

RECORDER
DAS240/DAS220

USER'S MANUAL

Edition October 2018 M220-240-004E

Thank you for buying a SEFRAM recorder and for your trust in our company. The main goal of our various teams (research department, production, commercial, after-sales…) is to meet your requirements as much as possible by designing or updating high tech products.

Please read cautiously this user's manual for an optimal use of your recorder.

Our team is available to provide you any additional information:

04-77-59-01-01

Commercial service e-mail: sales@sefram.fr
After-sales service e-mail: sav@sefram.fr
Technical support e-mail: support@sefram.fr

Fax: +33 (0)4 77 57 23 23

Web: www.sefram.fr

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WARRANTY

Your instrument is guaranteed for one year for labor and parts against any manufacturing defect and/or functioning hazard. This guarantee extends from the delivery date and ends 730 calendar days later.
In case of guarantee contract, this will cancel or replace these guarantee conditions here above.
The guarantee conditions by SEFRAM are available on the website www.sefram.com. The general guarantee conditions should prevail on the following conditions that they sum up.
This guarantee does not cover the result of any abnormal use, handling mistake or mistake in the storage conditions outside the defined range.
In case of application of the guarantee, the user shall return, at its own expenses, the relevant appliance to our factory:

SEFRAM Instruments & Systems
After-Sales Service
32, Rue Edouard MARTEL
BP 55
42009 SAINT-ETIENNE CEDEX 2

And add a description of the observed breakdown to the appliance.

The standard supplies provided with the appliance (cables, outlets…), the consumables (batteries …) and the optional supplies (suitcases…) are guaranteed for 3 months against any manufacturing defect.

Such items as a suitcase, a LCD screen or a touchpad are guaranteed only for a normal use. The guarantee does not cover wearing, accidental breaks or consecutive to a shock or any abnormal use.

The factory options integrated to the appliance are guaranteed for the same duration as the appliance itself.

In case of replacement or repair of the product, the remaining guarantee duration shall be:
- The remaining duration of the guarantee if the appliance is still under guarantee
- If the guarantee duration is less than 90 days, the replaced part is guaranteed for 90 days

Any replacement part becomes the property of the user and the exchanged parts become the property of SEFRAM.
In case of intervention by an insurance company, the product becomes the property of the insurance company upon its exclusive request. Else, it shall remain property of the user.
The guarantee covers exclusively the materials manufactured and provided by SEFRAM.
Any intervention by the user or any third party without prior authorization by the company voids the guarantee.
The user shall be responsible for the return of its appliance to our site. Hence, it shall provide for a conditioning that shall correctly protect the appliance while shipping. It shall subscribe, at its own expenses, any insurance required for the transport.
The SEFRAM company reserves the right to refuse any product wrongly conditioned and not to take in charge any break consecutive to the transport.
Particular case of the battery: There is a Li-ion battery as a standard equipment of this appliance. It shall not be transported outside the appliance. In no case shall the user replace it. Its replacement in the factory is necessary to check the charge system and the protective securities.

What to do in case of malfunction?
In case of malfunction or for any problem of use, please contact the SEFRAM Instruments & Systems after-sales service.
A technician will take your call in charge and will provide you any required information to solve your problem.

What to do in case of machine failure?
In case of failure, please contact the SEFRAM Instruments & Systems after-sales service.

Need advice?
Need technical assistance?

SEFRAM Instruments & Systems commits itself to help you by phone for the use of your appliance.
Please phone: **04-77-59-01-01**

Or send an e-mail to: **support@sefram.fr**

METROLOGY

The metrological conditions of your measurement instrument are defined in the specifications of this notice. Climate and environmental conditions restrict the specifications of your recorder. SEFRAM checks the characteristics of each appliance one by one on an automatic bench during its manufacture. The adjustment and control are guaranteed under conditions of the ISO9001 certification by facilities in connection with the COFRAC (or equivalent in the context of ILAC reciprocity).
The specified characteristics are considered stable for a period of 12 months of use, and under normal conditions of use.
We recommend a check after 12 months and max. 24 months of use, then every 12 months after 24 months.
For any check of the characteristics, the following average climate conditions shall be maintained (23°C +3°C – 50(+20) %RH). The recorder should have been working for 0.5 hour before check.

We recommend that you have this control made by our after-sales service (Service Après-Vente) for the best service and preservation of the measuring quality of your instrument.
When a recorder returns to SEFRAM, maximum service is provided with internal updating according to the required adjustments and software updates. In case of shift in the characteristics, your instrument shall be adjusted to recover its original characteristics.

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1. IMPORTANT INFORMATION

Please read cautiously the following instructions before using your recorder.

1.1. Specific cautions

Do not use the product for any other use than planned.

To prevent any risk of electric shock, never plug or unplug the measurement cords when linked to the mains.
Never use in a wet environment.
Never use in an explosive atmosphere.

In case of malfunction or for the maintenance of the appliance, only qualified personal shall be allowed to work on it. In such a case, it is necessary to use SEFRAM spare parts.
Never open the appliance: there is live voltage.

Do not alter or defeat the ground connection. Without the safety ground connection, all accessible conductive parts (including control knobs) may provide an electric shock. Failure to use a properly-grounded approved outlet and the recommended three-conductor *AC* line power cable may result in injury or death.

1.2. Safety instructions

For a correct use of the appliance, it is necessary that the users abide by the security instructions and the instructions of use described in the manual.

Specific warnings are provided all along the manual

If required, there are warning symbols on the appliance

Symbols and definitions

Symbols in this handbook:



Warning: potential danger for the user



Attention: potential danger for the appliance and/or the connected equipment

Remark: important information.

Symbols on the appliance:



Danger (High voltage): immediate corporal danger



Attention: see the handbook. Risk of damage to the material connected to the instrument of the instrument itself.



Ground: accessible parts linked to the ground of the appliance.

1.2.1. Conformity and limits of the appliance

The DAS240/DAS220 recorder is in conformity with IEC 61010-1 (2001-02).

See chapter "**Technical specifications**". §11.10

Attention: Never apply a higher voltage than the maximum authorized voltage between the channels and from the ground of the modules,

2. PRESENTATION

2.1. GENERAL

The DAS 240 and DAS220 is a programmable recorder that makes it possible to measure and record up to 200 channels(DAS240) or 10 channels (DAS220), voltages (from 1mV to 100V), currents, temperatures (thermocouple, Pt100, Pt1000), resistance etc… as well as logical channels.

The dialog between the user and the recorder is made easier thanks to an intuitive interface on a wide capacitive and color 10’’1 touchscreen.
The measurement parameters are easy to program.

The recording is made directly on an internal 32 GB memory card.

The DAS240 is composed with a main base frame and extension modules of 20 channels each.

The DAS220 is composed with a main base frame and 10 analog inputs are integrated.

The DAS240 and DAS220 are easy to program via Ethernet/Wi-Fi and uses the NTP, FTP and VNC protocols for a better use.

The DAS240/DAS220 can be delivered with an internal battery (ref: 900240500)

2.1.1. Recording period

The acquisition on each valid channel is done every millisecond,
For each channel one can choose a sampling period variable from 1 ms to 100 ms
(for Pt100 and Pt1000 3 wires : the period is variable from 2ms to 200ms.)

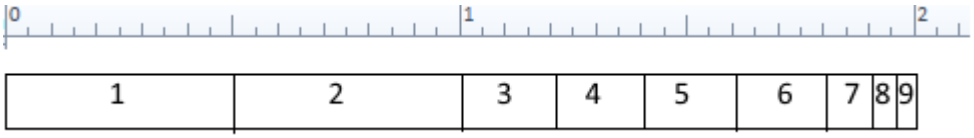
This period of integration can eliminate noise for high frequency
Example : main noise at 50Hz or engine noise at 1kHz.

For white noise or noise with lower frequency (lower than recording frequency) you can choose a software Butterworth filter

Example :

Recording 9 Channels :
Sampling Period

Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch9
50ms	50ms	20ms	20ms	20ms	20ms	10ms	5ms	5ms



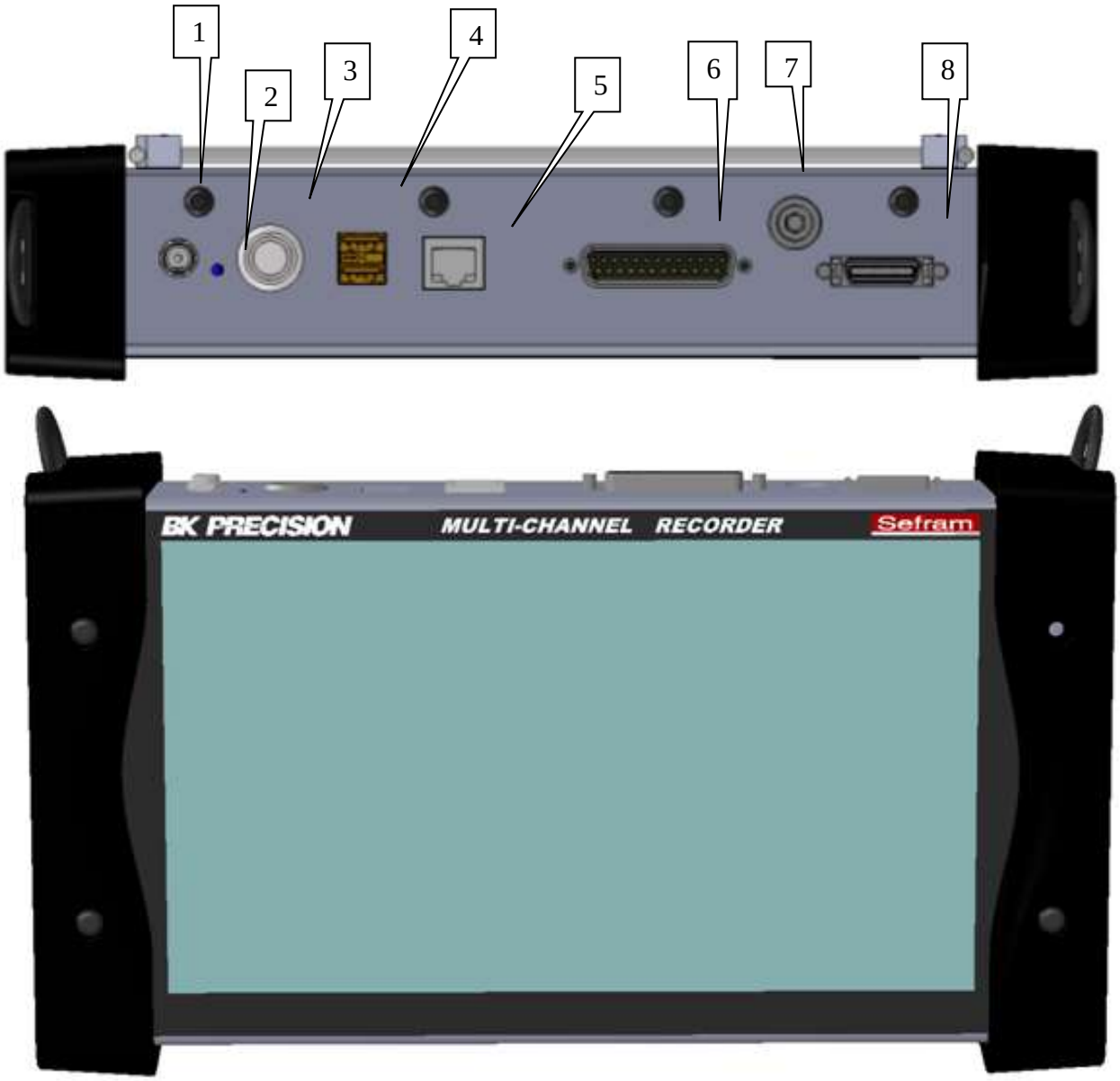
The total time for an acquisition is 200ms, so the minimum period of recording will be 200ms

2.2. DESCRIPTION

2.2.1. Electrical connectors of the main frame

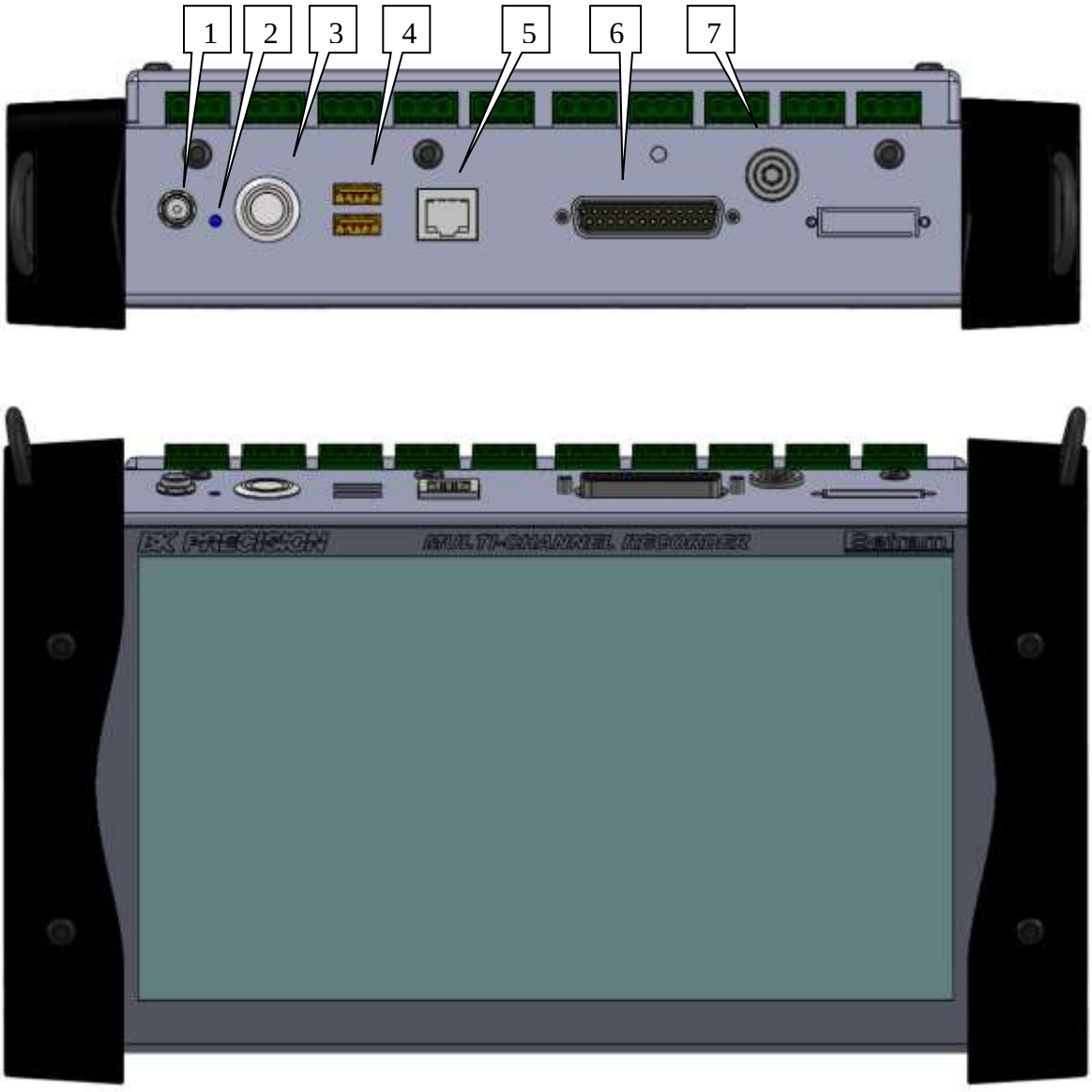
DAS240

1- Battery supply/charger
2- Battery charging LED.
3- ON/OFF switch and switching on indicator.
4- 2 USB connectors for (female) USB stick.
5- RJ45 connector for the Ethernet 10/100 Base interface.
6- SUB-D 25-pin connector for the 16 logical inputs and the alarm output.
7- Ground connection
8- 24 point connector for an access to the external module.



DAS220

1- Battery supply/charger
2- Battery charging LED.
3- ON/OFF switch and switching on indicator.
4- 2 USB connectors for (female) USB stick.
5- RJ45 connector for the Ethernet 10/100 Base interface.
6- SUB-D 25-pin connector for the 16 logical inputs and the alarm output.
7- Ground connection

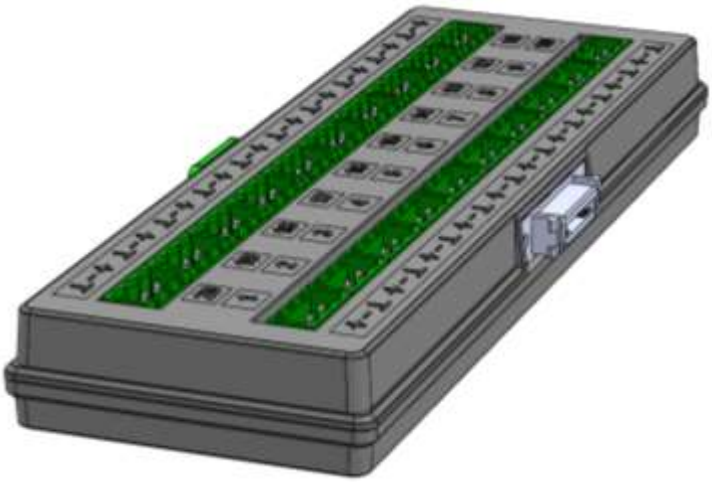


2.2.2. Extension module (DAS240 only) :

A module is delivered with the appliance with its 70 cm bounding cable and 20 external terminal blocks.



Extension cord (70cm)



Extension module



5.08 mm 3 contact step connectors.

3. SETUP and PRECAUTION of USE

3.1. Switching on

Before switching on the appliance, make sure that the extension modules are connected.



Attention: Never remove or put the extension modules under voltage. (DAS240 only)

You turn on the recorder by pressing the button at the top of the appliance.

When the appliance is on, the ON/OFF button is lit in blue.

After launching the software, the recorder displays a homepage that specifies the hardware version, and then switches automatically to the "**Direct Display**" mode (oscilloscope).

You can display this homepage any time in the main menu by pressing the "**additional option**" or "**start screen**" keys.

At power-up, the appliances start with the latest configuration when they were shut down (see next paragraph).



If the configuration has changed at power-up, contact the after-sales service.

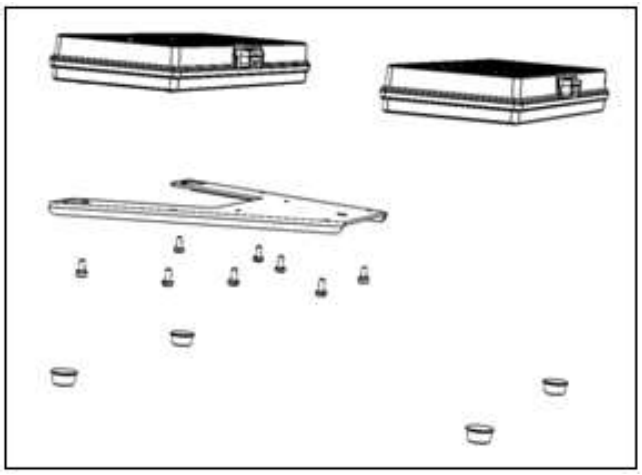
If the initial setup is wrong:

- If the appliance still starts correctly : you can reinitialize the base setup, by entering the main menu and clicking on the "**Default setup** " key.

- Otherwise: You can switch on the appliance with the base setup: To do so, press quickly and many times the "**ON/OFF**" key at power-up of the appliance until display of the front page. A setup_error.cnf file will be created in the base folder of the internal SD.
  Then contact the after-sales service.

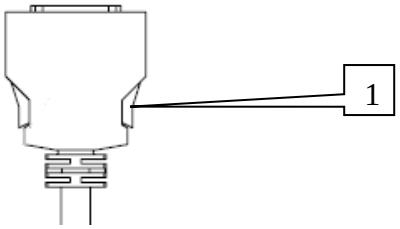
3.1.1. Use of the extension modules (DAS240 only) :

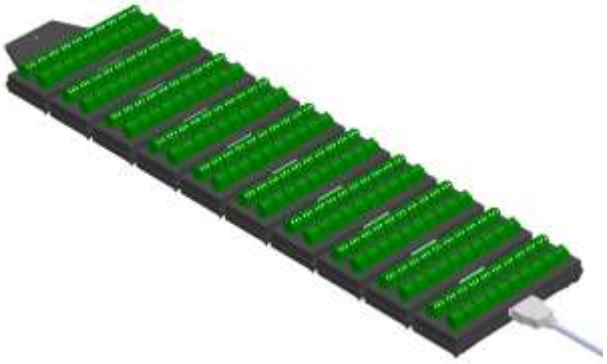
You can assemble up to 10 extension modules.





- Screw the electrical connectors' plate delivered in each additional extension.
- Assemble the extension modules together.
- Then screw the plates with the adjacent modules.
- Stick the additional adhesive buttress.
- Connect the cable using unlocking levers (1)
- Connect the cable on the DAS240 (which must be powered off).
- Switch on the appliance.





The appliance is delivered with a 70cm cable.

3.1.2. Switching off

To switch off the recorder, press the ON/OFF key (see paragraph 2.2).



The setup will be saved, the current file will be closed and the appliance will be turned off.

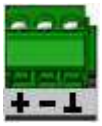
If the appliance is not switched off correctly, then press the ON /OFF button for 5 seconds. In such case, the setup will not be saved.

✓ **Appliance without battery :**

If the appliance stops without pressing the ON/OFF button (brutal stop of the power supply), the setup will not be saved.
The appliance setup at next start will be the same as the one of the latest start or of the latest acquisition.

3.2. Connection to the measuring circuit

You will use the terminal blocks provided with the appliance (ref x7004000).



3.2.1. Voltage measurement

The voltage measurement is performed between the + and – terminals of the relevant input.
The "⊥" terminal is not used.

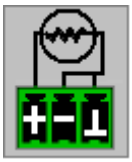
3.2.2. Temperature measurement with a thermocouple

The voltage resulting from thermocouple effect must be measured between the + and – terminals of the relevant input.
The "⊥"terminal is not used.

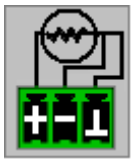
3.2.3. Temperature measurement with Pt100/Pt1000

The Pt100/Pt1000 probe must be connected to the + and – terminals.
The current is injected through the "⊥" terminal.
For a 4 wire Pt100/Pt1000, the mounting will be in 3 wires, the 4th wire will not be connected.
Warning: the "⊥" current injection is shared by all the channels.

Wiring:



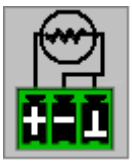
2 wires



3 wires

3.2.4. Resistance measurement

The resistance must be connected to the + and – terminals. A current injection is performed in 2 wires.



3.2.5. Current measurement

You can make current measurement by **shunt** between the + and - terminals of the relevant input.
You will use either an external resistance or
the SEFRAM shunt (ref 902406500 : 50Ω)



In this case, select the "**current**" type among the parameters of the relevant channel.
Connect the measurement wires to the shunt terminals.

3.2.6. Connection of the ground

- If the source of the signal you have to record has **low internal impedance**, you shall use **twisted wires**. In case of **high impedance**, you shall use **shielded wires**.
- When gathering grounds from the various items on the measurement line, it is good to check that there is no voltage difference between them, in order to prevent any shortcut. If any doubt, make a measurement with a voltmeter on a low resistance (i.e. 1kΩ) between the terminals.
- If any important noise,
  - When using the battery , connect the GND connection to the ground(§ 2.2.1)
  - use the sampling period for each channel >20ms (§ 2.1.1)
  - an appropriate capacity can be placed between the ground and the – wire of the signal.

3.2.7. Routine maintenance

Maintenance only consists in cleaning outside the appliance. Any other operation requires a qualified personal.



Unplug the appliance before any intervention.

Never let water flow through the appliance to prevent any electrical discharge. Periodically clean the recorder with the following instructions:

- Use water and soap to clean the front and rear boards.
- Never use any product that contains petrol, benzene or alcohol: they would damage the screen printings.
- Wipe with a soft lint-free cloth.
- Use some antistatic product to cleanse the screen.

3.3. UPDATING THE INTERNAL SOFTWARE

The internal software is updated regularly with the latest evolutions. These updates are available on our website. http://www.sefram.com/en/software-updates.html

- To update the software, copy the file that will be provided on an USB stick. Place it on the USB connector on the rear side of the appliance.
- Press the **"Setup"** key.
- Then press the **"Software update"** key to enter the update.
- Finally, to run the update, press the **"Sofware update"** key.
- Then, the internal software automatically copies the necessary files to the new version.
- Turn the appliance off and on after the end of the updating process.

3.4. External power

You can power the appliance using an external continuous voltage source. The appliance operates with a voltage of 15V (5 A). The charger block provided during the purchase acts as an external power.



Attention: minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical safety ground. This instrument is grounded through the ground conductor of the supplied, three-conductor *AC* line power cable. The power cable must be plugged into an approved three-conductor electrical outlet.



Attention : When the charger is connected to the appliance, the metallic frame is linked to the ground of the electrical installation

3.5. Battery

The appliance s equipped with a lithium-ion battery (Li-ion). It is sent with charged battery. However, if the appliance has remained unused for more than one month, check its loading status and reload it if required.

	**Warning**: any intervention on the battery requires dismantling of the appliance and shall be made by a SEFRAM technician. **Only use batteries provided by SEFRAM**.

Security advice:

- Never heat up or throw the battery pack into fire
- Never shunt parts of the battery: risk of explosion!
- Do not bore the battery.
- Do not dismantle the battery pack.
- Do not reverse the polarities of the battery.
- This battery pack includes a protective item that shall not be damaged or removed.
- Do not store the pack in a place exposed to heat.
- Do not damage the protective sheath of the pack.
- Do not store the appliance in a vehicle exposed to sunbeams.

The battery should last 200 charge-discharge cycles or 2 years.

Advice to extend the life of the battery:

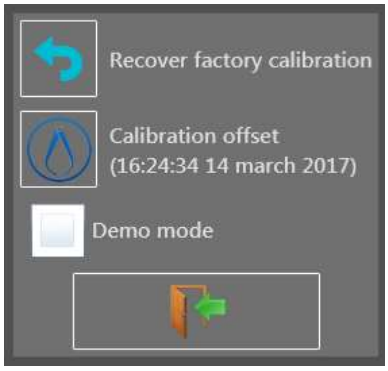
- Do not discharge too much.
- Do not store the batteries too long without using them.
- Store the battery at around 40% charge.
- Do not fully charge or discharge the battery before storage.

When the battery is practically discharged, the appliance closes all open files, stops correctly the software, then shuts up by itself.

To recharge the battery inside the appliance:

Connect the provided external power supply on the jack plug of the appliance.
Connect the mains.
The internal charger stars loading the battery, the green light of battery charge lights up.
You can charge the appliance **when on or off**.
When the battery is loaded, the light turns off automatically.

3.6. Offset calibration



You can easily calibrate the recorder inputs for the voltage and thermocouple offsets. This will remove any offset present on different channels.

To do so:

- Let the appliance work for 20 minutes (ambient temperature 20-25°C).
- Enter the recorder main page and then press the "**Setup**" key.
- Select the "**Additional Option**" menu.
- Select the "**Electric Calibration**" menu.
- Finally, press the " **Calibration offset** " key in order to confirm the calibration, which will last approximatly 5 minutes.
- Restart the appliance.

3.7. Default calibration

You can restore the default factory calibration to correct any possible mistake in the calibration coefficients:

Enter the "**Electric Calibration**" page (see the previous paragraph).

By pressing the **"Recover factory calibration"** key and then by confirming, you will restore the default factory calibration coefficients and give the date of initial plant start.

3.8. Demo mode

With the **"Demo mode"**, you can apply a fictitious simulation to the inputs.

To do so, activate the trial mode and restart the appliance: the channels will be emulated and a sine wave will be applied to all the channels.

Do not forget to remove this mode after test.

3.9. Keypad lock

You can also lock the recorder completely, no key will be accessible.
- Press the "**Setup**" key.
- Press the "**Additional Option**" key.
- Press the "**Locking the recorder**" key.

Confirm!

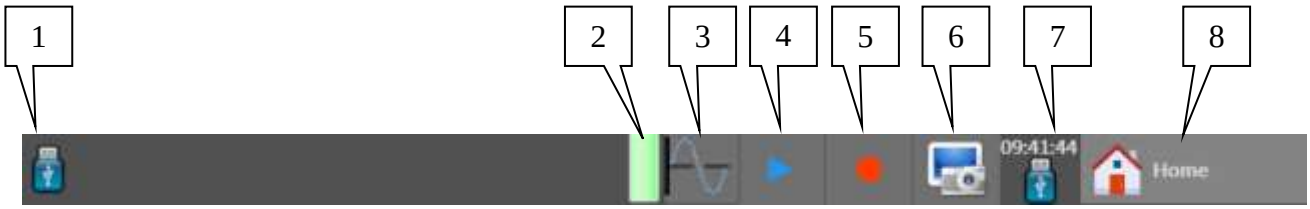
The keypad lock will occur 10 seconds after you have pressed the confirmation key.
All the keys of the appliance will be blocked.
The "**Main Menu**" key will be replaced by a yellow padlock.

To unlock the recorder press twice of three times straight away this padlock.

4. USE

The recorder is equipped with a capacitive touchscreen. You can use the provided pen or a USB mouse.

4.1. Description of the upper band



Different areas on the screen:

1- Acquisition status (in progress, stop).
2- Battery status (if present option).
3- Direct access to display.
4- Access to the display of the saved file.
5- Access to the record.
6- Screenshot button.
7- Time and date.
8- Access to the main menu.

Last updates introduced alarm status under the time area.



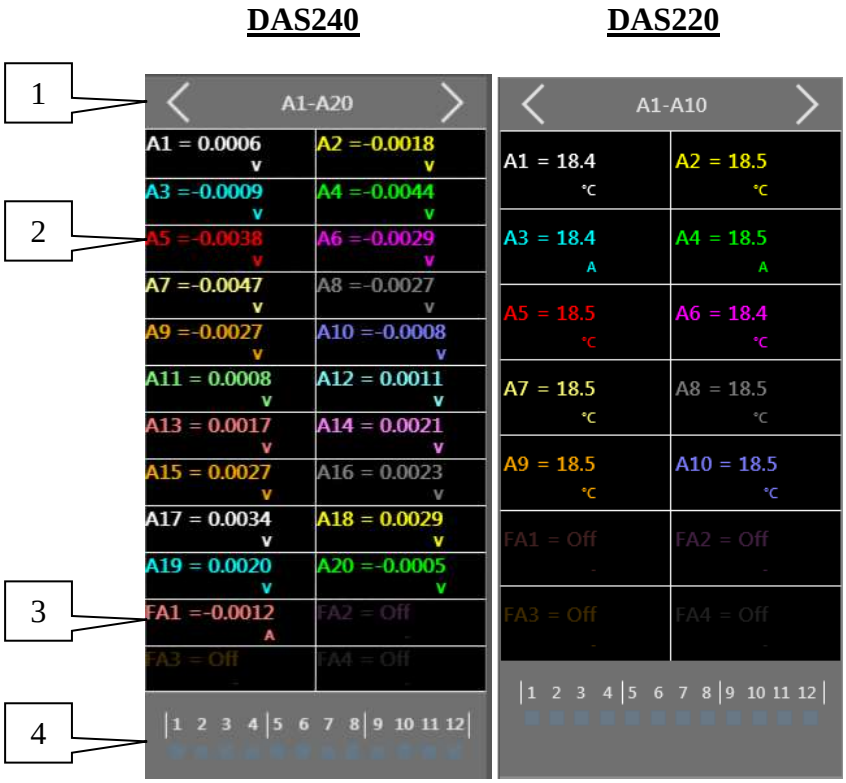
Three statuses exist:

- ➔ Transparent : alarm disabled
- ➔ Blue : alarm enabled, not triggered
- ➔ Red : alarm enabled and triggered

You can acknowledge alarms by clicking into that area.

4.2. Description of the right band

In this band, you directly have the instant value of the inputs, the functions and the logical channels. You can also access to the pages of the analog and logical channels.



1- Selection of the inputs to be displayed : you can display (by pressing the  or  keys):
   - Whether all the channels of a complete extension module as well as the associated functions, e.g. A1-A20 + FA1-FA4 or B1-20 +FB1-FA4 etc...
   - Whether a customized bloc (Custom-1) or (Custom-2)
   - Or the additional channels frequency and meter K1 to K4.

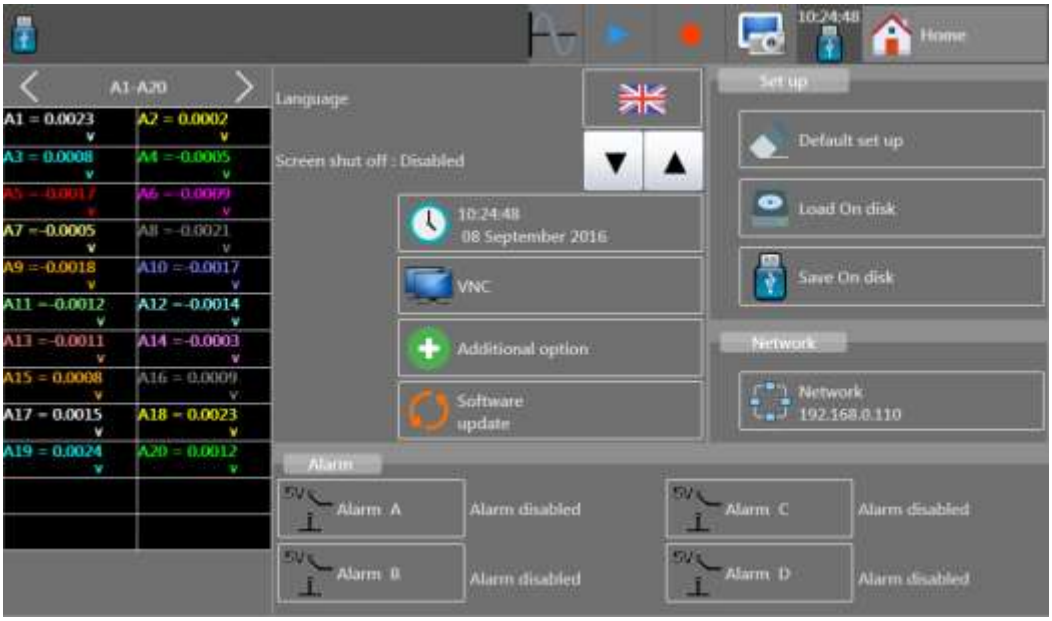
2- Direct access to a particular channel: by pressing the channel, you will display directly its page.

3- Direct access to the functions associated to the modules.

4- Real time display and access to the logical channels pages (if the logical channels are confirmed).

4.3. Setup menu

General configuration of the appliance, monitoring of the alarm outputs, network address TCP/IP, calibration of the channels, update of the internal software.

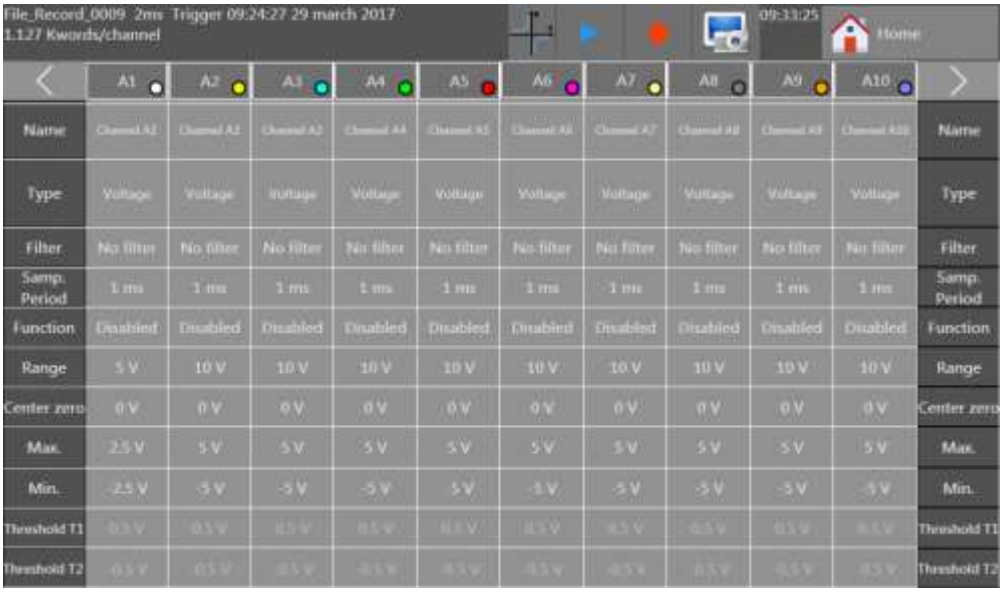


- Language: selection of the language of the appliance.
- Screen intensity: adjustment of the delay (without or variable 1-30min)
- Date modification : adjusting the time and date of the appliance (For NTP, see the Interface paragraph)
- VNC use: (see the Interface paragraph)
- Setup administration : (see paragraph 13)
  - Setup initialization: initialization of the appliance in its typical setup.
  - Recover on disk: recovery of a setup saved on the internal storage or on USB stick.
  - Save on a disk: Saving of the setup on the internal storage or on USB stick.
- Network : (see the Interface paragraph)
- Additional options: Modification of the different parameters
  - Keypad beep: Activation or not of the keypad beep
  - Screen luminosity: Decrease of the backlight of the LCD screen.
  - Locking of the recorder (see paragraph 3.9)
  - Electric calibration (see paragraph 3.6)
  - Display of the start screen
- Version update : update of the internal software (see paragraph 3.3)
- Alarm A ,B,C or D : use of the alarm outputs A-D (output (0-5V)

  - Without: No condition monitors the contact, which always remains open.
  - Trip-out: Monitoring by combination of the analog or logical channels, on several thresholds (see chapter Trip-out).

4.4. Channels menu

By pressing the menu « channels », you access the table of all available analogic and temperature channels of your recorder.

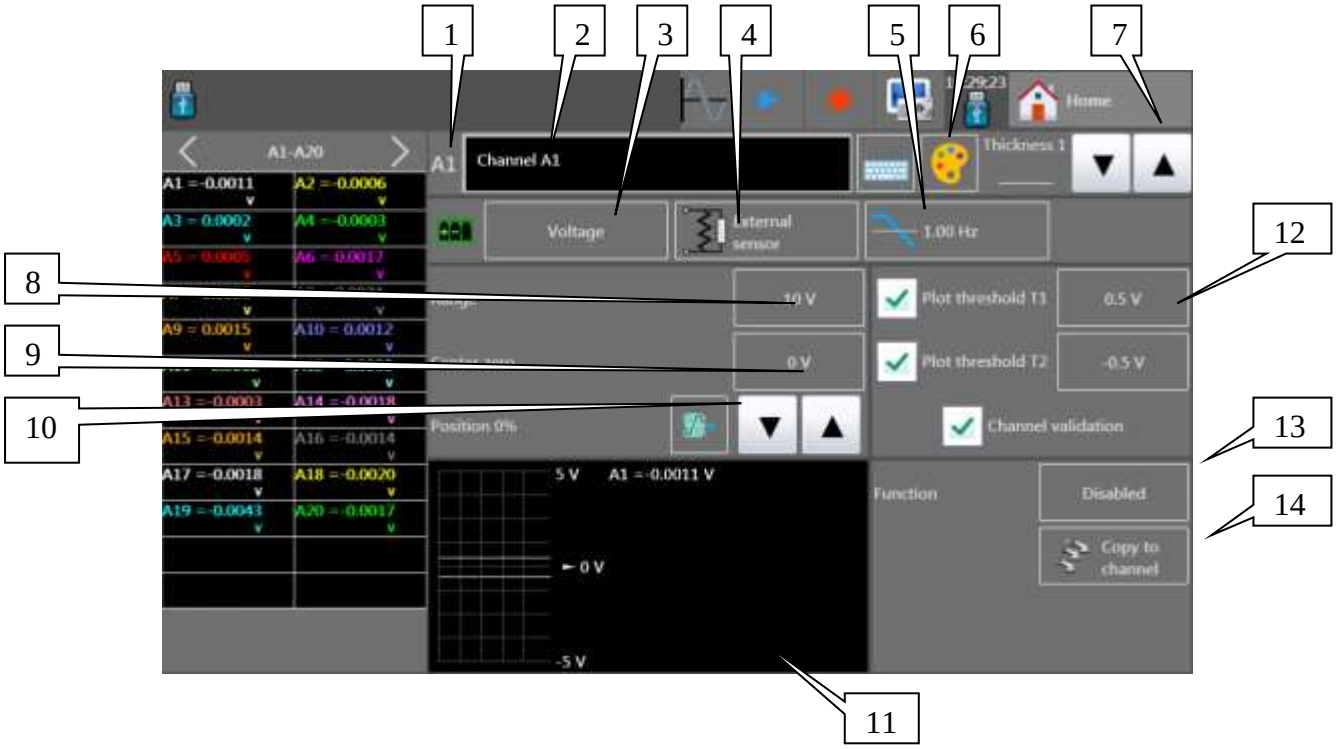


This table gives you a quick insight of the various adjustments of the channels. You can change these adjustments directly in this table by pressing the parameter you want to update. You can display 10 channels maximum.

 or  keys : to display other channels

You can access the setting of parameters channel by channel by pressing the name of the channel at the top of the table (A1, A2…) or by pressing on the bargraph of the channel (right side of the screen).

4.5. Analogic channels



1- Number of the channel
2- Name of the channel: give a name to the channel (26 characters max.)
3- Type : choose the type of the measurement performed on the input

- Voltage
- Current
  - Shunt value in current measurement (Automatic sensor 4-20mA): you choose the shunt resistance.
- Thermocouple
  - Choice of the thermocouple (J,K,T S B E N C L)
  - Choice of the cold junction compensation
  - Choice of the unit (Celsius , Fahrenheit, Kelvin)
- Resistance
- Pt100, Pt1000
  - Choice of the number of wires
  - and of the resistance

4- Type of external sensor :
Direct access to the menu
Allows presetting the type of this sensor (1-10V or 4-20mA)

5- Filter : numerical filter from 100Hz to 0.1Hz
6- Change the Channel color

7- Change the signal thickness with the « » and « » keys.

8- Setting the diameter: the diameter is the measurement extent corresponding with the total height of the screen, where the channel is traced.

9- Setting the location : location of the zero on the screen from -100 to 100% :

- Max: 100 %: zero is at the top
- Centre :0 % zero is in the center
- Min: -100% zero is at the bottom

For example, in the resistance mode, it is interesting to have the zero at its minimum value (-100%), then we will have the maximum value corresponding to the diameter.

10- Setting the zero: The zero (or center or offset) is the central value of the measurement.

11- Summary window and viewing of the threshold, of the diameter, of the offset of the zero

12- Validation and setting the thresholds of trigger 1 and 2; the outline of thresholds on the screen is valid in the f (t) mode: a horizontal line allows viewing the threshold.

Note: A warning message displays when the programmed analogic thresholds are out of the measuring range.

13- Function: Allows to assign a function of mathematical calculation to the considered channel.

- Without : no function.
- Unit change **:** Transforms the measurements unit made on the channel ; you can program a couple of point X1, Y1 and X2, Y2 to perform a scaling.
- Calculation: available mathematical functions, associated parameters and units.

aX+b	is identical to the change of unit but instead of giving a couple of points, we give the zero (b) and the slope (a).
a |X|+b	absolue value
a X^2+bX+c	square
a ln(X)+b	Neperian logarithm
a Sqrt (dX+c)+b	square root
aExp(cx)+b	natural exponential
a (1/X)+b	opposite.

14- Channel copy : allows to copy the channel settings on one or several channels.

4.6. Additional functions between channels

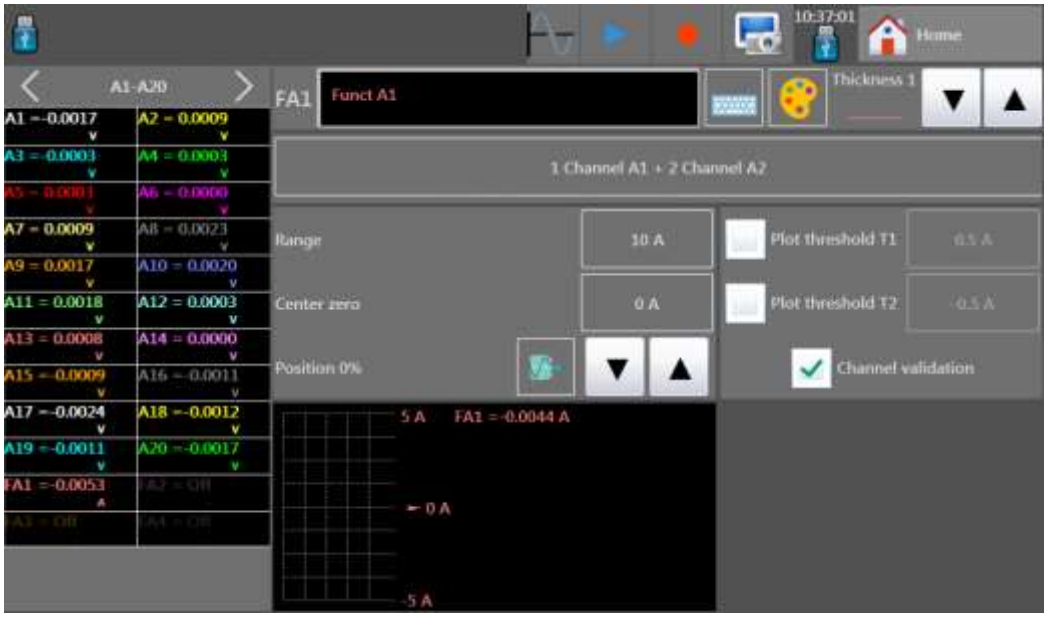
Additionnal channels calculation functions allow to make calculations between channels. Indeed, you can enable up to 4 additional functions per extension module (20 channels).

Those functions are not recorded but calculated in real-time with the channels. In order to see them in an acquisition, the X and Y channels must be recorded.

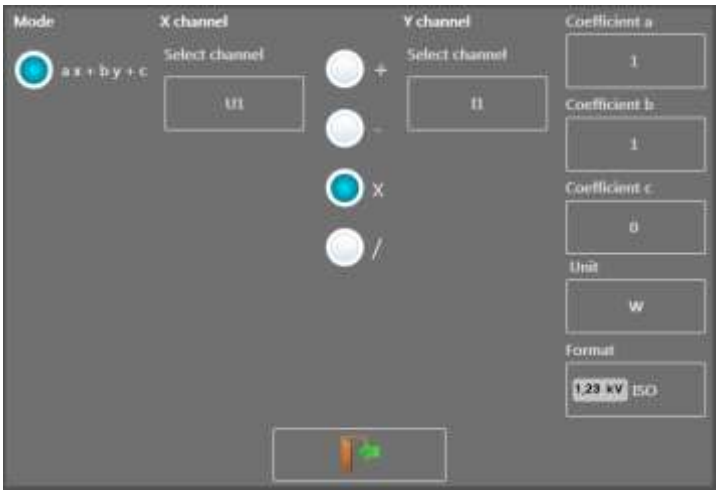
Press the « Functions » key :

A summary page of functions assigned to each plug in.  or  key : allows to change the view page and to view other functions.

We can access the functions by pressing on the corresponding key in the right band (§4.2). Caution: the function appear only if they are valid (see § 4.8).



The following page appears. Then, you just have to perform the calculation you wish to do by pressing on the formula bar and creating calculation in the following page.



Example : To calculate a power P=U.I.
We will then have : (ax*by)+ c with:
X = voltage U1= voltage
operator = *
Y= I1 = current
Unit = W

- a = 1
- b = 1
- c = 0

NB : We can choose any valid channels (of all plugs-in modules).

4.7. Logical channels

4.7.1. Logical functions

4 additional channels K1 to K4 allow having either the calculation of a frequency or a meter.
For that :

- In the right band (see § 4.2) : scroll until you reach the K1 to K4 logical functions window.
- Or on the « CHANNELS » page (see § 4.4) scroll pages until you reach the K1 to K4 logical functions window.
-

Characteristics: see §11.7.

Frequency:
You can also choose to display the result in tr/min :

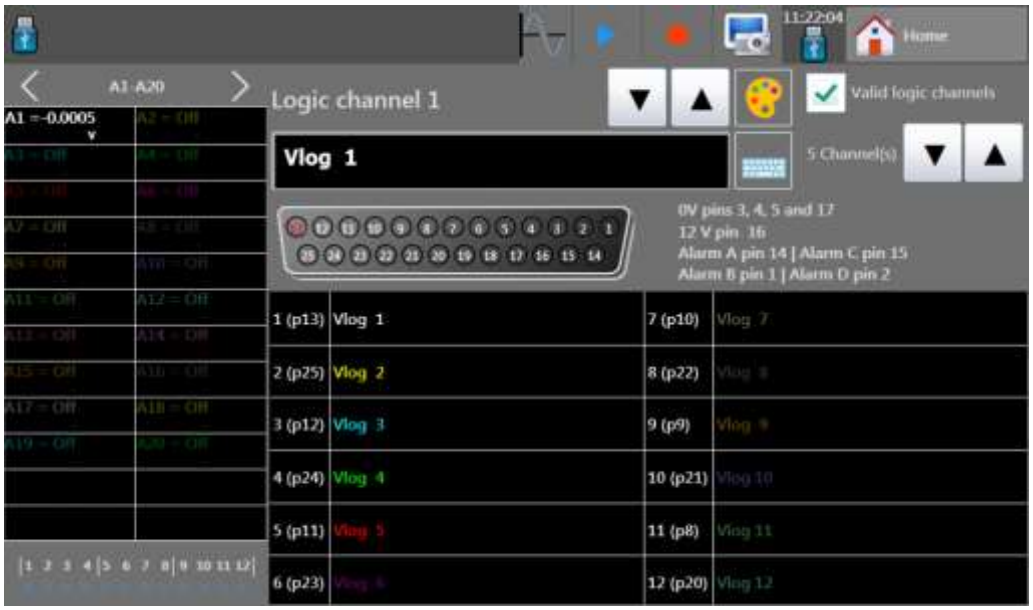
Counter : (see § 11.7)
A key allows initializing the counter.

4.7.2. Logical channels

The 12 logical channels might be recorded simultaneously with the analog channels. To set the logical channels, press on

- The **« logical channels »** menu on the main screen.
- or directly press on the section of logical channels present on the left band (you must however confirm the logical channels on the **« channels and function validation »** screen**,** (see §4.8)

You access the configuration page of the logical channels :



After choosing the logical channel, you have :

- The choice of the name of each channels on the screen
- The choice of color for each channel on screen.

Moreover, you can access :

- Logical validity : validation of the acquisition of logical channels
- Number of viewed logical channels (from 1 to 12)

4.8. Channel validation

You have the possibility to validate or not the channels to record through the different configuration menus of the recorder.

In order to validate or not the recording of a channel, you have to check (to validate) or uncheck (not to validate) on the right of the bargraph of the channel.

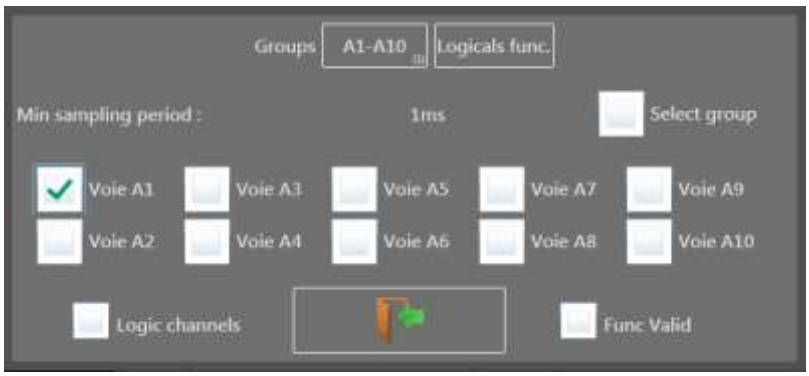
The number of recorded channels gives the minimum sampling period.

We can also choose the validation of logical channels, of functions between channels and of logical channels functions.

DAS240



DAS220



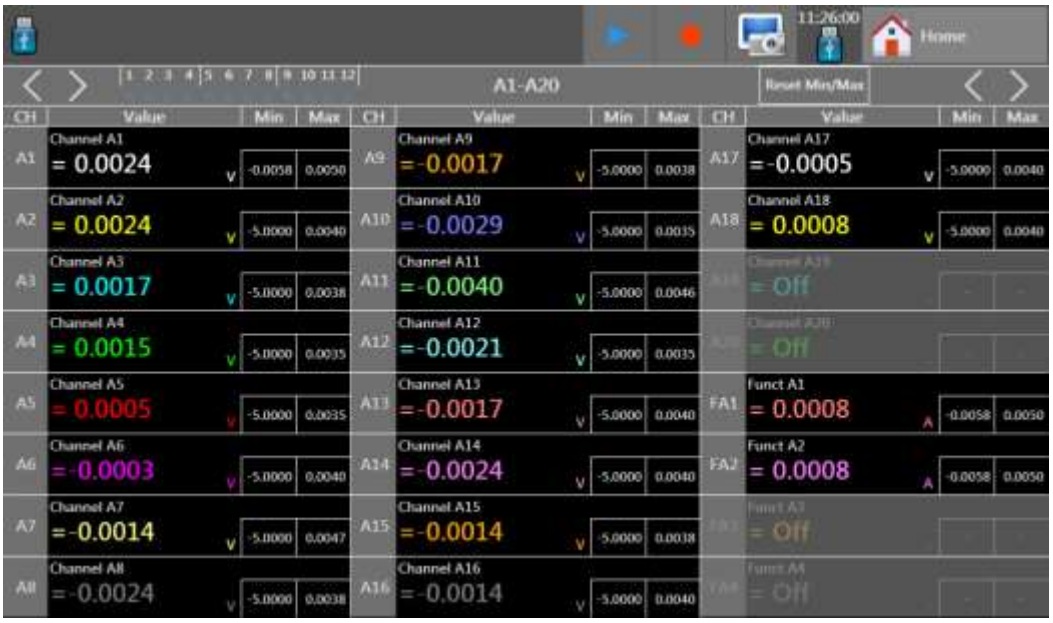
- For each plug-in (group) or for the logical functions group,you choose the channels to validate or to cancel.
- A key allows to validate/cancel all channels of the group, at the same time.

- A key allows to validate the functions: the 4 functions associated to the viewed group appear.
- The minimum sampling period appears (see §5.x).

4.9. Numerical Display

The numerical display is accessible via the main menu by pressing the “Numerical” key.

The numerical page allows having in real time all values of channels groups. (Plugs-in, personal group etc..)



The  or  keys : allow to change groups and view other channels.

For each channel, you view:

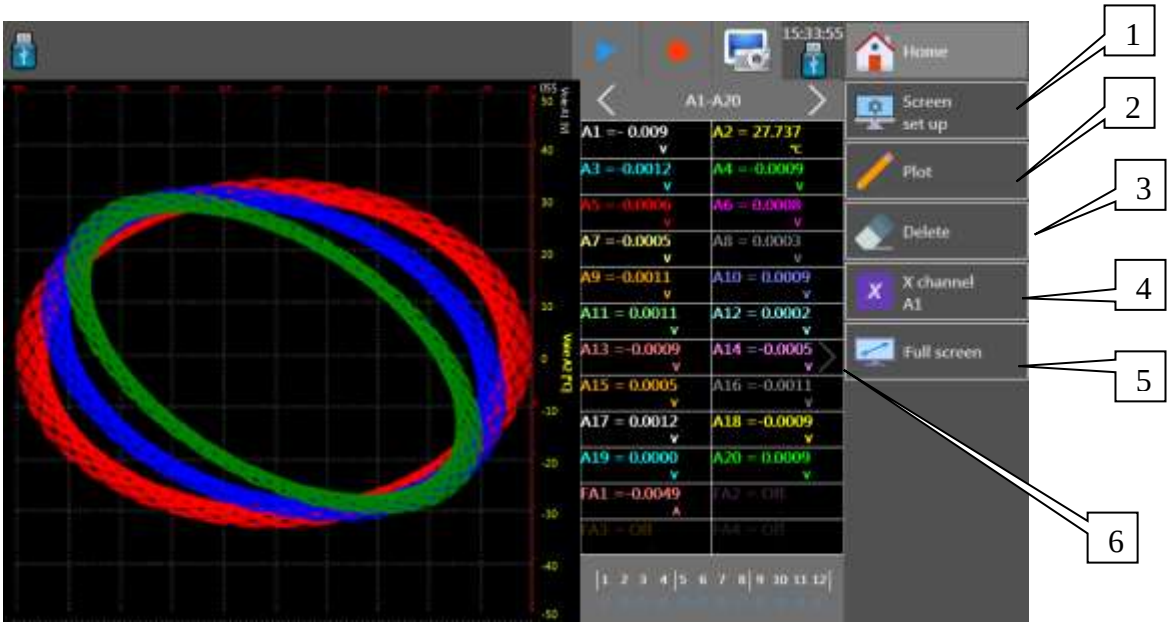
- The name of the channel
- The instantaneous value
- The minimum and maximum values

The RAZ min/max key allow reinitializing the min and max meters.

4.10. XY Display

The XY mode is accessible via the main menu by pressing the XY key.

The **XY** display mode allows visualizing the validated channels on the screen and in real time, relative to each other.
One of the channel defines the excursion on the horizontal axis, the other channels give points on the vertical axis.



1- Screen configuration: Setting the measurement display on screen.
- Choice of the mode of graphical visualization :
- F(t)
- XY
- Numerical of measurement (full screen)
- Full screen to visualize the reticule on full screen (f(t) mode.
- Color to customize the display colors (background, reticule, cursor).
- Assign a channel to a reticle for groups Custom 1 and 2 with the button « Channel selection »

2- Traced : allows to start or stop the outline.
3- Delete : allows to delete the screen.
4- X channel : Choice of the channel on the horizontal axis. (sweep).
5- Full screen: Allows to view on the full screen, press on the reticule to come back to the normal mode.
6- The or key allow to view or not the numerical window (see §4.11.3).

4.11. F(t) key

Waveform visualization of acquisition.
The oscilloscope is a scrolling mode, you choose time basis speed and you display the channels in real time.



4.11.1. F(t) Menu keys

- **Setting the screen** : Configuration of measurements display on the screen.
  - Choice of the mode of graphical visualization : F(t) or XY
  - Numerical of measurements (full screen)
  - Display of the mathematical calculations
  - Display of terminals and terminals type
  - Screen number
  - Color to customize the display colors (background, reticle, cursor).

- **Channels validation**: allows to choose the channels of groups Custom 1 and Custom 2, we choose then 24 channels maximum among all recorded channels.
  The « reinitialize channels » key erases the group configuration.

- **Freeze the screen** : freezes the graph at the screen to perform measurements through cursors, calculations, save or print the measurements at screen, in the F(t) mode.
  You can access to :
  - **Restart** : restart the Sweep
  - **Time cursor :** displays vertical cursors (2) to perform measurements on display : move the cursor by selecting it with your finger or the mouse.
  - **Voltage cursors** : displays horizontal cursors (2) to perform amplitude measurements on display ; for their movement, do as for the time cursors. You can also change the diameter/zero to dilate and move your measurement in the screen.

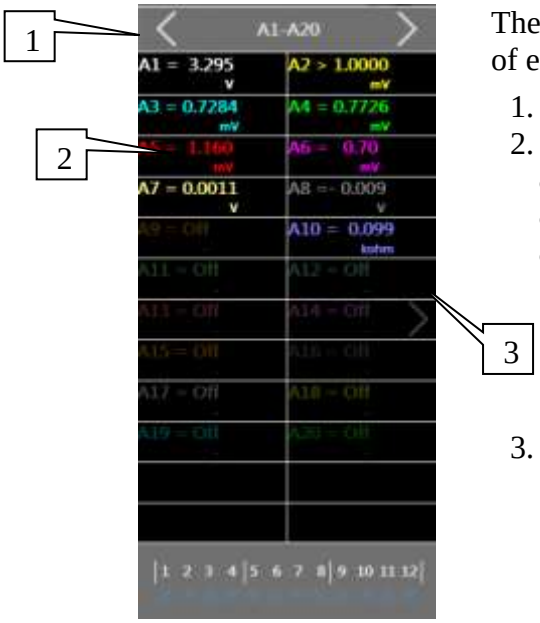
- **Time basis** : Allows to set the time basis per division.

  NB : We can have a rectangular visualization : for example, for a speed of 500 ms/div, if 100 channels are validated, the sampling period will be of 100ms, and we will have then 5 points per division and 50 points on the entire screen, hence the rectangular effect.

- **Full screen** : Allows to visualize the graph on the entire screen. (pressing once on the screen displays the previous screen).

- **Mathematical calculation**: allows to display values of mathematical calculations on screen. (To access the mathematical calculations, you have to validate them previously in the **"Screen setting"** window)

4.11.2. Numerical window



The numerical window allows to visualize in real time the values of each channel.

1. The < or > keys : allow to choose the group to view
2. By pressing a specific channel :
   - The graph terminals are bound to this channel.
   - In real time acquisition, the instant value will show up.
   - By visualizing the cursors; then the difference value between cursors as well as T1 and T2 values corresponding to cursors T1 and T20 will be displayed.

3. > Key: allows to validate/cancel the display of this window.

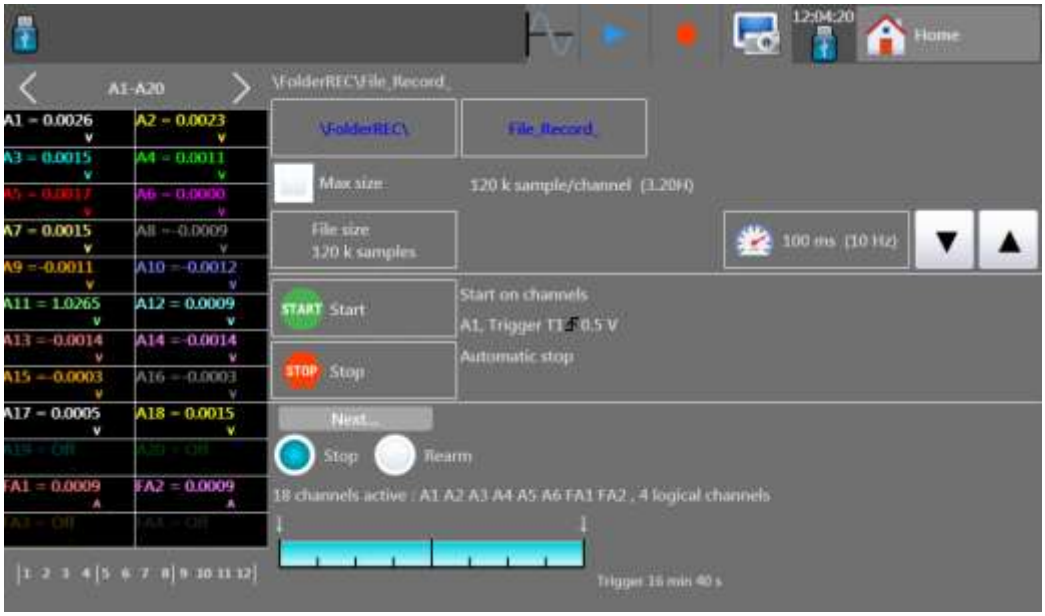
4.11.3. Graphical window

The reticle of the graphical window is divided into 10 divisions, the visualization of the total curves is 10 times the time basis (for 1s/div, we have 10 seconds of graphic).
The number of visualized points is 1000 (100 per division).
The number of screen can be set in the « screen setting » window.
The right terminals are bound to a valid channel: you just have to press on that channel in the numerical window.

4.12. «Trigger » menu

Programming the conditions of start and stop of the data acquisition.

Selection of the actions after data acquisition or plotting and validation of data save in real time.



See the chapter about data acquisition for a more complete description (§ 7).

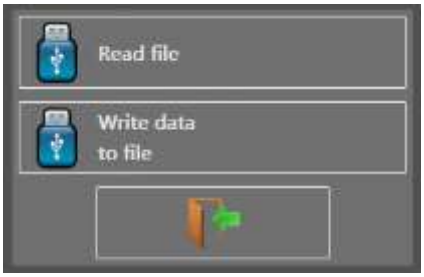
4.13. « Memory output » key

Display on screen of the possible data acquisitions into files on the internal memory or an USB stick



This function includes the same commands as the « **Direct view** » function.

The « **Read file** » command allows you to select the file to display. When pressing this key, the following window shows up:



- Read file: selection of the file to view
- Write data to file: saving the part of the displayed file into another file.

> For big amounts of acquisition data to display, recovering and displaying the dots may take a long time.

The display includes 2 rounds:

- A quick round for the display of the acquisition envelope: some dots may not appear
- A phase for the display of all dots of the data acquisition: the percentage of loading is specified at the bottom of the screen

4.14. « Record » key

This key has various effects according to the way you use it.

Launching the data acquisition into a file and position of the appliance in a stand-by mode, waiting for the trigger condition **Start**.

In any case, you can force the triggering and stop without fulfillment of the conditions inside the recorder by pressing 

(to force the record) and 

(to force the stop).

The following shows up on the screen:



- current sampling speed
- status of data acquisition (waiting for trigger, sampling rate xx%, …)

4.15. Screen copy

You can create a file copying the content of the LCD screen:

You only have to press  the key up right of the screen.

A file will be created, either on the USB stick if present, or into the internal memory.
The name of the file will be bmpxxxxx.bmp (incremental name)
In the internal memory, the files are saved into the « FolderBMP » folder.

You can either copy this folder onto an USB stick or erase it.
You can also use a ftp link to recover these files.

5. TRIGGERS

This chapter describes all possible triggers of the appliance.

They are used by:
- the « setup » menu, with the A and B alarms
- the « triggers » menu, with the start and stop parameters of the recording.

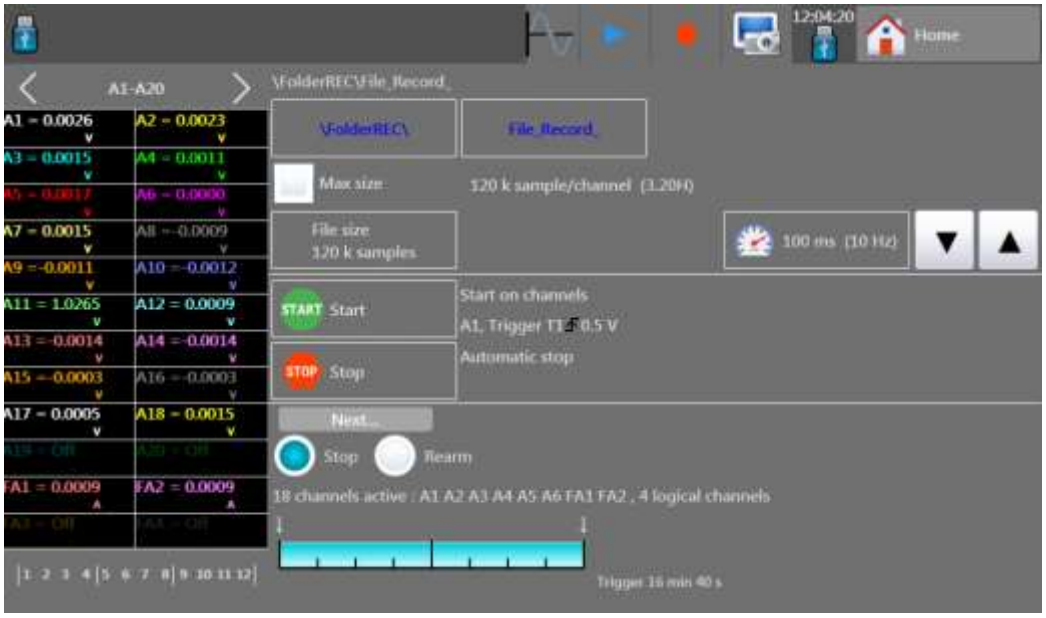
➔ **Edge/Level trigger**

- Edge trigger: you need a change of status
  - *Example*: Channel A1, rising edge, threshold = 0V: triggers only if the signal status changes from negative to positive
- Level trigger: no need to pass the threshold
  - *Example:* Channel A1, high level, threshold = 0V: triggers only if the signal is positive
- Alarms only have level triggers.

➔ **Analogic / Logic channels**: trigger only from analogic or logic channels

➔ **Single / Multiple threshold**:
- triggering from only one threshold,
- complex triggering from several channels and several thresholds; see description below.

Such complex triggering is only possible with analogic channels.
You can setup these triggers thanks to the « trigger » menu in the homepage.

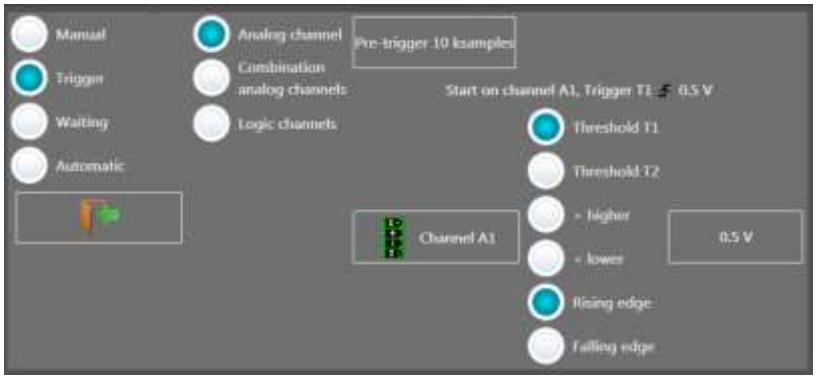


5.1. Analogic channel trigger

By pressing Start or Stop, you open the setup window for the trigger of the start or stop of recording.
After selection of the trigger on Analogic Channels, the following line on screen allows you to set the trigger condition. It depends on the selection of single or multiple threshold.

5.1.1. Single threshold

Single threshold trigger:



- ✓ Channel: selection of the channel, on which the trigger threshold is applied
- ✓ Threshold 1 / Threshold 2: selection of the threshold to settle; each channel is tested with reference with 2 thresholds, i.e. you can program a start condition on the channel A1 and the threshold 1, and a stop condition on this same channel A1 and the threshold 2
- ✓ Higher / Lower: trigger when the channel value is more or less than the set threshold
- ✓ Threshold value: threshold value selected in real value (taking the current unit and scale of the configuration of the selected channel into account)
- ✓ Edge: Selection of the active edge of the channel in reference to the threshold
- ✓ Pre-triggering (only for start): gives the acquisition time before the trigger appears.

5.1.2. Multiple thresholds

Trigger: Combination of analogic channels

After selection of a trigger on a set of logic channels, the window allows you to set the trigger under several conditions.
Then, by pressing the various thresholds in front of their respective channels, you open the threshold parameter window.



- ✓ One of the thresholds (or): the first achieved condition activates the trigger
- ✓ All thresholds (and): all conditions must be simultaneously achieved to validate the trigger
- ✓ A table makes it possible to select all channels and the validity of the channels
  Selecting the channel allows the selection of the thresholds
  - S1 and S2
  - Value of the thresholds
  - Rising / Falling edge, or

  Low / High value



5.1.3. Trigger on Logic Channels

After selection of the trigger on Logic Channels, the window allows you to set the trigger condition.



The 12 logic channels can be used in the trigger word:

- either active at status 0 (less than 1.6 volt)
- or active at status 1 (more than 4.0 volts)
- or non used X

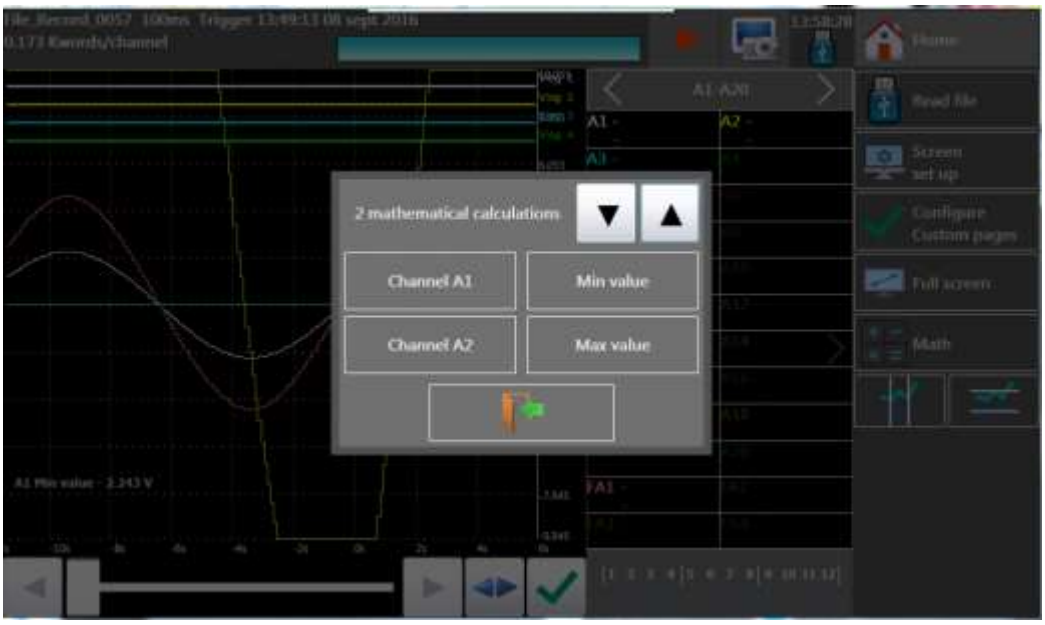
- AND / OR: the logic function AND / OR is applied to each channel
- Type: edge or level: the trigger is applied on an edge (change of value) or a level

6. MATHEMATICAL CALCULATIONS

You can apply mathematical calculations on your data acquisitions.
You can access them with the « **Direct display** » function.

6.1. Definitions

- In « **Screen setup** »: validate « **Display Mathematical calculations** »
- Then, press the « **Mathematical calculations** » key



- **Selection of the number of calculations**
- **Channel:** selection of the channel where the calculation is made
- **Function:** selection of the calculation function. You can change it by directly pressing the type you want, which pops up a window with all available calculations.



19 various mathematical formulas are available.
You can display up to **5 simultaneous calculations** on screen

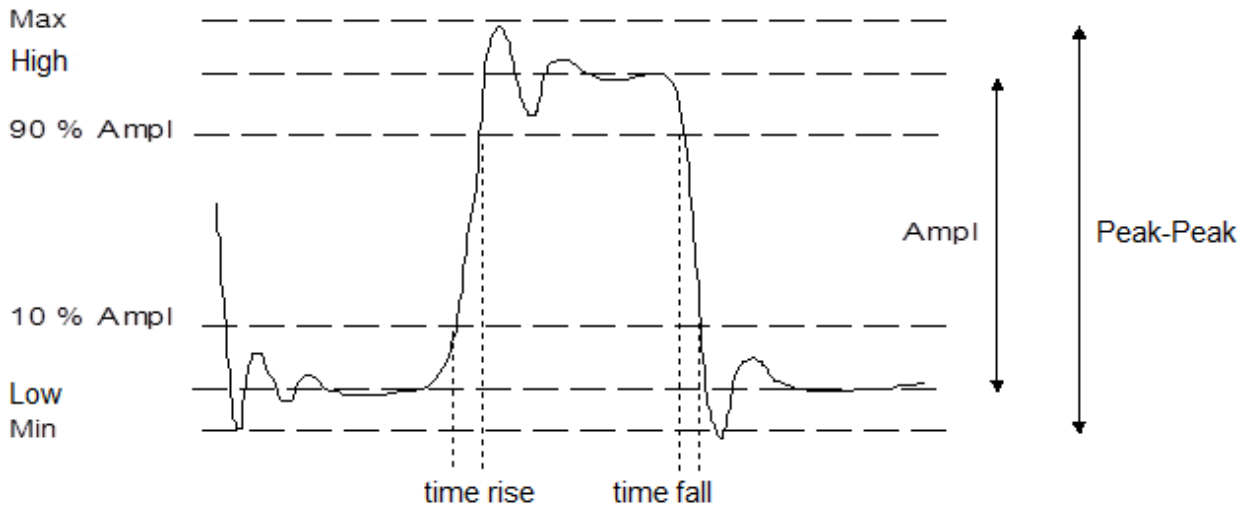
The display is made in windows above the diagrams, where are specified:

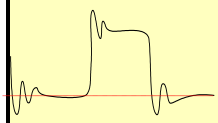
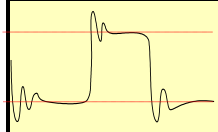
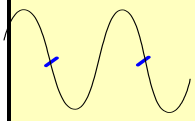
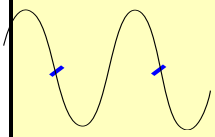
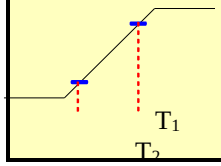
- the number of the channel (with its color)
- the type of calculation
- the value of calculation

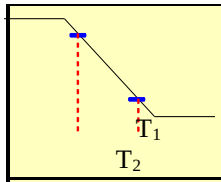
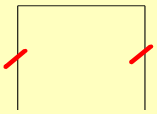
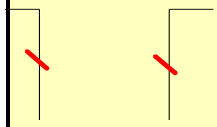
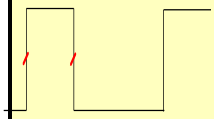
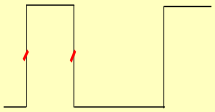
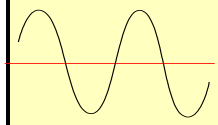
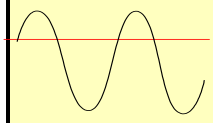
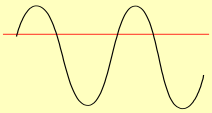
You can place this window anywhere on the screen (click/slide).

Under « **Direct display** », calculations are made in real time and the display is updated every 300ms.
The calculation is made on the 1000 points displayed on screen. Hence, the time resolution is 0.1%.
When cursors are enabled, calculation is realized by the difference of cursor position onto the 1000 points displayed on screen.

6.2. Types of calculations

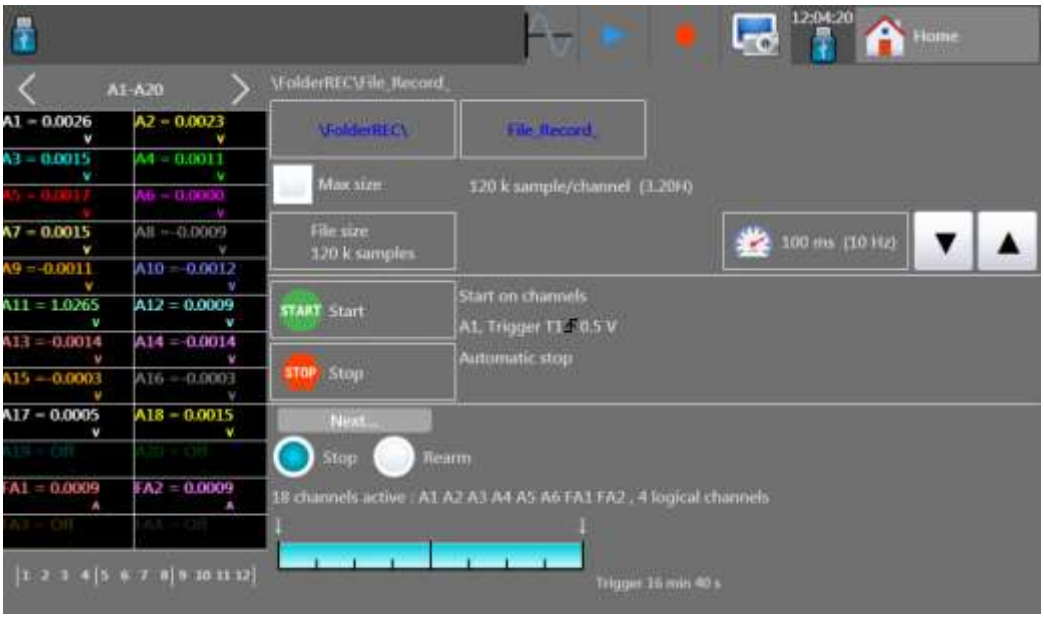


Drawing	Math function	Calculation	Observations
	**Minimum**		**The lowest negative voltage bottom**
	**Maximum**		**The highest positive voltage peak**
	**Peak to Peak**	Max – Min	
	**Low**		**The most frequent value below the median**
	**High**		**The most frequent value above the median**
	**Amplitude**	High – Low	
	**On positive oscillation**	$\frac{Max - High}{Amplitude} \times 100$	
	**On negative oscillation**	$\frac{Low - Min}{Amplitude} \times 100$	
	**Frequency**	$\frac{1}{Period}$	**Average frequency**
	**Period**	$\frac{Duration\ of\ \ N\ complete\ \ periods}{N}$	**Average duration of a complete cycle calculated on as many periods as possible**
	**Rising edge**	T_1 = 10% Amplitude T_2 = 90% Amplitude $T_{rise} = T_2 - T_1$	

	**Falling edge**	T_1 = 90% Amplitude T_2 = 10% Amplitude $T_{fall} = T_2 - T_1$	
	**Width of positive impulsion**	Measurement of the time of 1st positive pulse. It is measured at 50% of amplitude	
	**Width of negative impulsion**	Measurement of the time of 1st negative pulse. It is measured at 50% of amplitude	
	**Positive cyclic ratio**	$\frac{positive\ pulse\ duration}{period}$	
	**Negative cyclic ratio**	$\frac{negative\ pulse\ duration}{period}$	
	**Average**	$Aver = \frac{1}{N} \times \sum_{i=1}^{N} V_i$ N : total number of dots	**Calculation on the whole graphic range**
	**RMS**	$RMS = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (V_i)^2}$	**Calculation on the whole graphic range**
	**Standard deviation**	$S = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (V_i - \overline{V})^2}$	**Calculation on the whole graphic range**

7. DATA ACQUISITION

In the « **Launch »** page, you must first program the data acquisition.



7.1. Launch page

- Definition of the data acquisition file:
  - Selection of the folder
  - Selection of the name (beginning of the file name, the end is an incremental value)
  - Length of the file (maximum or selection of the number of samples per channel)

- Speed:
  The minimum speed is conditioned by the number of channels for acquisition. See §2.1.1

- Start: Start condition of the data acquisition



  - Manual: by pressing a key
  - Trigger: on a channel or a combination of analogic or logic channels (see § 5)
  - Waiting: after a delay or at a specified date and hour
  - Automatic: immediate; automatic stop when the file is full.
  - Pre-triggering: definition of the position of the Start trigger in the data acquisition; this position is specified as a number of samples and time

- Stop: Stop condition of the data acquisition
  - Automatic: when the file is full
  - Trigger: on a channel or a combination of analogic or logic channels (see § 5)

- After acquisition: action after the end of the data acquisition
  Possible only if the Start and Stop triggers are not Manual

- Stop: no action
- Relaunch: a new file is relaunched waiting for the Start trigger

➢ View of the active channels, of the recording time, of the pre-launch…

A message « **Impossible** » shows up when the saving possibilities are exceeded: reduce the sampling speed or the number of channels

7.2. Recording

You launch the data acquisition by pressing the « **Record » key.**

The recorder will create a file and wait for a trigger. If the trigger is in automatic mode, the data acquisition starts:

On the upper left of the screen appear:
- the name of the file
- the current sampling speed
- the data acquisition state (waiting for trigger…)

The « **START** » key forces the trigger and launches the recording.
The **« STOP** » key stops the pending data acquisition.



When waiting for the trigger, the screen makes it possible to display the channels in real time (scrolling mode); you can select the scrolling rate.

After launching, you can also visualize the channels by scrolling or DMM mode:
- press « **Main menu** »
- **F(t)** for real time scrolling
- **Numeric** to display channels in DMM mode.

When changing of menu page, you can return to data acquisition by pressing the "**Record**" key.



For longer data acquisition times, you can zoom onto a part of the data or change of page.

Keys of the « **Display »** menu:

- **Total**: the complete memory is displayed and update during the acquisition
- **Partial**: only a part of the memory is displayed; the screen is frozen; only the bargraph and the filling rate allow you to know the status of data acquisition; you have access to the time cursors and zooms (see the next chapter).

7.3. File output

You can access the « **Replay memory** » mode by pressing 

Display of the available data acquisitions in files:

7.3.1. F(t) display

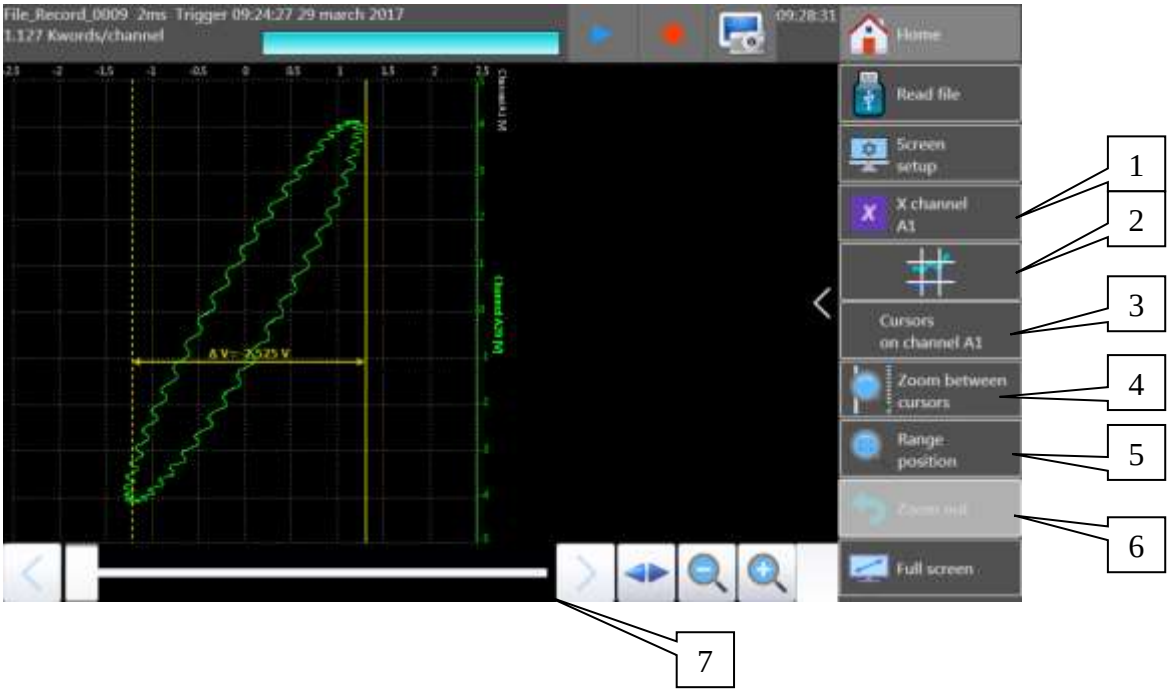


1- Read file: selection of the file to display.
2- Screen setup: type of display, diagrams; see § 4.
3- Configure custom pages (in the pages Custom 1 and Custom 2)
4- Full screen
5- Math (if valid)
6- Time cursors (vertical cursors)
Channel value cursors (horizontal cursors)
7- Zoom between cursors: makes it possible to zoom between the positioned cursors
Zoom + and Zoom -: make it possible to zoom or unzoom onto a part of the data acquisition.
8- Total display of the data acquisition
9- Validation of the recorded channels to display
10- Cursor to scroll in the data acquisition.

Up in the window, you have:

- the name of the file
- the sampling speed
- the date of the trigger
- the number of dots per total channel
- a bargraph showing the filling status of the file.

7.3.2. XY display



1. Selection of the channel for abscissa values X
2. Display of the cursors
3. Selection of the channel where to apply the cursor
4. Zoom between cursors
5. Manual change of the caliber/position of the channel
6. Return to the initial calibers/positions of the channels
7. Position inside the memory.

8. FILE MANAGEMENT

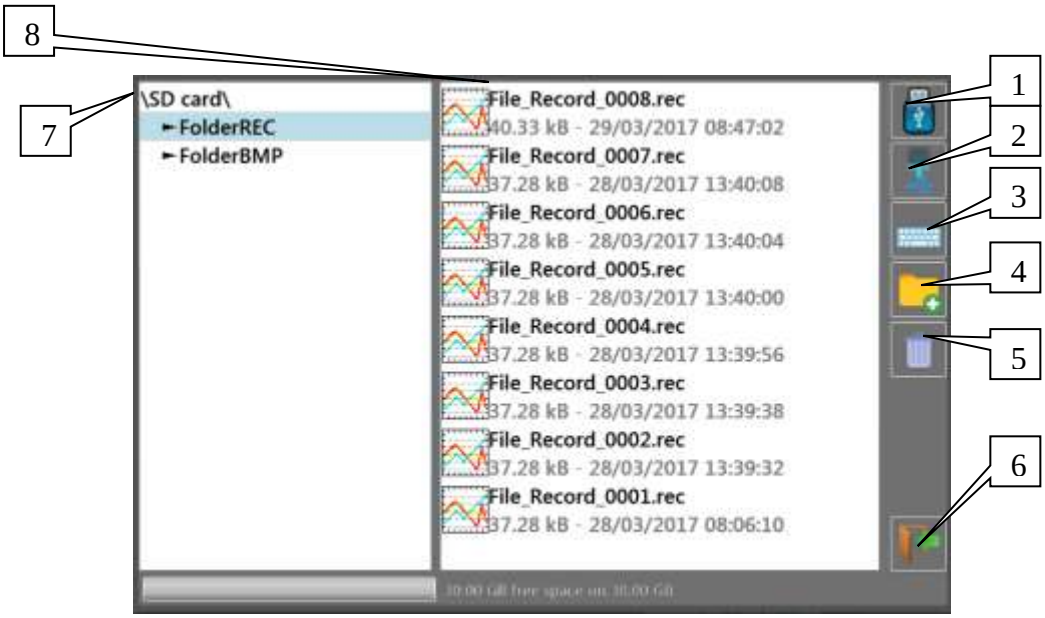
8.1. General

For all possible files, the appliance has an internal flash disk available and may accept an USB stick, which makes it possible:

- to save and load the total configuration of the recorder
- to save or restore a data acquisition.

The names of the setup files have a « .cnf » extension.
The names of the data acquisition files have a « .rec » extension.

You can create directories and save the files into them.



1- **HD / USB stick**: read/write into the internal flash disk or an USB stick (if it was connected at the start of the appliance)
2- **Copy of a file to USB**: copy the selected file or folder to an USB peripheral
3- **Type the name of a new file**
4- **Create folder**: creation of a new folder; you can type its name with the alphanumerical keyboard displayed on screen
5- **Erase**: erases the selected folder or file
6- **Close the window**
7- **Selection of the folder window**: Allows you to select the folder to work with
8- **Selection of the file window**: Allows you to select the file to work with



It is highly advisable to work in a folder and not at the root of the flash disk
When erasing a folder, all files in this directory will be erased too.

8.2. Setup file

The configuration file management page is linked to the « **Setup**» key.
Their name bear the **"cnf"** extension.
These commands are only available when the data acquisition is stopped.

The available commands in the configuration window are:

- **Reset**: sets up the appliance in standard configuration
- **Load from disk**: loads a configuration from a file in the internal flash disk or an USB stick
- **Save to disk**: saves a configuration into a file in the internal flash disk or an USB stick

8.2.1. Save Setup files

Press **« Save to disk** »
You can type the name of the file with the alphanumerical keyboard displayed on screen.



Advice: Do not save files to the root of the disk; create directories for a more efficient management.

8.2.2. Load setup files

Press **« Load from disk** »
Select the directory and then the file to load, and click « **Load** ».



Attention: you will lose the pending configuration.

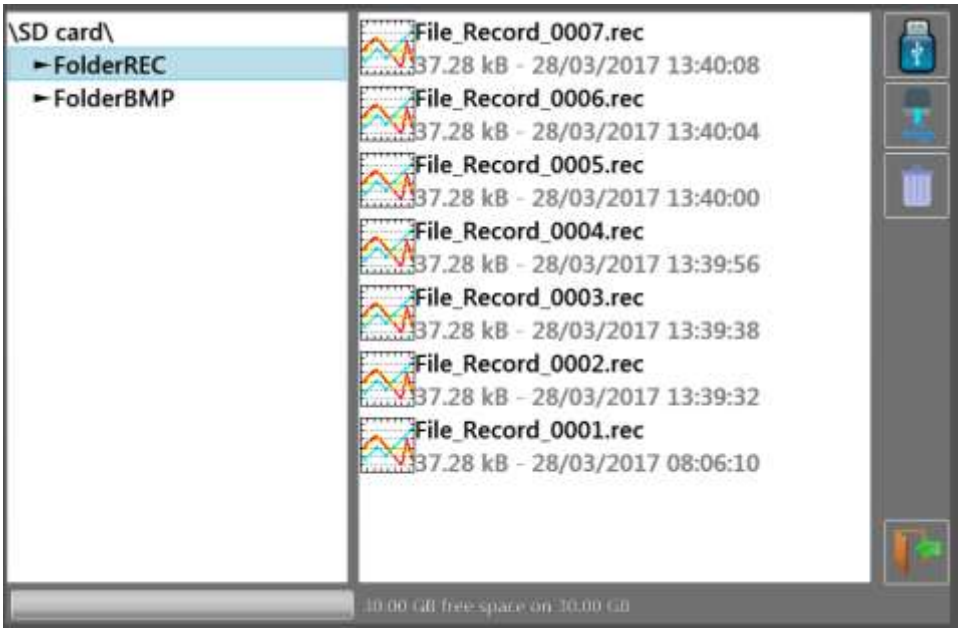
8.3. Management of the data acquisition files

In the main menu, press the « **Memory output** » key.
Press the first « **Read file** » key.

- **Read file**: loading of the data acquisition files
- **Write into file**: saving a part of a file into another file

8.3.1. Loading the data acquisition files

The following window shows up:



When selecting a file - you can only read data acquisition files (suffix .rec), you can:

- Copy it onto an external USB stick
- Erase it
- Read it.

Select the place and name of the file to load and display on screen, then press 

« **Load configuration** » make it possible to load the configuration of the appliance when the file was created. The pending configuration of the appliance will be deleted.

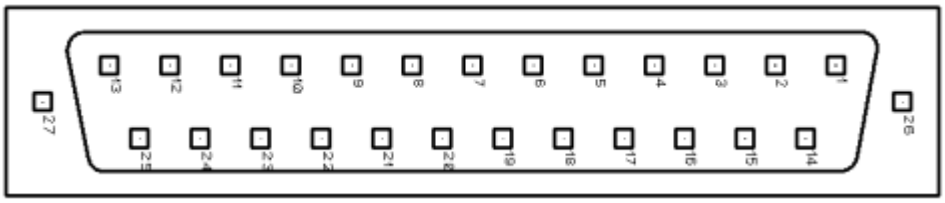
8.3.2. Saving the data acquisitions

You choose a file name; the part displayed on screen will be saved into this new file. Only the zoomed part of the older file will be saved into the newer file.

9. INPUTS/OUTPUTS

9.1. Additional Input/Output Connectors

The connector is at the rear (female SUB-D 25pin).

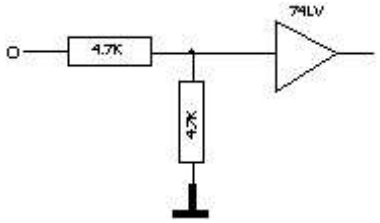


#pin	Name of the signals
13	Logic channel 1
25	Logic channel 2
12	Logic channel 3
24	Logic channel 4
11	Logic channel 5
23	Logic channel 6
10	Logic channel 7
22	Logic channel 8
9	Logic channel 9
21	Logic channel 10
8	Logic channel 11
20	Logic channel 12
7	Logic channel 13
19	Logic channel 14
6	Logic channel 15
18	Logic channel 16
5	Ground
17	Ground
4	Ground
16	9-15V 0.2A power
3	Ground
15	Alarme C
2	Alarme D
14	Alarm A
1	Alarm B

The power supply ground is the mechanical ground of the carter of the SUB-D25 connector.

9.2. Logic inputs

Inputs are according to the following circuit:



Non-connected inputs are 0V potential (level 0).

Number of logic channels: from 1 to 12.
TTL level: 3.3V (protected up to 24V)

To create a rising edge, you only have to place a connection between the power input and output of the connector.
Similarly, to create a falling edge, you only have to remove this connection.
You can also use an output signal TTL 3.3V.

Plotting and display:

They are displayed at the top or the bottom of the screen according to the selected position.
They are numbered from the right to the left.
Each channel is plotted between two dotted lines that show their limits.

Triggers:
You can use the logic channels to trigger the plotting and the data acquisitions (start and stop). (AND or OR mode)
See chapter « **Trigger** ».

9.3. Alarm outputs

Available contacts and outputs on the rear connector A , B C and D.
All outputs are TTL 5V.
When the appliance is powered off, outputs have a 5kΩ impedance

Signal for internal events to the outside toward the recorder (triggers on logic or analogic channels, status of the printing block…)

See chapter « **Use** ».

9.4. Power supply output

There is a power supply output restricted to 0.2A (see figure "connector").
The voltage is the one of the 9-12V battery as a function of the charge and 15V is the charger is connected.
The ground of this power supply is the mechanical ground.

Thus, you can use this output to provide power to a sensor or an electronic circuit in order to manage the logic inputs.



The power supply may disappear in case of overload (> 0.2A).
In this case, you must turn off the appliance a few minutes before turning it on again.

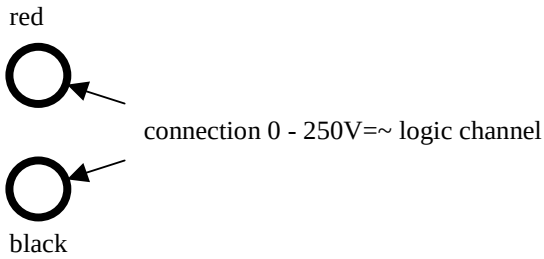
9.5. Extension box input/output interface

The extension box input/output interface option (code 984405500) makes it possible to:

- Convert an alternating voltage (example 230V 50Hz) into a logic signal 1
- Easy connection of the inputs of the 16 logic channels
- Insulation of the 16 logic inputs (250V=~ between channels, 250V=~ between channels and ground)
- Easy connection of the alarm outputs by a screw terminal
- Power supply of an external accessory with 3.3V, 5V or 12V by a screw terminal.

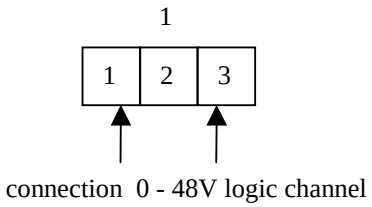
Connection of the logic channels according to the signal voltage:

- 0 to 250V =~



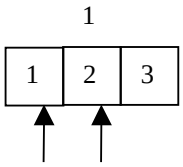
by insulated pin plug between red and black terminals
max. usable voltage: 250V continuous or alternating
typical trip threshold (AC or DC): 48V
frequency: 45 to 440Hz
undetected low threshold (AC or DC): 0 to 10V
detected high threshold (AC or DC): 60V to 250V
insulation: 250V=~ between channel and ground

- 0 to 48V=~



by a screw terminal between the points 1 and 3 of the screw terminal box
max. usable voltage: 48V (AC or DC)
frequency: 45 to 440Hz
typical trip threshold (AC or DC): 9V
undetected low threshold (AC or DC): 0 to 2V
detected high threshold (AC or DC): 10V to 48V
insulation: 50V=~ between channel and ground

- 0 to 10V=~



connection 0 - 10V logic channel 1

by a screw terminal between the points 1 and 2 of the screw terminal box
max. usable voltage: 10V DC or AC
frequency: 45 à 440Hz
typical trip threshold (AC or DC): 2.2V
undetected low threshold (AC or DC): 0 to 1V
detected high threshold (AC or DC): 3V to 10V
insulation: 50V=~ between channel and ground

Response time:

To detect the alternating current, the signal of the logic channels is rectified and filtered.

Typical delay for a rising signal: 10ms
Typical delay for a falling signal: 50ms

Use:

Link the box to the input/output connector of the appliance with the 25-pin connector provided as an option.
Connect the logic channels to record with respect of the maximum acceptable voltages.

Power supply / Alarms:

	DAS1600/800/8460	DAS20/30/40/50	DAS240/DAS220
1	Ground	Ground	Ground
2	3.3V	3.3V	3.3V
3	5V	5V	5V
4	12V	12V	12V
5	Ground	Ground	Ground
6	Alarm A c1	-	Alarm C
7	Alarm A c2	-	Alarm D
8	Alarm B	Alarm A	Alarm A
9	Alarm C	Alarm B	Alarm B
10	Ground	Ground	Ground

max current 3.3V: 200mA
max current 5V: 200mA
max current 12V: 200mA
Alarm A,B,C,D : logic output 0V / 5V not isolated

9.6. Extension wire for logical channels

code 902407000



Length: 1,2m

Color	Mark	#	
Black	GND	3	Ground
Red	12V	1	12V
White	L1-L8	8	Logical channel 1 à 8
Blue	L9-L16	8	Logical channel 9 à 16
Yellow	AL1-AL4	4	See below

DAS240/DAS220

	Mark	
K1	L13	Logical function K1
K2	L14	Logical function K2
K3	L15	Logical function K3
K4	L16	Logical function K4

	DAS1600/800/8460	DAS20/30/40/50	DAS240/DAS220
AL1	Alarm A c1	-	Alarm C
AL2	Alarm A c2	-	Alarm D
AL3	Alarm B	Alarm A	Alarm A
AL4	Alarm C	Alarm B	Alarm B

10. INTERFACE

10.1. Ethernet Interface

You can use the recorder remotely via its Ethernet interface with the TCP-IP protocol. Connect the recorder to your network with a straight-through cable onto the 10/100 BASE-T (RJ45) connector at the rear of the appliance.

You can use the recorder on an Ethernet network 10 Mbit/s or 100Mbit/s.

In case of a network with BNC cable, you must use an external hub to convert the BNC signal into RJ45 signal (use a straight-through cable).

If your PC has no network, you can also use a crossover cable directly between the PC and the recorder.

Crossover cable

Connector 1		Connector 2	
Pin	Signal	Pin	Signal
1	TX+	3	RX+
2	TX-	6	RX-
3	RX+	1	TX+
6	RX-	2	TX-

The recorder uses the TCP/IP protocol to dialog with the PC. Thus, you can give it an IP address with a subnet mask.
Ask your network administrator an IP address and a corresponding mask, then, when you have Setup the recorder with the SETUP key, turn off and on the appliance, so that the changes are taken into account.

If you don't have any network administrator:
Check that the TCP/IP driver is correctly installed on your appliance.
Case of a PC under Win XP or other:
From Windows Explorer, go to "Work station", "Configuration panel", "network connection", and then go to the properties of the network card.
Check that the TCP/IP protocol has been installed, then check the IP address and the subnet mask.

You have to take great care and define an IP address and a subnet mask that are compatible with the ones of the remote computer.
The port that the recorder uses is **Port #23**.

For example, in I mode, you could have:

PC	IP=192 135.20.00	mask = 255.255.255.0
Recorder	IP=192.135.20.01	mask = 255.255.255.0

Refer to the definition of the classes of IP addresses.

Programmation:
You can create your own software under Visual Basic, Visual C++, etc. by using, for example, the Winsock.dll driver by Microsoft.
Then, you only have to send the commands as per the following paragraphs to the recorder.

10.2. WIFI interface

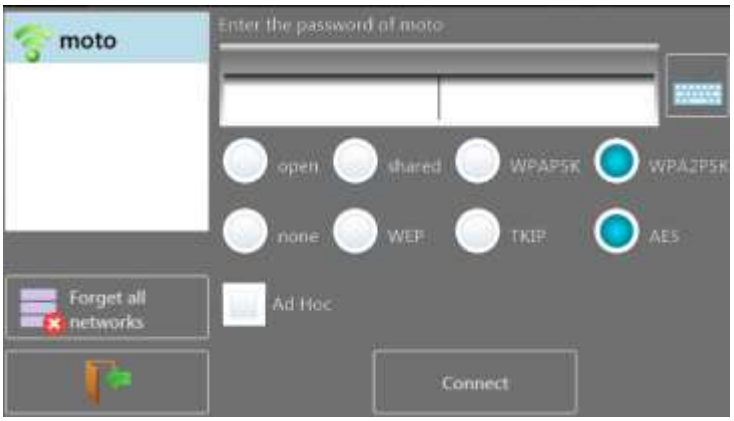
Use only the USB stick provided by SEFRAM.
Turn the appliance on with the USB stick on a relevant port.

In the « **Setup** » menu, press the « **Network** » key.

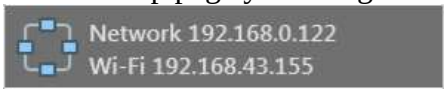
Once the Wi-Fi validated, press the « **Wi-Fi networks** » key.



(if you don't see your network, press the Ethernet/Wi-Fi keys several times)
When your network appears, select it and validate.
The commands are automatically positioned. You only have to type the password. In case of connection problem, contact your network administrator.



In the setup page you will get the IP addresses of the Ethernet and Wi-Fi networks.



10.3. FTP transfer

Transfer your files to your computer to save them or view them with the SeframViewer software.

- **Using of the Windows file explorer**
- **Filezilla**: freeware (https://filezilla-project.org/)
- **Using an external browser** (Internet Explorer, Mozilla, Opera, Chrome, etc.)

Launch your browser and type the connection address (see § **Setup**):
« **Ftp://** » followed by the IP address of your recorder
Then, press the Entry key of your computer.

You will get direct access to the directories of your recorder, including the data acquisition files: **HD**: root directory of the internal drive disk of your appliance.
Once you have selected the folder where you recorded your data acquisitions, you can rename them, move them, copy them or erase them.
Transfer your files to your computer to use them with the provided SeframViewer software or FLEXPRO.



You cannot read a file in real time while recording it.
You can use the protocol http for this.

10.4. Managing with VNC:

This piece of software allows you to manage the recorder remotely.

10.4.1. Changing the password

In the « Setup » page, press VNC.
You can then change the password of VNC.
The default password is « **sefram** ».

10.5. External software VNC Viewer

You are submitted a link to easily download this software:
http://www.realvnc.com/download/viewer/. Select the.exe file.

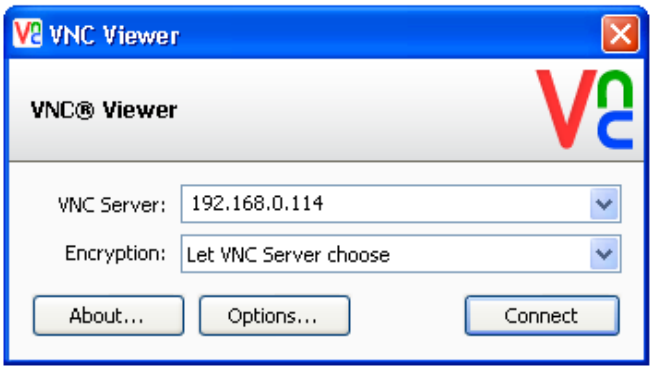
You only have to follow the instructions on site to install this software properly. At the end of setup, you will have the possibility to select a version for your VNC viewer (you may

have to pay for some of them). Select the version you want according to the applications you need.

Just open the « VNC viewer » file where you recorded it.

On the VNC Server line: you must type the IP address of your recorder and the password (the default password is « **sefram** »), then click « Connect »

You will be able to control your recorder from your computer.



10.6. Viewing with SeframViewer

You can transfer the data acquisition files to a PC computer for viewing.

The SeframViewer software is provided on a CD-ROM with the appliance. You can use it to view the recorded files or convert it into xls or txt files.

It works under WINDOWS with Framework 2.0.

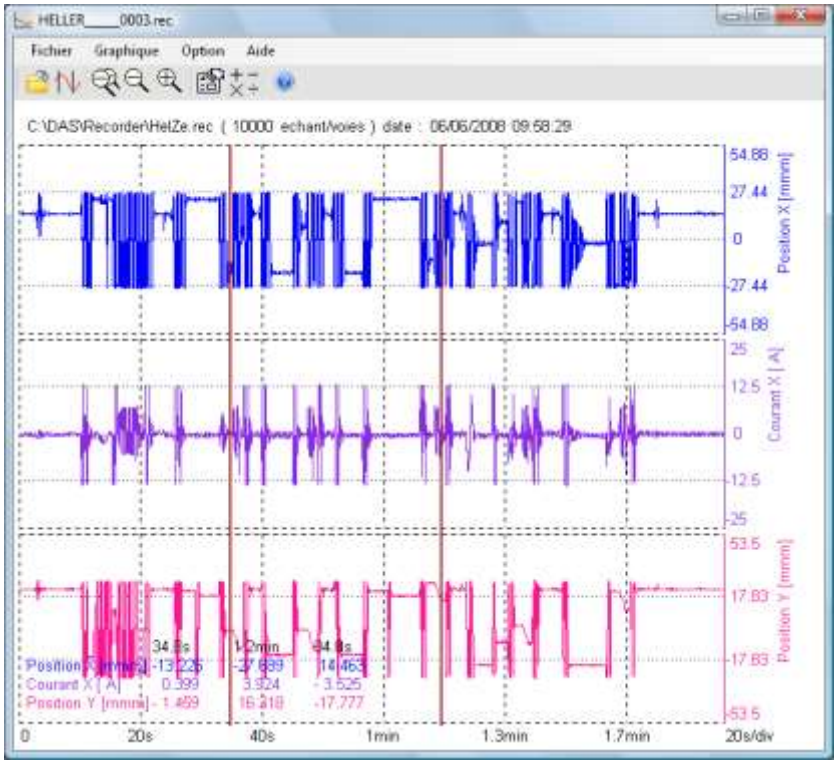
Transfer of the files from the appliance to the PC computer:

- USB peripheral device
- with the FTP protocol

Launch the SeframViewer software (or double-click on a file)
Open a data acquisition file (suffix .rec)
You can select:

- the channels to display
- the display mode f(t) or xy
- the self-calibration of the channels.

Your data acquisition file shows up on screen. The functions of SeframViewer are available.



Refer to the instruction manual included in the software to discover all available functions in SeframViewer by clicking on the last icon « **Help** ».

You can also directly create a file (.txt or .xls) by launching the command mode of Windows® with the following line (see the Options sub-menu of the help):
Example:

C:\Program Files (x86)\SeframViewer\seframviewer.exe myfile.rec /x
will create a .xls file
C:\Program Files (x86)\SeframViewer\seframviewer.exe myfile.rec /t
will create a .txt file

Excel@export will directly launch Excel in the browser.



10.7. Control your device with DASLaB

The DASLaB software manages configurations of your DAS240/DAS220 device.

It helps you to :

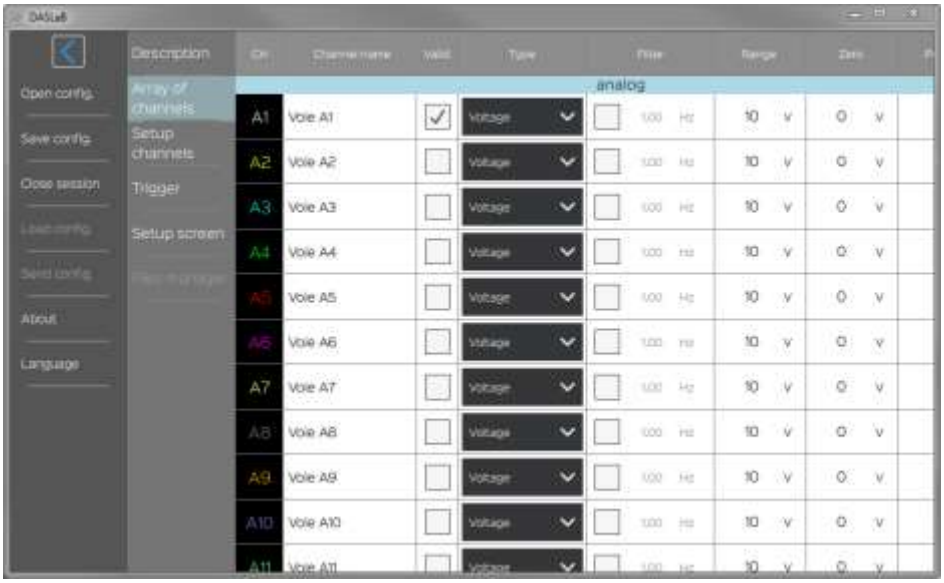
- Open, modify and save your configurations
- Manage configurations remotly using network via Ethernet or WiFi
- Download your record files using network via Ethernet or WiFi

DASLaB is available on the sefram website :
http://www.sefram.com/en/products/recorders-dataloggers/DAS240-multi-channel-handheld-recorder.html



According to your needs, click on the right button. If you want manage your DAS240/DAS220 using network, please enter the IP address to establish the connection.

For every action, including opening, saving, sending or refreshing configurations, the left sliding menu makes you able to apply it.



11. TECHNICAL SPECIFICATIONS

11.1. General characteristics

DAS240 :
Number of inputs: 20 per module
max. 20 modules

DAS220 :
Number of inputs : 10

Impedance: 1 MΩ

max. acceptable voltages:
between the 2 terminals of a channel: +100 V DC
between 2 channels 100 V DC
between a channel and the ground 100 V DC
Installation category: overvoltage category: 100V cat. 1 (see § 11.12)

Type of measurements:
Voltage, current (through external shunt),
Thermocouple J, K, T, S, B, N, E, C, L
Pt100, Pt1000, Resistance

11.2. Voltage recording

max caliber	200 V (-100 V to +100 V)
min caliber	1 mV (-0.5 mV to +0.5 mV)
accuracy	± 0.1% of full scale ± 10µV
offset drift	100ppm/°C ± 1µV/°C

11.3. Record of the temperature of thermocouple

Sensor	Domain of use
J	-210°C to 1200 °C
K	-250°C to 1370 °C
T	-200°C to 400 °C
S	-50°C to 1760 °C
B	200°C to 1820 °C
E	-250°C to 1000 °C
N	-250°C to 1300 °C
C	0°C to 2320 °C
L	-200°C to 900 °C

The accuracy of the thermocouples is specified in append.
Compensation of the cold welding: ± 0.5°C

11.4. Pt100/Pt1000 Record

- Current generator:
  - Pt100: 1mA
  - Pt1000: 100µA
- Domain of use: -200°C to 850°C
- 2 wires or 3 wires
- Correction resistance in 2-wire mode: max. 30Ω
- max. resistance in 3-wire mode: 50Ω
- Accuracy at 20°C room temperature: ±0.3°C ± 0.1% of the measurement value

11.5. Resistance Probe Record

2 input ranges:

- 1kΩ:
  - Current generator: 1mA
  - Accuracy 1Ω

- 10kΩ
  - Current generator: 100µA
  - Accuracy 10Ω

11.6. Sampling

- Polling system (one sample per valid channel)
- Resolution: 16 bits
- Sampling period per channel 1ms to 100ms (see § 2.1.1)
  (2ms to 200ms if Pt100 / Pt1000 3 wires)

- Filters: Butterworth filter order 2 from 10Hz to 0.01Hz
  (the frequency of the filter must be max. half the total sampling frequency).

11.7. Additional inputs / outputs

11.7.1. Logic functions

Logic functions (K1 to K4)
Same characteristics as the logic channels (see the following chapter)

- Pulse counter:
  - counter from 0 to max. 10000000
  - Minimum impulsion : 10µs
- Frequency:
  - 10Hz to 10kHz
  - Accuracy : 0.1 %
- PWM :
  - Frequency : 100Hz to 2kHz
  - Accuracy : 0 .1 %

11.7.2. Logic channels

- Number of channels: 12
- Input impedance: 4.7kΩ
- Max. sampling frequency: 1 kHz (1ms)
- Max. admissible voltage: 24V category 1

11.7.3. Alarm outputs

- 4 alarms A, B, C and D
- Outputs 0-5V
- On trigger (see § 17.7)
- On triggering of the data acquisition

11.7.4. External power supply

- Nominal voltage battery voltage (from 9 to 15V)
- Max. current 0.2A restricted resettable fuse

11.8. Triggers

- Date
- Delay
- Thresholds and combinations (or/and) of thresholds (2 per channel)
- Word on logic channel (and, or, edge, level)

11.9. Acquisition files

- Size of the internal flash disc min. 32GB
- max. file size 2GB
- Trigger: see §11.8
- Pre-trigger: variable from 0 to 100 ksamples

The max. speed depends on the number of channels for acquisition. see §11.6

11.10. Communication interface

11.10.1. Ethernet

- Speed 10/100 base-T
- Connector RJ45
- DHCP possible
- FTP server
- VNC server
- NTP client
- Remote control:

Protocol	TCP/IP
Connection port	23

11.10.2. USB connector

For memory and wi-fi sticks, and mouses

Standard	USB 2
Type	2 female connectors type A

11.10.3. Display

Screen	TFT 10", color, backlight
Total resolution	1024 x 600 pixels

11.11. Environment conditions

11.11.1. Weather conditions

Working temperature	0°C to 40°C
max. relative humidity	80 % non-condensing
Storage temperature	-20°C to 60°C

11.11.2. Power supply - battery

External power supply:	mains block 100/240 VAC, jack 5.5 mm, hole 2.1 mm output 15 V 4 A max
Non-removable battery:	lithium ion 10.8 V, 6.5 Ah (9 V at end of discharge) 200 cycles charge / discharge
Battery life:	with screen saver: 15h without screen saver: 10h

11.11.3. Dimensions and weight

DAS 240:

Depth	66mm
Width	298mm
Height	175mm
Weight	1,5kg (2kg with battery)

DAS 220:

Depth	75mm
Width	298mm
Height	175mm
Weight	1,6kg (2,1kg with battery)

20-channel module:

Depth	196mm
Width	67mm
Height	23mm
Weight	0.2kg

11.12. Security, insulation class, installation category

Security class: handy appliance for use on field

Security	conform to IEC61010-1 (2010)
Pollution degree	2
Power supply by 15 V external block	code 207195117

Installation category (overvoltage category)

Measurement input	category I 100V, overvoltage 500V
Other input/ouput	measurement category I (CAT I)



The carter of the appliance is grounded if the mains block is connected to the recorder

11.13. Accessories

11.13.1. Accessories provided with the DAS240

Battery charger	207195117
1 male 25-pin connector for logic channels	214200250
1 cover for connector	214299014
Extension box (with accessory set)	902401000

11.13.2. Accessories provided with the DAS220

Battery charger	207195117
1 male 25-pin connector for logic channels	214200250
1 cover for connector	214299014
Accessories connector for 10 channels	702200060

11.13.3. Accessories and options for DAS240

Transportation briefcase	902408000
Internal battery	902405000
Shunt 50Ω 0.01% (0.5W)	902406500
Box for logic channels	984400550
Cord for logic channels	902407000
Cord for 0.7m box	902407500
Extension box (with accessory set)	902401000
Wi-Fi stick	902402000
Rack	902409000

11.13.4. Accessories and options for DAS220

Transportation briefcase	902408000
Internal battery	902405000
Shunt 50Ω 0.01% (0.5W)	902406500
Box for logic channels	984400550
Cord for logic channels	902407000
Wi-Fi stick	902402000
Rack	902209000
Accessories connector for 10 channels	902201050

12. APPENDS

12.1. Measurement accuracy for thermocouple

The thermocouple measurements are treated as voltage measurements.

For a given range of temperature measurement, the software calculates the voltage caliber the following way:

* Let « T » the absolute value of the max. measurable value, in °C
* Add 40°C to take the max. cold welding temperature into account
* Search the corresponding voltage value U in the table of thermocouples
* Program the caliber with U included in the range.

Example:

You want to program a measurement range between -50 and + 50°C with a J thermocouple:

- Max. absolute value T = 50°C
- Add 40°C T + 40 = 90°C
- Corresponding U voltage according to the tables ThJ U = 4.726 mV
- Programmed caliber: 10 mV (measurement range: -5mV to +5mV)

The measurement inaccuracies below are max. values: the typical values are half to thrice as much.

The temperature measurement accuracy is the sum of several possible uncertainty causes:

Pl: linearization accuracy
Ps: weld welding accuracy
Pm: measurement accuracy of the equivalent voltage

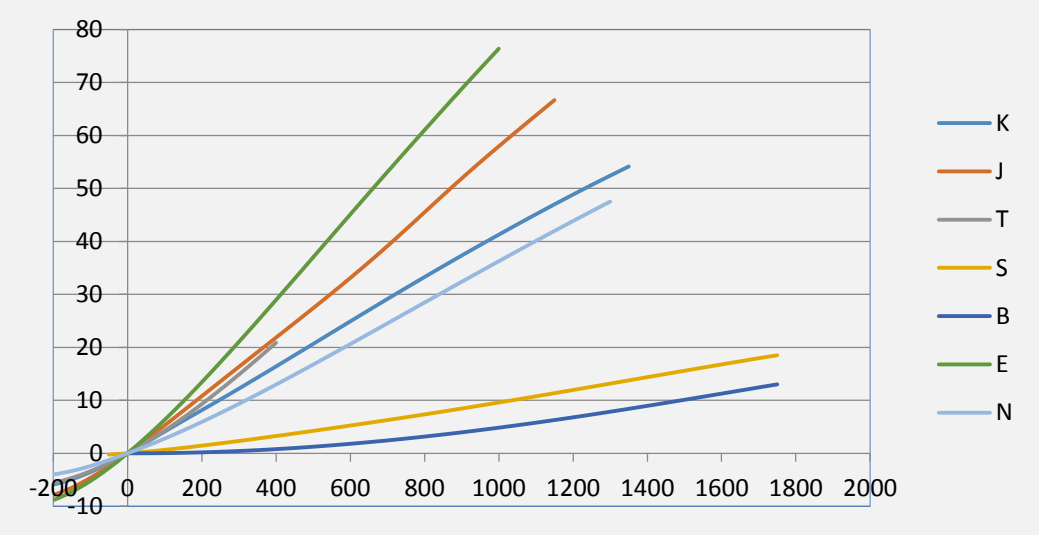
The total accuracy Pt is then: Pt = Pl + Ps + Pm

For the recorder:

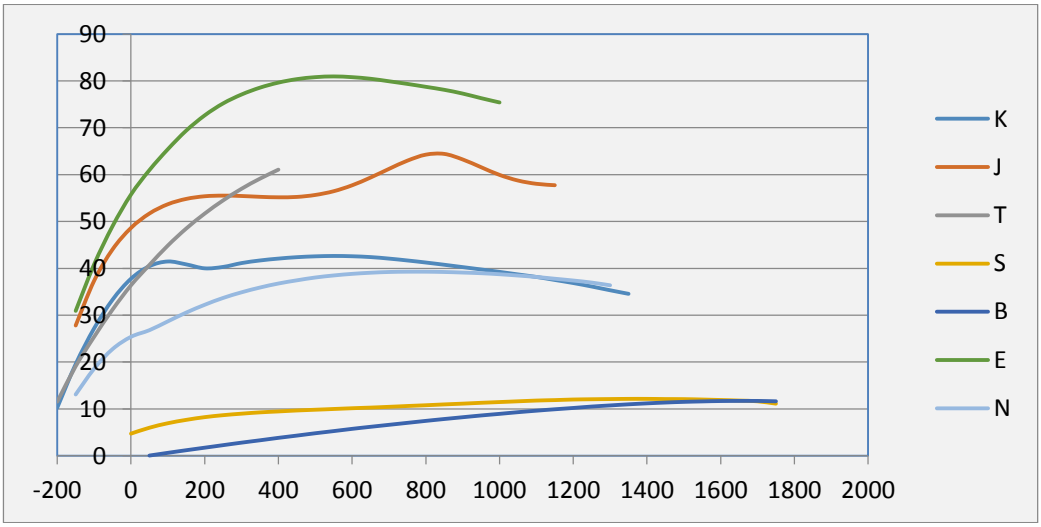
Pl = ± 0.25°C for all thermocouples
Ps = ± 0.5°C for all thermocouples
Pm = 0.1% of the voltage range + 10µV) divided by the slope of the thermocouple in µV/°C

Measurement accuracy: Pm

The measurement accuracy Pm depends on the voltage range of the appliance (see the previous paragraph) and on the slope of the thermocouple. You shall take the slope at 0°C while knowing that it will vary as a function of the temperature, but this variation is generally of the second order for the accuracy calculation.



Voltage of thermocouple (mV)



Slope of the thermocouples (µV)

Example :

At 100 °C the slope of thermocouple J is 55µV
At -100 °C slope is 30µV .
So the error is 2 time greater then 100°C to -100°C.

EXAMPLE OF ACCURACY CALCULATION

You make a welding between -50°C and +50°C with a J thermocouple with compensation of cold welding.

Pt = Pl + Ps + Pm

Pl = ± 0.25°C (linearization accuracy)
Ps = ± 0.5°C (compensation of cold welding)

Used caliber	10mV (see previous example)
Accuracy for voltage measurement	0.1%*10mV + 10µV = 20µV
Slope of J thermocouple	50 µV/°C
Accuracy Pm	Pm = 20/50 = 0.4°C
Total accuracy	Pt = 0.25 + 0.5 + 0.4 = 1.15°C

12.2. Accuracy class – class index

This is one of the most important concepts of the CEI recommendation; it tends to shorten the list of specifications. To do so, it introduces the concept of PREDICTIVE CLASS that depends on the C CLASS INDEX.
The normalized values of the class index are: C = 0.1, 0.25, 0.5 and 1.

The intrinsic error (in the reference conditions) does not exceed $\pm$ C % (the manufacturer may also specify this limit of the intrinsic error as an absolute value (ex. $\pm$ 5 µV) for the first calibers).

The variations (of the measured value) with the variations of one of the influential variables in the nominal range of use do not exceed:

- C % for the position for the magnetic induction with external source and parasite voltage
- 0.5 C% for the power supply source
- 0.3 C% according to the class index at ambient temperature (0.15% for the 0.25 class).

In addition, the insensitivity range should not exceed:

- C% in the reference conditions
- 1,5C% for the maximal resistance of the external measurement circuit
- 2C% for parasite voltage

And the excess should not be more than 2C% (4C% within the limits of the power supply source).