COACH-II

Instruction manual

1. INTRODUCTION

COACH-II is a data logger dedicated to overhead crane (adaptable to other type of hoisting equipment).

Actual « flight recorder », COACH-II will log all crane events without need of any connected computer.

Hourly recording of following informations:

- Amount and duration of following movements: up, down, translatory mvt of the crane and direction of the trolley
- Amount and duration of “inching” for all movements
- Load spectrum
- Amount and overload values
- Sequence of last movements
- Amount of pulses transmitted to free entries (option)

Calculation of Safe Working Period, taking into account the applied load on the hoist.

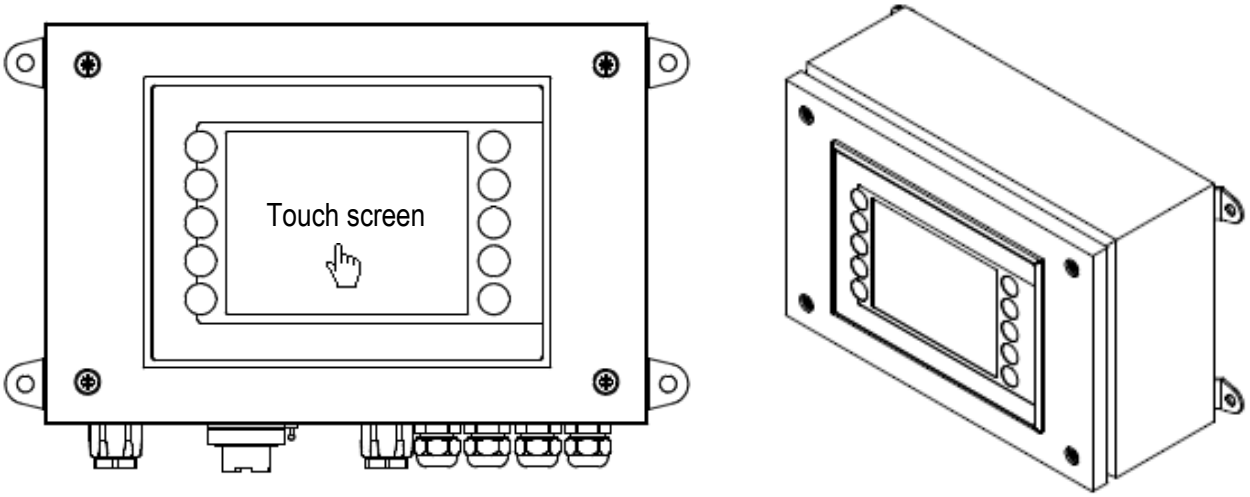
Recordings visualized via COACHVIEW **delivered along with COACH-II.**

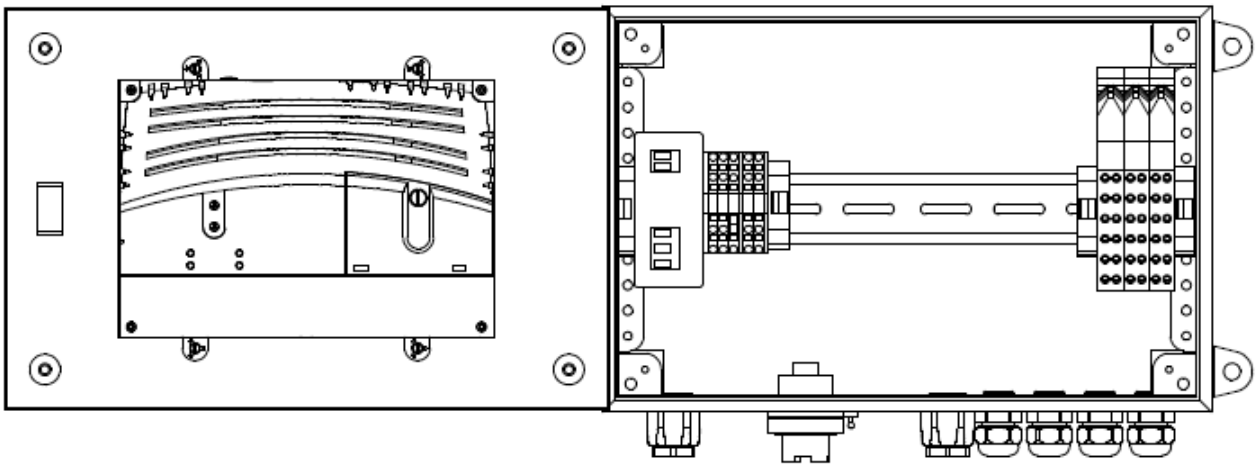
This powerful and user friendly software works under "WINDOWS" and allows visualization of the data’s through graphs and tables.

COACH-II will help to plan maintenance, detect misuses and abuses, decrements the Safe Working Period and determines the FEM classification of the crane.

Note : it is also possible to analyze the recordings via Microsoft Excel.

2. GENERAL VIEW





Power supply (24 VDC- 48 VAC-110VAC-230 VAC)

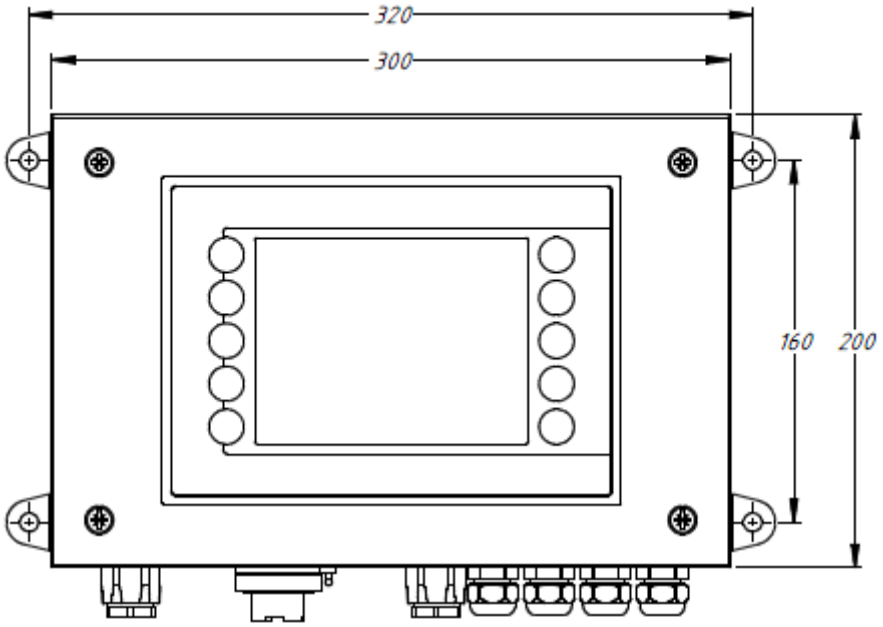
Movements (up, down, translatory, direction of trolley)

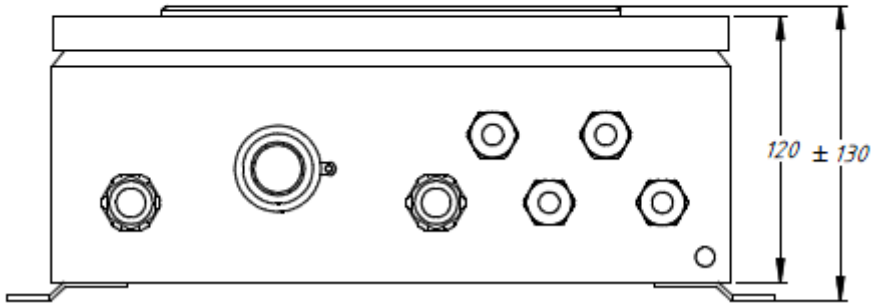
Load cell signal/analogical input (0 – 10 V ou 4 – 20 mA)

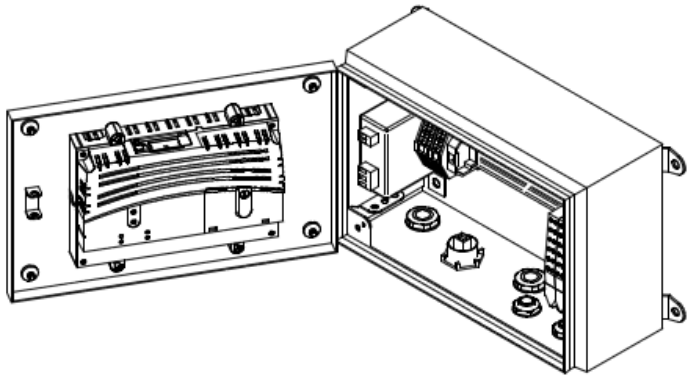
Analogical output (0 – 10V ou 4 – 20 mA)

Relay output 1 and 2

3. DIMENSIONS







4. TECHNICAL CHARACTERISTICS

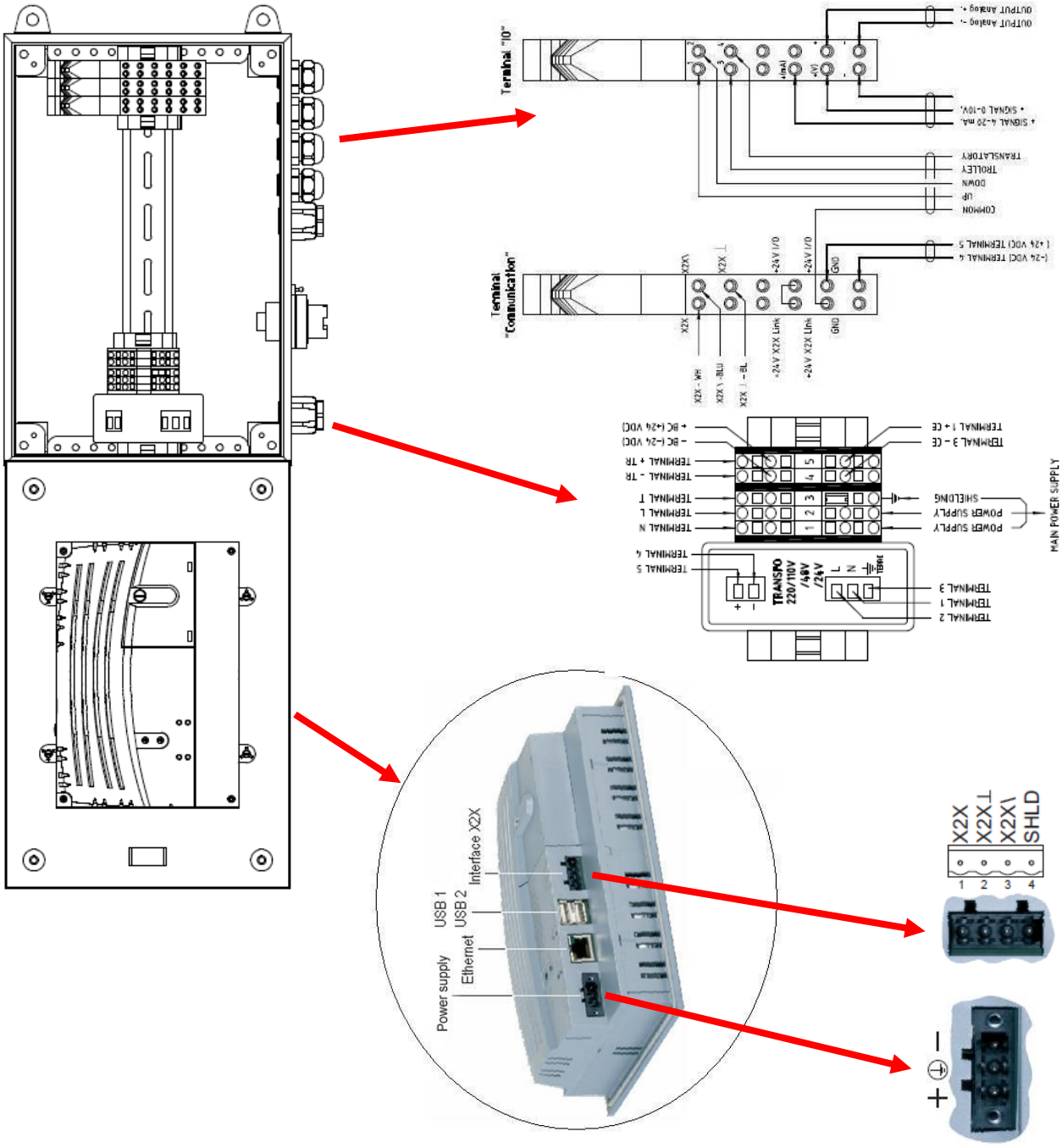
4.1. Generale

4.1.1. Screen	5.7" LCD touch screen
Type	Color
Resolution	QVGA, 320 x 240 pixels
Diagonal	5.7"
4.1.2. Keys	
Amount	10
4.1.3. Interfaces	
USB	1 x USB 2.0, type A connection
Ethernet	RJ 45 Twisted Pair (10 / 100 BaseT)
4.1.4. Supply	
Power supply	24 VDC ± 15%, 48 VAC, 110 VAC or 230 VAC
4.1.5. General information	
Power consumption	Max. 600 mA ou 13 W
Certification	CE, C-UL-US, GOST-R
4.1.6. Operating conditions	
Operating temperature	0 to +50°C
Humidity	10% to 90%
Ingress protection	IP65

4.2. Input/output specifications

4.2.1. Analogic input	
1 analogical entry	0 - 10 V or 0 - 20 mA
Resolution	12-bit
4.2.2. Analogic output	
1 analogical output	0 - 10 V or 0 - 20 mA
Resolution	12-bit
4.2.3. Digital entries	
4 digital entries	Type – potential free
Commutation tension	24 VDC (commutation set-point)
4.2.4. Power relays	
2 power relays	Normaly open and closed (230 VA / 5 A, 30 VDC / 5 A)
Channel insulation	yes
Commutation capacity	Minimum : 10 mA / 5 VDC Maximum : 180 W / 1500 VA
Electrical insulation	yes

5. WIRING


Terminal "RELAY"
Terminal "IO"
Terminal "Communication"
MAIN POWER SUPPLY
Interface X2X
USB 1
USB 2
Ethernet
Power supply
X2X
X2X⊥
X2X\
SHLD
1 2 3 4

5.1. Remarks on wiring

- Digital entries (DI1 à DI4) : Change of condition when 24VDC is exceeded.
- Relay outputs : Manual relay disabling possible (if related alarm is reset) by pushing on « alarma reset » button on main screen.
- Analogical output (AO 1) : Varies in function of SWP evolution.

Reminder :

SWP = Safety Work Period

The SWP allows calculation the maintenance interval of the crane, taking into account actual lifted loads.

- Method of calculation :

$$SWP = \underbrace{D}_{\text{Theoretical working period at nominal load}} - \sum_{i}^{n} \underbrace{K_i^3}_{\left(\frac{\text{Live load} + \text{Dead weight}}{\text{Nominal load}}\right)^3} \cdot \underbrace{t_i}_{\text{Working time of the hoist}}$$

Note : Kmin = 0.5

- Output behavior:

Low scale (0V or 4 mA) → -11% of D
10 % of the scale (1V or 5,6 mA) → 0 of D
Full scale (10V or 20 mA) → 100% of D

- Example :

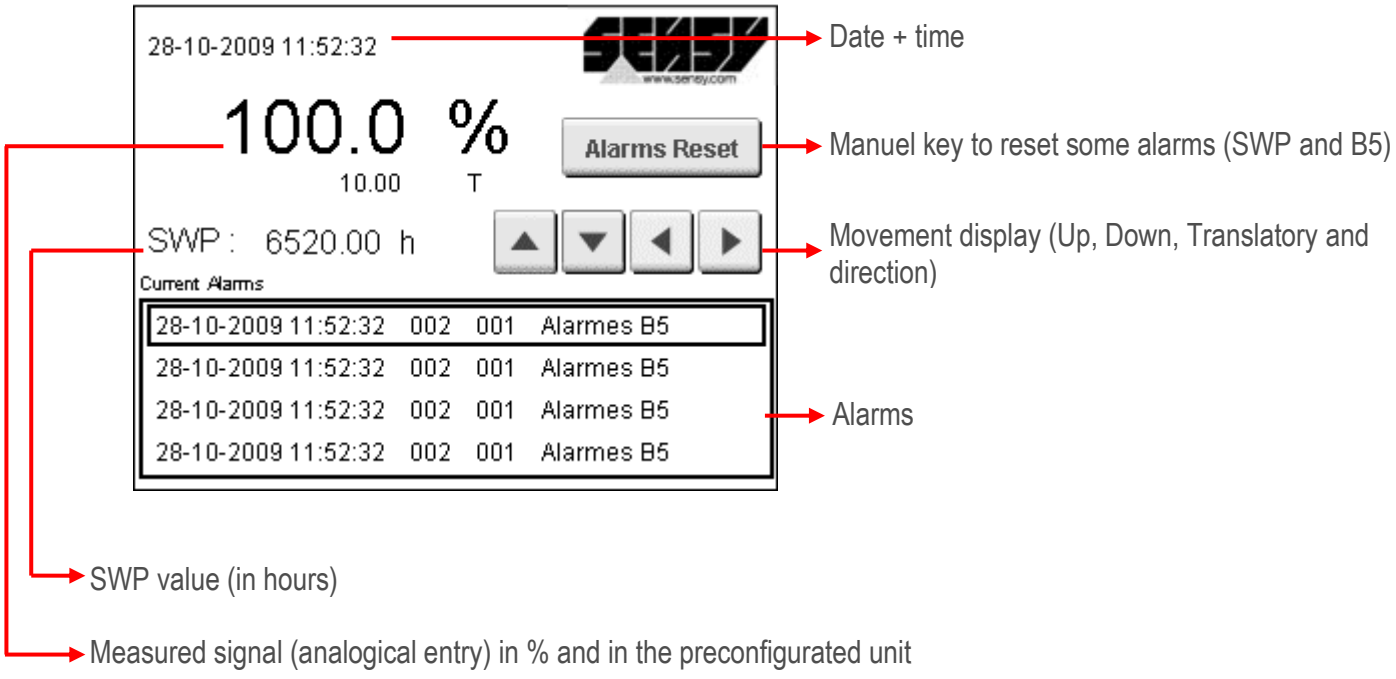
Valeur D (H)	Signal sortie analogique (V)
10000	10
0	1
-1110	0

6. FUNCTIONALITIES

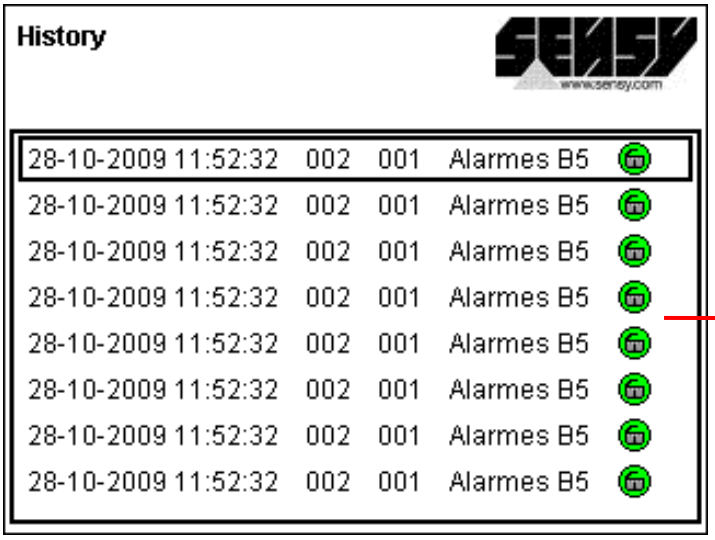
COACH-II has 10 keys :

7. SCREENS DESCRIPTION

7.1. Main screen (F1)



7.2. Alarms historic's screen (F2)



Display of the historic (alarms, files creations, restart,….)

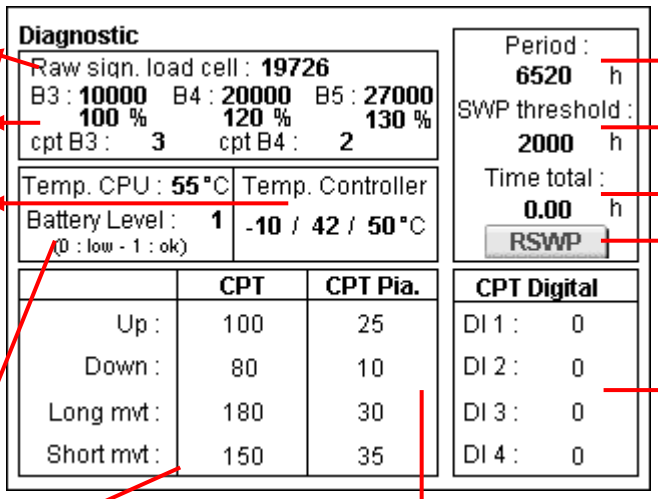
Shape : Date / Time / Action description

If displayed :

- Open padlock: Alarm reset
- Closed padlock: Apparition of the alarm

Possibility to page through the historic :
Touch the screen, this window appears
Use UP and Down arrows to page through.
Touch « X » to get out of historic.

7.3. Diagnosis screen (F3)



Load cell signal (0 – 32768)

Alarms: B3, B4 and B5 + counter B3 - B4

Temp threshold
Min: -10 C
Max: 50°C
Ambiant T° : 42°C
CPU temperature

Battery Level

Period of use - SWP

SWP threshold

Current SWP

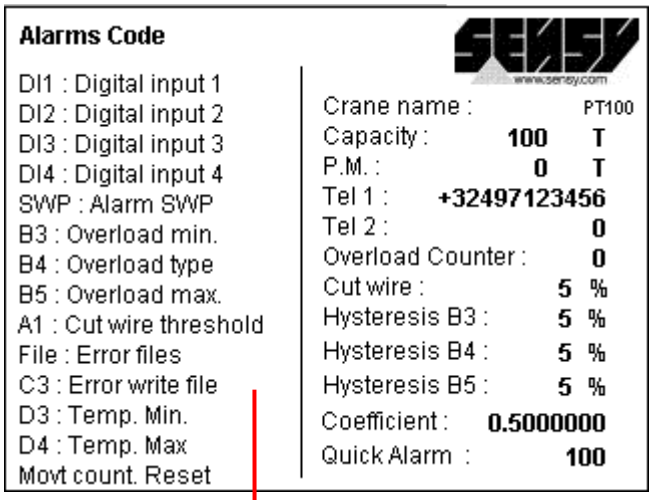
SWP reset

Digital alarms counter

Movement counter:
Up movements
Down movements
Translatory movements
Direction movements

Inching Up movements
Inching Down movements
Inching Translatory movements
Inching Direction movements

7.4. Alarms codes screen (F4)

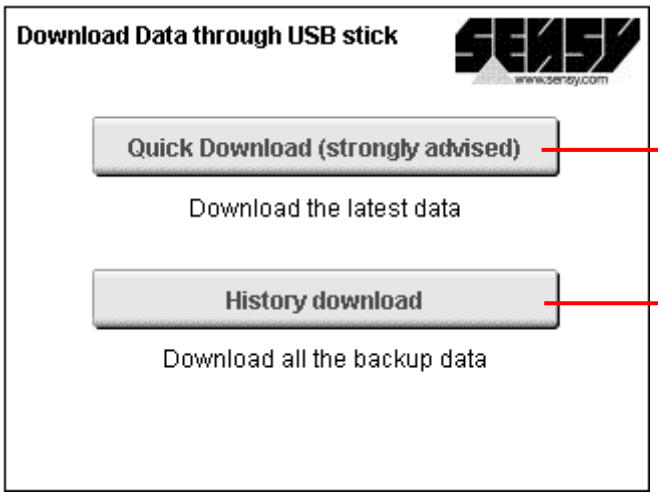


Name of the crane
Capacity (in Kg – can be T)
Dead weight (Kg)
Telephone nr. (optional)
Telephone nr. (optional)
Overload counter
Cut off threshold (ex: 4 mA)
Hysteresis

Calibration coefficient
Number of lines in the alarm file at quick download

See error codes glossary + description

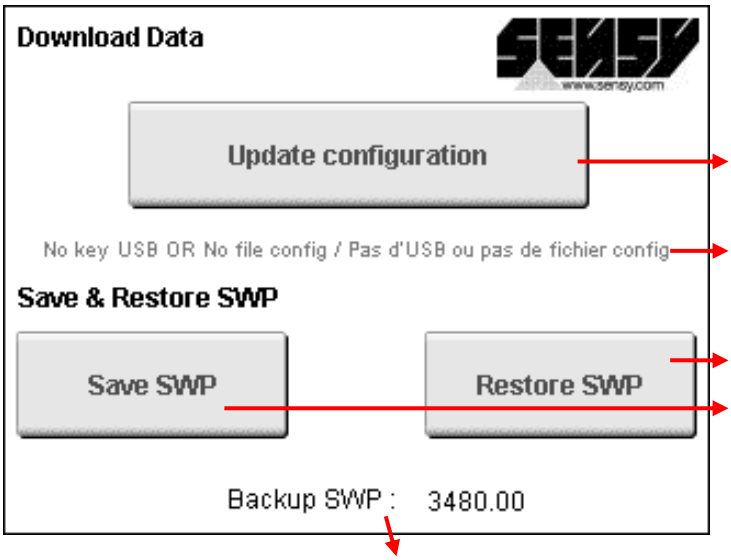
7.5. Data's download screen (F5)



Quick download: Download the latest data

History download: Download all the backup data

7.6. Configuration update screen (F6)



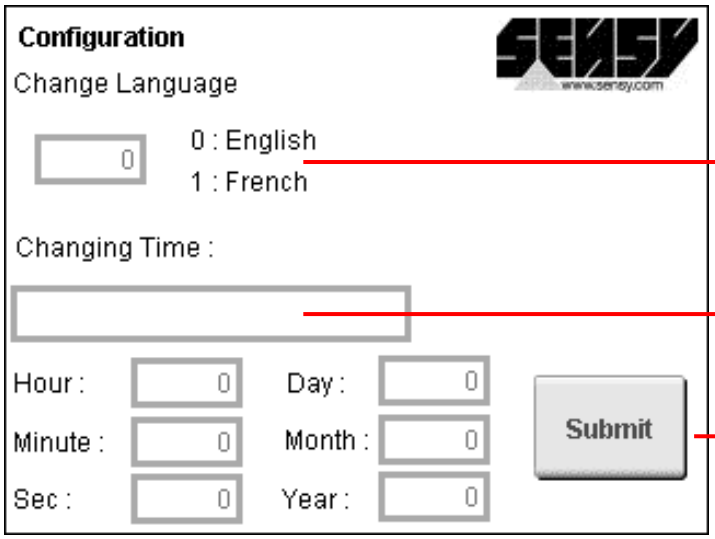
Update key (see configuration update procedure)

Error message

Save and restore keys for SWP (see procedure)

SWP recorded value (in hours).

7.7. Date, time, language configuration screen (F7)

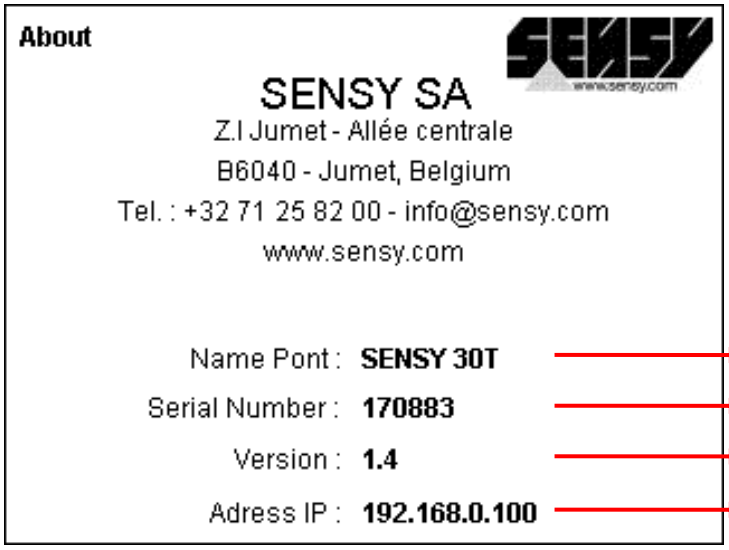


Language choice (English or French)

Time display

Date/time update key

7.8. Contact/information screen (F8)



Crane name

Serial number

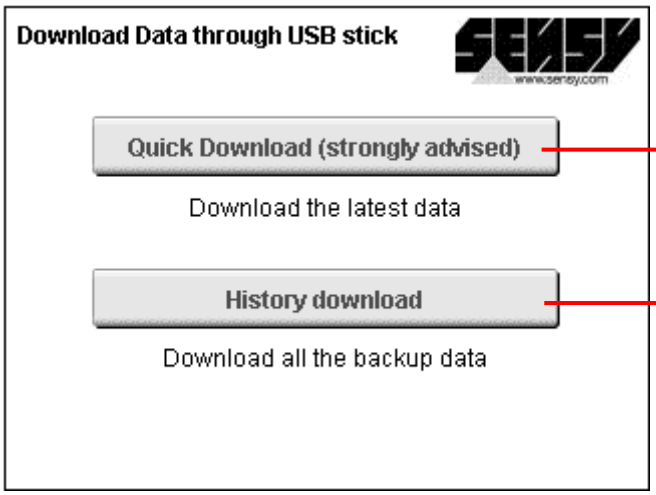
Software version

IP Address

8. USB TRANSFER PROCEDURE

8.1. Data's upload/download

- Place USB stick at connection point
- push on F5
- Press key :



Quick download: Download the latest data

History download: Download all the backup data

- Wait for data's copy/ display of WAIT message
- Pull out USB stick
- Informations are on USB stick directory: DATA\ Date + recording time\.....)

Remark :

Recording is not possible in case of short movement.

8.2. Update configuration file

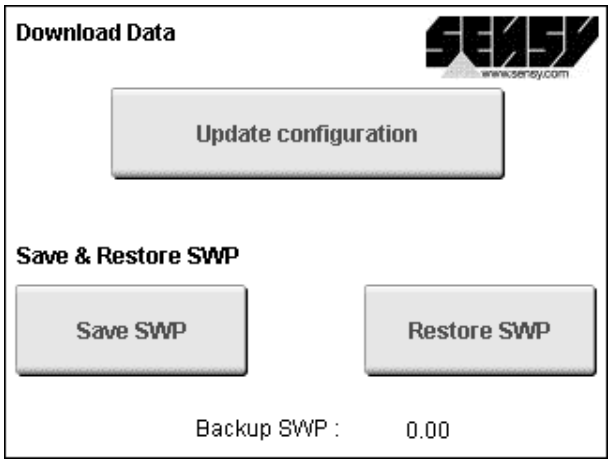
For each configuration file update through USB stick, please follow hereunder.
COACH-II searches a directory (DATA\UPLOAD\Crane name) with the same crane name as present one in the configuration file. If the directory exists, it's going to use the file under the corresponding name.
Once the update is done, power off/on to reboot COACH-II.

« DATA »
« UPLOAD »
« XD0 230605 1741 » // Configuration file for the update
« ALL » // Default configuration file

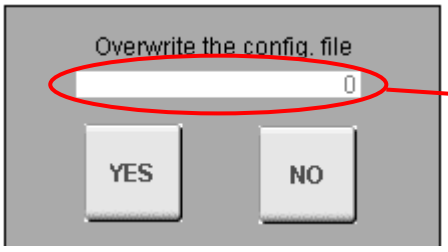
If the crane name in the configuration files matches to the corresponding crane, the configuration file will be replaced by the new one.
This way, it is possible to load the configuration files of several cranes on the same USB stick.

Remark :
If no directory with crane name is available, COACH-II will check in « ALL » directory (default configuration file).

8.2.1. Transfer procedure



- Place USB stick
- Push on F6 key
- Push on Update configuration
- COACH-II searches for a configuration file. If no file, error message. If file is detected, request for « file crushing" confirmation.



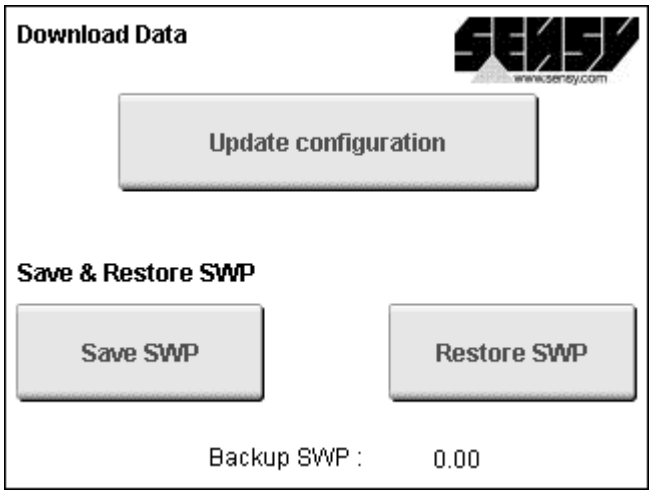
Display of crane name file or default file « ALL »

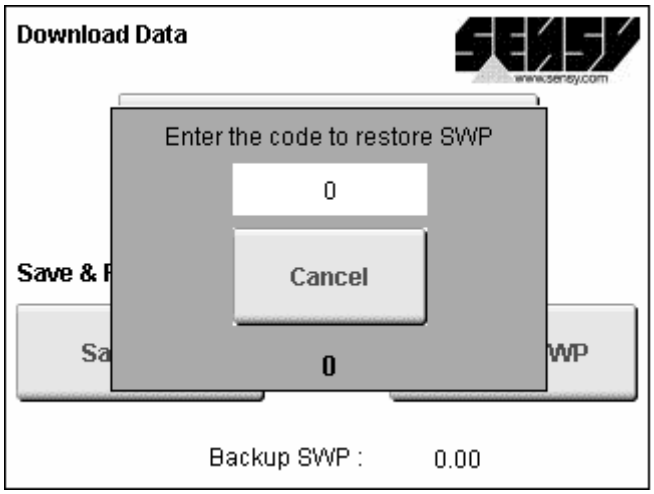
Never forget to cut off COACH-II after downloading for rebooting with new configuration.

8.3. SWP save/restore

When software is updated, some values are set back to « 0 ». In order to avoid loss of informations, it is necessary to connect USB stick and save data's. After software update, you'll need to upload saved data's to restore the values.

8.3.1. Procedure





Save :

- Place USB stick
- Push on F6 key
- Push on Save SWP key

Restore :

- Place USB stick
- Push on F6 key
- Push on Restore SWP key
- In order to avoid accidental data « crushing », password will be required.
- If password is correct, update message will appear.

Password = 7

Backup SWP: saved SWP value

Remark :
Saved data's will be recorded on the USB stick, in swp.txt and config.txt files (in root directory).

8.4. Compact Flash

128Mo Compact Flash is installed and acting like hard disk drive of COACH-II.

Remark :

- Before first start of the system or during formatting of the Compact Flash , it is mandatory creating a Config repertory and put in the different configuration files + one Quick \ Details repertory.
- For an optimal operation, we recommend changing the Compact Flash every 3 years.

8.5. Downloaded files structure

Several files will be present on the Compact Flash or the USB stick:

- Details + date: this file contains the different movements, inchings and counters of one day of operation.
- Alarms + month and year: this file contains all alarms (see alarms chapter) that occurred during the concerned month.
- Memorization + year : this file contains hour after hour recordings of movement amounts and their duration, the inchings, free entries counters, alarms amounts, overloads amounts, SWP and the different steps of the load spectrum.

« DATA »
« DOWNLOAD »
« XD0 230605 1741 » *// Creation of « Crane name + date + hour » file in the « Download » repertory*
« Alarms » files *// Files containing all alarms that occurred*
« Details » « Details » files *// Repertory with all data's file*
« Memorization » file

« CONFIG » *// Repertory with all configuration files*
Current configuration files *// copy of all configuration files*
Current « variables » files (Recovery of SWP, counters, etc.. values)

Remark :
The quantity of data's to be downloaded will determine the download duration, it can take several minutes.

9. TECHNICAL APPENDIX

9.1. Alarms / error codes

A1 : Load cell signal not correct (lower than minimum set point)
B3 : B3 set point crossing(minimum overload)
B4 : B4 set point crossing (intermediate overload)
B5 : B5 set point crossing (maximum overload)
C3 : Files writing Error
D3 : Temperature lower than minimum set point
D4 : Temperature higher than maximum set point
DI 1, 2, 3, 4 : Free entries Alarm TTL 1, TTL 2, TTL 3 et TTL 4
E2 : SMS sending error
F5 : RS232 Communication error
FILE : File error
SWP : SWP Alarm

9.2. Error codes glossary

A : Load cell problem
B : Alarm
C : Software problem
D : General hardware problem
E : SMS module problem
F : Communication problem

9.3. Load spectrum

COACH-II splits analog signal entry in steps.

- Signal between 0 (ou negative) and 5 % = 1° step
- Signal between 6 and 32 % = 2° step
- Signal between 33 and 66 % = 3° step
- Signal between 67 and 100 % = 4° step
- Signal between 101 and 110 % = 5° step
- Signal between 111 and 120 % = 6° step
- Signal above 120 % = 7° step

Recorded values are times obtained by steps and given in seconds.
These values can modified in the analysis software COACH VIEW.

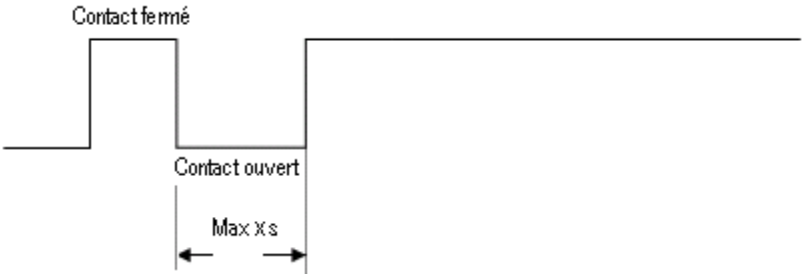
9.4. Temperature sensors

COACH-II has 2 temperature sensors :

- One for the inner temperature of the unis (screen).
- One for the CPU temperature.

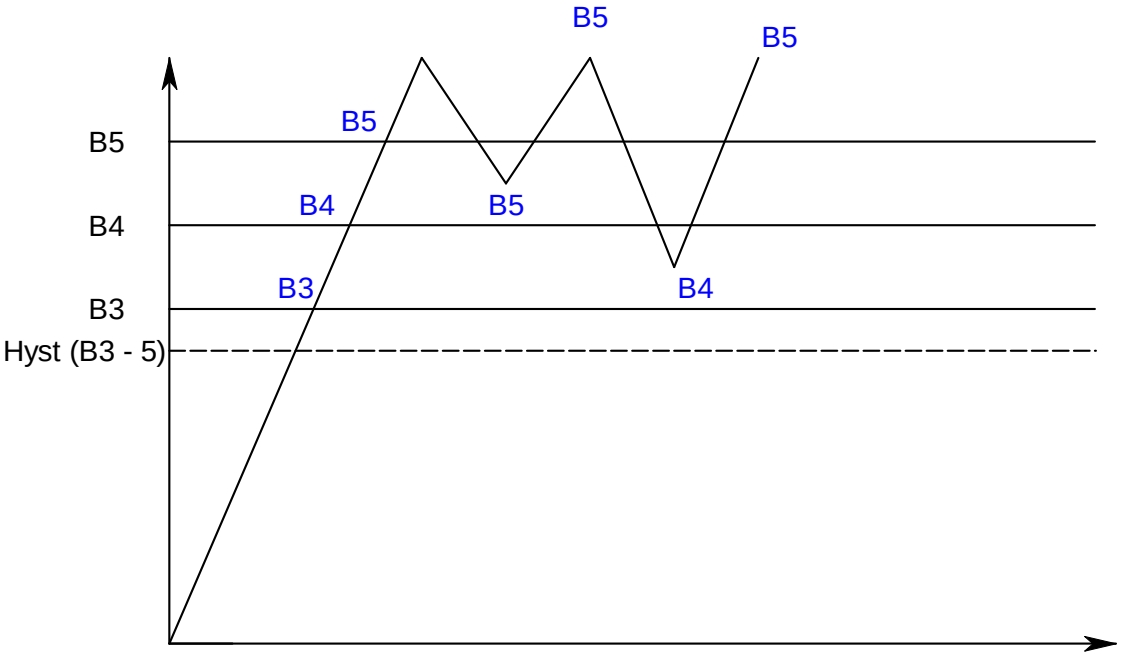
10. INCHING DEFINITION

Movement inching counters will be incremented when the period between 2 contacts is lower than 2 seconds.



11. ADVANCED FUNCTIONS

11.1. Alarm tripping mechanism



When the load cell signal crosses a set point (B3, B4, B5), related alarm trips. For resetting it, it is necessary that the signal goes below the set point. In present example, resetting B5 alarm implies that it needs to go lower than B4 set point.

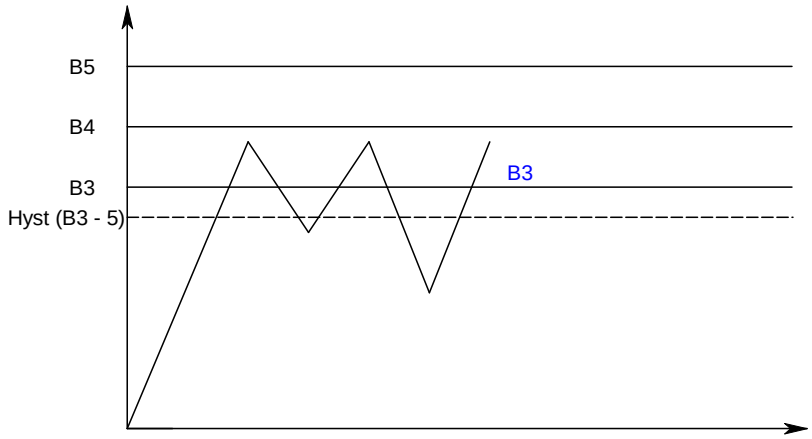
Remark :
For resetting B3 alarm, it requires to go below B3 - hysteresis.

11.2. Creation of memory file from details file

- When one hour is finished, COACH-II analyses the recording of the file. Then, it sums all recorded lines for which the movement time is before the time of analysis. When date changes, COACH-II goes back in details file of the day before.

- If COACH-II is cut off between 2 hours, when restarting, it will create the file of previous hour.

11.3. Overload counter (B3)



It is necessary, in this example, to cross B3 at least 3 times (see MaxCptSurcharge variable = 3 – config_pont file) in less than one hour to get alarm B3 tripping.

Remark :

- This counter is reset if B4 set point is crossed.

11.4. Wires connection – only 5 wires are required.

4 wires for the different movement and one common wire for grounding.

11.5. Archiving

In order avoiding Compact Flash available space saturation, COACH-II has an archiving system.

The system erases the files exceeding a precise date.

- Detail files: archiving of files above 200 days.
- Alarms file, no archiving.
- Traces file, no archiving.
- Memory file, no archiving.