

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

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ARDETEM®

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PROGRAMMABLE SIGNAL CONDITIONERS

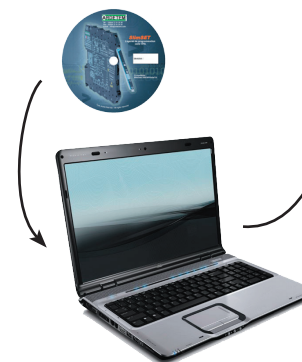
TPIv-SI 40/41



version 02.x

LCD μ console

Software SlimSET



User handbook



ARDETEM - TA CO/137 TPIv SI - D 07/22 Any data in this documentation may be modified without prior notice.

UE CONFORMITY DECLARATION

■ Summary

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The manufacturer:

ARDETEM-SFERE
Route de Brindas
Parc d'activité d'Arbora n°2
69510 Soucieu en Jarrest
France

declares that the following products:

Name: Programmable signal conditioners
Type: TPIv-SI 40/41
Marking:
II 3 (1) G Ex ec nC [ia Ga] IIC T4 Gc

comply with the following directives and standards:

The Low Voltage Directive 2014/35/UE

EN61010-1 : 2011

The EMC Directive 2014/30/UE

EN61326-1 : 2013

The directive ATEX 2014/34/UE

EN 60079-0: 2012/A11:2013(*)	IEC60079-0: 2011(*)
EN 60079-7: 2015	IEC60079-7:2015
EN 60079-11: 2012	IEC60079-11: 2011
EN 60079-15: 2010	IEC60079-15: 2010

ATEX/IECEx notification:

QPS
Canada

UE type test certificate n°:

SIRA 17 ATEX4222 X
IECEx CofC: CSA17.0025X

Soucieu en Jarrest, July 20, 2022



Jacques Huguet
Signature of the Manager

(*) An examination of the standards EN60079-0 (2018) and IEC60079-0 (2017) does not evidence any significant changes relevant for the equipment, therefore the standards EN60079-0 (2012) and IEC60079-0 (2011) still represent the «state of the art» rules.



The instrument may be connected to dangerous electrical voltages. It must be mounted, connected and implemented respecting the current specific regulations, by a qualified technician, trained to the safety regulations, who will have read this manual.

This appliance has to be installed in an environment defined in pollution degree 2 / Overvoltage category II or better for a max. altitude of 2000 m.

Before any installation or maintenance work, make sure the power supply of the instrument is cut.

When the instrument is permanently connected to a dangerous voltage, it is necessary to add a means of sectionalizing on the power supply (switch, fuse or circuit breaker) near to the product, to make it easy of access and to mark it as being the means for cutting the instrument.

This sectionalizing means should cut all the conductors leading the current.

Accessible parts are all communication ports (μ USB or RS485) and analog output.

The person who has designed the system (electrical installation including the instrument) is sole accountable for the safety and must make sure it has been designed according to the current safety standards.

This device is an Open Type Listed Process Control Equipment. To prevent injury resulting from accessibility to live parts the equipment must be installed in a cabinet.



This appliance contains electronic components and should not be disposed of with the domestic waste. It should be collected with the WEEE (Waste Electrical and Electronic Equipment), according to the current regulation.

1. INTRODUCTION

The series TPIV-SI offers intrinsic safety inputs.

They are associated equipment, to be placed in safe area or area 2 (presence of an explosive atmosphere accidentally in case of misoperation or of short duration). They are provided with input circuits for connection to a sensor located in hazardous area and output circuits for connection in safe area only or area 2.

The series TPIV offers a complete range of measure interfaces, fully programmable either with the μ console or by PC via the configuration software and a standard USB/ μ USB cable.

The rear-lit tactile graphical LCD allows the visualisation of all the following information concerning the instrument:

- the value of the measure with its unit,
- the value of the analog output,
- the name of the product (TAG),
- the status of the relay outputs and the RS485 communications.

Scrolling message for programming help (programmable in several languages).
Programming protected by code (0000 on factory exit).
Programmable keys for direct access to some functions.

• Input features specific to the series TPIV-SI 41

- Thermocouple inputs (J, K, B, R, S, T, E, N, L, W, W3, WRE5)
- Sensor inputs: Pt100, Ni 100 (2, 3 or 4 wire), Δ Pt100
- Resistive sensors: caliber 0-400 Ω and 0-10 k Ω
- Potentiometers: from 100 Ω to 10 k Ω

• Input features common to the series TPIV-SI 40 and TPIV-SI 41

- A bidirectional DC current or voltage input:
 ± 100 mV, ± 1 V, ± 10 V, ± 150 V, ± 270 V, ± 20 mA.

Available options (specify on order)

- Isolated analog output: option A:

Active or passive current, or voltage output (programmable).

- Relay output R:

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

- Isolated digital data link N: RS 485 2 wire, protocole MODBUS-JBUS.

Coding

Type TPIV-SI XXXX ARN

Inputs: TPIV-SI 40
TPIV-SI 41
Outputs: A analog I/U isolated
R 2 change-over relays
N digital RS 485 isolated

Available versions:

TPIV-SI 40/41	A	AR	ARN
---------------	---	----	-----

- CJC terminal (option): reference B1CSF-4
- Standard programming cable USB type A male to µUSB type B male: reference C1-µUSB

Features of the inputs

TPiv-SI		Types of INPUTS	Measure range adjustable from:		Permanent overload	Intrinsic error	Input impedance
40	41						
●	●	mA(1)	-2 to +22mA (U) ----- 22 to +22mA(B)		±100mA	< ±0.1% of the MR for inputs of the type (U)	Max. drop 0.9V
●	●	mV(1)	-10 to +110mV (U) ----- -110 to +110mV (B)		±1V		< ±0.05% of the MR for inputs of the type (B)
●	●	V	-0.1 to +1.1V (U) ----- -1.1 à +1.1V (B)		±50V		
			-1 to +11V (U) ----- -11 to +11V (B)				
			-15 to +165V (U) ----- -165 to +165V (B)		±300V		
			-30 to +300V (U) ----- -300 to +300V (B)				
					Thermocouples(1) Standard IEC 581 J K B R S T E N L W W3 WRE5	°C -160/1200 -270/1370 200/1820 -50/1770 -50/1770 -270/410 -120/1000 0/1300 -150/910 1000/2300 0/2480 0/2300	
	●	Pt100Ω sensor (1)(2) Standard IEC 751 (DIN 43760)	°C -200/850	°F -328/1562	- ----- -	<±0.1% of the MR	Current 250µA
	●	Ni 100 sensor (1)(2)	-60/260	-76/500	-		
	●	Differential measu- res from 2 sensors Pt100Ω 2 wire Standard IEC 751 (1)	-200/270	-328/518	-		
	●	Resistive sensors	Calibers 0-440 Ω(1)(2) and 0-10 kΩ		-	<±0.1% of the MR	Max. current 250µA
	●	Potentiometer	from 100Ω to 10 kΩ		-		Max. voltage 100mV
●	●	Supply for 2-wire sensor	27...17 Vdc / 0...20mA with protection from short-circuits : 25 mA.				
●	●	Special linearisation programming up to 20 points	On input: mV, V, mA. resistive sensor and potentiometer				
●	●	Extraction of the square root	On input mV, V or mA				

(1) Sensor break detection:
mA input (if down scale ≥ 3.5mA)
Other inputs: A 12µA pulsed current allows the detection of line or sensor break.

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

(3) Efficiency of the CJC (-20°C to 60°C):

Internal CJC: ±2°C ±0.03°C/°C
CJC (option terminal): ±1°C

MR Measure range
Thermal drift <150ppm /°C

Code	Types of OUTPUTS		Features
A	1 analog	Current active/passive	Current: Direct or reversed 0-20mA Load impedance \leq Lr 600 Ω
		Voltage	Voltage: Direct or reversed 0-10V Load impedance: \geq Lr 5K Ω Accuracy: 0.1% in relation to the display Ripple: 0.2% Response time in relation to the display: 40ms.
R	2 change-over relays		2 setpoints per relay configurable over the whole MR. Hysteresis programmable from 0 to 100%. Time delay programmable from 0 to 999,9 sec. (5A/250 VAC on resistive load)
N	Digital data link RS485 Protocole MODBUS/JBUS (EIA RS485) isolated.		

Response time

(for a variation from 10 to 90% of the input signal)

Average response time 150 ms

(1) Add 40 ms for the response time on the analog output, or 10 ms for the response time on the relay outputs.

General features

Galvanic isolation:

3.8kV-50Hz-1min. between input and [supply/outputs]

3.0kV-50Hz-1min. between relay outputs and [analog output/RS485 output/supply]

3,0kV-50Hz-1min. between relay output 1 and relay output 2

1.0 kV-50Hz-1min. between analog output and RS485 output

Working voltage: 250 Vac/dc

PARAMETRES ELECTRIQUES RELATIFS A LA SECURITE SAFETY ELECTRICAL PARAMETERS						
Type de mesure Measure type	Câblage Wiring	Uo (V)	Io mA	Po (mW)	Co (μ F)	Lo (mH)
Alimentation capteur 2-wire sensor supply	G1-H1	28.4	90.5	643	0.077	4
mV, V, mA, Tc, RTD Résistance, potentiomètre Resistance, potentiometer	G1-G2-G3 G4-H2 H3-H4	8.0	2.0	2.0	8.4	>1000
Um < 250 Vdc and Um < 250 Vac						

Power supply:

Max. operating range	Power draw	Dielectric withstanding
20-250 VAC & 20-250 VDC	2.5 W max. 5 VA max.	3.0KV-50Hz-1min.

Measure:

- Standard sampling time: 100 ms
- Common mode rejection rate: 130 dB
- Serial mode rejection rate: 70 dB 50/60 Hz

Self-calibration

Use:

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

Compliance with standards:

Directive LV 2014/35/UE EN 61010-1

Standard for UL electrical safety UL 61010-1

..... CSA C22.2 NO.61010-1-12

Directive ATEX 2014/34/UE..... EN 60079-0, EN60079-7

..... EN 60079-11, EN60079-15

IECEx IEC 60079-0, IEC 60079-7

..... IEC 60079-11, IEC 60079-15

Directive EMC 2014/30/UE EN 61326-1

Marking:



II 3(1)G Ex ec nC [ia Ga] IIC T4 Gc
SIRA 17ATEX4222 X
IECEx CSA 17.0025 X



ATEX
ZONE 2



Process
Control
Equipment
E482453

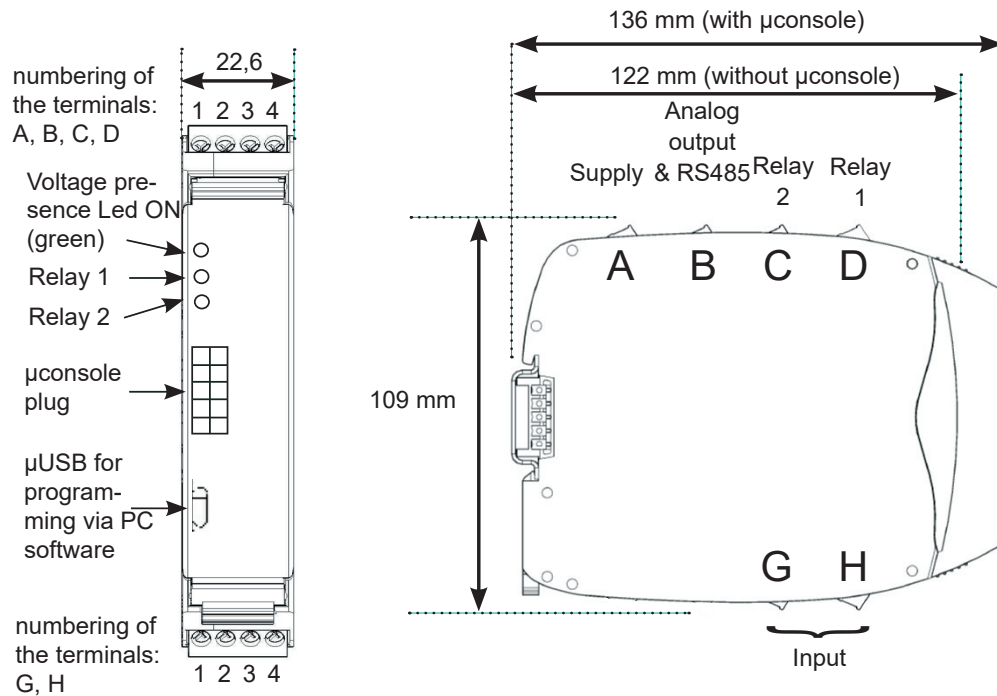
Housing:

- Self-extinguishing case of black UL 94VO PA66
 - Mounting in switchbox: latching on symmetrical DIN rail.
 - Removable terminal blocks for screwed connections (2.5mm², flexible or rigid)
 - Screw thread M3
- Max. tightening torque: 0.5Nm / 4.5in.lbs
- Min. solid/stranded conductor section: 0.2mm² / 26A WG
- Max. solid/stranded conductor section: 2.5mm² / 14A WG
- Protection: case / terminals: IP20

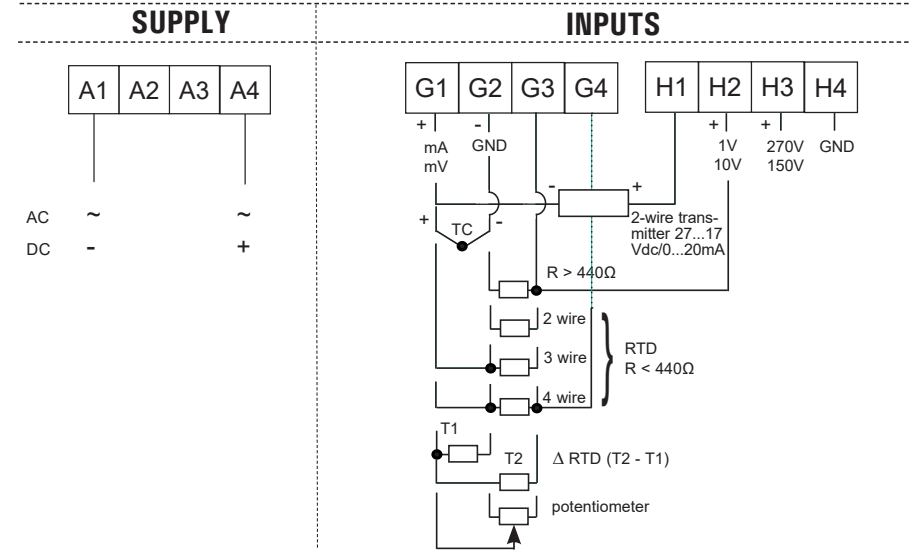
Dimensions: without µconsole: 109mm x 122mm
with µconsole: 109mm x 136 mm

Max. weight: 290g (with packaging)

2. DIMENSIONS

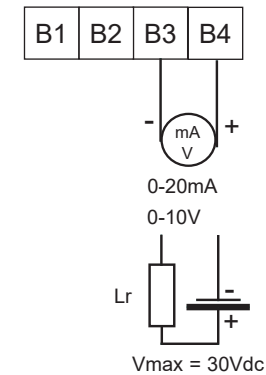


3. CONNECTINGS

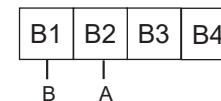


OUTPUTS

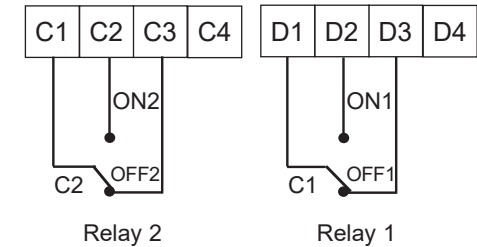
Analog output
(option A)



RS485 output
(option N)



Relay outputs
(option R)



• INSTALLATION IN AREA 2 (ATEX and IECEx):

The product must be installed by qualified staff, competent on the directives and the regulation applicable to the area 2.

In locations where high external humidity and internal temperature variations (e.g. frequent on-off cycles) may cause condensation inside the equipment, the interior should be periodically inspected.

When installed in the hazardous or non-hazardous area, the equipment shall be installed in a suitably-certified enclosure (Ex ec for gas applications Zone 2). When installed in a non-hazardous area, the equipment may alternatively be installed in a controlled environment that provides equivalent protection. The installer shall ensure that the maximum ambient temperature of the equipment when installed is not exceeded.

Cable entries and blanking elements shall fulfil the same requirements.

When the device is mounted in an hazardous area, connection and disconnection of the module connectors while live is only permitted if the potentially explosive atmosphere is shown to be absent.

The field installation shall be undertaken in a controlled environment with suitably reduced pollution, limited to pollution degree 2 or better as stated in manufacturer's documentation.

The non-intrinsically safe circuits may only be connected to an overvoltage category I or II power source, as defined in IEC 60664-1.

The supply shall be protected such that transients are limited to a maximum of 140% of the rated voltage; no such protection is required for the signal lines.

4. PROGRAMMING

• With the micro-console

(LxhxD= 23.3 x 89.5 x 24.3 mm)

This µconsole for clipping on the front face allows the visualisation of the measure or occasional modifications of the programming via its tactile keyboard. It also allows the teleloading of a programming file to other products of the ARDETEM range.

The programming menus and the functions which can be accessed from the console are detailed in the following pages.

The graphical rear-lit LCD allows the visualisation of 3 pieces of information:

- the value of the measure (5 mm high) with its unit,
- the value of the analog output and the name of the product (TAG),
- the status of the relay outputs and the RS485 communications.

- Scrolling message for programming help (programmable in several languages)

- Protection of the programming by code.

- Programmable keys for direct access.

• Via the configuration software SlimSET

To communicate with the series TPIV-SI from a PC you will need a connection cable (USB / µUSB standard). To connect this cable to the TPIV-SI, unclip the front face and insert the µUSB plug into the especially foreseen USB connector. Then connect the USB plug on a USB port of the PC.

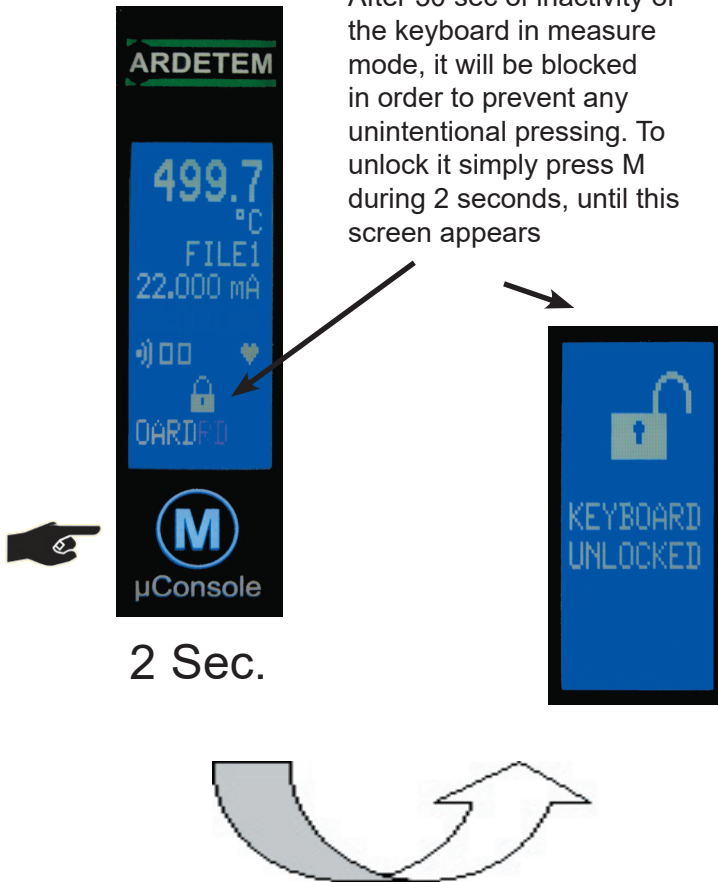
The software SlimSET allows the reading of the measures or the modification of the converter configuration.

Each configuration is kept as a file stored on disk. These files can be consulted, modified, duplicated or loaded into the converters. The files can be created with or without having a converter connected. This software also allows the saving of existing configurations from the instruments already in service. All the files can be edited on any type of printer.

Measure screen

Unlocking of the keyboard

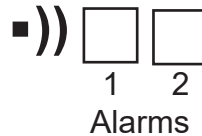
Locked keyboard symbole.
After 30 sec of inactivity of the keyboard in measure mode, it will be blocked in order to prevent any unintentional pressing. To unlock it simply press M during 2 seconds, until this screen appears



Description

Tactile screen. Press the measure screen for access to the direct functions.

Symbole representing the status of the alarms if option present.
Empty square: alarm not in alarm
Full square: alarm in alarm
Blinking square: alarm recorded



Tactile key F1: Programmable quick access function




Display of the measure, of the error messages (eg.: sensor break, scale overrange etc.) or the alarm messages if alarm latched and message programmed


Display of the measure unit

Display of the name given to the configuration (TAG)

Display of the values of the analog outputs (if option present)

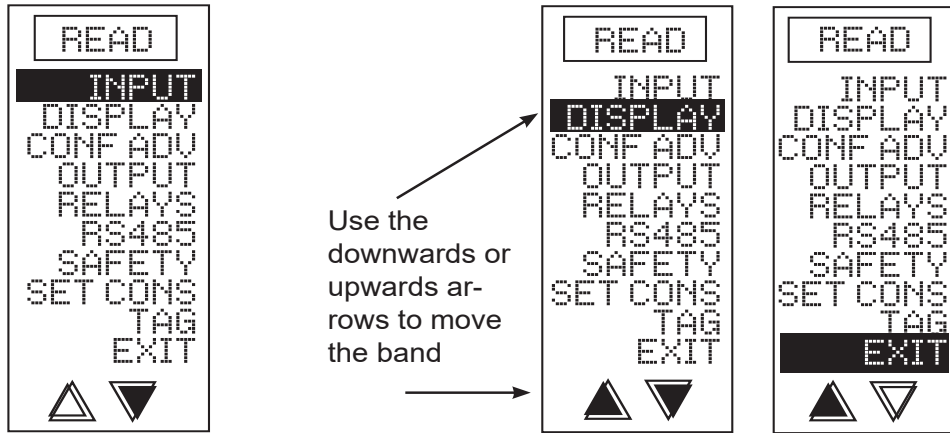
Blinking heart: activity witness, replaced by the symbole  during a communication on the RS485

Tactile key F2: Programmable quick access function

Tactile key 
- Allows the unlocking of the keyboard
- The access to the main menu if pressed during the measure screen
- The switching back to the previous menu during the reading or the programming

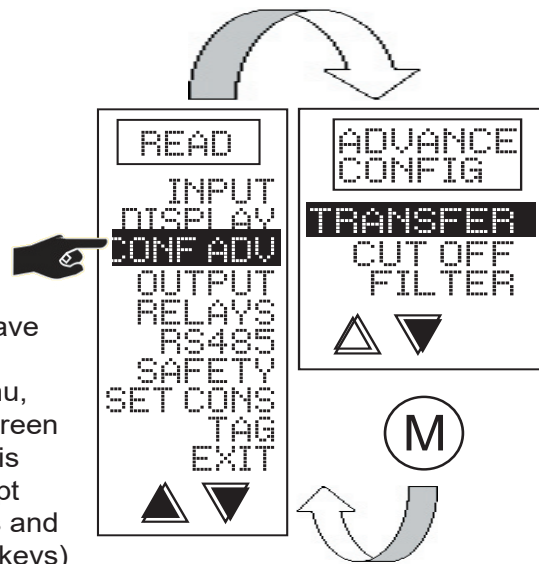
Moving through the list menus:

Eg.:



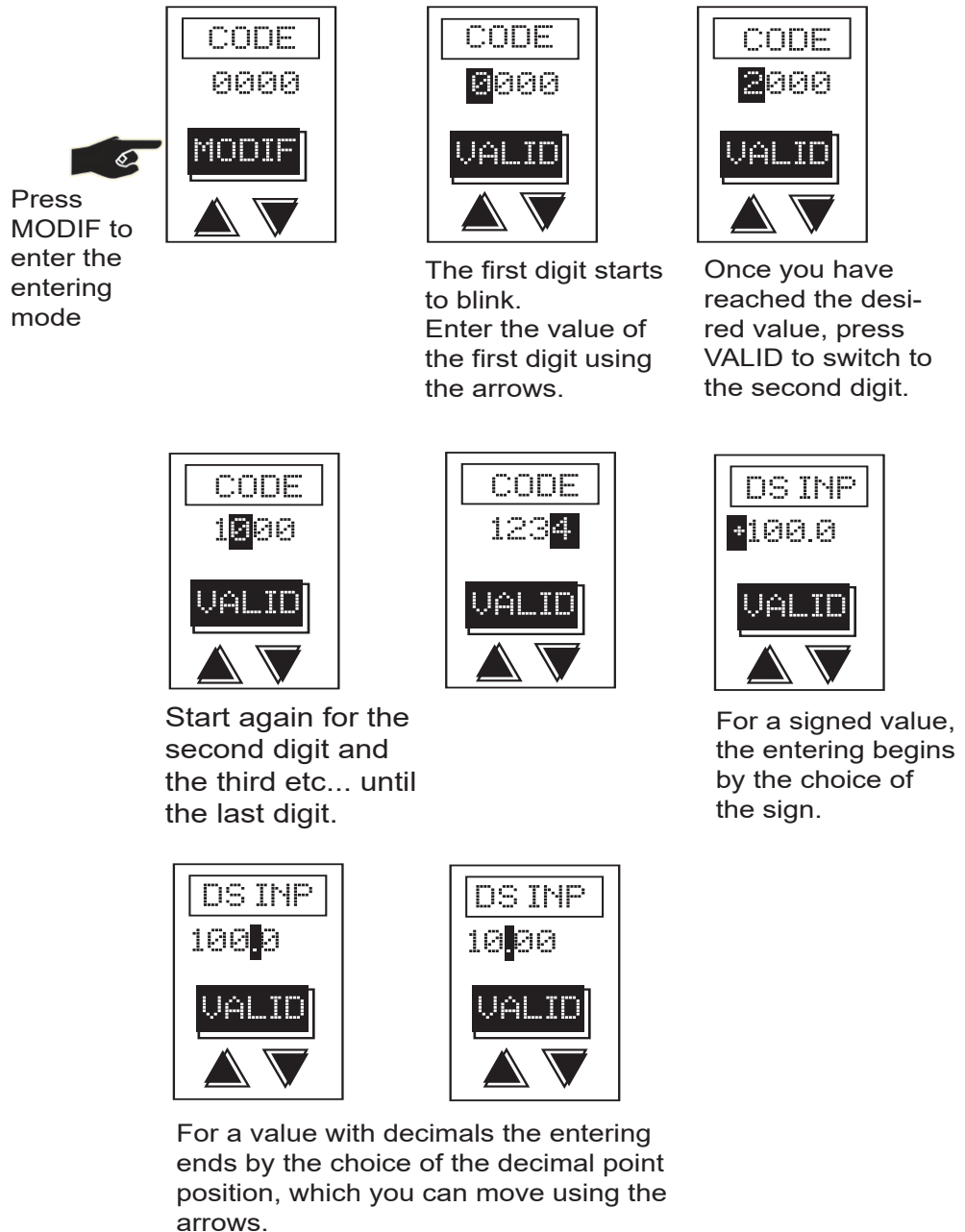
Note: the empty upwards arrow indicates that you are at the top of the menu

Note: the empty downwards arrow indicates that you are at the bottom of the menu

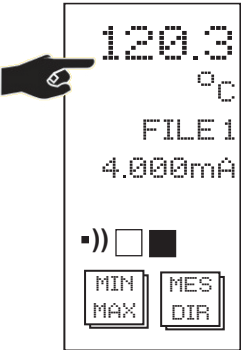


You will then enter the chosen menu. Press M to come back to the previous menu.

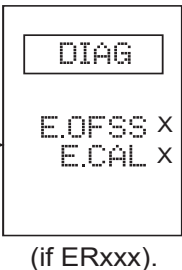
Entering of a value:



MEASURE SCREEN



Press the screen in measure mode to access the menu of the direct functions or the display of the details of the latched self-diagnosis errors: ERxxx (see page 26).



Menu of the functions with direct access see page 13

Press the key M on the measure screen to access the main menu.



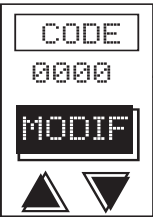
access to the configuration



READ:
Access to the reading of the configuration.
Menu identical to the programming of the configuration, but modification impossible (the key MO-DIF disappears in the entering of the parameters). The keys ▲ ▼ are replaced by the keys ◀ ▶ when you access the chosen parameter, these keys allowing to come back to the previous menu or to access the next parameter.
Press the screen to scroll the reading of the configuration parameter after parameter.



Default code:
0000

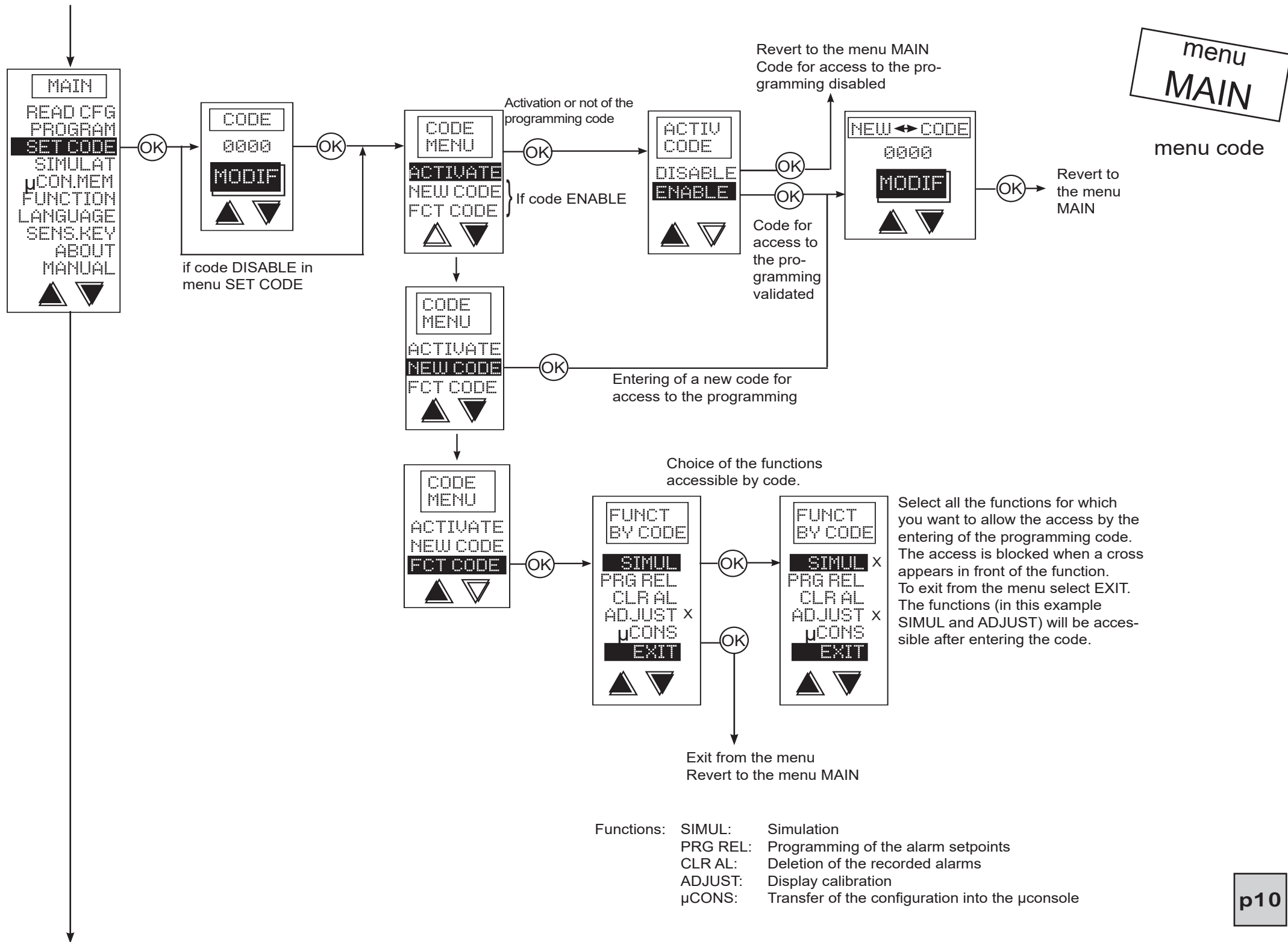


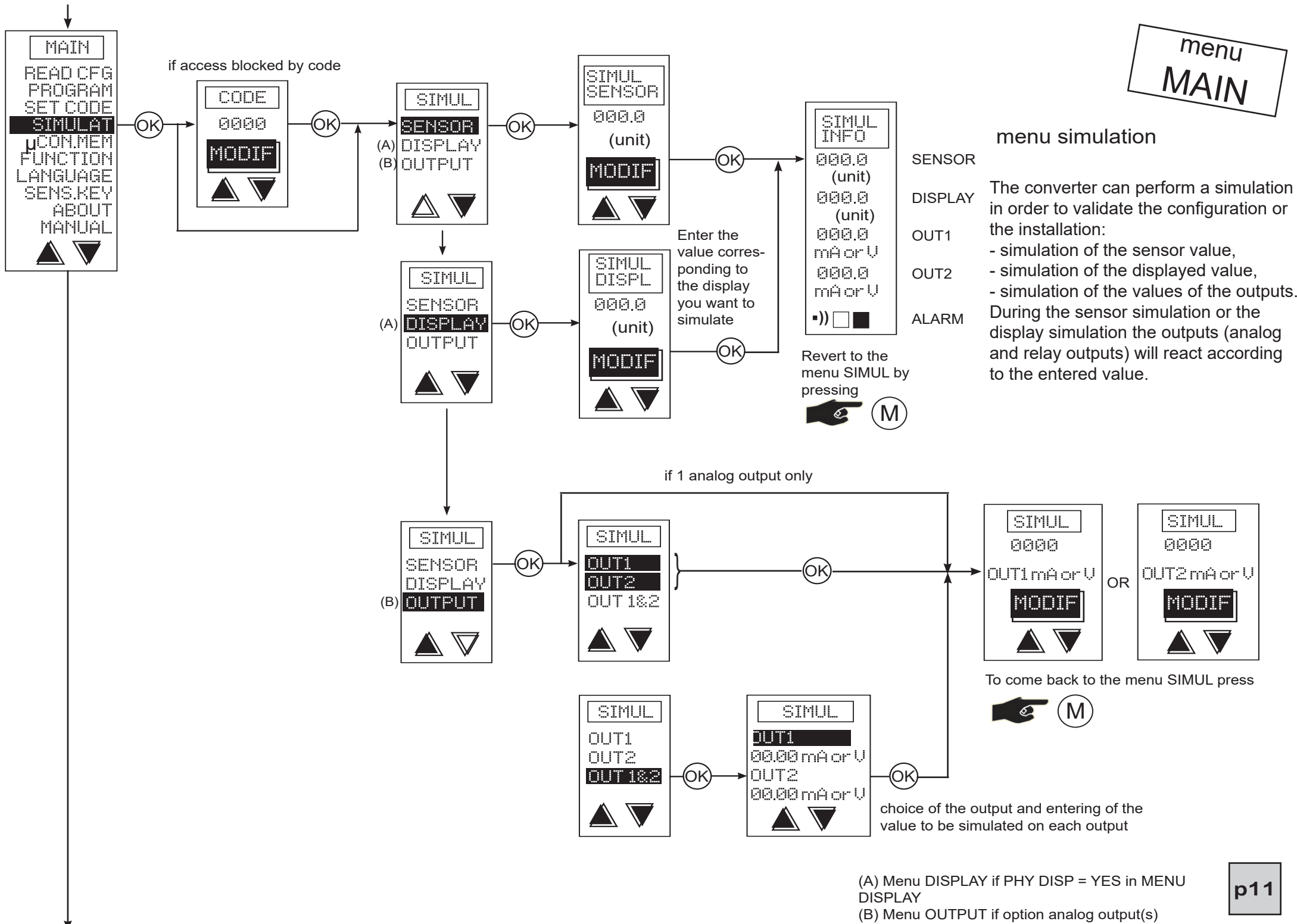
if code DISABLE in menu SET CODE

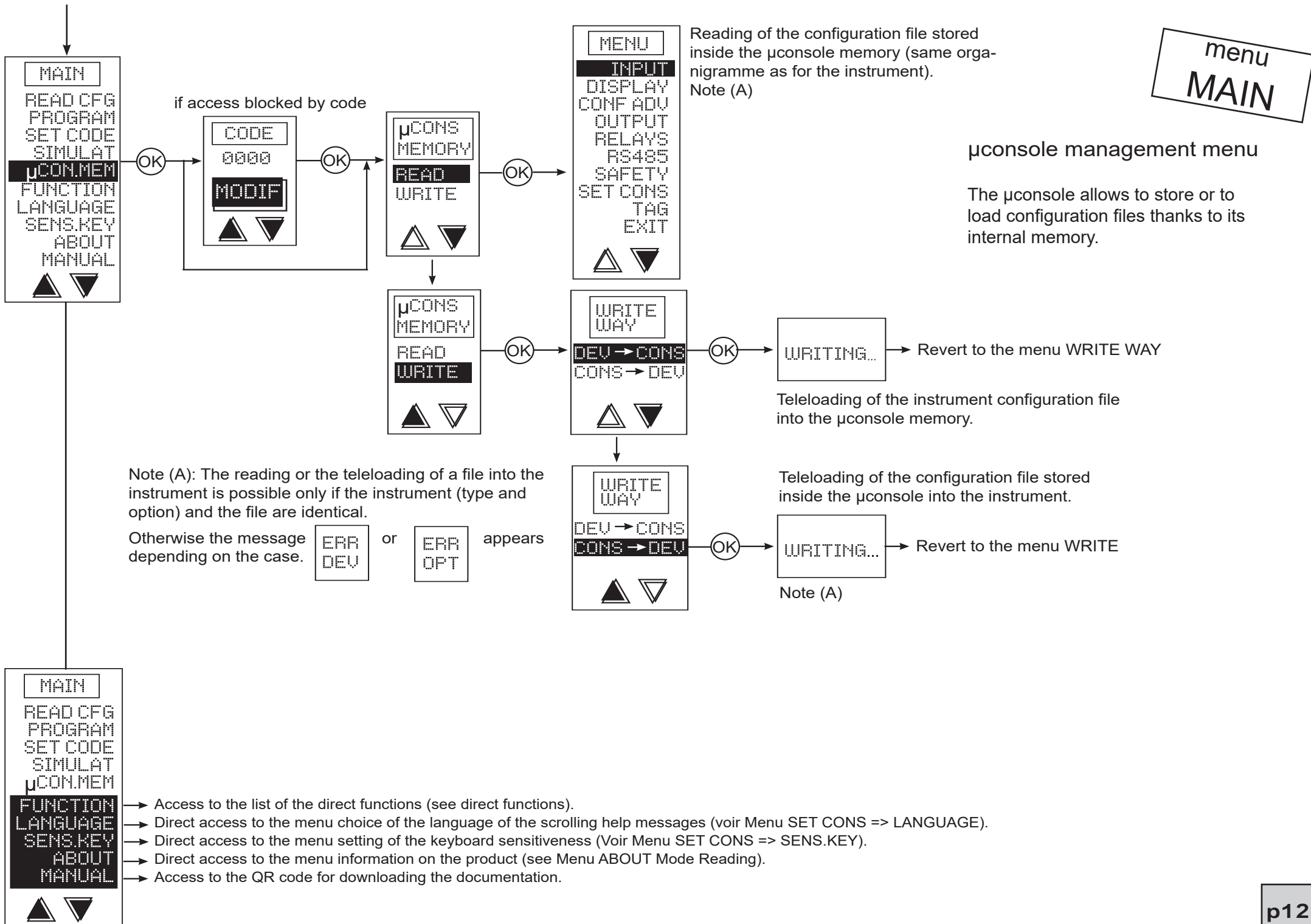


PROG:
Access to the programming of the instrument configuration see page 15.

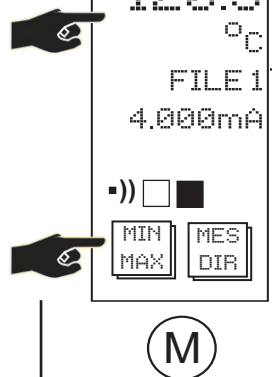
Note:
The instrument will revert to the Measure screen if no key is pressed during 1min. in mode programming and 20 sec. in mode reading.



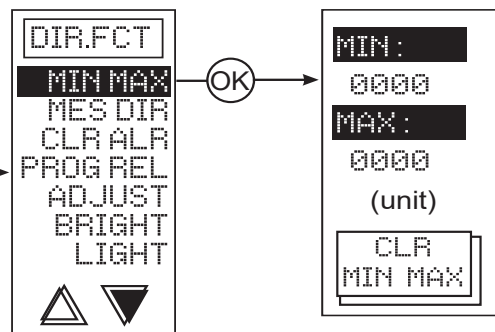




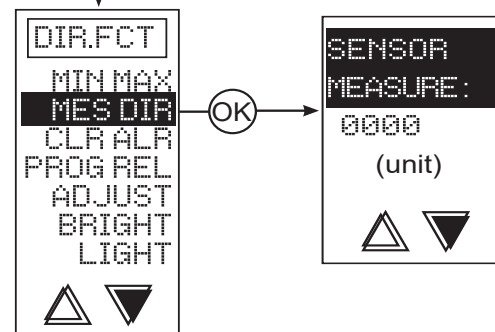
MEASURE SCREEN



Direct access to the function of the key, in this example the display of the measured MIN and MAX.



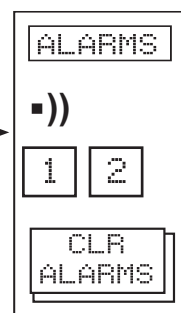
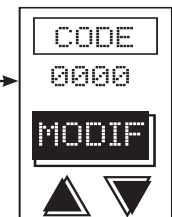
Press the key CLR MIN MAX to delete the recorded min and max.



Direct display of the measure without processing:
in mV, V or mA for the Process inputs
in mV for the thermocouple inputs
in Ω for the inputs PT100, NI100 or resistance
in % for the Potentiometer inputs



if access blocked by code

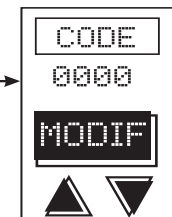


Visualisation of the status of the alarms

Press CLR ALARMS to reset the alarm recordings to 0



if access blocked by code



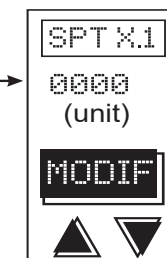
choice of the alarm to be programmed

if mode window



if plain mode

direct modification of the alarm setpoint



back to the previous menu

menu
DIR.FCT

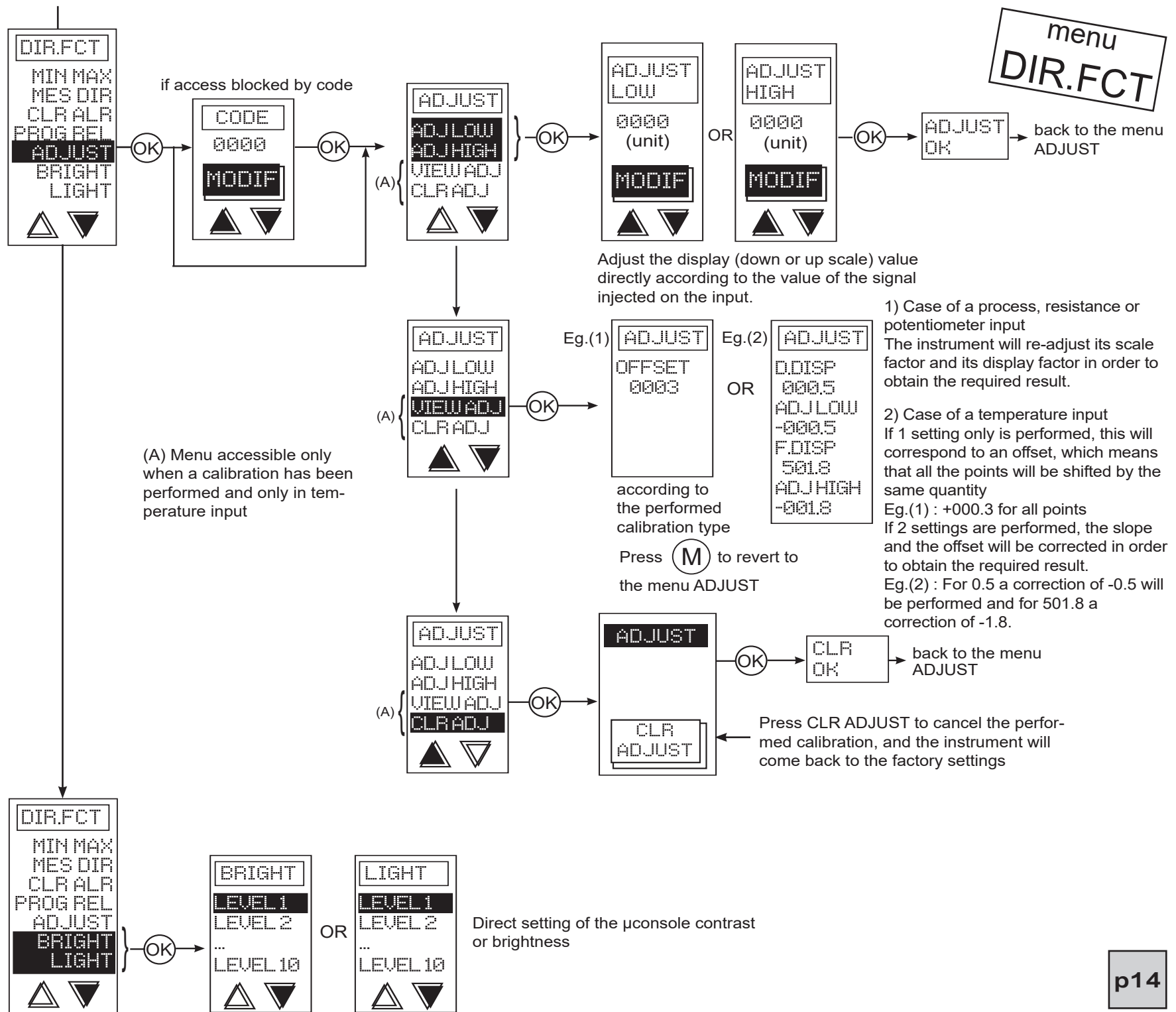
Functions with direct access

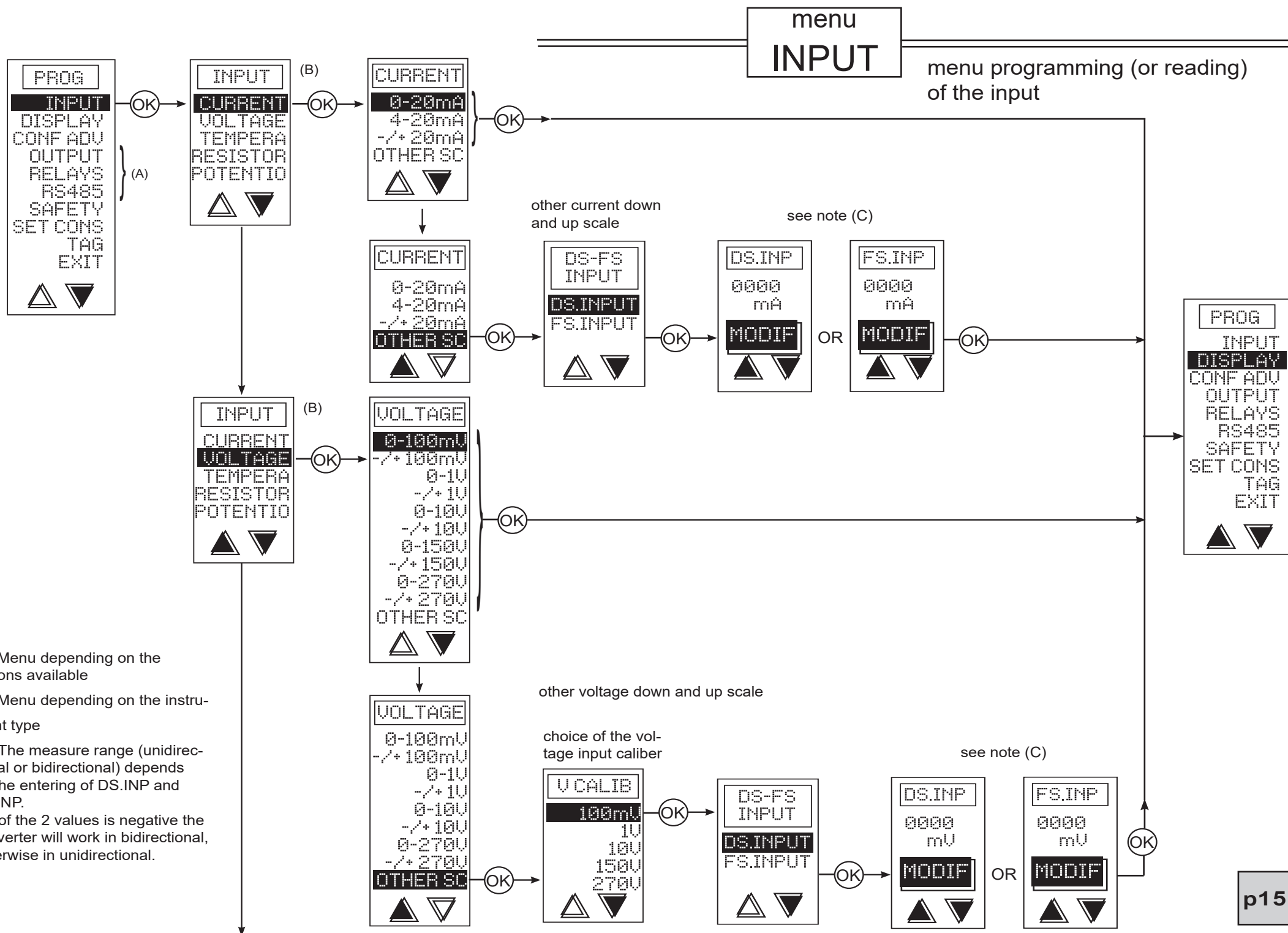
To simplify the use, some functions can be accessed in a more direct way. These functions are:

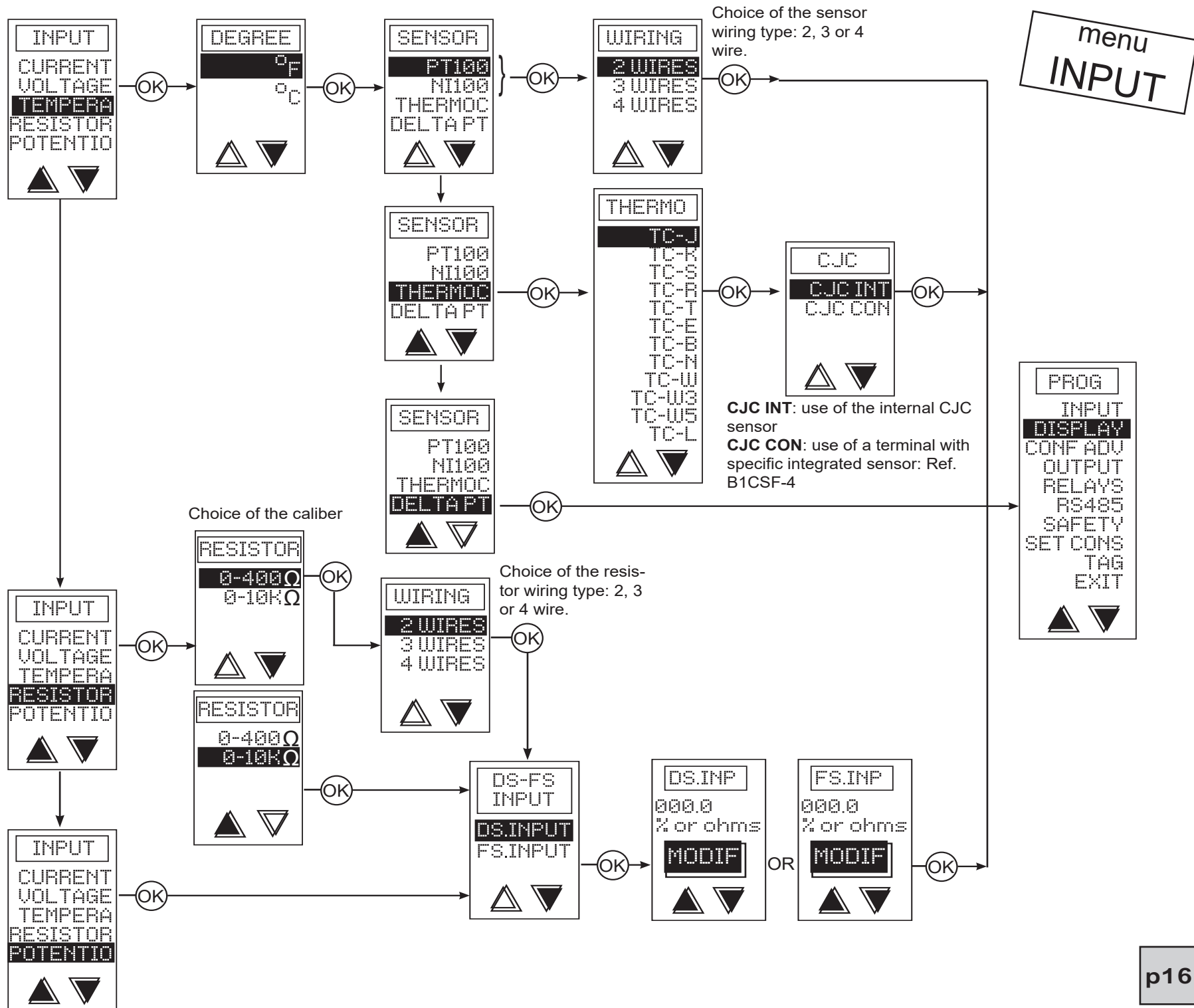
- the display and the 0 reset of the measure, min. and max.,
- the direct display of the electrical value of the sensor (unprocessed value),
- the 0 reset of the alarm recordings,
- the programming of the alarm setpoints,
- the adjusting of the display in relation to the measure (process calibration),
- the setting of the contrast,
- the setting of the brightness.

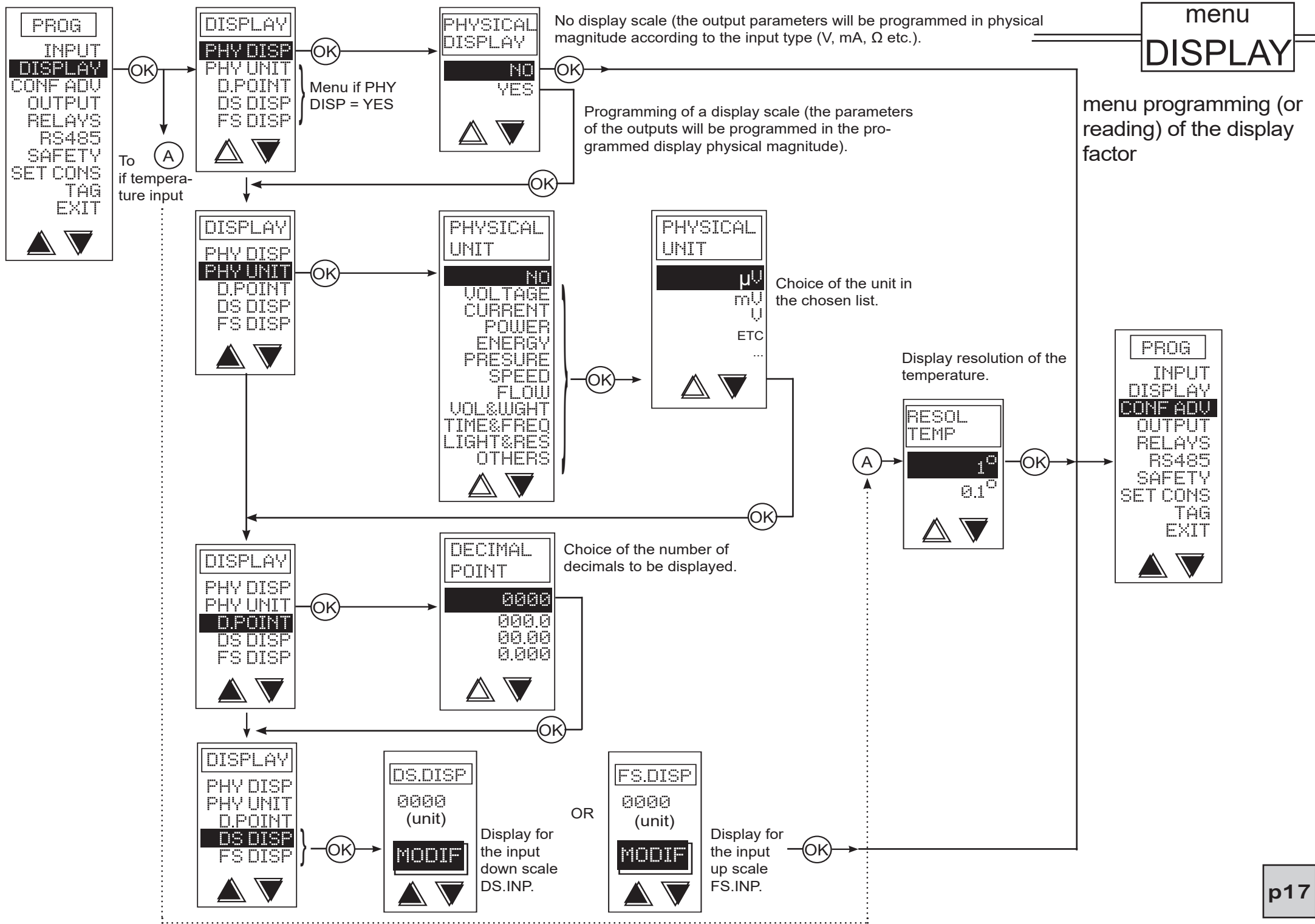
These functions can be accessed in 3 different ways:

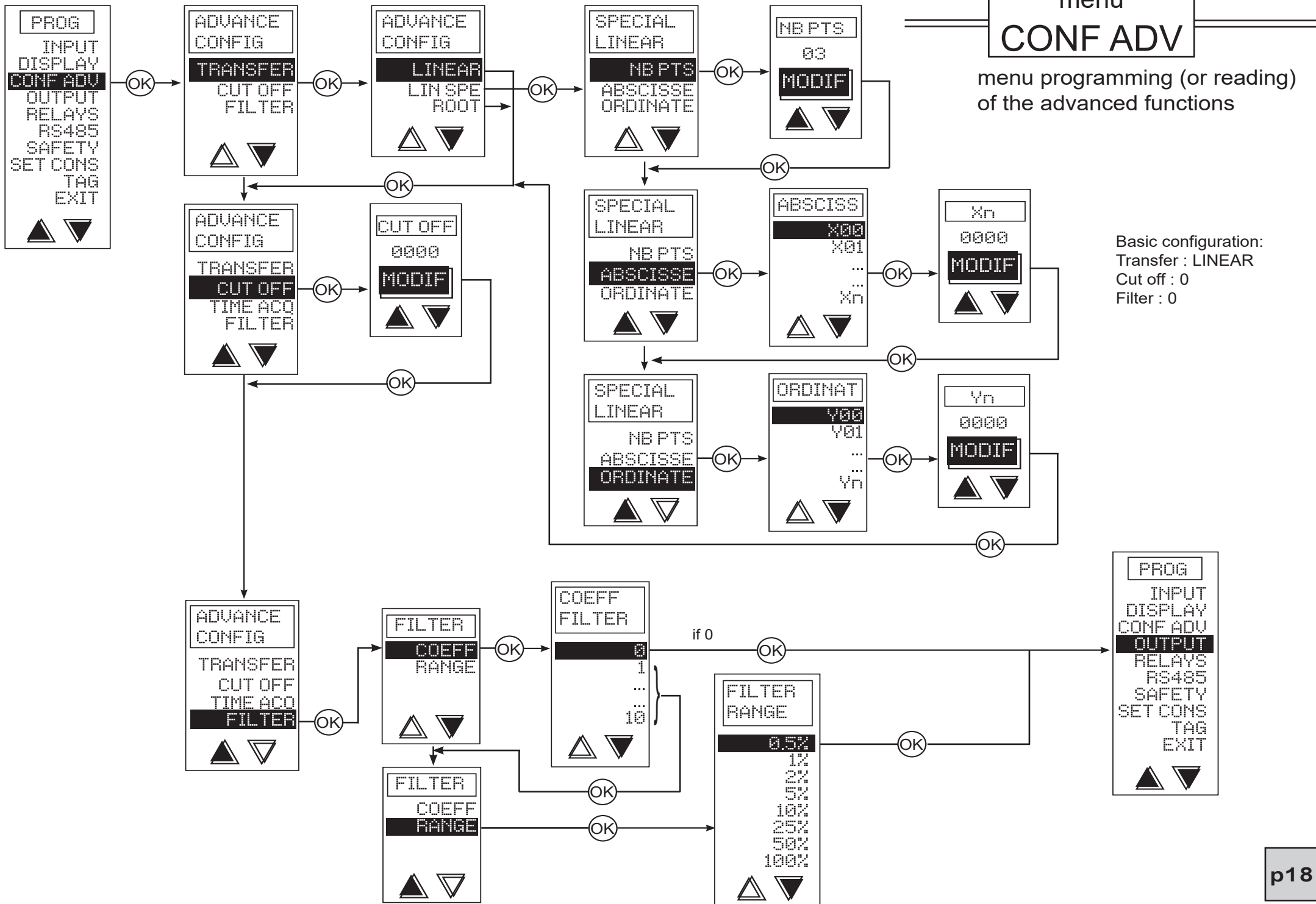
- 1) By pressing the screen in mode measure.
- 2) In the menu MAIN => FUNCTION.
- 3) By the 2 programmable keys of the measure screen (Menu SET CONS, keys F1 and F2).











TRANSFER

LINEAR: Linear function

ROOT: extraction of the square root
 $\sqrt{\text{of the measure brought back in \% of the programmed measure range.}}$
 Eg.: Input 4-20mA => 12mA gives 0.707 ($\sqrt{0,5}$)
 The function square root tends to amplify the input signal background noise when getting near zero.
 To avoid the ripples caused by this noise, simply programme a cut-off value.

LINSPE: Special linearisation

Special linearisations:

For specific applications such as the measurement of volumes, the converter can memorise an unlinear curve programmable in X and in Y.

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

Note:

The values of the abscisses (x) must go increasing: value of X00 < value of X01...

Example:

For a layed cylindric tank, 1 meter high (h) and 1 meter long (l); a 0-20 mA linear sensor measures the height of the liquid surface line:

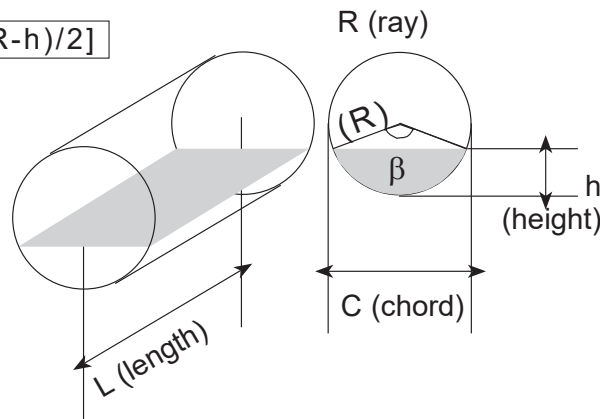
0 meter -> 0 mA (empty tank) 1 meter -> 20 mA (full tank)

with $\cos \beta/2 = (R-h)/R$ and $\sin \beta/2 = C/2R$

Empty tank volume = 0.000

Full tank volume = 0.785

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



Say a curve of 10 equally long segments:
 Measure range / number of segments = 20mA/10 = 2mA length of the segment.

For 10 segments nb = 11 (number of linearisation points).

Input mA	Height m	Angle Degree	Chord m	Volume m ³	Outputs in mA
X00	0	0.00	0.00	Y00 0.000	00.00
X01	2	73.74	0.60	Y01 0.041	01.04
X02	4	106.26	0.80	Y02 0.112	02.85
X03	6	132.84	0.92	Y03 0.198	05.04
X04	8	156.93	0.98	Y04 0.293	07.47
X05	10	180.00	1.00	Y05 0.393	10.00
X06	12	203.07	0.98	Y06 0.492	12.54
X07	14	227.16	0.92	Y07 0.587	14.96
X08	16	253.74	0.70	Y08 0.674	17.17
X09	18	286.76	0.60	Y09 0.745	18.98
X10	20	360.00	0.00	Y10 0.785	20.00

Programming:

X00 = 0 mA

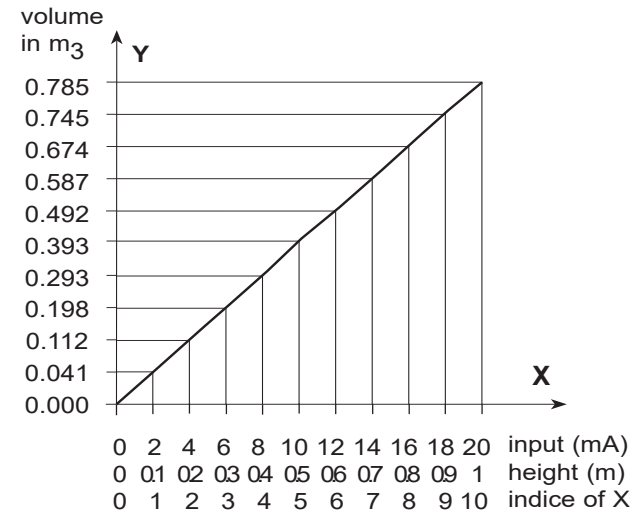
X10 = 20 mA

nb = 11

Y00 = 0,000 m³

Y10 = 0,785 m³

Programming from X00 to X10 and from Y00 to Y10 according to the table.



CUT OFF: Programming of the Cut Off value

- If the display up scale > display down scale and if the display is \leq to the cut off value then it will be held at the down scale.
- If the display up scale < display down scale and if the display is \geq to the cut off value then it will be held at the down scale.

FILTER

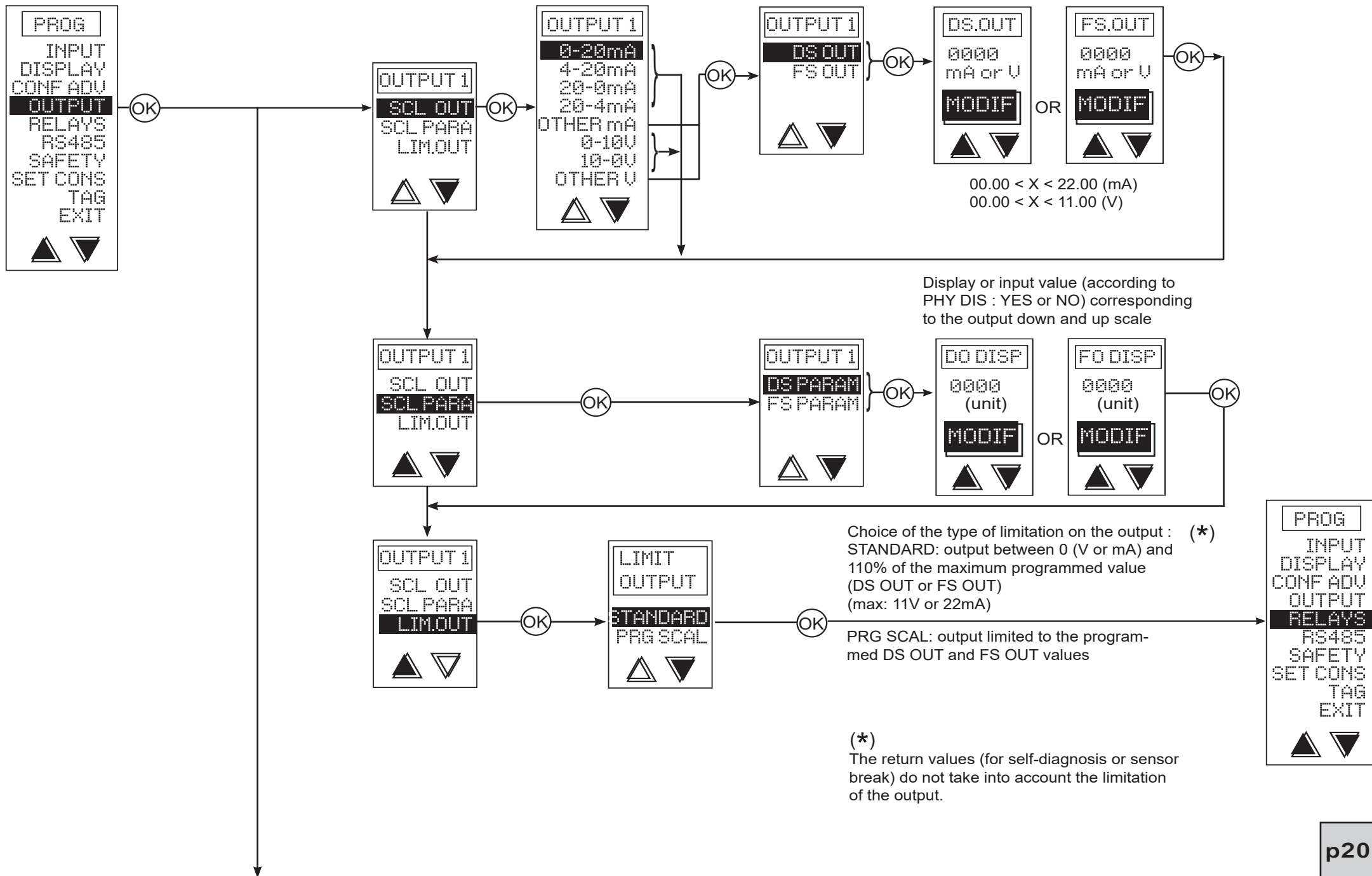
COEFF: integration indice of the digital filtering

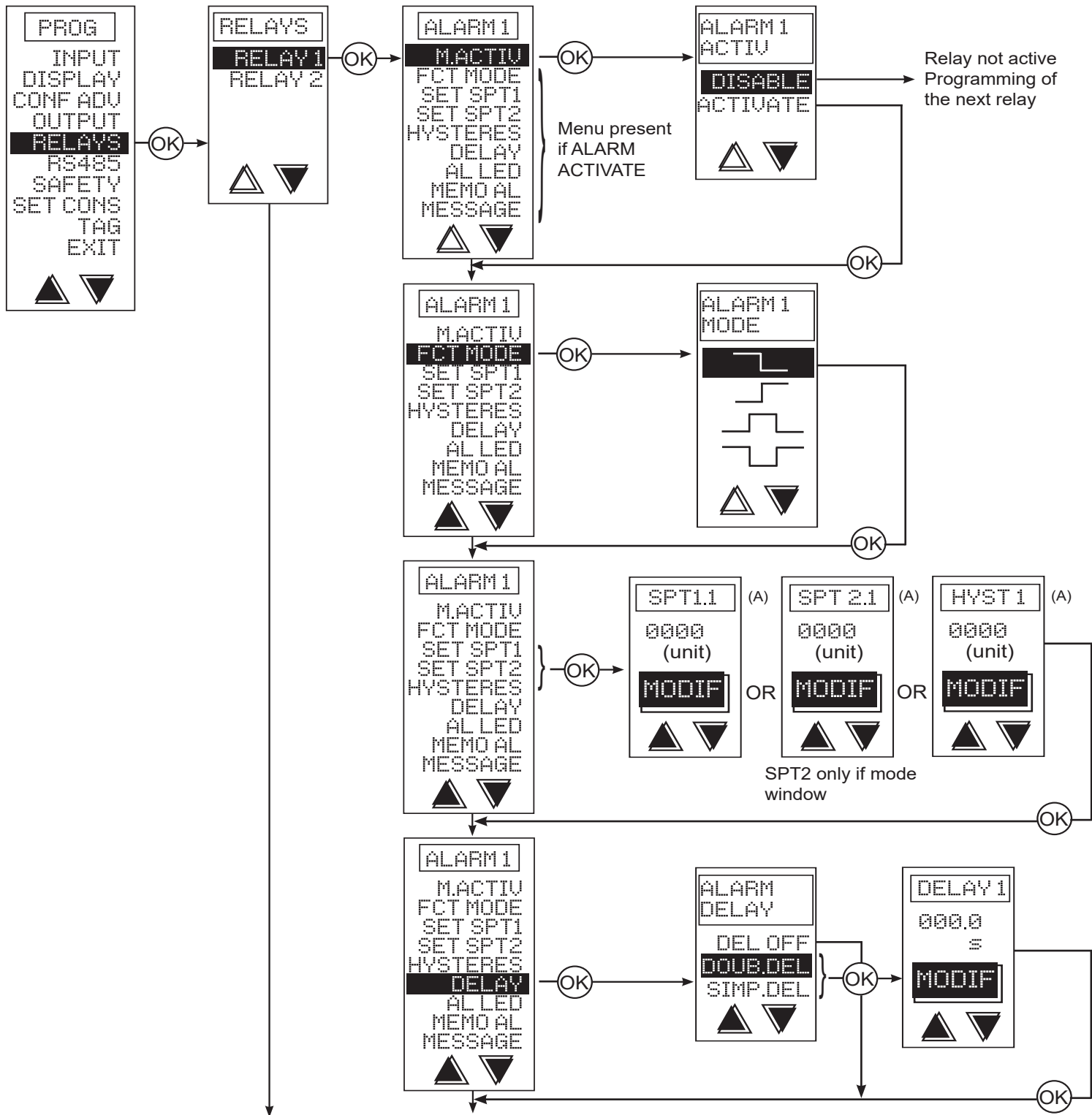
Programmable from 0 to 10, for use in case of unsteady input

RANGE: Percents of variation of the measure on which the filter will be active

Eg.: COEFF: 3 RANGE: 0.5%

The filter with indice 3 is active when the measure varies by $\pm 0,5\%$. When it exceeds 0.5% it will no longer be filtered. This allows to obtain a minimum response time, while eliminating any parasite noise of $\pm 0.5\%$ superimposed to the signal, rendering the measure unsteady. If RANGE = 100% the filter will then be active on the whole measure range.

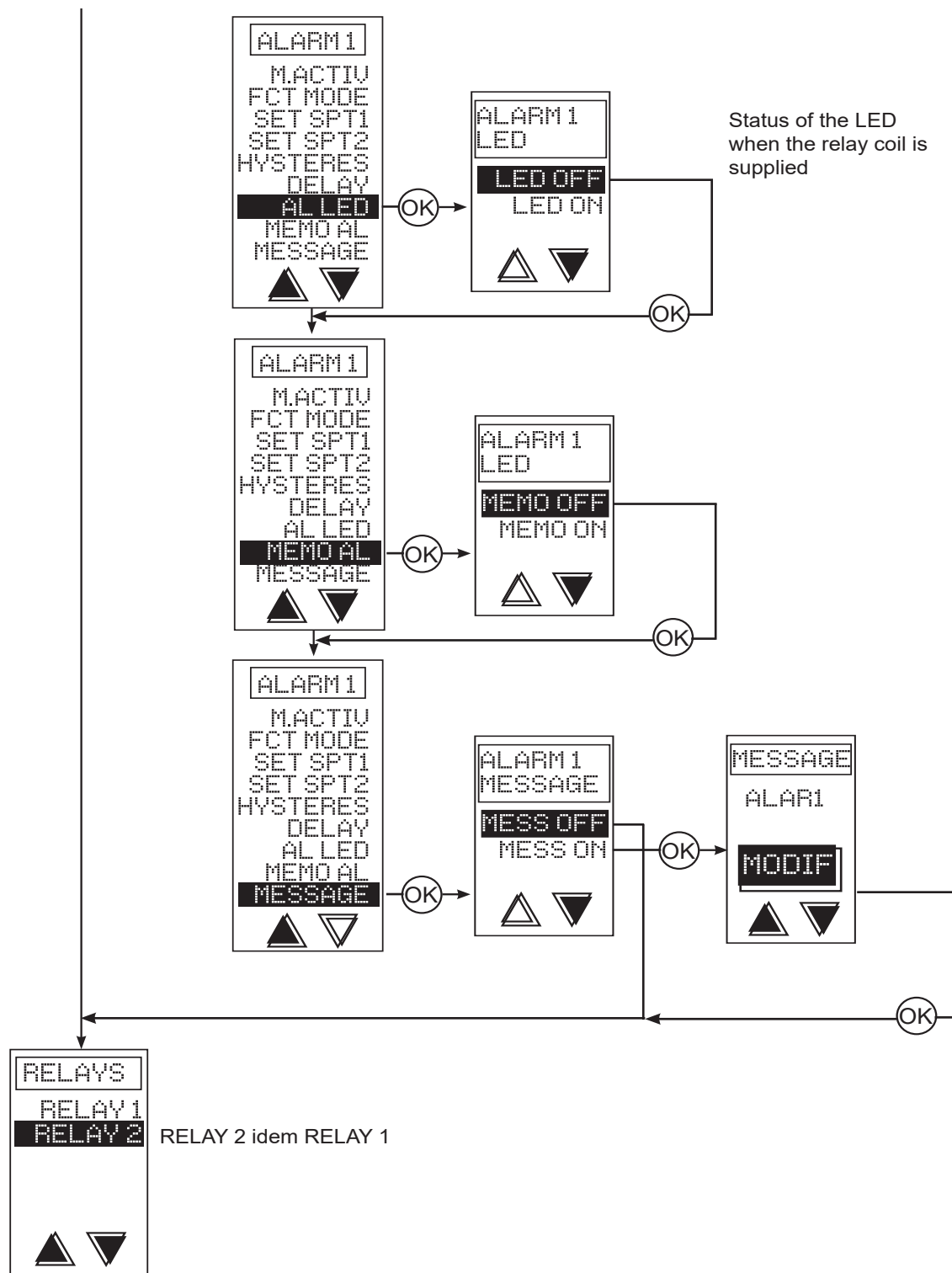




menu programming (or reading) of the
relay outputs (if option present)

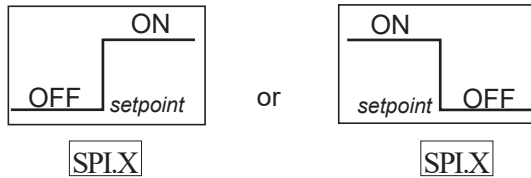
menu RELAYS

menu RELAYS



Status of the LED
when the relay coil is
supplied

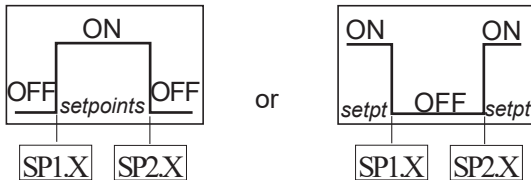
• Mode setpoint



Legend:

ON coil supplied
OFF coil not supplied

• Mode window

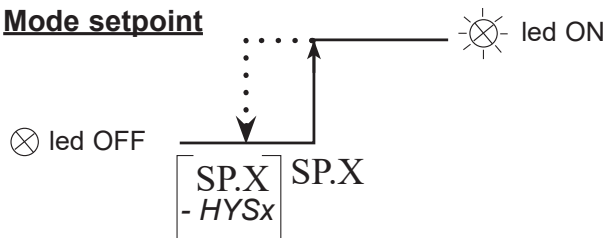


HYSx

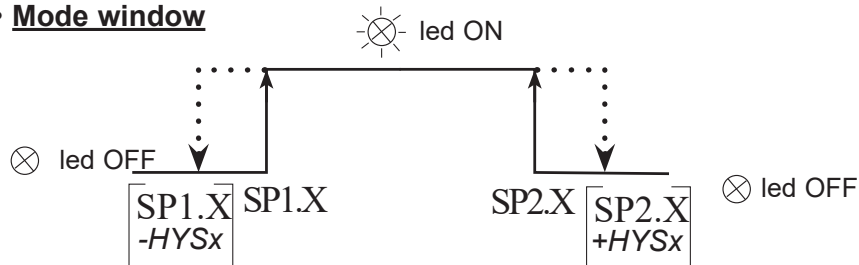
• Setting of the hysteresis

The hysteresis is activated on switching from led ON to led OFF; that is to say on switching out of alarm, since the led represents the alarm status.

• Mode setpoint



• Mode window



DLAYx

• Time delay on the alarm

Setting of the delay from 0 to 999,9 sec.

DOUB DEL: delay on switching on alarm and off alarm

SIMP DEL: delay only on switching on alarm

ALLED

- Choice of the status of the relay associated led when the relay coil is supplied

ALARM MEMORY

• Alarm recording

Allows the 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 the setpoint has been passed (to set the alarm recordings to 0 see the menu CLRALR in the direct functions).

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

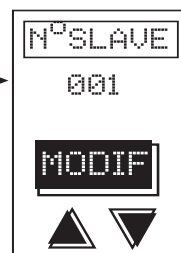
ALARM MESSAGE

• Display of the alarm messages

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

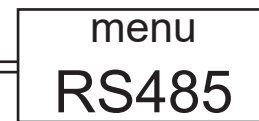


OK



OK

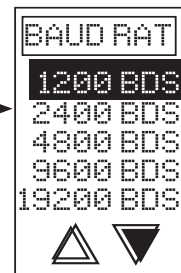
Slave number:
between 1 and 255



menu programming (or reading) of the
RS485 output (if option present)



OK



OK

transmission
speed



OK



OK

Parity:
NONE
EVEN
ODDe



OK



OK

Transmission rank of the bytes:
MSB 1ST: MSB transmitted first
LSB 1ST: LSB transmitted first



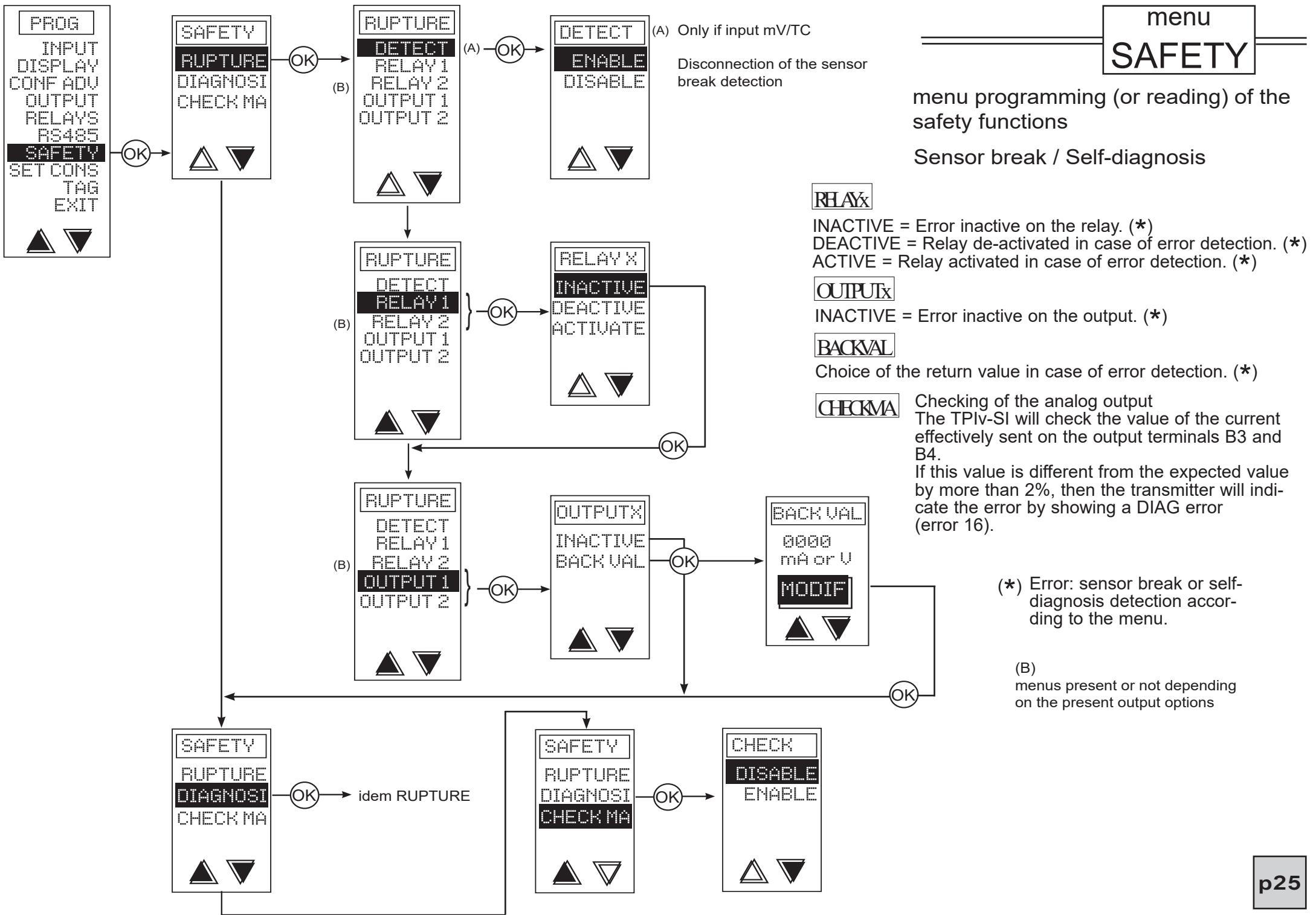
OK



OK

Delay before any response
sequence (typical delay
10ms)





SAFETIES: SAFETY

• Sensor break

The sensor break can be detected on the inputs mV, Tc, Pt100, Ni100, resistance (<400Ω) and current if the down and up scale <3.5mA.

On the µconsole: the message OPEN appears

On the converter: The LED ON blinks (approx. 4Hz)

Disconnection of the sensor break detection: (if input mV or temperature)

The sensor break detection can be disconnected in order not to disturb some calibrators which may be sensitive to the rupture detection current.

• Self-diagnosis

The converter permanently watches any drifts of its components. The self-diagnosis serves to warn the user in case of abnormal increase of these drifts before they may provoke false measures.

The self-diagnosis error information can be reported:

- On the display: An error message appears alternating with the measure.

Coding:

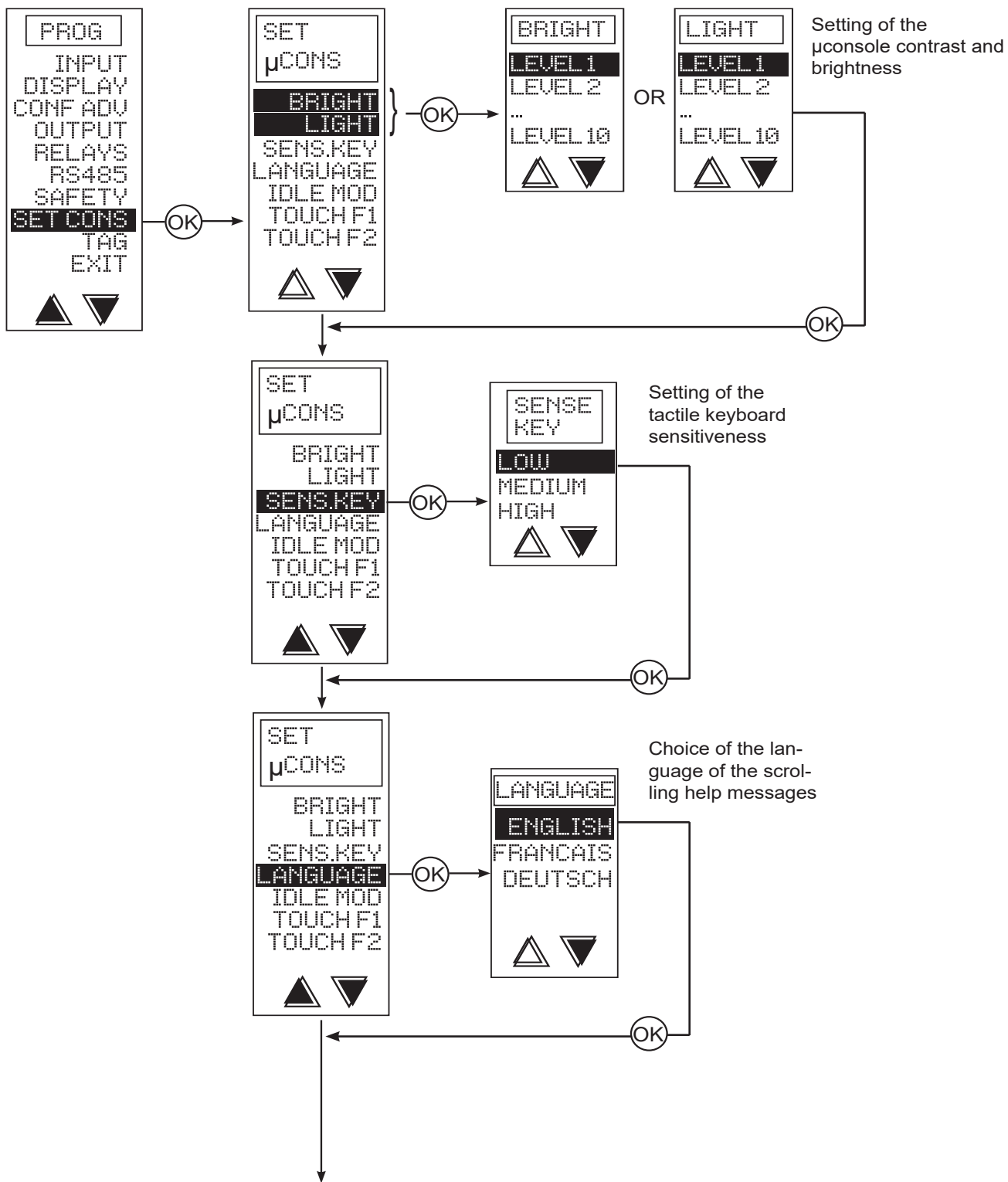
- 1 : Programming error (incoherent programming parameter) (E.PROG)
- 4 : Error on internal offset (excessive drift) (E.OFFS)
- 8 : Calibration error (E.CAL)
- 16 : Checking error of the value of the current sent on the analog output (E.OUT).
This error appears systematically if the connector of the analog output (terminal B) is disconnected or if the current output loop is open (with a current different from zero).
- 32 : Error on the CJC (excessive drift or incoherence between the presence or not of the specific terminal «B1CSF-4» and the programming of «CJC» (INT or CON)) (E.CSF)
- 64 : Upper or lower electrical overstepping of the input. (E.OVRG)

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

Press the screen in mode measure to access the display of the details of the latched self-diagnosis errors.

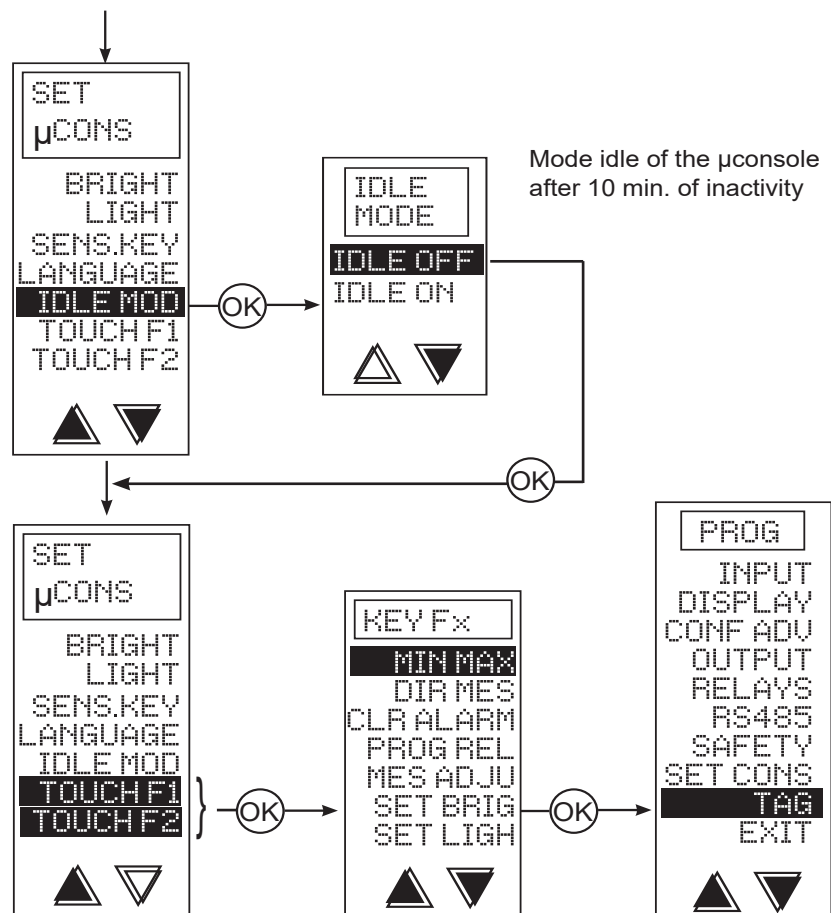
- On the converter:

The LED ON blinks (approx. 4Hz)



menu SET CONS

menu programming (or reading) of the functions concerning the μconsole

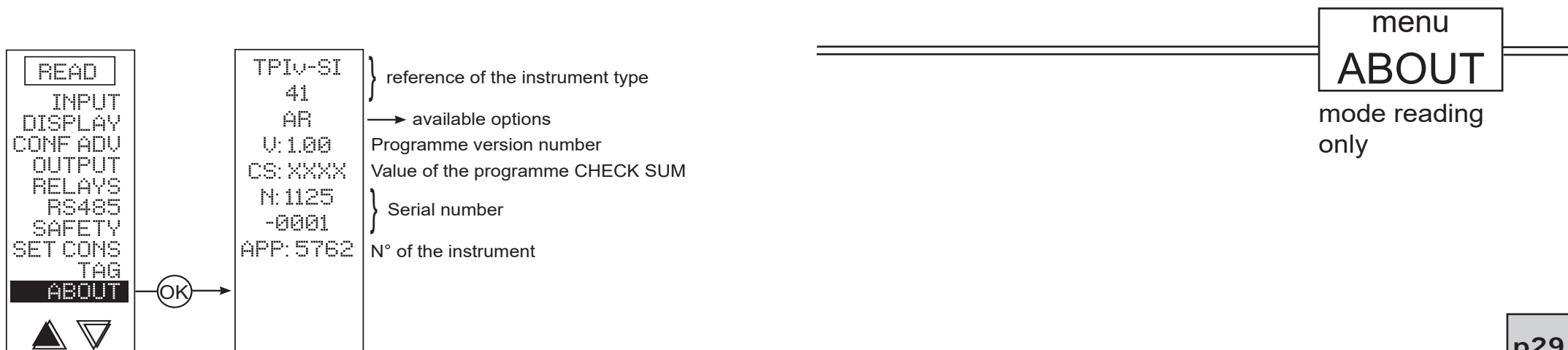
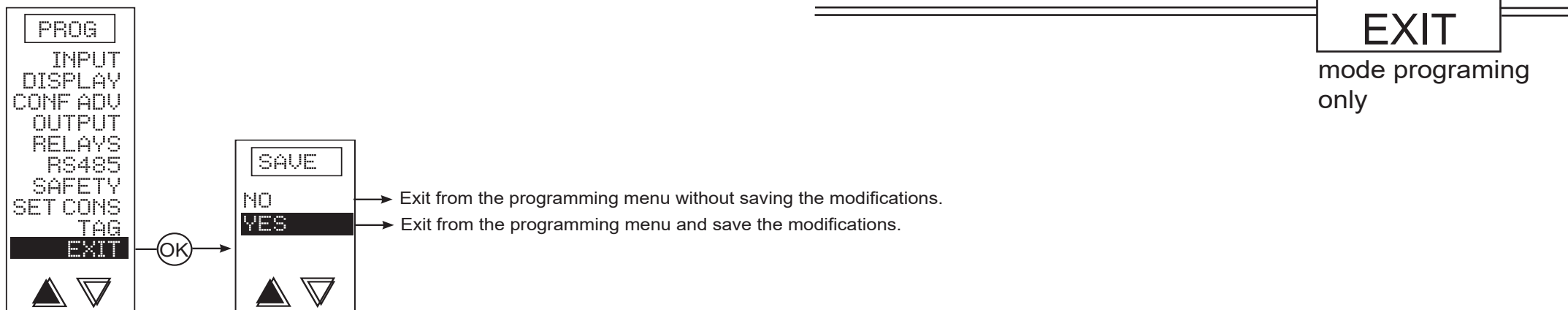
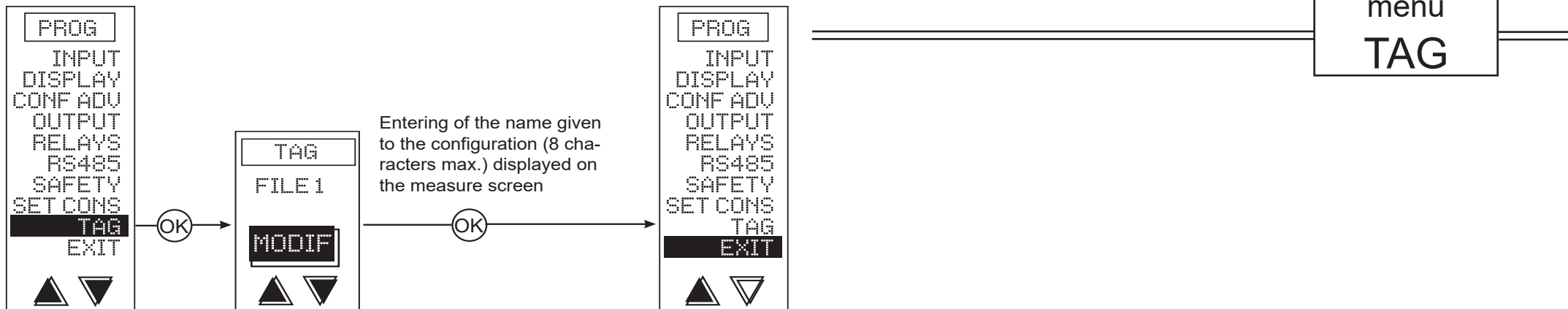


Choice of the functions associated with the direct access keys on the measure screen:

F1: left hand key

F2: right hand key

- MIN MAX: Display and 0 reset of the recorded min. and max.
- DIR MES: Direct measure of the sensor.
- CLR ALARM: 0 reset of the alarm recordings.
- PROG REL: Direct setting of the alarm setpoints.
- MES ADJU: Access to the adjusting of the input scale.
- SET BRIG: Setting of the contrast.
- SET LIGH : Setting of the brightness.



5. ERROR MESSAGES

2000	Measure in overrange	----	Upper or lower electrical overstepping of the input
OPEN	Sensor break	OL	Displayable value overload
ERR1	Value set out of range	ERxx	Self-diagnosis error (see p26)

5.1 Blinking of the led ON:

Fast blinking (approx. 4 Hz):

- Self-diagnosis active (display ERxx) OR
- Sensor break detected (display OPEN) OR
- Upper or lower electrical input overstepping (display ---- + ER.64)

Slow blinking (1 Hz):

The converter is blocked in mode SIMU or GENE

6. GENERAL WARRANTY TERMS

WARRANTY applying and duration

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

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

* Complete warranty terms and details available on request.

7. ANNEXE: MODBUS

7.1 Table of the Modbus addresses

Word address	Description
0	Measure of the sensor primary
1	decimal point/unit
2	final measure
3	decimal point/unit
4	final measure min.
5	decimal point/unit
6	final measure max.
7	decimal point/unit
12	value of analog output n°1
13	decimal point/unit
14	value of analog output n°2
15	decimal point/unit
51	Self-diagnosis
100	Status relays 1 and 2

Measures

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

Eg.:

Word address	Decimal value	Coding
0	10 094	module
1	12 289	dec. point / unit

Coding of the integer point/ unit

H L

BYTE BYTE

point unit: code of correspondance in the list hereunder

Value of the quartet:

- 0 : no decimal

16 : 1 decimal

32 : 2 decimals

48 : 3 decimals

Eg.: 12 289 = 48 X 256 + 1
- 0 : none

1 : V

2 : kV

etc ...

The integer encodes the unit V with 3 decimals
The measure read is thus 10.094 V

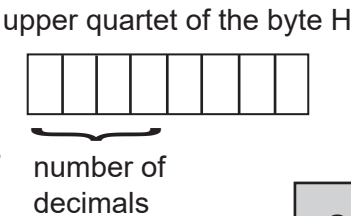
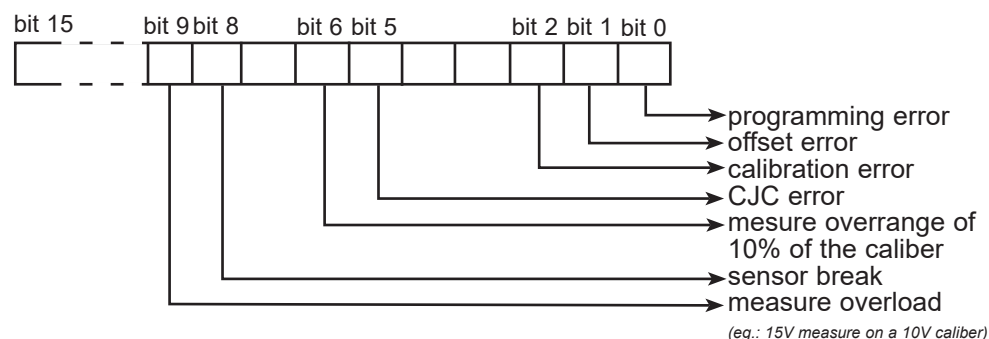
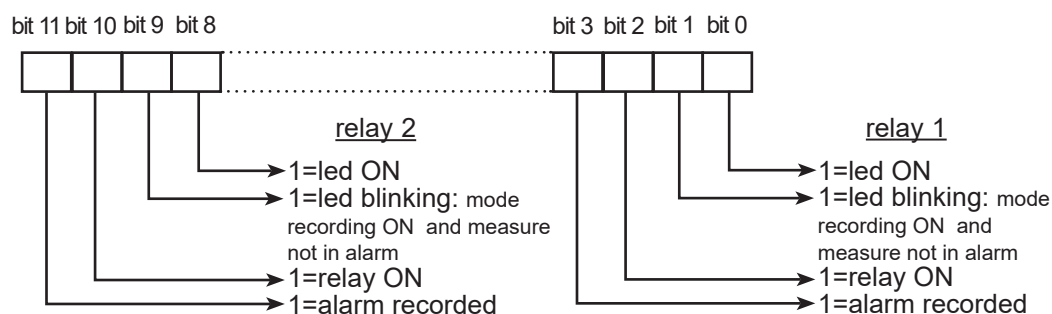
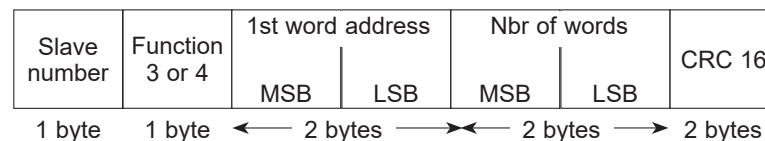
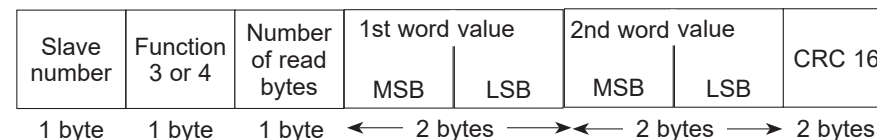
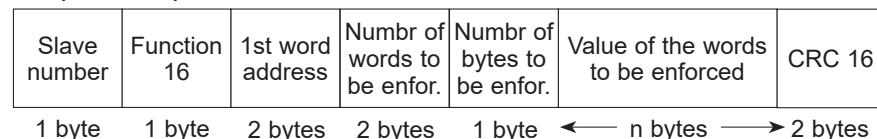
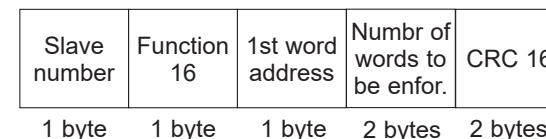


Table of units

Code	Unit	Code	Unit	Code	Unit	Code	Unit	Code	Unit
000		023	MVARh	100	°C	122	mm/s	144	mV DC
001	V	024	GVARh	101	°F	123	cm/s	145	V DC
002	KV	025	Hz	103	mm	124	m/s	146	KV DC
003	A	026	KhZ	104	cm	125	m/mn	147	mA DC
004	KA	027	Deg	105	m	126	m/h	148	A DC
005	W	028	Ohms	106	km	127	mm3	149	KA DC
006	KW	029	Kohms	107	mBar	128	cm3	152	Mohms
007	MW	030	h	108	Bar	129	m3	153	US.gal/s
008	GW	031	mn	109	Pa	130	g	154	US.gal/min
009	VAr	032	s	110	Kpa	131	kg	155	US.gal/h
010	KVAR	033	%	111	Kg/cm2	132	t	156	US.gal
011	MVAR	034	cos PHI	112	PSI	133	l	157	lb
012	GVAR	035	to 099 free	113	mCE	134	hl	158	C
013	VA			114	l/s	135	Rpm	159	imp
014	KVA			115	l/mn	136	CP/mn	160	CP
015	MVA			116	l/h	137	PH	161	mA
016	GVA			117	m3/s	138	mV AC	163	mA.h
017	Wh			118	m3/mn	139	V AC	164	A.h
018	KWh			119	m3/h	140	KV AC	165	μV
019	MWh			120	tr/s	141	mA AC	166	mV
020	GWh			121	rad/s	142	A AC		
021	VARh					143	KA AC		
022	KVARh								

Integer selfdiagnosis: (address 51)**Integer status of relays 1 and 2: (address 100)****7.2 Description of the born Modbus functions:****Reading of N words: Function n°3****Request sequence:****Response sequence:****Writing of N words: Function N°16:****Request sequence:****Response sequence:**

Writing of 1 word: Function N°6:

Request sequence:

Slave number	Function 6	Word address	Value of the word to be enf.	CRC 16
1 byte	1 byte	2 bytes	2 bytes	2 bytes

Response sequence:

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

Exception pattern:

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

Values of the error codes:

- 1: Function code unknown
- 2: Address incorrect
- 3: Data incorrect
- 9: Writing impossible

7.3 Reading in double integer format:

Example: Reading of the displayed measure

Request:

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

• Response with a positive measure:

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

Value of the measure:

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

Sign : 0 positive
1 negative

$$\begin{aligned}
 \text{Measure} &= \text{byte 3} \times 256^3 + \text{byte 4} \times 256^2 + \text{byte 1} \times 256 + \text{byte 2} \\
 &= 0 \times 256^3 + 0 \times 256^2 + 19 \times 256 + 136 \\
 &= 5000
 \end{aligned}$$

Reading of the address 3 => decimal point = 2 => displayed measure 50.00

• Response with a negative measure:

254	3	4	236	120	255	255	CRC 16
			byte 1	byte 2	byte 3	byte 4	2 bytes

byte 3	byte 4	byte 1	byte 2
11111111	11111111	11101100	01111000

Sign: 1 negative: inversion of the bits, and plus 1.

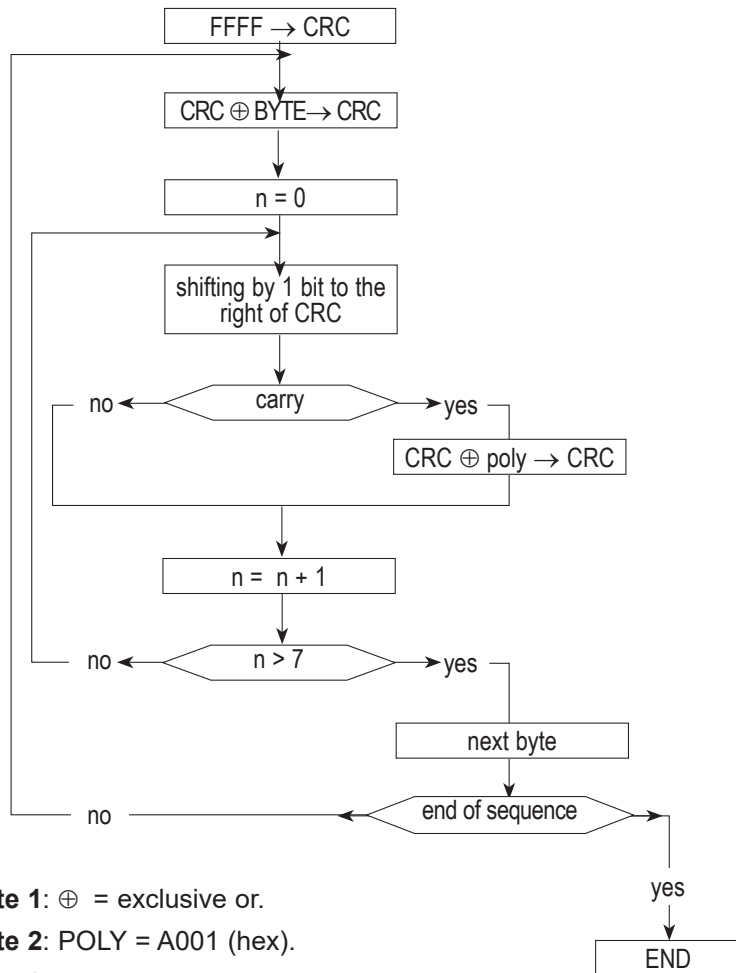
Inversion	byte 3	byte 4	byte 1	byte 2
	00000000	00000000	00010011	10000111

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

$$\begin{aligned}
 \text{Measure} &= -(\text{byte 3} \times 256^3 + \text{byte 4} \times 256^2 + \text{byte 1} \times 256 + \text{byte 2}) \\
 &= -(0 \times 256^3 + 0 \times 256^2 + 19 \times 256 + 136) \\
 &= -5000
 \end{aligned}$$

Reading of address 3 => decimal point = 2
=> displayed measure -50.00

7.4 CRC 16 calculation algorithm :



Note 1: \oplus = exclusive or.

Note 2: POLY = A001 (hex).

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

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

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