ÉTUDES ET RÉALISATIONS
ÉLECTRONIQUES / INSTRUMENTATIONS / AUTOMATISME

Route de Brindas - Parc d'activité d'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

ARDETEM®

http: *//www.ardetem.com* - ***e-mail:*** *info@ardetem.com*

DIGITAL PANEL METERS

programmable ±10 000 points

DIP 404

User handbook
Valid for instruments with version 04.xx

ARDETEM®

ARDETEM
Soucieu en Jarrest - FRANCE

■ **Summary**

1. PRESENTATION

The series **DIP 404** 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 allow display, control and transmission of data from alternating voltage, alternating current and of frequencies from alternating signals.

• DIP 404

Measurement of an alternating voltage, an alternating current and of the frequency of an alternating signal.

- 2 programmable voltage calibers : 150V and 500V

Un = 150 VAC and 500 VAC
Overstepping 1.2 Un

- 2 programmable current calibers : 1A and 5A

In = 1.2A and 6A
Overstepping 1.2 In
Automatic caliber on 0-500V, 0-5A possible

- Voltage overload

permanent : 750 V
during 10s : 1000 V

- Current overload

permanent : 10A
during 10s : 50A

- Frequency : 45 Hz to 65 Hz
- Accuracy rating :

0.2 % voltage / current (at 25°C)

- Measure cycle

55 ms

- Display :

3 magnitudes can be programmed for a display accessible simply by pressing 1 key.

AVAILABLE OPTIONS : ***(specify on order)***

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

Relay output : R or R4
2 or 4 relays :
Setpoint relays :
mode setpoint or mode window.

Latching function.
Time delay and hysteresis adjustable on each setpoint.
Alarm messages

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

LOGIC input 2 insulated LOGIC inputs with programmable functions
Display hold,
Min. and max. zero reset

Bargraph : (16 led display) : B
Allows a quick evaluation of the measured value variations.
Programmable scale factor
Possibility to programme 3 bargraphs (1 for each displayed parameter)

General features

- Input impedance ≥ 1 MΩ for the voltage inputs
  < 0.2 VA for the current input
- Common mode rejection rate : 130 dB
  Serial mode rejection rate : 70 dB 50/60 Hz
- Thermic drift < 200 ppm/°C
- 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 emissions and EN 50082-2; on immunity (in 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.
  CE marking according to Directive EMC 89-336

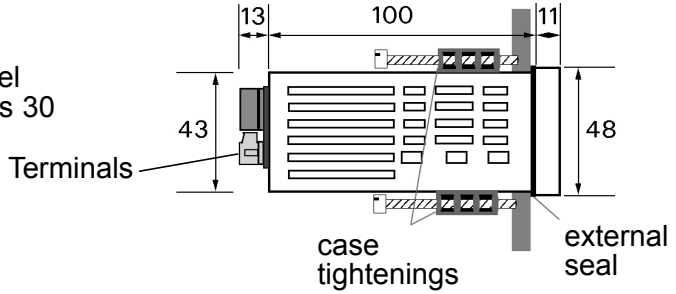
- **Environment** :

Operating temperature : -5° to 55°C
Storage temperature : -30° to 80 °C
Relative dampness : 80% annual average.

2. SPACE REQUIREMENTS

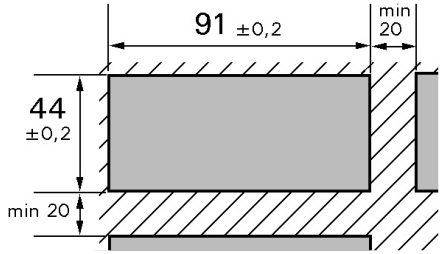
Case dimensions : (with terminals)

96 x 48 x 124 mm



Panel mounting

cut out 44 x 91 mm



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

Case :
Self-extinguishing casing of black UL 94 V0 ABS.

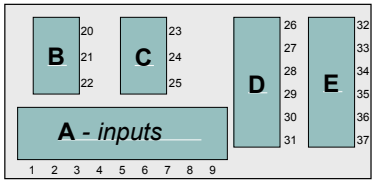
Connectors plug-off connectors on rear face for screwed connections (2.5mm², flexible or rigid)

Display : ±10 000 points (14 mm)
Electroluminescent red (green optional)
4 alarm leds

-2 000 / +10 000 points (20 mm) (consult)

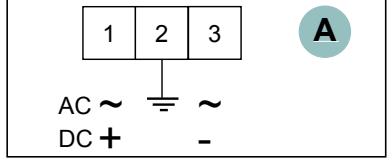
3. WIRING

Wiring recommendations
The input network may carry significant disturbances, and they may disturb the complete chain. In order to avoid this, the disturbance immunity can be made significantly better by respecting following rules :
- do not connect close to each other : the input network and the DIP 404 power supply wires,
- do not connect close to each other : the input network and all the DIP 404 output wires,
- use for all DIP 404 outputs shielded cables connected to the ground on both extremities.

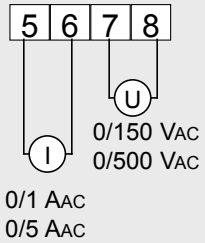


Location of terminals
(view of case rear side)

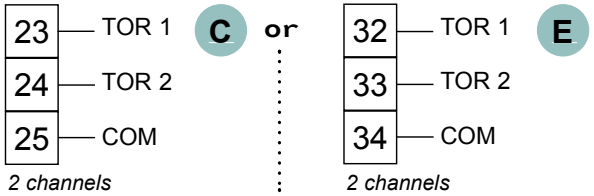
POWER SUPPLY



INPUTS

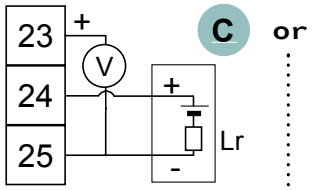


LOGIC INPUTS
(options)



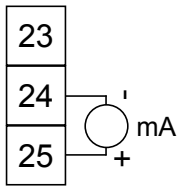
OUTPUTS (options)

VOLTAGE
PASSIVE CURRENT



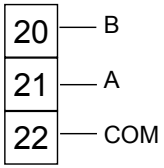
0-4/20mA passive
external source 30 V max.

ACTIVE CURRENT

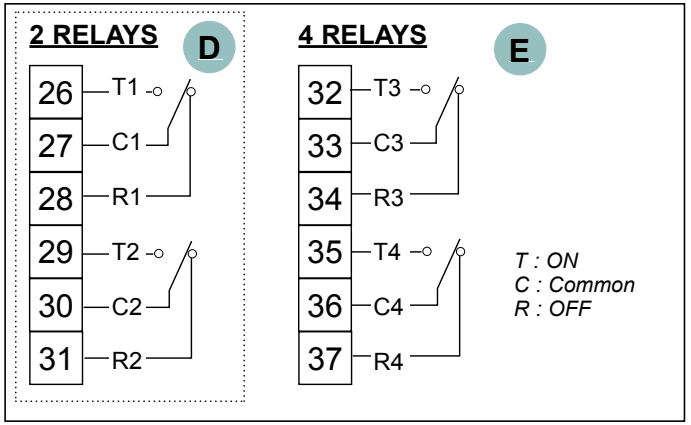


0-4/20mA active

DIGITAL



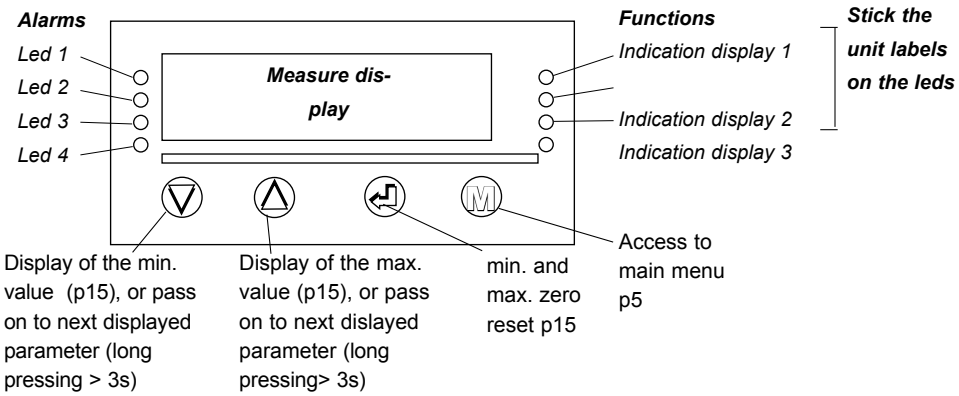
Data link RS 485



4. PROGRAMMING

4.1 Communication with the instrument

Several functions can be accessed from measure :



Further functions can be reached by pressing several keys simultaneously :

- ▲ + ▼ Automatic voltage cut-off setting; (see p16)
- ↵ + M Automatic current cut-off setting; (see p16)
- ▼ + M Visualisation of the measure unit; (see p16)
- ▲ + M Visualisation and setting of the alarm setpoints; (see p16)
- ▲ + ↵ Modification of the display resolution; (see p16)
- ▼ ↵ M Recording of the current display as the display which will appear on setting on tension.

Reading convention :

- ——— Move through the main menu
- ·····➤ Revert to previous menu
- ▭ Blinking display : awaiting validation or setting
- ▽ Alternate information display

Entering of a parameter :

6888 first start by increasing or decreasing the 1st digit and the sign : from -9 to +9. ▲ + ▼

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 with key ↵

6.520 and choice of the decimal point by ▲ and ▼ validate this choice by ↵

1 | 10 3 | 10 6 | 10 9 and choice of the unit by ▲ and ▼ validate this choice by pressing key ↵

4.2 Orientation through the programming

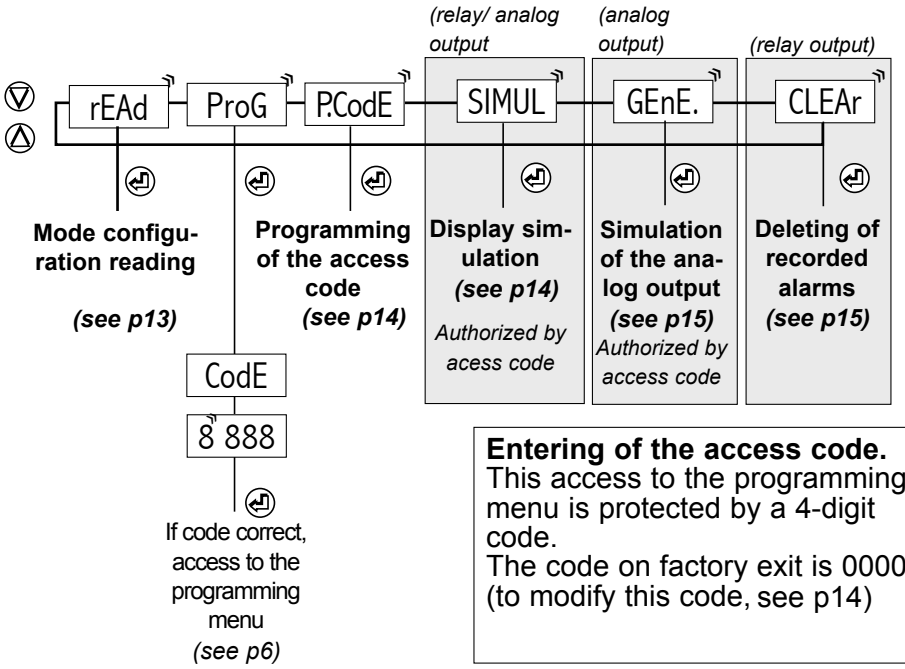
Dialogue is ensured by 4 keys located on the front face.

▼	▲	M	↵
Move through menus : downwards, or decrease the value shown	Move through menus : upwards, or increase the value shown	Exit from a sub-menu to access next menu / access to the programming exit menu	Validation of the displayed parameter, or access to a sub-menu

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 move**



Entering of the 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 p14)

4.4 **Programming menu** *(according to options)*

InPut	Access to the programming of the network type, CT and VT ratios ...	p6
dISPL.	Access to the programming of the 3 displays, the voltage and current cut-off, filtering	p7
OUt.MA or OUt.U	Access to the analog output programming *(option analog output)*	p7
JbuS	Access to the communication parameters *(option digital output)*	p8
tor	Access to the programming of the LOGIC inputs *(option LOGIC inputs)*	p8
rELAY	Access to the relay programming (2 or 4 relays) *(option relay outputs)*	p8
SECU	Access to the programming of the relay outputs in case of error self-diagnosis	p9
Pr.diS	Access to the display programming : Leds, Bargraph, Display brightness	p9
SAvE	Access to the programming exit menu with or without recording the configuration	p10

Note :

⇒ Press key (M) to revert to menu SAvE

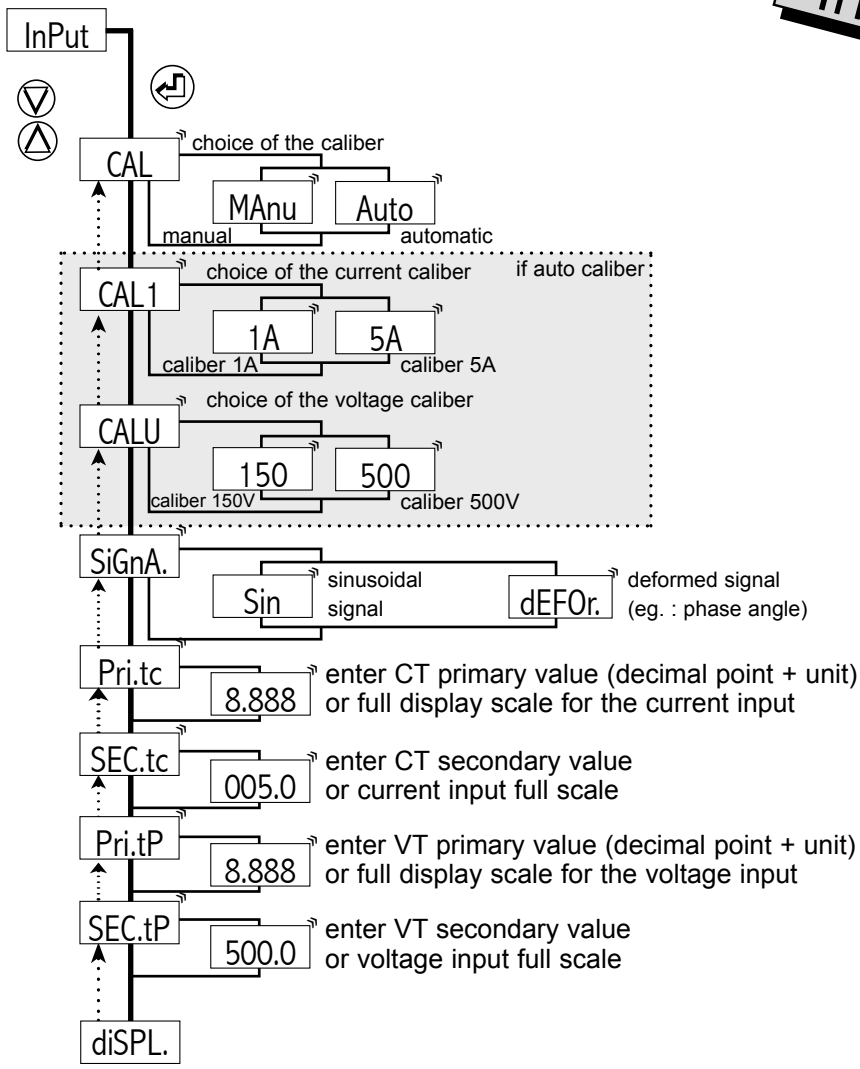
⇒ In mode programming, the instrument will automatically revert to measure with the former configuration if no key is pressed during 1min.

(▽)(△) Move through menus / choice

(M)	Menu exit /access	(△)	Upwards move / increase
(▽)	Downwards move / decrease	(↵)	Validation / Vertical move

4.4.1 **Programming of the input**

InPut

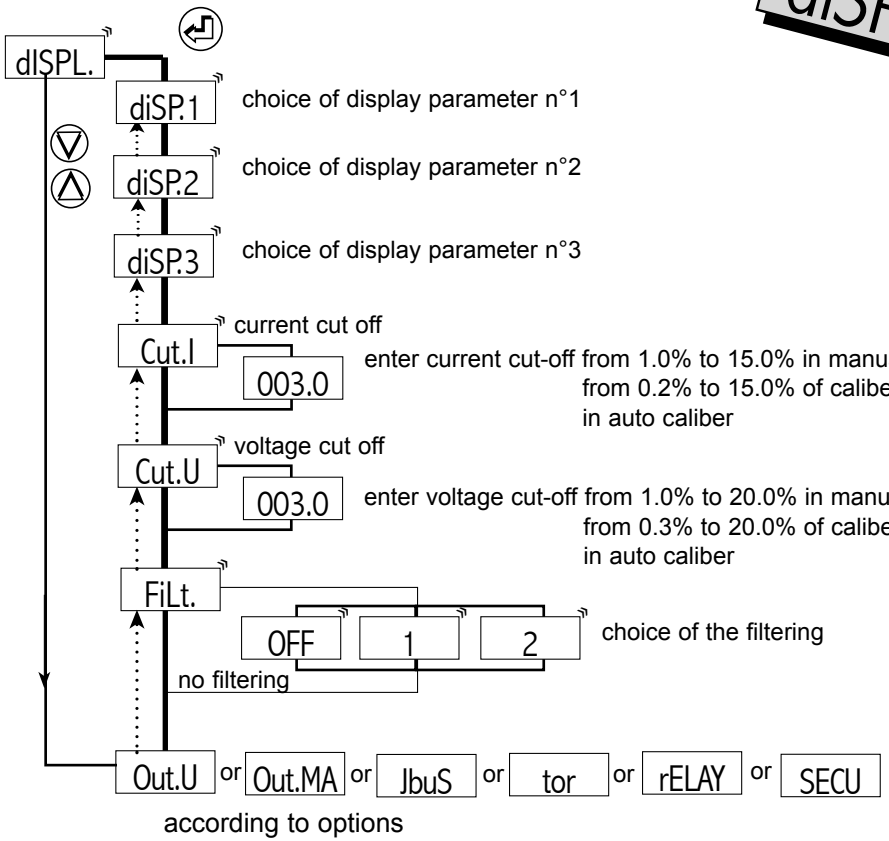


Note :

Press (M) to revert to menu diSPL.

4.4.2 Programming of the display

diSPL.



Choice of the display parameters

U, I, FrE.

U : voltage

I : current

FrE. : network frequency

Note :

Press (M) to go on to next menu

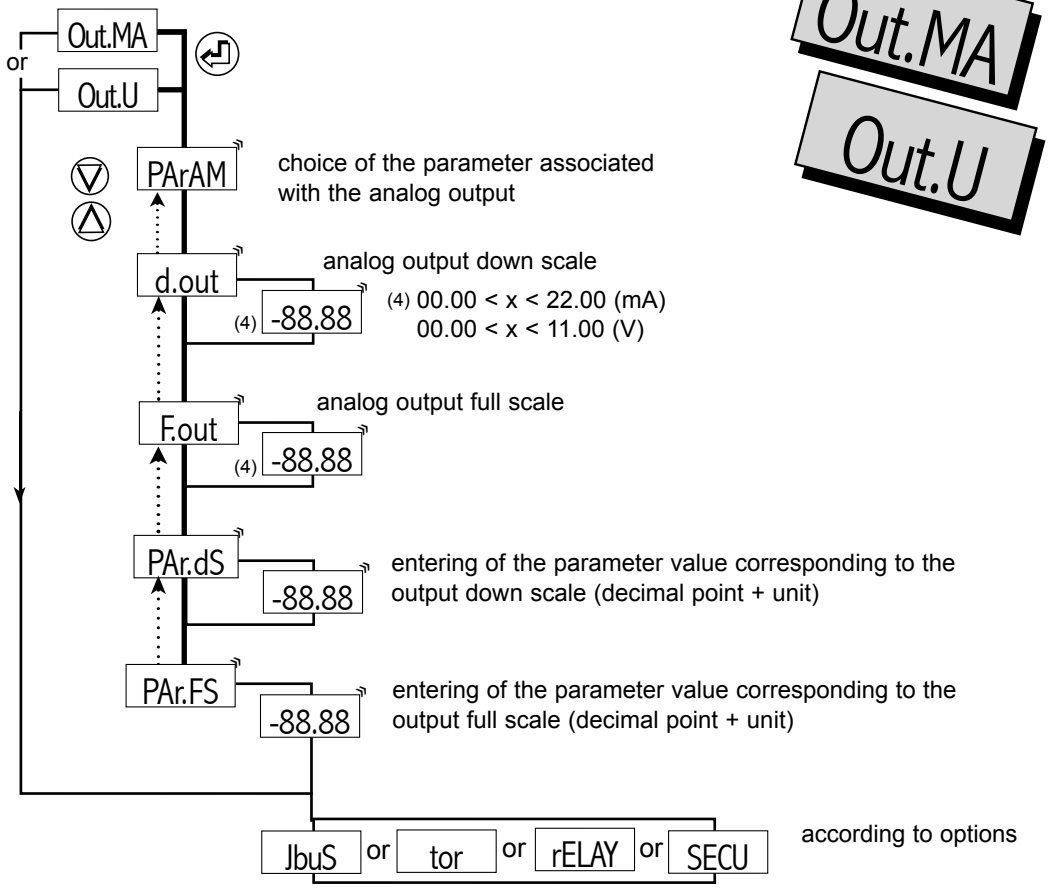
(▽) (△) Move through menus / choice

(M) Menu exit / access	(△) Upwards move / increase
(▽) Downwards move / decrease	(↵) Validation / Vertical move

4.4.3 Programming of the analog output

Out.MA

Out.U



see also the output features p11

Choice of the parameter dedicated to the analog output : U, I, FrE.

U : voltage

I : current

FrE. : network frequency

Note :

Press (M) to go on to next menu

(▽) (△) Move through menus / choice

(M) Menu exit / access	(△) Upwards move / increase
(▽) Downwards move / decrease	(↵) Validation / Vertical move

4.4.4 Digital output programming

Option digital output

JBuS

JBuS
- slave number
- SLAvE
  - -8888 — must be included between 1 and 255
- bAUd — transmission speed
  - 19200 / 9600 / 4800 / 2400 / 1200
- dELAY — delay before any response pattern
  - On : delay 75ms
  - On / OFF
  - OFF : delay 20ms
- tor or rELAY or SECU

See also the features of the digital data link p11

4.4.5 Programming of the LOGIC inputs

Option LOGIC inputs

tor

tor
- tor 1
  - HoLd — function display hold
  - CLr.M — function min. and max. zero reset
- tor 2
  - HoLd
  - CLr.M
- rELAY or SECU

See also the features of the LOGIC input p11

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

(▽ △) Move through menus / choice

(M) Menu exit /access	(△) Upwards move / increase
(▽) Downwards move / decrease	(↵) Validation / Vertical move

4.4.6 Programming of the relay outputs

Option output 2 or 4 relays

rELAY

rELAY
- rEL.1
  - alarm
  - Acti.1 — active: On / de-activated: OFF
  - PArA.1 — choice of the parameter dedicated to the output
  - ModE.1 (5) — mode setpoint / mode window
    - access to SP1
    - access to SP1.1
    - *if mode setpoint programmed*
      - SP 1 — 02.00 (dec. point + unit)
    - *if mode window programmed*
      - SP1.1 — 02.00 (dec. point + unit)
      - SP1.2 — SPI.2 must be ≥ SPI.I — 04.00 (dec. point + unit)
  - HYSt.1 — hysteresis — 00.00 decimal point + unit
  - tiME.1 — time delay on the relay — 000.0 — 0 < tIME < 025.0 in 0.1s increases
  - t.Act.1 — if time.1 ≠ 0. Programming of the location of the relay time delay. — doubl / SiMPL
  - LEd 1 — ***choice of the state of the relay associated Led*** — OFF / On
    ON : led lit when relay active
    OFF : led still when relay active
  - MEM.1 — no / YES — latching function
  - MESSI — no / YES — function display of the alarm message
    - AbCd. — enter 4 characters + the point
- rEL.2 — idem rEL.1
- rEL.3 — idem rEL.1
- rEL.4 — idem rEL.1

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

If option 2 relays, at end of menu REL.2,
if option 4 relays, at end of menu REL.4
access to SECU or Pr.diS

See also the features of the relay ouputs p11

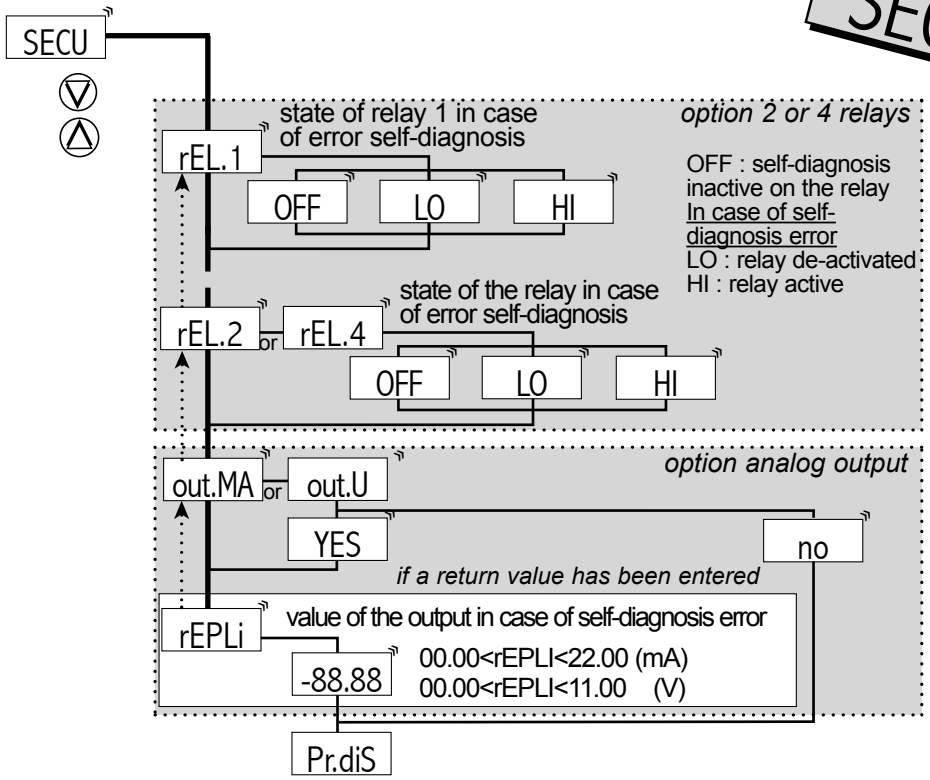
Choice of the parameter dedicated to the relay output

Alarm output

idem analog output, see chapter 4.4.3.

4.4.7 Programming of the safety mode

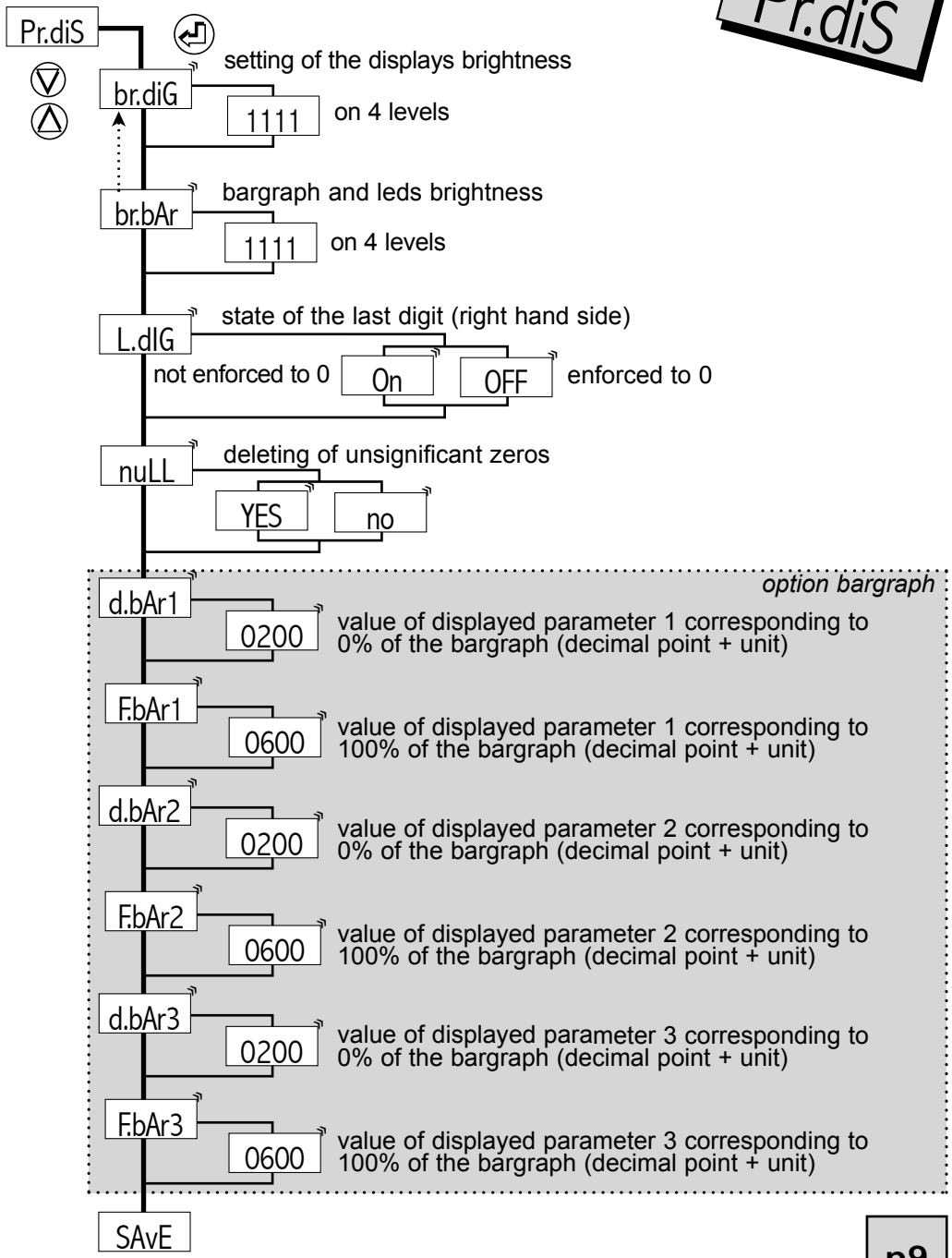
SECU



See also the safety features p12

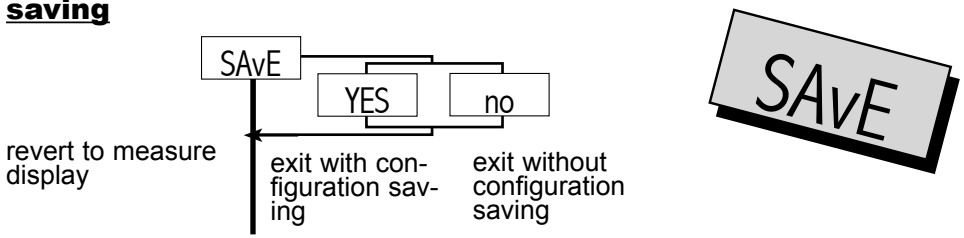
4.4.8 Programming of the brightness, of the bargraph and the displays

Pr.diS



See also the display features p13

4.4.9 Programming exit with or without saving



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

4.5 Input features and programming limits

4.5.1 Manual or automatic caliber

CAL

Auto automatic caliber

MAnu manual caliber

4.5.2 Choice of the current caliber

CALI

1A or 5A only in manual

Current input features

Caliber	Display resolution	Input level resolution	Accuracy
0 to 1 A In=1.2A	± 1 digit	10 bits	0.2% of measure range
0 to 5 A In=6A	± 1 digit	10 bits	0.2% of measure range

4.5.3 Choice of the voltage caliber

CALU

150 or 500 only in manual

Voltage input features

Caliber	Display resolution	Input level resolution	Accuracy
0 to 150 V	± 1 digit	10 bits	0.2% of measure range
0 to 500 V	± 1 digit	10 bits	0.2% of measure range

4.5.4 Choice of the CT ratio or the current scale factor

Example : say an installation with a 5000 kA / 5 A CT, or a display of 5000 for 5A

Pri.tc 5000. and 10 3

SEc.tc 005.0

4.5.5 Choice of the VT ratio or the voltage scale factor

Example : say an installation with a 400 kV / 110 V VT

Pri.tP 400.0 and 10 3 display 1 cipher after the decimal point

=> 400.0 for 110V

SEc.tP 110.0

Note concerning the entering of the Pri.tc and Pri.tP :

The instrument will always try to display with a maximum resolution.

eg. : for Pri.tP = 400.0, the display will be 400.0

for Pri.tP = 0400, the instrument will save the value Pri.tP = 400.0 and in measure the display will be the same 400.0

likewise for Pri.tc = 0010, the instrument will save Pri.tc = 10.00 and in measure the display will be 10.00

The decimal point location is fixed once and for all on the configuration saving (taking into account the possible display with the maximum resolution). It can in no case be modified in measure, that is to say after a display of 99.99 there will be after an input signal increase 0.L (display overload) and 100.0 with moving of the decimal point to the right.

NOTE : by pressing ⏃ and ↵ the display resolution can be modified if you do not want the maximum resolution (see p16).

4.5.6 Programming of the LOGIC inputs (optional)

Board of 2 LOGIC inputs : input signal 24 Vdc

Possible functions :

HoLd	Display hold in case of activation of the LOGIC function. The display and the analog output remain fix in case of variation of the measure. The relays carry on reacting to the measure.
CLr.M	min. and max. zero reset The activation of function LOGIC will reset the min. and max. to zero

4.6 Output features and programming limits

4.6.1 Analog 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 the chosen parameter (at +25°C)
- Residual ripple ≤ 0.2%
- Admissible load 0Ω ≤ Lr ≤ 500Ω (current)
  Lr ≥ 2 kΩ (voltage)
- Programmable scale ratio with enlarging effect
- Response time : 40 ms

PArAM	Choice of the parameter dedicated to the output (see chapter 4.4.3)
d.out	Analog output down scale
F.out	Analog output full scale
PAr.dS	Value of the parameter dedicated to the output corresponding to the output down scale
PAr.FS	Value of the parameter dedicated to the output corresponding to the output full scale

In mode measure, the analog output can not overstepp 10% of the greatest of the 2 values : d.out and F.out

4.6.2Digital output :

- Data link RS485 (2 wire)
- Protocoles MODBUS-JBUS format of data : integer and double integer
- Single transmission format : 1 start bit
  8 bits without parity
  1 stop bit

SLAvE	Slave number included between 1 and 255
bAud	Transmission speed included between 1200 and 19200 bauds
dELAY	Delay before any response

*Table of **modbus addresses**, used functions, see annexe p19*

4.6.3 Relay outputs :

2 relay outputs rEL.1 rEL.2

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

- Hysteresis independently programmable in the chosen parameter unit
- Time delay independently programmable from 0 to 25 s in 0.1s increases.
- NO-NC contact 8 A - 250 V on resistive load

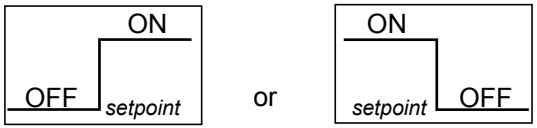
Activation or de-activation of relay x Acti.X

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

Mode alarm

Choice of the operating mode : ModE.x

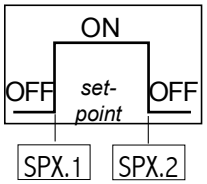
- **Mode setpoint**

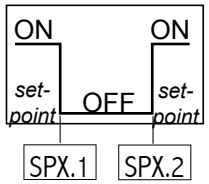


or

Legend :
ON coil supplied
OFF coil not supplied

- **Mode window**



or


Choice of the state of the relay associated led LEdx

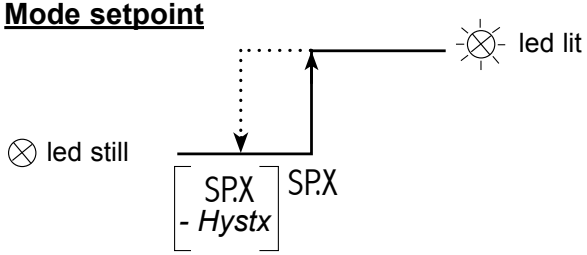
The led indicates the alarm state.

On led lit when relay active (coil supplied)

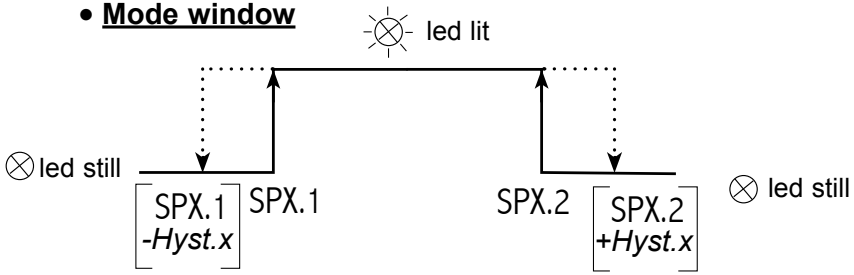
OFF Led still when relay active (coil supplied)

HYSt.x Setting of the hysteresis in the unit of the chosen parameter
The hysteresis is active on switching from led lit to led still; i.e. on switching out of alarm, as the led represents the alarm state.

- **Mode setpoint**



- **Mode window**



- **Alarm time delay** tiME.x

The relay time delay is adjustable from 000.0 to 025.0s. in 0.1s increases. It is active both on switching and switching back.

- **Time delay position** t.Act.X

SIMPL Time delay on switching on alarm

doubL Time delay on switching on alarm and off alarm

- **Latching function** MEM.x

Allows recording of the alarm after a setpoint has been passed. When the measure reverts below the alarm setpoint, the relay remains ON and the led blinks to warn the user that a setpoint has been passed (to reset the recording of alarms to zero see menu CLEAr p 15).

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

- **Display of alarm messages** MESSx

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

- **Setting of the setpoints :** There are 2 ways to adjust setpoints.

- either in mode programming entering the correct access code (see p16)
- or by simultaneous pressing on M and △ if the access to a quick entering has been authorized on the code programming

4.6.4 Safeties : diAG

- **Self-diagnosis :**

The self-diagnosis serves to warn the user in case of error.

The self-diagnosis error information can be reported :

· *On the display* : An error message appears alternating with the measure ; an error code is registered, and can be read in menu About (see p14)

Coding :
1 : Current caliber overstepping
2 : Voltage caliber overstepping
4 : Frequency calculation error
8 : Programming error
16 : Input calibration error
32 : Output calibration error

If the instrument detects for instance a current and a voltage caliber overstepping **the error code value will be 3** (1+2).

· *On the relays* :

OFF — No influence of a self-diagnosis error on the relay

LO — Relay de-activated (coil not supplied) in case of self-diagnosis error

HI — Relay active (coil supplied) in case of self-diagnosis error

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

· *On the analog output*

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

4.6.5 Display features :

diSP.1 — Choice of the parameter dedicated to the display n°1

diSP.2 — Choice of the parameter dedicated to the display n°2

diSP.3 — Choice of the parameter dedicated to the display n°3

Cut.I — Cut-off on the current programmable from 1.0% to 15.0% in manual caliber, from 0.2% to 15.0% of caliber 5A in auto caliber

Cut.U — Cut-off on the voltage programmable from 1.0% to 20.0% in manual caliber, from 0.3% to 20.0% of caliber 500V in auto caliber

FiLt. — Choice of the digital filtering : OFF , 1 , 2 ; increase the value in case of unsteady measures.

• **Response time** :

Typical response time : 110ms.

Note : For the analog output response time, add 40 ms to the above value.
For the relays : add the time delay programmed on the alarms.

• **Setting of the digits brightness** br.diG

1111 Lowest brightness 4444 Strongest brightness

• **Setting of the brightness of the bargraph and leds** br.bAr

1111 Lowest brightness 4444 Strongest brightness

The brightness level is visualised directly on leds 5 to 8 and on the bargraph.
Caution : during the setting, the 4 leds and the bargraph no longer represent the measure, including in mode reading.

• **Inhibition of the last digit** *(low weight)* L.dIG

In the programming mode, the menu L.dIG allows deleting the display of the last digit, enforcing it to 0 if OFF is validated.

• **Deleting of unsignificant zeros** nuLL

nuLL = YES Suppresses the unsignificant zeros on the left hand side.

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

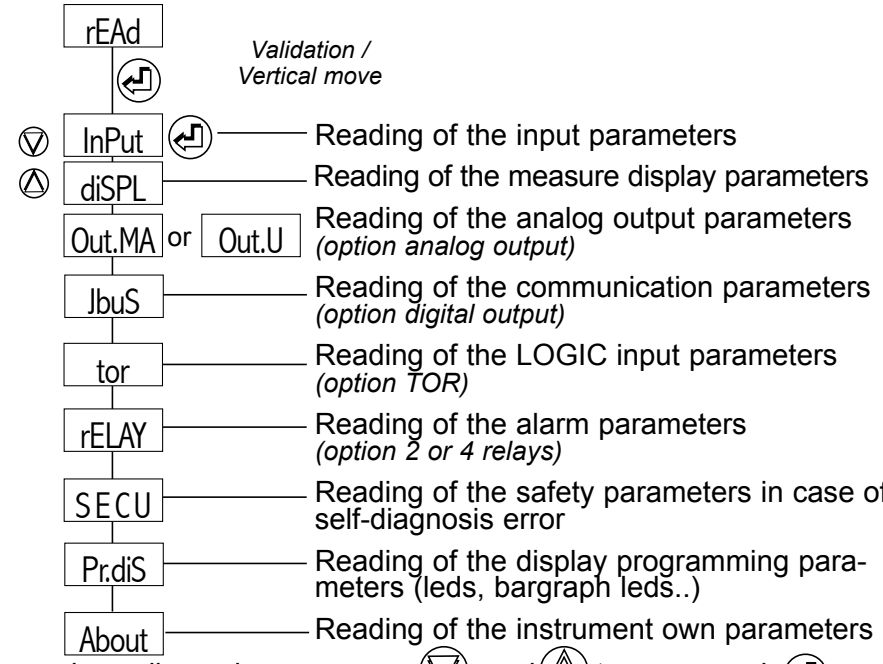
• **Bargraph display factor** (option bargraph only)

d.bArX — Value of the display parameter X corresponding to 0% of the bargraph

F.bArX — Value of the display parameter X corresponding to 100% of the bargraph

In case of overstepping, the bargraph starts to blink.

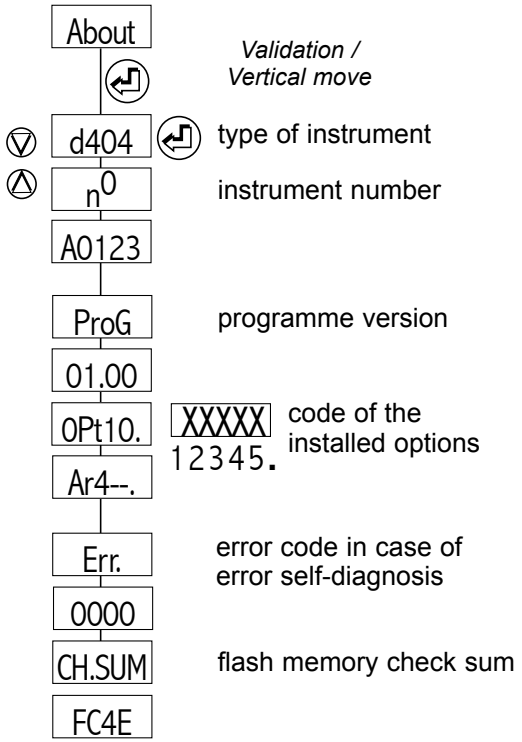
4.7 Reading of the configuration rEAd



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

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

Sub-menu



XXXXX
12345.

X1 : - : No analog output
A : Analog 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

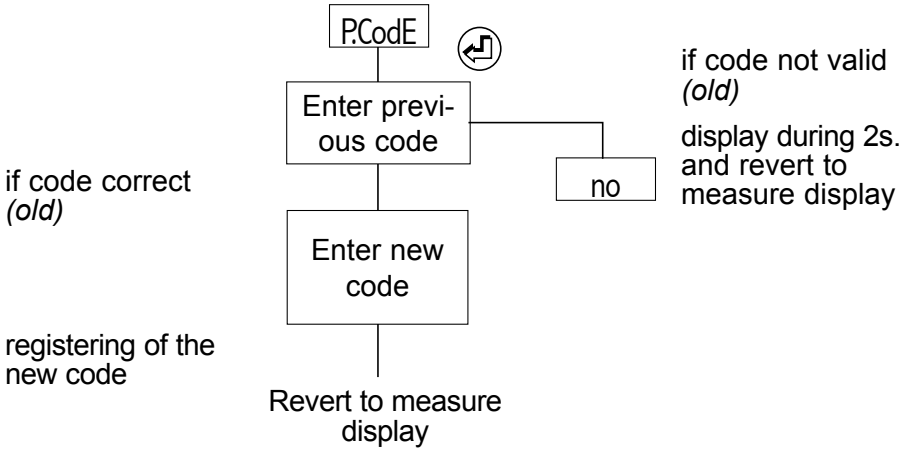
(.) : decimal point still : no bagraph
"." : decimal point lit : option bargraph

4.8 Access code

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

0 0 0 0	Factory code
x x x x	
0 to 5	Access to the current and voltage automatic cut off
6 to 9	No access
0 to 5	Access to the display and output simulations
6 to 9	No access
0 to 5	Access to a quick entering of alarm setpoints
6 to 9	No access

4.9 Programming of a new access code

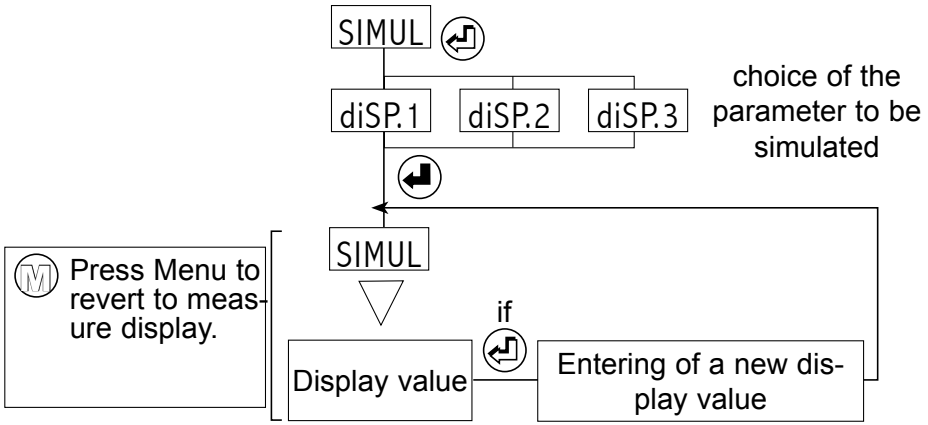


Reminder : If no key is pressed during 1 min, the instrument will automatically revert to measure display.

4.10 Functions accessible in the main menu

4.10.1 Display simulation

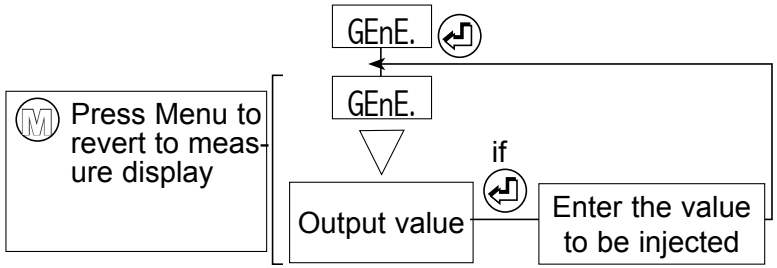
(accessible according to the programmed access code, and if option relays or analog output)



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

4.10.2 Simulation of the analog output

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

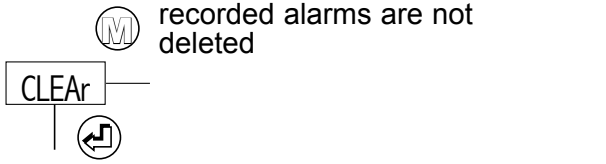


Note : The instrument carries on measuring during simulation. Only the analog output no longer reacts to the measure.

4.10.3 Menu CLEAr : Deleting of recorded alarms

If the function recording of alarms has been programmed :
The relay state is recorded after a setpoint has been passed.

If the setpoint is passed back the other way, the relay state does not change and the corresponding led starts to blink.
To come back to the normal state (led not blinking and relay in the correct state) use menu CLEAr).



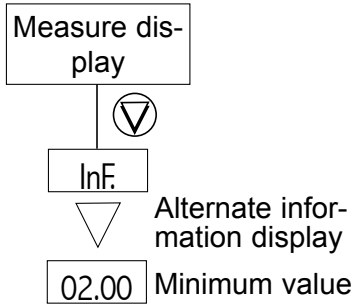
Reminder : If no key is pressed during 20 s., the instrument will automatically revert to measure display.

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

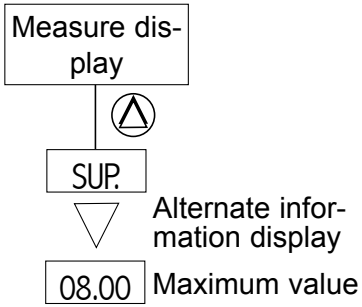
5. FUNCTIONS DIRECT FROM DISPLAY

5.1 Functions which require pressing only 1 key :

a / min. value display



b/ max. value display

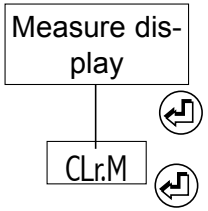


c / Display switching *(3 possible parameters)*

A long pressing (>3 s) on ▽ or △ allows passing on to next or previous parameter (a led indicates which parameter is selected).

d / Deleting of maximum and minimum values

1 min. and 1 max. available for each displayed parameter



deleting of recorded min. and max., and revert to measure display

Ⓜ The instrument reverts to measure display.

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

Note : An exit from mode programming with configuration saving will reset the min. and max. values to zero.

5.2 Functions which require pressing several keys :

5.2.1 Automatic setting of the cut offs

(accessible according to programmed access code)

△ ▽ automatic voltage cut off setting

↵ M automatic current cut off setting

voltage cut off setting current cut off setting

The automatic voltage or current cut off setting is an operation that will enforce the voltage or current to 0 for U (I) low values. Once the menu is chosen, the instrument will measure the values on its inputs and enforce display to 0 for values lower than the programmed cut-off in percentage of the full scale. To eliminate these cut-offs, just go into programming and programme a new cut-off value (current from 1.0% to 15% in manual caliber, from 0.2% to 15% of caliber 5A in auto caliber, voltage from 1.0% to 20% in manual caliber, from 0.3% to 20% of caliber 500V in auto caliber).

5.2.2 Visualisation of the measure unit

Press ▽ and M to obtain during 3s the display of the unit alternating with the measure.

5.2.3 Visualisation and setting of the alarm setpoints

Option 2 or 4 relays

Setting of the setpoints : There are 2 ways to adjust setpoints :
- either in mode programming entering the correct safety access code (see p14)
- or by simultaneous pressing on △ and M

The meter then shows the message SP.x or SPx.x alternating with the value of the corresponding setpoint and its unit.

The various setpoint values can be accessed by ▽ and △ .

These setpoints can then be modified (if access code < 6000 (see p14)) by pressing ↵ .

When the setpoint is adjusted press ↵ to revert to the setpoints 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 after 60 s. the meter will revert to measure display without modification of the setpoints value.

5.2.4 Modification of the display resolution

Press △ and ↵ allows changing the display resolution of the selected parameter if you do not want the maximum resolution.

eg. : display with max. resolution : 147.0 you can have 0147
5.000 you can have by pressing
successively △ and ↵ 05.00 or 005.0 or 0005

6. ERROR MESSAGES

Err.1	Value set out of range
O.L	Displayable value overstepping
Er.xxx	Self-diagnosis error (see p12)

7. GENERAL WARRANTY TERMS

WARRANTY applying and duration
This appliance is under warranty for a duration of 1 year against any design or manufacturing defects, under normal operating conditions.

Intervention terms * : The processing out of warranty will be submitted to acceptance of a repair estimate. The products will be returned at the customer's charge to the company and they will be restored after processing. Without a written agreement on the repair estimate within 30 days, products will not be held.

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

8. LEXIQUE

General access

- rEAd — Access to the reading of the parameters
- ProG — Access to the programming of the input and output parameters
- CodE — Access code
- P.CodE — Programming of a new access code
- SiMUL — Access to the display simulation
- GEnE — Access to the analog output simulation
- CLEAr — Deleting of recorded alarms

Inputs

- InPut — Access to the input programming sub-menu
  - CAL — Manual or automatic caliber
    - MAnu — manual caliber
    - Auto — automatic caliber
  - CALI — Current caliber
    - 1A — caliber 1A
    - 5A — caliber 5A
  - CALU — Voltage caliber
    - 150 — caliber 150V
    - 500 — caliber 500V
  - SiGnA. — Type of signal
    - Sin — Sinusoidal signal
    - dEFOr. — Deformed signal
  - Pri.tc — CT primary value
  - SEc.tc — CT secondary value
  - Pri.tP — VT primary value
  - SEc.tP — VT secondary value

LOGIC inputs

- tor — Access to the LOGIC inputs programming sub-menu
  - tor 1 — programming of LOGIC input 1
  - tor2 — programming of LOGIC input 2
    - HoLd — function display hold
    - CLr.M — function deleting of min. and max.

Display

- diSPL. — Access to the display programming sub-menu
  - diSP.1 — choice of the 1st parameter to be displayed
  - diSP.2 — choice of the 2nd parameter to be displayed
  - diSP.3 — choice of the 3rd parameter to be displayed
  - U — parameter voltage (see chapter 4.4.2)
  - Cut.I — current cut-off
  - Cut.U — voltage cut-off
  - FiLt. — digital filtering
    - OFF — no filtering
    - 1 — filtering 1
    - 2 — filtering 2

Display parameters

- Pr.diS — Programming sub-menu of the display features
- br.diG — Adjusting of the digits brightness (4 levels)
  - 1111 — Lowest brightness
  - 4444 — Strongest brightness
- br.bAr — Setting of the brightness of the bargraph and the leds
  - 1111 — Lowest brightness
  - 4444 — Strongest brightness
- L.dIG — Last digit (low weight)
  - On — Last digit in service
  - OFF — Last digit enforced to 0
- nuLL — Deleting of unsignificant zeros
  - YES — Yes
  - no — No

d.bAr1 display of parameter 1 corresponding to 0% of bargraph

d.bAr2 display of parameter 2 corresponding to 0% of bargraph

d.bAr3 display of parameter 3 corresponding to 0% of bargraph

F.bAr1 display of parameter 1 corresponding to 100% of bargraph

F.bAr2 display of parameter 2 corresponding to 100% of bargraph

F.bAr3 display of parameter 3 corresponding to 100% of bargraph

Analog output

Out.U Access to the voltage output programming sub-menu

Out.MA Acces to the current output programming sub-menu

- PArAM Choice of the parameter dedicated to the analog output
- d.out Analog output down scale
- F.out Analog output full scale

to PAr.dS Value of the parameter dedicated to the output corresponding output down scale

to PAr.FS Value of the parameter dedicated to the output corresponding output full scale

Digital output

JbuS Access to the RS output programming sub-menu

SLAvE Slave number

bAud Transmission speed

- 1200 Minimum speed
- 19200 Maximum speed

dELAY Time delay before any answer

- On Time delay 75ms
- OFF Time delay 20ms

Relay outputs : x : 1 to 4

rELAY Access to the relay outputs programming sub-menu

- rEL.x Access to the programming of relay x

Acti.x Activation of relay output x

- On Activation
- OFF De-activation

Mode alarm ModE.x

- __1-- --1__ Mode setpoints
- _1--1_ -1__1- Mode window
- SPx Value of the setpoint in mode setpoint
- SPx.1 Value of the 1st setpoint in mode window
- SPx.2 Value of the 2nd setpoint in mode window

HYSt.x Value of the hysteresis in display points

tiME.x Time delay on relay X

t.Act.X Time delay position

- SIMPL Time delay on switching on alarm
- doubL Time delay on switching on alarm and off alarm

LEdx Programming of the led associated with the relay

- On Led lit when relay active (coil supplied)
- OFF Led still when relay active (coil supplied)

MEM.x Recording of alarm X

- YES Recording
- no No recording

MESSx Alarm message

- YES Message
- no No message

Safeties

SECU Access to the safeties programming submenu

- rEL.X State of relay X in case of sensor rupture
  - OFF No sensor rupture associated with the relay
  - LO Relay de-activated in case of sensor rupture (coil not supplied)
  - H I Relay active in case of sensor rupture (coil supplied)
- out.U or out.MA Return value on the output (or not) in case of error self-diagnosis
  - YES Return value required
  - no No return value
- rEPLi Return value

Configuration saving

SAvE Configuration saving

YES Saving no No saving

Reading of the instrument internal features

About Access to the internal features reading submenu

- d404 Instrument type : DIP404,
- n0 A0006 Identification numbers
- PrOG Programme version
- 01.00 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. Minimum value display
- SuP. Maximum value display
- CLr.M Deleting of the min. and max.

Error messages

- Err.1 Value set out of range
- OL Displayable value overstepping
- Er.xxx Self-diagnosis error

9. ANNEXE : MODBUS

9.1 Table of the measure Modbus addresses

Address	Measures	Format	nb of words
1	voltage U	integer	1
2	current I	integer	1
3	network frequency	integer	1

The value read in the 1st table gives the measure module.
To know the unit and decimal point of this measure, read them in the 2nd table, the table of units and decimal points.

The unit and the decimal point do not vary. They depend on the programmed CT and VT ratios. Hence, the 2nd table does not need to be read permanently.

9.2 Table of the measure units and decimal points

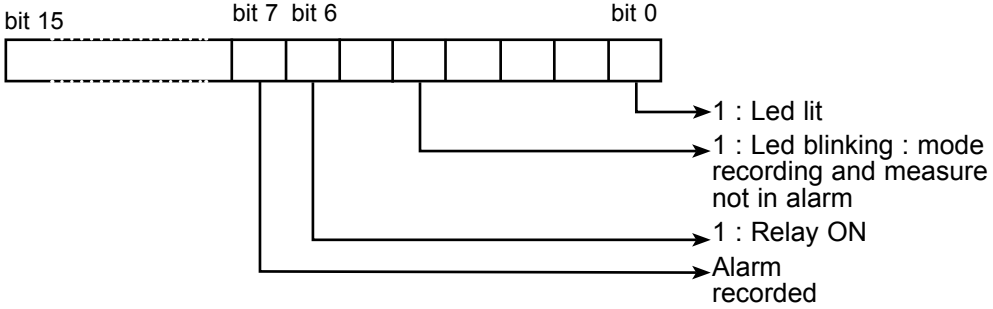
Address	Decimal points and units of the measures	Format
17	dec. point (top weight) / unit (low weight) voltage U	integer
18	dec. point (top weight) / unit (low weight) current I	integer
19	dec. point (top weight) / unit (low weight) network frequency	integer

unit : 0 to 4
0 : x1 1 : kilo 2 : mega 3 : giga 4 : tera
decimal point : 1 to 4
1 : x.xxx 2 : xx.xx 3 : xxx.x 4 : xxxx.
example : line current : value 5000 decimal point : 1 unit : 1
➔ value of the current : 5.000 kA

Further addresses

Address	Value of the analog output	Format	nb of words
50	in µA (mA output) in mV (10V output)	double integer	2
52	maximum display 1	double integer	2
54	maximum display 2	double integer	2
56	maximum display 3	double integer	2
58	minimum display 1	double integer	2
60	minimum display 2	double integer	2
62	minimum display 3	double integer	2
64	state of relay 1	integer	1
65	state of relay 2	integer	1
66	state of relay 3	integer	1
67	state of relay 4	integer	1

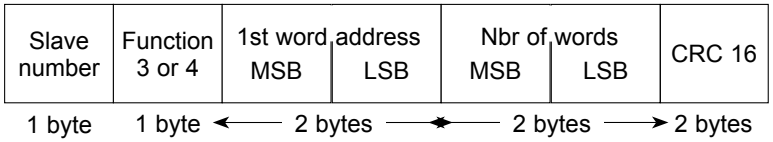
• **State of the relays** :



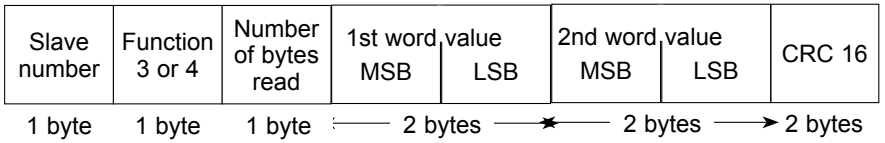
9.3 Description of born Modbus functions :

Reading of N words : Function n°3

Request pattern :

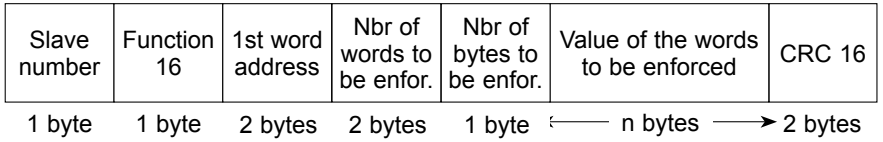


Response pattern :

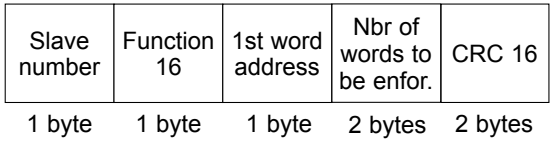


Writing of n words : Function N°16 :

Request pattern :



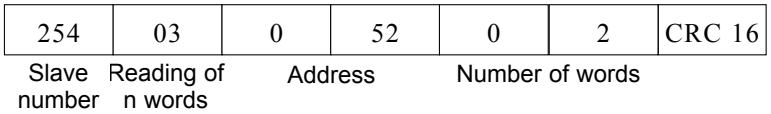
Response pattern :



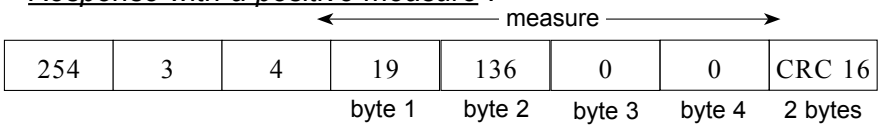
9.4 Reading in double integer format :

Example : Reading of the maximum on display 1 (voltage maximum)

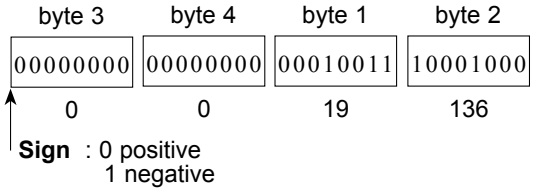
Request :



• *Response with a positive measure* :



Value of the measure :



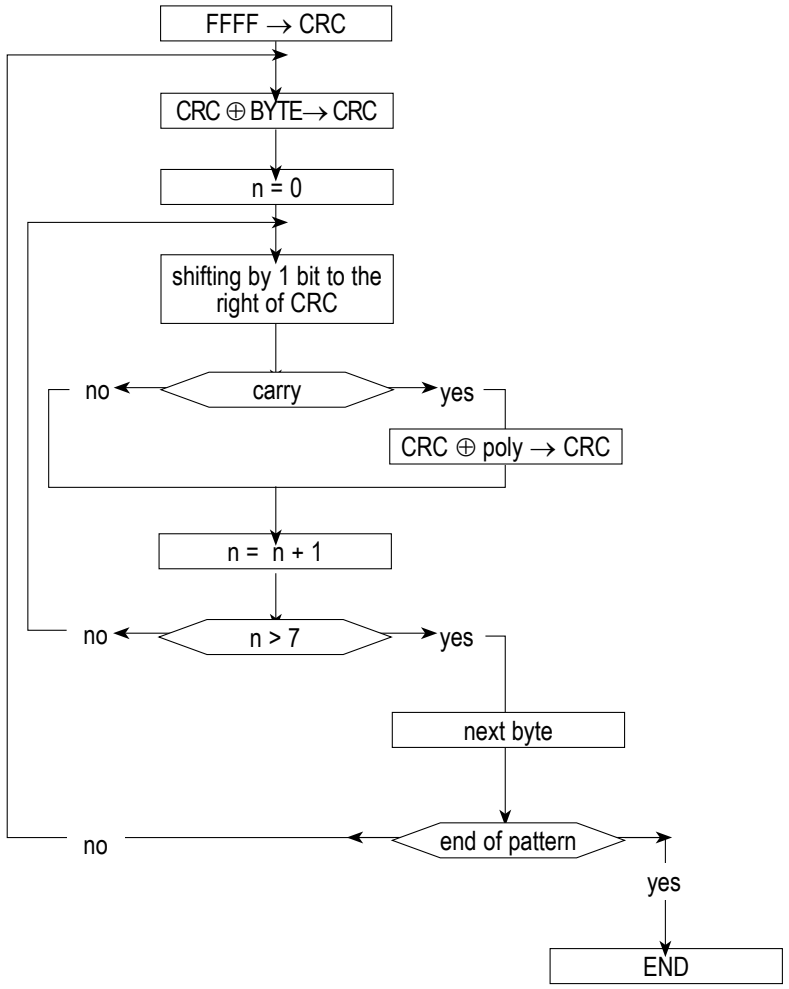
Measure = byte 3 x 256^3 + byte 4 x 256^2 + byte 1 x 256 + byte 2

= 0 x 256^3 + 0 x 256^2 + 19 x 256 + 136

= 5000

Reading of address 17 => decimal point = 3 unit = 0 => maximum = 500.0V

9.5 CRC16 calculation algorythm :



Note 1 : ⊕ = exclusive or.

Note 2 : POLY = A001 (hex).

Note 3 :
The CRC 16 calculation applies to all bytes in the pattern (except CRC16).

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

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