LOAD CELL MONITOR

Part number: 90-60-540

USER MANUAL
&
INSTALLATION SHEET

V1.1

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1. PRESENTATION

LOAD CELL MONITOR a strain gauge measurement interface for the TOPLINE Bus. This device is most commonly used to measure the load on a forestay with a pin load cell.

Load cells operating principles
Load cells operation is based on the electric resistance variation in proportion to the bending stress applied by the load: $\Delta \mathbf{R = k}\ \Delta \mathbf{l}$
This K factor stands for the proportionality

2. OPERATION

Data is transmitted from the ***Load Cell Monitor*** to the "TOPLINE Bus" as channels:

- Forestay load in daN
- Dynamic channel

The dynamic channels can be set (name and unit) with the Toplink software.

3. CONFIGURATION OF THE LOAD CELL MONITOR

The configuration of the interface is done with the Toplink software.

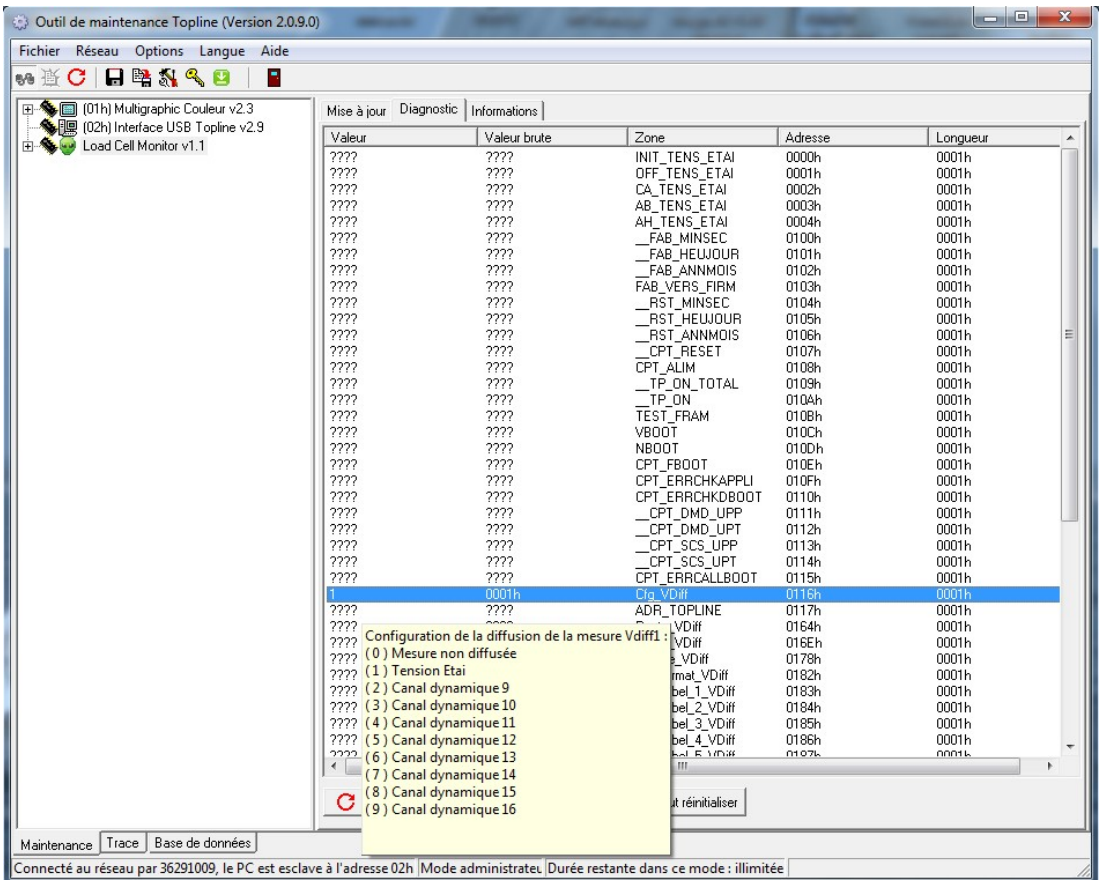
> Before proceeding to configurate, check that the mechanical installation of the sensor is correct.

3.1 Configuration of the *LOAD CELL MONITOR* with the Toplink software

3.1.1 Forestay load

This is the factory setting. In the Diagnostic section of the Toplink software, **Cfg_VDiff** is set to 1.

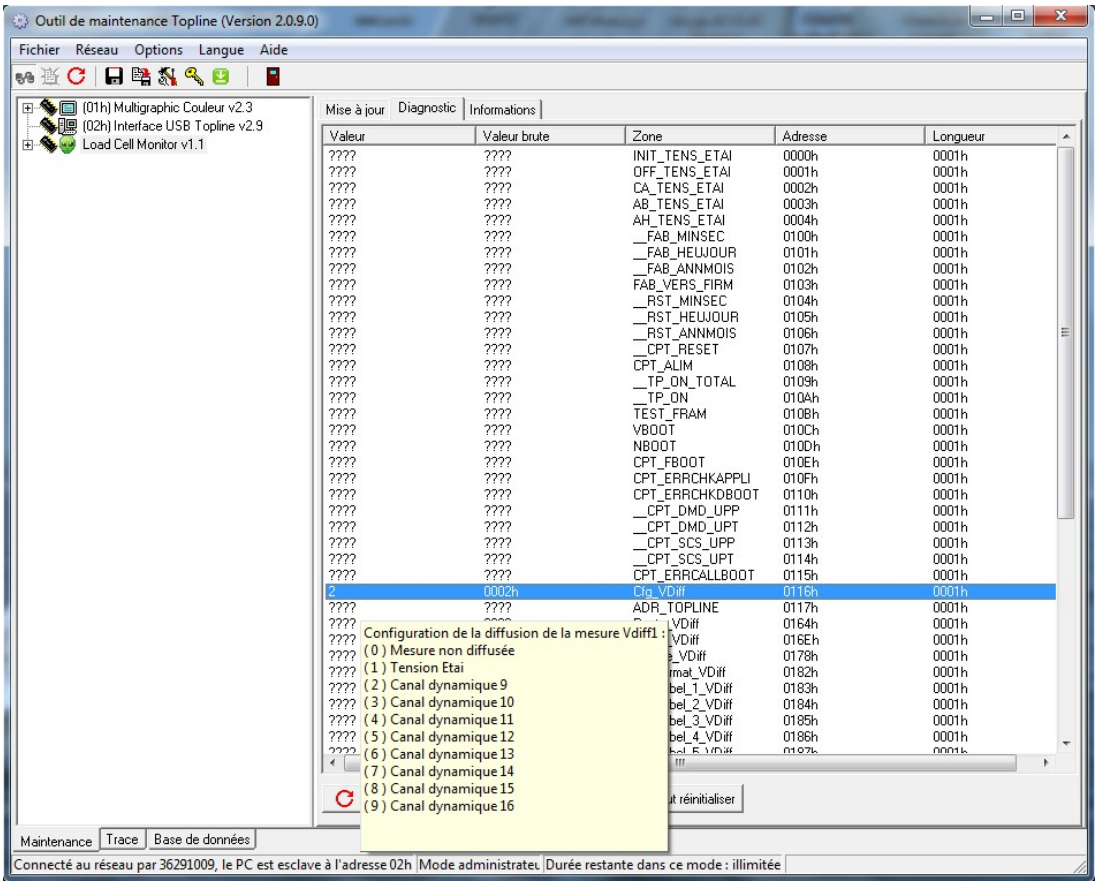
This makes the forestay load data available on the Topline bus.



3.1.2 Dynamic Channels

8 dynamic channels are available in the ***Load cell Monitor.*** To setup the ***Load cell Monitor*** in dynamic channel mode, you must set the **Cfg_VDiff** value from 2 to 9 according to the channel used. Eight *Load* ***cell Monitors*** in dynamic channel mode can be installed on the same Topline bus. They are used to display values coming from custom sensors.

Example: Starboard runner in daN. Use of a dynamometric axis to carry out measurement and display of "Stb Runner" as label and "daN" as unit. Refer to § 3.1.6 for the configuration of the label and unit.



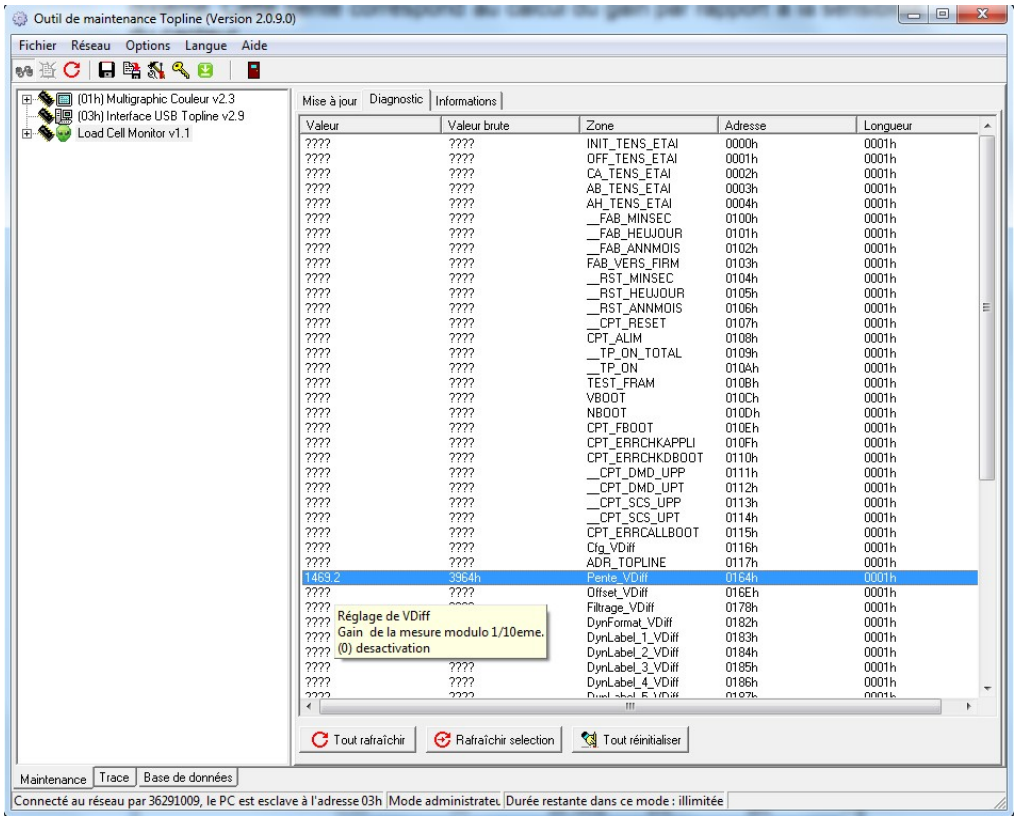
3.1.3 Gradient configuration

To set the gradient, the **Gradient_VDiff** value must be modified. It is set to zero in its factory configuration, which means deactivated. This gradient can be set to the 10th. It corresponds to the gain in relation to the sensor sensibility.

Gradient calculation example:

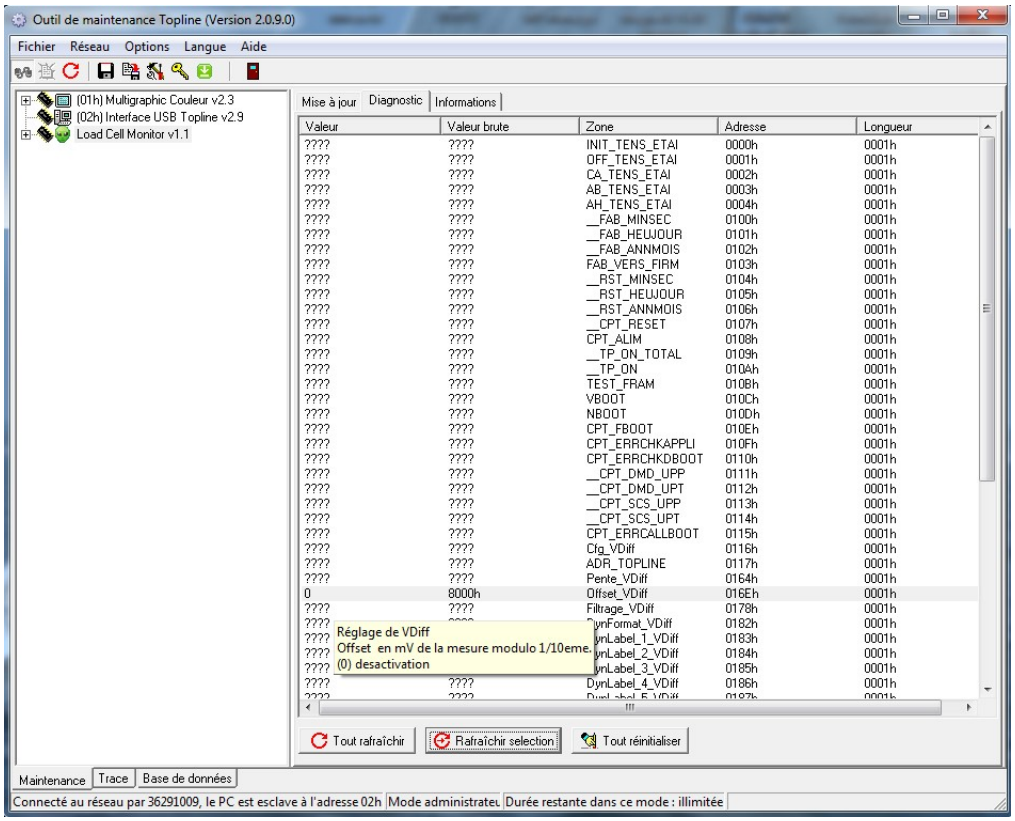
In the case of a dynamometric axis with a 0,825mV/V and a maximum load measurement of 4 tons.

The axis input voltage is 3.3V, which means:
2.7225 mV (0.825 X 3,3 =) voltage for a 4 tons traction.
Calculation of the conversion gain: 4000 tons / 2.7225 mV = 1469.23
The value 1469.2 has to be entered in **Gradient_VDiff**



3.1.4 Offset configuration

To set the offset, the **Offset_VDiff** value must be modified. This value is set to zero in its factory configuration, which means deactivated. This offset can be adjusted to one 10th in positive or negative.



3.1.5 Dynamic channel display format configuration

To change the display format, it is possible to modify the **DynFormat_VDiff** value.

the ***Load cell Monitor*** is set with factory configuration with the value **DynFormat_VDiff** = 0 : factory configuration with positive value and two decimal places.

DynFormat_VDiff = 1 : Positive display with four digits and no decimal place

DynFormat_VDiff = 4 : Positive display with one decimal place.

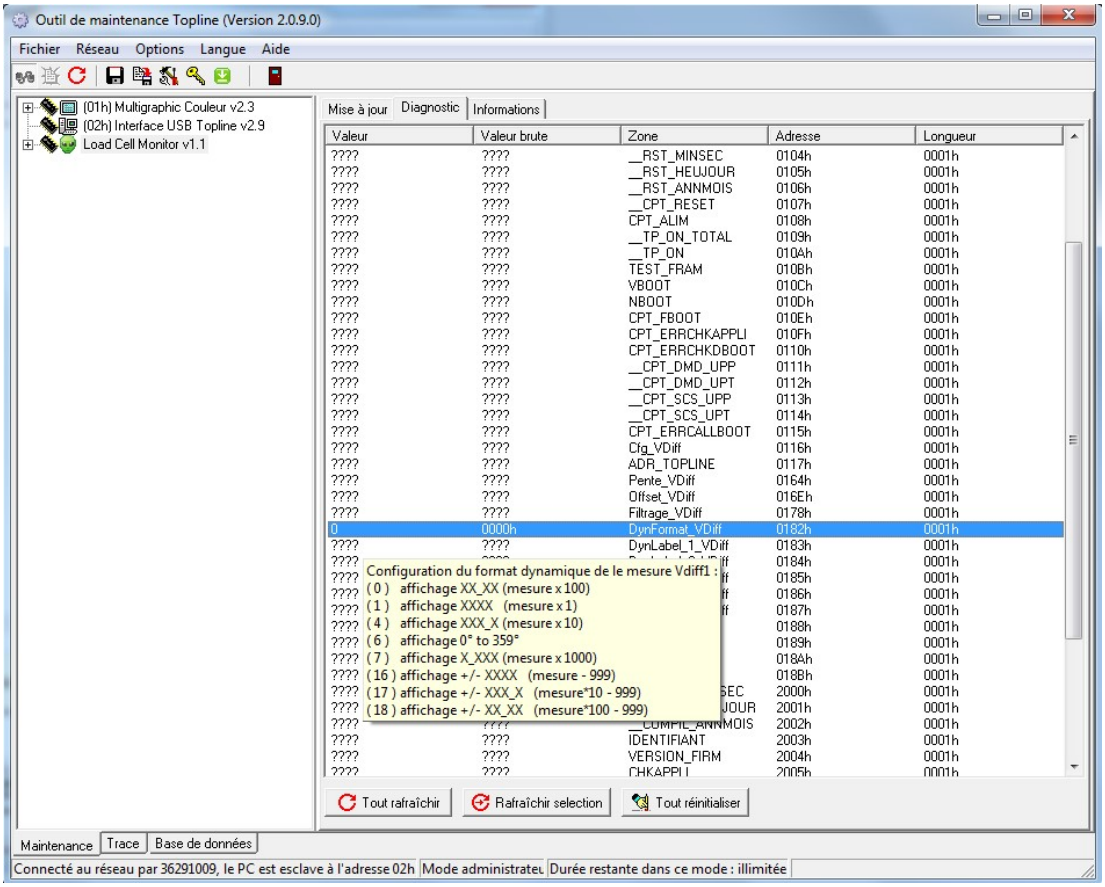
DynFormat_VDiff = 6 : Value displayed in degrees from 0° to 359°

DynFormat_VDiff = 7 : Positive value with three decimal places.

DynFormat_VDiff = 16 : Positive and negative value with four digits, no decimal place

DynFormat_VDiff = 17 : Positive and negative values with one decimal place.

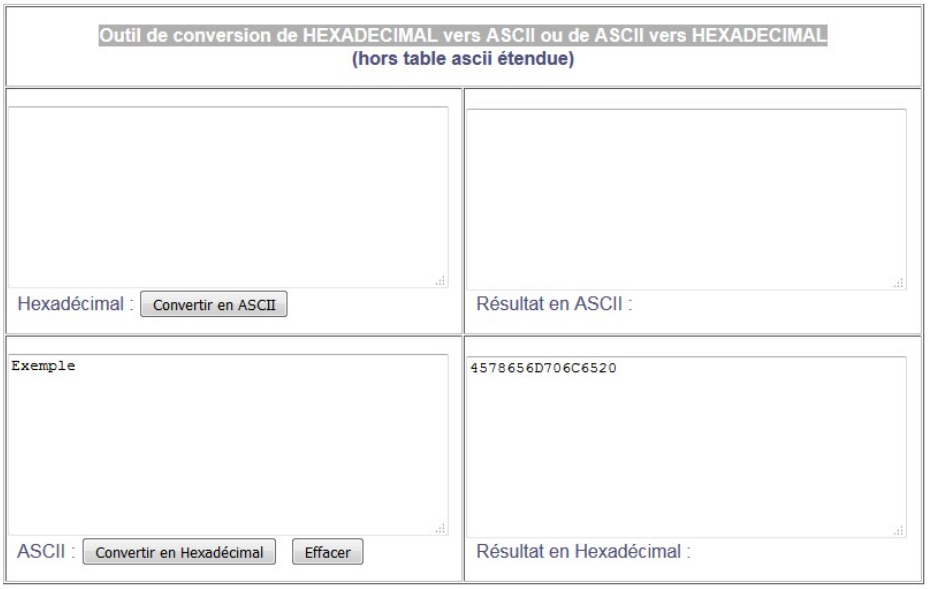
DynFormat_VDiff = 18: Positive and negative values with two decimal places.



3.1.6 Label and unit configuration of the dynamic channel

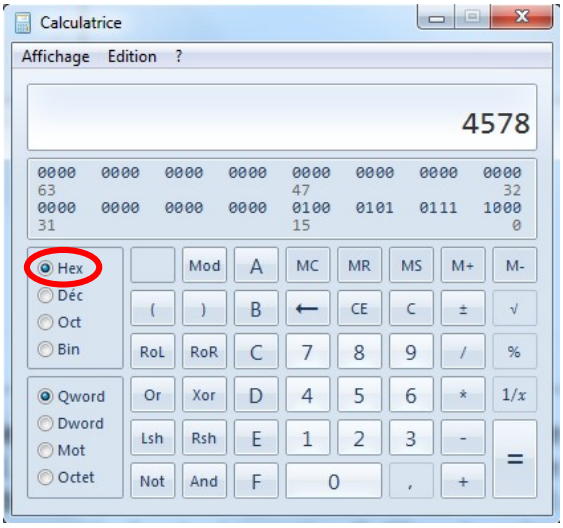
The label and unit configuration is used for the custom mode (dynamic channel) in order to obtain a display on Multigraphic.
The label is made of 5 two digit values, allowing to write a word of 10 digits max.
The unit is made of 4 values of two digits allowing to write a word of 8 digits max.
Spaces are counted as a digit.

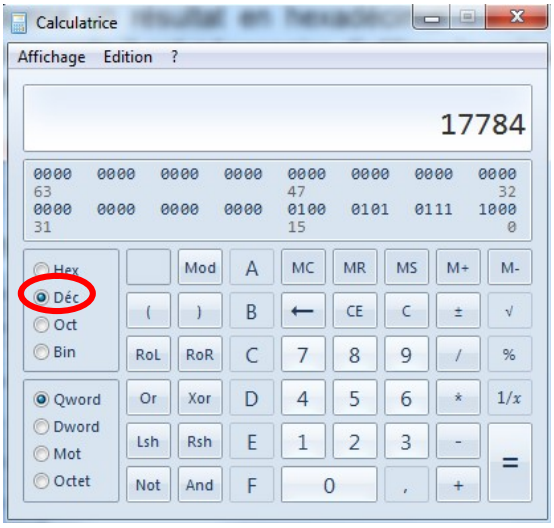
http://www.table-ascii.com/



In this example, we use the website to convert the text "Example" into hexadecimal code. The values integrate a pack of two letters. In this case "Ex" is interpreted as the hexadecimal code "4578".
WARNING: a 7 letter word must end with a space, like in our Example.

The result needs to be converted in decimal. To do this, use the calculator available in your OS in programming mode (see the example below). Enter a hexadecimal value and click on "Dec" to get it in decimal format.





Enter that decimal value in Toplink. The principle is the same as for the Label and Unit values.

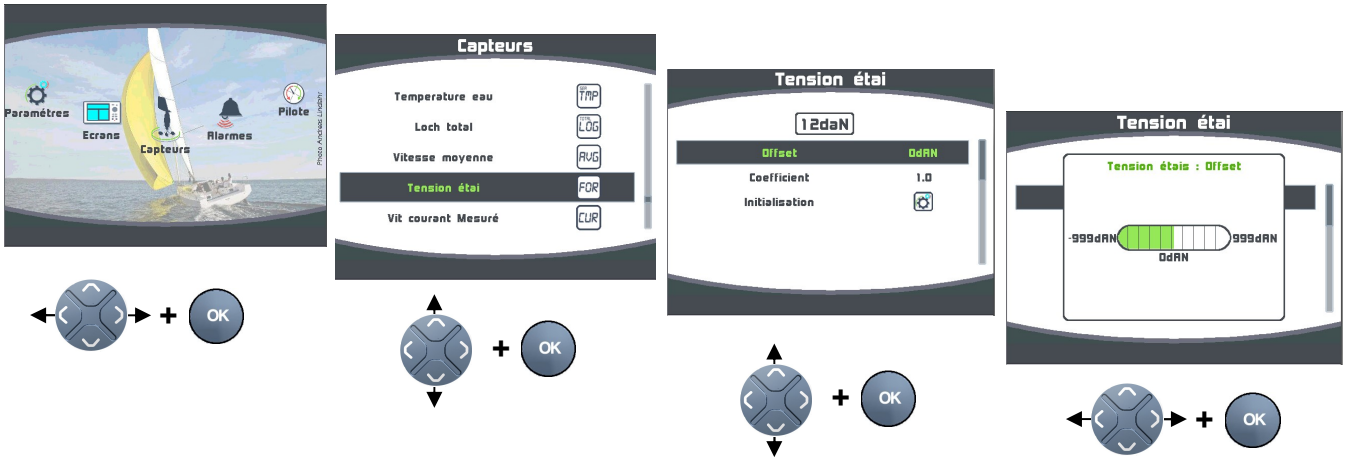
Ex	7845h	DynLabel_1_VDiff	0183h	0001h
????	????	DynLabel_2_VDiff	0184h	0001h
????	????	DynLabel_3_VDiff	0185h	0001h
????	????	DynLabel_4_VDiff	0186h	0001h
????	????	DynLabel_5_VDiff	0187h	0001h
????	????	DynUnit_1_VDiff	0188h	0001h
????	????	DynUnit_2_VDiff	0189h	0001h
????	????	DynUnit_3_VDiff	018Ah	0001h
????	????	DynUnit_4_VDiff	018Bh	0001h

Example of display for Label and Unit on a Multigraphic:
Runner is the label and the unit is replaced by text ("Stdb") This enables you to differentiate the port from the starboard runner.

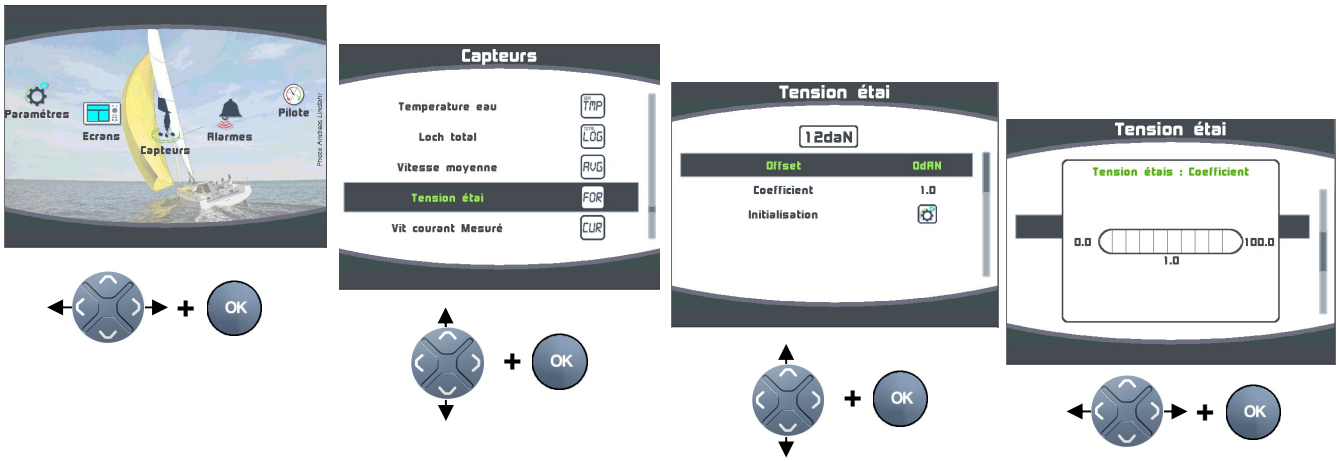
3.2 Setup with a *MULTIGRAPHIC* display

Press and hold PAGE to access the menu from which you can select  to display the "Sensors" page. Then select the data created by the Load cell Monitor (forestay tension).

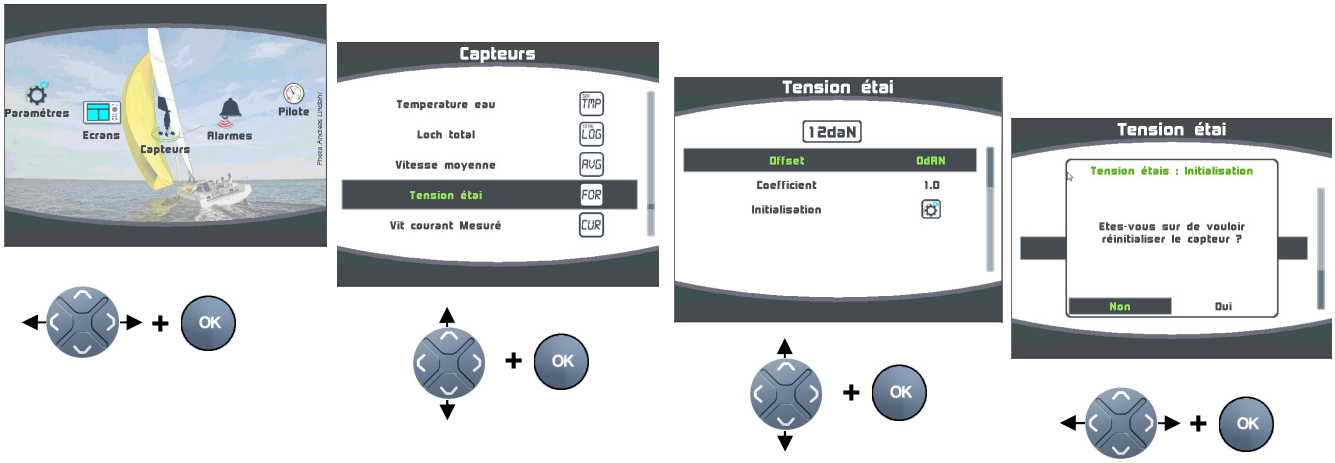
3.2.1 Offset configuration



3.2.2 Coefficient configuration (sensor gradient)



Initialisation = Full initialisation of the **Load cell Monitor** with the factory configuration, by default.



3.3 Managenent of several *Load cell Monitors*

Several ***Load cell Monitors*** linked on the same **Topline** network in order to control different sensors.

Example: installation with 3 ***Load cell Monitors:***

1 ***Load cell Monitor*** for the forestay tension. Forestay channel mode
Load cell Monitor for the two runners tension. (Dynamic channel mode)

> Warning
> Only one interface programmed in "Forestay tension" on the same BUS.

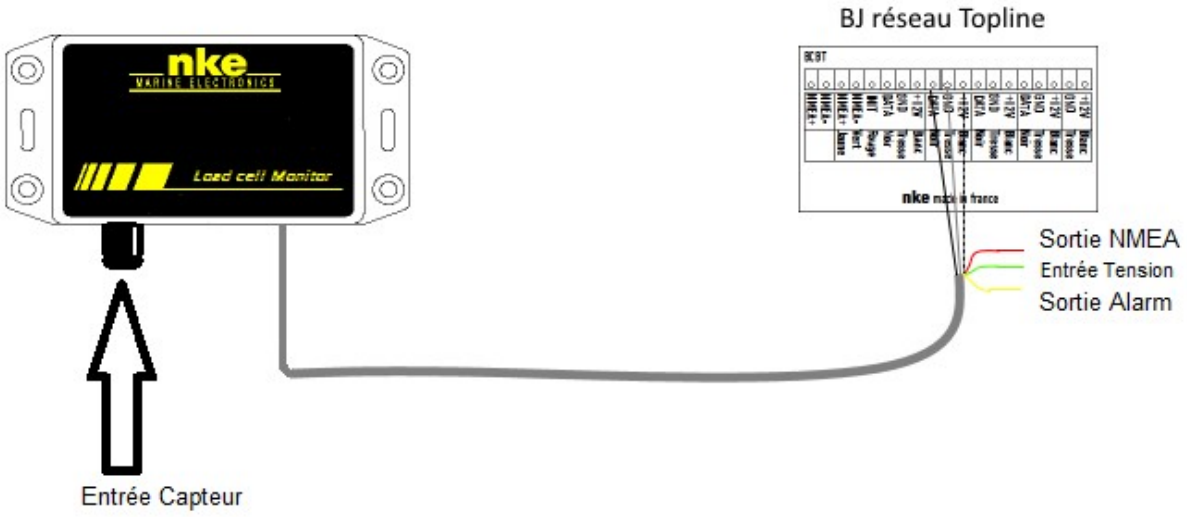
4. INSTALLATION

CAUTION/WARNING

Turn the power supply off before doing any work on the TOPLINE Bus.

4

4.1 Wiring the Load cell Monitor



- Connect the bus cable to a " Bus Topline" junction box as follow:
  White wire to the "+12 volts" terminal
  Shield to the "GND" terminal
  Black to the "Data" terminal
  Red is a NMEA 0183 38400 bauds output
  Yellow is for an Alarm output. (Not implemented)
  Green is for aux. voltage input (Not implemented)

Binder 620 4 connectors wiring.

Binder 620 4 connectors	Description	Example: Load Pin nke
1	GND (0V)	Black 0V
2	Signal +	White signal +
3	Signal -	Green signal -
4	V+ (3.3V)	Red power input +

If the traction value is reversed or remains at 0, the signal wires + and - must be reversed on the *Binder 620 4 plots* connector.

4.2 NMEA output

2 proprietary NMEA0183 (38400 bauds) sentences are available on the Topline red wire:

$PNKEV.loadcellmonitor.V1.1 dec 21 2015 16 :46 :22*30

This sentence is sent at the start. It feeds/fuels/informs the software version of the Analog Monitor.

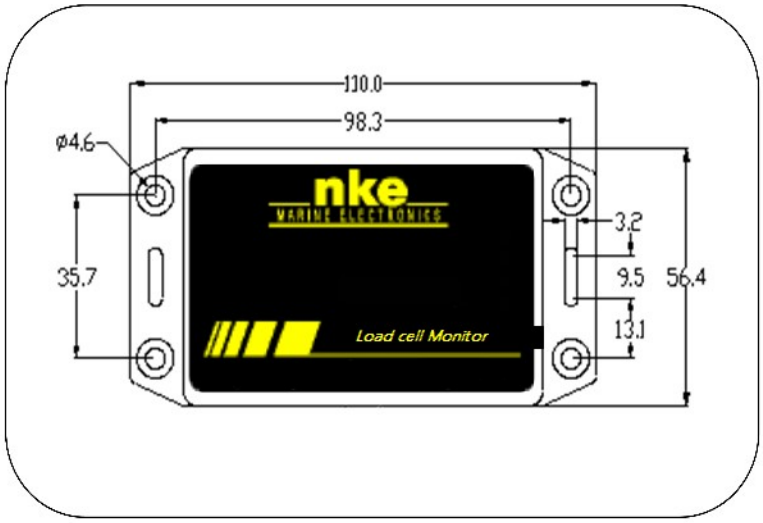
$IIXDR,N,x.x,N *hh<CR><LF>

_ Forestay load

This sentence feeds/fuels/informs the forestay tension

5. LOAD CELL MONITOR CHARACTERISTICS

5.1 Mechanical characteristics of the Load cell Monitor module



5.2 Characteristics of the *Load cell Monitor*

Parameter	Value
Power supply:	8V – 32V DC
NMEA output	NMEA 0183 38400 bauds
Weight	300g
Operational consumption @ 12 V	< 20mA
Topline bus power cable	Ø5.5mm, 4 wires + ground, length 6m
4 wires connector	Binder plug / 4 connectors / female
Operating temperature	-10°C / 50°C
Storage temperature	-20°C / 60°C
Protection rate	IP54 waterproof to water projections