DIGITAL PANEL METERS

programmable ±10 000 points

DIGINORM

DGN 75

User handbook

Applies for all devices version 06.xx

KLAY-INSTRUMENTS

■ **Summary**

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1. INTRODUCTION

The series **DGN 75** offers a whole range of high accuracy programmable panel meters. Each instrument is equipped on its front face with a five 14mm high red digits display, whose brightness suits applications in industrial control rooms perfectly.
They enable display, control and transmission of data from any measurable magnitude.

• The **DGN 75 U** **(Process Input)** counts as standard :

A DC current or voltage input
Bidirectionnal ±100mV, ±1V, ±10V, ±300V, ±20mA.

- Accuracy : 0,05 % of full scale at +25 °C
  Tehrmic drift < 150 ppm/°C
- Measurable scale overstepping from -5 % to +5%
- Scale factor programmable
- Enlarging effect - Square root extraction
- Special 20 point linearisation
- Supply for 2 or 3 wire sensor 26 V_{DC} (±15%) -25 mA
  protected from short circuits

• The **DGN 75 T** **(Temperature Input)** counts as standard :

Either a thermocouple input :
(J, K, N, S, B, W5, T, R, E, W, W3, L)

- Accuracy : 0,1% of full scale at +25°C,
  or 25µV typical (50µV max.)
- Thermic drift < 150ppm/°C
  CJC efficiency : < 0,03°C/°C ± 0,5°C from -5°C to +55°C

Or a sensor input : Pt 100 Ω, Ni 100 Ω
- Line resistance influence in 3 wire measure included in grade
  for 0<RI<25Ω
- Measure of Δ Pt100 2 wires from -200°C to +270°C (0<RI<10Ω)
  (R max. 400Ω)
- Max. measure current : 250 µA
- Accuracy : 0,1% of full scale at +25°C
- Tehrmic drift < 150ppm/°C.

• **The DGN 75 M** **(Inputs Process, temperature, resistance and potentiometer)**

(See DGN 75 U and DGN 75 T features on left hand column)

Resistive sensors : calibers 0-400 Ω and 0-2 kΩ (0-8 kΩ option)
- Accuracy : 0,1% for calibers 0-400 Ω and 0-8 kΩ and
  0,5% for caliber 0-2 kΩ (of full scale at +25°C)
- Tehrmic drift < 150ppm/°C

Potentiometers : from 100 Ω to 10 kΩ
- Accuracy : 0,1% of full scale at +25°C
- Tehrmic drift < 150ppm/°C

AVAILABLE OPTIONS : *(specify on order)*

Insulated analogue output : A
Active or passive current, or voltage.
Programmable scale ratio with enlarging effect.

Relay output : R or R4
2 or 4 relays : mode setpoint or mode window.
Recording of alarms.
Temporisation and hysteresis adjustable on each setpoint.
Alarm messages

Insulated digital output : N
RS 485 2 wires, protocole MODBUS-JBUS.

LOGIC input 2 insulated LOGIC inputs with programmable functions
Display locking,
Decimal point moving,
Tare function,
min. and max. zero reset

Bargraph : (display 16 leds) : B
Enables fast evaluation of the measured value variations.
Programmable scale factor

General features

- Sampling time : 100 ms
- Input impedance ≥ 1 MΩ for voltage inputs
  Drop 0,9 V max. for current input
- Common mode rejection rate : 130 dB
  Serial mode rejection rate 70 dB 50/60 Hz
- Zero drift compensation and self calibration
- Insulation : Input / power supply : 2,5 kV eff. 50Hz-1min
  Input / Output : 2,5 kV eff. 50Hz-1min

- **Power Supply :** *(specify on order)*

  2 Versions : High Voltage or Low Voltage

  High Voltage : 90...270 VAC and 88 ...350 VDC 50/60/400 Hz
  Low Voltage : 20...53 VAC and 20...75 VDC 50/60/400 Hz

- **Power draw** : 5 W max. 8 VA max.

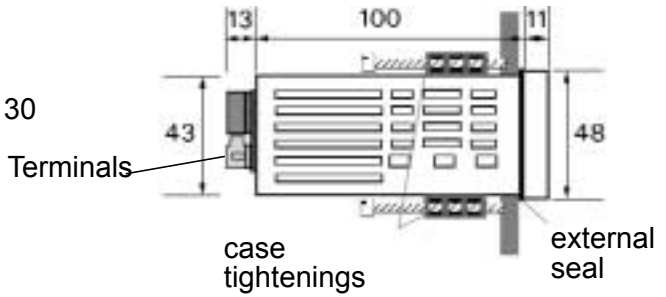
- **Complies** with standards EN 50081-2 on emission and EN 50082-2; on immunity (industrial environment)
  EN 61000-4-2 level 3, EN 61000-4-3 level 3,
  EN 61000-4-4 level 4, EN 61000-4-6 level 3.
  Marked CE according to directive CEM 89-336

2. SPACE REQUIREMENTS

Case dimensions : (including terminals)

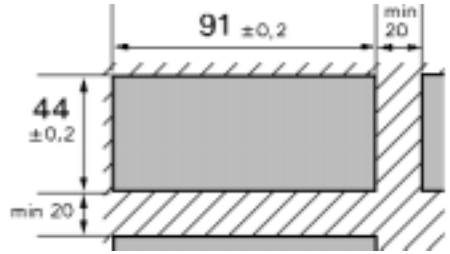
96 x 48 x 124 mm

Holding panel
max. thickness 30



Panel mounting

Cut out 44 x 91 mm



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

Case :
Self-extinguishing in black
UL 94 V0 ABS.

Connectors plug-off connectors on rear face for screwed connections (2,5mm², flexible or rigid)

Display : ±10 000 points (14 mm)
Electroluminescent red (green as option)
4 alarm Leds
+ 4 leds with programmable functions

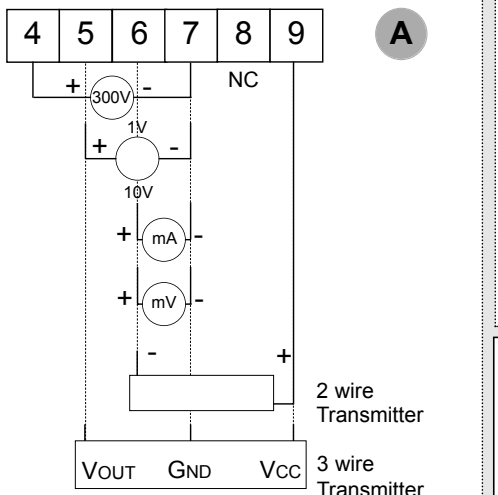
-10 000/+100 000 points (14 mm) (as option)
-2 000 / +10 000 points (20 mm) (consult with us)

3. CONNECTIONS

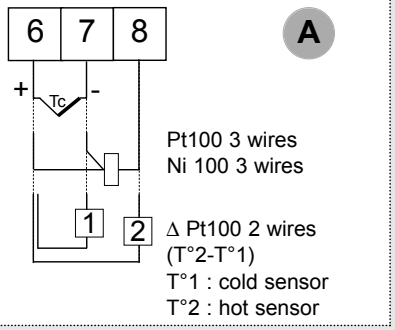
INPUTS

DGN 75 M

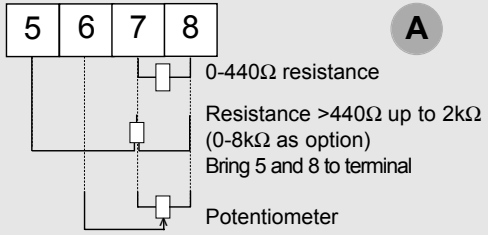
PROCESS — DGN 75 U



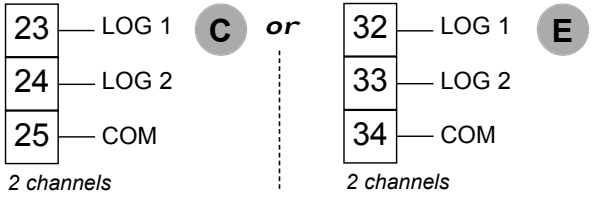
TEMPERATURE — DGN 75 T

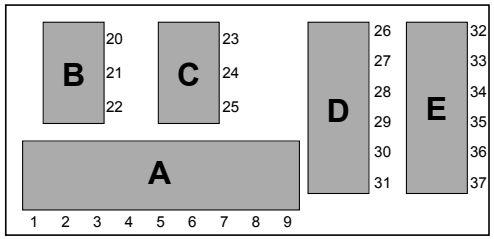


RESISTANCE and POTENTIOMETER



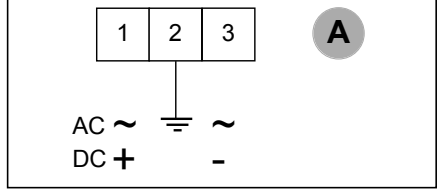
LOGIC INPUTS (options)





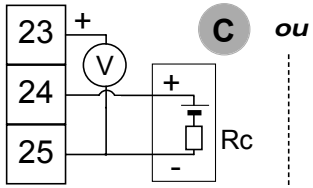
Location of terminals
(view from case rear face)

POWER SUPPLY



OUTPUTS (options)

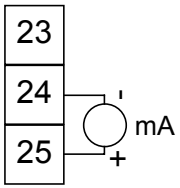
VOLTAGE CURRENT PASSIVE



0-4/20mA passive
external source 30 V max.

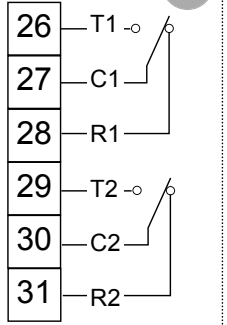
ou

ACTIVE CURRENT

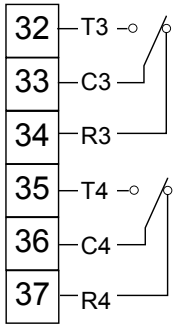


0-4/20mA active

2 RELAYS — D

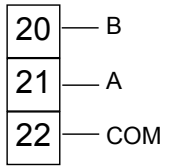


4 RELAYS — E



T : NO
C : Common
R : NC

DATA LINK

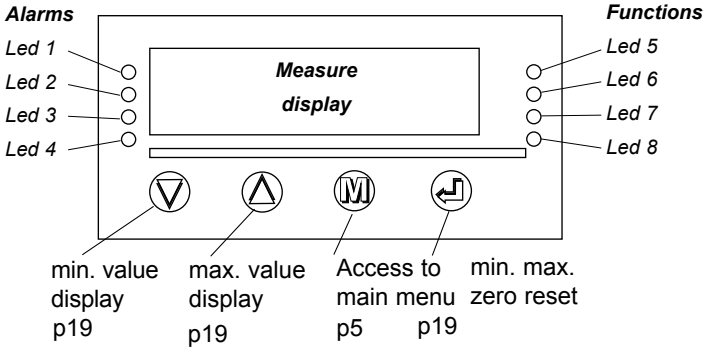


Digital data link RS485

4. PROGRAMMING

4.1 Communicate with the instrument

Several functions based on the measuring are available :



You can access further functions by pressing several keys simultaneously :

- ▽ + △ Setting of down scale display; (see p20)
- ↵ + M Setting of full scale display; (see p20)
- ▽ + M Visualise direct measure ; (see p20)
- △ + M Visualise and adjust alarm setpoints; (see p21)
- ▽ + ↵ Set tare (except temperature inputs see p21)

Reading convention :

- Move through main menu
- Revert to previous menu
- Flashing display : awaiting validation or setting
- Alternate information display

Entering a parameter :

6888 Start by increasing or decreasing △ and ▽ the 1st digit and the sign : from -9 to +9.

6588 The 2 nd from 0 to 9.

6528 The 3 rd from 0 to 9.

6520 The 4 th from 0 to 9.

Between each entering, validate the digit by pressing ↵

4.2 Find your way through programming

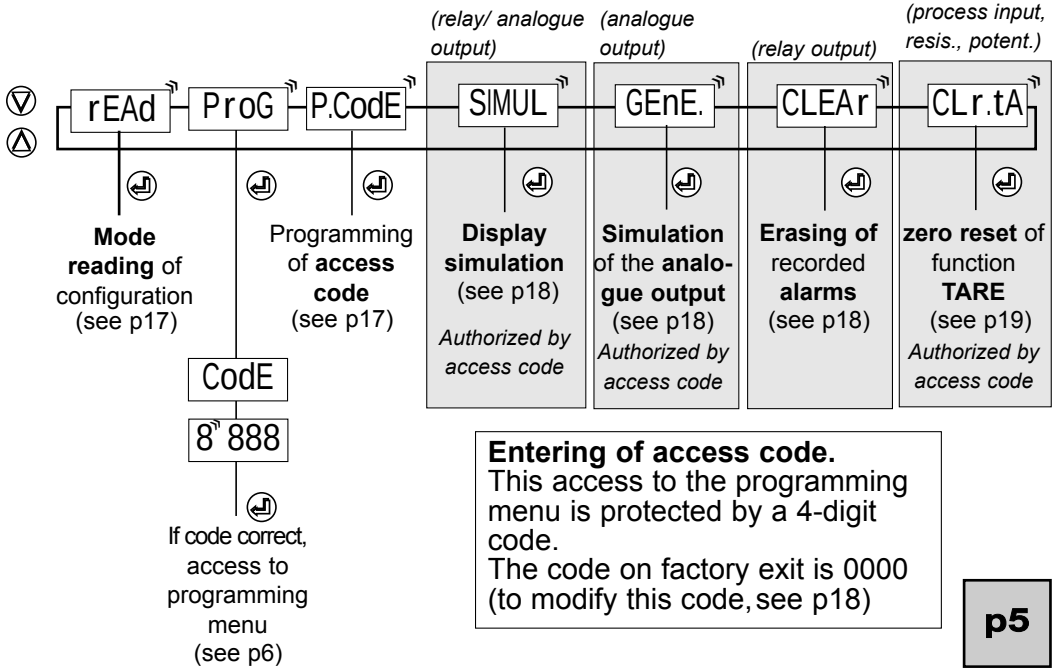
Dialogue is ensured by 4 keys located on the front face.

▽	△	M	↵
Move through menus to the bottom, or decrease displayed value	Move through menus to the top, or increase displayed value	Exit a submenu to access next menu / access programming exit menu	Validate displayed parameter, or access a submenu

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

4.3 Main menu

▽ **scroll menus** ↵ **vertical moving**



Entering of access code.
This access to the programming menu is protected by a 4-digit code.
The code on factory exit is 0000 (to modify this code, see p18)

4.4 Programming menu *(according to options)*

InPut	Access to input programming	p6
dISPL.	Access to display factor programming	p8
OUt.MA or OUt.U	Access to analogue output programming *(option analogue output)*	p8
JbuS	Access to communication parameters *(option digital output)*	p9
tor	Access to programming of LOGIC inputs *(option LOGIC inputs)*	p9
rELAY	Access to relay programming (2 or 4 relays) *(option relay outputs)*	p9
SECU	Access to programming outputs, relays, in case of error self-diagnosis and/or sensor rupture and access to disconnecting sensor rupture *(option analogue or relay outputs)*	p10
Pr.diS	Access to display programming : Leds, Bargraph, Display brightness	p10
SAuE	Access to programming exit menu with or without recording configuration	p11

Note :
⇒ Press key (M) to revert to menu SAuE

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

Note :
Press key (M) to go on to next menu

(▽) (△) Move through menus / choice

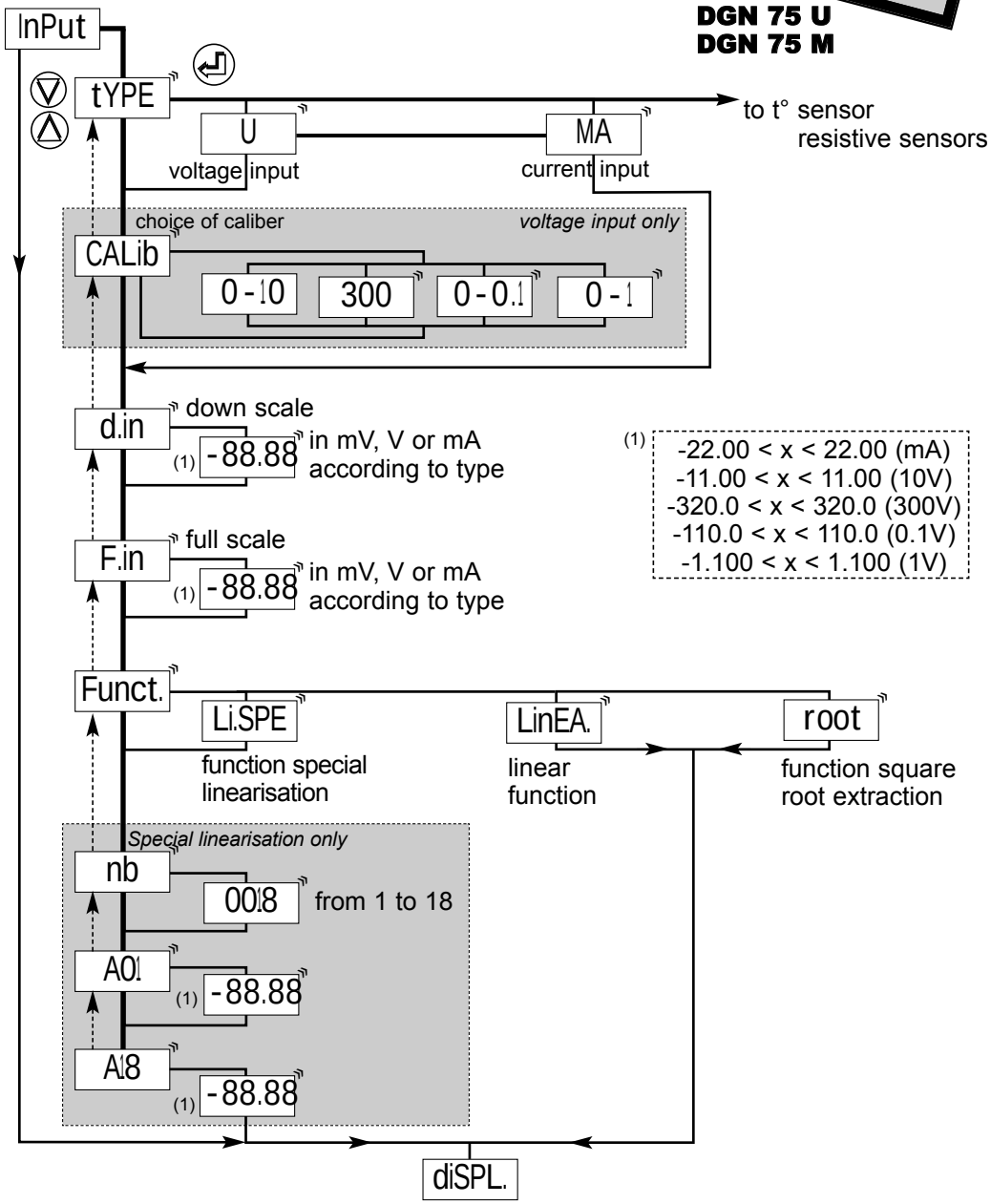
(M) Exit / Menu access	(△) Move to the top / Increase
(▽) Move to the bottom / decrease	(↵) Validation / Vertical move

4.4.1 Input programming

a. Process signals

InPut

DGN 75 U
DGN 75 M



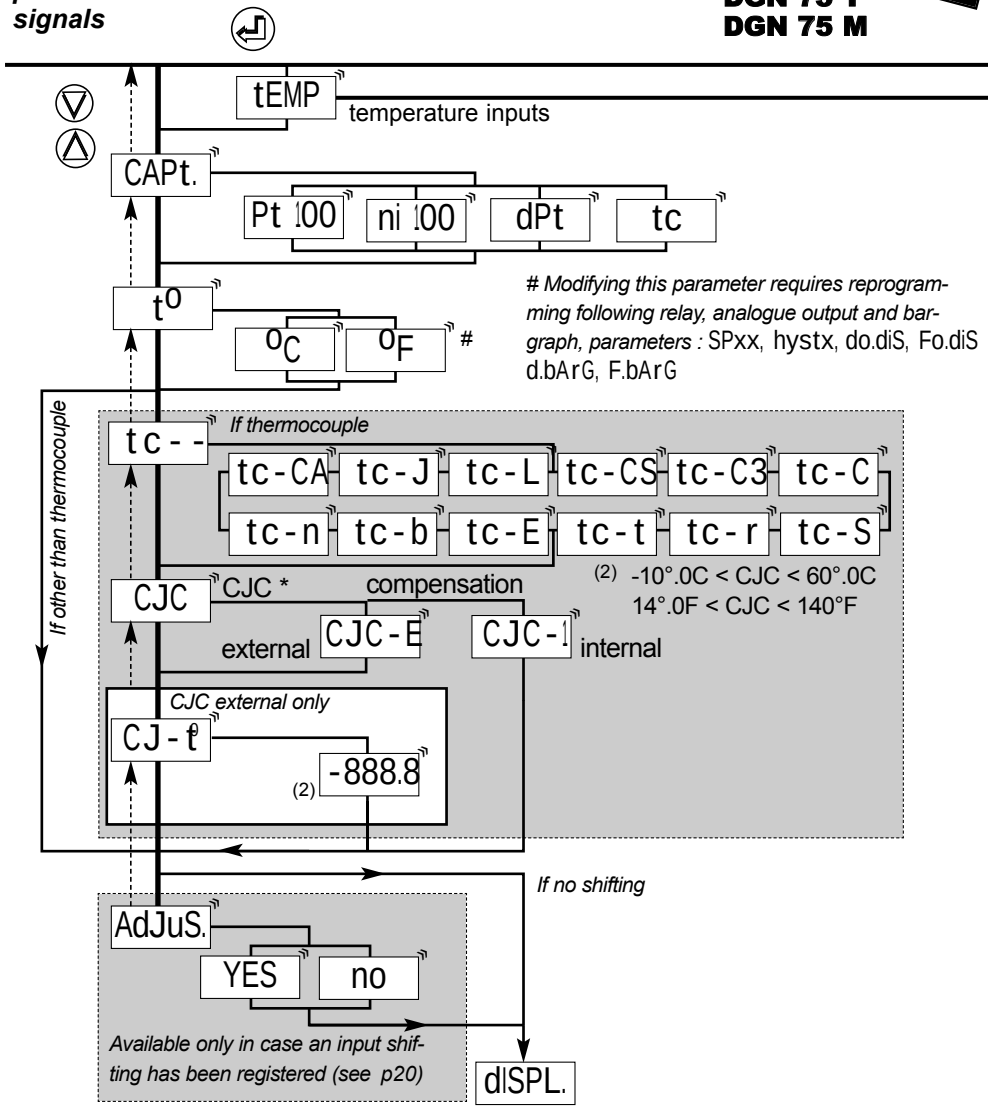
Note :
Press key (M) to revert to menu diSPL.

b. Temperature signals

InPut

DGN 75 T
DGN 75 M

process signals



Note :
Press key Ⓜ to revert to menu dISPL.

▽ △ Move through menus / choice

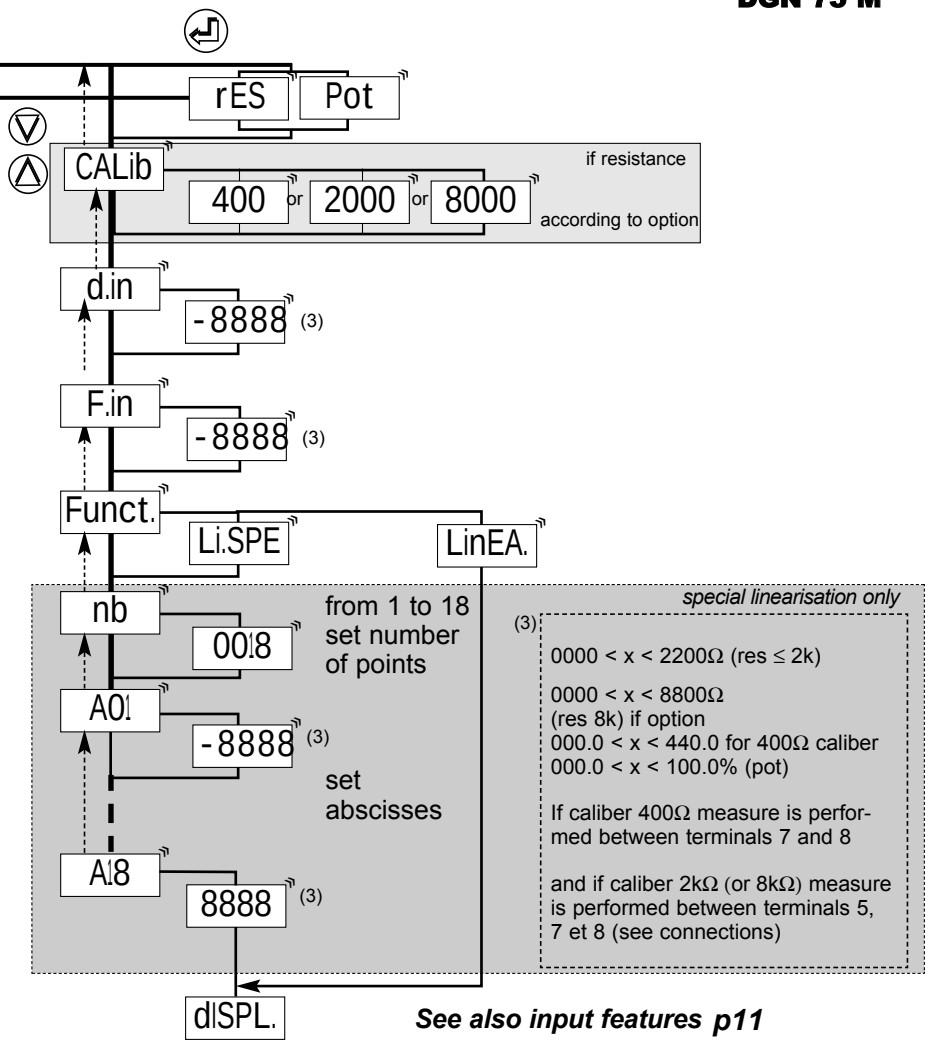
* cold junction compensation, except thermocouple B, which is only in external CJC.

c. Resistive sensors

InPut

DGN 75 M

temperature signals
process signals



See also input features p11

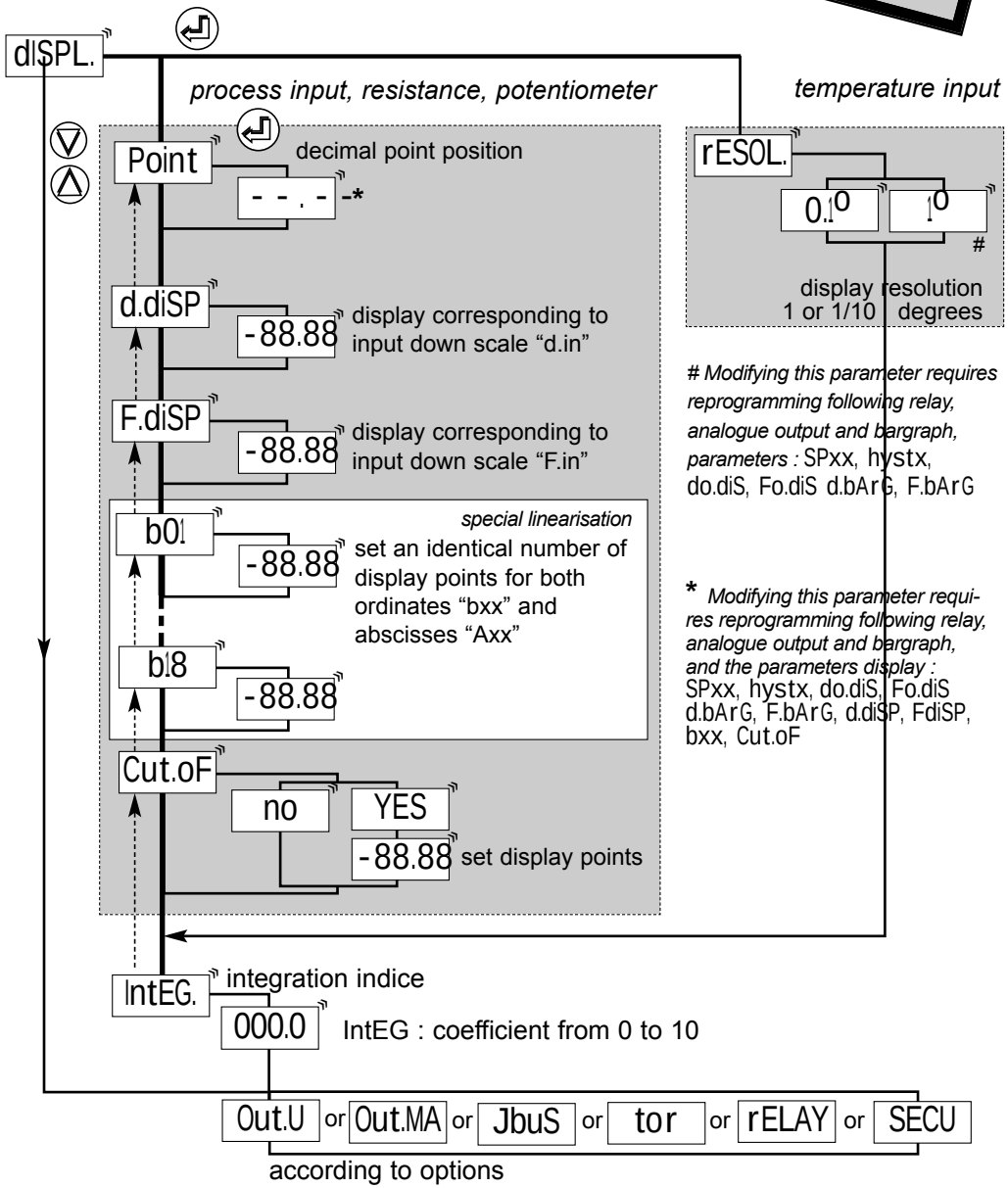
Note :
Press key Ⓜ to go on to next menu

▽ △ Move through menus / choice

Ⓜ Exit / Menu access	△ Move to the top / Increase
▽ Move to the bottom / decrease	↵ Validation / Vertical move

4.4.2 Display programming

diSPL.

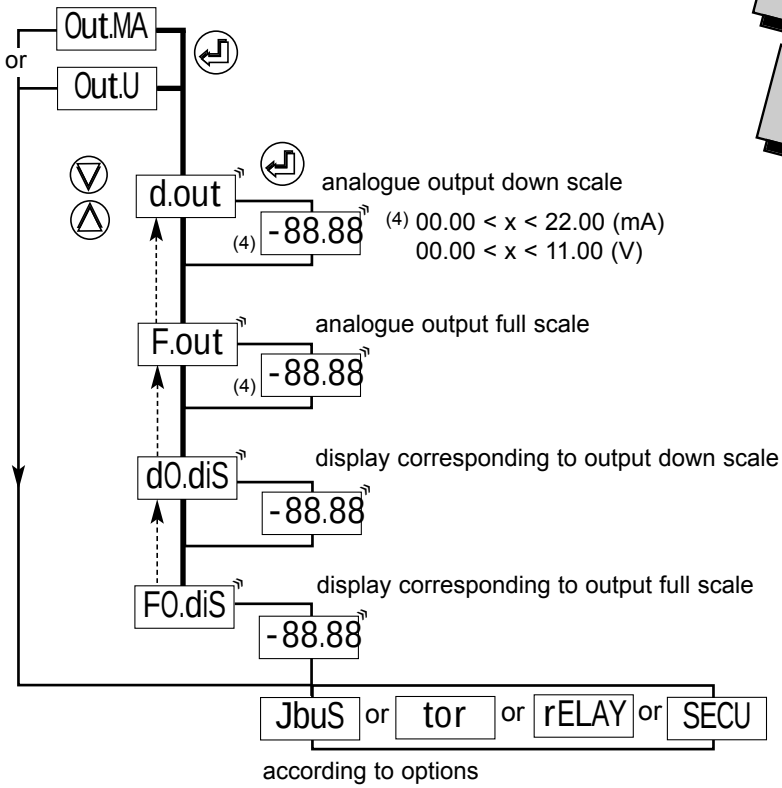


 # Modifying this parameter requires reprogramming following relay, analogue output and bargraph, parameters : SPxx, hystx, do.diS, Fo.diS d.bArG, F.bArG

** Modifying this parameter requires reprogramming following relay, analogue output and bargraph, and the parameters display :* SPxx, hystx, do.diS, Fo.diS d.bArG, F.bArG, d.diSP, FdiSP, bxx, Cut.oF

Out.MA

Out.U



See also output features p13

Note :

Press key M to go on to next menu

▽ △ Move through menus / choice

M Exit / Menu access	△ Move to the top / Increase
▽ Move to the bottom / decrease	↵ Validation / Vertical move

Communication parameters

Option digital output

JBuS
- SLAuE — slave number
  - -8888 — must be incl. between 1 and 255
- bAUd — baud rate
  - 19200 | 9600 | 4800 | 2400 | 1200
- dELAY — delay to be counted before any answer pattern
  - On : time = 75ms
  - OFF : time = 20ms

tor or rELAY or SECU

See also digital data link features p14

Option LOGIC inputs

tor
- tor 1
  - Point
    - --.--
  - CLr.M
  - HoLd
  - tArE
- tor 2
  - Point
    - --.--
  - CLr.M
  - HoLd
  - tArE

decimal point moving function	min. and max. zero reset function	display hold function	function tare *(only for inputs process, resistance, potentiometer)*

rELAY ou SECU

See also LOGIC input features p13

Note :
Press key M to go on to next menu

Move through menus / choice

M Exit / Menu access	Move to the top / Increase
Move to the bottom / decrease	Validation / Vertical move

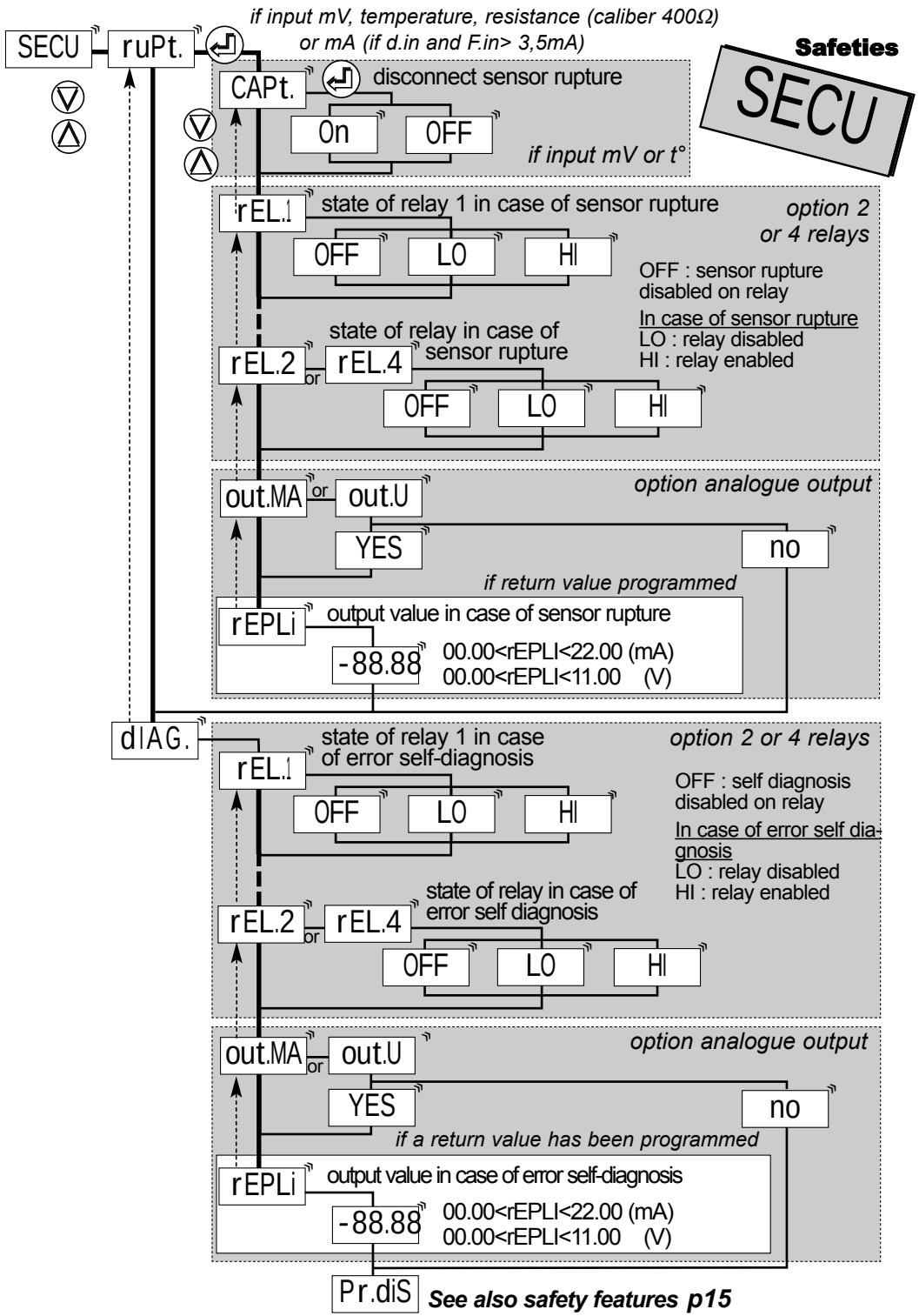
Option output 2 or 4 relays

rELAY
- rEL.1
  - alarm
  - AL.1
    - enabled: On
    - disabled: OFF
  - ModE.1 (5)
    - mode setpoint — access to SP1
    - mode window — access to SP1.1
  - *if mode setpoint programmed*
    - SP 1 — 02.00
  - *if mode window programmed*
    - SPI.1 — 02.00
    - SPI.2 — SPI.2 must be ≥ SPI.I — 04.00
  - HYSt.1 — hysteresis — 00.00 — 0 < hys. < 9999 in display points
  - tiME.1 — delay on relay — 000.0 — 0 < tIME < 025.0 in 0,1 sec. increases
  - LEd 1 — ***choice of status of the Led associated with the relay*** — OFF | On
    ON : led lit when relay enabled
    OFF : led still when relay enabled
  - MEM.1 — no | YES — function alarm recording
  - MESSI — no | YES — function display alarm message
    - AbCd. — enter 4 digits + dot
- idem rEL.1: rEL.2
- idem rEL.1: rEL.3
- idem rEL.1: rEL.4

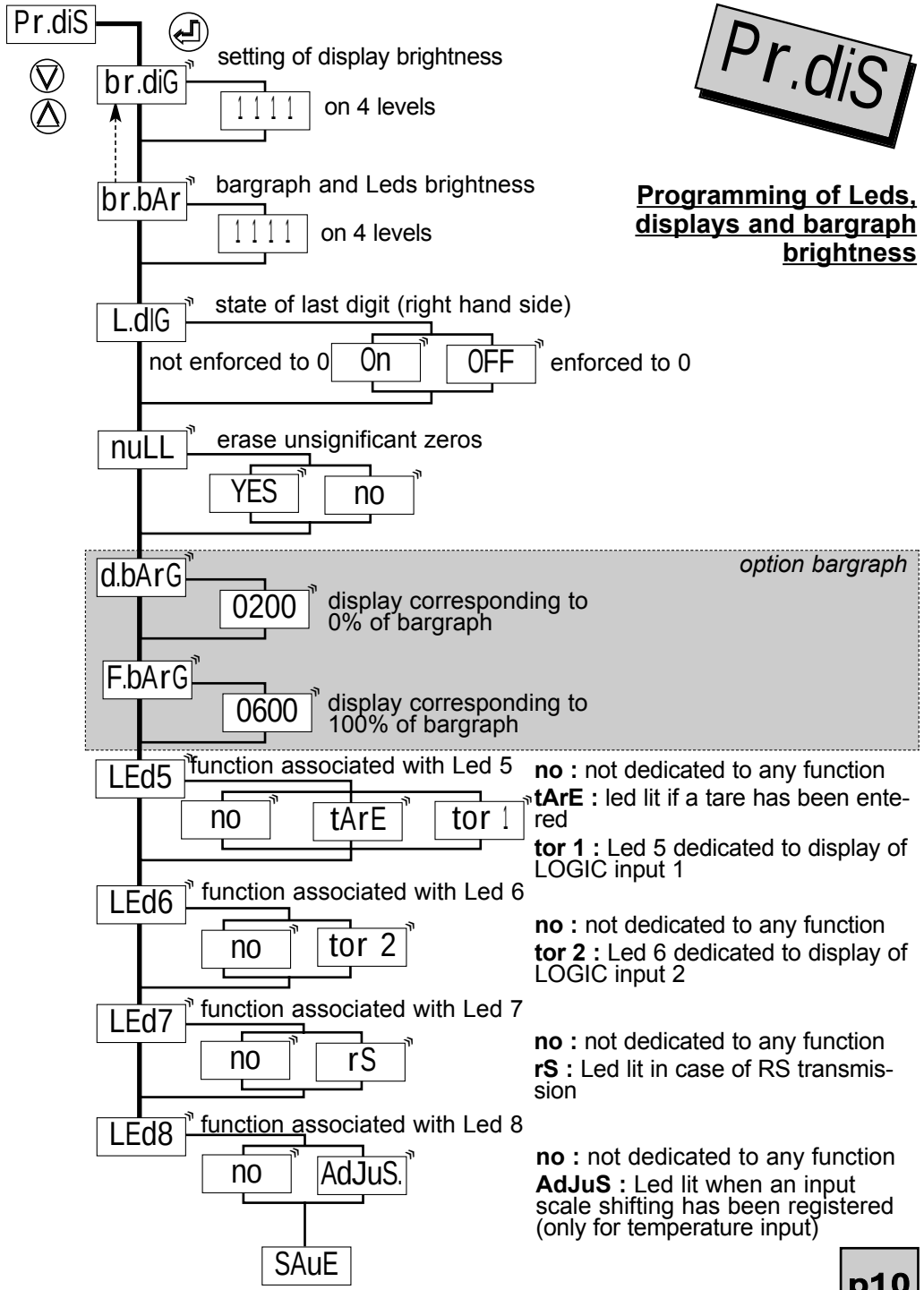
rEL.2 — If option 2 relays, at the end of menu REL.2,
If option 4 relais, at the end of menu REL.4
access to SECU or Pr.diS

(5) choice of relay function mode : mode setpoint or mode window (see p14)

See also relay output features p14



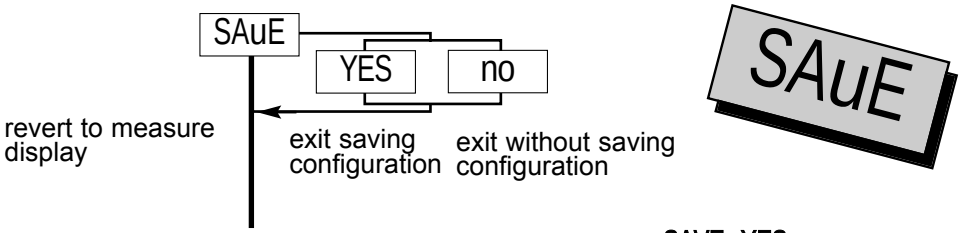
See also safety features p15



Programming of Leds, displays and bargraph brightness

See also display features p16

Exit programming with or without saving



Note : Exit of programming mode saving configuration (SAVE, YES) will automatically reset to zero tare, min. and max. as well as alarm recording.

In case of decimal point location modification or resolution modification (for temperature), the instrument will propose after SAVE YES all parameters with decimal point that have not been modified (see p8)

4.5 Input features and programming limits

4.5.1 Current input MA

• **Linear** :

Features

Caliber	Display resolution	Input resolution	Accuracy
from -20 to +20mA	± 1 digit	14 bits	0,05% of measure range

Input measurable limits : -22 to 22 mA

• **Not linear :**

Square root extraction root

Note : Function square root tends to amplify the input signal background noise when it gets near 0.

To avoid drifts caused by this noise, just programme a cut-off value (in display points).

– If display full scale > display down scale and if display ≤ cut off value then it is maintained at down scale.

– If display full scale < display down scale and if display ≥ cut off value then is is maintained at down scale.

Special linearisation : Li.SPE

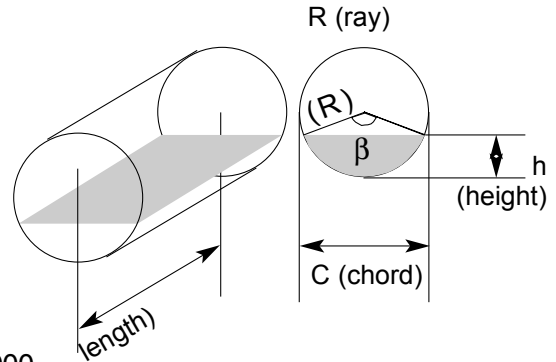
For special applications, such as volume measure,
the meter can record an unlinear curve programmable in X and in Y.

The curve resulting from your equation can be replaced by a sequence of linear segments with a maximum of 20 points (19 segments).

Note : The values of abscisses (x) must be entered increasing d.in < A01 value < A02 value...< F.in.

Example :
For a cylindric layed tank, measuring 1 meter in height (h) and 1 meter in length (l); a 0-20 mA linear sensor measures the liquid surface line height :

Meter input : height h
0 meter -> 0 mA (tank empty)
1 meter -> 20 mA (tank full)
with $\cos \beta/2 = (R-h)/R$
$\sin \beta/2 = C/2R$



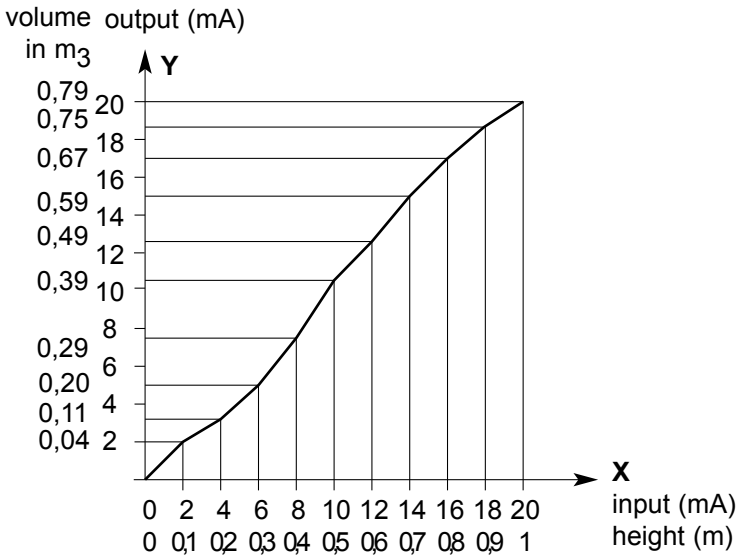
Meter display :
Empty tank volume d.diSP = 0.000
Full tank volume F.diSP =0.785

Volume = $L\ [\pi\ R^2\ \beta/360 - C(R-h)/2]$

Say a 10 equally long segments curve :
Measure span / number of segments = 20mA/10 = 2mA segment length. For 10 segments nb = 9 (11 points to be programmed, with d.in and F.in).

Input mA		Height m	Degree	Chord m	Volume m³		Outpts in mA
d.in	0	0.0	0.00	0.00	d.diSP	0.000	00.00
A01	2	0.1	73.74	0.60	B01	0.041	01.04
A02	4	0.2	106.26	0.80	B02	0.112	02.85
A03	6	0.3	132.84	0.92	B03	0.198	05.04
A04	8	0.4	156.93	0.98	B04	0.293	07.47
A05	10	0.5	180.00	1.00	B05	0.393	10.00
A06	12	0.6	203.07	0.98	B06	0.492	12.54
A07	14	0.7	227.16	0.92	B07	0.587	14.96
A08	16	0.8	253.74	0.70	B08	0.674	17.17
A09	18	0.9	286.76	0.60	B09	0.745	18.98
F.in	20	1.0	360.00	0.00	F.diSP	0.785	20.00

Programming :
d.in = 0 mA F.in = 20 mA
nb = 9
d.disp = 0,000 m^3 F.disp = 0,785 m^3
Programming from A01 to A09 and from B01 to B09 : see table.



4.5.2 Voltage input U

• **Linear** : Features

Caliber	Display resolution	Input resolution	Accuracy
-100 to +100 mV -1 to + 1 V -10 to +10 V -300 à 300 V	± 1 digit	14 bits	0,05% of measure span

Measurable limits : -5% to +5%

Example for caliber 1V : -1,1V at +1,1V

• **Not linear :** (see p11)

4.5.3 Temperature input Pt 100 dPt ni 100

• Resistor sensor

Pt 100 Platinium probe RTD 100 Ω in 3 wire system

dPt Delta RTD 100 2 wire measure

ni 100 Nickel probe ni 100 Ω

Sensor type	Measurable input limits	Accuracy (EM: measure span)
Pt 100	-200 / 850 °C -328 / 1562 °F	* ± 0,1% of EM
ni 100	-60 / 260 °C -76 / 500 °F	± 0,1% of EM
Delta Pt 100	-200 / 270 °C -328 / 518 °F	± 0,1% of EM

* *The line resistance influence 0<Rl<25Ω is included in the accuracy rating.*

• Thermocouple

Type : J, K, N, S, B, W5, T, R, E, W, W3, L

Cold junction compensation efficiency :
0,03% / °C ±0,5% from -5°C to +55°C

Cold junction compensation CJC

Internal CJC-I

External CJC-E Programmable from -10°C to 60°C
+14°F to 140°F

Thermocouple		Measurable input limits °C	Measurable input limits °F	Acc. in mea. span %*
tc-jj	J	-160 / 1200°C	-256 / 2192°F	0,1 %
tc-CA	K	-270 / 1370°C	-454 / 2498°F	0,1 %
tc-nn	N	0 / 1300°C	32 / 2372°F	0,1 %
tc-Ss	S	-50 / 1770°C	-58 / 3218°F	0,1 %
tc-bb	B	200 / 1820°C	392 / 3308°F	0,1 %
tc-C5	W5	0 / 2300°C	32 / 4172°F	0,1 %
tc-tt	T	-270 / 410°C	-454 / 770°F	0,1 %
tc-rr	R	-50 / 1770°C	-58 / 3218°F	0,1 %
tc-EE	E	-120 / 1000°C	-184 / 1832°F	0,1 %
tc-CC	W	1000 / 2300°C	1832 / 4172°F	0,1 %
tc-C3	W3	0 / 2480°C	32 / 4496°F	0,1 %
tc-LL	L	-150 / 910°C	-238 / 1670°F	0,1 %

* or 10µV typical (20µV max.) for R, S, B
25µV typical (50µV max.) on the others

4.5.4 Input resistance and potentiometer

• Resistance

Caliber	Measurable input limits	Measure span accuracy
0 / 400 Ω	0 / 440 Ω	0,1%
0 / 2000 Ω	0 / 2200 Ω	0,5%
0 / 8 KΩ (option)	0 / 8,8 KΩ	0,1%

• Potentiometer :

Caliber	Measure span accuracy
from 100Ω to 10 KΩ	0,1%

4.5.5 LOGIC inputs (optional)

• Board of 2 LOGIC Inputs : Input signal 24 Vdc

Possible functions :

HoLd Holds display in case function LOGIC is enabled .
Display and analogue output remain still in case of input signal variation. The relays will continue to react to the input signal.

CLr.M Reset min. and max. to zero. Enabling function LOGIC will reset min. and max. to zero

tArE Enable function tare.
The meter passes in mode tare, tare being the display value present at the moment of enabling.

Point Function decimal point moving

_.___ In case function LOGIC is enabled, the decimal point places itself like programmed.

4.6 Output features and programming limits

4.6.1 Analogue output Out.MA or Out.U

Current output 0/4-20mA active or passive (Vmax.=30VDC) or voltage output 0-10V

• Accuracy 0,1 % in relation to display (at +25°C)
• Residual drift ≤ 0,2%
• Admissible load 0Ω ≤ Rc ≤ 500Ω (current)
Rc ≥ 2 kΩ (voltage)
• Scale ratio programmable with enlarging effect
• Response time : 40 ms in relation to display

d.out Analogue output down scale (eg 04.00 (4mA))
F.out Analogue output full scale (eg 20.00 (20mA))
d0.diS Display value corresponding to output down scale
F0.diS Display value corresponding to full scale value

In mode measure, the analogue output can not overstep10% of the greatest of the 2 values : d.out and F.out

4.6.2 Digital output :

- Data link RS485 (2 wires)
- Protocoles **MODBUS-JBUS** data format : integer and double integer
- One transmission format only : 1 start bit
  8 parityless bits
  1 stop bit

SLAuE	Slave number included between 1 and 255
bAud	Baud rate included between 1200 and 19200 bauds
dELAY	Delay to be counted before any answer pattern

Table of modbus addresses, functions used, see annexe p25

4.6.3 Relay outputs :

2 relay outputs rEL.1 rEL.2
or 4 relay outputs rEL.1 rEL.2 rEL.3 rEL.4

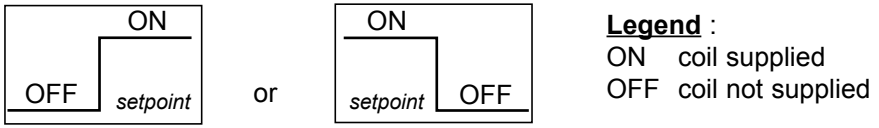
- Hysteresis programmable independently in the display unit
- Temporisation programmable independently from 0 to 25 s in 0,1s. increases
- NO-NC contact 8 A - 250 V on resistive load

Enable or disable alarm x AL.X

On	The state of relay x depends on the entered programming
OFF	Relay x remains still

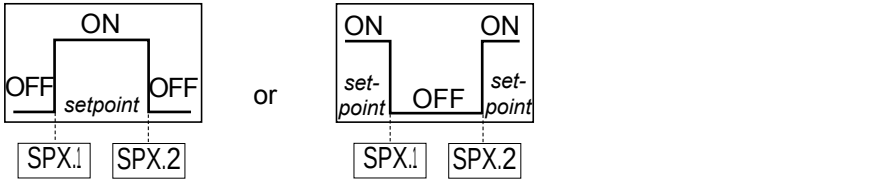
Choice of function mode : ModE.x

- **Mode setpoint**



Legend :
ON coil supplied
OFF coil not supplied

- **Mode window**



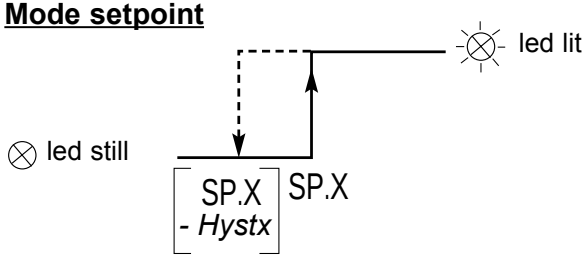
Choose state of the Led associated with the relay LEdx

The Led indicates the state of alarm

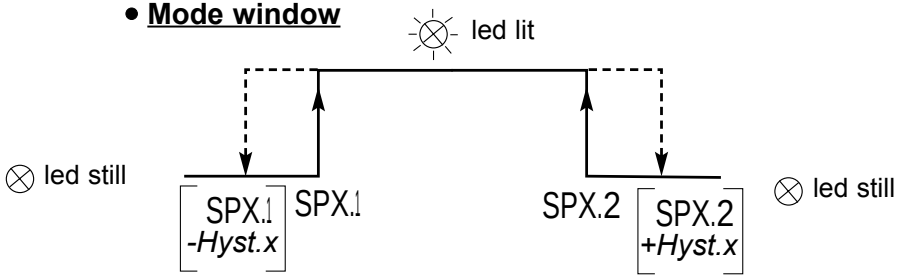
On	The Led is lit when relay enabled (coil supplied)
OFF	The Led is still when relay enabled (coil supplied)

HYSt.x Adjust hysteresis in display points.
The hysteresis is enabled as the Led passes from lit to still, i.e. when alarm stops, as the Led represents the alarm state.

- **Mode setpoint**



- **Mode window**



• **Alarm delay** tiME.x

The relay delay is adjustable from 000.0 to 025.0s., in 0,1s. increases. It is active on enabling and disabling.

• **Alarm recording** MEM.x

Allows alarm recording when setpoint is passed. As measure comes back bellow the alarm setpoint, the relay remains enabled and the Led flashes to warn the user that the setpoint has been passed (to set alarm recording to zero see menu CLEAr p18).

Note : Return from programming mode saving configuration will reset alarm recordings to zero.

• **Display of alarm messages** MESSx

You can have the display to show a programmed alarm message alternating with measure. The message will appear only as alarm is ON, i.e. when the associated Led is lit.

• **Setting of setpoints :** You have 2 ways to adjust setpoints.

- either in mode programming entering the correct access code
- or by pressing simultaneously (M) and (△) if access to fast entering has been authorized during code programming (see p17)

4.6.4 Safeties :

• **Self diagnosis :** diAG

The meter permanently watches any drifts of its components that may surge. The self-diagnosis serves to warn the user from abnormal increases of these drifts before they provoque false measures.

The error self diagnosis information can be transmitted :

· *On the display* : An error will appear alternating with measure; an error code is entered and can be read in menu About (see p17)

Coding :
1 : Programming error
2 : Gain error
4 : Offset error
8 : Input calibration error
16 : Output calibration error
32 : Cold Junction Compensation error

If the instrument detects an offset error for instance (4) and a gain error (2) the **error code value will be 6** (4+2).

· *On relays :*

OFF	No influence of an error self diagnosis on the relay
LO	Relay disabled (coil not supplied) in case of error self-diagnosis
HI	Relay enabled (coil supplied) in case of error self-diagnosis

Note : The led is still or lit according to its programming in menu rELAY.

· *On the analogue output*

If a return value is programmed
Value included between : 0 and 22 mA (current output)
or 0 and 11 V (voltage output)

• **Sensor rupture** ruPt

The sensor rupture can be detected on inputs mV, CT, Pt100, Ni100, ΔPT100, resistance (0-400Ω), and current if down and full scale > 3,5 mA.

The sensor rupture information can be transmitted :

· *On the relay*

OFF	No influence of sensor rupture on the relay
LO	Relay disabled (coil not supplied) in case of sensor rupture
HI	Relay enabled (coil supplied) in case of sensor rupture

Note : The led is still or lit according to its programming in menu rELAY.

· *On the analogue output*

If a return value is programmed
Value included between : 0 and 22 mA (current output)
or 0 and 11 V (voltage output)

· *On the display* : Message OPEn

Note **:** The sensor rupture detection has priority on the self diagnosis.

• **Disconnect sensor rupture** *(If input mV or temperature)*

You can disconnect sensor rupture, in order not to disturb some calibrators that may be sensitive to the rupture detection current :
In menu SECU :

CAPt	Disconnect sensor rupture, or not
On	Not disconnect sensor rupture
OFF	Disconnect sensor rupture

4.6.5 **Display features** :

Point — Placing of decimal point for inputs other than temperature

rESOL. — Display resolution for temperature inputs **0,1°**or **1°**

d.diSP — Display corresponding to input down scale (except temperature input)

F.diSP — Display corresponding to input full scale (except temperature input)

Cut.oF — Only for inputs process, resistance, potentiometer, expressed in display points.

– If display full scale > display down scale and if display ≤ cut off value then it is maintained at down scale.

– If display full scale < display down scale and if display ≥ cut off value then is is maintained at down scale.

• **Response time** :

intEG — Digital filtering integration indice :
Programmable from 0 to 10; to be used in case of unsteady input signal.

intEG	0	1	2	3	4	5
Typical response time at 90%	120 ms	400 ms	600 ms	1 s	1,4 s	2 s

6	7	8	9	10
3 s	5 s	7,5 s	10 s	15 s

To have the max. response time, add 240 ms.

Note : For the analogue output response time, you have to add 40ms to values given in this table.
For the relays : you have to add the delay programmed on the alarms.

• **Adjust digits brightness** br.diG

1 1 1 1 1 Lowest brightness 44444 Highest brightness

• **Adjust brightness of bargraph and Leds** br.bAr

1 1 1 1 Lowest brightness 4444 Highest brightness

The brightness level is visualised directly on Leds 5 to 8 and on the bargraph.

Caution : during adjusting, the 4 Leds and the bargraph no longer represent measure, like also in mode reading.

• **Inhibition of last digit** *(LSB)* L.dIG

In the programming mode, menu L.dIG allows to suppress the last digit of display, the latter being enforced to 0 if OFF is enabled.

• **Erasing of unsignificant zeros** nuLL

nuLL = YES Erases unsignificant left hand zeros.

Eg : Display value 0015

nuLL = no Display 0015

= YES Display 15

Eg : Display value 00.15

nuLL = no Display 00.15

= YES Display 0.15

• **Bargraph display factor** (option bargraph only)

d.bArG Display corresponding to still bargraph (0%)

F.bArG Display corresponding to a fully lit bargraph (100%)

In case of overstepping, the bargraph starts to flash. A sensor rupture is indicated on the bargraph by lighting of one Led out of two.

• **Programming of Leds 5 to 8**

Programming of Led 5 LEd5

no Led still (no function associated)

tArE Led 5 indicates that the instrument is in mode tare

tor 1 Led 5 is lit when LOGIC input 1 is active

Programming of Led 6 LEd6

no Led still (no function associated)

tor 2 Led 6 is lit when LOGIC input 2 is active

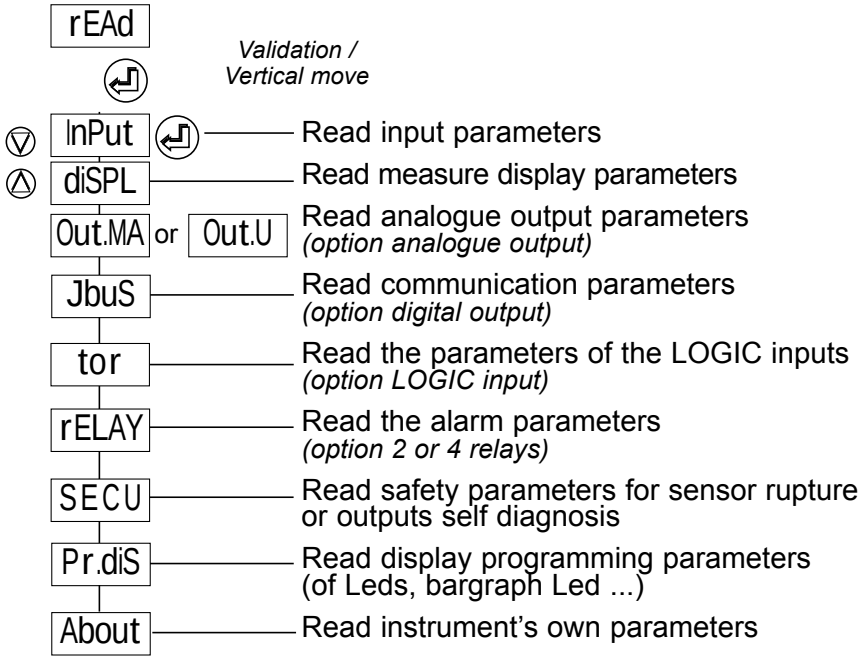
Programming of Led 7 LEd7

no	Led still (no function associated)
rS	Led 7 is lit during instrument response

Programming of Led 8 LEd8

no	Led still (no function associated)
AdJuS.	Led 8 is lit when a shifting of display down and/or full scale has been entered (see p20) *(temperature inputs only)*

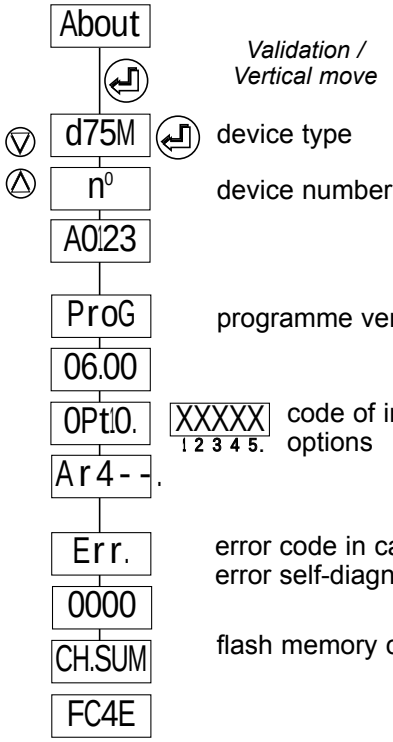
4.7 Configuration reading rEAd



In each reading submenu, press ▽ and △ to move, and ↵ to visualise parameters.

If no key is pressed during 20 s., the instrument will revert to measure display.

Submenu



XXXXX (1 2 3 4 5.)

X1 : - : No analogue output
A : Analogue output

X2 X3 : - - : No relay output
r- : Output 2 relays
r4 : Output 4 relays

X4 : - : No RS output
n : RS output

X5 - : No LOGIC input
t : 2 LOGIC inputs

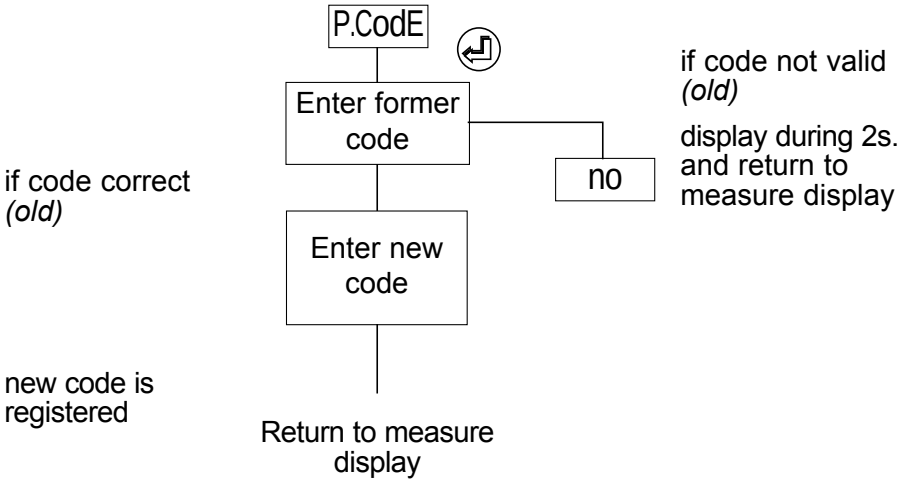
(.) : decimal point still : no bargraph
"." : decimal point lit : option bargraph

4.8 Access code

An access code adjustable from 0000 to 9999 serves to protect the meter and the setpoints from unauthorized programming, and to lock access to some functions.

0 0 0 0	Factory code
x x x x	
0 to 5	Access to display shifting
6 to 9	No access
0 to 5	Access to display and output simulations
6 to 9	No access
0 to 5	Access to function "tare" (except temperature inputs)
6 to 9	No access
0 to 5	Access to fast entering of alarm setpoints
6 to 9	No access

4.9 Programming of a new access code



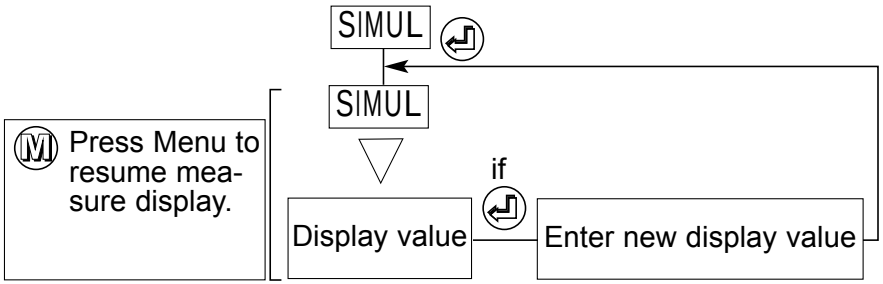
Reminder : If no key is pressed during 1 min, the instrument will revert to measure display.

4.10 Functions accessible in the main menu

4.10.1 Display simulation

(accessible according to programmed access code and if option relays or analogue output)

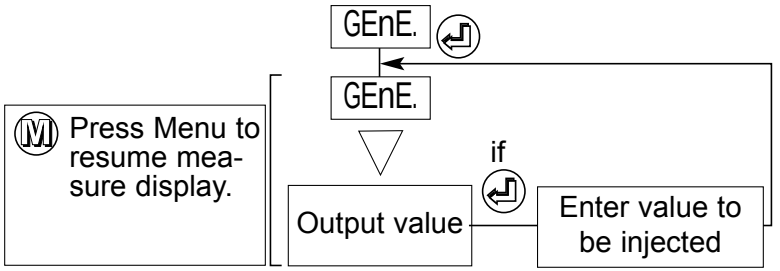
Display can be simulated with the meter in order to validate the analogue output and relay outputs configuration in the system.



Note : During simulation, the instrument no longer measures, the analogue and the relay outputs react according to entered display value.
If alarm messages have been programmed, they can appear during simulation.

4.10.2 Analogue output simulation *(mode generator)*

(accessible according to programmed access code and if option analogue output)

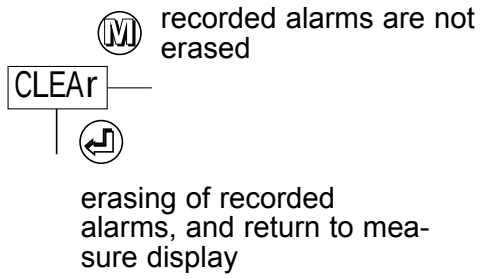


Note : During simulation, the instrument goes on measuring, only the analogue output no longer reacts to measure.

4.10.3 Menu CLEAr : Erasing of recorded alarms

If function alarm recording has been programmed :
After passing the setpoint, the relay state is recorded.

If the setpoint is passed in the opposite way, the relay does not change state and the corresponding Led starts to flash.
To come back to the normal state (Led not flashing and relay in the correct state, use menu CLEAr).

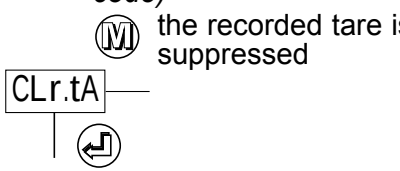


Reminder : If no key is pressed during 20 s.,
the instrument will resume measure display.

Note : Exit from programming mode saving configuration will reset recorded alarms to zero.

4.10.4 Menu CLr.tA : to suppress programmed tare

(accessible according to programmed access code)

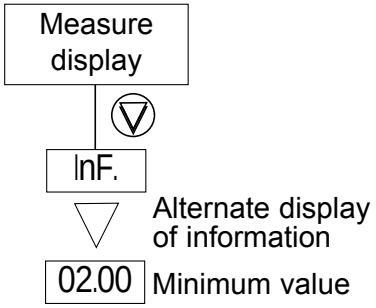


Reminder : If no key is pressed during 20 s., the instrument will resume measure display.

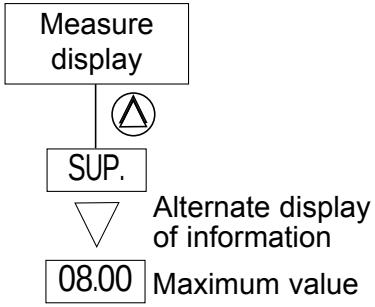
5. FUNCTIONS DIRECT from DISPLAY

5.1 Functions that require pressing only 1 key :

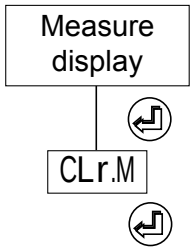
a / Display min. value



b/ Display max. value



c / Erase maximum and minimum values



erase recorded min. and max., and return to measure display

M the instrument resumes measure display.

Reminder : If no key is pressed during 20 s., the instrument will resume measure display.

Note : Exit from programming mode saving configuration will reset min. and max. values to zero.

5.2 Functions that require pressing several keys :

5.2.1 Display shifting

(accessible according to programmed access code)

△ ▽ Shift display down scale (AdJ.Lo)

↵ M Shift display full scale (AdJ.Hi)

After injecting an input signal corresponding to down (or full) display scale, press simultaneously on keys △ and ▽ (or ↵ and M . Message AdJ.Lo (AdJ.Hi) appear alternating with the value, to indicate you are in the adjusting menu.

By pressing △ and ▽ you can also decrease or increase the down (or full) display scale.
If you keep pressing during 3s. on △ or ▽ you will have access to fast decreasing or increasing of the display value.
Press ↵ to validate the shifting. Once shiftings are validated, the shifted input will keep this shifting even if set out of tension.
Pressing M (or no pressing during 20 s) will induce return to measure display without modification.

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

The instrument will then readjust its scale factor and its display factor in order to obtain the required result on the display.

• **Case of a temperature input**

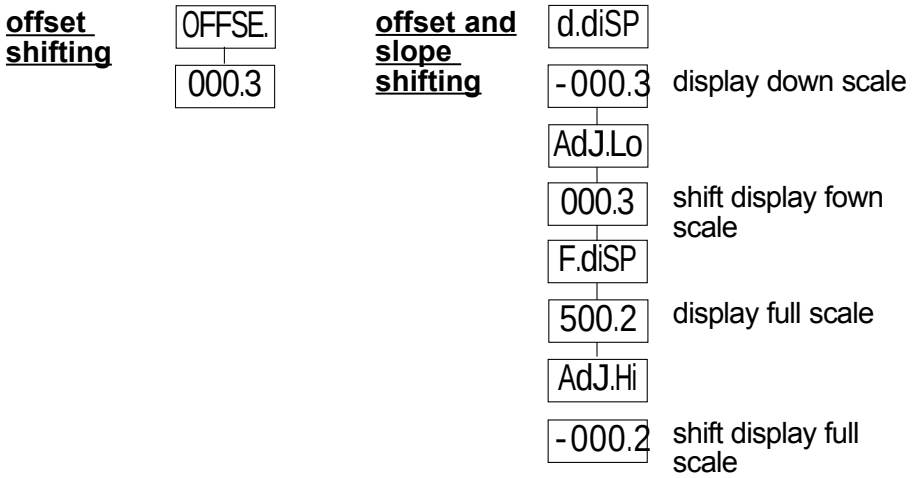
On a temperature input; if one of the two settings is performed : this corresponds to an offset, which means all points will be shifted by an equal quantity.

However, if both settings are performed, slope and offset will have to be corrected, in order to obtain the required result.

example :

Say an RTD 100 input for 0°C, the obtained display is -000.3
At 500°C the obtained display is 0500.2. To correct this display, you have to shift the display down scale by 3 points to obtain 000.0 and shift the display full scale by -2 points to obtain 0500.0.

note : Only for **temperature inputs** :
From menu rEAd, the performed scale shiftings can be visualised in sub-menu InPut :



Suppress input shifting :
(Case of temperature input only)
Menu AdJuS. in mode programming of a temperature input allows to suppress or not suppress the entered shift.

no : the instrument returns to the settings it had on factory exit
Yes : the instrument takes new entered settings (offset and/or slope) into account.

5.2.2 Direct measure visualising

Press ▽ and M to visualise the signal directly, without processing : scale factor, square root, linearisation

– in mV, V or mA for process inputs,
– in mV for thermocouple input,
– in Ω for input Pt100, Ni100,
– in Ω for resistance input,
– in percentage for potentiometer input,
– hot sensor temperature for ΔPt100 input.

5.2.3 Visualisation and setting of alarm setpoints

Option 2 or 4 relays

Setting of setpoints : 2 ways are possible to adjust setpoints.

- either in mode programming entering the correct access safety code (see p17)
- or pressing simultaneously on △ and M

The display will then show message SP.x ou SPx.x alternating with the corresponding setpoint value.

To access the various setpoint values, press ▽ and △.

You can then modify the setpoints (if access code < 6000 (see p17)). by pressing ↵

Once the setpoint is adjusted, press ↵ to come back to the setpoint reading menu.

Once all setpoints are adjusted, just press M and the meter will revert to mode measure, taking the new values into account.
If no key is pressed during 60 s., the meter reverts to measure display without setpoint value modification.

5.2.4 Tare setting (except temperature inputs)

(accessible according to programmed access code)

Press ↵ and ▽ to enforce the display at display down scale for the input signal d.dISP

Note : The tare will not be recorded in case of power supply cut.
To suppress the tare, validate menu CLr.tA in the main menu p19
Exit from programming mode saving the configuration will reset the tare to zero.

6. ERROR MESSAGES

2000	Measure overstepping	- - -	Electrical lower or upper input overstepping
OPEn	Sensor rupture	O.L.	Overstepping of displayable value
Err.1	Value set out of range	Er.xxx	Error self-diagnosis (see p15)

7. GENERAL WARRANTY TERMS

WARRANTY applying and duration
The company garantees this instrument for a duration of 1 year from any design or manufacturing defects, under normal operating conditions.

Intervention terms * : The processing out of warranty will be subject to acceptance of a proposal. The products will have to be returned at the customer's expense to the company, who will return them at its cost after processing. Without a written agreement on the repair quotation within 30 days, the products will not be kept.

** Details and complete warranty terms available on request.*

8. LEXIQUE

Messages shown by the meter in mode programming and/or reading

General access

rEAd	Access to parameter reading
ProG	Access to programming of input and output parameters
CodE	Code for access to programming input and output parameters
P.CodE	Programming of a new access code
SiMUL	Access to display simulation
GEnE	Access to analogue output simulation
CLEAr	Erasing of recorded alarms
CLr.tA	Tare suppression

Inputs

- InPut — Acess to input programming submenu
  - tYPE — Input type
    - U — Voltage input
    - MA — Current input
    - tEMP — Temperature input
    - Pot — Potentiometer input
    - rES — Resistance input

Voltage input and current input [U] [MA]

- CALib — Choice of voltage caliber
  - 0-10 — Input 0 to 10 V (or -10/10V)
  - 300 — Input 0 to 300 V (or -300/300V)
  - 0-0.1 — Input 0 to 100 mV (or -100/100mV)
  - 0-1 — Input 0 to 1 V (or -1/+1V)
- d.in — Input down scale
- F.in — Input full scale
- Funct — Choice of processing function
  - LinEA. — Linear
  - root — Square root extraction
  - Li.SPE — Special linearisation
    - nb — Number of linearisation points
    - Axx — Abscisse of a special linearisation point

Temperature input [tEMP]

- CAPt. — Type of temperature sensor
  - Pt 100 — Input RTD 100
  - tc — Input thermocouple
    - tc - - — Type of thermocouple
      - tc.CA — Thermocouple K (see table page p13)
    - CJC — Type of cold junction compensation
    - CJC-I — Internal cold junction compensation
    - CJC-E — External cold junction compensation
    - CJ-t° — Value of external cold junction compensation
  - dPt — Input delta PT100
  - ni 100 — Input NI100
- t° — Type of degrees
  - °C — Degree Celcius
  - °F — Degree Fahrenheit
- AdJuS. — Input shifting
- OFFSE. — Offset shifting
- d.diSP — Shift display down scale slope and offset
  - AdJ.Lo — Adjust display down scale
- F.diSP — Shift display full scale slope and offset
  - AdJ.Hi — Adjust display full scale

Potentiometer and resistance input [Pot] [rES]

- d.in — Input down scale
- F.in — Input full scale
- Funct — Choice of processing function
  - LinEA. — Linear
  - Li.SPE — Special linearisation
    - nb — Number of linearisation points
    - Axx — Abscisse of a special linearisation point

LOGIC inputs

- tor — Access to LOGIC inputs programming submenu
- tor 1 — Programming of LOGIC input 1
- tor 2 — Programming of LOGIC input 2
  - Point — Function decimal point moving
    - - - . - — -Decimal point position
  - CLr.M — Function erase min. and max.
  - HoLd — Function hold display
  - tArE — Function Tare

Display

- diSPL. — Access to display programming submenu
  - Point — Choice of decimal point position
    - - - . - — -Decimal point position
      - d.diSP — Display down scale
      - F.diSP — Display full scale
      - bxx — Ordinate of a special linearisation point
  - Cut.oF — Cut-off programmable or not
  - rESOL. — Display resolution for temperature inputs
    - 0.1°0 — Resolution 1/10th degree
    - 1°0 — Resolution degree
- IntEG. — Integration indice

Display parameters

- Pr.diS — Display features programming submenu
- br.diG — Digits brightness setting (4 levels)
  - 1111 — Lowest brightness
  - 4444 — Highest brightness
- br.bAr — Set bargrpah and Leds brightness
  - 1111 — Lowest brightness
  - 4444 — Highest brightness
- L.dIG — Last digit (LSB)
  - On — Last digit in service
  - OFF — Last digit enforced to 0
- nuLL — Erasing of unsignificant zeros
  - YES — Yes
  - no — No
- d.bArG — display corresponding to 0% of bargraph
- F.bArG — display corresponding to 100% of bargraph
- LEdS — *Dedication of Led 5*
  - no — No dedication
  - tArE — Led lit if a tare has been entered
  - tor 1 — Led 5 dedicated to indication of LOGIC input 1
- LEd6 — *Dedication of Led 6*
  - no — No dedication
  - tor 2 — Led 6 dedicated to indication of LOGIC input 2
- LEd7 — *Dedication of Led 7*
  - no — No dedication
  - rS — Led lit in case of RS transmission
- LEd8 — *Dedication of Led 8*
  - no — No dedication
  - AdJuS. — Led lit when an input shifting has been entered (temperature input only)

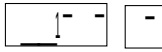
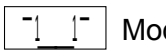
Analogue output

- Out.U — Access to voltage output programming submenus
- Out.MA — Access to current output programming submenu
  - d.out — Analogue output down scale
  - F.out — Analogue output full scale
  - d0.diS — Access to the display corresponding to output down scale
  - F0.diS — Access to the display corresponding to output full scale

Digital output

- JbuS — Access to RS output programming submenu
- SLAuE — Slave number
- bAud — Baud rate
  - 1200 — Possible rates
  - 19200 — Possible rates
- dELAY — Delay before any answer
  - On — 75ms delay
  - OFF — 20ms delay

Relay outputs : x : 1 to 4

- rELAY — Access to relay outputs programming submenu
  - rEL.x — Access to relay X programming
- AL.x — Enable relay output 1
  - On — Enable
  - OFF — Disable
- ModE.x — Relay x function mode
  -   — Mode setpoints
  -   — Mode window
  - SPx — Value of setpoint in mode setpoint
  - SPx.1 — Value of 1st setpoint in mode window
  - SPx.2 — Value of 2nd setpoint in mode window
- HYSt.x — Hysteresis value in display points
- tiME.x — Delay on relay X
- LEdx — Programming of the led associated with the relay
  - On — Led lit when relay is enabled (coil supplied)
  - OFF — Led still when relay is enabled (coil supplied)
- MEM.x — Alarm x recording
  - YES — Recording
  - no — No recording
- MESSx — Alarm message
  - YES — Message
  - no — No message

Safeties

- SECU — Access to safeties programming submenu
  - rUPt — Programming of sensor rupture safety
    - CAPt. — Disconnect sensor rupture (or not)
      - OFF — Enable disconnection
      - On — Disable disconnection
    - rEL.X — State of relay X in case of sensor rupture
      - OFF — No sensor rupture associated with relay
      - LO — Relay disabled in case of sensor rupture (coil not supplied)
      - HI — Relay enabled in case of sensor supply (coil supplied)
    - out.U / out.MA — Output return value (or not) in case of sensor rupture
      - YES — Return value required
      - no — No return value
    - rEPLi — Return value
  - diAG. — Self diagnosis safety programming
    - rEL.X — State of relay X in case of error self diagnosis
      - OFF — No self diagnosis associated with relay
      - LO — Relay disabled in case of error self diagnosis (coil not supplied)
      - HI — Relay enabled in case of error self diagnosis (coil supplied)

out.U / out.MA Return value (or not) on the output in case of error self-diagnosis

or

YES Return value required no No return value

rEPLi Return value

Saving configuration

SAuE Configuration recording

YES Recording no No recording

Reading of instrument internal features

About Access to internal features reading submenu

- d75M Instrument type : DGN 75 U, DGN 75 T, DGN 75 M
- n° A0006 Identification numbers
- PrOG Programme version
- 06.00 Programme version number
- OPtIO. Option code
- Ar - - - Option code value
- Err. Self diagnosis error
- 0000 Type of error
- CH.SuM Check sum display
- FC4E Check sum value

Further functions

- InF. Display minimum value
- SuP. Display maximum value
- CLr.M Erase min. and max.

Error messages

- Err.1 Set value out of range
- OPEn Sensor rupture
- 2000 Flashing measure : measure in overload
- OL Displayable value overstepping
- - - - Input lower or upper electrical overstepping
- Er.xxx Error self diagnosis

9. ANNEXE : MODBUS

9.1 Table of modbus addresses

Address		Format	nb of words
200	Analogue output value in µA (mA output) in mV (10V output)	double integer	2
202	Minimum value of displayed value	double integer	2
204	Maximum value of displayed value	double integer	2
206	Displayed value	double integer	2
208	Direct measure	double integer	2
290	State of relay 1	integer	1
291	State of relay 2	integer	1
292	State of relay 3	integer	1
293	State of relay 4	integer	1

• **Direct measure** :

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

Resistance value in 1/100 th Ω for NI100 and Pt100

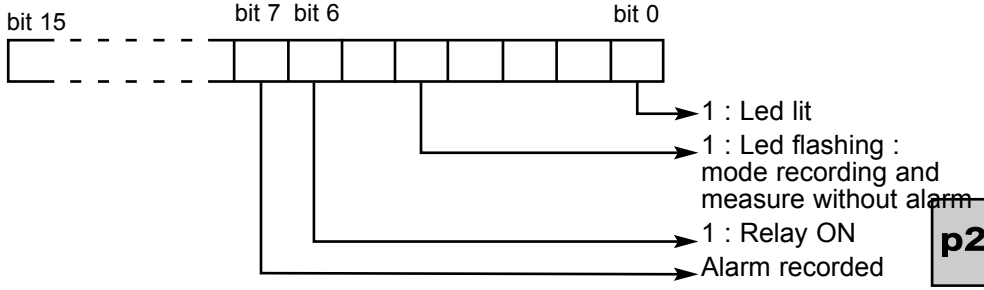
Value of hot sensor temperature in 1/10 th of degree for ΔPt100

Resistance value
- in 1/100 th Ω for resistance input 0-400Ω
- in 1/10 th Ω for resistance input 0-2000Ω
- in Ω for resistance input 0-8000Ω

Value in µV for input thermocouple

Value in 1/100 th of % for input potentiometer

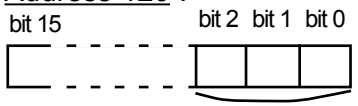
• **State of relays** :



• **Displayed measure :**

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

Address 120 :



Decimal point location 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 decimals
4 : Display with 0 decimals

9.2 Description of born modbus functions :

Reading of N words : Function n°3

Request pattern :

Slave Number	Function 3 or 4	1st word address MSB	1st word address LSB	Number of words MSB	Number of words LSB	CRC 16
1 byte	1 byte	← 2 bytes →		← 2 bytes →		2 bytes

Response pattern :

Slave Number	Function 3 or 4	Number 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 pattern :

Slave Number	Function 16	1st word address	Nbr of W. to be enforced	Nbr of bytes to be enfor.	Value of words to be enforced	CRC 16
1 byte	1 byte	2 bytes	2 bytes	1 byte	← n bytes →	2 bytes

Response pattern :

Slave number	Function 16	1st word address	Nbr of W. to be enforced	CRC 16
1 byte	1 byte	1 byte	2 bytes	2 bytes

Writing of 1 word : Function N°6 :

Request pattern :

Slave Number	Function 6	Word address	Value of W. to be enforced	CRC 16
1 byte	1 byte	2 bytes	2 bytes	2 bytes

Response pattern :

Slave Number	Function 6	Word address	Value of W. to be enforced	CRC 16
1 byte	1 byte	2 bytes	2 bytes	2 bytes

Exception pattern :

Slave Number	Function requested with MSB=1	Error code	CRC 16
1 byte	1 byte	1 byte	2 bytes

Values of error codes :
1 : Function code unknown
2 : Adress incorrect
3 : Data incorrect
9 : Writing impossible

9.3 Reading in double integer format :

Example : Reading of displayed measure

Request :

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

• *Response with positive measure* :

			← measure →				
254	3	4	19	136	0	0	CRC 16
			byte 1	byte 2	byte 3	byte 4	2 bytes

Value of measure :

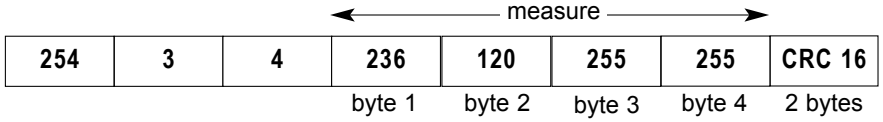
byte 3	byte 4	byte 1	byte 2
00000000	00000000	00010011	10001000
0	0	19	136

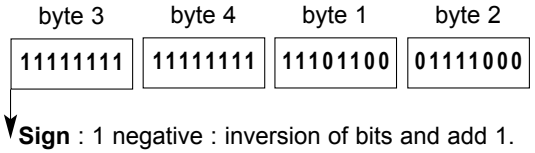
Sign : 0 positive
1 negative

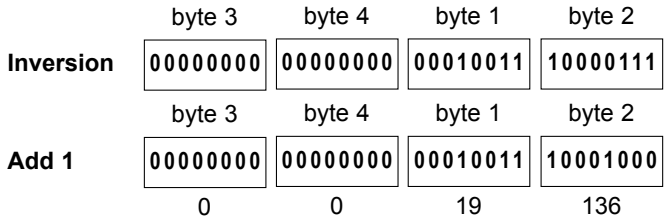
Measure = byte 3 x 256^3 + byte 4 x 256^2 + byte 1 x 256 + byte 2
= 0 x 256^3 + 0 x 256^2 + 19 x 256 + 136
= 5000

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

• *Response with negative measure* :



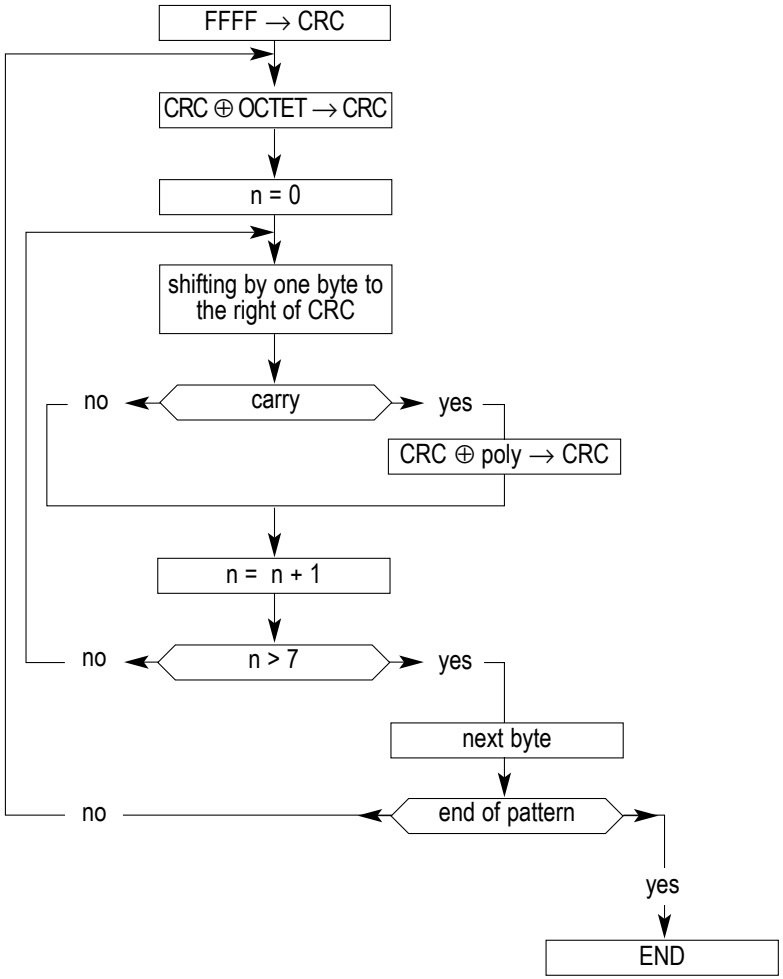




Measure = -(byte 3 x 256^3 + byte 4 x 256^2 + byte 1 x 256 + byte 2)
= -(0 x 256^3 + 0 x 256^2 + 19 x 256 + 136)
= -5000

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

9.4 CRC 16 calculation algorythm :



Note 1 : ⊕ = exclusive or.

Note 2 : POLY = A001 (hex).

Note 3 :
The CRC16 calculation applies to all bytes in the pattern (except CRC16).

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

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