

SOFTWARE DC4D MONITOR

Communication between PC and DigiLSU can be achieved only with the cable USB-TTL from FTDI. Reference TTL-232R-5V-AJ is sold as an option.

DC4D Monitor is the same application as DigiLSU Monitor. The user interface adapts to the detected module. For commercial reasons, the file name has not been changed.

MINIMUM SET

- Screen: 1366 x 768 (full HD 1920 x 1080 recommended).
- Processor: Pentium.
- Connectivity: USB1.1 Port.
- OS: Windows XP, Vista or W7 Home, W7 professional recommended.
- FTDI TTL-232R-5V-AJ cable

INSTALLATION

The FTDI cable is not any cable but an USB accessory. FTDI brings an electronics conversion integrated into the USB connector. Like any USB device is important to install the program before you first connect the cable to the USB port. The reason is to ensure the presence of the "drivers" on the computer for the installation of an USB device.

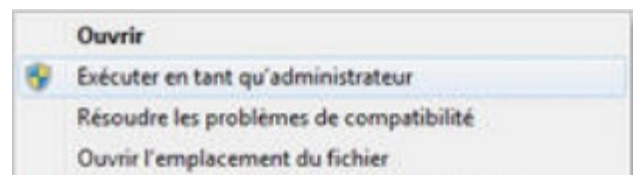
If you have already installed a previous version of the program, do not have to reinstall the "drivers" unless you have to update them.

Do not connect the cable to the USB port before installing the "drivers".

If you install a new version, it is important to uninstall the previous version with the “uninstall” tool from the program or using the Windows tool (Control Panel / Programs / Uninstall program).

Execute the file "InstDigiLSU_Monitorxxx.exe" (in administrator mode if your operating system is windows7) and follow the instructions.

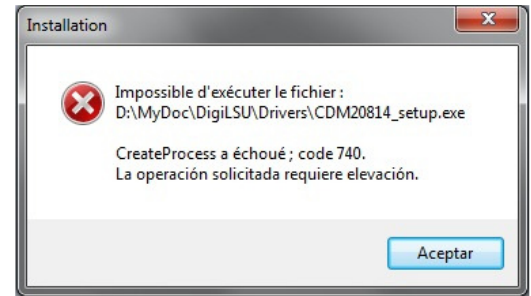
To start the installation in administrator mode, right click with the mouse on the executable file and choose "Run as administrator".



At the end of the software installation, choose or not the option install the drivers. Remember that if you have not started this installation in administrator mode, drivers will not be installed.

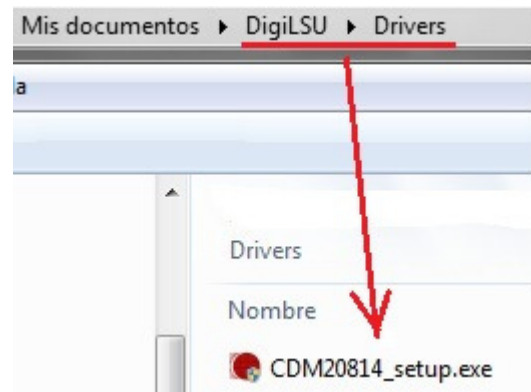


If you get this message when you install drivers is that the installation process was not started in administrator mode. Uninstall and repeat with the right way.



Depending on permission levels to Windows, some problems could be occur to install drivers from the installer. To ensure the drivers installation it is recommended to do it manually as follows:

An alternative to install drivers without passing through the entire installation process is to run the file "CDMxxxxx_Setup.exe" present in the applications folder then subfolder "Drivers" (in administrator mode for windows7).



APPLICATION START

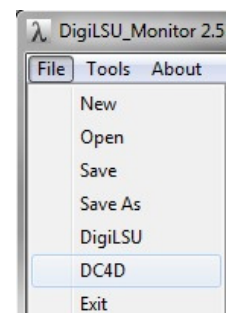
When the program starts, it scans available COM ports (up to 32) to find the device connected. It is preferable to connect the cable and to have the device fed before this process. The program save in memory the last COM port used to use it first in the next program start. That gets faster start and the program is ready almost immediately.

In case the software has not found the device, you can do a manual search by clicking on "Search COM port".

Important: To quit the program once initiated communication with the device is important to close the application before removing the USB connector of the PC. The program is not able to detect that the serial port is missing and will lock wasting unsaved information.

Module identification

The identification is automatic if the communication with a module is established. If no module is connected (offline work) it is possible to manually choose between DigiLSU and DC4D.



MAIN PAGE



1. Windows of values received in real time from device.
 - In green, the values are updated.
 - In yellow, no data is received with the proper period.
 - In grey, communication has been lost.
2. Channel name. Special case of channel A / F: the stoichiometric coefficient is shown in reminder.
3. Channel value at the cursor position.
4. Selection of the richness unit for the oscilloscope window (richness, lambda, A / F, O2 or mV).
5. Display of diagnostics chain measure.
6. Control buttons communication.
 - “Search Display”: Starts the search COM port if the automatic mode failed.
 - “Display Info”: Display internal data updates (software version, hardware ...).
 - This communication also restarts if it has been stopped due to a DigiLSU timeout.
 - “Stop Frames” stops receiving data and freezes the displayed values.
7. Oscilloscope window.
8. Windows to read values from the four CAN channels. The Checkbox shows or hides the graph of the channel in the window oscilloscope.
9. Scale setting of time in seconds of the oscilloscope window. When the curves reach the end of the window, they move to the left 10% of the window width.
10. Buttons control data recording.

Bar below the window information

The bar shows the following information:

- COM port number where DigiLSU detected.
- Serial number, firmware and hardware version of the module connected.
- Level of use: "basic" or "expert." The level "basic" cannot change the DigiLSU internal settings except the four CAN channels. These are just reading the CANbus and do not affect the operation of the measurement chain. The sensor WinjNet is also accessible in the "basic".
- Time of use of the sensor. Measuring time only when the sensor is in operational mode (100mV < Vin < 4900mV).
- Level of buffer memory to record data (see details data recording).
- Date and time.

Description of the values on screen

Values	Description	Unit	Resolution
Vout	Value in mV of the analog output.	mV	1 mV
Richness	Measure of richness		0,001
Lambda	Richness in « lambda » (1/richness)		0,001
O2	Ratio of oxygen present in the exhaust gases. The value is negative when the richness is higher than 1.	%	0,01%
A/F (or AFR)	Ratio "air / fuel" parameter calculated from the richness. It is important to know the fuel stoichiometric coefficient to make the correct calculation.		0,1
Vin.	Analog input voltage	mV	4.88mV
Vlux.	Light sensor voltage.	mV	4.88mV
Vbat	Battery voltage	V	0,1V
Channel5	Analogue input value after conversion values		
Klux	Light reduction coefficient computed from light sensor	%	0,1%
Channel	Channel selected on the display		
Fuel Type	Bargraph scale selected on the display		
Brightness	Light intensity selected on the display		

Description of diagnostic

The background color is green if the diagnosis is correct and turns red if a fault is detected.

Libellé du flag	Description
Right Push	Red if right button is pushed
Left Push	Red if left button is pushed
Analog Mode	Red if richness value come from analog input
CAN Mode	Red if richness value come from CAN bus
Show Msg	Red if a message is screened on the display
CAN	The CAN error counter is not zero. This error counter is incremented when a CAN transmission error is detected and decremented when a message is transmitted without error.

Window Management oscilloscope

Richness channel selection

Select the appropriate scale of richness with the box option "4" (see the image of the main screen).
The richness scale appears in the left side of the window and the time scale in seconds on the basis.

Zoom in

To zoom in, press the right mouse button and slide holding the button down.

Zoom out

To zoom out, press and release the right mouse button without moving. The time scale is increased by 10% each time.

Displacements

The cursor becomes a hand by pressing the left mouse button. Holding it down, slide your hand to move the graphics.

Values at the cursor

The cell values "3" indicate the values of each channel depending on the location of the cursor.

Show or hide channels

It shows or hides each CAN channel by clicking the checkbox for every channel name.

Selection of the timescale

With the list box "9" you can choose the time scale of the oscilloscope window.
If communication is established and data recording on, the curves are shifted 10% to the left when they reach the end of the window. If you have made a zoom, it disappears when the signals reach the end of the window.

Management of data recording

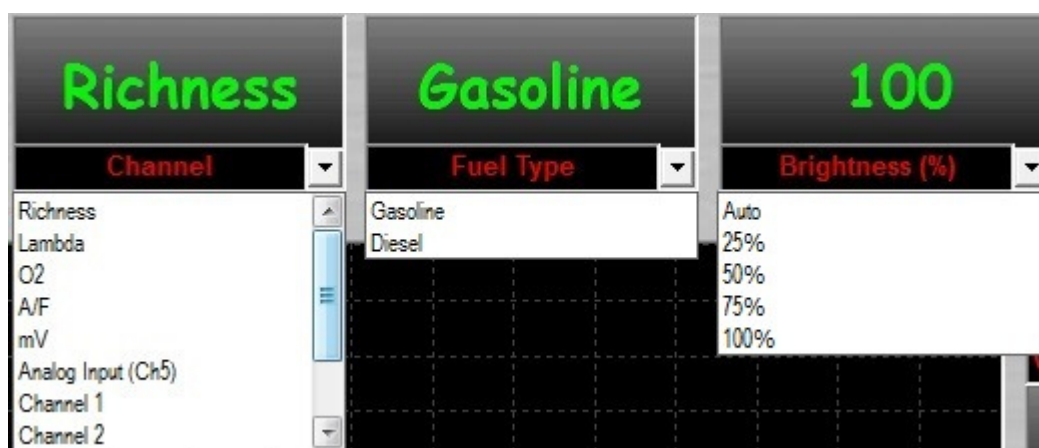
DC4D Monitor saves the last 21 minutes data from display. After this time, the oldest data is deleted (circular memory).

When you start, the program activates the default data recording. You can freeze the graph to enlarge or scroll the image without losing the data continues to be recorded. To reactivate the screen, click the green arrow and recent values appear with the defined time scale.

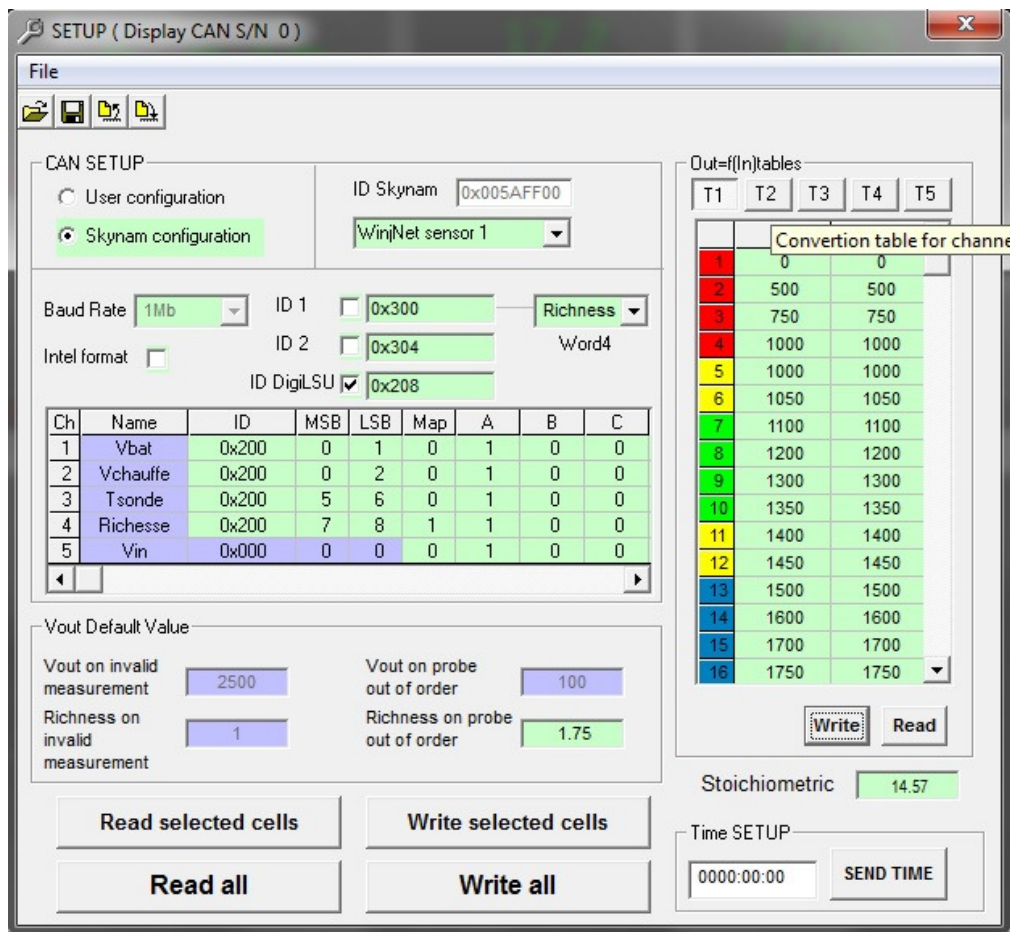
We can stop recording data with the red square button. To save the data to a file, you must stop recording and then display the menu "File / Save" or "File / Save as".

Screen configuration remote control

It is possible to change the display of DC4D accessible via three drop-down lists on the main screen. Simply select the channel, the type of scale or the intensity and configuration will be automatically sent to the display.



SETUP



As a general rule, the cell background becomes coloured according to the origin of value.

- White: default value or previous settings.
- Green: the value comes from the Device.
- Blue: the value comes from reading the configuration file.
- Red: the value has been changed by the user.

USE LEVELS

The DC4D is sold with two levels of use: Basic and Expert. This level is defined in device memory. To find out what level you have, see the information bar "User level" on the bottom of the screen.

“BASIC” LEVEL:

The level "basic" allows you to modify only the CAN reception settings to prevent changes that may affect the performance of the measurement chain.

The WinjNet channel of Skynam protocol will be also modifiable.

“EXPERT” LEVEL:

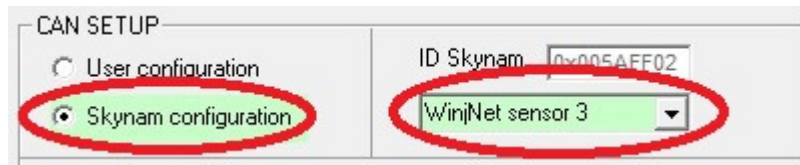
- Allows to set the type of protocol and CAN parameters (baud rate, format, identifier).
- Allows setting the output voltage depending of the richness, allowing a linear voltage. Example: 0 of richness = 0V, 1 of richness = 1000mV.
- Allows setting the values of analog and CAN output in case of failure or breakdown of the measurement chain
- Allows managing the usage time of the sensors.

CAN SETTING

Skynam configuration

If you use a calculator Skynam (Sybele), the richness of analog information read by the display can be sent on the CAN bus protocol Skynam.

To do this, simply select the protocol and choose the appropriate sensor number.



Standard configuration

The richness information and other can also be sent on the CAN bus with the protocol described below.

Select the same communication speed than your CANbus. All nodes on the bus must have the same speed. Choose the Motorola format (default) or Intel. Motorola format sends the most significant byte, MSB, first followed by the least significant byte, LSB, in the case of double-byte information. Intel does the reverse, LSB first and MSB last.

Enter the ID for the two posts. The identifier is written in hexadecimal and may be 11bit or 29bit. To differentiate the two cases, the format is "0xXXX" for 11bit and "0XXXXXXXX" for 29bit. Example: ID 400 hexa will be "0x400" for 11bit and "0x00000400" for 29bit.

In case of Skynam CAN bus use, all auxiliary messages sent must have 11bit identifier

Each message sent must have a different ID. The first message (ID1) is eight bytes long:

Motorola Format:

Byte (ID1)	1	2	3	4	5	6	7	8
Valeur	Vbat	SW/FuelType/Canal	MSB Klux	LSB Klux	MSB Canal 5	LSB Canal 5	MSB Canal richness	LSB Canal richness

Intel Format:

Byte (ID1)	1	2	3	4	5	6	7	8
Valeur	Vbat	SW/FluelType/Canal	LSB Klux	MSB Klux	LSB Canal 5	MSB Canal 5	LSB Canal richness	MSB Canal richness

Vbat : battery voltage with 0,1V resolution

Push Button : Two MSB bit : GDxx xxxx

Fuel Type : Four LSB bits ; 0000xxxx=Gasoline 0001xxxx=Diesel

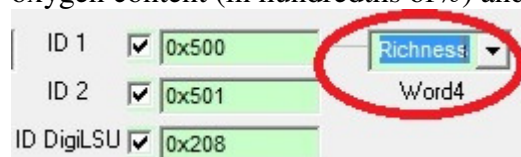
Canal :

Binary value	Decimal value	Channel selected
xxxx 0000	0	Richesse
xxxx 0001	1	Lambda
xxxx 0010	2	O2
xxxx 0011	3	AF
xxxx 0100	4	mV
xxxx 0101	5	Canal5
xxxx 0110	6	Canal CAN 1
xxxx 0111	7	Canal CAN 2
xxxx 1000	8	Canal CAN 3
xxxx 1001	9	Canal CAN 4
xxxx 1010	10	Vbat
xxxx 1011	11	Time

Klux : brightness correction coefficient %.

Canal 5 : Analog input after conversion.

Richness channel : Choice between Vout in mV, richness (in thousandths), lambda (in thousandths), oxygen content (in hundredths of%) and report Air / Fuel (tenths).



The second message (ID2) is composed of four scales of richness:

Motorola Format:

Byte (ID2)	1	2	3	4	5	6	7	8
Value	MSB Vout	LSB Vout	MSB Richness	LSB Richness	MSB Lambda	LSB Lambda	MSB % de oxygen	LSB % de oxygen

Intel Format:

Byte (ID2)	1	2	3	4	5	6	7	8
Value	LSB Vout	MSB Vout	LSB Richness	MSB Richness	LSB Lambda	MSB Lambda	LSB % de oxygen	MSB % de oxygen

The two messages are sent with a period of 10 ms.

Each message can be sent or not sent by crossing its corresponding checkbox.

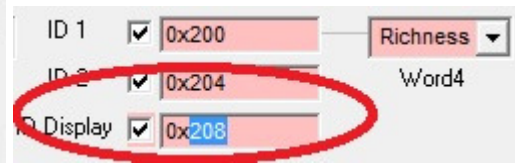
Configuration when DigiLSU is connected to DC4D

On CAN bus concept, IDs of each module must be different to not create conflict message on the bus. If the display is connected to DigiLSU via CAN, the identifier "ID DigiLSU" must be the same on the DC4D as for DigiLSU. In this case, on DC4D, this identifier indicates the READED message on the CAN then in the DigiLSU, this identifier indicates the SENDED message on the CAN bus. There will be no conflict.

On DC4D



On DigiLSU



If DigiLSU or DC4D are used on a Sybele infrastructure (Skynam), these identifiers must be 11bit size (<400 hexadecimal) in order to not conflict communication protocol Sybele.

It is strongly recommended to use the CAN bus for interconnections between DigiLSU and display. This will avoid any measurement errors. However, if the measurement is made in analog form, it is essential to have the output of DigiLSU configured with default values ("Factory set").

Reading Function CAN channels

DigiLSU V2 offers the possibility to read four CAN messages. For that you need to set the following parameters.

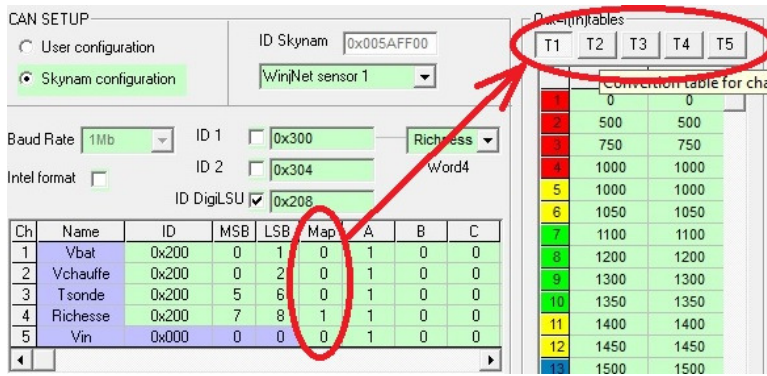
- The channel name
- The identifier (ID) of the CAN message where the channel is
- The position of the channel within the message indicating the position of the MSB and LSB.
- The coefficients A, B, C and D, knowing that the final value $(A * x + B) / (C * x + D)$.
- The number of decimals to display the value
- The scale of the oscilloscope window giving the max. and min. value
- Units
- The color

The DC4D receives only CAN messages with identifiers set in configuration. If an identifier matches, the controller extracts the value inside this message and sends it to the computer who applies coefficients of conversion.

Input values conversion

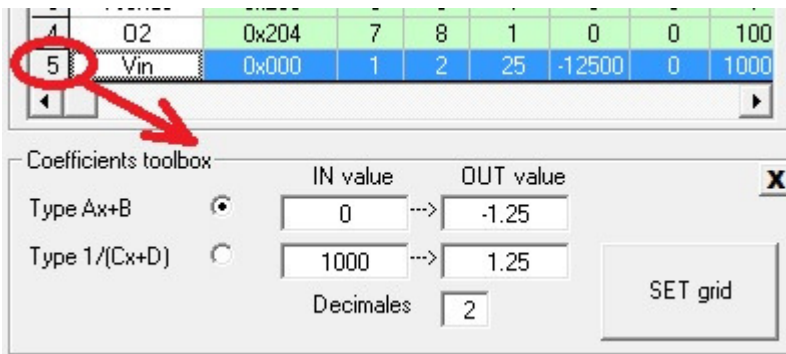
It is possible to change the value or level of the incoming via CAN and / or the value of the analog input values.

To select the type of conversion $(Ax + B) / (Cx + D)$ just do not select a table (MAP = 0).



The coefficients A, B, C, and D must be integers from -32768 to 32767. Intermediate calculations (eg $A * x + B$) may not exceed 2,147,418,112 (4bytes) otherwise overflow.

By clicking on the start of the line, a help window to define the coefficients appears. Simply choose the type of linearization (Ax or $1/x$) then give two matches in the first case or one in the case of a form $1 / x$.



It is advisable to make two voltage measurements point of the external sensor to compensate sensor power supply errors.

The min and max values on the table are used to define the min and max leds. The ignition LEDs progression is linear. The scale will be reversed if the min value is greater than the max.

In the example below, the bargraph will begin to "9" and the number of LED grow right up to "-1".

Ch	B	C	D	Dec	Min	Max	Unit
1	0	0	100	2	30	0	mV
2	0	0	1000	3	0	2	
3	0	0	1	0	0	1000	
4	0	0	100	2	22	-13	%
5	-12500	0	10000	2	9	-1	%

The MAP column indicates the table number (1 to 5) used to convert the corresponding incoming value. The table values must be integers (-32768 to 32767) and the values of the "In" column must be increasing. Each line corresponds to the central value of each LED. This sets LEDs scales fully nonlinear. In the example shown, the richness channel is read manually from the DigiLSU and scale ignition of LEDs has been redefined by the user.

For example, one can, easily convert the DC4D as shift light (if RPM is readable on the CAN bus), fuel level indicator,

Library and tables management

Each channel can be saved or taken from a library. To access to the library, do a right click on the line of the channel that you want to save or change. A popup menu appears. If you select "Add to Library" the channel will be added to the library.

Ch	Name	ID	MSB	LSB	Map	A
1	RPM	0x200	2	1	0	1
2	Twater					
3	Richness					
4	RBV					
5	Vin	0x000	1	2	0	1

If you select "Select From Library", a list of channel names present in library appears.

Then select the desired channel by double click on it and it will be automatically loaded into the table.

To remove a channel from the library, click on the selected and press "DEL" keyboard channel

Ch	Name	ID	MSB
1	RPM	Padm	
2	Twater	RBV	
3	Richness	Richness	
4	RBV	RPM	
5	Vin	Tadm	

This table has independent functions of reading and writing. The button "Factory set" returns to the initial setup of manufacturer.

It is also possible to save these values in a single file. To do this, right click on a table and a popup menu will ask for desired action: read a file or save a file.

Out=f(In)tables					
	T1	T2	T3	T4	T5
	In	Out			
1	233	-40			
2	253	20			
3					
4					
5					

Voltage and value in case of error

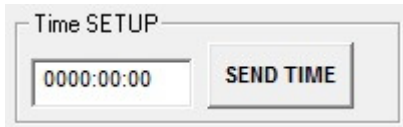
If the analog input is in default, the value of richness is the value set by the user. Other values are useful and available only in the case of DigiLSU.

Vout Default Value	
Vout on invalid measurement	2500
Richness on invalid measurement	1
Vout on probe out of order	100
Richness on probe out of order	1.75

Time management of the sensor use

The use time probe is recognized only when the input voltage is between 100mV and 4900mV (not in default).

The time may be changed manually if the sensor is changed



Enter the time, and then click the button "SEND TIME" to send it to DC4D.

If the display is used with a DigiLSU, this time does not match the used time probe knowing that information is transmitted via CAN. In this case, refer to the time counter on DigiLSU.

Read / Write value from/to the module

The output voltage table is only complete bloc read or writes.

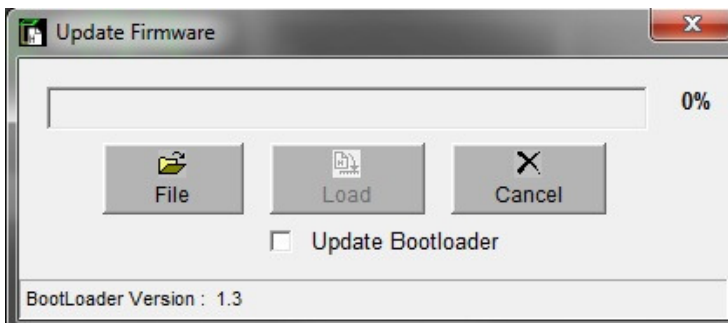
Overs could be read or write by two methods: selected values or all.

In case of read/write selected values, only will be read/write the red ones like "new values".

Doing double-click on each cell, you can change the color for red color like new value.

Changing the firmware

First you must have communication with DC4D before opening the window to load new firmware. Accessed by "menu" then "Tools / Firmware".



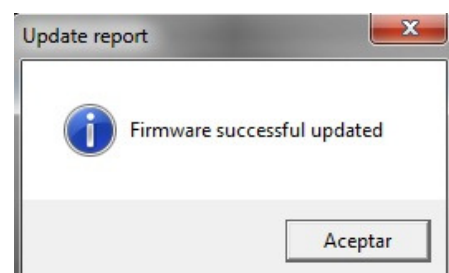
Select the firmware file to load. The filter file of DC4D is ".CDU".

Select the file and click the button "Load" to upload the file into the module. The bar graph indicates the loading progress.

At the end of download, the firmware is installed in its final memory location.

NO NOT DISCONNECT OR REMOVE POWER SUPPLY DURING THESE SECONDS.

Once finished, a message indicates the end of the process.



Writing a new firmware erases the five conversion tables because they are located in the program memory. It is imperative to load them through the "setup" menu.