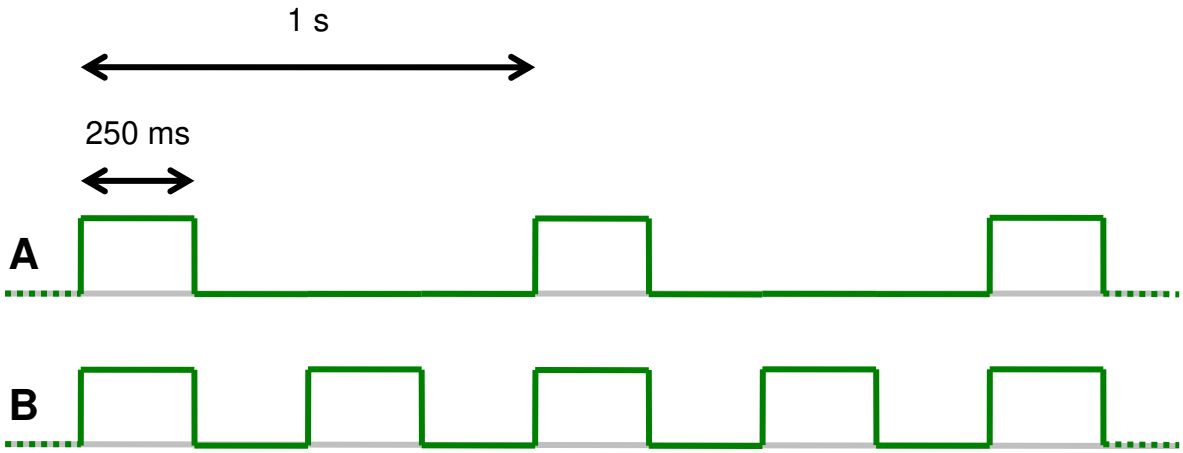
(1) Due to the battery. -20°C +65°C for the wake-up (battery's charge)



5.4.1. Functional description

Principle of flashing LEDs on the remote:
During a total period of 1 second, each diode can turn on 1, 2 or 3 times during 250ms to indicate the following modes:

- mode A for a slow flashing,
- mode B for a quick flashing.



Operation of the 6 top LEDs

Power

1) The green "**Power**" diode lights **fixed light** to mean the power of the logging device. It stays **OFF** when the datalogger is in "Stand-by" mode

Record

1) The blue "**Record"** diode stays **OFF** if no recording is in progress.
2) The blue "**Record"** diode lights **fixed light** during the recording period, until receiving a stop condition.
3) The blue "**Record"** diode **flashes rapidly (mode B)**, during the recording phase of post-trig, since the presence of the stop condition until the timer expires.

ERROR

1) The red "**Error**" diode lights **fixed light** when a technical problem occurs in the datalogger:
    a. Full memory error
    b. Loss of I2C communication
2) The red "**Error"** diode **flashes rapidly (mode B)**, in case the associated box or interface does not have any "**DLC**" license.
3) The red "**Error**" diode stays OFF at the moment of powering the datalogger.

Note: a "hardware" timer of 3 seconds is implemented into the remote control to delay the lighting of this diode and then avoid its untimely lighting at each powering.

Memory

1) The green "**Memory**" diode stays **OFF** if no recording program is installed in the datalogger or if the free memory space is lower than 5%.
2) The red "**Memory**" diode stays **OFF** if no recording program is installed in the datalogger or if the free memory space is higher than 25%.
3) The green "**Memory**" diode lights fixed light if a recording program is installed in the datalogger or if the free memory space is higher than 5%.
4) The red "**Memory**" diode lights fixed light if a recording program is installed in the datalogger or if the free memory space is lower than 25%.

*Note: The "**Memory**" diode lights to indicate that the datalogger is ready to work, the color shows the occupied memory space rate: **green** from 0 to 75%, **orange** from 75 to 95%, **red** over 95%. In case the memory is full, the red "**Error**" diode also lights.*

Capture

1) The yellow "**Capture**" diode stays OFF if no record has been realized since the opening of the session.
2) The yellow "**Capture**" diode lights fixed light if at least 1 record has been realized since the opening of the session.

User

1) Bicolor diode lighting accordingly to the status of its associated triggers or conditions (1 for the green diode, 1 for the red diode)

Note: To avoid any untimely lighting of the « error » diode at the remote control powering, the display of all diodes is delayed of 1 second.

Diode Status	OFF	mode A 1 impulsion (Slow)	mode B 2 impulsions (Quick)	Fixed light
POWER	No power	N/A	N/A	Power OK
RECORD	No recording in progress	N/A	"Post-trig" recording in progress	Recorging in progress
ERROR	OK	N/A	N/A	Datalogger failure
MEMORY green	No file	N/A	N/A	0 to 95% of memory space occupied
MEMORY red	No file	N/A	N/A	75 to 100% of memory space occupied
CAPTURE	No new record	N/A	N/A	At least 1 new record
USER green	According to configuration file	Not defined	Not defined	According to configuration file
USER red	According to configuration file	Not defined	Not defined	According to configuration file

Working of the 8 down LEDs

Diode status	OFF	Mode B GREEN	RED ON And no valid frame	MODE B RED Valid frames and CAN Errors	ON green
CAN 1	CAN 1 not selected	CAN 1 in communication	Communication error on CAN 1	Com. fault on CAN 1 and valide frames	CAN 1 selected
CAN 2	CAN 2 not selected	CAN 2 in communication	Communication error on CAN 2	Com. fault on CAN 2 and valid frames	CAN 2 selected
CAN 3	CAN 3 not selected	CAN 3 in communication	Communication error on CAN 3	Com. fault on CAN 3 and valid frames	CAN 3 selected
CAN 4	CAN 4 not selected	CAN 4 in communication	Communication error on CAN 4	Com. fault on CAN 4 and valid frames	CAN 4 selected
LIN 1	LIN 1 not selected	LIN 1 in communication	Communication error on LIN 1	Com. fault on LIN 1 and valid frames	LIN 1 selected
LIN 2	LIN 2 not selected	LIN 2 in communication	Communication error on LIN 2	Com. fault LIN 2 on and valid frames	LIN 2 selected
LIN 3	LIN 3 not selected	LIN 3 in communication	Communication error on LIN 3	Com. fault on LIN 3 and valide frames	LIN 3 selected
LIN 4	LIN 4 not selected	LIN 4 in communication	Communication error on LIN 4	Com. fault on LIN 4 and valide frames	LIN 4 selected

5.4.2. Buttons working

"Start" button

	Opened session		Closed session
	Recording in progress	**No recording in progress**	
Short push	---	Starts a new record	Starts a new recording session
Long push	---	---	---

The "start" button allows the wake-up of the datalogger in standard stand-by mode and extended stand-by mode, applying a voltage onto the USB power supply, due to an accumulator.

"Stop button"

	Opened session		Closed session
	Recording in progress	**No recording in progress**	
Short push	Stops record	---	---
Long push	Stops record and closes the recording session	---	---

6. Drivers

6.1.1. Drivers history

6.1.2. USB Drivers

Until now, two drivers allowed the installation of EXXOTEST® USB interfaces

- The 1st one, based on a proprietary development kit (JUNGO), named WINDRIVER in our applications, is now obsolete and its support will be interrupted on next March 1st 2012.
- The 2nd one, based on a Microsoft development kit, named EXXOTEST or EXXOTEST_USB in our applications replaces now the 1st one.

Both of them are supported by a same “generic” software library “MUXDLL.dll” since its 6.1.7 version.

6.1.3. Windriver drivers

« Windriver » is the historical « Jungo » driver used since the first EXXOTEST® hardware and software developments.

It is now obsolete and its support will be interrupted on next March 1st 2012.

6.1.4. Exxotest v1.x and v2.x drivers

The development of the “Exxotest” driver was justified by the needs of performances which were not covered by the “Windriver “ version and by the will of ANNECY ELECTRONIQUE to fully master the scalability of its actual and next generations of MUX interfaces.

Again in a way of performance, especially justified by the need to offer a driver version compatible with 64bits Windows OS, the Exxotest driver has undergone a major overhaul in 2011 to reach a version now identified 2.x

Supported operating systems

Operating system	Exxotest V2.x driver	Exxotest V1.x driver
Windows 2000	Not supported	Supported
Windows XP (32 bits version)	Supported	Supported
Windows XP (64 bits version)	Supported	Not supported
Windows Vista (32 bits version)	Supported	Supported
Windows Vista (64 bits version)	Supported	Not supported
Windows 7 (32 bits version)	Supported	Supported
Windows 7 (64 bits version)	Supported	Not supported
LINUX	Under development	Not supported

6.1.5. PCI drivers

Supported operating systems

Operating system	Exxotest V2.x driver	Jungo 6.03 driver
Windows 2000	Not supported	Supported
Windows XP (32 bits version)	Supported	Supported
Windows XP (64 bits version)	Supported	Not supported
Windows Vista (32 bits version)	Supported	Not supported
Windows Vista (64 bits Version)	Supported	Not supported
Windows 7 (32 bits version)	Supported	Not supported
Windows 7 (64 bits version)	Supported	Not supported
LINUX	Not supported	Not supported

6.1.8. Warning

This new generation of drivers covering all XP to Seven, 32 and 64 bits Windows operating systems for USB and 2000 to XP 32 bits Windows operating systems for PCI, is now available on the "downloads" webpage of www.exxotest.com and in our "KIT CD MUX" in the form of an utility named:

« EXXOTEST® Driver Kit and utilities »

All EXXOTEST® applications and utilities available on the Exxotest downloads webpage of and in our "KIT CD MUX" have been updated to run optimally with this new generation of drivers:

- MUXTRACE EXPERT – 4.86 version or higher
- DLC / DLC Light – 1.19 version or higher
- MUXSERVER – 1.25 version or higher
- USBMAJ – 2.13 version or higher
- DCP – 1.14 version or higher

If you do use EXXOTEST® communication interfaces with third party applications (car manufacturer, component manufacturer, test bench, …), **you should ensure** that the designers and / or suppliers of these applications have approved the use of these new drivers and updated their applications accordingly.

In the absence of information of providing of these new drivers from them side, we recommend the continued use of the Exxotest driver v1.47 (USB Driver Kit 1.47 installer)

6.1.9. Installation

6.1.10. Installation goal

The new driver installation goal is to improve the performances of applications working with EXXOTEST® card and interfaces through USB and PCI buses.

6.1.11. Warning

To support this update, any application which is not provided by Annecy Electronique and which works with Exxotest card or interface (proprietary application) must realize a "dynamic load" of the software library or being recompiled with this new library.

You are strongly advised to check with people who develop these applications before performing this driver update.

6.1.12. Driver installation and applications update

The driver update will be performed accordingly to following steps:

- Either from the KIT CD MUX (if 2012 version or higher) that came with your EXXOTEST® card or interface, or from a downloaded version from the www.exxotest.com downloads webpage, execute the installation file :

  « **Exxotest_MUX_driver_kit_2.x.x** »

- EXXOTEST® applications update:

  - MUXTRACE EXPERT – 4.86 version or higher
  - DLC / DLC Light – 1.19 version or higher
  - MUXSERVER – 1.25 version or higher
  - USBMAJ – 2.13 version or higher
  - DCP – 1.14 version or higher

- Update of the software libraries (MUXDLL.dll) associated to your proprietary (non EXXOTEST®) working with EXXOTEST® card or interfaces.
  Attention: Check with the supplier or service responsible for distributing these applications to the good compatibility of these applications before installing the EXXOTEST® Driver Kit and utilities v2.xx

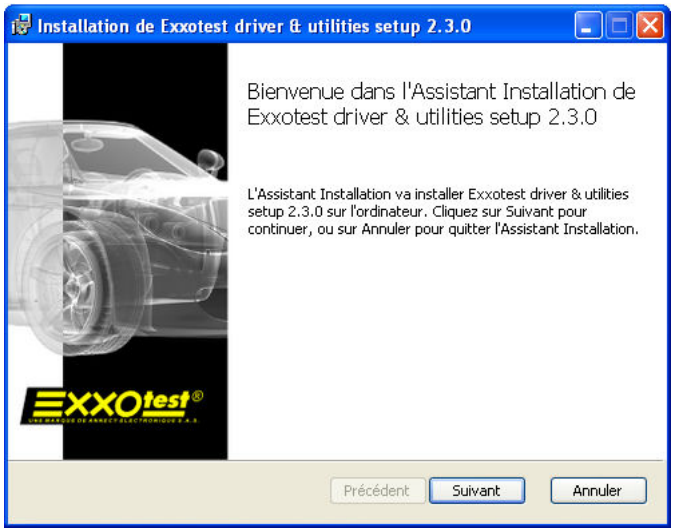
- Update of the firmware of your EXXOTEST® interface (USB only) using the USBMAJ utility version 2.13 or higher.

6.1.13. Execution of the installation file

Step 0 : Place the installation CD that came with your hardware in the CD drive of your computer, select the « Drivers » page and launch the installation of the « **Exxotest_MUX_driver_kit_2.x.x »** file or visit the download area of the www.exxotest.com website to download and execute this file's latest version.

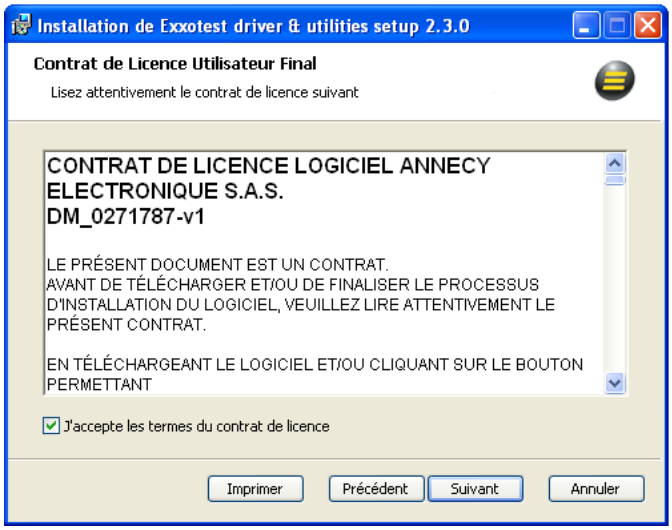
Step 1 : Starting the drivers installation

We recommend you at this step to check that no USB EXXOTEST® is connected to your PC
.



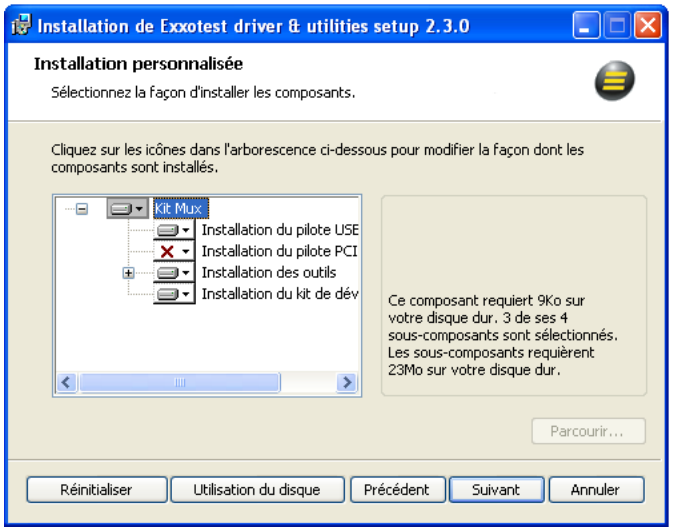
Click on « Next ».

Step 2 : Final user license contract agreement



After reading of the license contract, tick « I accept » and click on « next » to continue the procedure.

Step 3 : Installation options selection

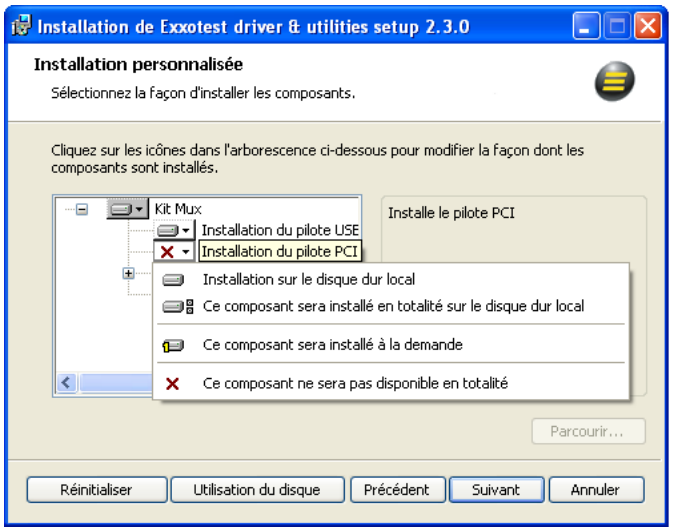


Select or unselect the options to be installed accordingly to your needs.

We therefore recommend you to keep the default configuration.
Click on « Next » to continue.

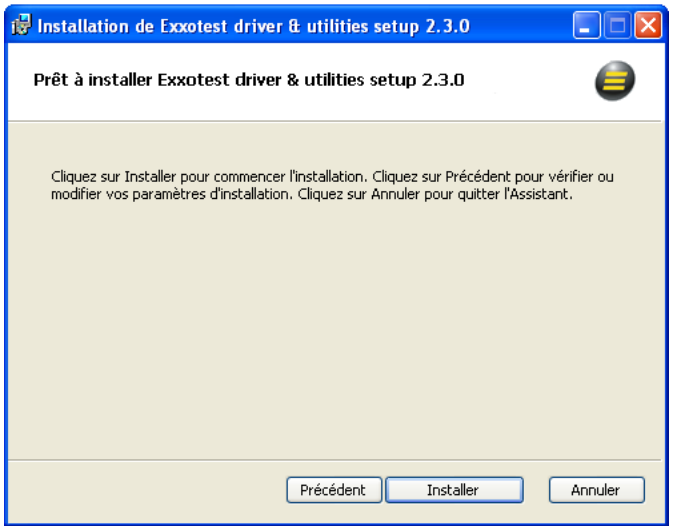
WARNING: PCI cards users, the PCI driver installation is not activated in the default configuration. WE then recommend you to proceed as described here below.

Etape 3 bis : PCI card users only



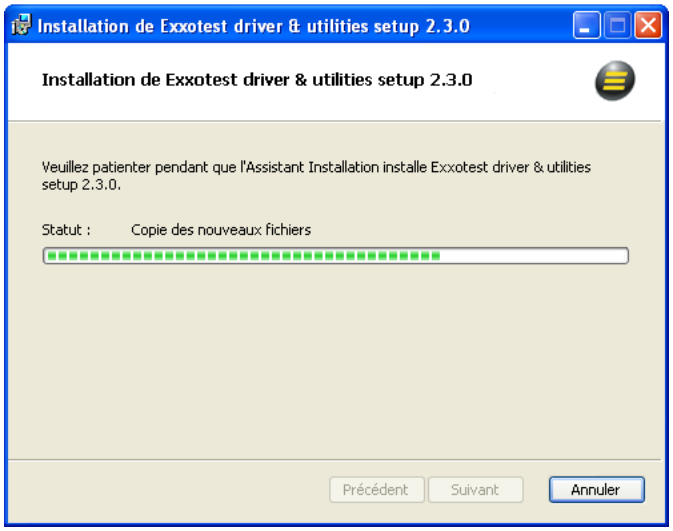
Click on the button in front of “PCI driver installation”, select the option and click on “Next” to continue.

Step 4 : Starting the installation



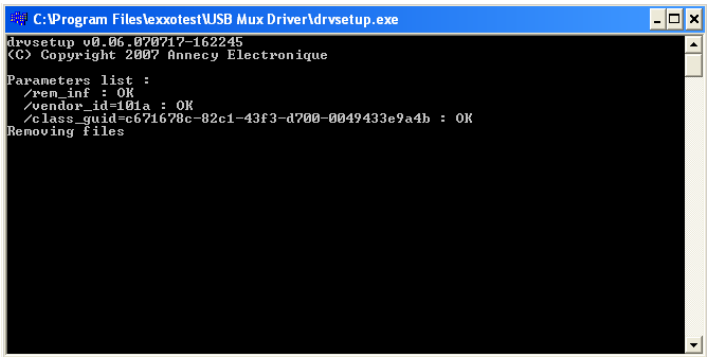
Click on “next » to start the installation as configured previously.

Step 5 : Installation



Installation in progress, no action from your part is required.

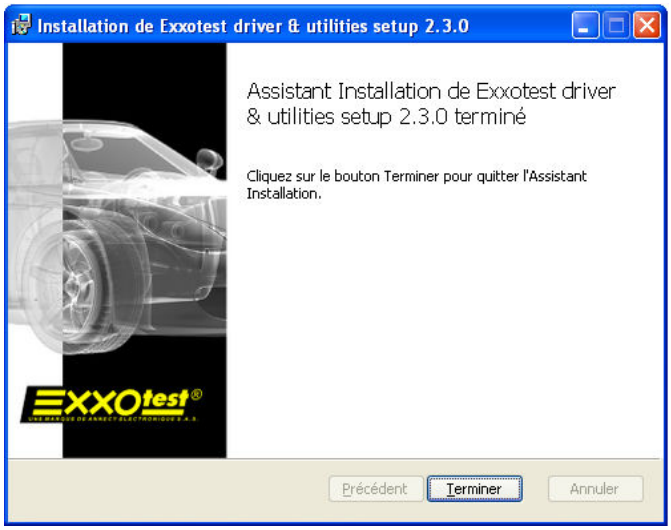
Note: the status indicator may, in certain operations stand still for several minutes.



Deleting of oldest drivers found on your PC

No action from your part is required.

Etape 6 : End of installation

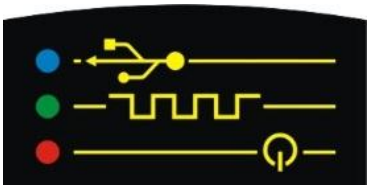


Click on « Finish » to end the installation.

You can now connect your interface(s) to the PC, they will be automatically detected and installed.

7. Troubleshooting

7.1.1. Indications apportées par l'état LEDS de l'interface



The LEDs indicate:

- Blue ON: correct link with the PC.
- Blue FLASHING: communication with the PC on the way.
- Bleu OFF: No more link with the PC, peripheral deactivated or in stand-by mode ; may also indicates a trouble with USB.

- Green ON: Problem with the embedded software.
- Green FLASHING (slow): correct execution of the embedded software.
- Green FLASHING (quick) : communication with the PC on the way.
- Green OFF: no embedded software, it is needed to reload the software (only if blue and red LEDs are ON).

- Red ON : Correct power supply of the interface.

All LEDs OFF: the interface is not powered or deactivated or in USB stand-by mode.

7.1.2. Technical support

In case of any failure or help need during or after this installation, please feel free to contact our technical support « MUX »:

- **E-mail : support.mux@exxotest.com**

- **Phone: +33 (0) 450 02 34 34**

ANNEX: Optional adapter AMUX-2C2L

Pinout

SUB D9 CAN HS1 / ISO 1	
2	CANL
3	GND
4	ISO1/LIN1
7	CANH
8	L Line ISO1

SUB D9 CAN HS2 / ISO 2	
2	CANL
3	GND
4	ISO2/LIN2
7	CANH

SUB D9 CAN LIN3 / ISO3	
1	Ana. Input (+APC)
3	GND
4	LIN3 / ISO3
9	Power supply. + BAT

SUB D9 CAN LS / LIN4	
2	CANL
3	GND
4	LIN4 / ISO4
7	CANH

Successive editions list

Version	Date	Created / modified by
1	16/05/2012	Gaël PERAGOUX
Modification		
Document's creation (full new version)		
Version	**Date**	**Created / modified by**
Modification		
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