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: $\Delta \mathbf{R} = \mathbf{k} \Delta \mathbf{I}$ 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.

- 🏂 🥅 (01h) Multigraphic Couleur v2.3	Mise à jour	Diagnostic Informations				
-% 💷 (02h) Interface USB Topline v2.9 - 🍆 🍛 Load Cell Monitor v1.1	Valeur	Valeur brute	Zone	Adresse	Longueur	
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	2777	2222	AH_TENS_ETA		0001h	
	2777	????	FAB_MINSE	C 0100h	0001h	
	2222	2222	FAB_HEUJO		0001h	
	2777	2222	FAB_ANNM(0001h	
	2222	2222	FAB_VERS_FIF		0001h	
	2222	2222	RST_MINSE		0001h	
	7??? 7???	7777 7777	RST_HEUJC		0001h 0001h	
	2222	2222	RST_ANNM CPT_RESET		0001h	1
	2222	2222	CPT ALIM	0108h	0001h	
	2222	2222	TP ON TOT		0001h	
	2222	2222	TP ON	010Ah	0001h	
	2777	2222	TEST FRAM	010Bh	0001h	
	2777	????	VBOOT	010Ch	0001h	
	????	????	NBOOT	010Dh	0001h	
	7777	2222	CPT_FBOOT	010Eh	0001h	
	????	????	CPT_ERRCHK		0001h	
	2777	2222	CPT_ERRCHK		0001h	
	7??? 7???	7777 7777	CPT_DMD_U		0001h	-
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	2222	2222	CPT SCS U		0001h	
	2222	2222	CPT ERRCALL		0001h	
		0001h	Cfg VDiff	0116h	0001h	
	2222	2222	ADR TOPLINE		0001h	
	2722		D VDiff	0164h	0001h	
	L CCC (ALL	iguration de la diffusion de la mesure	TAD!!!	016Eh	0001h	
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		Canal dynamique 14				
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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.

🔖 🧰 (01h) Multigraphic Couleur v2.3	Mise à jour Diagnostic Informations							
(02h) Interface USB Topline v2.9	Valeur	Valeur brute	Zone		Adresse	Longueur		
≽₩ Load Cell Monitor v1.1	7777 7777	7777 7777 7777 7777 7777 7777 7777 7777 7777	INIT_1 OFF_T CA_TE AB_TE AB_TE AB_TAB FAB FAB FAB FAB FAB FAB TCT CTT_4 TEST_ VB00 NB00 OPT_E CPT_E CPT_ CPT_ CPT_ CPT_ CPT_ CPT_ CPT_ CPT_	ON_TOTAL ON FRAM T BOOT IRRCHKAPPLI IRRCHKAPBOOT _DMD_UPP _DMD_UPT _SCS_UPP _SCS_UPT IRRCALLBOOT	0000h 0001h 0002h 0002h 0002h 0004h 0100h 0102h 0102h 0102h 0102h 0102h 0108h 0105h 0108h 0118h 0118h 0118h	0001h 0001h		
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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**

(01h) Multigraphic Couleur v2.3	Mise à jour Diag	nostic Informations			
🖳 (03h) Interface USB Topline v2.9 🥪 Load Cell Monitor v1.1	Valeur	Valeur brute	Zone	Adresse	Longueur
🥐 Load Cell Monitor v1.1	2222	2222	INIT_TENS_ETAI	0000h	0001h
	2722	7777	OFF_TENS_ETAI	0001h	0001h
	2222	2222	CA TENS ETAI	0002h	0001h
	2772	2222	AB TENS ETAI	0003h	0001h
	2222	2222	AH TENS ETAI	0004h	0001h
	2222	7777	FAB MINSEC	0100h	0001h
	2222	2222	FAB HEUJOUR	0101h	0001h
	2222	2222	FAB_ANNMOIS	0102h	0001h
	2222	2222	FAB VERS FIRM	0103h	0001h
	2222	7777	RST MINSEC	0104h	0001h
	2222	2222	RST_HEUJOUR	0105h	0001h
	2222	2222	RST_ANNMOIS	0106h	0001h
	2222	7777	CPT_RESET	0107h	0001h
	2222	2222	CPT_ALIM	0108h	0001h
	2222	2222	TP_ON_TOTAL	0109h	0001h
	2772	2222	TP ON	010Ah	0001h
	2222	2222	TEST_FRAM	010Bh	0001h
	2777	2222	VBOOT	010Ch	0001h
	2777	2222			0001h
	2777		NBOOT	010Dh	
		2222	CPT_FBOOT	010Eh	0001h
	2222	2222	CPT_ERRCHKAPPLI	010Fh	0001h
	2222	7777	CPT_ERRCHKDBOOT	0110h	0001h
	2222	2222	CPT_DMD_UPP	0111h	0001h
	2222	2222	CPT_DMD_UPT	0112h	0001h
	2222	2222	CPT_SCS_UPP	0113h	0001h
	2777	7777	CPT_SCS_UPT	0114h	0001h
	2772	????	CPT_ERRCALLBOOT	0115h	0001h
	2???	2222	Cfg_VDiff	0116h	0001h
	2222	????	ADR_TOPLINE	0117h	0001h
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	2222 Réglage d		Filtrage_VDiff	0178h	0001h
		a mesure modulo 1/10eme.	DynFormat_VDiff	0182h	0001h
			DynLabel_1_VDiff	0183h	0001h
	???? (0) desact		DynLabel_2_VDiff	0184h	0001h
	2222	2222	DynLabel_3_VDiff	0185h	0001h
	2777	2222	DynLabel_4_VDiff	0186h	0001h
	3777	2000	Dunt shall E 1/Diff	01076	00016
	1 La				



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 10^{th} in positive or negative.

Image: Control of the state of the stat	éseau Options Langue Aide						
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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.

Fichier Réseau Options Langue Aide						
🗉 🦠 🗐 (01h) Multigraphic Couleur v2.3	Mise à jour Diagnostic	Informations				
(02h) Interface USB Topline v2.9	Valeur	Valeur brute	Zone	Adresse	Longueur	- (
tiri See See Load Cell Monitor v1.1	????? ?????? ?????<	7777 7777 7777 7777 7777 7777 7777 7777 7777	Zone RST_MINSEC RST_ANIMOIS RST_ANIMOIS CPT_RESET CPT_ALIM TP_ON TEST_FRAM VB00T NB00T CPT_FB00T CPT_ERRCHKAPPLI CPT_ERRCHKAPPLI CPT_ERRCHKAPPLI CPT_ERRCHKAPPLI CPT_CPT_SCS_UPP CPT_SCS_U	201332 0104h 0105h 0105h 0106h 0108h 0108h 0108h 0108h 0106h 0106h 0106h 0106h 0106h 0106h 0106h 0111h 0112h 0113h 0113h 0113h 0113h 0115h 0115h 0115h 0115h 0115h 0115h 0116h 0117h	0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h 0001h	
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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/

	ers ASCII ou de ASCII vers HEXADECIMAL scii étendue)
Hexadécimal : Convertir en ASCII	Résultat en ASCII :
Exemple	4578656D706C6520
ASCII : Convertir en Hexadécimal Effacer	Résultat en Hexadécimal :

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.

							4	578
0000 00 63 0000 00 31			9999 9999	0000 47 0100 15	000 010			3000 32 1000 0
Hex		Mod	A	MC	MR	MS	M÷	M-
Déc	6)	В	-	CE	C	ź	1
Bin	RoL	RoR	С	7	8	9	/	%
Qword	Or	Xor	D	4	5	6	*	1/x
 Dword Mot Octet 	Lsh	Rsh	E	1	2	3	-	
	Not	And	F		0		+	=

							17	784
0000 00 63 0000 00 31			9999 9999	0000 47 0100 15) 00 (0000 32 1000 0
C Hex		Mod	Α	MC	MR	MS	M+	M
Déc Oct	(J	В	-	CE	С	ź	V
© Bin	RoL	RoR	С	7	8	9	1	%
Qword	Or	Xor	D	4	5	6	*	1/2
O Dword	Lsh	Rsh	Ε	1	2	3		
🔘 Mot 🔘 Octet	Not	And	F		0		+	=



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

11					
Ex	7845h	DynLabel_1_VDiff	0183h	0001h	
????	????	DynLabel_2_VDiff	0184h	0001h	
2777	????	DynLabel_3_VDiff	0185h	0001h	
2777	????	DynLabel_4_VDiff	0186h	0001h	
2777	????	DynLabel_5_VDiff	0187h	0001h	
2777	2222	DynUnit_1_VDiff	0188h	0001h	
2777	2222	DynUnit_2_VDiff	0189h	0001h	
2777	2222	DynUnit_3_VDiff	018Ah	0001h	
2777	????	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.

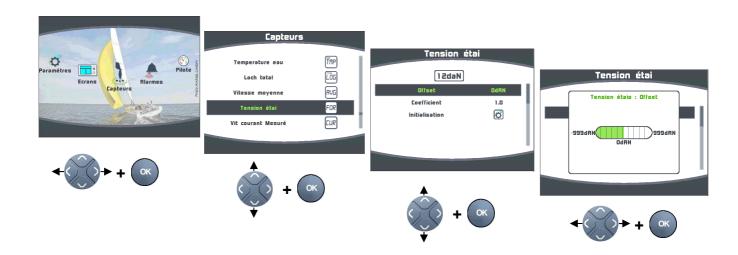




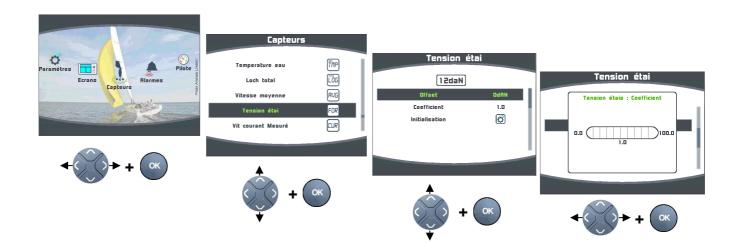
3.2 Setup with a MULTIGRAPHIC display

Press and hold 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

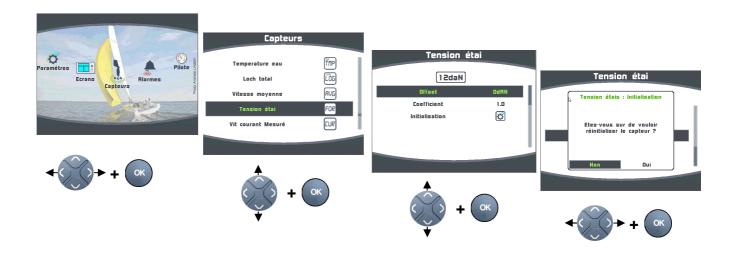


3.2.2 Coefficient configuration (sensor gradient)





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



3.3 Management 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)

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



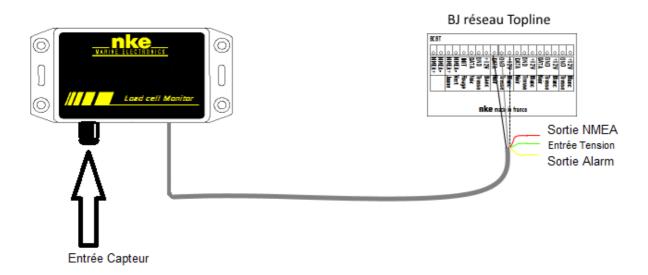
4. INSTALLATION

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.

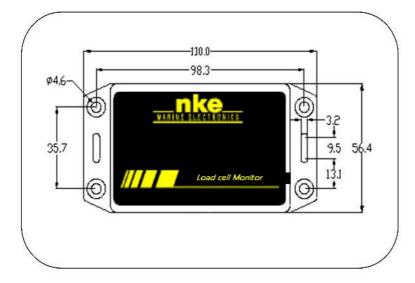
\$IIXDR,N,x.x,N *hh<CR><LF>

_ 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

