

USER MANUAL

USER MANUAL_C_US 320_OA009.DOCX

Author	Date	Comments	Version
smartINST team	06/06/2016	First version	C_FR
smartINST team	14/09/2016	Corrections	C_US_OA009

revision history

Copyright © smartINST. All rights reserved.

All *smartINST* products are covered by the patents pending or those being filed in Europe and in the United States. The information contained in this publication supersedes any previously published documents. *smartINST* reserves the right to modify specifications and prices without warning.

smartINST S.A.S.

213 rue de Gerland

Bâtiment B1

69007 Lyon

France

Tel : +33 (0)482 740 300

Fax : +33 (0)482 740 314

www.smartinst.fr

© 2013 *smartINST*

Contents

CONTENTS	3
INTRODUCTION.....	5
SMARTCENTER WARRANTY.....	6
SMARTCAPS WARRANTY.....	6
TERMS AND SAFETY SYMBOLS.....	8
TERMS USED IN THIS MANUAL	8
SYMBOLS THAT APPEAR ON THE PRODUCT OR IN ITS DOCUMENTATION	8
SAFETY MEASURES – GENERAL POINTS.....	9
CONDITIONS FOR USE	9
TYPE OF EQUIPMENT	9
PREVENTION OF ANY ELECTROSTATIC DAMAGE.....	10
ENVIRONMENT – RECYCLING THE PRODUCT	10
PREFACE	11
BASIC INSTRUCTIONS	11
OBSERVE THE INSTRUCTIONS IN THIS MANUAL	11
CONTACTS FOR SMARTINST	12
TECHNICAL ASSISTANCE	12
CORRESPONDENCE	12
WEBSITE	12
INSTALLATION AND START-UP.....	13
LOCATION FOR INSTALLATION AND FOR OPERATION	13
UNPACKING	13
OPERATING POSITIONS	13
ELECTRICAL CONNECTION	14
COOLING.....	15
CONNECTING THE RADIOFREQUENCY ANTENNAE	15
CONNECTIONS – ADDING PERIPHERAL EQUIPMENT	16
POWERING THE SMARTCENTER ON	16
POWERING ON	16
MOVING THE SMARTCENTER	16
MENUS AND CONTROLS ON THE FRONT	18
USE OF SPECIALIZED CONTROLS.....	19
USE OF THE NUMERICAL KEYPAD	19
USE OF THE NAVIGATION KEYPAD	19
USE OF FEATURE BUTTONS.....	20
LCD DISPLAY	20
ACTIVATOR.....	21
RECORDING AND STORING DATA	22
RECORDING SCREEN CAPTURES	22
RECORDING SIGNAL DATA: NAME OF FILES.....	22
SMARTCONTROL MENUS	23
WELCOME SCREEN	23

MENU.....	24
STOPWATCH	25
TOOLS	26
PROCEDURES FOR USING SMARTCAPS	27
CONNECTING AN ANTENNA AND ACTIVATING A RECEIVER.....	27
CONNECTING A <i>SMARTCAPS</i>	28
LAUNCHING AN ACQUISITION.....	30
CALIBRATING A <i>SMARTCAPS</i>	31
<i>CALIBRATION OF ACCELERATION</i>	31
<i>CALIBRATION OF INTERNAL TEMPERATURE</i>	31
<i>CALIBRATION OF THE CONDUCTIVITY METER</i>	32
STOPPING AN AQUISITION.....	33
TURNING OFF A <i>SMARTCAPS</i>	35
EXPORTING DATA.....	37
INITIALIZING A NEW <i>SMARTCAPS</i>	37

INTRODUCTION

This User Manual complements the Installation Manual. In addition to the description of the *smartCENTER 7472A* with its specifications and its use, also contains important security information.

We recommend that you first read the Installation Manual, and then read this entire document in order to be properly informed of risks and warnings relating to the conditions for operation as well as the actual use of this equipment.

The *smartCENTER 7472A* was designed solely for the following purposes:

- To provide monitoring of the embedded sensors called *smartCAPS*
- To acquire measurement data sent by the *smartCAPS*
- To manage and display the acquired data
- To send the data to an external support tool

smartCENTER Warranty

smartINST guarantees the products manufactured and sold by *smartINST* against any defect in material or error by labor for a period of two (2) years beginning with the date of purchase from a sales representative accredited by *smartINST*. If any product should be determined to be defective during this Warranty period, *smartINST*, at its discretion, shall assure, free of charge (parts and labor), the repair required for the defective product or shall furnish a replacement product in exchange for the defective one.

For any repair request according to the terms of this Warranty, the customer shall inform *smartINST* of the defect prior to the expiration of the Warranty period and shall take all necessary steps to ensure the undertaking of the repairs. The customer shall be responsible for packing and shipping costs for the defective product, sent along with proof of purchase, to be sent to the repair center that shall be designated by *smartINST*. *smartINST* shall be responsible for the cost of returning the product to the customer if the customer is located in the same country as the *smartINST* repair center. The customer shall be responsible for all shipping costs, Customs expenses, taxes, and all other expenses relative to products sent elsewhere.

This Warranty does not apply to any defect, failure or damage resulting from improper use or inadequate maintenance of the product. *smartINST* shall not be required to provide repair according to the terms of this Warranty if:

- a) the damages result from product installation, repair or troubleshooting attempts made by any person(s) other than official representatives of *smartINST*;
- b) the damages result from improper use or connection to an incompatible product;
- c) the damages or malfunction result from the use of accessories from any source other than *smartINST*;
- d) the product was altered or integrated with other products in such conditions that render repair difficult or prolong the repair time for the product.

THIS WARRANTY IS MADE BY *smartINST* FOR ALL SPECIFIED PRODUCTS, AND IT REPLACES ANY OTHER WARRANTY, EXPLICIT OR IMPLIED. *smartINST* AND ITS DEALERS REFUTE ANY IMPLIED WARRANTY FOR MARKETING OR FOR THE CONVENIENCE OF A PARTICULAR USE. THE RESPONSIBILITY OF *smartINST* REGARDING THE REPAIR OR REPLACEMENT OF DEFECTIVE PRODUCTS CONSTITUTES THE SOLE RE COURSE AVAILABLE TO THE CUSTOMER TO BREACH THIS WARRANTY. *smartINST* AND ITS DEALERS SHALL NOT BE HELD RESPONSIBLE FOR ANY DAMAGE, WHETHER INDIRECT, SPECIFIC, ACCESSORY OR CONSECUTIVE, IF *smartINST* OR ITS SALES REPRESENTATIVES WERE NOT FOREWARNED OF THE POSSIBILITY OF SUCH DAMAGES.

smartCAPS Warranty

smartINST guarantees the products manufactured and sold by *smartINST* against any defect in material or error by labor for a period of one (1) year beginning with the date of purchase from a sales representative accredited by *smartINST*. If any product should be determined to be defective during this Warranty period, *smartINST*, at its discretion, shall assure, free of charge (parts and labor), the repair required for the defective product or shall furnish a replacement product in exchange for the defective one. Batteries are not covered by this Warranty.

For any repair request according to the terms of this Warranty, the customer shall inform *smartINST* of the defect prior to the expiration of the Warranty period and shall take all necessary steps to ensure the undertaking of the repairs. The customer shall be responsible for packing and shipping costs for the defective product, sent along with proof of purchase, to be sent to the repair center that shall be designated by *smartINST*. *smartINST* shall be responsible for the cost of returning the product to the customer if the customer is located in the same country as the *smartINST* repair center. The customer shall be responsible for all shipping costs, Customs expenses, taxes, and all other expenses relative to products sent elsewhere.

This Warranty does not apply to any defect, failure or damage resulting from improper use or inadequate maintenance of the product. *smartINST* shall not be required to provide repair according to the terms of this Warranty if:

- a) the damages result from product installation, repair or troubleshooting attempts made by any person(s) other than official representatives of *smartINST*;
- b) the damages result from improper use or connection to an incompatible product;
- c) the damages or malfunction result from the use of accessories from any source other than *smartINST*;
- d) the product was altered or integrated with other products in such conditions that render repair difficult or prolong the repair time for the product.

THIS WARRANTY IS MADE BY *smartINST* FOR ALL SPECIFIED PRODUCTS, AND IT REPLACES ANY OTHER WARRANTY, EXPLICIT OR IMPLIED. *smartINST* AND ITS DEALERS REFUTE ANY IMPLIED WARRANTY FOR MARKETING OR FOR THE CONVENIENCE OF A PARTICULAR USE. THE RESPONSIBILITY OF *smartINST* REGARDING THE REPAIR OR REPLACEMENT OF DEFECTIVE PRODUCTS CONSTITUTES THE SOLE RE COURSE AVAILABLE TO THE CUSTOMER TO BREACH THIS WARRANTY. *smartINST* AND ITS DEALERS SHALL NOT BE HELD RESPONSIBLE FOR ANY DAMAGE, WHETHER INDIRECT, SPECIFIC, ACCESSORY OR CONSECUTIVE, IF *smartINST* OR ITS SALES REPRESENTATIVES WERE NOT FOREWARNED OF THE POSSIBILITY OF SUCH DAMAGES.

TERMS AND SAFETY SYMBOLS

Terms used in this manual

The following terms may appear in this manual:



WARNING – Warnings identify conditions or actions that may cause personal harm if one fails to read the label.



WATCH OUT – These precautions identify conditions or actions that may cause damage to the product or to other goods.



DANGER – indicates a risk of severe or mortal injury if one fails to read the label.

Symbols that appear on the product or in its documentation



High Voltage
Risk of electrical
shock



Ground (Earth)
Terminal



Double
Insulation



May not be
disposed of in
normal trash



Standard
IEC320 Power
Connector Type

8



European
Standard
Conformity



USB
connection



Power On
Button



Power Supply Switch
power off



power on



Symbol regarding general points
about smartINST



Symbol regarding general points
about the smartCENTER



Symbol regarding general points
about smartCAPS

SAFETY MEASURES – GENERAL POINTS

Please read the following precautions and safety measures attentively in order to avoid any personal harm and any damage to this product and to any and all products connected to it. To avoid any potential danger, use this product solely within the guidelines specified hereinafter.

Use the specified power cord.

Only use the power cord specified for this product and approved by the country in which it will be used.

Respect all of the rated values for the terminals.

To avoid all risk of fire or electrical shock, respect all of the limitations and nominal values for this product. **Before** you plug in the product, be sure to consult the User Manual that comes with it, to read all additional information.

When ready, proceed to plugging in and unplugging, both in the appropriate manner.

Verify that the outlet is appropriately grounded for the protection of the building before plugging in and powering on the equipment.

Be sure that the equipment is switched off before connecting it to the power source or before disconnecting it from the power source.

Never turn on the equipment without its protective panels.

Do not put the equipment in operation if its covers or panels have been removed.

Avoid any exposed circuits.

Do not touch any exposed electrical connection or electrical components while the equipment is powered on.

Do not use the product if you suspect any malfunction.

If you think that the product is damaged in any way, have it inspected by a qualified repair person approved by smartINST.

Do not use the equipment in humid conditions.

Do not use the equipment in an explosive atmosphere.

Keep all surfaces of the equipment clean and dry.

Make sure there is adequate ventilation.

Do not place any object in a location that may impede or restrict air circulation from the ventilation source or within the smartCENTER's ventilation zone.

Do not perform any servicing of the equipment.

Servicing of this equipment may only be performed by personnel authorized by smartINST. If the equipment should fail or become inoperative, return the product to smartINST in the original packing materials designed for this purpose.

Conditions for use

The smartCENTER is not intended for outside use. It should be used inside a building, in a clean and dry environment, and within an operating temperature range of +0° C to +50° C.

Under no circumstances should you open the equipment. Opening the smartCENTER may cause an electrical shock and will also invalidate the Warranty.

Type of equipment

The smartCENTER is used for measurements and testing.

The smartCENTER has been declared in conformity to the R&TTE 1999/5/CE (Radio et Equipement Terminaux de Télécommunication / Radio and Telecommunications Terminal Equipment) directives of the European Community.



As such, this CE conformity label is affixed to the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Prevention of any electrostatic damage



WATCH OUT – An electrostatic charge may damage components of the smartCENTER. To avoid any electrostatic discharge, observe the following precautions as appropriate.

Ensure the safety of the work area.

Do not use any equipment that may produce or maintain a static charge in the work space where you will install the product or remove any fragile component. Avoid any handling of fragile components in a space where the floor or the table surfaces may produce a static charge.

10

Handle components with caution.

Do not allow any fragile component to slip on any surface. Do not touch any exposed power plug pin.

Follow correct procedures for plugging in and unplugging the equipment.

Plug in the radio antenna's SMA outlet of the measuring instrument before powering on the measuring instrument. Unplug the radio antenna's SMA outlet when the measuring instrument is powered off.

Precautions for transportation and storage.

Transport and store all fragile components (*smartCAPS*) in the packing material supplied by *smartINST* and which is protected from static discharges.

Environment – Recycling the product

This section contains information about the impact of the product on the environment.

This equipment may contain substances that are potentially dangerous to the environment or to human health if they are not properly handled during the scrapping of the product. To avoid any diffusion of such substances into the environment, we encourage you to recycle the product in an appropriate way, in order to guarantee that the majority of its component materials will be correctly reused or recycled.



The symbol above indicates that this product respects the requirements of the European Union, in conformity with Directive 2002/96/CE relative to electric and electronic equipment waste ("DEEE") which deals with selective waste collection.

PREFACE

This User Manual describes the menus and controls available on the *smartCENTER* 7472A as well as the use of *smartCAPS*.

BASIC INSTRUCTIONS

Observe the instructions in this manual

Attentively read this entire User Manual before operating the *smartCENTER*; do this even if you have already used *smartINST* products.

Proper use of the equipment is dependent on attentive reading of this User Manual, the Installation Manual, and all labels, whether physically on the equipment or displayed in its software.

CONTACTS FOR smartINST



Technical assistance

For any question relative to the use of *smartINST* measuring products, call the following number from 9:00 am to 6:00 pm (GMT+1:00):

+33(0) 482 740 300

Or contact us by email:

debug@smartinst.fr

Service for the *smartCENTER* product and for *smartCAPS* may only be performed by *smartINST*'s Service personnel.

Correspondence

smartINST
213 rue de Gerland
Batiment B1
69007 Lyon
FRANCE

Website

www.smartinst.fr

INSTALLATION AND START-UP

Location for installation and for operation

You will be able to get to work very quickly as long as you install your *smartCENTER* in an appropriate location. It is therefore essential to take the following points into consideration as you chose the installation site:

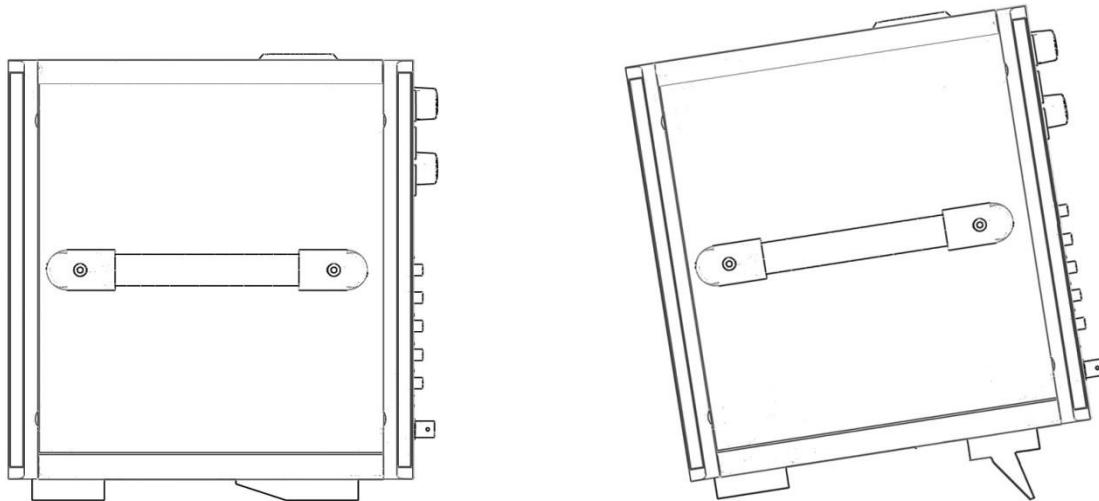
- Place the *smartCENTER* on a solid, flat and dry surface
- Orient the *smartCENTER* so that you have enough radiofrequency cable length to connect the *smartCENTER* to the radio

Unpacking

Carefully remove the *smartCENTER* from its packaging, remove the plastic protective cover from the screen, and install the *smartCENTER* at the worksite prepared for it, including a power outlet and sufficient room around the equipment for ventilation.

Operating positions

The feet allow you to position the *smartCENTER*, as shown in the illustration below:



13

The tilt of the *smartCENTER* provides better, more comfortable, viewing of the screen.

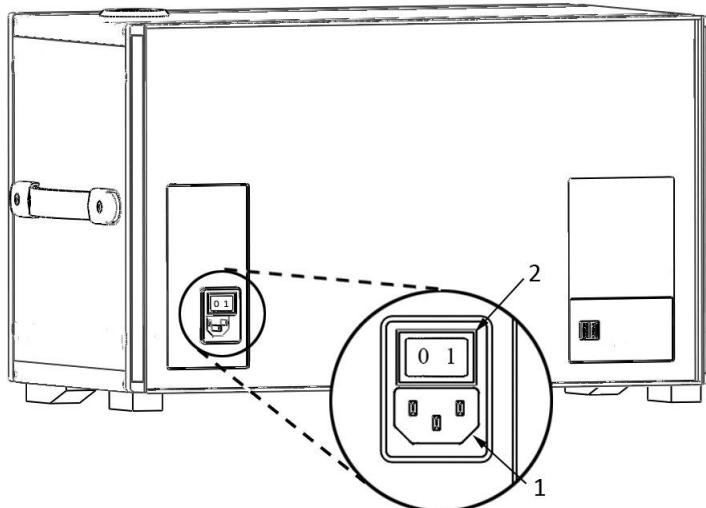
Electrical connection

You can operate the *smartCENTER* using a grounded power source with a line voltage within the range of 100 V_{AC} to 240 V_{AC} and a frequency of 50 Hz to 60 Hz.

The *smartCENTER* is grounded through the use of its IEC320 Type C13 power cord.

Follow these steps to connect the power cord:

1. Make sure that the I/O switch, located above the power inlet, is in the 0 (off) position. See the illustration below.
2. Attach the power cord to the *smartCENTER*'s power inlet. See the illustration below.



14

1: 100-240 V_{AC} power inlet

2: I/O switch



WATCH OUT – Inappropriate use – If you find that the power plug, cord or equipment itself is worn or damaged, it is essential to unplug the equipment and to place a safety sign regarding this problem on the equipment itself, to ensure that no one will try to use it.



WATCH OUT – Verify that the power source is indeed grounded for the protection of the building before you plug the equipment in and turn the power on.



WATCH OUT – It is the *smartCENTER*'s detachable power cord that is its disconnecting device in case of an emergency. For this reason, make sure that the power cord remains always accessible while the equipment is plugged in to the power source and/or while the equipment is in use.

Cooling

Cooling of the *smartCENTER* is provided by the circulation of forced ambient air from the rear and through openings under the equipment. These apertures must never be blocked, not even partially, in order to be sure the equipment is properly cooled.

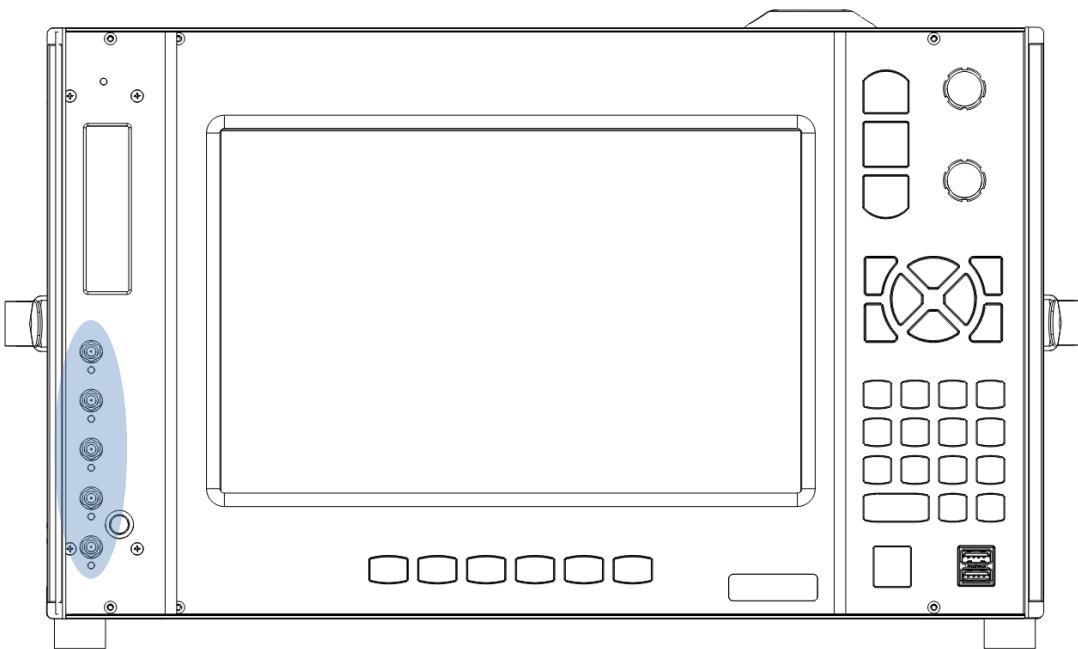


WATCH OUT – To ensure adequate cooling, keep the sides and rear of the *smartCENTER* clear. Never attempt to introduce any object into the ventilation grill. Do not place any object in front of the ventilation grill, the power inlet or the equipment itself.

Connecting the radiofrequency antennae

The connection between the *smartCENTER* and the radiofrequency antenna that receives the data sent by the *smartCAPS* is accomplished with the help of an RF cable. This cable links the antenna to one of the 5 SMA-RP cable connections located to the left of the *smartCENTER* screen (see illustration below).

Each SMA-RP connector is equipped with an operating indicator for each receptor contained in the *smartCENTER* (LED) cassette. The LED corresponding to the receiver in use lights up when the receiver is powered on and operating.



15

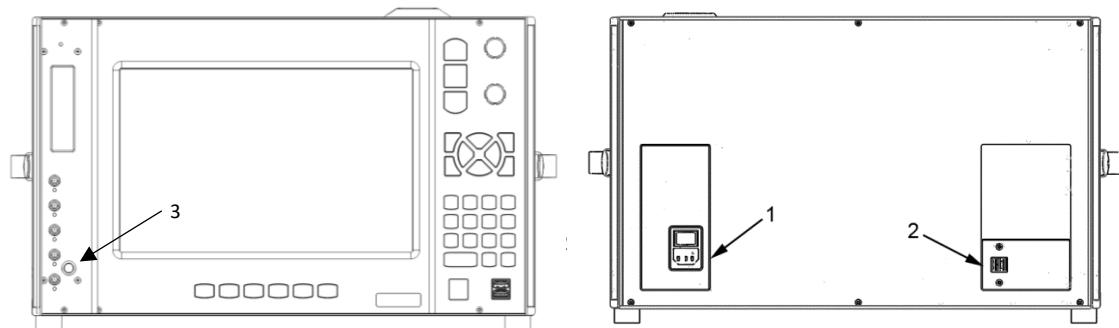


WATCH OUT - We highly recommend that you connect the radiofrequency cable while the *smartCENTER* is not powered on.

Connections – Adding peripheral equipment

Connecting and disconnecting additional peripheral equipment (data storage, external keyboard, mouse, etc.) can be accomplished using the two USB ports available on the front and rear surface of the *smartCENTER*. The *smartCENTER* can detect any external peripheral, even if it is connected while the *smartCENTER* is powered on.

To trigger measurements, it is also possible to connect a BNC cable to the *smartCENTER* at the location reserved for this purpose (see illustration below):



1. **Power inlet:** to be connected to an AC power source with an integrated safety ground
2. **Two USB connectors:** used for the addition of USB peripherals
3. **BNC trigger connector:** input for external start (*solely optional*)

POWERING the smartCENTER ON

Powering on

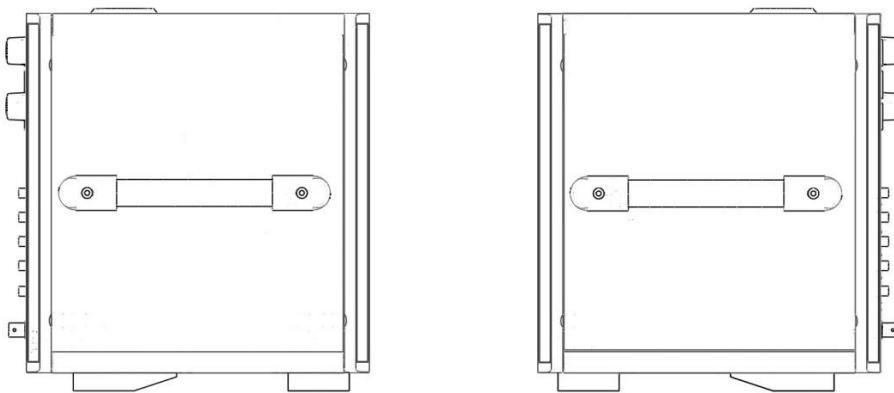
16

Follow these steps to power the *smartCENTER* on:

1. Make sure that the I/O switch on the rear surface near the power inlet is in the O (off) position and that the *smartCENTER* is receiving electrical power using the power cord plugged in at the rear of the housing.
2. Press the I/O switch on the rear surface to put it into the I (on) position.
3. Press the power ON key on the front surface keypad. The *smartCENTER* will start automatically.

MOVING the smartCENTER

Before moving the *smartCENTER*, unplug the power cord. You can coil it around one of the handles on either side of the *smartCENTER* (see illustration below).



The handles on both sides of the *smartCENTER* make it easier to move the equipment.



WATCH OUT – To avoid damaging the *smartCENTER*, remove the RF connections as well as all other peripherals (data storage, external keyboard, mouse, etc.) before you move the *smartCENTER*.



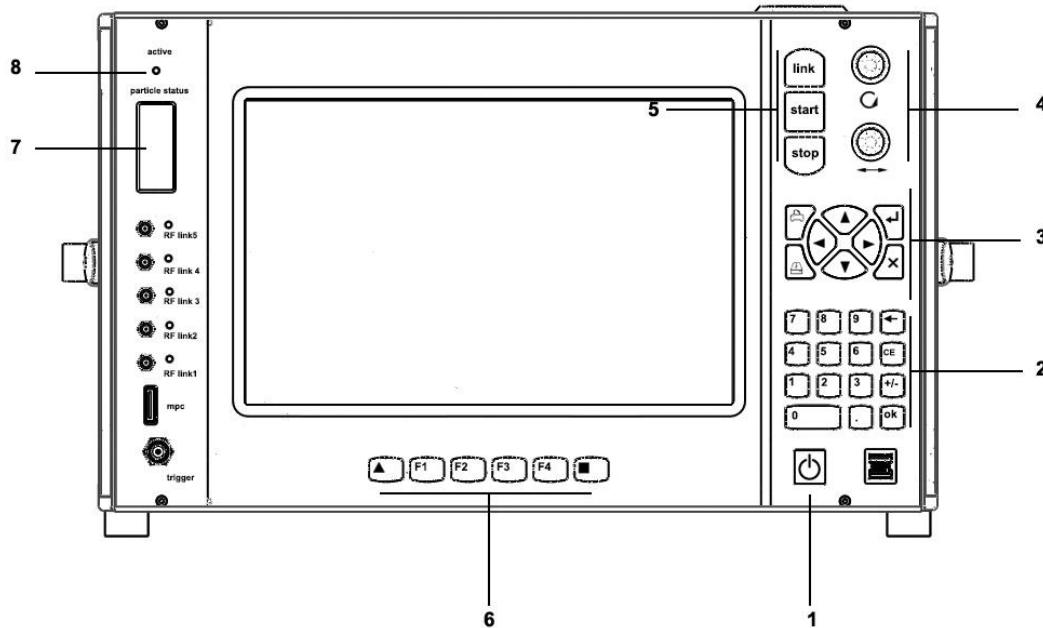
WATCH OUT – Use the accessory container provided to hold the *smartCAPS*.

MENUS AND CONTROLS ON THE FRONT



The front panel of the *smartCENTER* is equipped with the buttons and controls corresponding to:

- The most frequently used features
- Menus that allow access to more specialized features

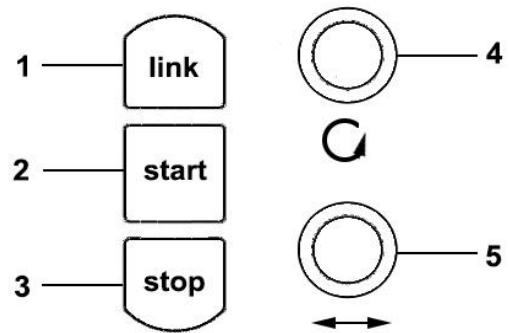


1. **Power button.** Powers the equipment on or stops it. Powering up may take from approximately 15 to 30 seconds, depending on the *smartCENTER*'s internal self-check process.
2. **Numerical keypad**
3. **Navigation keypad** and peripheral controls: buttons for directional choice, validation, cancellation, printing/screen capture and transfer.
4. **Rotating buttons:** their features depend upon the program (zoom, interval, etc.)
5. **Activation** of *smartCAPS*, start and stop measuring procedure
6. **Feature buttons:** 6 buttons for customizable features
7. LCD check on status of *smartCAPS*
8. LED cassette feed: status of the RF receivers

Use of specialized controls

These specialized buttons and controls generally allow the user to control signals and cursors without using a software interface.

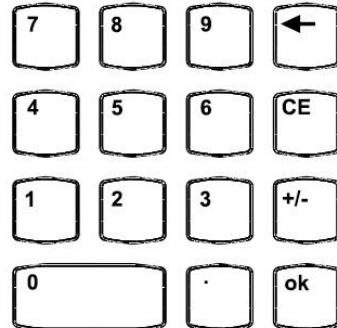
1. **LINK.** Allows connection to *smartCAPS*
2. **START.** Starts acquisition from the *smartCAPS*
3. **STOP.** Stops acquisition from the *smartCAPS*
4. Scroll wheel for general use
5. Scroll wheel for general use



Use of the numerical keypad

Certain choices of acquisition parameters require adjustment of a numerical value before proceeding to its configuration.

Use the numerical keypad to adjust the value of the parameter.
Press the OK button to validate the adjustments.

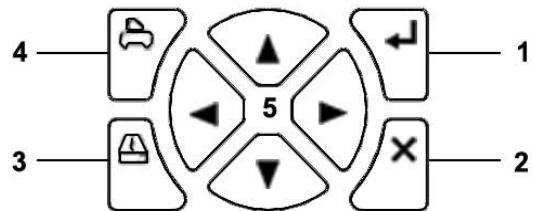


19

Use of the navigation keypad

The navigation keypad is used to provide short cuts without having to use a software interface.

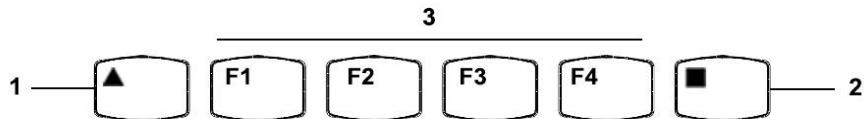
1. **Validation**
2. **Cancellation**
3. **Recording.** Used to set parameters for saving data.
4. **Print.** If connected to a printer, initiates printing; if not, makes a screen capture and saves it to a location defined by the user.
5. **Navigation.** Moving the cursor.



Use of feature buttons

You can use the buttons located below the screen to activate numerous personalized features of the *smartCENTER*.

1. **TRIANGLE**: open or hide the main menu
2. **SQUARE**: refresh the display of graphs
3. **F1, F2, F3, F4**: Options not activated



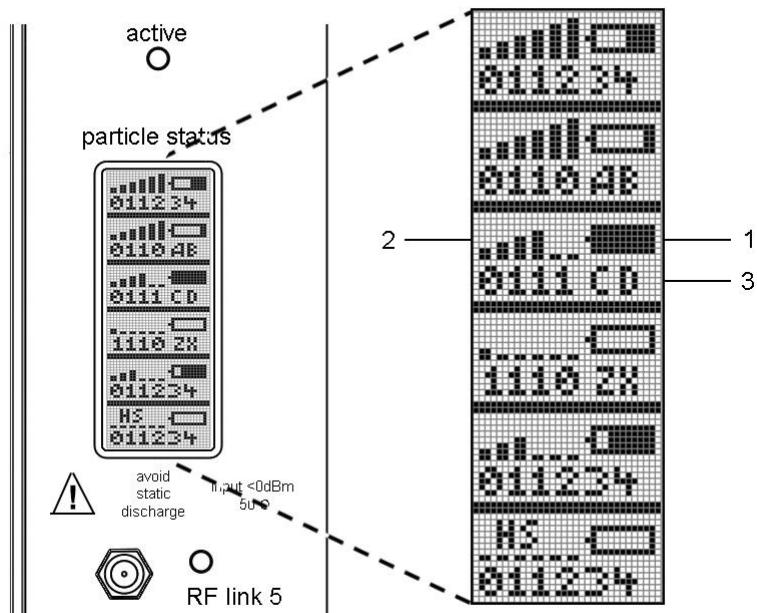
LCD Display

The backlit display allows the user to know:

1. the status of radio reception quality for each *smartCAPS*
2. the status of each *smartCAPS*' battery
3. the identification number of each *smartCAPS*

By default, the display provides monitoring of 6 *smartCAPS*. It scrolls when the user has activated more than 6 *smartCAPS* at the same time.

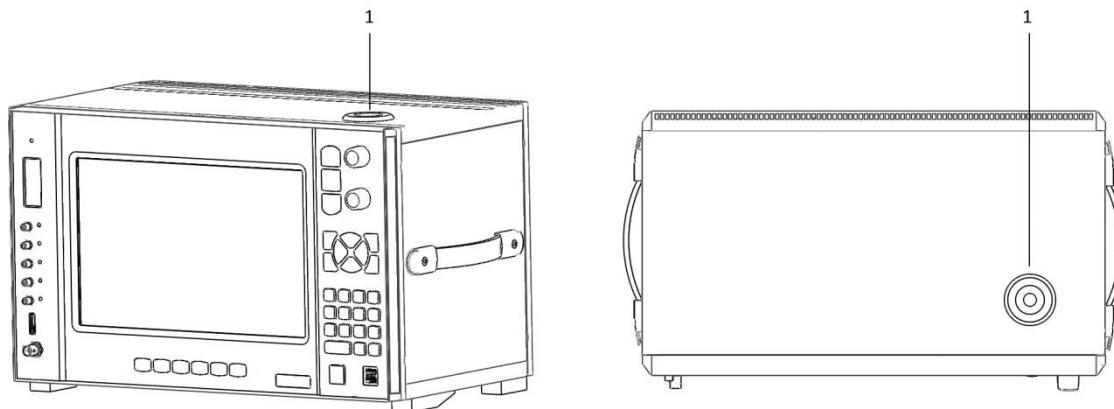
20



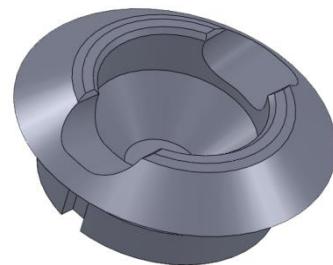
Activator

The activator is a major component of the equipment because it ensures connection to the *smartCAPS* by generating a magnetic field. It then allows the user to start the *smartCAPS* by sending them the acquisition parameters selected by the user as they are being activated.

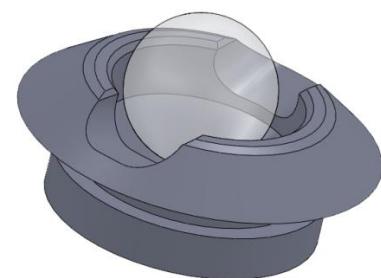
The activator is located on the top of the *smartCENTER* (see illustration below).



1: activator base



3D mechanical part of the activator.



smartCAPS positioned within the activator.



WATCH OUT – The user must be vigilant not to allow any material (metal or otherwise) other than *smartCAPS* within the activator.

RECORDING AND STORING DATA



The *smartCENTER* offers a permanent storage system for configuration parameters, signal captures. Use the *smartCENTER* to record configuration files and the data from chosen signals.

You can use external memory storage to transfer data or images to remote computers, whether for analysis or for archiving. You can use external memory storage such as hard drives or USB flash drives by connecting them to the *smartCENTER*.

Data can be imported in a spreadsheet format to conduct additional analyses.

Recording screen captures

There are two ways to save a screen capture of graphs generated at the end of an experiment or in the midst of an experiment:

- Press the Print button on the navigation keypad (see the “Use of the Navigation Keypad” section of this manual)
- Use a mouse. In this case, place the cursor on the graph, right click, then select the “Export” option, and then select “Export a simplified image”.

The recording is saved to D:\smartCONTROL\record

Recording signal data: name of files

A binary acquisition file is created each time a program in the D:\smartCONTROL\record directory is started.

The *smartCENTER* names each file it creates using by default the following format:

22

- FULLSTREAM_[date]_[time acquisition was begun].txt for spreadsheet files. The .txt file is created by default in the directory “Data Stream log File Path” chosen for this purpose. This file contains data compatible with most spreadsheet programs (e.g., Excel, Calisto).
- FULLSTREAM_[date]_[time acquisition was begun].bin for binary format files.
- IMG_XXXXX.png, IMG_XXXXX.bmp or IMG_XXXXX.tif for image files.

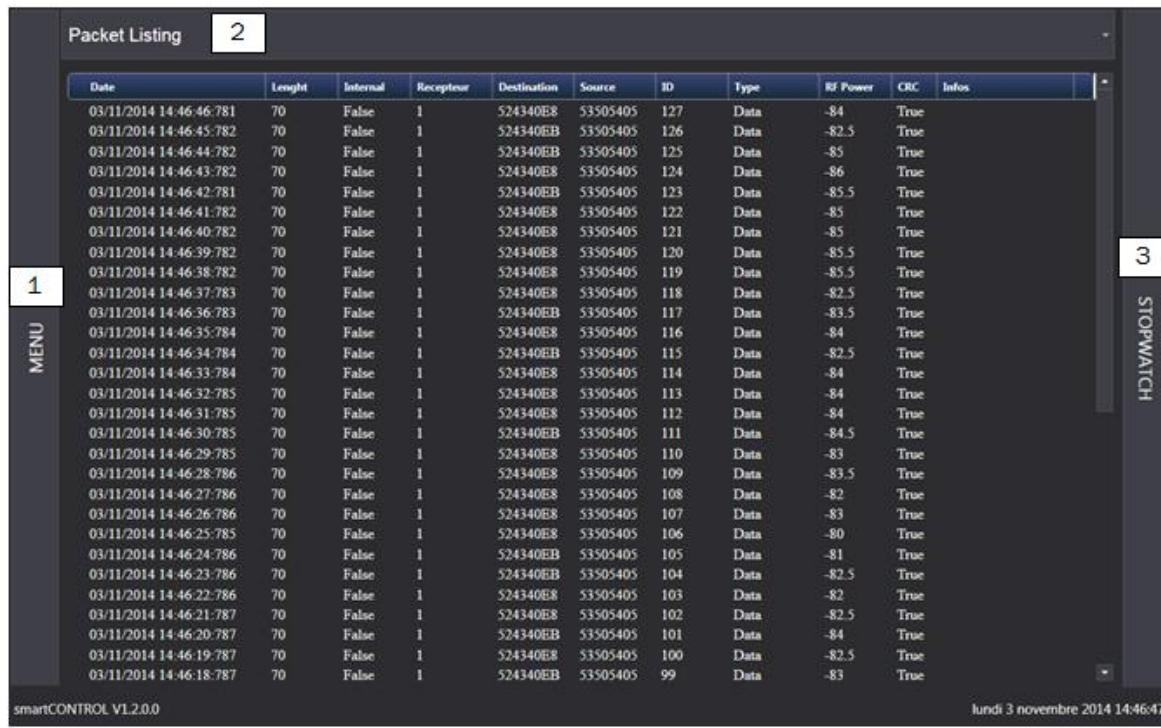


WATCH OUT – Unless the user adjusts the program otherwise, acquisition will record by default all transmission channels received by the *smartCENTER*.

smartCONTROL MENUS

The *smartCONTROL* driver software for the *smartCENTER* has the following menus which can be selected by using the touchscreen or the buttons on the front of the *smartCENTER*.

WELCOME SCREEN

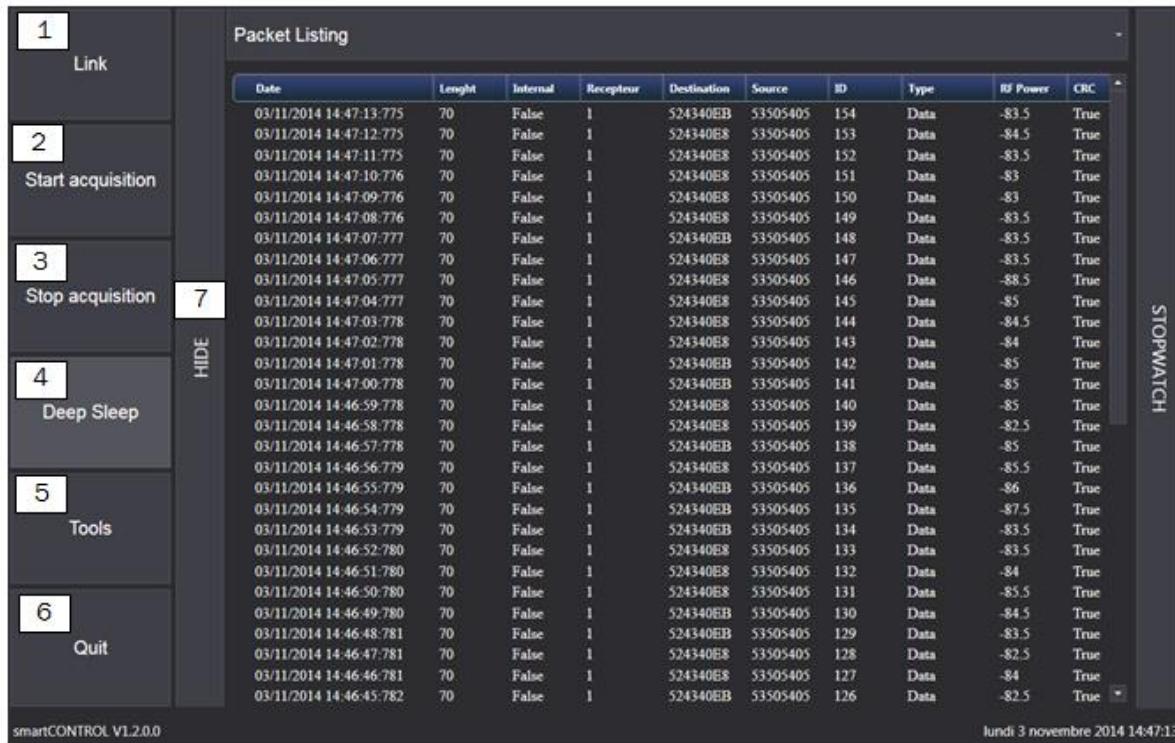


The screenshot shows the 'Packet Listing' screen of the smartCONTROL software. The table has 12 columns: Date, Length, Internal, Recepteur, Destination, Source, ID, Type, RF Power, CRC, and Infos. The table contains 30 rows of data. The first row is 03/11/2014 14:46:46:781, Length 70, False, 524340EB, 53505405, 127, Data, -84, True. The last row is 03/11/2014 14:46:18:787, Length 70, False, 524340EB, 53505405, 99, Data, -83, True. The table is preceded by a 'MENU' button (1) and followed by a 'STOPWATCH' button (3). The status bar at the bottom shows 'smartCONTROL V1.2.0' and 'lundi 3 novembre 2014 14:46:47'.

Date	Length	Internal	Recepteur	Destination	Source	ID	Type	RF Power	CRC	Infos
03/11/2014 14:46:46:781	70	False	1	524340EB	53505405	127	Data	-84	True	
03/11/2014 14:46:45:782	70	False	1	524340EB	53505405	126	Data	-82.5	True	
03/11/2014 14:46:44:782	70	False	1	524340EB	53505405	125	Data	-85	True	
03/11/2014 14:46:43:782	70	False	1	524340EB	53505405	124	Data	-86	True	
03/11/2014 14:46:42:781	70	False	1	524340EB	53505405	123	Data	-85.5	True	
03/11/2014 14:46:41:782	70	False	1	524340EB	53505405	122	Data	-85	True	
03/11/2014 14:46:40:782	70	False	1	524340EB	53505405	121	Data	-85	True	
03/11/2014 14:46:39:782	70	False	1	524340EB	53505405	120	Data	-85.5	True	
03/11/2014 14:46:38:782	70	False	1	524340EB	53505405	119	Data	-85.5	True	
03/11/2014 14:46:37:783	70	False	1	524340EB	53505405	118	Data	-82.5	True	
03/11/2014 14:46:36:783	70	False	1	524340EB	53505405	117	Data	-83.5	True	
03/11/2014 14:46:35:784	70	False	1	524340EB	53505405	116	Data	-84	True	
03/11/2014 14:46:34:784	70	False	1	524340EB	53505405	115	Data	-82.5	True	
03/11/2014 14:46:33:784	70	False	1	524340EB	53505405	114	Data	-84	True	
03/11/2014 14:46:32:785	70	False	1	524340EB	53505405	113	Data	-84	True	
03/11/2014 14:46:31:785	70	False	1	524340EB	53505405	112	Data	-84	True	
03/11/2014 14:46:30:785	70	False	1	524340EB	53505405	111	Data	-84.5	True	
03/11/2014 14:46:29:785	70	False	1	524340EB	53505405	110	Data	-83	True	
03/11/2014 14:46:28:786	70	False	1	524340EB	53505405	109	Data	-83.5	True	
03/11/2014 14:46:27:786	70	False	1	524340EB	53505405	108	Data	-82	True	
03/11/2014 14:46:26:786	70	False	1	524340EB	53505405	107	Data	-83	True	
03/11/2014 14:46:25:785	70	False	1	524340EB	53505405	106	Data	-80	True	
03/11/2014 14:46:24:786	70	False	1	524340EB	53505405	105	Data	-81	True	
03/11/2014 14:46:23:786	70	False	1	524340EB	53505405	104	Data	-82.5	True	
03/11/2014 14:46:22:786	70	False	1	524340EB	53505405	103	Data	-82	True	
03/11/2014 14:46:21:787	70	False	1	524340EB	53505405	102	Data	-82.5	True	
03/11/2014 14:46:20:787	70	False	1	524340EB	53505405	101	Data	-84	True	
03/11/2014 14:46:19:787	70	False	1	524340EB	53505405	100	Data	-82.5	True	
03/11/2014 14:46:18:787	70	False	1	524340EB	53505405	99	Data	-83	True	

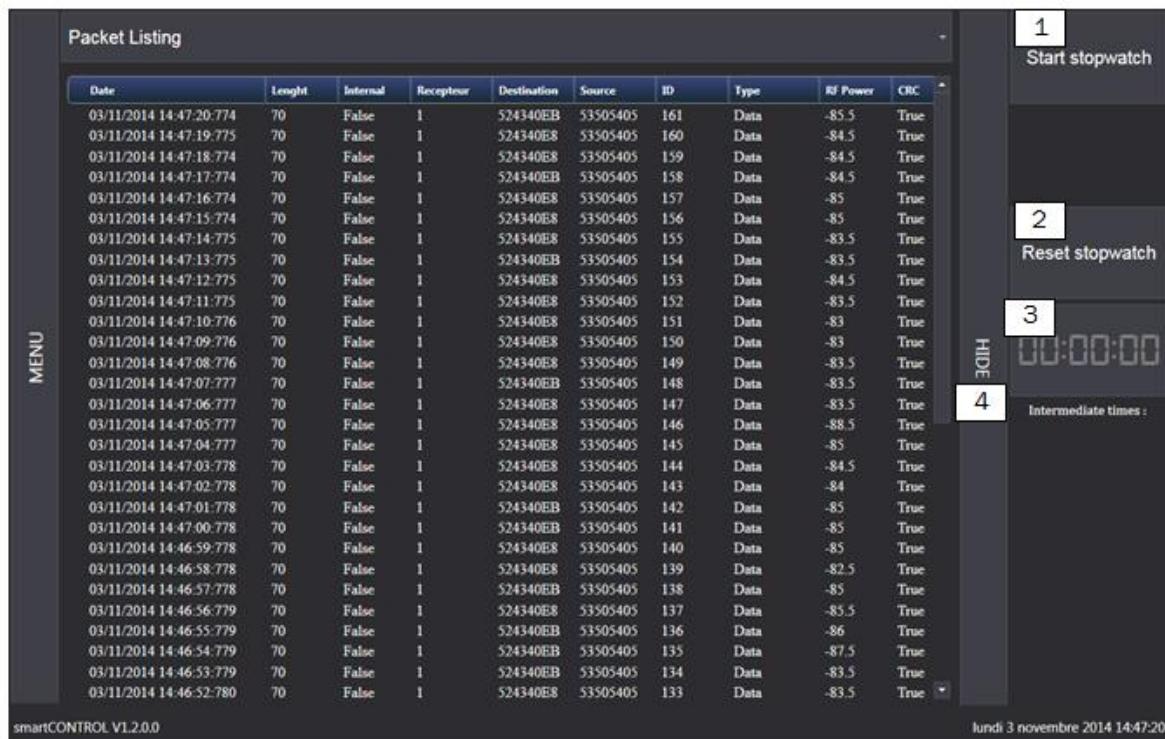
1. Menu: main menu
2. Packet listing: scrolling through the radio packets following this order of columns:
 - a. date
 - b. length of packets
 - c. type of packet : True=emission by the *smartCENTER*, False=reception by the *smartCENTER* of an emission from an active *smartCAPS*
 - d. the ID number of the receiver that received the packets
 - e. the address of the receiver
 - f. the address of the *smartCAPS* that emitted the packet
 - g. the ID number of the packet
 - h. the type of packet
 - i. the RF power of the packet
 - j. verification of the integrity of the packet
 - k. other packet information
3. stopwatch (chronometer)

MENU



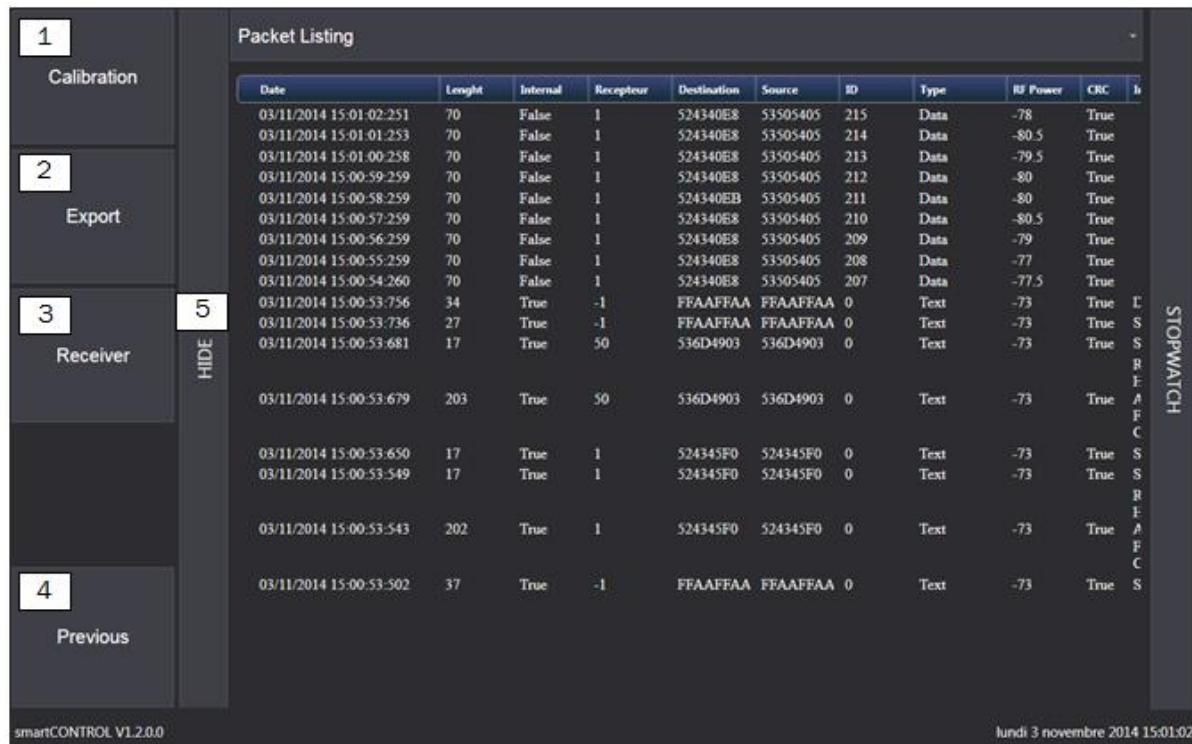
1. Link: used to connect a *smartCAPS* and to shift it from DEEP SLEEP mode to SLEEP mode.
2. Start acquisition: used to start measurements using a *smartCAPS* and shifting it from SLEEP mode to ACQUIRE DATA mode
3. Stop acquisition: used to stop measurements using a *smartCAPS* and to shift it from ACQUIRE DATA mode to SLEEP mode
4. Deep sleep: used to shut off a *smartCAPS* and to shift it into DEEP SLEEP mode.
5. Tools: used to open the Tools menu
6. Quit: used to leave *smartCONTROL*
7. Hide: used to hide submenus

STOPWATCH



1. Start stopwatch: used to start the chronometer; the pause stopwatch button allows the user to put the stopwatch into pause mode. The button is visible as soon as the stopwatch is started.
2. Reset stopwatch: used to reset the chronometer to zero
3. The chronometer
4. Hide: used to hide submenus; the chronometer still remains displayed at the bottom of the screen

TOOLS



1. Calibration: used to calibrate the sensors of a *smartCAPS*
2. Export: used to export files from the hard drive to an external memory storage instrument connected by USB
3. Receiver: used to activate and deactivate the receivers where the antennae are connected
4. Previous: used to return to the main menu
5. Hide: used to hide submenus

PROCEDURES FOR USING *smartCAPS*



CONNECTING AN ANTENNA AND ACTIVATING A RECEIVER

By default, receiver No. 1 is activated, and therefore if only one antenna is connected, you must use receiver No. 1.

The following procedure describes how to connect additional antennae and how to activate the corresponding receivers:

1. Turn the *smartCENTER* off
2. Attach antennae to receivers 2 to 5
3. Using a torque wrench, tighten each nut to 1 Nm torque
4. Turn *smartCENTER* on
5. Open Menu\Tools\Receivers
6. Activate the receivers to which antennae are connected by sliding each bar to the right (see illustration below the menu window: note how Receivers 1 & 2 are On while Receivers 3, 4 & 5 are Off)
7. Press the CLOSE button to leave the Receivers menu

Packet Listing

Date	Lenght	Internal	Recepteur	Destination	Source	ID	Type	RF Power	CRC	Infos
05/11/2014 10:55:51:456	17	True	2	524345F1	524345F1	0	Text	-73	True	Success
05/11/2014 10:55:51:356	17	True	2	524345F1	524345F1	0	Text	-73	True	Success
05/11/2014 10:55:51:354	202	True	2	524345F1	524345F1	0	Text	-73	True	Receiver : C HardWare : F Assembly : F FirmWare : U

Receivers

Recepteur ligne 1	On
Recepteur ligne 2	On
Recepteur ligne 3	Off
Recepteur ligne 4	Off
Recepteur ligne 5	Off

CLOSE

05/11/2014 10:55:35:992	17	True	4	524345F3	524345F3	0	Text	-73	True	Success
05/11/2014 10:55:35:990	202	True	4	524345F3	524345F3	0	Text	-73	True	Receiver : C HardWare : F Assembly : F FirmWare : U Canal de communicat
05/11/2014 10:55:35:280	198	False	1	164BC4E1	53501405	237	Data	-95	False	
05/11/2014 10:55:34:710	17	True	3	524345F2	524345F2	0	Text	-73	True	Success
05/11/2014 10:55:34:609	17	True	3	524345F2	524345F2	0	Text	-73	True	Success

smartCONTROL V1.2.0.0 mercredi 5 novembre 2014 10:56:04

CONNECTING A *smartCAPS*

This procedure outlines the steps to follow in order to connect a *smartCAPS* to the *smartCENTER* and to shift it from DEEP SLEEP mode to SLEEP mode in preparation for data acquisition:

1. Select the MENU\LINK menu or press the Link button on the front of the instrument (see the “Use of Specialized Controls” section of this manual)
2. Choose the address of the *smartCAPS* you wish to connect. If the address does not appear in the list, refer to the final paragraph of this manual for the initialization of a new *smartCAPS*.

Packet Listing										
Date	Lenght	Internal	Recepteur	Destination	Source	ID	Type	RF Power	CRC	Infos
04/11/2014 09:57:07-430	71	False	50	B69BCD9F	5672BA7B	190	None	-86	False	
04/11/2014 09:56:06-317	155	False	50	BF605FD9	BF4F23A5E	251	Data	-86.5	False	
04/11/2014 09:55:55-729	17	True	50	536D4903	536D4903	0	Text	-73	True	Success
04/11/2014 09:55:55-728	17	True	1	524345F0	524345F0	0	Text	-73	True	Success
04/11/2014 09:55:55-724	34	True	-1	FFAAFFAA	FFAAFFAA	0	Text	-73	True	Opening Activator M
04/11/2014 09:55:55-699	70	False	1	524340E1	53505405	96	Data	-77.5	True	
04/11/2014 09:55:54-699	70	False	1	524340E1	53505405	95	Data	-77.5	True	
04/11/2014 09:55:53-699	70	False	1	524340E1	53505405	94	Data	-78	True	

Link of the smartPART : 1/5

Select the address of the smartPART to link									
<div style="display: flex; justify-content: space-around; align-items: center;"> PREVIOUS NEXT </div>									
<div style="border: 1px solid #ccc; padding: 2px; display: inline-block;"> C4H101 </div>									▼
C4H101									▲
C4H102									▼
C4H103									▲
C4H105									▼
C4H104									▲
C4H106									▼
L4H106									▲
L4H107									▼
04/11/2014 09:55:46:444	203	True	50	536D4903	536D49				
04/11/2014 09:55:46:415	17	True	1	524345F0	524345F0				
04/11/2014 09:55:46:313	17	True	1	524345F0	524345F0				
04/11/2014 09:55:46:307	202	True	1	524345F0	524345F0	0	Text	-73	

28

3. Place the *smartCAPS* in the activator located on the top of the *smartCENTER*; turn the marking on the *smartCAPS* to face the user (red North Pole which holds the sensors must be facing upward).
Press or click on the **NEXT** button.

Packet Listing										
Date	Lenght	Internal	Recepteur	Destination	Source	ID	Type	RF Power	CRC	Infos
04/11/2014 09:57:54.793	201	False	50	74AA10DA	5558F072	43	Data	-85	False	
04/11/2014 09:57:07.430	71	False	50	B69BCD9F	S627BA7B	190	None	-86	False	
04/11/2014 09:56:06.317	155	False	50	BF605FDF	B4F23A5E	251	Data	-86.5	False	
04/11/2014 09:55:55.729	17	True	50	536D4903	536D4903	0	Text	-73	True	Success
04/11/2014 09:55:55.728	17	True	1	524345F0	524345F0	0	Text	-73	True	Success
04/11/2014 09:55:55.724	34	True	-1	FFAAFFAA	FFAAFFAA	0	Text	-73	True	Opening Activator M
04/11/2014 09:55:55.699	70	False	1	524340E1	53505405	96	Data	-77.5	True	
04/11/2014 09:55:54.699	70	False	1	524340E1	53505405	95	Data	-77.5	True	

Link of the smartPART : C4H101

Place the smartPART into the activator.
The smartPART sensor has to be directed upwards.

				PREVIOUS	NEXT	CANCEL	CLOSE
	04/11/2014 09:55:46:446	17	True	50	536D4903	536D4903	0
	04/11/2014 09:55:46:444	203	True	50	536D4903	536D4903	0
	04/11/2014 09:55:46:415	17	True	1	524345F0	524345F0	0
	04/11/2014 09:55:46:313	17	True	1	524345F0	524345F0	0
	04/11/2014 09:55:46:307	202	True	1	524345F0	524345F0	0

Packet Listing											
Date	Lenght	Internal	Recepteur	Destination	Source	ID	Type	RF Power	CRC	Infos	
04/11/2014 10:00:49:651	201	False	50	879E3AB5	CBFCF9E2	154	None	-87.5	False		
04/11/2014 09:59:48:675	66	False	50	76A8F7CC	D35DD2F2	235	ACK	-90.5	False		
04/11/2014 09:59:32:342	110	False	50	7CD747CA	F2ED3BF0	235	Data	-87.5	False		
04/11/2014 09:59:27:696	185	False	50	0075BB58	446787BF	107	None	-87.5	False		
04/11/2014 09:57:54:793	201	False	50	74AF10DA	5558F072	43	Data	-85	False		
04/11/2014 09:57:07:430	71	False	50	B69BCD9F	5627BA7B	190	None	-86	False		
04/11/2014 09:56:06:317	155	False	50	BF605FDF	B4F23A5E	251	Data	-86.5	False		
04/11/2014 09:55:55:729	17	True	50	536D4903	536D4903	0	Text	-73	True	Success	

Link of the smartPART : C4H101 (Try : 1)

Activation of the smartPART in progress.
Do not remove the smartPART from the activator.



<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 100px; height: 20px;"></td><td style="width: 100px; height: 20px;"></td></tr> <tr> <td>PREVIOUS</td><td>NEXT</td><td>CANCEL</td><td>CLOSE</td><td colspan="8"></td></tr> </table>																								PREVIOUS	NEXT	CANCEL	CLOSE								
PREVIOUS	NEXT	CANCEL	CLOSE																																
04/11/2014 09:55:47:699	70	False	1	S24340E1	53505405	88	Data	-78	True																										
04/11/2014 09:55:46:699	70	False	1	S24340E1	53505405	87	Data	-77.5	True																										
04/11/2014 09:55:46:521	34	True	-1	FFAAFFAA	FFAAFFAA	0	Text	-73	True	Display : Packet List																									
04/11/2014 09:55:46:502	27	True	-1	FFAAFFAA	FFAAFFAA	0	Text	-73	True	Stopwatch : Reset																									
04/11/2014 09:55:46:446	17	True	50	536D4903	536D4903	0	Text	-73	True	Success																									
										Receiver : C																									
										HardWare : A																									
										Assembly : R																									
										FirmWare : U																									
										Canal de communicat																									
04/11/2014 09:55:46:444	203	True	50	536D4903	536D4903	0	Text	-73	True	Success																									
04/11/2014 09:55:46:415	17	True	1	S24345F0	524345F0	0	Text	-73	True	Success																									
04/11/2014 09:55:46:312	17	True	1	S24345F0	524345F0	0	Text	-72	True	Success																									

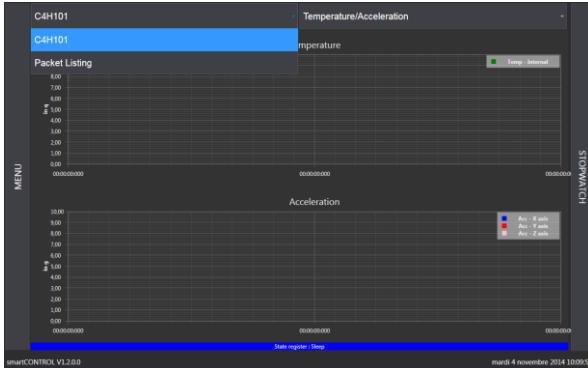
smartCONTROL V1.2.0.0

mardi 4 novembre 2014 10:01:05

- Wait for the connection to be completed: the message announcing a successful connection will appear as a new SLEEP mode for the *smartCAPS* at the bottom of the screen, as well as notification of the status of its battery and the quality of radio reception on the LCD screen.
- Indicate whether another *smartCAPS* needs to be connected (follow the same steps as above).

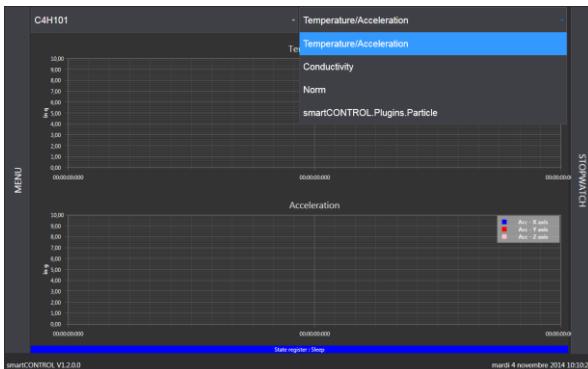
A new screen will open with:

- A display of packets or graphs



29

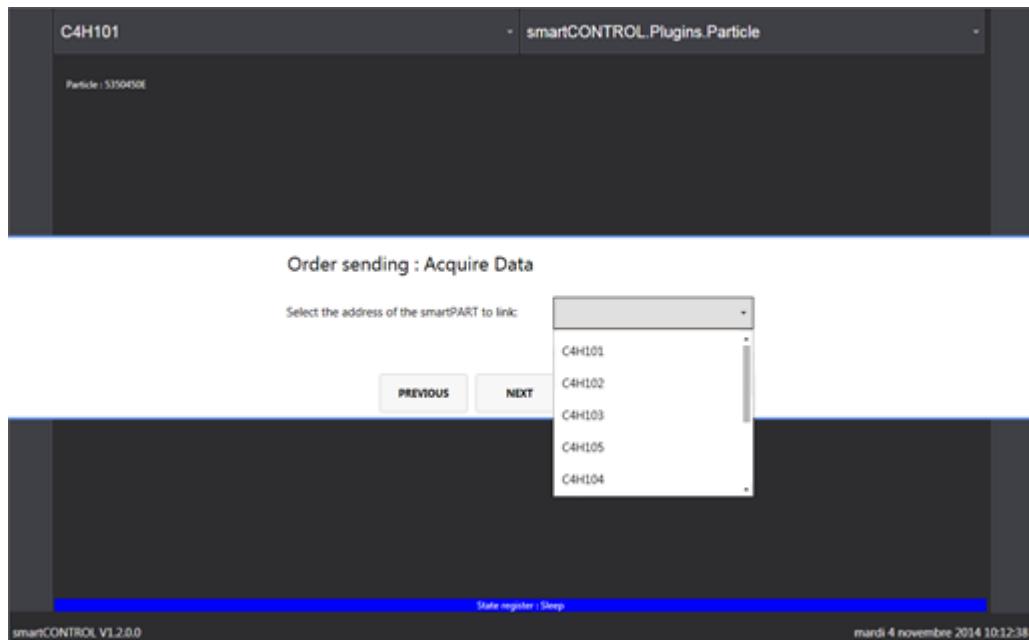
- For graphs, choice of display: temperature/acceleration, conductivity, optics, standard ("norm") for acceleration



LAUNCHING AN ACQUISITION

This procedure outlines the steps to follow in order to start the acquisition of data by a *smartCAPS*, and to shift it from SLEEP mode to the ACQUIRE DATA mode.

1. Select the MENU\START ACQUISITION menu or press the Start button on the front of the instrument (see the “Use of Specialized Controls” section of this manual).
2. Choose the receiver that will be used to send the command to begin acquisition
3. Choose the address of the *smartCAPS*, which will need to have been connected before.



30

4. The message “End of order sending” will confirm which *smartCAPS* is acquiring, and that its status has shifted to ACQUIRE DATA mode at the bottom of the screen

The graphic screens show the various physical quantities in the process of being acquired.



CALIBRATING A *smartCAPS*

All of the sensors are calibrated at the factory, but it is nevertheless possible to recalibrate them using the following procedure:

1. With the *smartCAPS* in ACQUIRE DATA mode, select the MENU\TOOLS\CALIBRATION menu
2. Select the address of the *smartCAPS* to be calibrated
3. Select the sensor to be calibrated: acceleration (used for the following example) or another measurement

CALIBRATION OF ACCELERATION

4. Open the acceleration display
5. Select acceleration
6. Place the *smartCAPS* in the activator in the position shown onscreen: markings facing the user, and the red North Pole (where the sensors are) oriented upward
7. Click on/select Next and wait until the calibration in this position ends
8. Now place the *smartCAPS* in the activator in the position shown onscreen: North Pole facing right
9. Click on/select Next and wait until the calibration in this position ends
10. Place the *smartCAPS* in the activator in the position shown onscreen: North Pole facing downward
11. Click on/select Next and wait until the calibration in this position ends
12. Place the *smartCAPS* in the activator in the position shown onscreen: North Pole facing left
13. Click on/select Next and wait until the calibration in this position ends
14. Place the *smartCAPS* in the activator in the position shown onscreen: red North Pole facing the back
15. Click on/select Next and wait until the calibration in this position ends
16. Place the *smartCAPS* in the activator in the position shown onscreen: red North Pole facing the user
17. Click on/select Next and wait until the calibration in this position ends
18. Click on/select Next to save the parameters of the calibration
19. Click on/select Yes to calibrate another sensor if needed
20. Select another measurement to calibrate, such as internal temperature or conductivity (see below)

31

CALIBRATION OF INTERNAL TEMPERATURE

4. Open the temperature display
5. Select temp-internal
6. Select Custom mode
7. Enter the first temperature calibration point
8. Enter the second temperature calibration point
9. If needed, enter other calibration temperatures
10. Click on/select Next
11. Put the *smartCAPS* in the environment of the first calibration temperature. Wait for the value to stabilize, then click on/select Next
12. When the first calibration is finished, click on/select Next
13. Put the *smartCAPS* in the environment of the second calibration temperature. Wait until the value stabilizes, then click on/select Next

14. When the second calibration is finished, click on/select Next to save the calibration parameters.
15. Click on/select Yes to calibrate another sensor if necessary.
16. Select the next measurement to calibrate, e.g., conductivity.

CALIBRATION OF THE CONDUCTIVITY METER

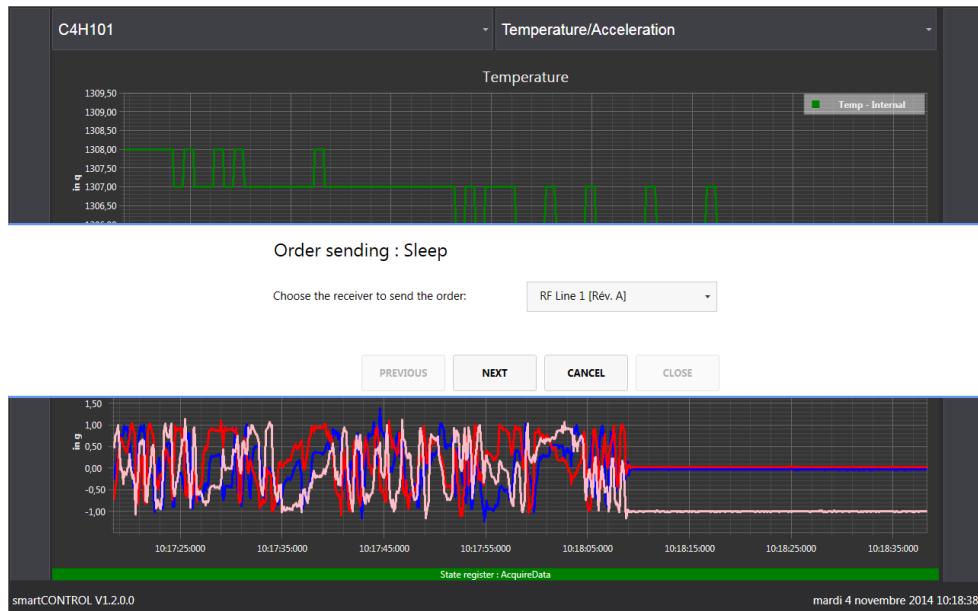
It is preferable to hydrate both of the conductivity meter's electrodes with water several hours before the calibration.

1. Open the display for the conductivity meter.
2. Select conduc
3. Select the calibration mode: Full mode for standard buffer solutions of pour 1.413 mS/cm, 5 mS/cm and 12.88 mS/cm or choose Custom to use other buffer solutions or to calibrate at a temperature other than 25°C
4. Place the *smartCAPS* in solution No. 1, wait for the value to stabilize, then click on/select Next
5. Wait for the calibration with this first solution to end, then click on/select Next
6. Place the *smartCAPS* in solution No. 2, wait for the value to stabilize, then click on/select Next
7. Wait for the calibration with this second solution to end, then click on/select Next
8. Place the *smartCAPS* in solution No. 3, wait for the value to stabilize, then click on/select Next
9. Wait for the calibration with this third solution to end, then click on/select Next
10. Click on/select Next to save the calibration parameters
11. Click on/select Yes in order to calibrate another sensor if necessary.

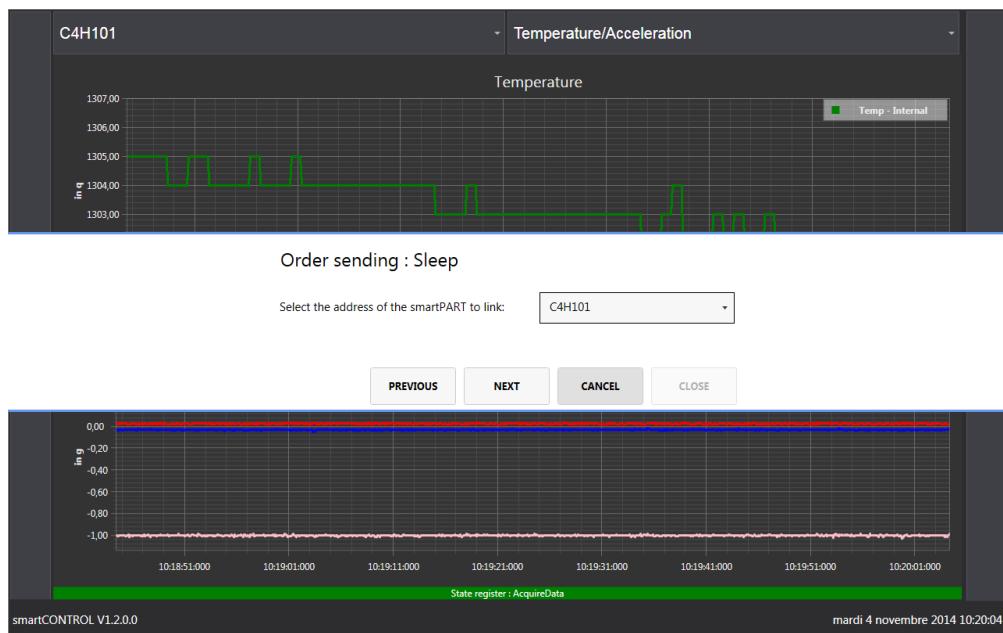
STOPPING AN AQUISITION

This procedure outlines the steps to follow in order to stop the acquisition of data by a *smartCAPS* and to shift it from the ACQUIRE DATA mode to the SLEEP mode

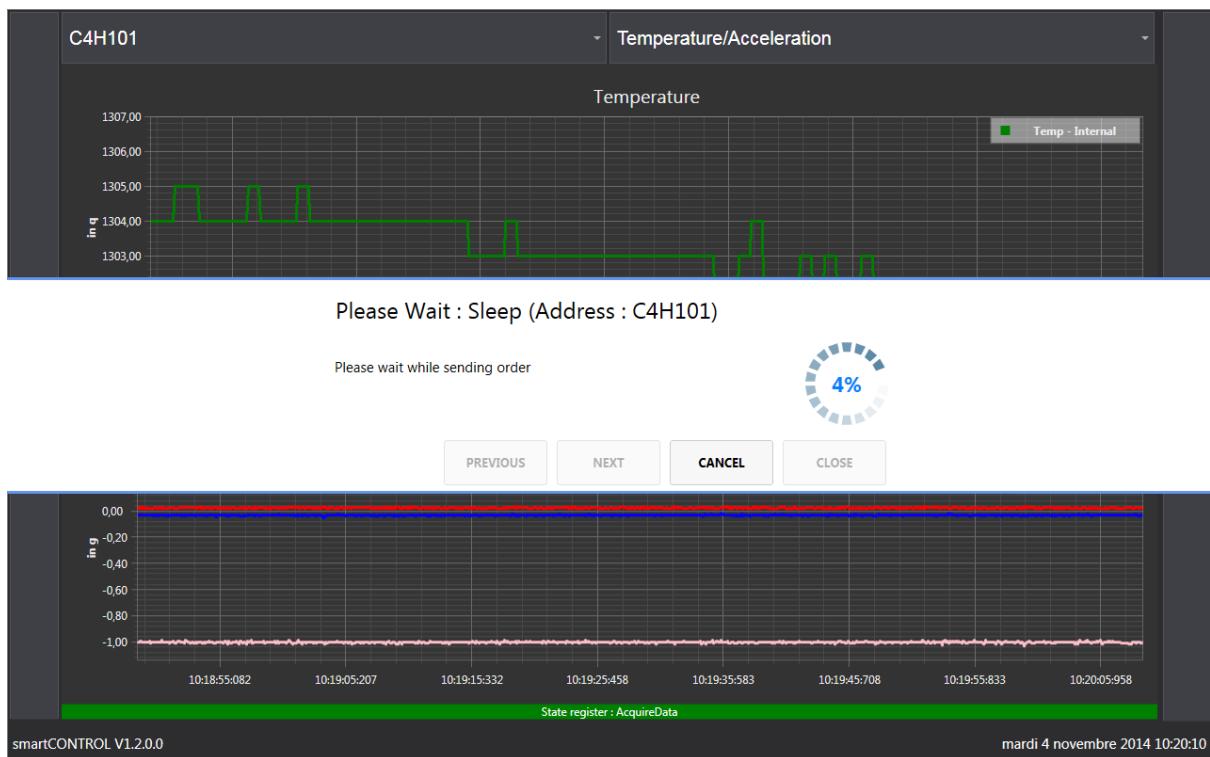
1. Select the MENU\STOP ACQUISITION menu or press the blue Stop button on the front of the instrument
2. Choose the receiver that will be used to send the order to stop acquisition



3. Choose the address of the *smartCAPS* that should stop acquiring data



4. Wait until the *smartCAPS* has acknowledged receipt of the order



5. The “End of order sending” message will confirm the address of the *smartCAPS* that has been stopped from acquiring data, and its status will be confirmed at the bottom of the screen as shifted into SLEEP mode: the *smartCAPS* is no longer recording any data, and is now ready to restart acquisition

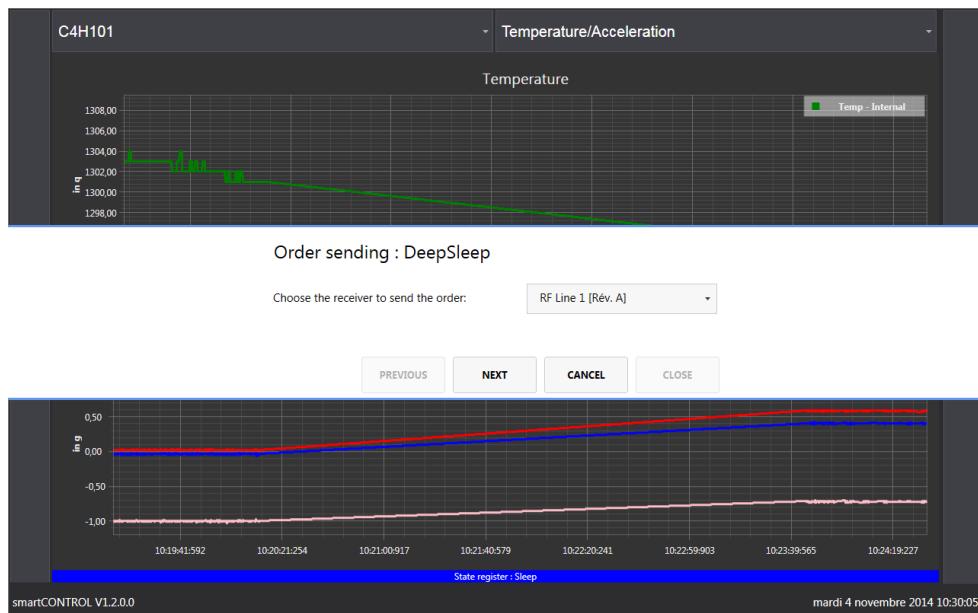
The *smartCAPS*’ power usage even in SLEEP mode is significant, therefore leave the *smartCAPS* in this mode only if a new acquisition is planned to be started quickly. If this is not the case, make sure to turn off the *smartCAPS* by shifting it into DEEP SLEEP mode to save the battery.

TURNING OFF A *smartCAPS*

This procedure outlines the steps to follow in order to turn off a *smartCAPS* and to shift it into DEEP SLEEP mode:

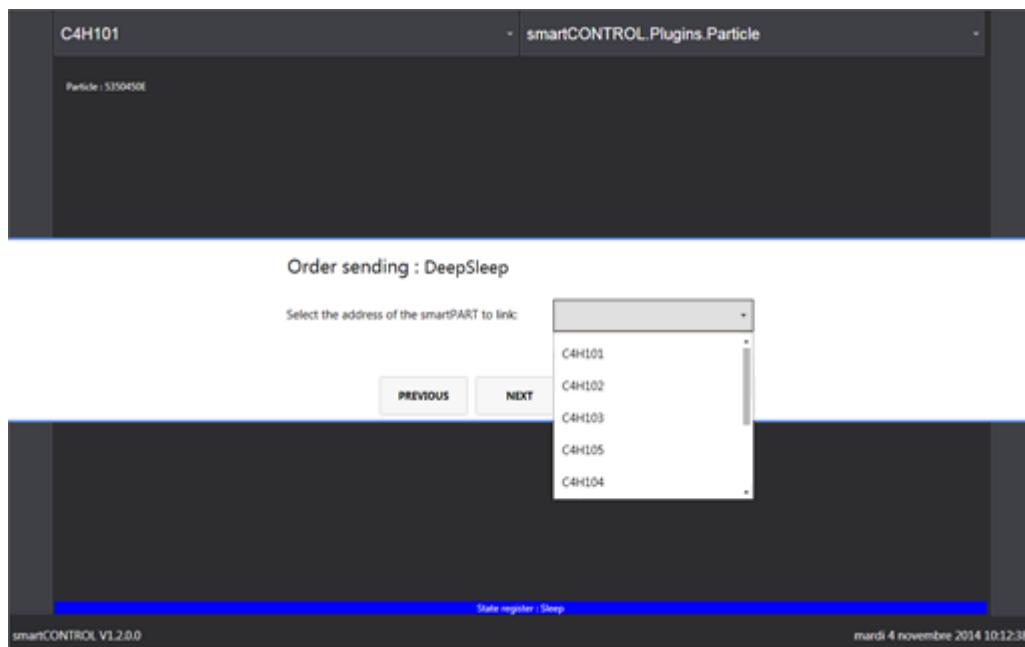
Note: it is possible to shift directly from the ACQUIRE DATA mode to DEEP SLEEP mode without passing through SLEEP mode, as outlined below.

1. Select the MENU\DEEP SLEEP menu
2. Select the receiver that will be used to send the Stop command to a *smartCAPS*

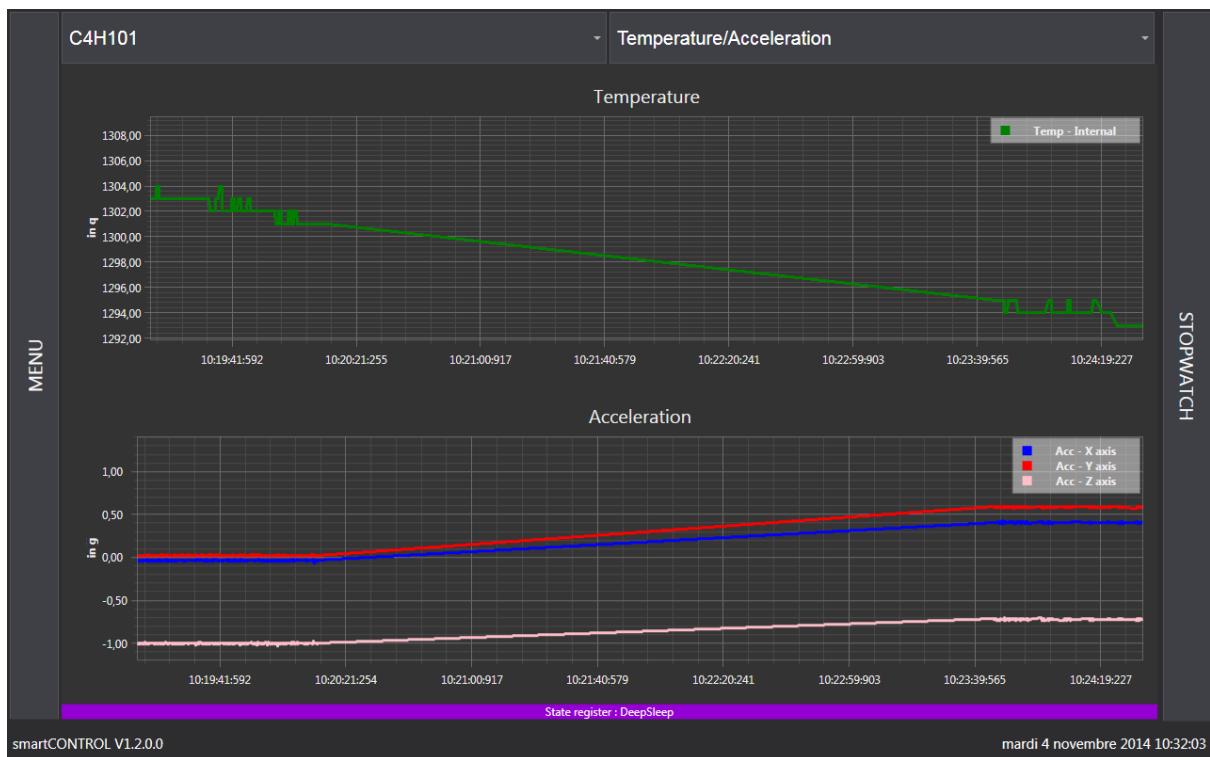


35

3. Choose the address of the *smartCAPS* that will be turned off



4. Wait until the *smartCAPS* acknowledges receipt of the order
5. The message "End of order sending" will confirm the address of the *smartCAPS* that has been turned off and confirm at the bottom of the screen that its status has shifted into DEEP SLEEP mode



EXPORTING DATA

This procedure explains how to export data recorded on the hard drive to a removable storage medium connected via USB.

1. Connect a removable storage medium (e.g., USB memory stick) to one of the USB ports
2. Go to MENU\TOOLS\EXPORT
3. Choose the removable drive to receive the exported data
4. Choose the recording date for the data you wish to export
5. Choose the recording time for the data you wish to export
6. Choose the format of the data to be exported: binary (.bin), raw (.raw), spreadsheet (.csv)
7. Indicate if any other file is to be exported

INITIALIZING A NEW *smartCAPS*

All of the *smartCAPS* delivered with a *smartCENTER* have been factory-configured and initialized in the *smartCENTER*.

For any new *smartCAPS*, instructions for the initialization procedure are supplied with the *smartCAPS*.