

## 12. PROTOCOL

The network communication protocol is the following:

### Weight Request :

**CI:** Plot Starting Code. The value is "0x88" (88 in hexadecimal) (1 byte).

**DIR:** Unit Address, in hexadecimal, to which the request is sent (1 byte).

**Checksum:** Checksum of the command to detect errors of transmission, the value of this field is XOR of the CI with DIR.

### Plot Format:

[CI], [DIR], [CI XOR DIR]

**example:** (if we configure the parameter `dir` with the value 0).  
0x88,0x01,0x89 (weight request of silo 2 unit).

### Answer of weight request:

The answer of weight request has the following format:

**CI:** Plot of Starting Code. The value is "0x88" (88 in hexadecimal) (1 byte).

**DIR:** Unit Address that answer in hexadecimal (1 byte).

**PESO:** Weight value of the interrogated silo (3 bytes), is sent the first byte of smaller weight.

**Checksum:** Checksum of the command to detect errors of transmission, the value of this field is XOR of the CI with DIR.

### Plot Format:

[CI], [DIR], [BYTE\_1], [BYTE\_2], [BYTE\_3], [CI XOR DIR XOR BYTE\_1 XOR BYTE\_2 XOR BYTE\_3]

**example:** answer to the anterior command.

0x88,0x01,0xE8,0x03, 0x00 0x62 (respuesta silo 2 = 1000)

### Response time:

The unit INS-2r can receive a command per second for a safe communication.

When a request for information is made, is necessary to release the line in less than 10 mseg. to allow the INS-2r to respond.

**Note:** The weight presented in the display is rounded up to the value indicated in `SCALE` & in the menu of display configuration `dir SP`. by means of the communication it also sent cleared.

### Level Bars and Luminous indications

The unit possesses two Bar Leds that visually indicates the level of each silo in percentage. When a unit arrives to a maximum capacity its capacity will illuminate all the bar of the silo (see figure 1).

The unit also possesses 4 LEDs.

- **Transmission Led (Tx):** It activates when the unit answers a command by network RS 485.
- **Led of Tare (Tare):** It activates when the value of the display has previously applied a made Tare.
- **Led selection of silo 1 (S1):** It shows in the display the measurement of the silo 1.
- **Led selection of silo 2 (S2):** It shows in the display the measurement of the silo 2.

**Note:** If LEDs of indication of both silos is lighted on, it means that the visualization display shows the sum of both.

# Instructions Manual of Unit INS-2r for Silos



Ref.: EA009-ID-MI-01 (01)  
Rev. 04/001



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**LEI Alarm of Time Connection**

If the alarm level is exceeded, this one does not activate until it pass a certain time. If during that time, the silo level let surpass the limit, the alarm will not activate (the time connection serves to avoid alarm activations when the silo level is very close to the activation level and might suffer variations due for example to the wind, or when it is filling). The activation time can vary from 0 to 1,000 seconds.

**Sound Alarm**

The INS-2r has an internal buzzer, that emits an intermittent sound when one alarms activates. In this parameter could select if it is wanted to activate or not the intermittent sound of the alarm. In any case the LED bars will blink to warn the cause of the alarm.

**Logic of the Alarm Level**

The alarm can be activated when exceeded or it lowers a certain level. With this parameter it activates the alarm when the level is surpassed (Logic = HI) or when the level gets lower (in this case Logic = Lo).

**Number of Relay**

The INS-2r has two internal relays. One of the alarms is possible to indicate, when the alarm activates means one of the relays is in used.

- To activate the relay 1 put **FELE** = 00001
- To activate the relay 2 put **FELE** = 00002
- Not to activate any relay put **FELE** = 00000

**8. DISPLAY**

In this option **di SP** we can configure the options to visualize the measurement. The options are the following :

- **SALto** This option serves to indicate the increase of measurement that visualize in the display. The values that can takes are 1, 2, 5, 10, 20, 25, 50 y 100.
- **PUNto** This option indicates the number of decimals in the display.

The possible values are:

- 00000: The display indicates 00000.
- 00001: The display indicates 00000.
- 00002: The display indicates 00000.
- 00003: The display indicates 00000.
- 00004: The display indicates 00000.

**1. INSTALLATION**

The installation of the load cell on each silo is made with the habitual connection of the unit. The order of the cables from left to right is: Red, Black, Green, White, and Screen. The power supply of the unit is 220Vac, being the ground pin is located on the central.

**2. DESCRIPTION OF CONNECTIONS**

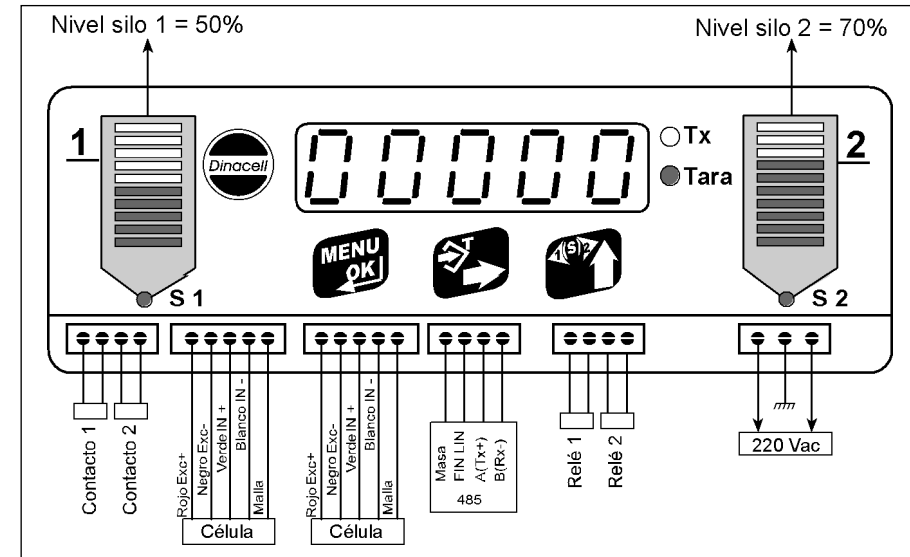


Figure 1

**Contact 1:** (Output for the external button) Pressing once the button show the difference between the measurement of the Silo 1 and its Tare. And pressing for more than 1,5 seconds it makes the Tare, & setting the display to zero.

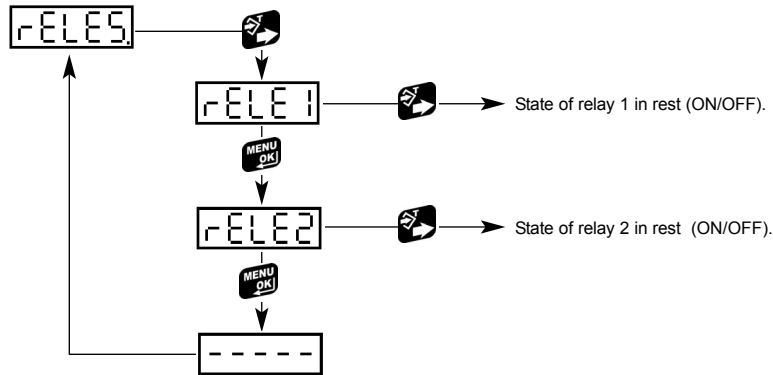
**Contact 2:** (Output for the external button) Pressing once the button show the difference between the measurement of the Silo 2 and its Tare. And pressing for more than 1,5 seconds it makes the Tare.

**Relay 1:** It change the state, if the alarm value that has assigned is activated, or if the overload takes place on the Silo 1.

**Relay 2:** It change the state, if the alarm value that has assigned is activated, or if the overload takes place on the Silo 2.

**RS-485:** Two threads that connects the unit to a network RS-485.

### 5.2.5. Relays menu



## 6. UNIT CALIBRATION

In this section it is explained how to introduce in the unit the relation between the signal of the load cell and the weight of the silo.

1. Keep pressed the key for more than 1,5 sec. to enter in the internal calibration menu.
2. Introduce the key (if the key is the same to "00000", will not request it).
3. If the key is correct or same to "00000", will appear .
4. To continue, press and will appear .
5. Press again and we could modify the capacity of the silo.
6. In order to save, press the key twice .

### I) Standard calibration (valid for sensors and load cells)

#### 1. Zero setting:

- a) Verify if the silo is empty or in the contrary case, find out the approximated weight of the load that contains.
- b) Locate in the option .
- c) Press the key and introduce the approximated weight of the load (zero if silo is empty). Next, confirm the value.

**Note:**

*It is highly recommended to make the zero when the silo is empty to avoid possible errors.*

#### 2. Weight Adjust:

- a) Locate in this option .
- b) Introduce inside the silo a well-known weight (at least 30% of the total capacity) and then press .
- c) Introduce the value of the load place inside the silo.
- d) To save the value, press twice this key .

## 4. HOW TO PROGRAM

- 1) Press the key until the display shows the desired parameter to be changed.
- 2) Press the key to highlight the specific digit to be modified. The digit to be modified will blink.
- 3) Introduce the desired value by using these keys y .
- 4) After introducing the data, press the key .

The display will blink during 10 seconds waiting to save the value (press this key again to stored the value). If you do not press, the changes will not be stored and the controller display will remain at the parameter you were modifying.

The digit to be modified will blink.



Pressing this key we moved to the following digit towards to the right.



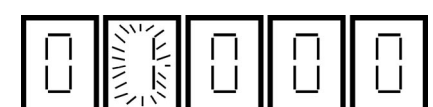
Pressing this key, we increased the value of the blinking digit.



Pressing again this key, we continued moving the digit.



In order to finalize, we must press the key menu. The digit will blink for 10 sec. indicating the value to be save.

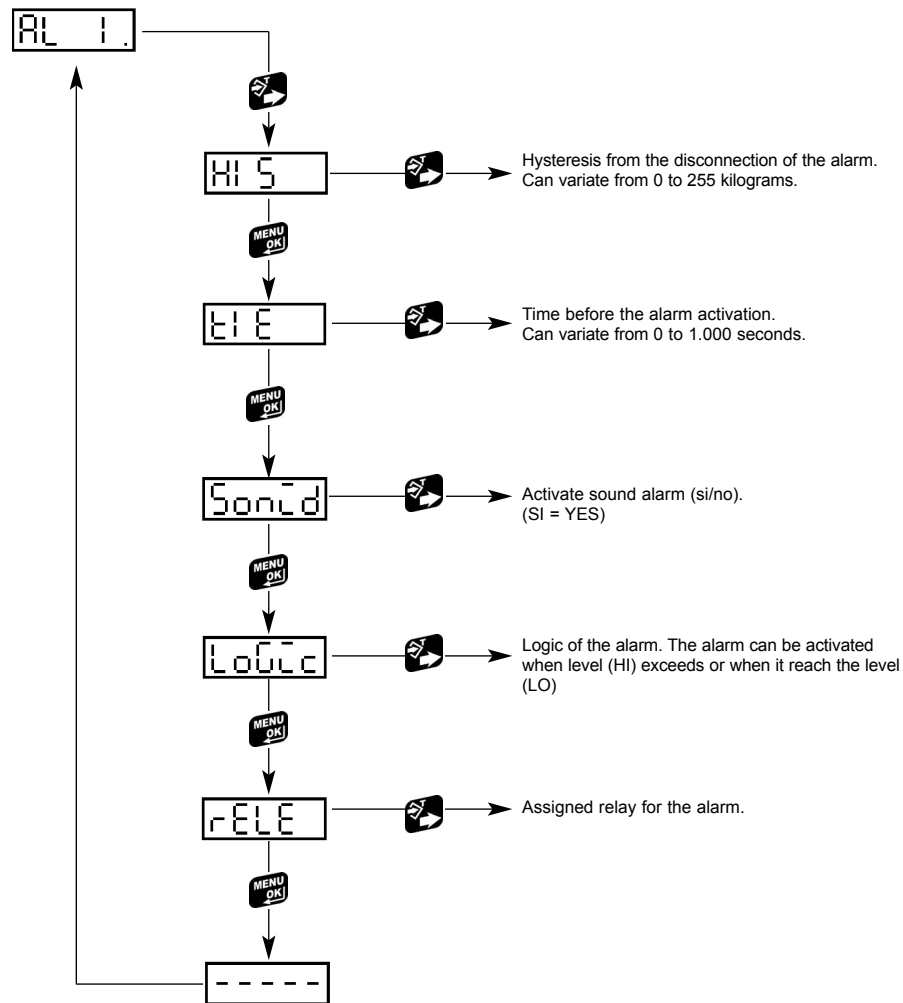


During 10 seconds all the digits blink, waiting for the confirmation to save the data. Pressing again the key menu within 10 seconds, we saved the introduced value and the data is updated.

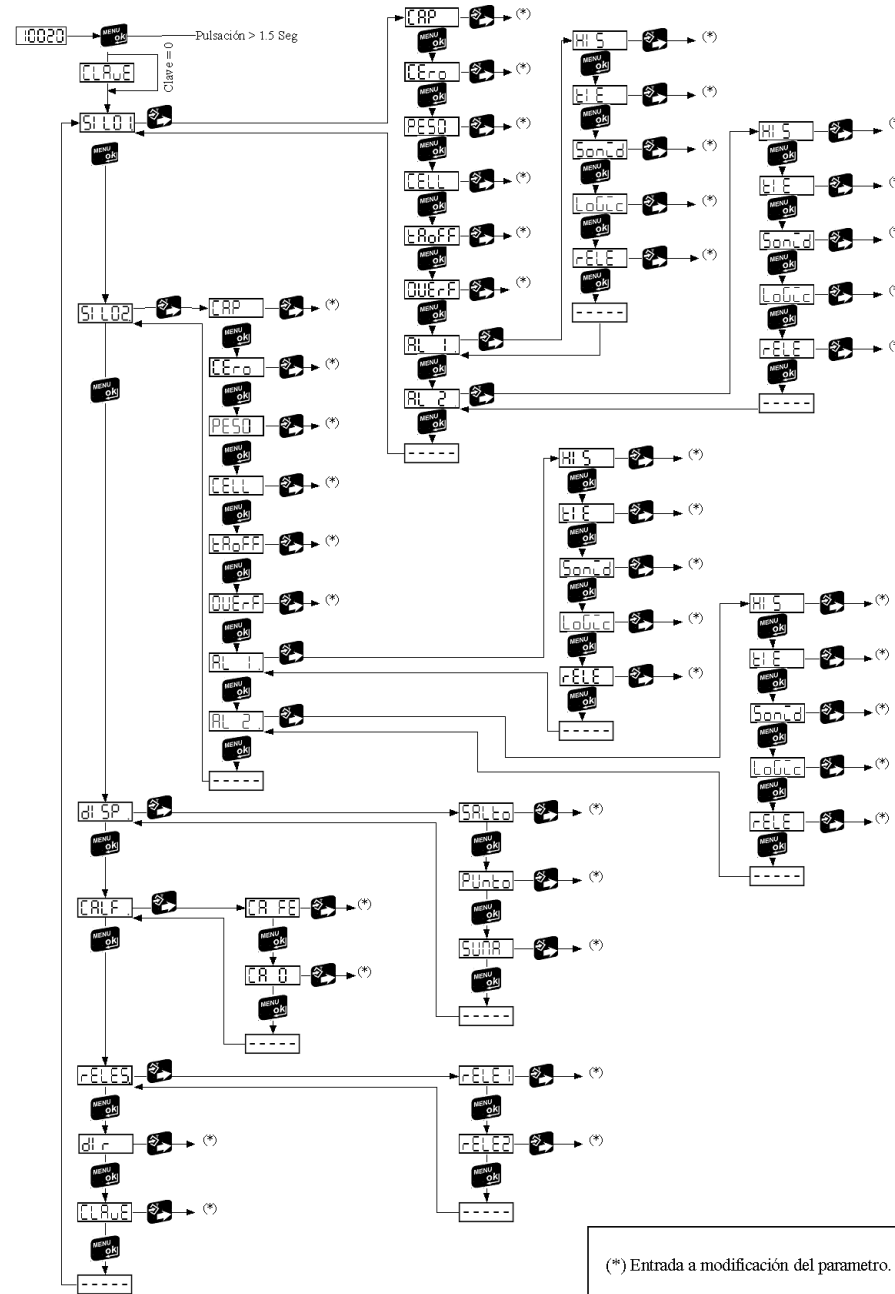
If you do not press within 10 sec, the changes will not be stored and the controller display will remain at the parameter you were modifying.

### 5.2.2. Alarms menu

This menu is the same for both alarms. Each silo has two alarms.



### Navigation diagram of the menu's



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- ♦ **SUM** This options serves to visualize on the display the sum of both silos.

The possible values are:

**no**: If we choose this option, it is not possible to show in the display the sum of the silos.

**SI**: If we choose this option, This will show in the display the total measurement of both silos.

**Note:** When the measurement is shown, we could visualize the load of silo 1 , silo 2 or the sum of both by pressing this key. 

## 9. CONVERTER CALIBRATION

The option **CALF** serves to calibrate the converter that gives the reading from the load cell. The parameters to calibrate are the full scale **CRFE** and the offset calibration of the converter **CR0**. These parameters is already calibrated from the factory and it is important not to modify them. These values is written down on the label of the serial number and it is only be necessary to introduce them in case the calibrated values get lost.

## 10. RELAY

The unit INS-2r has two internal relays that change state when an alarm activates. For that it is necessary to assigned in the alarms configuration menu a value on one of the relays .

In the menu **FELES** it must indicate the state of rest of each relay. When activating an alarm, the assigned relay will change its state.

The possible values of the relay state of rest are:

- ♦ **OFF** The relay is deactivated and the contact is open.
- ♦ **On** The relay is activated and the contact is closed.

## 11. COMMUNICATIONS

The unit INS-2r can communicate by means of a network RS-485. In the configuration of internal calibration menu there is an option **dir** , that allows to select the direction of the superior immediate address in which responds to silo 1 & Silo 2 . The address value must be between 0 and 252 (see connections in figure 1).

### 3. MENUS PARAMETERS ACCESS

The keys of the unit INS-2r have a different behaviour , depending on the options of the menu.

#### 3.1. Keys functions when the display shows the weight.



Keep pressing this key for more than 1,5 sec., enters to the internal calibration menu.

Press once, enters to the level alarm programming menu.

**Note:** If the unit is protected by a password, you will ask by a keycode. If you don't desire to protect the unit , just simply set the parameter "CLAVE" by placing 5 zeros .



Keep pressing this key for more than 1,5 sec., the unit will make the Tare of the selected silo.


Press once, it will deduct/ not deduct the tare of the selected silo.



Keep pressing this key for more than 1,5 sec., shows the reading in m/V of the corresponding Silo.

Press once, choose the desired silo to view (silo1, silo2 or the sum of both).

#### 3.2. Keys function when the unit scrolls on the menu's .

When entering on the programming menu, by pressing this key , you will acquire the following functions.





Keep pressing this key for more than 1,5 sec., you will leave the internal calibration menu.

Press once, will jump to the next parameter .



Press once, will enter to the selected parameter.

**Note:** There are two kinds of parameters:

- **Submenus** (This type of parameter has justify the decimal point to the right. and when pressing this key  you will enter to another submenu ).
- **Variables** (There si no decimal point justified to the right).In this case, this key  is used to choose the desired digit to modified.



Press once this key will be modify the value of the blinking digit. If the variable to modify is a text, or a defect value, with this key we changed the value.

#### II) Specific calibration of the load cell which nominal load is known:

##### 1. Unit Adjust (known weight of the empty silo ):

- a) Introduce the nominal load of the load cell in the parameter .
- b) Introduce the known weight of the empty silo in the parameter .

**Note:** You can interchange the order of this 2 operations.

##### 2. Unit Adjust (unknown weight of the empty silo):

- c) Introduce the nominal load of the load cell in the parameter .
- d) Make the setting indicating the approximate weight that the silo contains.

#### III) Replacement of another unit for calibration.

(normally for the change of unit breakdown):

- a) Copy all the parameters (except  &  that no need to modified).

**Note:** The calibration is contained in  & .

### 7. ALARMS

The alarms are the load levels in which it changes the state of the relays. To adjust the alarm. It is not necessary any weight, just simply program them on the keys of the unit.

Each silo has two alarms. In the programming alarm menu you can set the alarm limits and in the submenu  &  you can modify the features of each alarm.

When one of the alarm activates, the internal buzzer of the INS-2r emits an intermittent sound and the corresponding LEDs bar of the silo starts to blink . It acts on the relay that has assigned an alarm.

Several ways exist to deactivate an alarm:

- a) Pressing any key of the unit.
- b) Acting on the external push button of the corresponding silo.
- c) Once passed 12 minutes from the activation of the alarm.

In any case, The LED bars remains blinking in the state of alarm until the silo level does not activate any alarm level.

Levels of each alarms:

Alarm level 1 for the Silo1. Range from -19999 to 99999.

Alarm level 2 for the Silo1. Range from -19999 to 99999.

Alarm level 1 for the Silo 2. Range from -19999 to 99999.

Alarm level 2 for the silo 2. Range from -19999 to 99999.



Adjust parameters of each alarm:

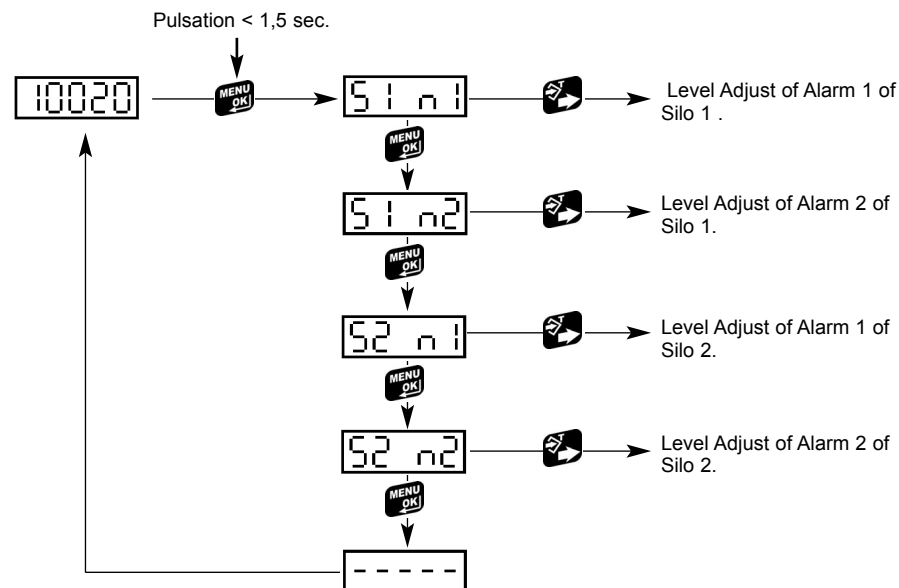
**Hysteresis Alarm**

In order to deactivate an alarm, it is not enough to recover the level of the alarm. But it is necessary a very small increase to exceed the level . This increase can adjust in this parameter. The range is from 0 to 255 kilograms.

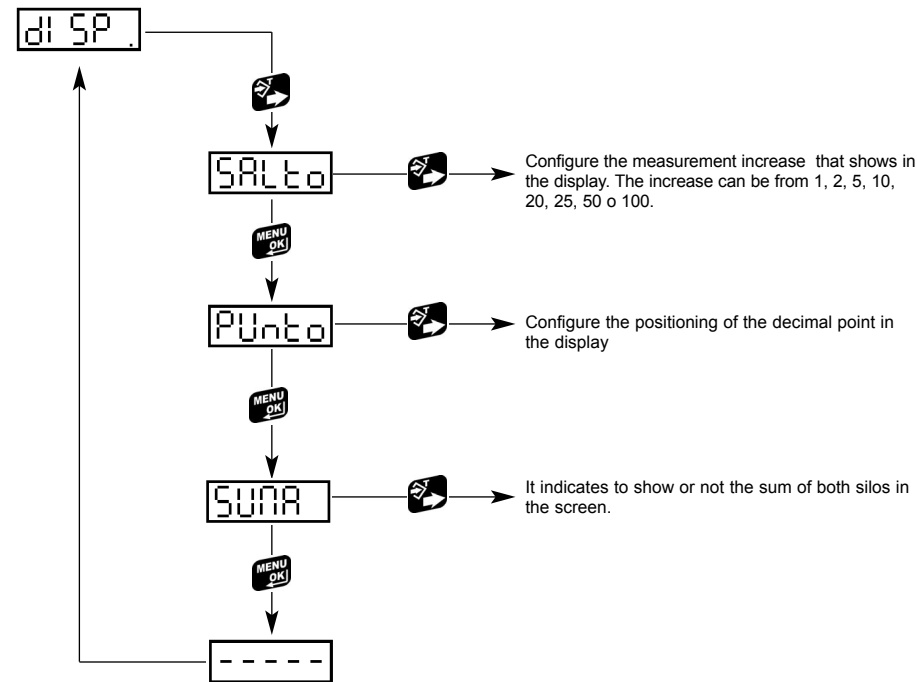
## 5. PROGRAMMING STRUCTURE (menús)

### 5.1. Alarm programming menu

To enter to alarm programming menu, press the key  (if we press for more than 1,5 seconds, we will enter to the internal calibration menu). On the unit INS-2r, there are 4 possible levels of alarm to adjust. Each silo has assigned two levels of alarm. The value of the alarm levels can vary between -19999 and 99999. Once placed the level value, it is necessary to indicate the logic operation on each corresponding alarm, It means that the alarms will activate when exceed or get lower the level programmed. This event can be program in the internal calibration menu, in the parameter  of the alarms menu.

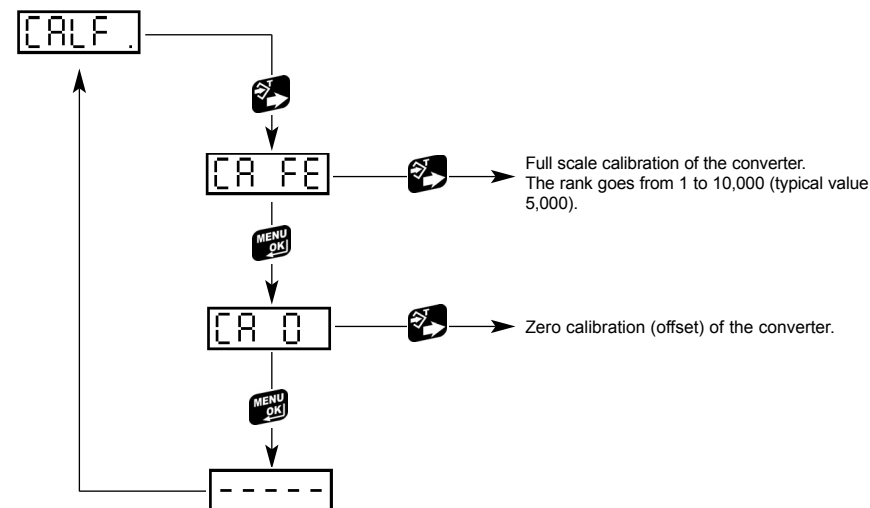


### 5.2.3. Display Menu

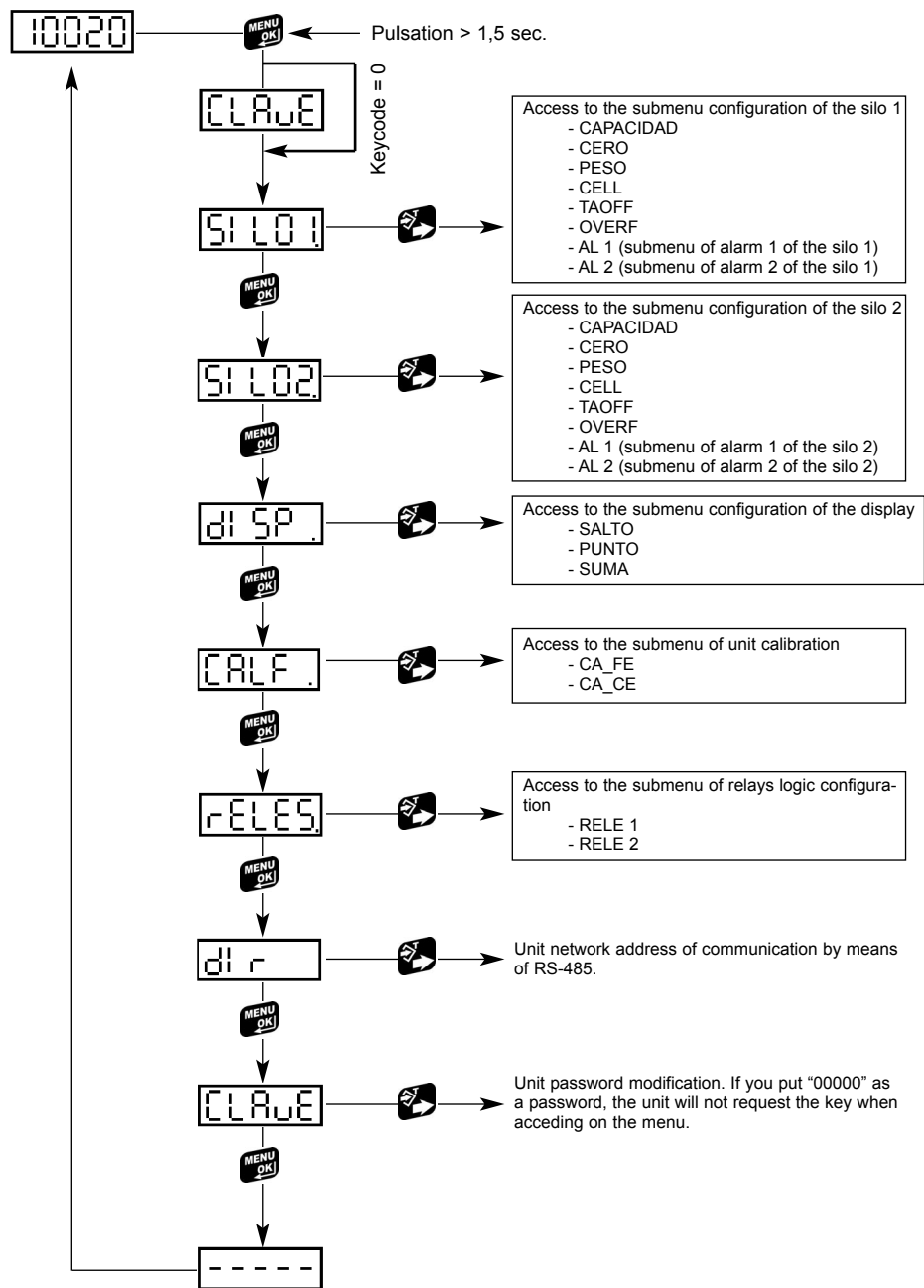


### 5.2.4. Converter calibration menu

These parameters are calibrated in the factory & it's written on the label.



## 5.2. Internal calibration menu



### 5.2.1. Silos Menu

This menu is the same for both silos.

