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DigiLSU V2 Data Sheet

This wide band Lambda sensor control module DigiLSU V2 uses **Bosch LSU 4.9. probe** to measure the engines richness.
It is a very wide band controller which is able to measure both gasoline and diesel engines richness.
This module is a very small dimension high performance microcomputer, one of the smallest on the market if not the smallest, and is integrated into one solid anodized aluminium box.
It has two outputs measure of richness, one analog and one CAN bus, being both completely configurable.
It can be used with an engine management unit or a data acquisition system or a dash board as well.
If you add his specific display, you can directly visualise Engine richness, Lambda, A / F or O2.

LSU4.9 vs LSU4.2

LSU4.9 sensors are better and more expensive than LSU4.2 but we prefer to work with LSU4.9 for the following reasons:

- Mechanically, the connector is smaller facilitating their integration, especially in the motorbikes.
- The sensor heating is secured with a lower voltage, which allows measurements in battery voltage unfavorable conditions, for example in case of faulty alternator.
- Internal electrical characteristics allow more accurate temperature regulation of heating.
- The measuring range is more suitable for diesel engines and their response time is faster.
- The most important point is the internal reference technology. In 4.2. the reference air bag is contaminated with time due to its location in the exhaust gases. That implies a drift and the controller must be calibrated periodically. The 4.9 has an electrical reference therefore not affected by the environment and the driver does not have to be re-calibrated.
- The life of 4.9 is 50% longer than the 4.2.
- Finally, the LSU4.2 not used as first-hand, is only sold as a spared part.

The LSU4.9 is therefore a better product and an investment in the future regarding the LSU4.2.


KIT CONTENT
(May be sold separately)

- One LSU 4.9 sensor (approximate length of 0.60 m, may vary depending on the available references)
- One controller DigiLSU (length 1m)
- One semi-finished wiring (length 1.20m)
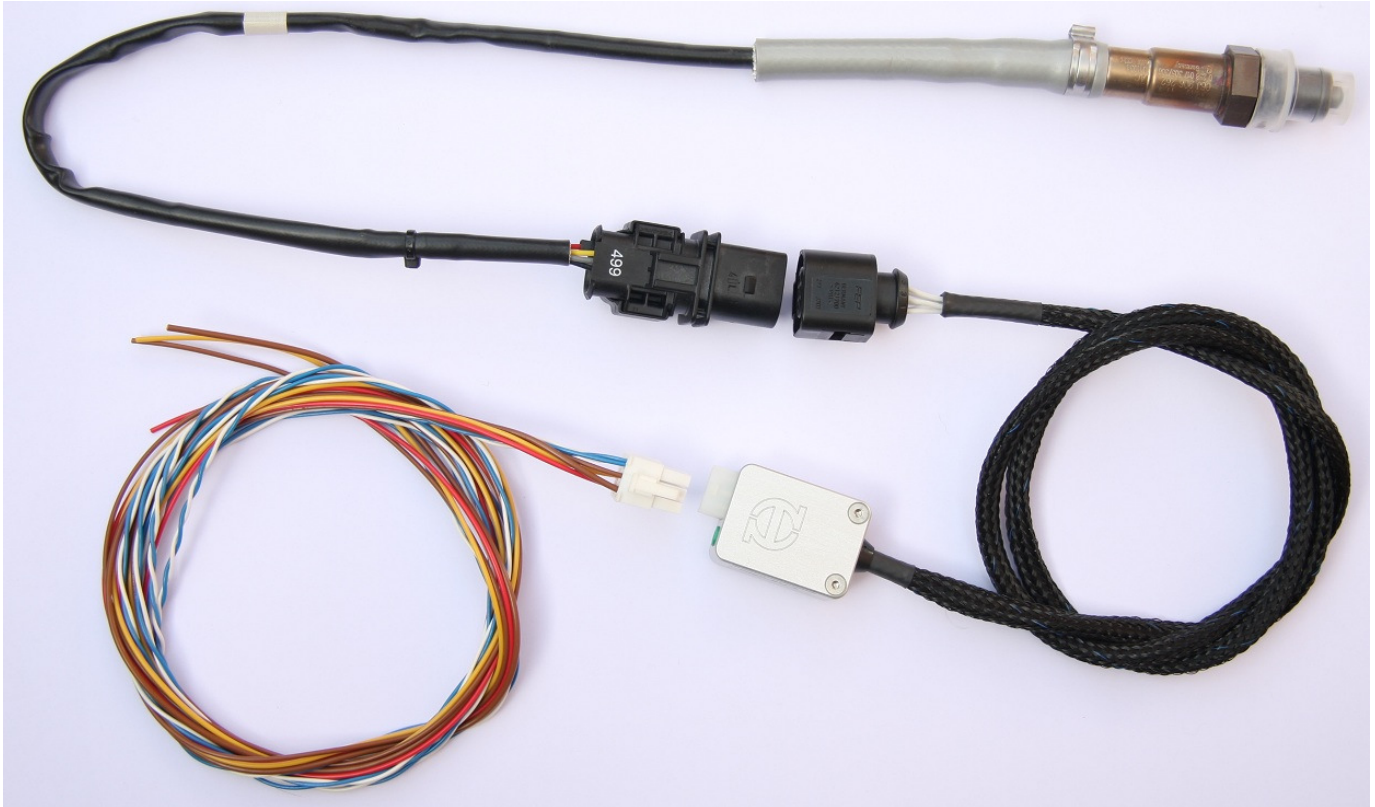
The finish of the probe may differ from the picture depending on the available references.

MECHANICAL DATA

- Overall dimensions: 30x49x17 mm (with connector and without cable)
- Weight: 100g
- Case: Natural anodized aluminum.
- Wiring composed of 6 20AWG tinned copper wire, ETFE sleeve class 150ºC (180ºC peak).
- Wiring semi finish: 3x 0.5mm2 (12V, GND, signal), 4x0.35mm2 (CAN), 1x1mm2 (PGND) class 105ºC
- Halogen free braided sleeve, resistant to temperature of use maxi 170 ° C (200 ºC peak)
- Cable length of the sensor: 0.96 m
- Maximum use temperature of electronics: 70 °C
- Electronics: IP67 (The electronics are fully sealed with epoxy resin)
- Connectors: IP44 for wiring semi-finished IP67 side sensor.
- Fastening possible with two M3 screws. Center distance: 22 mm.
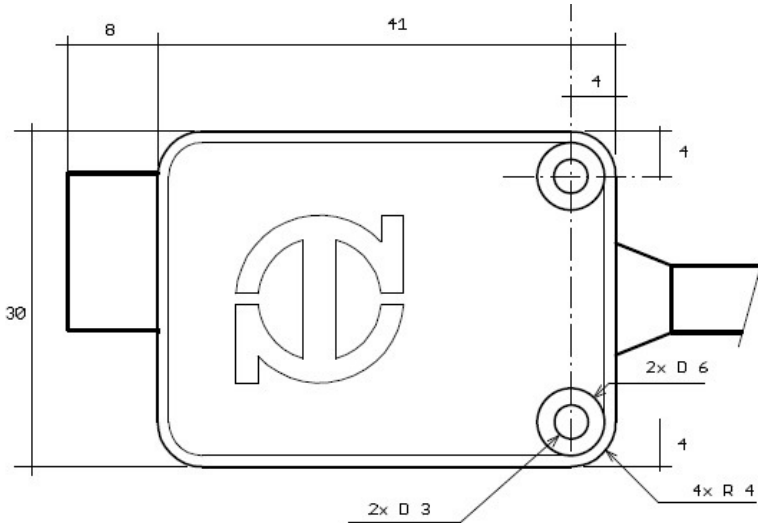
ELECTRICAL DATA

- Power supply maxi: 18V
- Power supply mini: 6.5V
- Heater power supply sensor: 7.5V (may be insufficient in the case of diesel engines)
- Current maxi: 3A
- Digital nominal current: 40mA
- Protection with a 3A fuse
- CANbus Load Resistance: 2kOhm

CONECTORS AND WIRES

- Connector for semi-finished wiring: Molex MiniFit 6 terminals
    Farnell References:
    connector: 169-7119 (alternative : 157-8470)
    terminals: 175-6653

- Connector of Lambda Bosch LSU 4.9 sensor: VW of origin (other brands use the same connector).
- Reference VW for wiring: 1J0 973 713

Optional wiring   Sensor   DigiLSU

An extension cable can be manufactured with the pair 1J0 973 713 and 3B0 973 813 but take care following the correct continuity terminal to terminal. A wiring error can damage the controller or the sensor irreversibly. Pay attention mainly to the two heating wires (terminals 3 and 4) for the 12 volts between them.

- Jack 3,5 mm 3 poles for DigiLSU Monitor communication software
Communication can be done only with the cable USB-TTL de FTDI.
Reference FTDI: TTL-232R-5V-AJ.
Internet link for FTDI:

http://apple.clickandbuild.com/cnb/shop/ftdichip?productID=69&op=catalogue-product_info-null&prodCategoryID=103

RICHNESS MEASURE CHARACTERISTICS
- Measure range: Air to 1.55 of richness
- Precision: +/-1% on gain

ANALOG OUTPUT
- Output range: 0-5V
- Output resistance: 270 Ohm
- Resolution: 1,22mV
- Offset: +/- 5mV (measured at the output of the connector Molex miniFit Jr)

CAN-BUS OUTPUT
- CAN-Bus 2.0A and 2.0B
- Baud Rate: 1Mb, 500kb, 250kb
- Output resistance: 2 kOhm

The CAN-bus of DigiLSU supports two protocols:

SKYNAM PROTOCOL:
See documentation Sybele ECUs:
- ID: - WinjNet sensor from 1 to 16, configured with the DigiLSU Monitor software

PROPRIETARY PROTOCOL:

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1 message configurable by the DigiLSU Monitor software:
- Message data: Vbat, Vheating, Tint, Diagnosis, Tsensor, richness channel selected by the user (Vout, richness, Lambda, O2, A/F)
- ID configurable by the user (11bit or 29bit)
- Format configurable: Motorola (default) or Intel (option)
- Fixed frequency: 100Hz

ASSEMBLY

TIPS FOR ASSEMBLY AND USING LAMBDA SENSOR

- The sensor should not be placed at the exit of the cylinder head because the excessive temperature of the gases can damage it (T max. 950 °C).
- Nor is advisable to mount the sensor near the exhaust exit because the pumping of gas lets enter the outer oxygen and deceive the measurement.
- Positioning the probe at a minimum angle as shown in Figure posterior to not collect water from the condensation of the steam generated by the fuel combustion.
- Never leave a probe mounted in an exhaust pipe if it is not being used. Combustion residues accumulated in the sensitive part could prevent proper operation of the sensor.
- Use unleaded gasoline. In case of use of leaded gasoline, Bosch states a sensor life expectancy depending on the density of lead bearing fuel.

  - 0,6g/l   20 000km   600h (according to the European driving cycle)
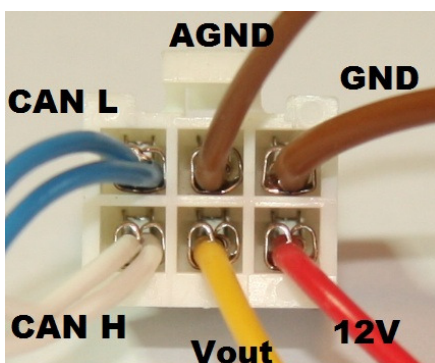 - 0,4g/l   30 000km   900h
  - 0,15g/l   60 000km   1800h

Typical racor to be welded in exhaust if necessary.
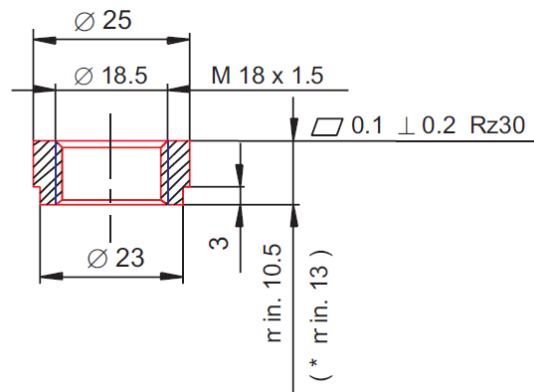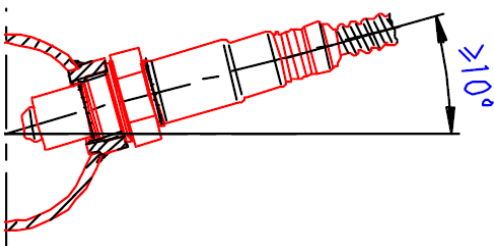

DigiLSU CONNECTION
Protect the power with a fuse of 3A (not supplied).

PinOut connector Molex MiniFit Jr :

The DigiLSU has two grounds to avoid the influence of the heating current in the analogue output.
These two grounds must imperatively be connected. Depending on the configuration of the assembly, the analog ground must be connected to the union power ground or the analog ground of the control unit (ECU or datalogger).
It is advisable to have no voltage difference between the two grounds so that the driver does not detect power ground connection defects (see the diagnostics).

Utilisation Analogique / Using analog output
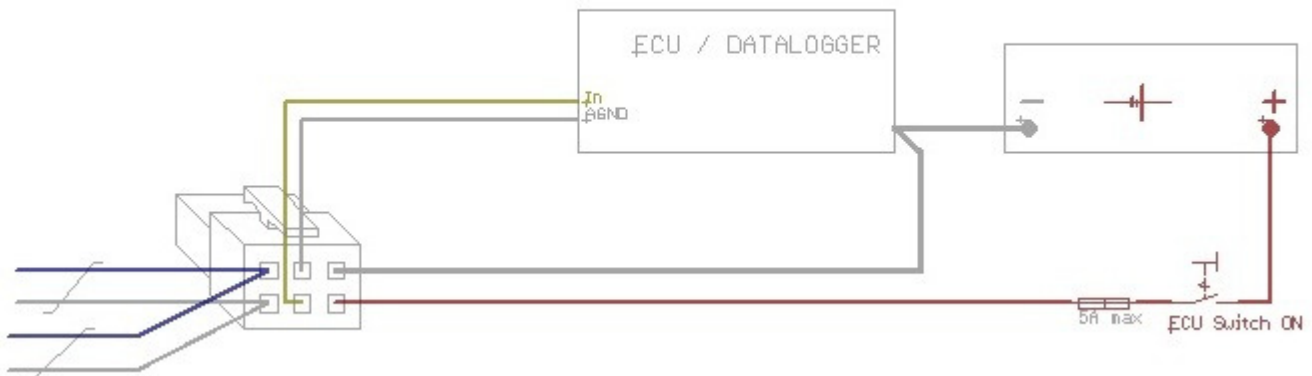
Utilisation Analogique / Using analog output (ECU SKYNAM)
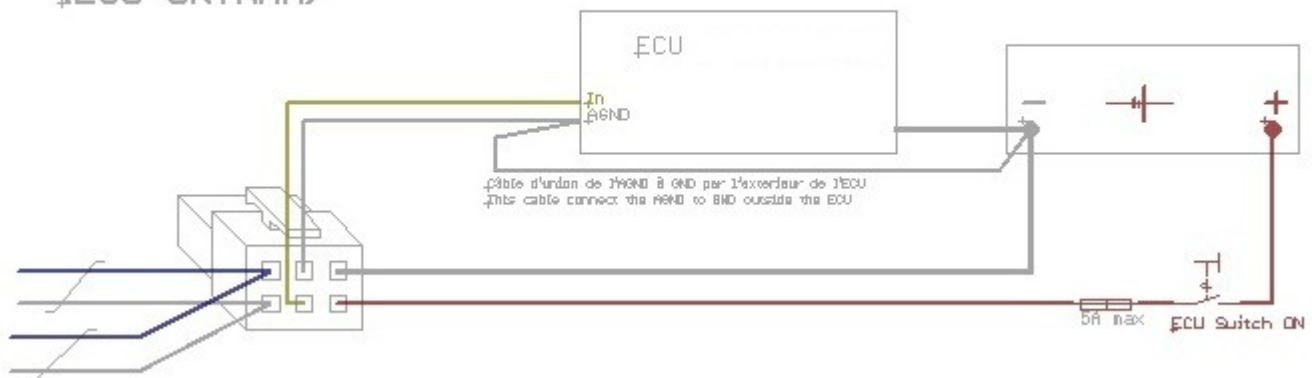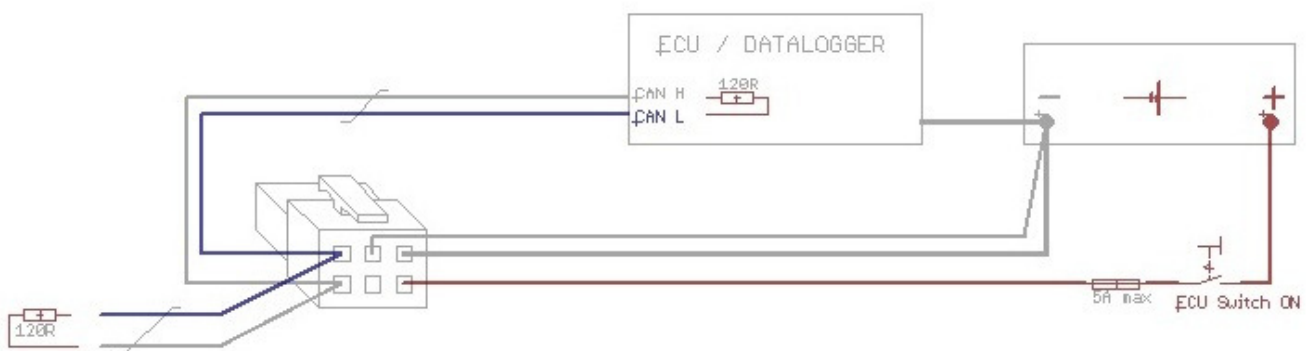

Utilisation CAN / Using CAN

REMINDER ON THE CONNECTION OF A CAN-BUS

The modules connected in a CAN bus must be chained. This means that the pair of twisted wires of the differential line joining CAN H and CAN L have to go from one module to another and then to the last.

A load of 120 ohms must be present at each end of the chain, previously have to consult the technical documentation of each module to determine, depending on the presence or absence of this load, if the module must be at the start / finish or in the middle of the chain.

If the list of modules provided contains just a load of 120 Ohm, the user can add a second by plugging a resistance of 120 Ohm 5% 0.25 W at the other end of the chain.

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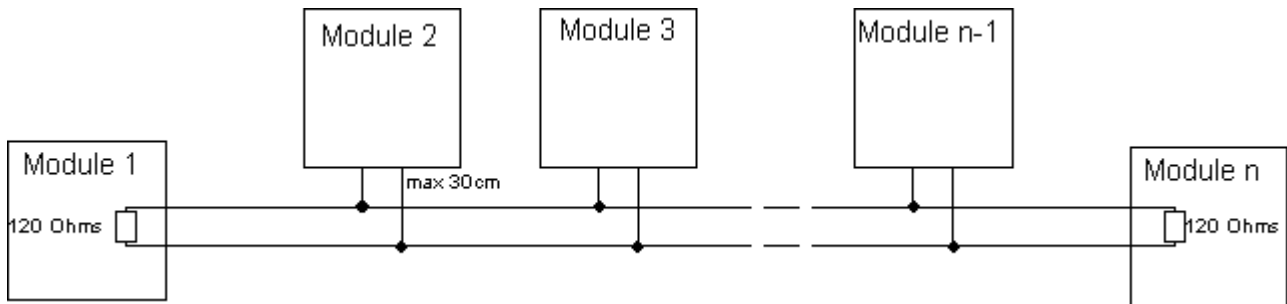
Correct chain

Incorrect chain
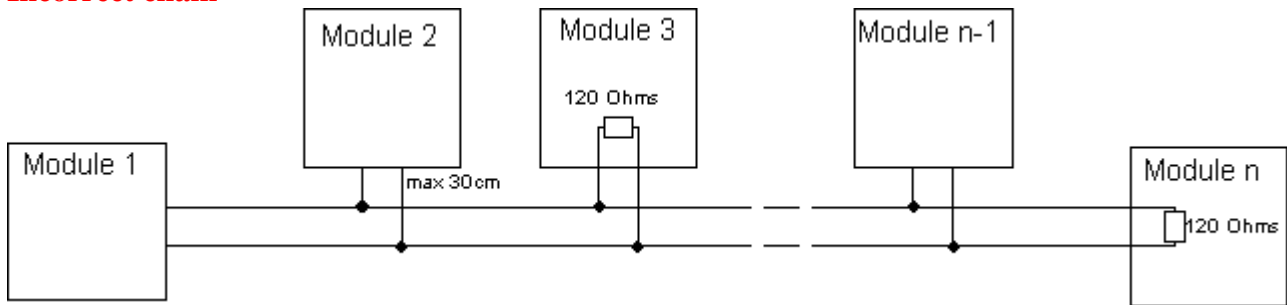
The controller lambda DigiLSU does not have this 120 ohm resistance. Therefore semi-finished wiring has a double line for connecting the CANbus to the output of the connector, and allows its insertion easily into the chain of modules.

CONVERSION TABLE OF THE ANALOG OUTPUT

Analog output linearization default ("factory setting") to:
- Exhaust pressure (P3) = 1013Mb
- H / C = 2 (for A/F scale and relation between richness and O2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Richness	1,755	1,500	1,450	1,400	1,350	1,300	1,250	1,200	1,150	1,100	1,050	1,000	0,950	0,900	0,850	0,800
Lambda	0,570	0,667	0,690	0,714	0,741	0,769	0,800	0,833	0,870	0,909	0,952	1,000	1,053	1,111	1,176	1,250
A/F	8,4	9,8	10,1	10,5	10,9	11,3	11,8	12,3	12,8	13,4	14,0	14,7	15,5	16,3	17,3	18,4
O2 (=f(Ri,C,H))	-14,1%	-9,51%	-8,58%	-7,65%	-6,72%	-5,78%	-4,83%	-3,88%	-2,92%	-1,95%	-0,98%	0,00%	0,98%	1,98%	2,97%	3,98%
Vout (mV) (@P3)	4	693	850	1014	1185	1360	1540	1725	1914	2107	2303	2500	2592	2686	2781	2879

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Richness	0,750	0,700	0,650	0,600	0,550	0,500	0,450	0,400	0,350	0,300	0,250	0,200	0,150	0,100	0,050	0,001
Lambda	1,333	1,429	1,538	1,667	1,818	2,000	2,222	2,500	2,857	3,333	4,000	5,000	6,667	10,000	20,000	1000,0
A/F	19,6	21,0	22,6	24,5	26,7	29,4	32,7	36,8	42,0	49,0	58,8	73,5	98,1	147,1	294,2	14709
O2 (=f(Ri,C,H))	4,99%	6,01%	7,03%	8,06%	9,10%	10,15%	11,20%	12,26%	13,33%	14,40%	15,49%	16,57%	17,67%	18,78%	19,89%	20,99%
Vout (mV) (@P3)	2978	3079	3183	3288	3395	3504	3616	3729	3844	3961	4080	4201	4324	4449	4576	4702

DESCRIPTION OF THE BLINKING LED

The LED is inside of the case and Molex connector transparency is used as control.

- Intermittency of 1.5 s: sensor preheating phase.

- Intermittency of 0.7 s: normal operation.

- Intermittency of 0.2 s, the measure cannot be done (too cold sensor, regulation impossible, battery voltage too low).

- Intermittency of 0.1 s: electrical problem found (2500mV incorrect virtual ground, power ground wrong connected, short circuit or open circuit of heating sensor).

SOFTWARE DigiLSU MONITOR

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

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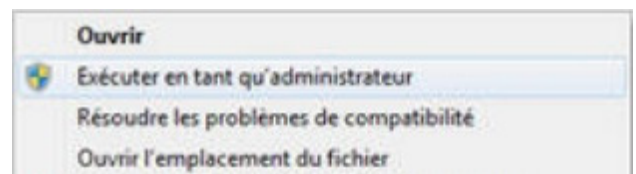
To start the installation in administrator mode, right click with the mouse on the executable file and choose "Run as administrator".

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.

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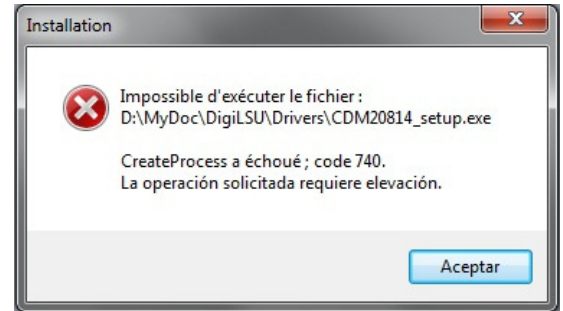
Depending on permission levels to Windows, some problems could be occur to install drivers from the installer. To ensure the drivers installation it is recommended to do it manually as follows:

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).
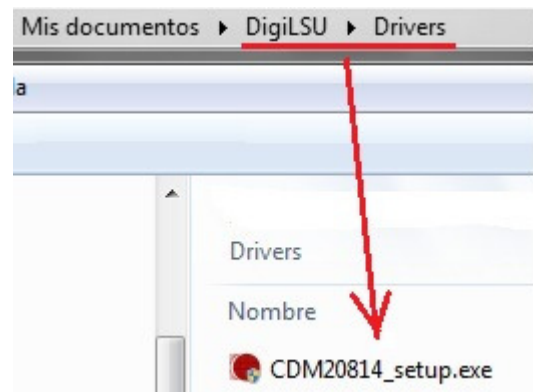

APPLICATION START

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

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

Important: To quit the program once initiated communication with the DigiLSU 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.
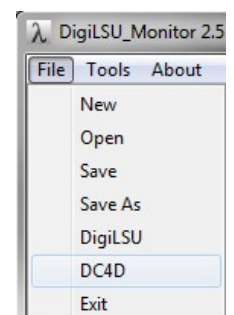
MAIN PAGE
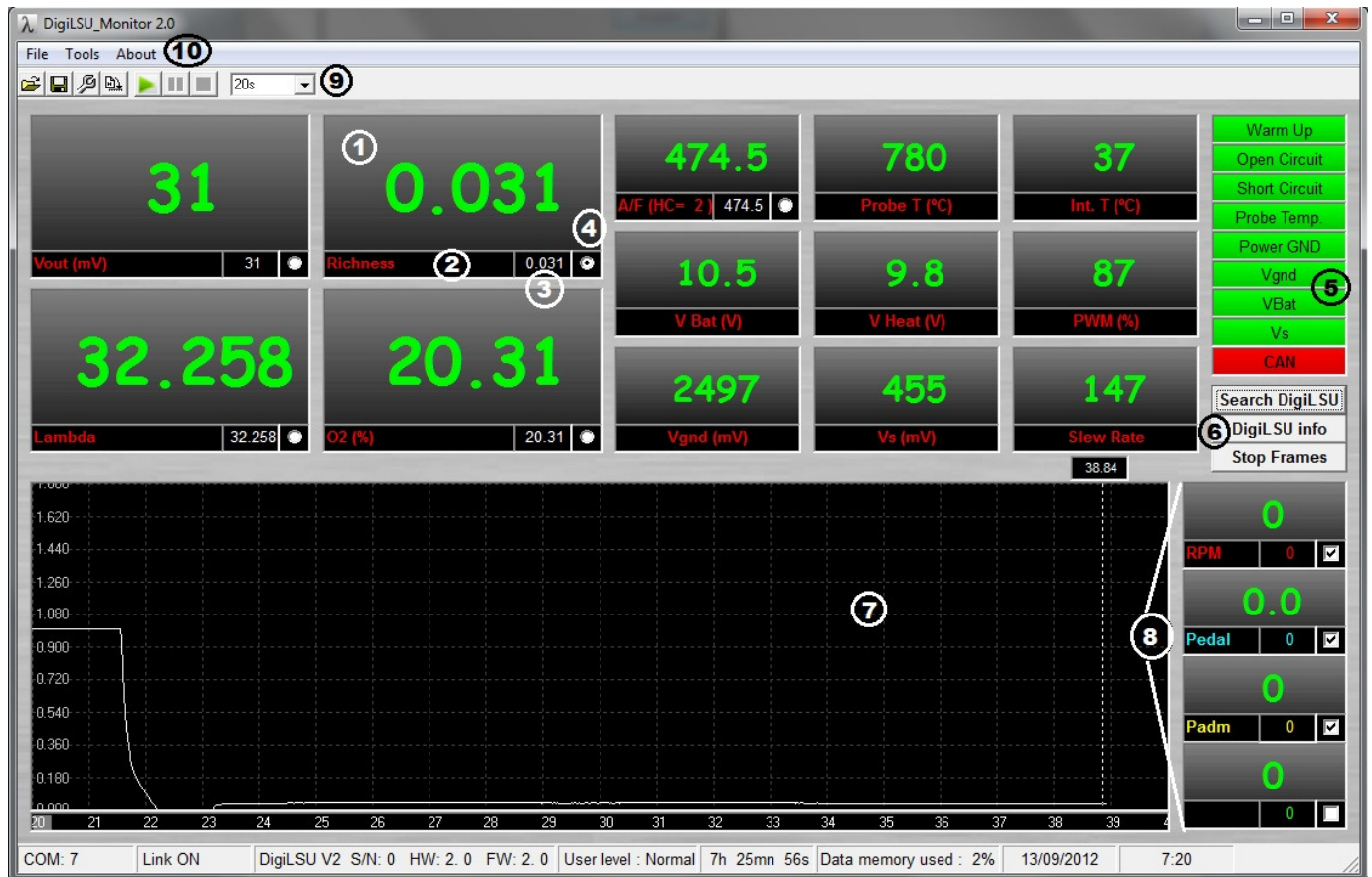
1. Windows of values received in real time from DigiLSU.
   - In green, the values are updated.
   - In yellow, no data is received with the proper period.
   - In grey, communication has been lost.
2. Channel name. Special case of channel A / F: the stoichiometric coefficient is shown in reminder.
3. 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 DigiLSU": Starts the search COM port if the automatic mode failed.
   - "DigiLSU Info": DigiLSU 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.
- 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
Probe T.	Sensor temperature in ° C. The measure of richness begins when the temperature reaches 780 ° C. DigiLSU regulates the voltage heating to maintain this temperature. If drops below 700 ° C, the measure will be considered incorrect and the default value is applied to the output.	°C	1°C
T. int.	DigiLSU internal temperature measured on the PCB.	°C	1°C
Vbat	Corrected battery voltage measured after the protection diode located at the input of DigiLSU.	V	0,1V
V Heat	Effective voltage applied to the heater element of the sensor	V	0,1V
PWM	Heating Ratio of the sensor	%	1%
Vgnd	Virtual ground voltage (measured at 10bit resolution gives 4.88 mV). It has to be equal to 2500mV (+ / - 10mV max. deviation). If the voltage is too far from 2500mV without sensor connected, consult your dealer. If this voltage is not held when connecting the sensor may mean that the sensor is damaged.	mV	4,88mV
Vs	Reference voltage of the sensor. There must be close to 450mV during the correct operation of the measuring chain when the engine operating point is stable. During the transition phase motor, this voltage may move away from 450mV.	mV	4,88mV
Slew rate	This coefficient is measured when the probe reaches 780 ° C. The DigiLSU evaluates the sensor response time at the start of the internal regulation. If this ratio becomes too large, it is strongly advised to change the sensor if you want accurate measurements	1/100s	0,01s

	in "dynamic" phases. This coefficient is taken into consideration only if the sensor is outdoors (outside the exhaust pipe) because gases remaining inside the pipe can change the outcome.		

Example of measurement of slew rate:

Sensor used   New sensor

Description of diagnostic

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

Diagnostic	Description	Default value
Warm Up	The sensor is warming up. This phase may take 15 seconds.	Measure is not valid
Open Circuit	The heating resistance is switched off. Check if the sensor is properly connected. If necessary, check the resistance between terminals 3 and 4 of the sensor Must be from 2 to 4 ohm (cold sensor).	Chain of measure out of service
Short Circuit	Short circuit detected at the output of heating. Check the wiring between DigiLSU and sensor	Chain of measure out of service
Probe Temp.	The sensor is not warm enough. Check if the battery voltage is sufficient to heat the sensor.	Measure is not valid
Power GND	The voltage difference between the grounds is too high. Check if the power ground is well connected and / or put shorter grounds.	Chain of measure out of service
Vgnd	Virtual ground improper voltage. Check if the problem persists with the sensor disconnected. If so, contact your dealer.	Chain of measure out of service
Vbat	The battery voltage is too low to ensure the processor measures.	Measure is not valid
Vs	Reference voltage too far from 450mV, the measure is not reliably.	Measure is not valid
CAN	The CAN error counter reports the existence of these. The counter goes up when an error occurs on the CAN bus and low if the transmission is error free.	(not applicable)

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

DigiLSU Monitor saves DigiLSU data from the last 21 minutes. 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".

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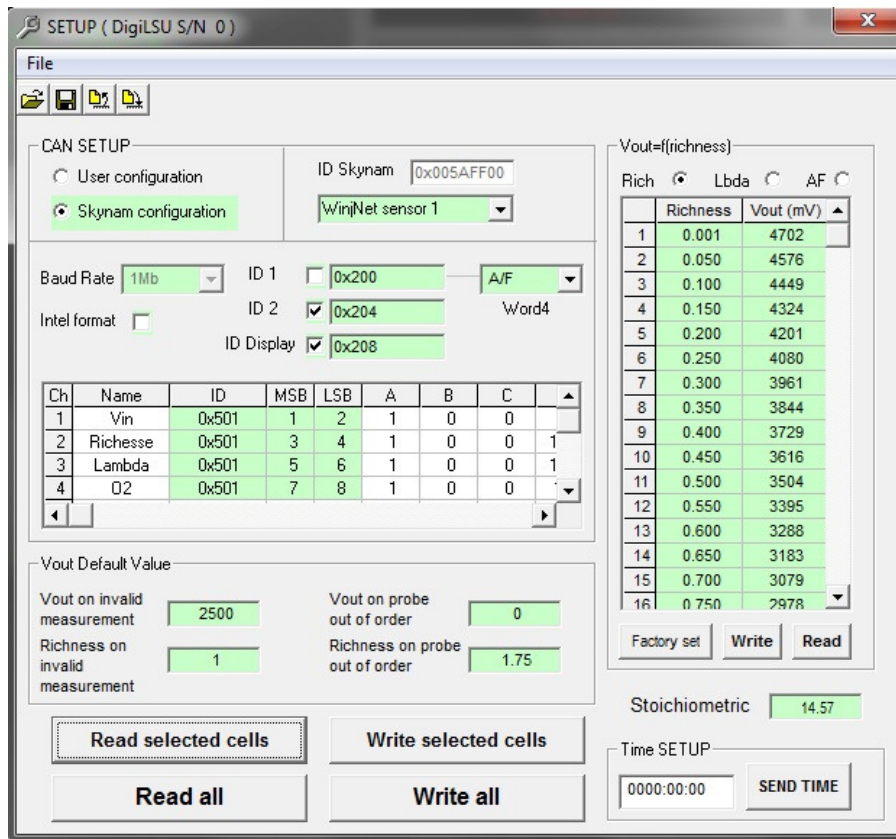
As a general rule, the cell background becomes coloured according to the origin of value.

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

USE LEVELS

The DigiLSU V2 is sold with two levels of use: Basic and Expert. This level is defined in DigiLSU 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

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 after.

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 "0xXXXXXXXX" 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
Value	Vbat	Vheating	T intern	Diagnostic	Tsensor MSB	Tsensor LSB	MSB Channel richness	LSB Channel richness

Intel Format:

Byte (ID1)	1	2	3	4	5	6	7	8
Value	Vbat	Vheating	T intern	Diagnostic	Tsensor LSB	Tsensor MSB	LSB Channel richness	MSB Channel richness

Vbat: battery voltage in tenths of Volts
Vheating: efficient heating voltage in tenths of Volts
Tinternal: internal temperature in ° C
Diagnostic: description of the state of operation.

Bit	7	6	5	4	3	2	1	0
Diag	Reference voltage defective	battery voltage < 6,5V	Virtual ground defective	Power ground disconnected	Sensor too cold	Sensor in short-circuit	Sensor disconnected	Warm up

Tsensor: Sensor Temperature in ° C
Richness Channel: choose between Vout in mV, richness (in thousandths), lambda (in thousandths), percentage of oxygen (in hundredths of %) and ratio Air / Fuel (in tenths).

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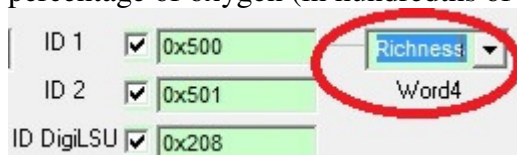
The second message (ID2) is composed of four scales of richness:

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.
When using the CAN display, enter the ID for this specific message.
(See the display documentation for more information)

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

Configuration when a DC4D is connected to DigiLSU

On CAN bus concept, IDs of each module must be different to not create conflict message on the bus.
If the DigiLSU is connected to a DC4D via CAN, the identifier "ID Display" must be the same on DigiLSU as for DC4D. 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 DigiLSU   On DC4D
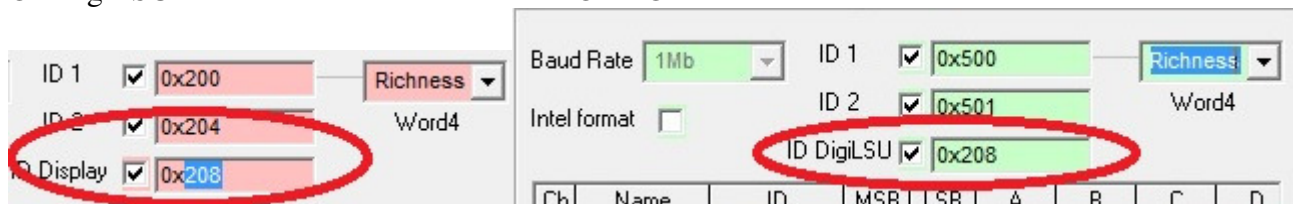
Reading Function CAN channels

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

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- Units
- The color

The DigiLSU 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.

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	0x308	2	1	0	1
2	Twater	Add to Library				
3	Richness	Select From Library				
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	
		Throttle	
		Twater	
		Vbat	

Voltage and value in case of error

The controller manages two levels of error. The first level is the highest fault detection as disconnected sensor, short-circuit, power ground miswired or virtual ground voltage out of range. These defects are priority and analog and CAN outset will pick set values.

Vout Default Value

Vout on invalid measurement	2500
Richness on invalid measurement	1
Vout on probe out of order	0
Richness on probe out of order	1.7

The second defect level indicates that the measure is incorrect in the following cases: heating phase, too cold sensor, reference voltage out of range (450mV) or battery voltage too low (<6.5 V).

Vout Default Value

|	
Vout on invalid measurement	2500
Richness on invalid measurement	1
Vout on probe out of order	0
Richness on probe out of order	1.7

Note: In case of Skynam settings selected, the output values are the following even though the values set.
- Output value if there is major breakdown: Vout = 0V
- Output value if the measure is invalid: Vout = 2500mV
- CAN: intel format 1Mb ID = by WinjNet sensor selected.

Richness value filtering

Since 2.7 firmware version, it is possible to select the richness filtering depth (all richness scales are affected).
The default value is "medium" and corresponds to previous versions filter depth.
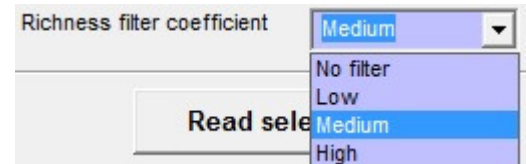
ECU protocol choice

Since 2.7 firmware version, the Microtec CAN protocol was added over Skynam protocol.

Probe heater strategy

If strategy is enabled, probe will be heated if RPM is higher of RPM threshold else, if timeout is reaches, heating is stop until RPM come back above threshold value.

==RPM value is read only by CAN and must be the first CAN channel set on CAN channel list.==

To allow heating when DigiLSU is swiched on, "Warm at init" must checked.
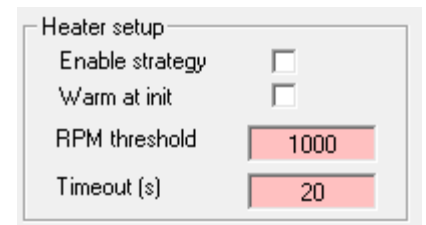
Analog Output Voltage

The table to the right of the window "setup" allows you to modify the output voltage depending on the richness. The type of scale is configurable.
This table allows a linear analog output, for example richness 1V = 1, and read the value of richness directly with a simple tester. Caution to work with a low voltage range may affect the precision of reading.

The analog value is affected by the supply current of DigiLSU electronic (40 mA). Analog ground should be as short as possible for best accuracy.

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.
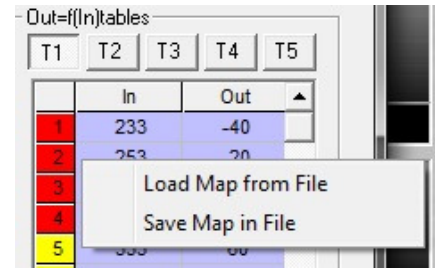
Time management of the sensor use

The usage time of the sensor is recorded only when the probe is in working condition. Thus the heating step no increases the time of use.
Changing sensor with the same DigiLSU, you can update manually the time corresponding to the sensor.


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

Read / Write value from/to the module

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

Firmware update

First you must have communication with DigiLSU before opening the window to load new firmware. Accessed by "menu" then "Tools / Firmware".
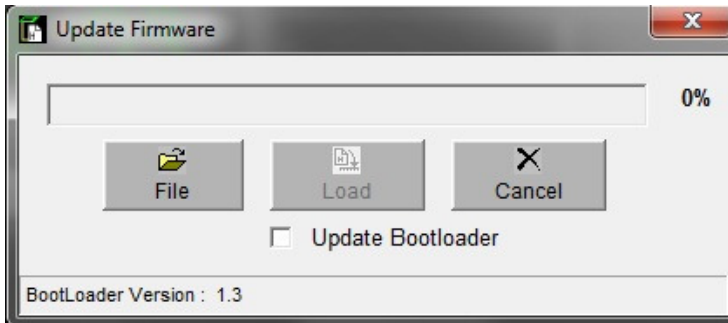
Select the firmware file to load. The filter file for version 1 of DigiLSU is ". LS1 '. For version 2 of DigiLSU the extension is ". LS2 '.

Select the file and click the button "Load" to upload the file into the module. The bar graph indicates the loading progress.
When the file finishes downloading, the firmware is installed in its final memory location.

DO 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 custom conversion tables and reset it to factory setting. It is imperative to load it through the "setup" menu.