**ÉTUDES ET RÉALISATIONS**
**ÉLECTRONIQUES / INSTRUMENTATIONS / AUTOMATISME**

Route de Brindas - Parc d'activités Arbora N°2
69510 - Soucieu en Jarrest

**Tél. 04 72 31 31 30 - Fax 04 72 31 31 31**
Tel. Intern. 33 4 72 31 31 30 - Fax Intern. 33 4 72 31 31 31

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http://www.ardetem-sfere.com - email : info@sfere-net.com



# TWO-COLOUR DIGITAL PANEL METERS

Programmable, ±10000 points

# DGN175 U / T / M


***User manual***

*Valid for instruments with version 01.xx*

# SUMMARY

# 1. INTRODUCTION

The series **DGN175** offers a complete range of highly accurate programmable digital panel meters. Each appliance is equipped on front face with a two-colour 4 digits 14 mm high display, with a brightness which integrates perfectly in applications in industrial control rooms.
They allow the display, the control and the transmission of data from any measurable magnitudes.

• **The DGN175 U** **(process inputs)** includes as standard:

**A bidirectional DC current or voltage input:**
±20mA, ±100mV, ±1V, ±10V, ±150V, ±300V.

- Measurable scale overrange from -10% to +10%
- Scale factor programmable
- Enlarging effect
- Extraction of the square root
- Special linearisation in 20 points
- Supply for 2 or 3-wire sensor

• **The DGN175 T** **(temperature input)** includes as standard:

**A thermocouple input:**
**(J, K, B, R, S, T, E, N, L, W/G, W3/D, W5/C)**

**A sensor input: Pt 100 Ω, Ni 100 Ω**

- Wiring in 2, 3 or 4 wire.

**2-wire Δ Pt100 measurement**

• **The DGN175 M** **(universal input)** includes as standard:

**The inputs of the DGN175 U and T plus:**

**A resistive sensor input:** Calibers 0-400 Ω and 0-10 kΩ

**A potentiometer input:** from 100 Ω to 10 kΩ

**AVAILABLE OPTIONS:** ***(to be specified on the order)***

**Isolated analogue output: A**

Active current output: **A1**
Passive current output: **A2**
Voltage output: **A3**
Scale ratio programmable with enlarging effect.

**Relay outputs: R or R4**

2 or 4 relays: mode setpoint or window.
Recording of the alarms.
Time delay and hysteresis adjustable on each setpoint.
Alarm messages.

**Isolated digital output: N**

RS 485 2-wire, protocol MODBUS-JBUS.

**Logic input (signal 24 VDC): T**

2 isolated logic inputs à with programmable functions:
Display hold.
Moving of the decimal point.
Tare function.
Min. Max. zero reset.

**Bargraph (16 leds display): B**

Allow a quick evaluation of the measured value variations.
Scale factor programmable.

## Programming

- With the keyboard
- With the configuration software SlimSET

To communicate with the DGN175 you will need a connection cable C1-µUSB (USB type A male to µUSB type B male.
To connect this cable to the DGN175 insert the µUSB contact into the provided female connector (on the side of the appliance). Then connect the USB cable to a PC.
The software SlimSET allows the reading of the measures or the modification of the digital panel meter configuration.

Each configuration is kept as a file stored on disk.
These files can be consulted, modified, duplicated or loaded into the digtal panel meters.
The files can be created with or without having a digital panel meter connected.
All files can be edited on any type of printer.

## CODING:

Type: **DGN175 M A1R4N RG**

**Inputs:**
Process DGN175 U
Temperature DGN175 T
Universal DGN175 M

**Colour code:**
RG: Two-colour display Red/Green
RW: Two-colour display Red/White

**Options:**
A: Isolated analogue output
- A1 active current
- A2 passive current
- A3 voltage

R: 2 Relays
R4: 4 Relays
N: Digital RS485 isolated
T: 2 logic inputs (24VDC) isolated
B: 16 leds bargraph display

**The outputs can be combined except for the configuration: AR4NT**

## Features of the inputs

| DGN 175 U | DGN 175 T | DGN 175 M | Types of inputs | Measure range adjustable from: | | Permanent overload | Intrinsic error | Input impedance |
|---|---|---|---|---|---|---|---|---|
| ● | | ● | mA (1) | -22 to +22mA | | ±100mA | < ±0.05% of the MR | Drop 0.9V max. |
| ● | | ● | mV (1) | -110 to +110mV | | ±1V | | ≥ 1 MΩ |
| ● | | ● | V | -1.1 to +1.1 V | | ±50V | | |
| ● | | ● | | -11 to +11V | | | | |
| ● | | ● | | -165 to +165 V | | ±300V | | |
| ● | | ● | | -300 to +300V | | | | |
| | ● | ● | Thermocouples (1) Standard IEC 581<br>J<br>K<br>B<br>R<br>S<br>T<br>E<br>N<br>L<br>W or G<br>W3 or D<br>W5 or C | °C<br>-160/1200<br>-270/1370<br>200/1820<br>-50/1770<br>-50/1770<br>-270/410<br>-120/1000<br>0/1300<br>-150/910<br>1000/230<br>0<br>0/2480<br>0/2300 | °F<br>-256/2192<br>-454/2498<br>392/3308<br>-58/3218<br>-58/3218<br>-454/770<br>-184/1832<br>-32/2372<br>-238/1670<br>1832/4172<br>32/4496<br>32/4172 | - | <±0.1% (3) of the MR, or 30µV typical (60µV max.) | ≥ 1 MΩ |
| | ● | ● | Pt100Ω sensor (1) (2) Standard IEC 751 (DIN 43760) | °C<br>-200/850 | °F<br>-328/1562 | - | <±0.1% of the MR | Current 250µA |
| | ● | ● | Ni 100 sensor (1) (2) | -60/260 | -76/500 | - | | |
| | ● | ● | Differential measures from 2 sensors Pt100Ω 2-wire Standard IEC 751 (1) | -200/270 | -328/518 | - | | |
| | | ● | Resistive sensors | Calibers 0-400 Ω and 0-10 kΩ ♣ | | | <±0.1% of the MR | Max. current 250µA |
| | | ● | Potentiometer | from 100Ω to 10 kΩ ♣ | | | | Max. voltage 100mV |
| ● | | ● | Supply for 2 or 3-wire sensor | 24 VDC ±15% with protection from short-circuits. 25 mA max. | | | | |
| ● | | ● | Special linearisation up to 20 points | On inputs: mV, V, mA. resistive sensors and potentiometer | | | | |
| ● | | ● | Extraction of the square root | On mV, V or mA inputs | | | | |

(1) Sensor break detection
mA input (if down scale ≥ 3,5 mA
Other inputs: a 12 µA pulsed current allows the detection of line or sensor break.

(2) Wiring in 2, 3 or 4 wire possible.
The influence of the line resistance (0<Rl<25Ω) is included in the announced intrinsic error (wiring in 3 or 4 wire).

(3) Efficiency of the CJC (-20°C to 60°C)
Internal CJC: ± 1°C ± 0.03°C/°C

MR: Measure Range

## Features of the outputs

| Types of OUTPUTS | | Features |
|---|---|---|
| Isolated analogue output | Current | Current: Direct or reversed 0-20mA<br>Load impedance ≤ Rc 600Ω |
| | Votage | Voltage: Direct or reversed 0-10V<br>ILoad impedance ≥ Rc 5kΩ |
| 2 or 4 change-over relays | | 2 setpoint per relay, configurable on the whole MR.<br>Hysteresis programmable<br>Time delay programmable from 0 to 999.9 sec.<br>8A/250 VAC on resistive load |
| Isolated digital comms RS485 | | Protocol MODBUS/JBUS (EIA RS485) |

## General features

***Galvanic isolation:***

3 kV-50 Hz - 1 min between supply, inputs, analogue output, relay outputs, RS485 output and logic input. 1.5 Kv between analogue output and RS485.

***Power supply:***

| Max. operating range | Consumption |
|---|---|
| 20 to 250 $V_{AC}$ - 50/60Hz and<br>20 to 250 $V_{DC}$ | 3 W max.<br>6 VA max. |

***Average response time:*** 150 ms (for a variation of the input signal from 10 to 90 %).

***Measure:***

- Standard sampling time: 100 ms
- Common mode rejection rate: 130 dB
- Serial mode rejection rate: 50 dB 50/60 Hz
- Zero drift compensation

***Use:***

- Operating temperature: -20 to 60°C
- Storage temperature: -20 to 70°C
- Use in pollution degree 2 and voltage surge category II or better.
- Max. altitude: 2000m.

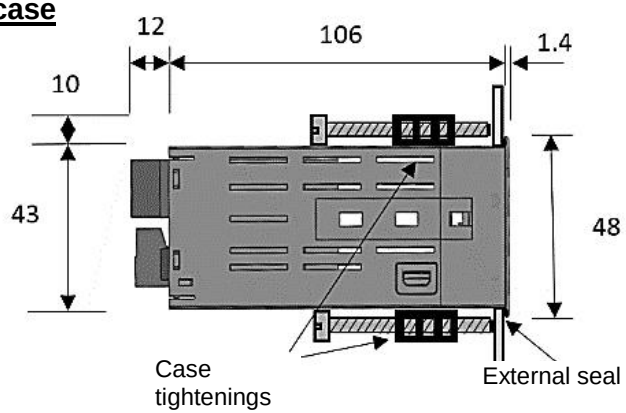
***Compliance with standards:***

- Directive LV 2014/35/UE……EN 61010-1
- Directive EMC 2014/30/UE……EN 61326-1
- Directive ROHS 2011/65/UE

# 2. DIMENSIONS

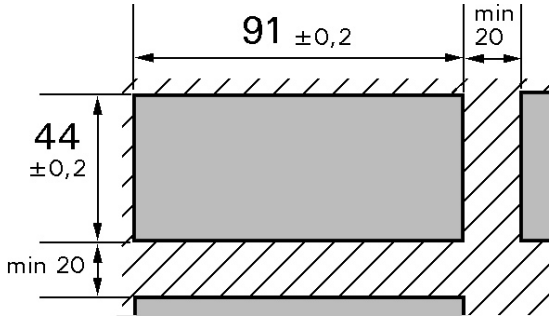
## Dimensions of the case

96 x 48 x 119.4 mm
(with terminals)




## Mounting on panel

Cut out 43 x 91.2 mm



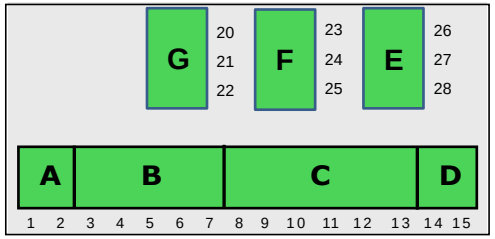

**Protection**:
Front face : IP 65
Case: IP20
Terminals: IP 20

**Housing**:
Self-extinguishing case of black UL 94 V0 ABS.
PC UL94 V0 front face.
Mounting on panel with tightening by 4 screw pads.

**Connectors** removable terminal blocks on rear face for screwed connections (2.5mm², flexible or rigid)

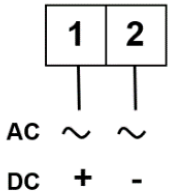
**Display**: ±10 000 points (14 mm)
Electroluminescent red and green (or red and white)
Alarm leds + 2 leds with programmable functions

# 3. CONNECTINGS

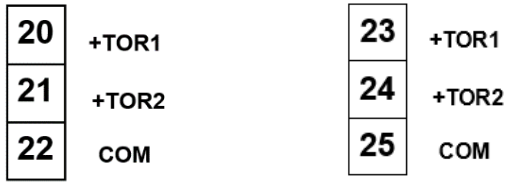



**Location of the terminals**
(view of case rear side)

## SUPPLY A

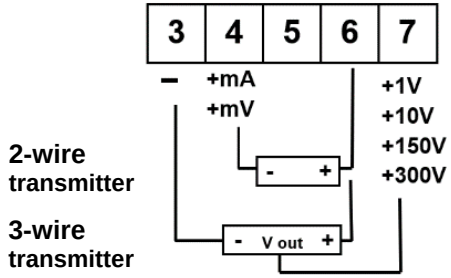



## LOGIC INPUTS G or LOGIC INPUTS F

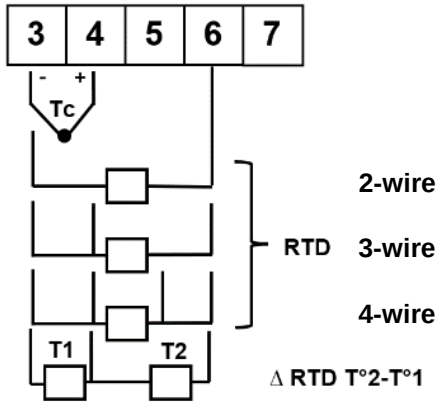



# INPUTS B

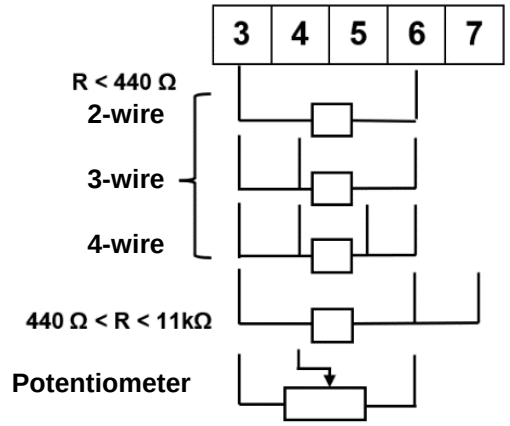
## PROCESS




## TEMPERATURE

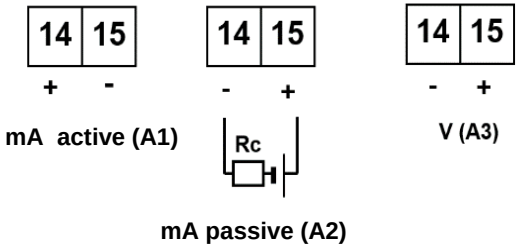



## RESISTANCE AND POTENTIOMETER

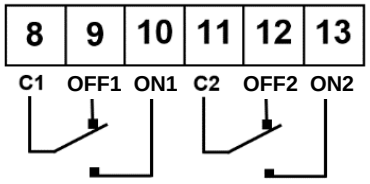



# OUTPUTS

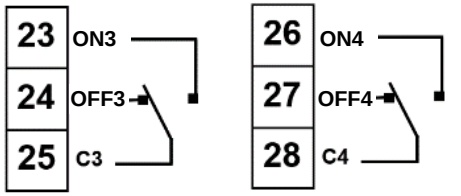
## ANALOGUE OUTPUT D



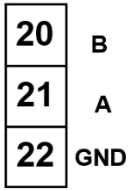

## RELAYS 1 AND 2 C




## RELAYS 3 AND 4 F E



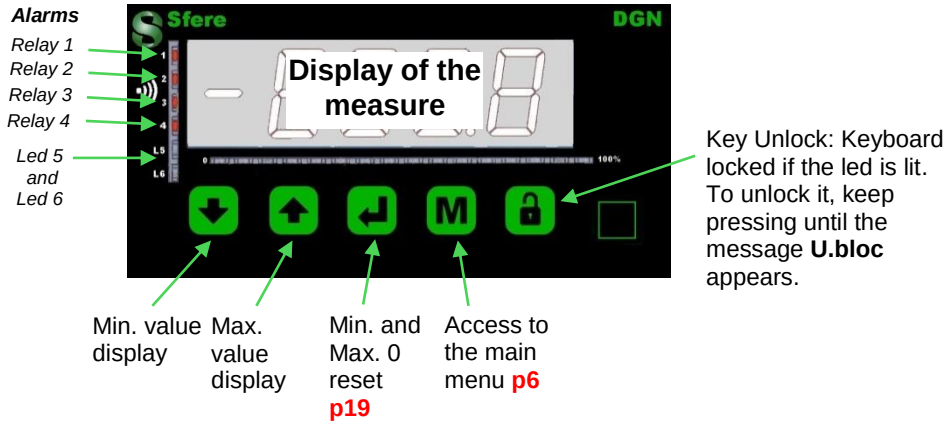

## RS485 G



# 4. PROGRAMMING

## 4.1 Communication with the instrument

**Several functions can be accessed from the measure display**:




**More functions can be accessed by pressing several keys simultaneously:**

- ↑ + ↓ : *Direct access to the menu Adjust.*
- ↵ + M : *0 reset of the alarm recordings.*
- ↓ + M : *Visualisation of the direct measure.*
- ↑ + M : *Direct access to the menu setting of the alarm setpoints*
- ↓ + ↵ : *Direct access to the menu TARE.*

**Reading convention:**

——— Move through the main menu

·····➤ Back to the previous menu

⇕ Alternating information display

**The display blinks when a choice is possible, or during the setting of a value.**

## 4.2 Orientation through the programming

The dialogue is ensured by 4 keys located on the front face.

↓ ↑ ↵ M

Exit from a submenu to access the next menu / access to the programming exit menu. (M)

Move through the menus: downwards move, or decrease the value shown. (↓)

Move through the menus: upwards move, or increase the value shown. (↑)

Validation of the displayed parameter, or access to a submenu (↵)

Note: In mode programming, the instrument will automatically revert to the measure with the previous configuration, if no key is pressed during 1 min.

**Entering of a parameter:**

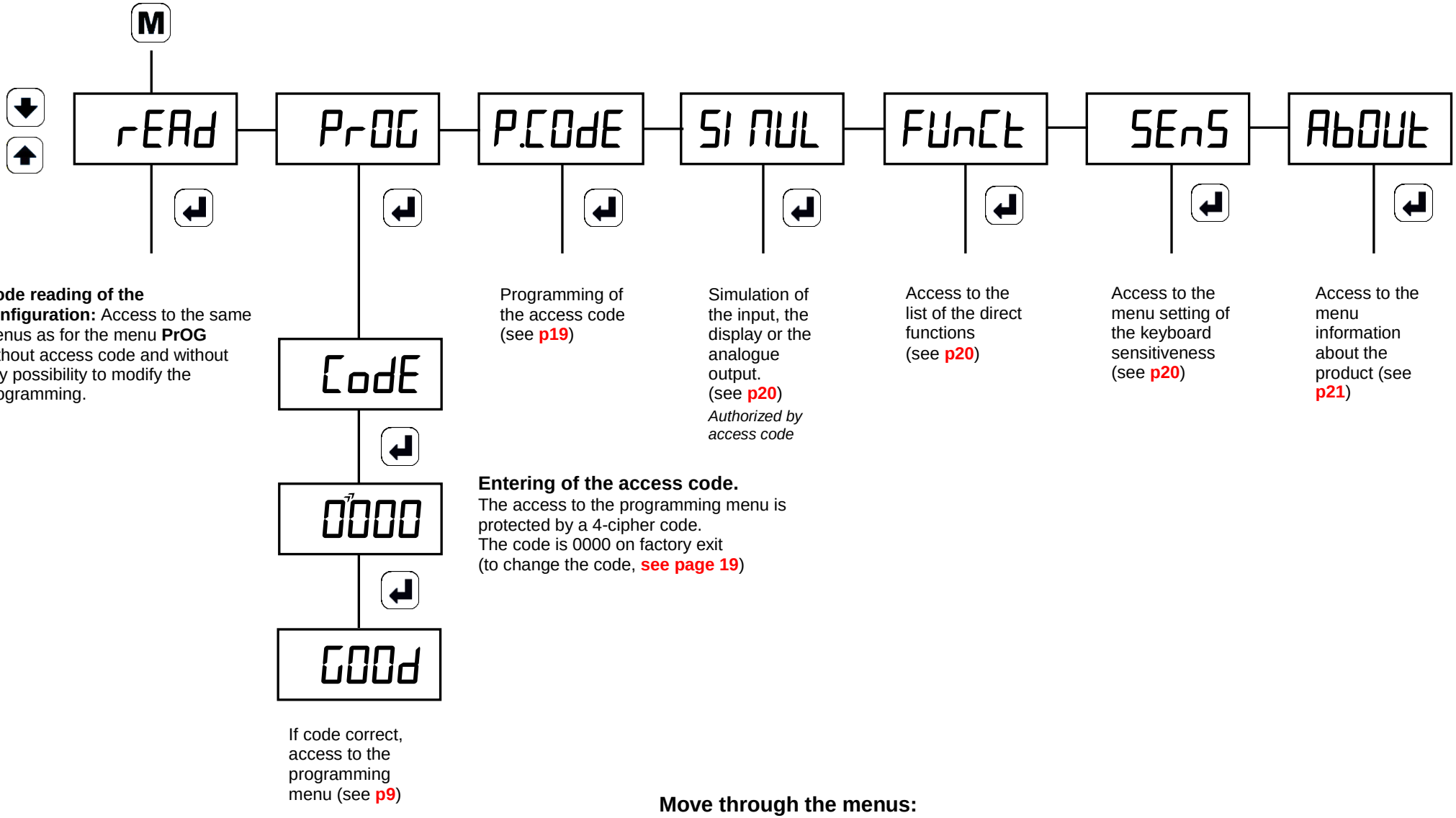
| | |
|---|---|
| 6888 | First start by increasing or decreasing the 1st digit and the sign: from -9 to +9. (↑ and ↓) |
| 6588 | The 2nd from 0 to 9 |
| 6528 | The 3rd from 0 to 9 |
| 6520 | The 4th from 0 to 9 |

Between each entering, validate the cipher by pressing ↵

- For a signed value the entering begins with the choice of the sign (- or 0 = +).

- For a value with decimals, the entering ends by the choice of the position of the decimal point, which can be moved by ↑ ↓ .

## 4.3 Main menu




**Mode reading of the configuration:** Access to the same menus as for the menu **PrOG** without access code and without any possibility to modify the programming.

Programming of the access code (see **p19**)

Simulation of the input, the display or the analogue output. (see **p20**)
*Authorized by access code*

Access to the list of the direct functions (see **p20**)

Access to the menu setting of the keyboard sensitiveness (see **p20**)

Access to the menu information about the product (see **p21**)

**Entering of the access code.**
The access to the programming menu is protected by a 4-cipher code.
The code is 0000 on factory exit
(to change the code, **see page 19**)

If code correct, access to the programming menu (see **p9**)

**Move through the menus:**

- Scrolling of the menus
- Upwards move / Increase
- Downwards move / Decrease
- Vertical move / Validation
- Menu exit / access

## 4.4 Programming menu *(depending on options)*

| | | |
|---|---|---|
| InPut | Access to the programming of the input | p9 |
| diSPL. | Access to the programming of the display factor | p11 |
| CF.AdU | Access to the programming of the advanced functions | p12 |
| AnA | Access to the programming of the analogue output *(option analogue output)* | p13 |
| rELAY | Access to the programming of the relays *(option relay outputs)* | p14 |
| JbuS | Access to the communication parameters *(option digital output)* | p16 |
| tOr | Access to the programming of the logic inputs | p16 |
| SECU. | Access to the programming of the analogue and relay outputs in case of self-diagnosis error and/or sensor break, and access to disabling the sensor break detection *(option analogue output and/or relay outputs)* | p17 |
| Pr.di S | Access to the programming of the display: Leds, brightness, colour of the digits… | p18 |
| SAVE | Access to the menu exit from the programming with or without saving the configuration | p19 |

**Note:**

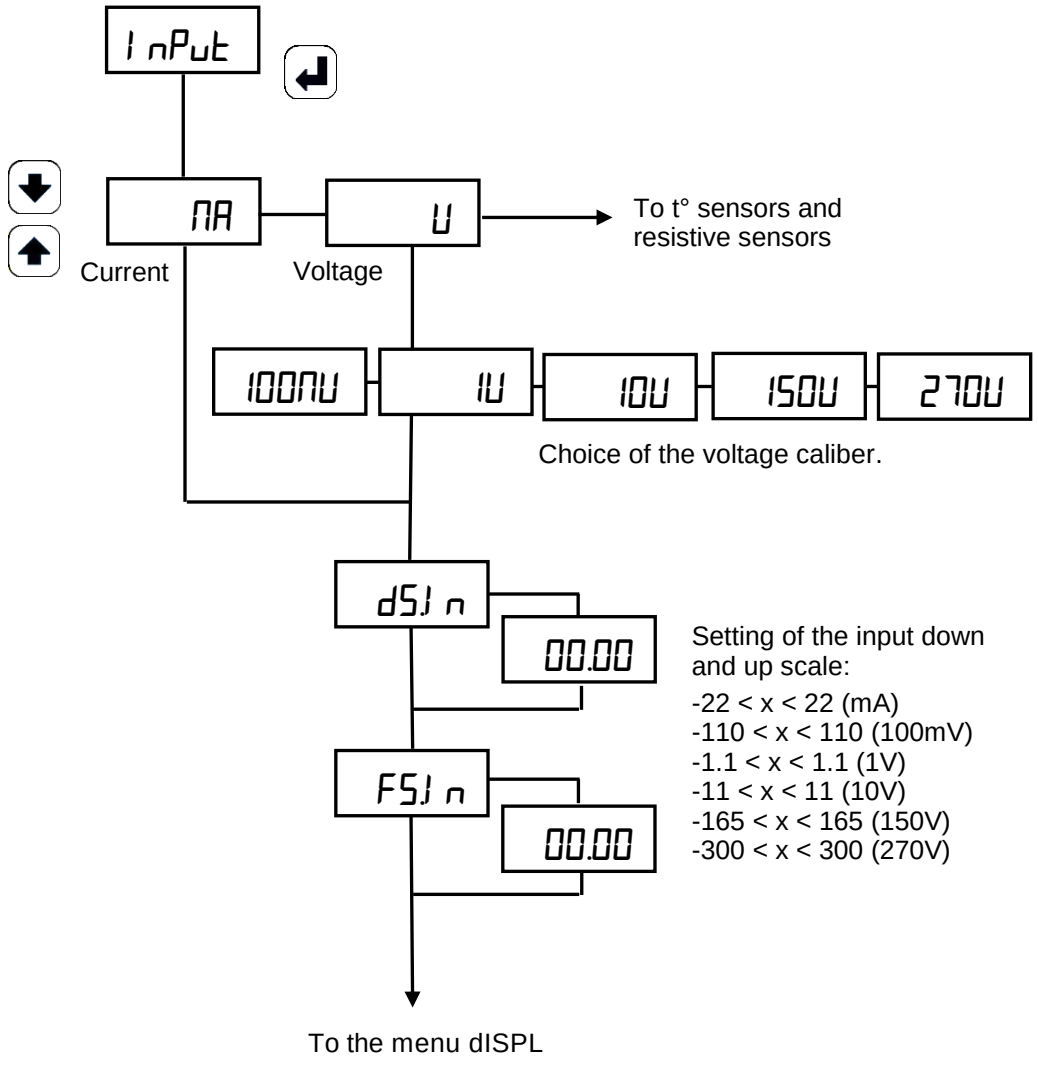
⇒ Press **M** to come back to the menu [SAVE]

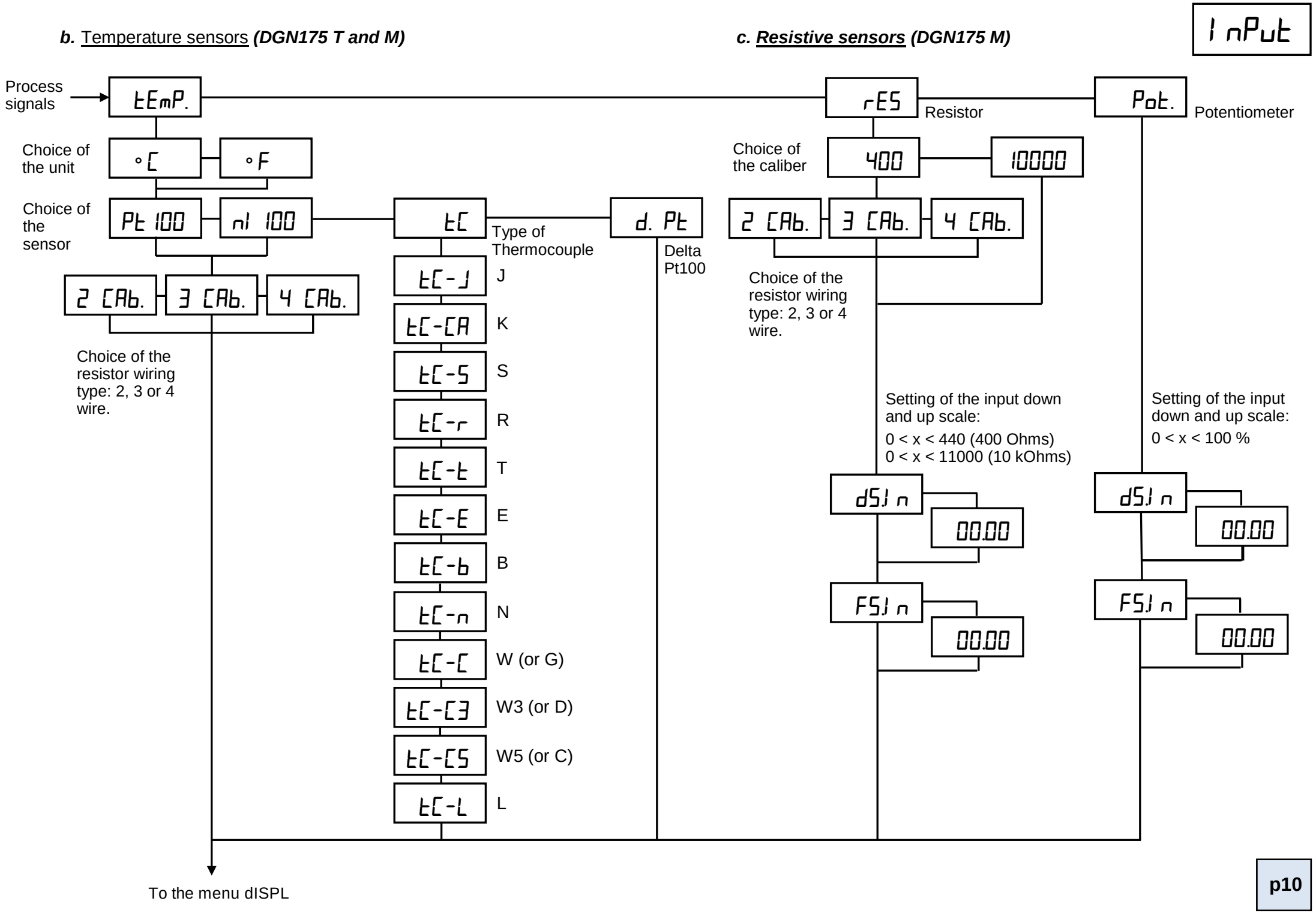
⇒ In mode programming, the instrument will automatically come back to the measure with the previous configuration if no key is pressed during 1min.

### 4.4.1 Programming of the input

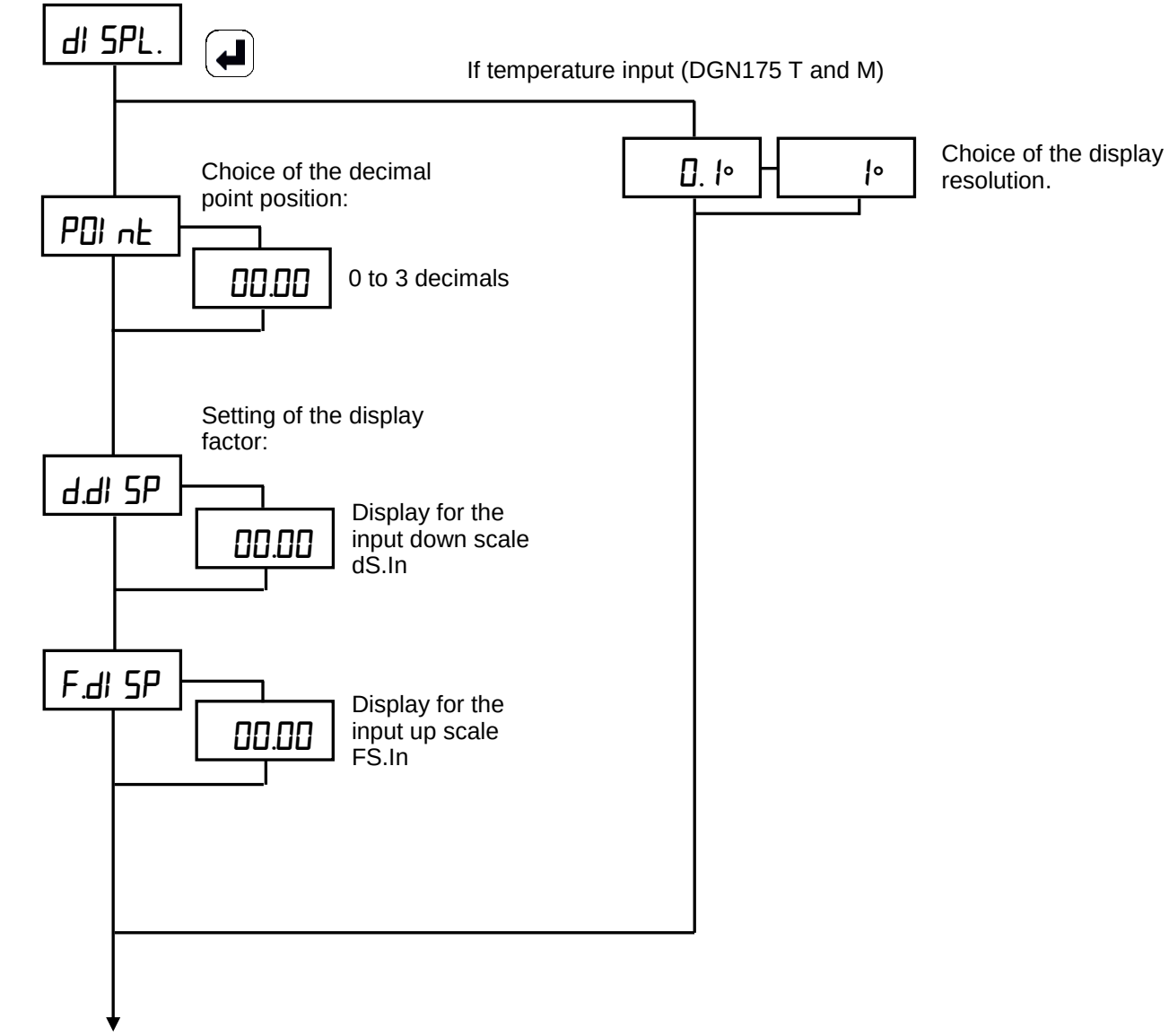
InPut

***a. Process signals*** ***(DGN175 U and M)***



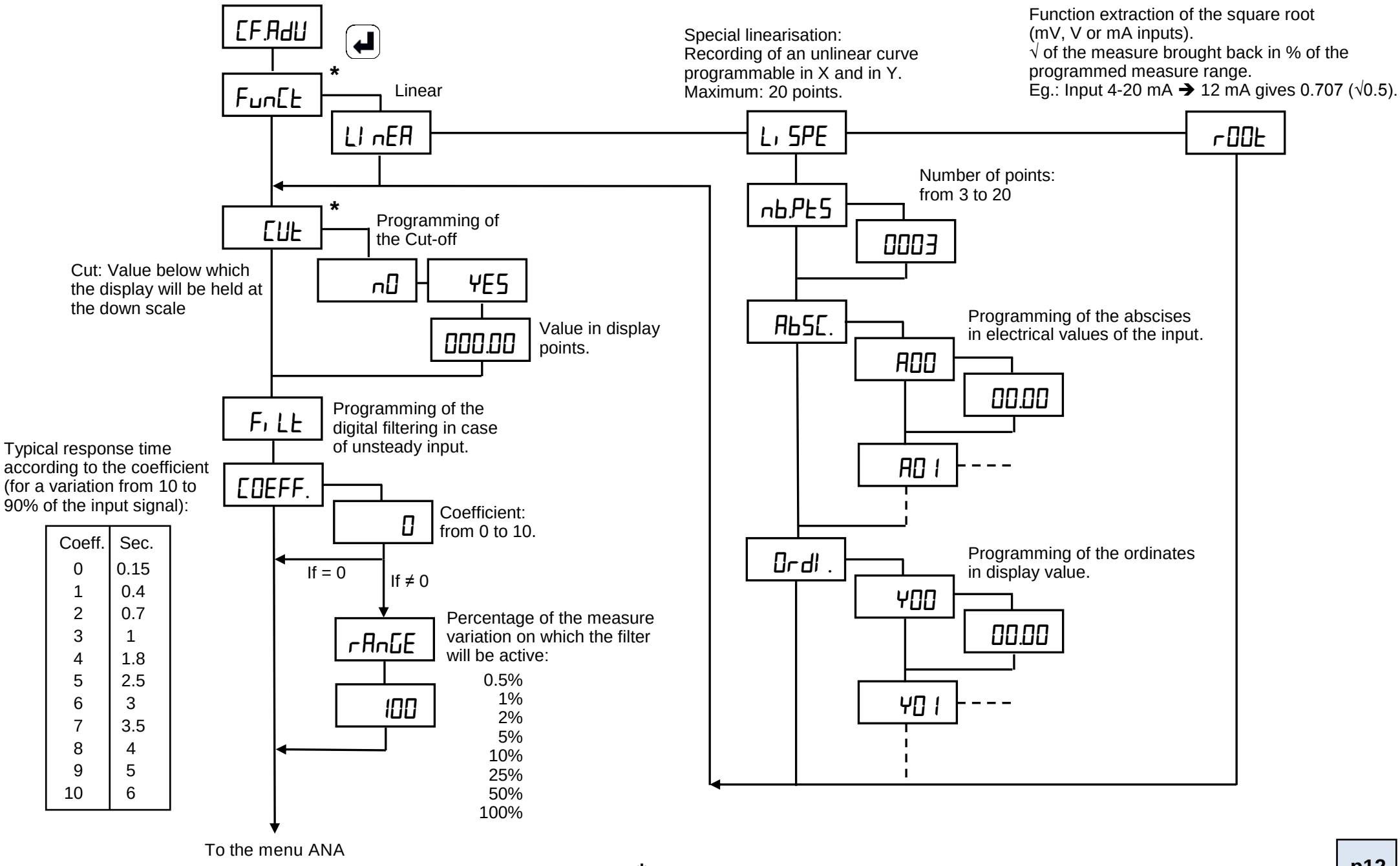

InPut
b. Temperature sensors (DGN175 T and M)
c. Resistive sensors (DGN175 M)
Process signals
tEmP.
rES
Resistor
Pot.
Potentiometer
Choice of the unit
°C
°F
Choice of the caliber
400
10000
Choice of the sensor
Pt 100
ni 100
tC
Type of Thermocouple
d. Pt
Delta Pt100
2 CAb.
3 CAb.
4 CAb.
Choice of the resistor wiring type: 2, 3 or 4 wire.
tC-J
J
tC-CA
K
tC-S
S
tC-r
R
tC-t
T
tC-E
E
tC-b
B
tC-n
N
tC-C
W (or G)
tC-C3
W3 (or D)
tC-C5
W5 (or C)
tC-L
L
Setting of the input down and up scale:
0 < x < 440 (400 Ohms)
0 < x < 11000 (10 kOhms)
Setting of the input down and up scale:
0 < x < 100 %
dSIn
00.00
FSIn
00.00
To the menu dISPL
p10

## 4.4.2 Programming of the display factor



## 4.4.3 Programming of the advanced functions

CF.AdU

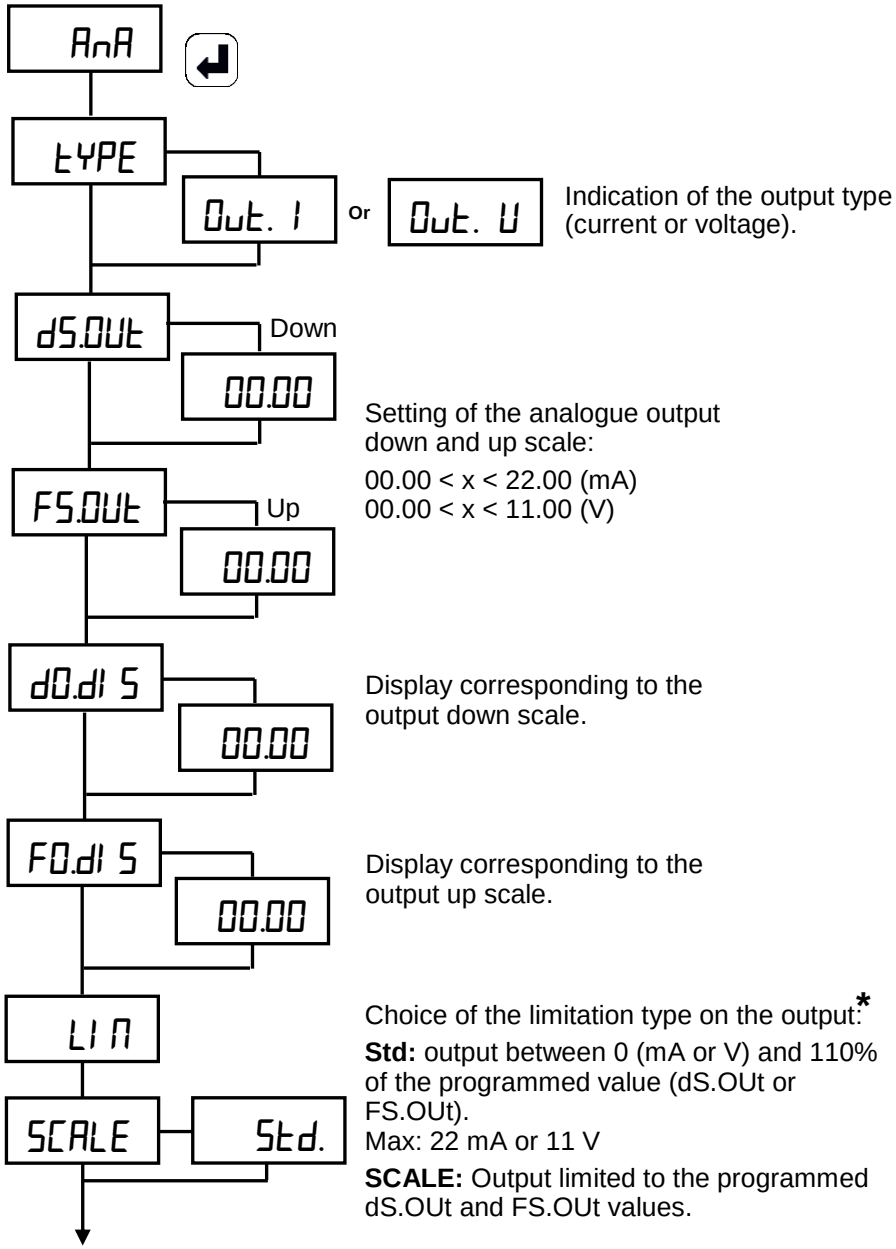



| Coeff. | Sec. |
|---|---|
| 0 | 0.15 |
| 1 | 0.4 |
| 2 | 0.7 |
| 3 | 1 |
| 4 | 1.8 |
| 5 | 2.5 |
| 6 | 3 |
| 7 | 3.5 |
| 8 | 4 |
| 9 | 5 |
| 10 | 6 |

***** If input other than Temperature

## 4.4.4 Programming of the analogue output (if option)

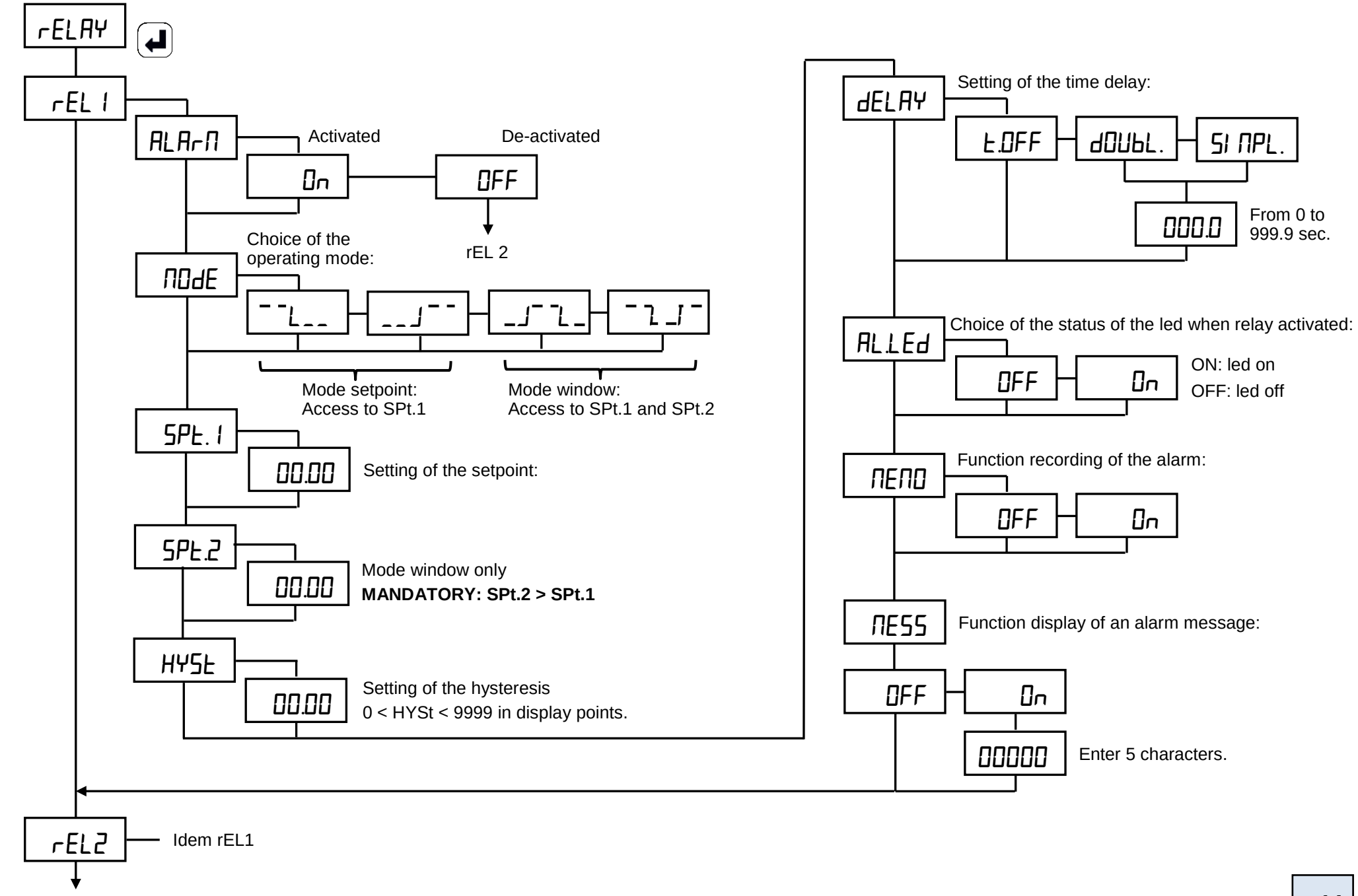
AnA



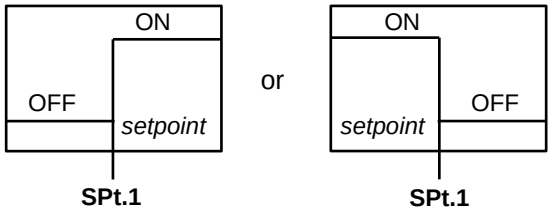

To the menu RELAY.

* The return values (for sensor break or error self-diagnosis) will not take the limitation of the output into account.

## 4.4.5 Programming of the relay outputs (if option)

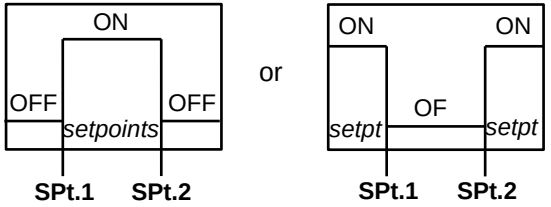


## Mode setpoint




ON: coil supplied
OFF: coil not supplied

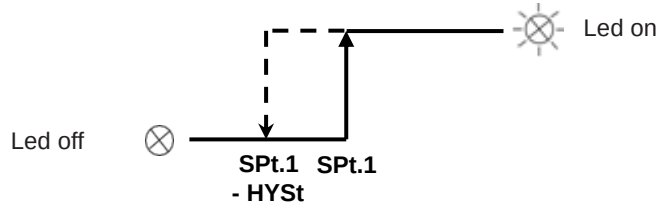
## Mode window



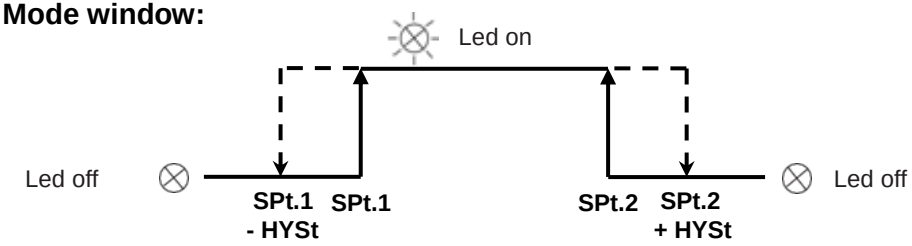

## Setting of the hysteresis HYSt

The hysteresis is activated on switching from led on to led off, that is to say on switching off alarm, since the led represents the alarm status.

**Mode setpoint**




**Mode window:**




## Time delay on the alarm dELAY

Setting of the time lapse from 0 to 999.9 sec.
dOUbL: time delay on the alarm triggering and switch off
SIMPL: time delay on the alarm triggering only

## Choice of the led status ALLEd

Choice of the status of the LED associated with the relay when the relay coil is supplied.

## Recording of the alarm MEMO

Allows recording the alarm after a setpoint has been passed. When the measure comes back below the alarm setpoint, the relay remains on and the led blinks to warn the user that the setpoint has been passed (for the reset to 0 of the alarm recordings see the menu CLr.AL in the direct functions).

Note: An exit from the mode programming with saving of the configuration will reset the alarm recordings to 0.

## Display of alarm messages MESS

A programmed alarm message can be made to appear alternating with the measure.
The message will appear only during the alarm, that is to say while the associated led is on.

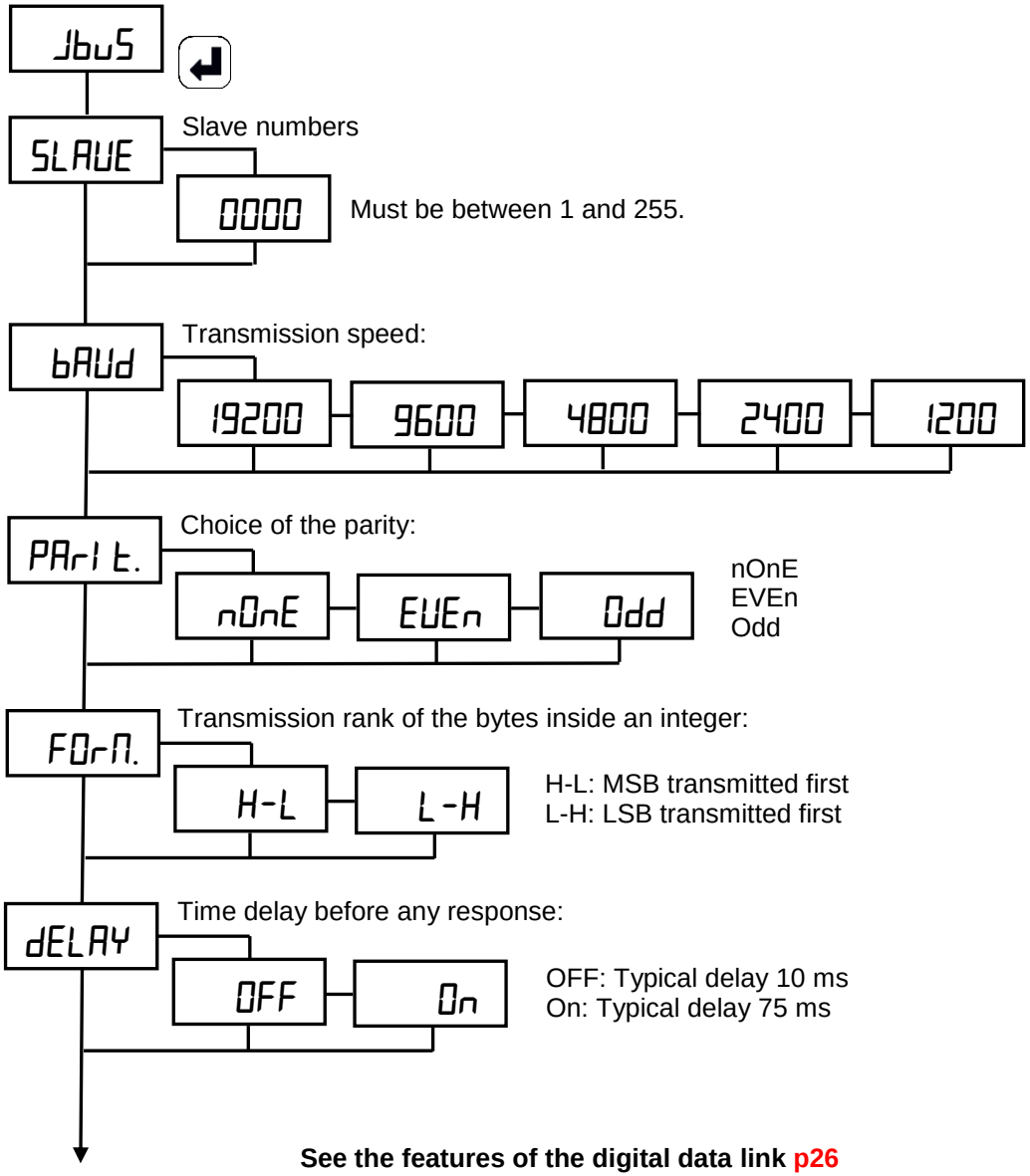
## Setting of the alarm setpoints

There are 2 ways to adjust setpoints:
- Either in mode programming entering the correct access code.
- Or by pressing simultaneously ▼ and ↵ if the access to a quick programming has been authorized on the programming of the code (**see p19**)

## 4.4.6 Programming of the RS485 output (option)

JbuS

Communication parameters



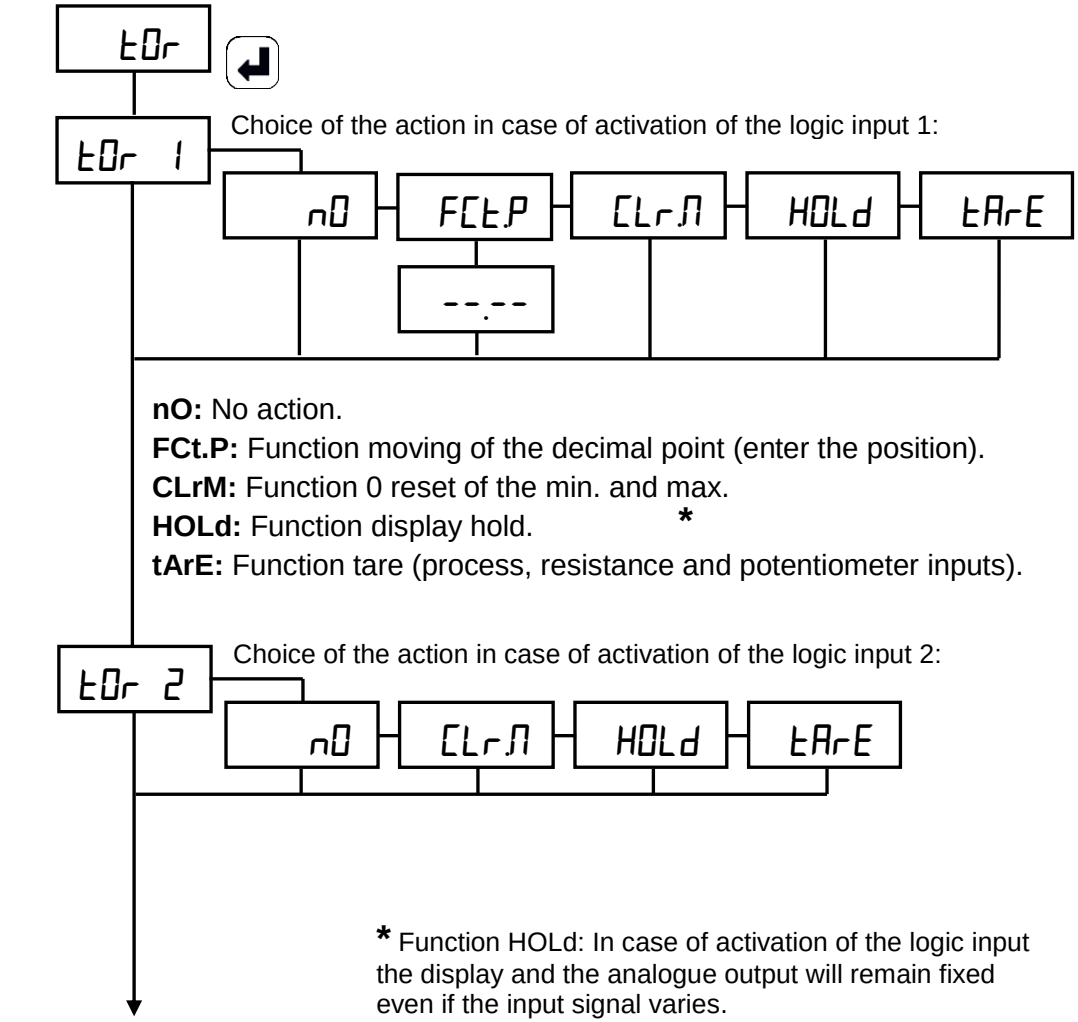

**See the features of the digital data link p26**

See the menus tOr or SECU

## 4.4.7 Programming of the logic inputs (option TOR)

tOr

Input signal 24 VDC




**nO:** No action.
**FCt.P:** Function moving of the decimal point (enter the position).
**CLrM:** Function 0 reset of the min. and max.
**HOLd:** Function display hold. *
**tArE:** Function tare (process, resistance and potentiometer inputs).

To the menu SECU

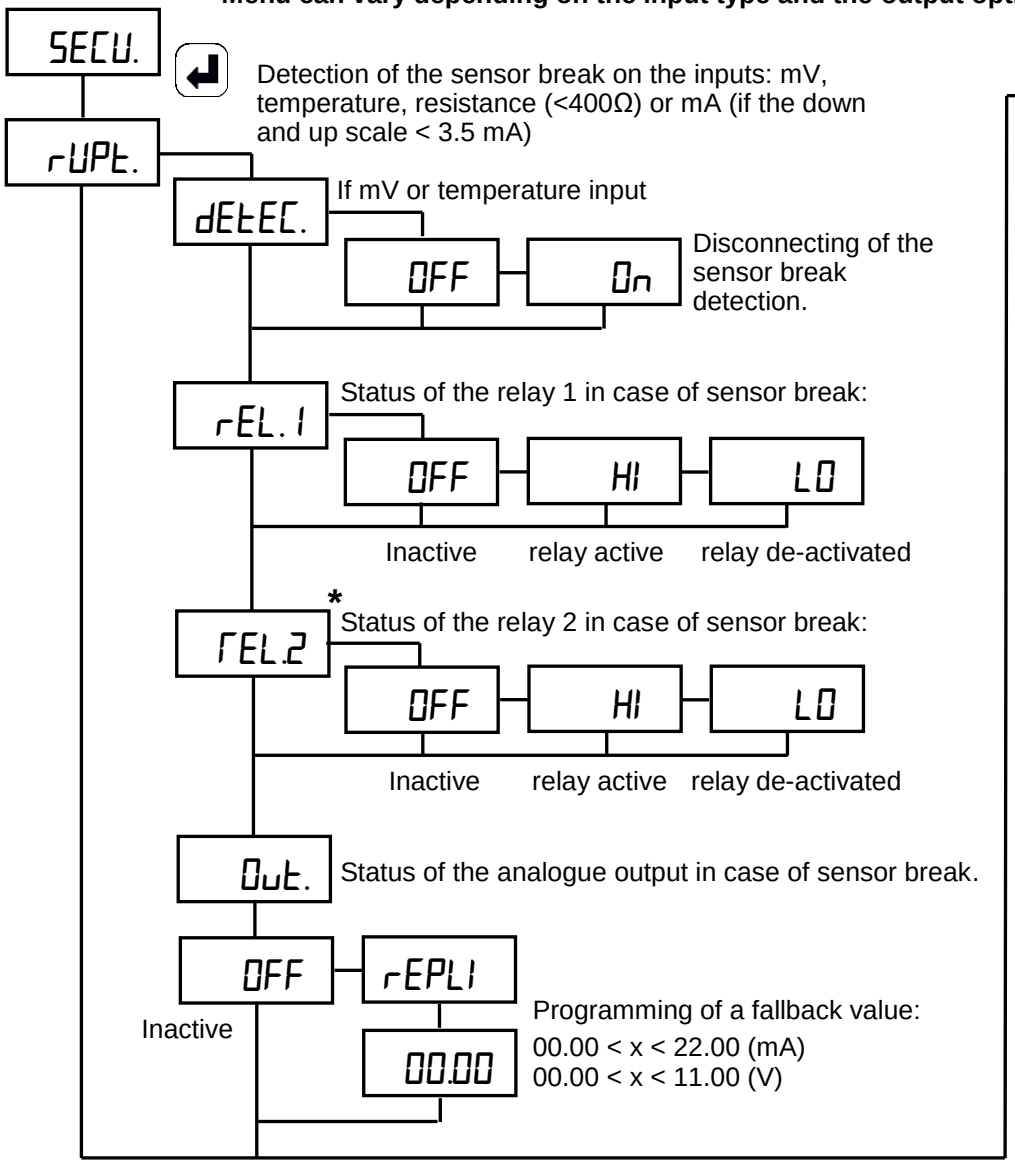
* Function HOLd: In case of activation of the logic input the display and the analogue output will remain fixed even if the input signal varies.
The relays will carry on reacting to the input signal.

## 4.4.8 **Safeties**

Menu programming of the safety functions: Sensor break / self-diagnosis

SECU.

**Menu can vary depending on the input type and the output options**




Detection of the sensor break on the inputs: mV, temperature, resistance (<400Ω) or mA (if the down and up scale < 3.5 mA)

If mV or temperature input

Disconnecting of the sensor break detection.

Status of the relay 1 in case of sensor break:

Inactive relay active relay de-activated

* Status of the relay 2 in case of sensor break:

Inactive relay active relay de-activated

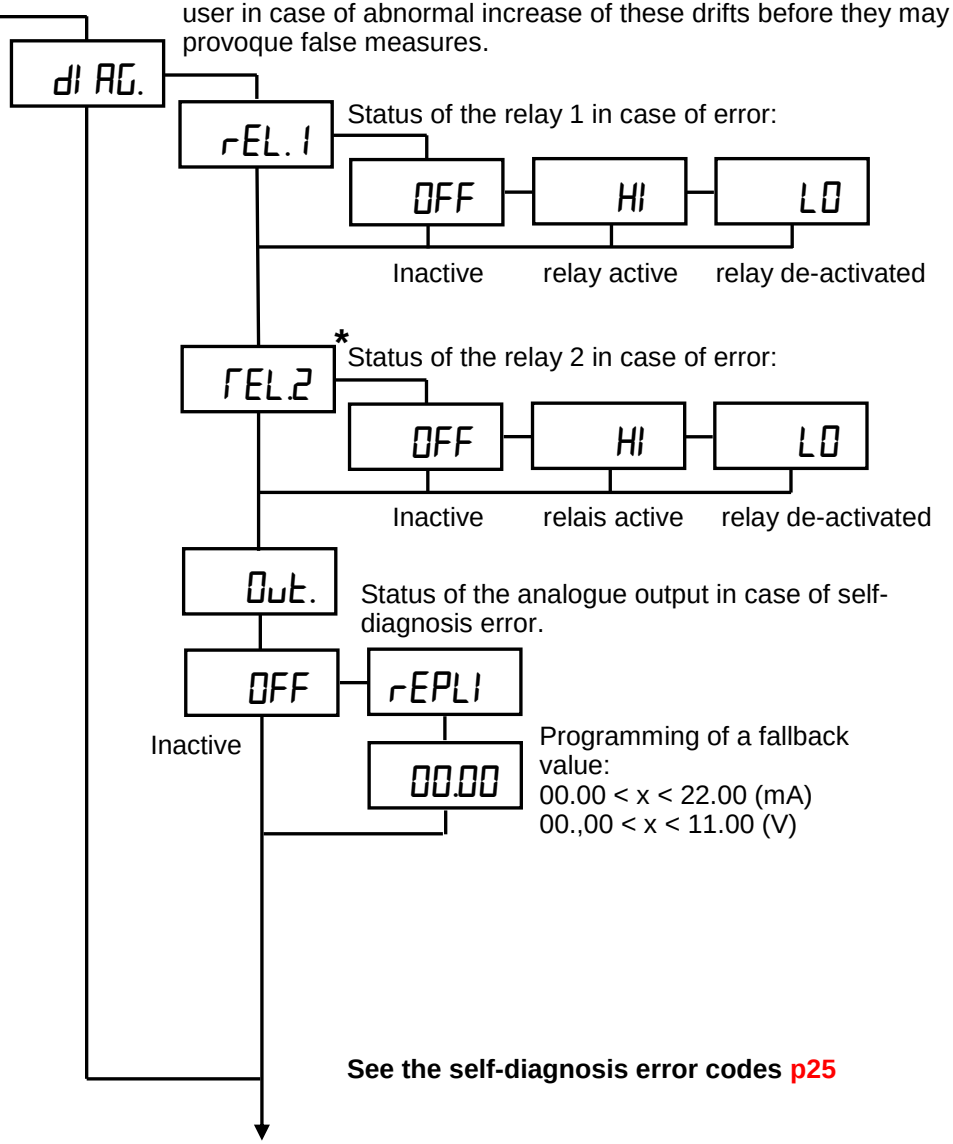
Status of the analogue output in case of sensor break.

Inactive

Programming of a fallback value:
00.00 < x < 22.00 (mA)
00.00 < x < 11.00 (V)

**dEtEC.:** In mV or temperature input, the sensor break detection can be disabled in order not to disturb some calibrators swhich may be sensitive to the sensor break detection current.

**Self-diagnosis:** The digital panel meter permanently watches its components for any drifts. The self-diagnosis serves to warn the user in case of abnormal increase of these drifts before they may provoque false measures.




Status of the relay 1 in case of error:

Inactive relay active relay de-activated

* Status of the relay 2 in case of error:

Inactive relais active relay de-activated

Status of the analogue output in case of self-diagnosis error.

Inactive

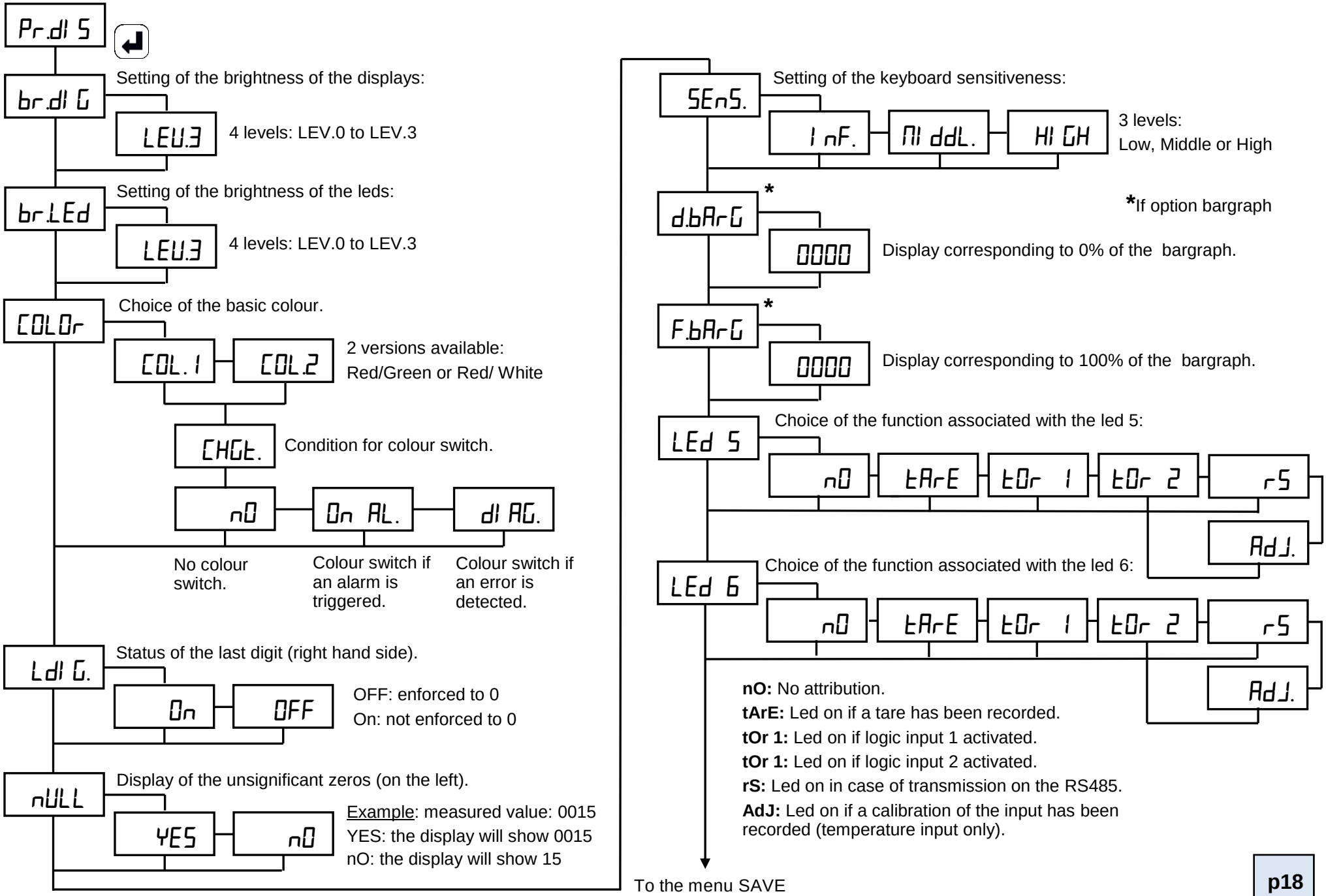
Programming of a fallback value:
00.00 < x < 22.00 (mA)
00.,00 < x < 11.00 (V)

**See the self-diagnosis error codes p25**

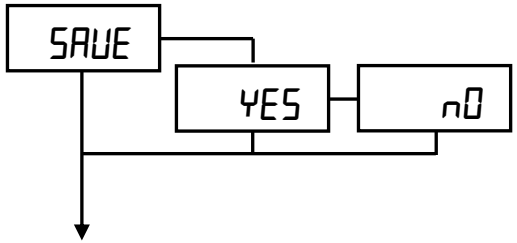
To the menu Pr.DIS

* Idem for the relays 3 and 4 (if option 4 relays)

## 4.4.9 Programming of the leds, the brightness and the colour of the displays



### 4.4.10 Exit from the programming with or without saving




Back to the measure display.

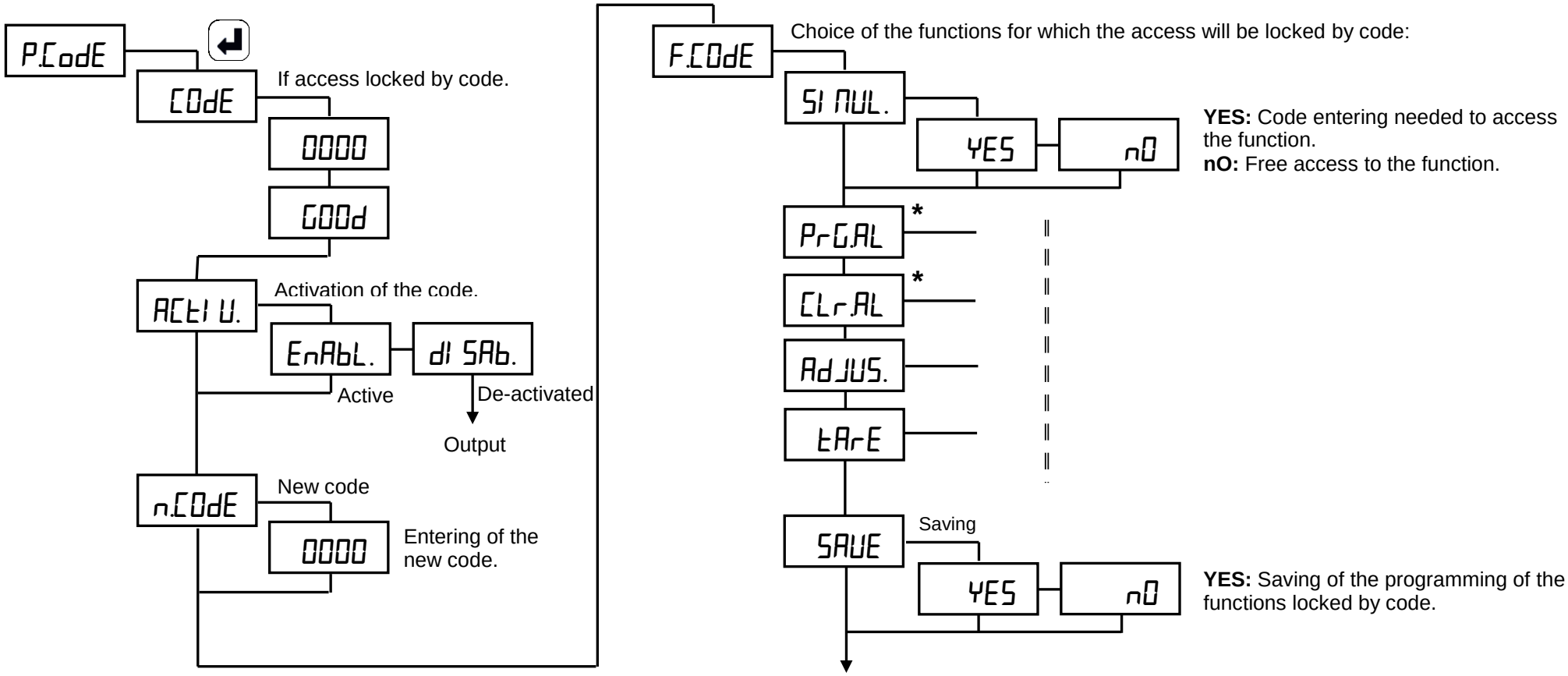
**YES:** Exit and save the configuration

**nO:** Exit without saving the configuration

Note: An exit with saving of the configuration will automatically reset to 0 the la tare, the min. and the max. as well as the alarm recordings.



## 4.5 Menu programming of the code

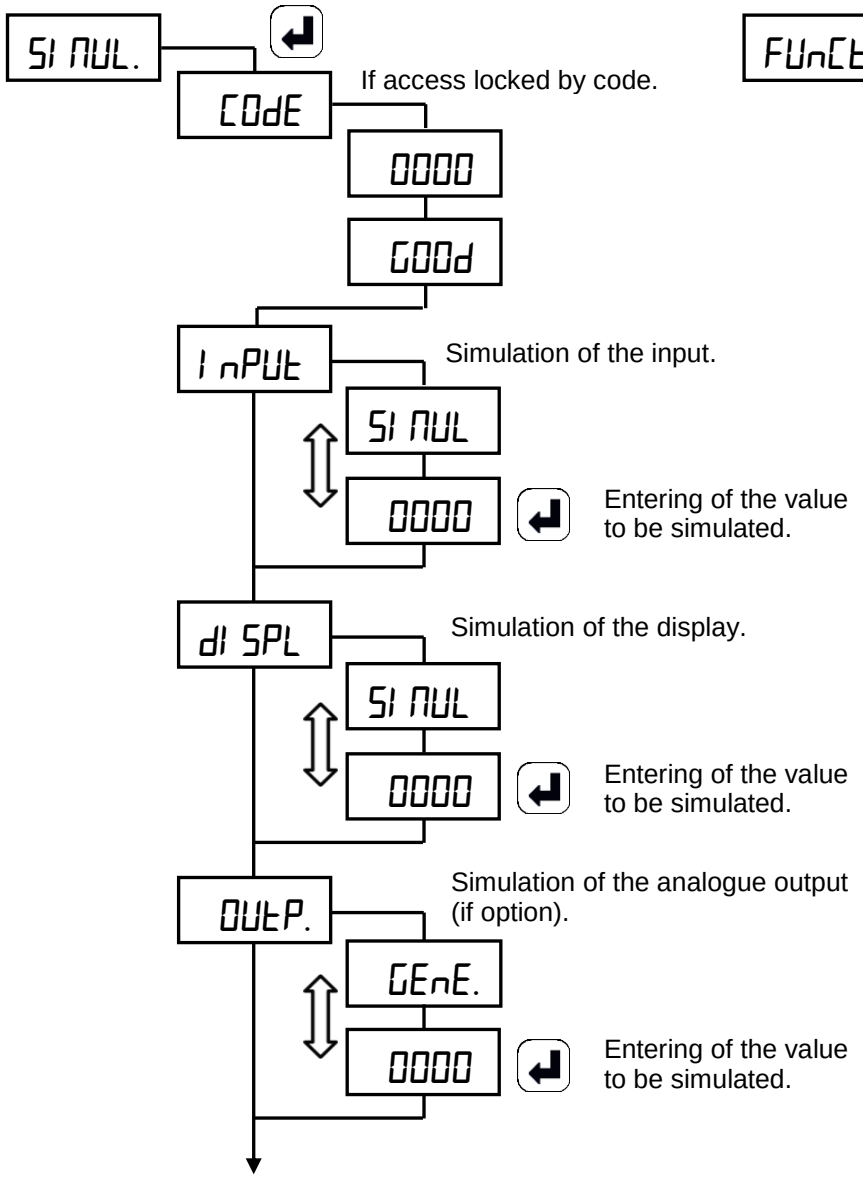



* If option Relays

## 4.6 Menu Simulation

SI MUL.

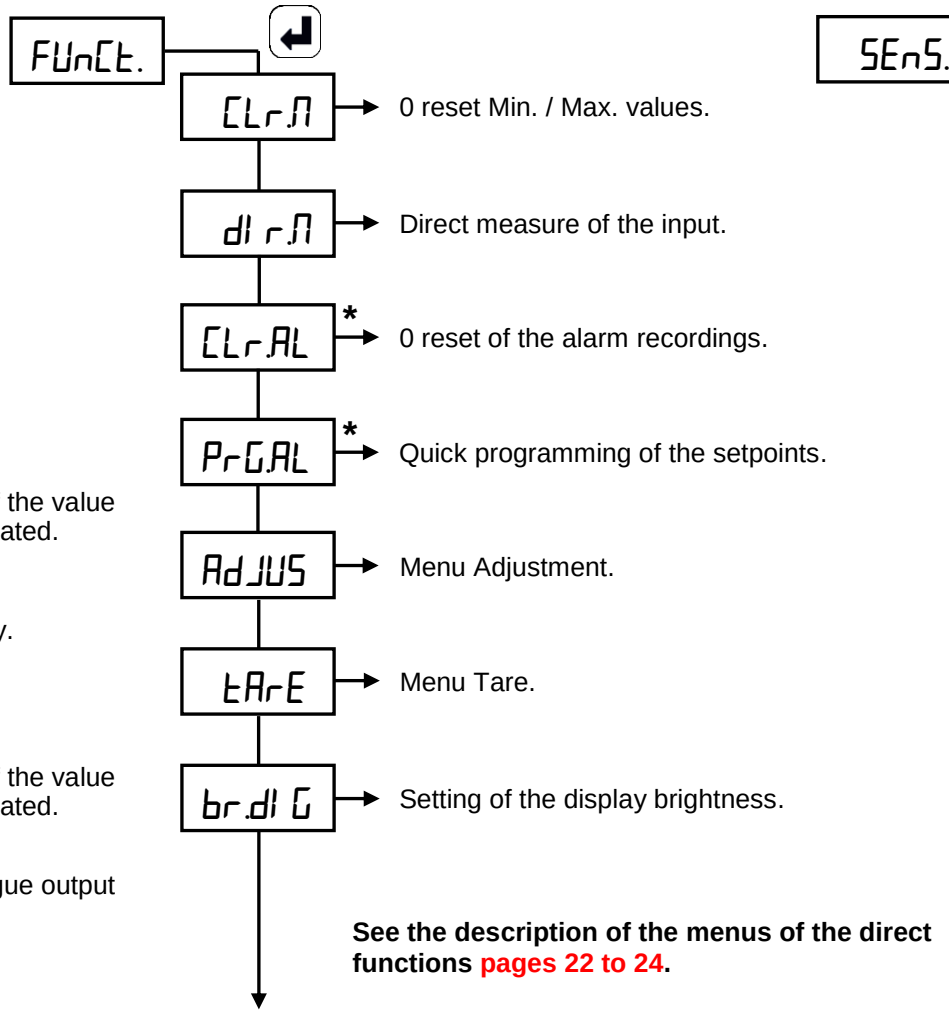
Simulation of the input, the display or the analogue output (if option).




## 4.7 Menu Direct functions

FUnCt.

Access to the direct functions



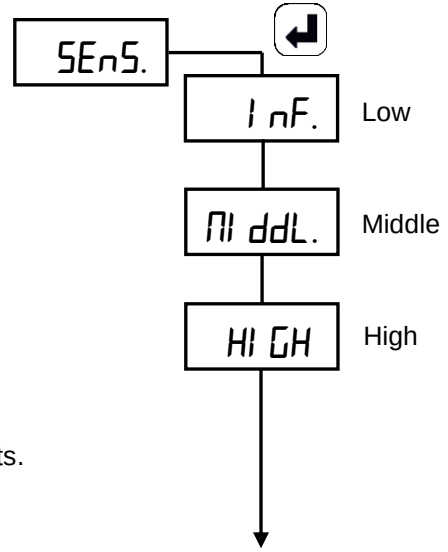

**See the description of the menus of the direct functions pages 22 to 24.**

* If option Relays

## 4.8 Menu Sensitiveness

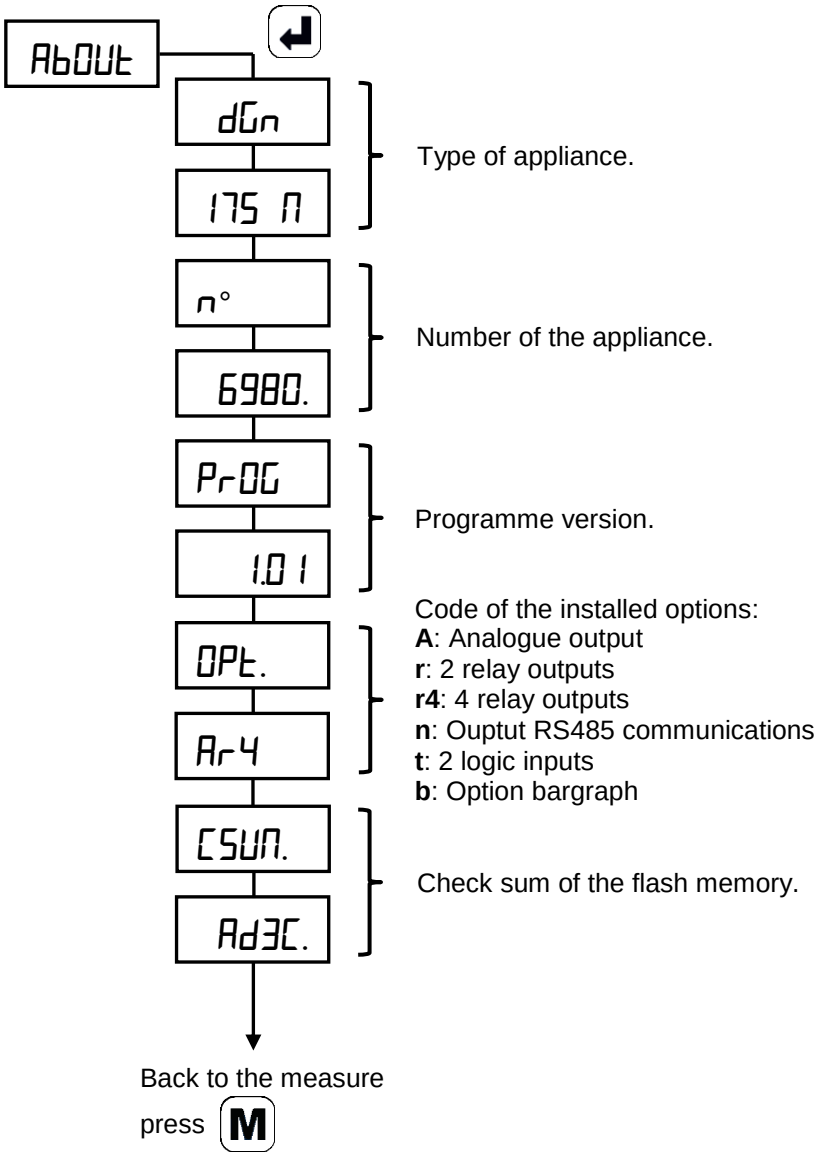
SEnS.

Setting of the keyboard sensitiveness



## 4.9 Menu ABOUT

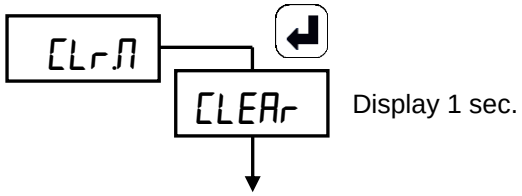
Access to the information about the product.



# 5 . DIRECT FUNCTIONS

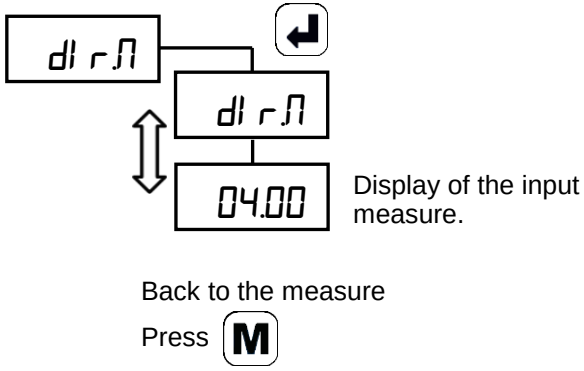
## 5.1 reset to 0 Min. / Max. values

Access by the menu **FUnCt** or by pressing ↵ during the measure display.




## 5.2 Display of the input direct measure

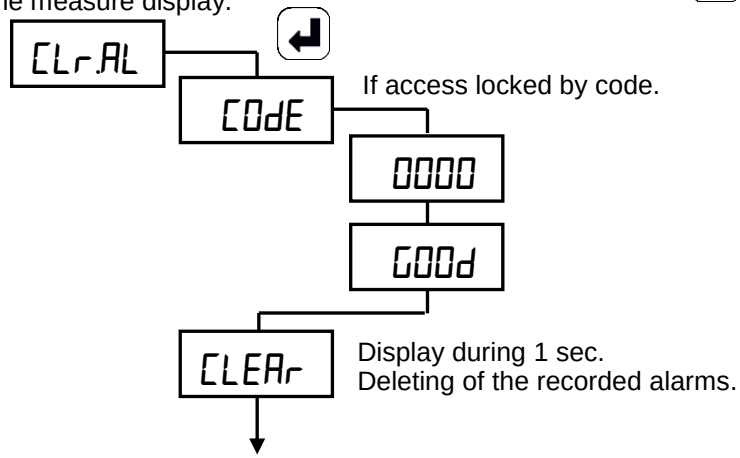
Access by the menu **FUnCt** or by pressing simultaneously ↓ + **M** during the measure display.




## 5.3 0 reset of the alarm recordings *

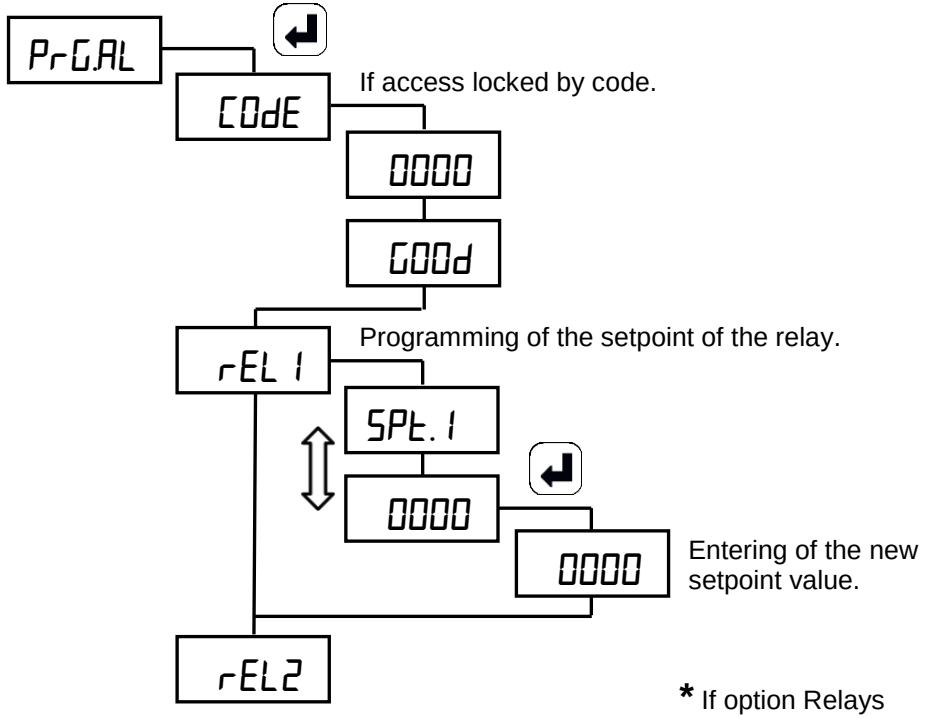
Access by the menu **FUnCt** or by pressing simultaneously ↵ + **M** during the measure display.

FUnCt.




## 5.4 Quick programming of the alarm setpoints *

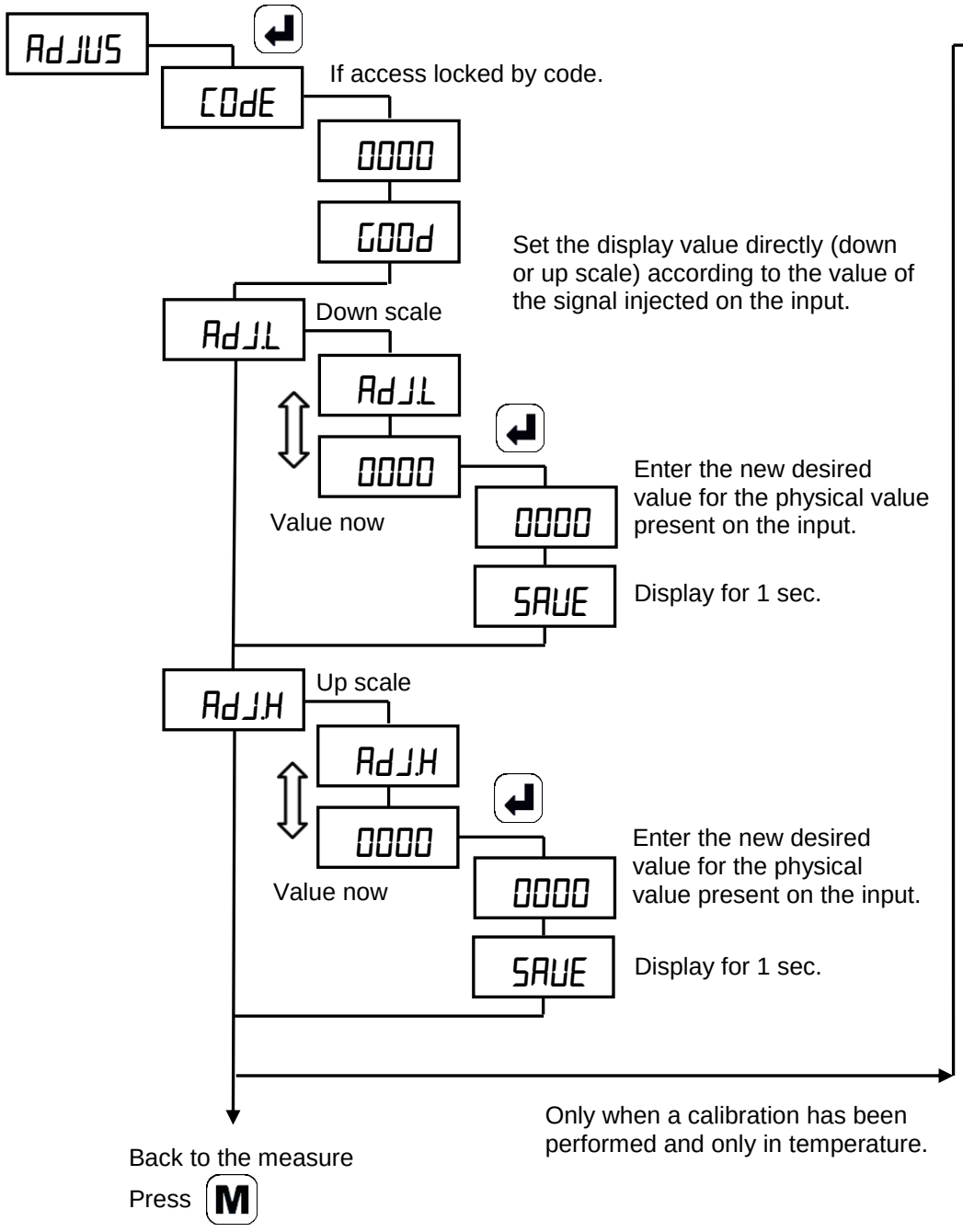
Access by the menu **FUnCt** or by pressing simultaneously ↑ + **M** during the measure display.

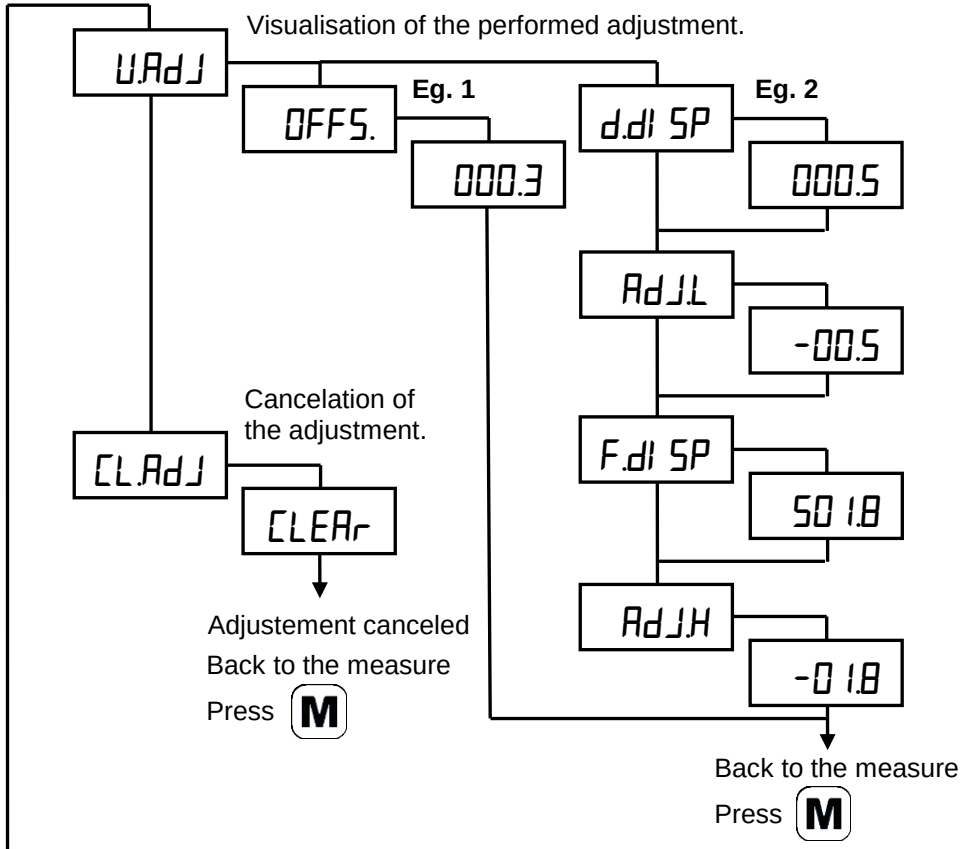



* If option Relays

## 5.5 Menu adjustment (display calibration).

Access by the menu **FUnCt** or by pressing simultaneously ↑ + ↓ during the measure display.




**Case of a process, resistance or potentiometer input:**

The instrument will re-adjust its scale factor and its display factor in order to obtain the desired result.

**Case of a temperature input:**

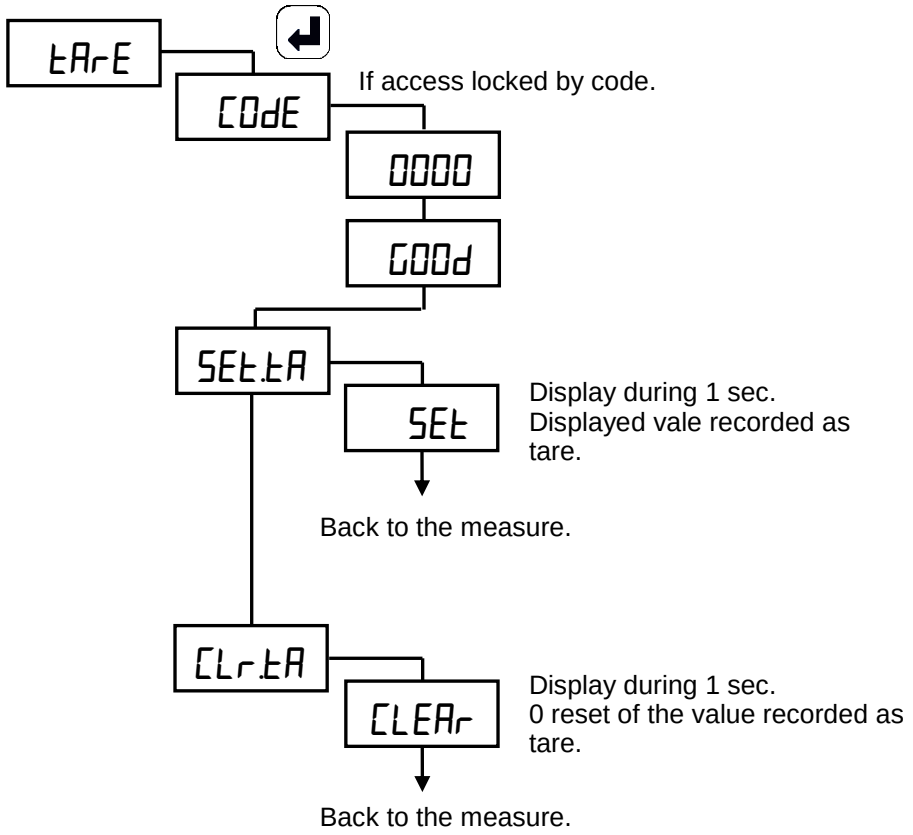
**Eg. 1:** If 1 setting only is performed, this will correspond to setting an offset, which means all the points will be shifted by the same quantity (+000.3° in this example).

**Eg. 2:** If the 2 settings are performed, the slope and the offset will be corrected in order to obtain the desired result.

In the example for 0.5° the performed correction will be of -0.5°, and for 501.8° a correction of -1.8° will be performed.

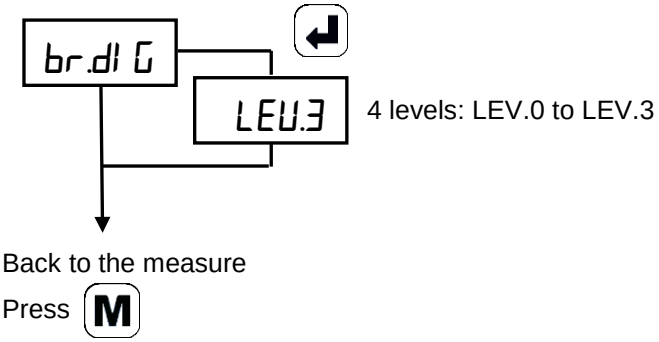
## 5.6 Menu Tare

Access by the menu **FUnCt** or by pressing simultaneously ↓ + ↵ during the measure display.




## 5.7 Setting of the brightness of the displays

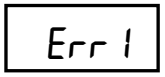
Acess by the menu **FUnCt** only.



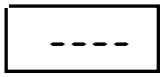
# 6 . ERROR MESSAGES


Measure in overrange.


Sensor broken.

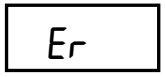



Value set out of range.




Upper or lower electrical overstepping of the input.


Displayable value overload.




Self-diagnosis error.

**Coding:**

**Err. 1:** Programming error (programming parameters incoherent).
**Err. 4:** Error on internal offset (excessive drift).
**Err. 8:** Calibration error.
**Err. 32:** Error on the CJC (excessive drift).
**Err. 64:** Upper or lower electrical overstepping of the input.

If the instrument detects for example an offset error (4) and a programming error (1) the value of the error code will be 5 (4+1).

# 7 . GENERAL WARRANTY TERMS

**WARRANTY APPLYING AND DURATION:**

This appliance is guaranteed for 1 year for any design or manufacturing defects, under normal operating conditions.

**Conditions for processing *:**

Processing not under warranty will be submitted to the acceptance of a repair estimate.
The customer will return the products at his charge, and they will be restored to him after processing.
Without a written agreement on the repair estimate within 30 days, the products will not be kept.

** Complete warranty terms and details available on request.*

# 8 . ANNEXE: MODBUS

## 8.1 Table of the Modbus addresses

| Word address | Description |
|---|---|
| 0 | Sensor primary measure. |
| 1 | Decimal point/unit. |
| 2 | Final measure. |
| 3 | Decimal point/unit |
| 4 | Final measure min. |
| 5 | Decimal point/unit |
| 6 | Final measure max. |
| 7 | Decimal point/unit |
| 8 | Value of the analogue output. |
| 9 | Decimal point/unit |
| 12 | Auto diag 1 |
| 13 | Auto diag 2 |
| 14 | Status of the relay 1. |
| 15 | Status of the relay 2. |
| 16 | Status of the relay 3. |
| 17 | Status of the relay 4. |

### Measures

The following parameters: sensor primary measure, final measure, min. and max. of the final measure and the values of the analogue outputs are transmitted in the form of a module and a unit associated with a position of the decimal point.

Eg.:

| Word address | Decimal value | Coding |
|---|---|---|
| 0 | 10 094 | module |
| 1 | 12 289 | point / unit |

### Coding of the integer decimal point / unit

H L

BYTE | BYTE

Dec.point unit: code of correspondance in the list hereunder

Value of the quartet:
0: no decimal
16: 1 decimal
32: 2 decimals
48: 3 decimals


Unité (octet L)
0 : aucune
1 : V
2 : kV
etc ...

Eg.: 12 289 = 48 X 256 + 1
The integer encodes the unit V with 3 decimals
Hence the measure read is 10.094 V

Table of the units

| Code | Unit |
|---|---|
| 000 | |
| 001 | V |
| 002 | KV |
| 003 | A |
| 004 | KA |
| 005 | W |
| 006 | KW |
| 007 | MW |
| 008 | GW |
| 009 | VAr |
| 010 | KVAR |
| 011 | MVAR |
| 012 | GVAR |
| 013 | VA |
| 014 | KVA |
| 015 | MVA |
| 016 | GVA |
| 017 | Wh |
| 018 | KWh |
| 019 | MWh |
| 020 | GWh |
| 021 | VARh |
| 022 | KVARh |

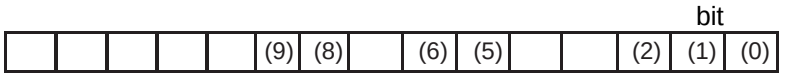
| Code | Unit |
|---|---|
| 023 | MVARh |
| 024 | GVARh |
| 025 | Hz |
| 026 | Khz |
| 027 | Deg |
| 028 | Ohms |
| 029 | Kohms |
| 030 | h |
| 031 | mn |
| 032 | s |
| 033 | % |
| 034 | cos PHI |
| 035 | to 099 free |

| Code | Unit |
|---|---|
| 100 | °C |
| 101 | °F |
| 102 | % |
| 103 | mm |
| 104 | cm |
| 105 | m |
| 106 | km |
| 107 | mBar |
| 108 | Bar |
| 109 | Pa |
| 110 | Kpa |
| 111 | Kg/cm2 |
| 112 | PSI |
| 113 | mCE |
| 114 | l/s |
| 115 | l/mn |
| 116 | l/h |
| 117 | m3/s |
| 118 | m3/mn |
| 119 | m3/h |
| 120 | tr/s |
| 121 | rad/s |

| Code | Unit |
|---|---|
| 122 | mm/s |
| 123 | cm/s |
| 124 | m/s |
| 125 | m/mn |
| 126 | m/h |
| 127 | mm3 |
| 128 | cm3 |
| 129 | m3 |
| 130 | g |
| 131 | kg |
| 132 | t |
| 133 | l |
| 134 | hl |
| 135 | Rpm |
| 136 | CP/mn |
| 137 | PH |
| 138 | mV AC |
| 139 | V AC |
| 140 | KV AC |
| 141 | mA AC |
| 142 | A AC |
| 143 | KA AC |

| Code | Unit |
|---|---|
| 144 | mV DC |
| 145 | V DC |
| 146 | KV DC |
| 147 | mA DC |
| 148 | A DC |
| 149 | KA DC |
| 150 | Ohms |
| 151 | Kohms |
| 152 | Mohms |
| 153 | US.gal/s |
| 154 | US.gal/min |
| 155 | US.gal/h |
| 156 | US.gal |
| 157 | lb |
| 158 | C |
| 159 | imp |
| 160 | CP |
| 161 | mA |
| 162 | A |
| 163 | mA.h |
| 164 | A.h |
| 165 | µV |
| 166 | mV |

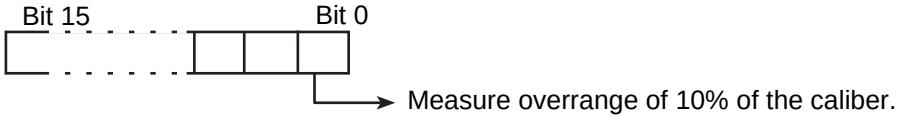
### Integer autodiag n°1: (address 12)



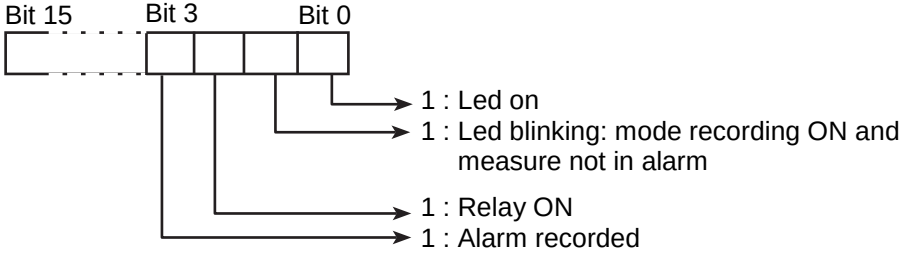

(5) CJC error
(6) Measure overrange of 10% of the caliber
(8) Sensor break
(9) Measure overload
*(eg.: measure of 15 V on caliber 10 V)*

(0) Programming error
(1) Offset error
(2) Calibration error

### Integer autodiag n°2: (address 13)




### Integer status relays 1 to 4: (address 14 to 17)



## 8.2 Correspondance with the DGN75

| Address | | Format | Nr of words |
|---|---|---|---|
| 200 | Value of the analogue output<br>in µA (mA output)<br>in mV (10V output) | double integer | 2 |
| 202 | Minimum value of the displayed value | double integer | 2 |
| 204 | Maximum value of the displayed value | double integer | 2 |
| 206 | Displayed measure | double integer | 2 |
| 208 | Direct measure | double integer | 2 |
| 290 | Status of the relay 1 | integer | 1 |
| 291 | Status of the relay 2 | integer | 1 |
| 292 | Status of the relay 3 | integer | 1 |
| 293 | Status of the relay 4 | integer | 1 |

**• Direct measure:**

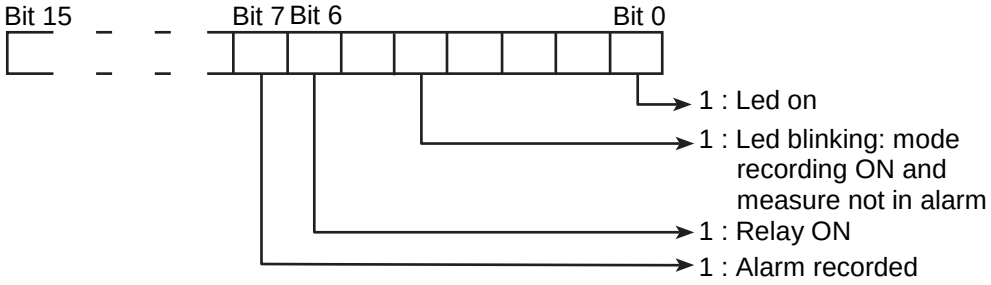
Value without scale factor for the inputs 100 mV, 1V, 10V, 300V, 20 mA :
- in mV for the input 10V
- in 1/10th of mV for the input 1V
- in µA for the input mA
- in 1/100th of mV for the input mV
- in 1/100th of V for the input 300V

Value of the resistance in 1/100th Ω for NI100 and Pt100.
Value of the temperature of the hot sensor in 1/10th of degree for ΔPt100.

Value of the resistance
- in 1/100th Ω for the resistance input 0-400Ω
- in 1/10th Ω for the resistance input 0-10 kΩ

Value in µV for the thermocouple input.
Value in 1/100th of % for the potentiometer input

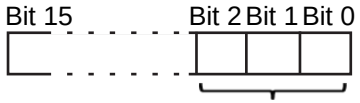
**• Status of the relays:**




**• Displayed measure:**

The value of the displayed measure is taken up without the decimal point.
To read the value of the decimal point, read the word at the address 120.

Address 120:




Position of the decimal point from 1 to 4 (version 10 000 points)
from 0 to 4 (version 100 000 points)

0 : Display with 4 decimals (version 100 000 points)
1 : Display with 3 decimals
2 : Display with 2 decimals
3 : Display with 1 decimal
4 : Display with 0 decimals

## 8.3 Description of the born Modbus functions

### Reading of N words: Function n°3

*Request sequence*:

| Slave number | Function 3 or 4 | 1st word adress MSB | 1st word adress LSB | Nmbr of words MSB | Nmbr of words LSB | CRC 16 |
|---|---|---|---|---|---|---|
| 1 byte | 1 byte | ← 2 bytes → | | ← 2 bytes → | | 2 bytes |

*Response sequence*:

| Slave number | Function 3 or 4 | Nmbr of bytes read | 1st word value MSB | 1st word value LSB | 2nd word value MSB | 2nd word value LSB | CRC 16 |
|---|---|---|---|---|---|---|---|
| 1 byte | 1 byte | 1 byte | ← 2 bytes → | | ← 2 bytes → | | 2 bytes |

### Writing of N words: Function n°16

*Request sequence*:

| Slave number | Function 16 | 1st word address | Nbr of words to enf. | Nbr of byte to be enf. | Value of the words to be enforced | CRC 16 |
|---|---|---|---|---|---|---|
| 1 byte | 1 byte | 2 bytes | 2 bytes | 1 byte | ← n bytes → | 2 bytes |

*Response sequence*:

| Slave number | Function 16 | 1st word address | Nbr of words to enf. | CRC 16 |
|---|---|---|---|---|
| 1 byte | 1 byte | 1 byte | 2 bytes | 2 bytes |

### Writing of 1word: Function n°6

*Request sequence*:

| Slave number | Function 6 | Address of the word | Value of the word to enfor. | CRC 16 |
|---|---|---|---|---|
| 1 byte | 1 byte | 2 bytes | 2 bytes | 2 bytes |

*Response sequence*:

| Slave number | Function 6 | Address of the word | Value of the word to be enf. | CRC 16 |
|---|---|---|---|---|
| 1 byte | 1 byte | 2 bytes | 2 bytes | 2 bytes |

*Exception sequence*:

| Slave number | Function requested with MSB=1 | Error code | CRC 16 |
|---|---|---|---|
| 1 byte | 1 byte | 1 byte | 2 bytes |

Values of the errror codes:

1: Unknown function code
2: Incorrect address
3: Incorrect data
9: Writing impossible

## 8.4 Reading in double integer format:

Example: Reading of the displayed measure

*Request*:

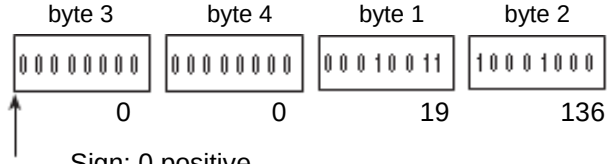
| 254 | 03 | 0 | 206 | 0 | 2 | CRC 16 |
|---|---|---|---|---|---|---|
| Slave Number | Reading of n words | | Address | | Number of words | |

*Response with a positive measure*:

measure

| 254 | 3 | 4 | 19 | 136 | 0 | 0 | CRC 16 |
|---|---|---|---|---|---|---|---|
| | | | byte 1 | byte 2 | byte 3 | byte 4 | 2 bytes |

*Value of the measure*:

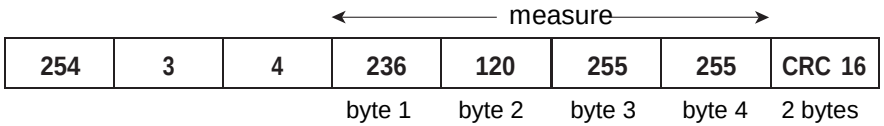



Sign: 0 positive
1 negative

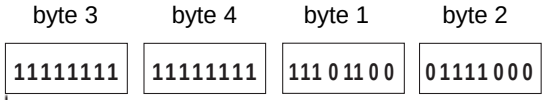
Measure = byte 3 x $256^3$ + byte 4 x $256^2$ + byte 1 x 256 + byte 2
= 0 x $256^3$ + 0 x $256^2$ + 19 x 256 + 136
= 5000

Reading of the address 120 => decimal point = 2 => displayed measure: 50.00

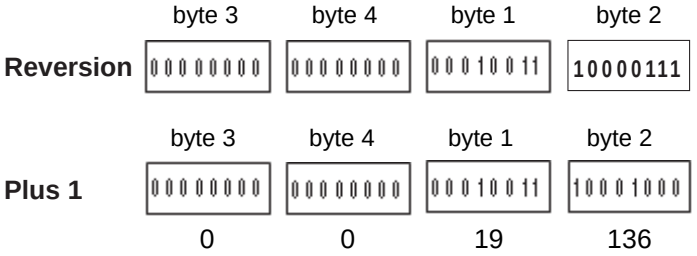
*Response with a negative measure*:




*Value of the measure*:



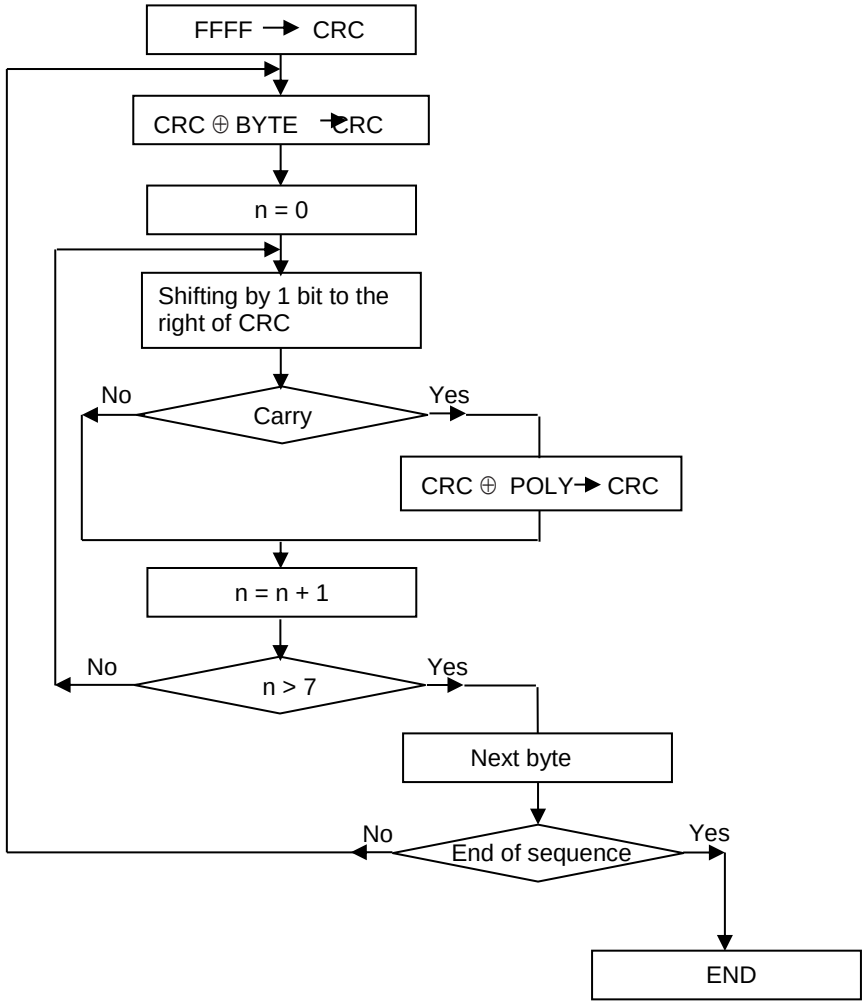

**Sign**: 1 negative: reversing of the bits and plus 1.




Measure = -(byte 3 x $256^3$ + byte 4 x $256^2$ + byte 1 x 256 + byte 2)
= -(0 x $256^3$ + 0 x $256^2$ + 19 x 256 + 136)
= -5000

Reading of the address 120 => decimal point = 2
=> displayed measure -50.00

## 8.5 CRC16 calculation algorythm:




**Note**: ⊕ = exclusive or.

**Note 2**: POLY = A001 (hex).

**Note 3**:
The CRC 16 calculation applies to all bytes in the sequence (excluding CRC16).

**Note 4**:
Caution! In the CRC 16, the 1st sent byte is the LSB.

*Example*: Sequence 1-3-0-75-0-2 CRC16 = 180-29 (the values are decimal).