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1. INTRODUCTION

The series C 975 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 C 955 counts as standard :
  - A DC current or voltage input
    Bidirectional ±100mV, ±1V, ±10V, ±300V, ±20mA.
  - Accuracy : 0.05 % of full scale at +25 °C
    Thermic 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 Vdc (±15%) -25 mA
    protected from short circuits

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.

General features

- Programmable sampling time : 100 ms, 20 ms, 16,6 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

Terminals

Case
tightenings
external
seal

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

PROCESS

C 95

4 5 6 7 8 9

A

 NC

VOUT GND VCC

+ (100V)

+ 5V

mA

+ mV

2 wire Transmitter

VOUT GND VCC

+ (100V)

+ 5V

mA

+ mV

2 wire Transmitter

POWER SUPPLY

A

AC ~ ~

DC + -

OUTPUTS (options)

VOLTAGE CURRENT PASSIVE

23 + V

24 +

25 - Rc

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

ACTIVE CURRENT

23 +

24 + mA

25 -

0-4/20mA active

2 RELAYS

D

26 T1

27 C1

28 R1

29 T2

30 C2

31 R2

4 RELAYS

E

32 T3

33 C3

34 R3

35 T4

36 C4

37 R4

T : NO
C : Common
R : NC

DATA LINK

20 B

21 A

22 COM

Digital data link RS485
4. PROGRAMMING

4.1 Communicate with the instrument

Several functions based on the measuring are available:

<table>
<thead>
<tr>
<th>Alarms</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Led 1</td>
<td>Measure display</td>
</tr>
<tr>
<td>Led 2</td>
<td>Access to main menu</td>
</tr>
<tr>
<td>Led 3</td>
<td>min. value display p17</td>
</tr>
<tr>
<td>Led 4</td>
<td>max. value display p17</td>
</tr>
<tr>
<td></td>
<td>min. max. zero reset p17</td>
</tr>
</tbody>
</table>

You can access further functions by pressing several keys simultaneously:

+ Setting of down scale display;
+ Setting of full scale display;
+ Visualise direct measure ;
+ Visualise and adjust alarm setpoints;
+ Set tare (except temperature inputs)

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

Entering a parameter:
- Start by increasing or decreasing and the 1st digit and the sign: from -9 to +9.
- The 2nd from 0 to 9.
- The 3rd from 0 to 9.
- The 4th from 0 to 9.

4.2 Find your way through programming

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

- Move through menus to the bottom, or decrease displayed value
- Move through menus to the top, or increase displayed value
- Exit a submenue 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 p16)
4.4 Programming menu (according to options)

- Input: Access to input programming
- DisPL: Access to display factor programming
- Clima: Access to analogue output programming
- Jbus: Access to communication parameters
- Relay: Access to relay programming (2 or 4 relays)
- Secu: Access to programming outputs, relays, in case of error self-diagnosis and/or sensor rupture and access to disconnecting sensor rupture
- Pr.dmis: Access to display programming: Leds, Bargraph, Display brightness
- Saue: Access to programming exit menu with or without recording configuration

Note:
⇒ Press key 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.

Move through menus / choice

4.4.1 Input programming

- Process signals

- Type: Voltage input, current input
- Vin: Range in mV, V or mA according to type
- Full scale: -22.00 < x < 22.00 (mA)
- -11.00 < x < 11.00 (10V)
- -320.0 < x < 320.0 (300V)
- -110.0 < x < 110.0 (0.1V)
- -1.100 < x < 1.100 (1V)

- LinEA: Linear function
- Root: Function square root extraction

- Funct: Function special linearisation

- Nb: From 1 to 18

Note:
⇒ Press key to go on to next menu

Move to the top / Increase
Move to the bottom / decrease
Validation / Vertical move

Exit / Menu access

Move to the top / Increase
Move to the bottom / decrease
Validation / Vertical move

p6
4.4.2 Display programming

- **Point**: decimal point position
  - * display corresponding to input down scale “d.in”
- **ddSP**: -88.88
  - * display corresponding to input down scale “d.in”
- **FddSP**: -88.88
  - * display corresponding to input down scale “F.in”
- **b01**: -88.88
  - special linearisation
  - set an identical number of display points for both ordinates “bxx” and abscisses “Axx”
- **bB**: -88.88
- **Cut.of**: -88.88
  - set display points
- **IntEG**: integration indice
  - 0000
  - ntEG : coefficient from 0 to 10

- **Out.MA**
  - or **J bus**
  - or **tor**
  - or **rELAY**
  - or **SECU**
  - according to options

* Modifying this parameter requires reprogramming following relay, analogue output and bargraph, and the parameters display:
  - SPxx, hystxx, doxxS, FdxxS, dBarG, FbARG, ddSP, FddSP, bxx, Cut.of

See also output 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
Communication parameters

- **SLAuE**: slave number
  - must be incl. between 1 and 255
- **bArd**: baud rate
  - 9600, 4800, 2400, 1200
- **dELAY**: delay to be counted before any answer pattern
  - On: time = 75ms
  - Off: time = 20ms

**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

See also digital data link features p11

**Option digital output**

- **REL.1**
  - alarm
  - enabled
  - disabled

- **REL.2**
  - **ModE.1**
    - mode setpoint
    - mode window
  - **REL.3**
  - **REL.4**

- **SP.1**: 02.00
- **SP.2**: 04.00

**See also relay output features p12**

- **Hyst.1**: 0 < hyst. < 9999 in display points
- **TIME.1**: 0 < TIME < 025.0 in 0.1 sec. increases
- **Led 1**: ON: led lit when relay enabled
  - OFF: led still when relay enabled

**Choice of status of the Led associated with the relay**

- **MEM.1**: no
  - YES
- **MESS.1**: no
  - YES

**Function alarm recording**

- enter 4 digits + dot
- If option 2 relays, at the end of menu REL.2
- If option 4 relays, at the end of menu REL.4

**Function display alarm message**

- See also relay output features p12

- move to the bottom / decrease
- validation / vertical move
Exit programming with or without saving

revert to measure display

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 SAVED YES all parameters with decimal point that have not been modified (see p7)

4.5 Input features and programming limits

4.5.1 Current input [MA]

Features

<table>
<thead>
<tr>
<th>Caliber</th>
<th>Display resolution</th>
<th>Input resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>from -20 to +20mA</td>
<td>± 1 digit</td>
<td>14 bits</td>
<td>0.05% of measure range</td>
</tr>
</tbody>
</table>

Input measurable limits: -22 to 22 mA

• 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 the display is under this value, it is kept at down scale (if input full scale > input down scale) or held at full scale (if input full scale < input down scale)

Special linearisation: [LSPE]

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 < A00 value < A01 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 β/2 = (R - h) / R
Sin β/2 = C / 2R

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

Volume = L [π R² β/360 - C(R-h)/2]

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

<table>
<thead>
<tr>
<th>Input mA</th>
<th>Height m</th>
<th>Degree</th>
<th>Chord m</th>
<th>Volume m³</th>
<th>Outputs in mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>d.in</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
<td>d.disP</td>
<td>0.00</td>
</tr>
<tr>
<td>A01</td>
<td>2</td>
<td>73.74</td>
<td>0.60</td>
<td>B01</td>
<td>0.041</td>
</tr>
<tr>
<td>A02</td>
<td>4</td>
<td>106.26</td>
<td>0.80</td>
<td>B02</td>
<td>0.112</td>
</tr>
<tr>
<td>A03</td>
<td>6</td>
<td>132.84</td>
<td>0.92</td>
<td>B03</td>
<td>0.198</td>
</tr>
<tr>
<td>A04</td>
<td>8</td>
<td>156.93</td>
<td>0.98</td>
<td>B04</td>
<td>0.293</td>
</tr>
<tr>
<td>A05</td>
<td>10</td>
<td>180.00</td>
<td>1.00</td>
<td>B05</td>
<td>0.393</td>
</tr>
<tr>
<td>A06</td>
<td>12</td>
<td>203.07</td>
<td>0.98</td>
<td>B06</td>
<td>0.492</td>
</tr>
<tr>
<td>A07</td>
<td>14</td>
<td>227.16</td>
<td>0.92</td>
<td>B07</td>
<td>0.587</td>
</tr>
<tr>
<td>A08</td>
<td>16</td>
<td>253.74</td>
<td>0.70</td>
<td>B08</td>
<td>0.674</td>
</tr>
<tr>
<td>A09</td>
<td>18</td>
<td>286.76</td>
<td>0.60</td>
<td>B09</td>
<td>0.745</td>
</tr>
<tr>
<td>F.in</td>
<td>20</td>
<td>360.00</td>
<td>0.00</td>
<td>F.disP</td>
<td>0.785</td>
</tr>
</tbody>
</table>
4.6 Output features and programming limits

4.6.1 Analogue output

Current output 0/4-20mA active

- Accuracy 0,1 % in relation to display (at +25°C)
- Residual drift ≤ 0,2%
- Admissible load 0Ω ≤ Rc ≤ 500Ω (current)

- Scale ratio programmable with enlarging effect
- Response time: 40 ms in relation to display

<table>
<thead>
<tr>
<th>d.out</th>
<th>F.out</th>
<th>d.disp</th>
<th>F.disp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analogue output down scale (eg 04.00 (4mA))</td>
<td>Analogue output full scale (eg 20.00 (20mA))</td>
<td>Display value corresponding to output down scale</td>
<td>Display value corresponding to full scale value</td>
</tr>
</tbody>
</table>

In mode measure, the analogue output can not overstep 10% 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 partyless bits 1 stop bit

<table>
<thead>
<tr>
<th>SL.Au</th>
<th>bAu</th>
<th>dELA</th>
<th>SlAVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slave number included between 1 and 255</td>
<td>Baud rate included between 1200 and 19200 bauds</td>
<td>Delay to be counted before any answer pattern</td>
<td>Slave number used</td>
</tr>
</tbody>
</table>

Table of modbus addresses, functions used, see annexe p22.
4.6.3 Relay outputs:

2 relay outputs \( \text{REL}_1 \text{ REL}_2 \)
or 4 relay outputs \( \text{REL}_1 \text{ REL}_2 \text{ REL}_3 \text{ REL}_4 \)

- 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 \( x \) \( \text{AL}_x \)

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>The state of relay ( x ) depends on the entered programming</td>
</tr>
<tr>
<td>Off</td>
<td>Relay ( x ) remains still</td>
</tr>
</tbody>
</table>

Choice of function mode:

- **Mode setpoint**

  - ON
  - OFF

- **Mode window**

  - SPX1
  - SPX2

Choose state of the Led associated with the relay \( \text{LED}_x \)

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>The Led is lit when relay enabled (coil supplied)</td>
</tr>
<tr>
<td>Off</td>
<td>The Led is still when relay enabled (coil supplied)</td>
</tr>
</tbody>
</table>

\( \text{HYSt}_x \) 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**

  - Led lit

- **Mode window**

  - Led still

Legend:

- ON coil supplied
- OFF coil not supplied
• **Alarm delay** [TimEx]
The relay delay is adjustable from 000.0 to 025.0s., in 0,1s. increases. It is active on enabling and disabling.

• **Alarm recording** [MEMx]
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 [CLeA] p16).

  **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 (Ω) and (Ω) if access to fast entering has been authorized during code programming (see p15)

### 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 provoke 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 p15)

### 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 |
    | H | Relay enabled (coil supplied) in case of error self-diagnosis |

  **Note**: The led is still 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)

• **Sensor rupture** [ruPC]
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 |
    | H | Relay enabled (coil supplied) in case of sensor rupture |

  **Note**: The led is still 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)

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

<table>
<thead>
<tr>
<th>intEG</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical response time at 90%</td>
<td>120 ms</td>
<td>400 ms</td>
<td>600 ms</td>
<td>1 s</td>
<td>1.4 s</td>
<td>2 s</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 s</td>
<td>5 s</td>
<td>7.5 s</td>
<td>10 s</td>
<td>15 s</td>
<td></td>
</tr>
</tbody>
</table>

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

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

- **Adjust digits brightness**: Digital filtering integration indice:
  - 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.

  **Eg**: Display value 0015
  - null = no
  - null = yes

<table>
<thead>
<tr>
<th>Eg</th>
<th>0015</th>
<th>0015</th>
</tr>
</thead>
<tbody>
<tr>
<td>null</td>
<td>no Display 0015</td>
<td>yes Display 15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Eg</th>
<th>00.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>null</td>
<td>no Display 00.15</td>
</tr>
</tbody>
</table>

**Adjust brightness of bargraph and Leds**: Digital filtering integration indice:
Lowest brightness

- **Point**: Placing of decimal point for inputs
- **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**: Digital filtering integration indice:
Programmable from 0 to 10; to be used in case of unsteady input signal.

<table>
<thead>
<tr>
<th>intEG</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical response time at 90%</td>
<td>120 ms</td>
<td>400 ms</td>
<td>600 ms</td>
<td>1 s</td>
<td>1.4 s</td>
<td>2 s</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 s</td>
<td>5 s</td>
<td>7.5 s</td>
<td>10 s</td>
<td>15 s</td>
<td></td>
</tr>
</tbody>
</table>

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

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

- **Adjust digits brightness**: Digital filtering integration indice:
  - 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.

  **Eg**: Display value 0015
  - null = no
  - null = yes

<table>
<thead>
<tr>
<th>Eg</th>
<th>0015</th>
<th>0015</th>
</tr>
</thead>
<tbody>
<tr>
<td>null</td>
<td>no Display 0015</td>
<td>yes Display 15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Eg</th>
<th>00.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>null</td>
<td>no Display 00.15</td>
</tr>
</tbody>
</table>

**Programming of Leds 5 to 8**

Program of Led 5 **Leds**

- **no** Led still (no function associated)
- **TARE** Led 5 indicates that the instrument is in mode tare

**Programming of Led 6 **Leds**

- **no** Led still (no function associated)
In each reading submenu, press and move, and to visualise parameters.

- **0** to **0**
  - Access to display and output simulations
  - Access to function "safe"
  - No access

**Factory code**

**Access code**

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.

**X1**: No analogue output
**X2**: No relay output
**X3**: Output 2 relays
**X4**: Output 4 relays

- **X5**: No RS output
- **X**: Factory code
- **0**: RS output

**Error code in case of error self-diagnostics**

- **0001**: Graceful error
- **0002**: Check sum

**Microcomputer options**

- **0**: 8-bit microcomputer
- **1**: 16-bit microcomputer

**Programme version**

- **0**: Series A

**Device type**

- **001**: Device type

**Validation / Vertical move**
4.9 Programming of a new access code

1. Enter former code
2. Enter new code
3. If code correct (old), new code is registered
   
   **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

(available 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.

1. Press Menu to resume measure display.
2. Display value
3. Enter new display value

**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)

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

1. Press Menu to resume measure display.
2. Output value
3. Enter value to be injected

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

3.10.3 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).

1. Recorded alarms are not erased
2. Erasing of recorded alarms, and return to 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.
4.10.4 Menu [Dr TA]: to suppress programmed tare
(accessible according to programmed access code)

- the recorded tare is not suppressed

Dr TA

- suppress recorded tare, and return to measure display

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

Measure display

INF

Alternate display of information

0200 Minimum value

b / Display max. value

Measure display

SUP

Alternate display of information

0800 Maximum value

c / Erase maximum and minimum values

Measure display

Dr M

erase recorded min. and max., and return to 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)
- 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 . 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 ▲ (no pressing during 20 s) will induce return to measure display without modification.

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

5.2.2 Direct measure visualising
Press ▼ and ▲ to visualise the signal directly, without processing:
- scale factor, square root, linearisation
- in mV, V or mA for process inputs.

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 p15).
- or pressing simultaneously on ▲ and ▼

The display will then show message SP.x ou SP.x.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 p15) by pressing ▼
Once the setpoint is adjusted, press ▼ to come back to the setpoint reading menu.
Once all setpoints are adjusted, just press ▼ 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)
(available according to programmed access code)
Press ▼ and ▲ to enforce the display at display down scale for the input signal

**Note**: The tare will not be recorded in case of power supply cut.
To suppress the tare, validate menu [CtrlA] in the main menu p17.
Exit from programming mode saving the configuration will reset the tare to zero.

6. ERROR MESSAGES

<table>
<thead>
<tr>
<th>2000</th>
<th>Measure overstepping</th>
</tr>
</thead>
<tbody>
<tr>
<td>- - -</td>
<td>Electrical lower or upper input overstepping</td>
</tr>
<tr>
<td>Open</td>
<td>Sensor rupture</td>
</tr>
<tr>
<td>OL</td>
<td>Overstepping of displayable value</td>
</tr>
<tr>
<td>Err.1</td>
<td>Value set out of range</td>
</tr>
<tr>
<td>E.xxx</td>
<td>Error self-diagnosis (see p13)</td>
</tr>
</tbody>
</table>

7. GENERAL WARRANTY TERMS

**WARRANTY applying and duration**
The company guarantees 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

- **PCode**
  Programming of a new access code

- **SimL**
  Access to display simulation

- **Gene**
  Access to analogue output simulation

- **CLEAR**
  Erasing of recorded alarms

- **CLr.tA**
  Tare suppression

**Inputs**

- **INPUT**
  Access to input programming submenu

- **tYPE**
  Input type

  - **U**
    Voltage input

  - **MA**
    Current input

**Voltage input and current input**

- **CALib**
  Choice of voltage calibrator

  - **0-0.1**
    Input 0 to 10 V (or -10/10V)

  - **0-0.5**
    Input 0 to 200 V (or -200/200V)

  - **0-1**
    Input 0 to 1 V (or -1/1V)

- **dIn**
  Input down scale

- **FIn**
  Input full scale

**Funct**

- **Choice of processing function**

  - **LinEA**
    Linear

  - **root**
    Square root extraction

  - **LISPE**
    Special linearisation

    - **nb**
      Number of linearisation points

    - **Axx**
      Abscisse of a special linearisation point

**Display**

- **disPL**
  Access to display programming submenu

  - **Point**
    Choice of decimal point position

    - **- - - -**
      Decimal point position

  - **ddSP**
    Display down scale

  - **FdSP**
    Display full scale

  - **bx**
    Ordinate of a special linearisation point

- **Cut.oF**
  Cut-off programmable or no

- **tMES**
  Programmable acquisition time : 16.6ms, 20ms, 100ms

- **IntEG**
  Integration indice
**Display parameters**

- **Pr.dS**: Display features programming submenu
- **br.dG**: Digits brightness setting (4 levels)
  - 1111: Lowest brightness
  - 4444: Highest brightness
- **br.bAr**: Set bargraph and Leds brightness
  - 1111: Lowest brightness
  - 4444: Highest brightness
- **LdG**: Last digit (LSB)
  - On: Last digit in service
  - Off: Last digit enforced to 0
- **null**: Erasing of insignificant zeros
  - Yes
  - No

- **Led5**: Dedication of Led 5
  - No dedication
  - Led lit if a tare has been entered
  - Led 5 dedicated to indication of LOGIC input 1

- **Led6**: Dedication of Led 6
  - No dedication

- **Led7**: Dedication of Led 7
  - No dedication
  - Led lit in case of RS transmission

- **Led8**: Dedication of Led 8
  - No dedication

**Analogue output**

- **Out.MA**: Access to current output programming submenu
  - **dout**: analogue output down scale
  - **Fout**: analogue output full scale
  - **dodS**: Access to the display corresponding to output down scale
  - **FodS**: Access to the display corresponding to output full scale

**Digital output**

- **J bus**: Access to RS output programming submenu
- **SLAuE**: Slave number
- **bAud**: Baud rate
  - 1200: Possible rates
  - 2200: Possible rates
- **DELAY**: Delay before any answer
  - On: 75ms delay
  - Off: 20ms delay

**Relay outputs**

- **RELx**: Access to relay outputs programming submenu
  - **RELx**: Access to relay X programming
  - **ALx**: Enable relay output 1
    - On: Enable
    - Off: Disable
  - **MdEx**: Relay x function mode
    - **1** - **1**: Mode setpoints
    - **1** - **1**: Mode window
    - **SPx**: Value of setpoint in mode setpoint
    - **SPx1**: Value of 1st setpoint in mode window
    - **SPx2**: Value of 2nd setpoint in mode window
  - **Hyst.x**: Hysteresis value in display points
  - **tlMex**: Delay on relay X

---

**p20**
Programmig of the led associated with the relay

<table>
<thead>
<tr>
<th>LEDx</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Led lit when relay is enabled (coil supplied)</td>
</tr>
<tr>
<td>Off</td>
<td>Led still when relay is enabled (coil supplied)</td>
</tr>
</tbody>
</table>

Alarm x recording

<table>
<thead>
<tr>
<th>MEMx</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>Recording</td>
</tr>
<tr>
<td>no</td>
<td>No recording</td>
</tr>
</tbody>
</table>

Alarm message

<table>
<thead>
<tr>
<th>MESSx</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>Message</td>
</tr>
<tr>
<td>no</td>
<td>No message</td>
</tr>
</tbody>
</table>

Safeties

<table>
<thead>
<tr>
<th>SECU</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>rUp</td>
<td>Access to safeties programming submenu</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>rUp</th>
<th>Programming of sensor rupture safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAPT</td>
<td>Disconnect sensor rupture (or not)</td>
</tr>
<tr>
<td>On</td>
<td>Enable disconnection</td>
</tr>
<tr>
<td>Off</td>
<td>Disable disconnection</td>
</tr>
<tr>
<td>rELX</td>
<td>State of relay X in case of sensor rupture</td>
</tr>
<tr>
<td>Off</td>
<td>No sensor rupture associated with relay</td>
</tr>
<tr>
<td>LO</td>
<td>Relay disabled in case of sensor rupture (coil not supplied)</td>
</tr>
<tr>
<td>HI</td>
<td>Relay enabled in case of sensor supply (coil supplied)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>outMA</th>
<th>Output return value (or not) in case of sensor rupture</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>Return value required</td>
</tr>
<tr>
<td>no</td>
<td>No return value</td>
</tr>
<tr>
<td>rEPLU</td>
<td>Return value</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>dIAG</th>
<th>Self diagnosis safety programming</th>
</tr>
</thead>
<tbody>
<tr>
<td>rELX</td>
<td>State of relay X in case of error self diagnosis</td>
</tr>
<tr>
<td>Off</td>
<td>No self diagnosis associated with relay</td>
</tr>
<tr>
<td>LO</td>
<td>Relay disabled in case of error self diagnosis (coil not supplied)</td>
</tr>
<tr>
<td>HI</td>
<td>Relay enabled in case of error self diagnosis (coil supplied)</td>
</tr>
</tbody>
</table>

outMA Return value (or not) on the output in case of error self-diagnosis

| YES | Return value required |
| no  | No return value |

rEPLU Return value

Saving configuration

<table>
<thead>
<tr>
<th>SAue</th>
<th>Configuration recording</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>Recording</td>
</tr>
<tr>
<td>no</td>
<td>No recording</td>
</tr>
</tbody>
</table>

Reading of instrument internal features

<table>
<thead>
<tr>
<th>About</th>
<th>Access to internal features reading submenu</th>
</tr>
</thead>
<tbody>
<tr>
<td>d75</td>
<td>Instrument type</td>
</tr>
<tr>
<td>n°</td>
<td>Identification numbers</td>
</tr>
<tr>
<td>ProG</td>
<td>Programme version</td>
</tr>
<tr>
<td>06xx</td>
<td>Programme version number</td>
</tr>
<tr>
<td>optO</td>
<td>Option code</td>
</tr>
<tr>
<td>Ar-</td>
<td>Option code value</td>
</tr>
<tr>
<td>Err.</td>
<td>Self diagnosis error</td>
</tr>
<tr>
<td>0000</td>
<td>Type of error</td>
</tr>
<tr>
<td>CHSUM</td>
<td>Check sum display</td>
</tr>
<tr>
<td>FC4E</td>
<td>Check sum value</td>
</tr>
</tbody>
</table>

Further functions

<table>
<thead>
<tr>
<th>Inf.</th>
<th>Display minimum value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sup.</td>
<td>Display maximum value</td>
</tr>
<tr>
<td>ClF.M</td>
<td>Erase min. and max.</td>
</tr>
</tbody>
</table>

Error messages

<table>
<thead>
<tr>
<th>Err.1</th>
<th>Set value out of range</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN</td>
<td>Sensor rupture</td>
</tr>
<tr>
<td>2000</td>
<td>Flashing measure : measure in overload</td>
</tr>
<tr>
<td>OL</td>
<td>Displayable value overstepping</td>
</tr>
<tr>
<td>- - -</td>
<td>Input lower or upper electrical overstepping</td>
</tr>
<tr>
<td>Err.xxx</td>
<td>Error self diagnosis</td>
</tr>
</tbody>
</table>
9. ANNEXE : MODBUS

9.1 Table of modbus addresses

<table>
<thead>
<tr>
<th>Address</th>
<th>Format</th>
<th>nb of words</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>Analogue output value in µA (mA output)</td>
<td>double integer</td>
</tr>
<tr>
<td>202</td>
<td>Minimum value of displayed value</td>
<td>double integer</td>
</tr>
<tr>
<td>204</td>
<td>Maximum value of displayed value</td>
<td>double integer</td>
</tr>
<tr>
<td>206</td>
<td>Displayed value</td>
<td>double integer</td>
</tr>
<tr>
<td>208</td>
<td>Direct measure</td>
<td>double integer</td>
</tr>
<tr>
<td>290</td>
<td>State of relay 1</td>
<td>integer</td>
</tr>
<tr>
<td>291</td>
<td>State of relay 2</td>
<td>integer</td>
</tr>
<tr>
<td>292</td>
<td>State of relay 3</td>
<td>integer</td>
</tr>
<tr>
<td>293</td>
<td>State of relay 4</td>
<td>integer</td>
</tr>
</tbody>
</table>

- **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

- **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.

<table>
<thead>
<tr>
<th>Address 120 :</th>
</tr>
</thead>
<tbody>
<tr>
<td>bit 15</td>
</tr>
</tbody>
</table>

  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** :

<table>
<thead>
<tr>
<th>Slave Number</th>
<th>Function 3 or 4</th>
<th>1st word address</th>
<th>Number of words</th>
<th>CRC 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 byte</td>
<td>1 byte</td>
<td>2 bytes</td>
<td>2 bytes</td>
<td>2 bytes</td>
</tr>
</tbody>
</table>

  **Response pattern** :

<table>
<thead>
<tr>
<th>Slave Number</th>
<th>Function 3 or 4</th>
<th>Number of bytes read</th>
<th>1st word value</th>
<th>2nd word value</th>
<th>CRC 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 byte</td>
<td>1 byte</td>
<td>2 bytes</td>
<td>2 bytes</td>
<td>2 bytes</td>
<td>2 bytes</td>
</tr>
</tbody>
</table>

- **Writing of N words : Function N°16**

  **Request pattern** :

<table>
<thead>
<tr>
<th>Slave Number</th>
<th>Function 16</th>
<th>1st word address</th>
<th>Nbr of W. to be enforced</th>
<th>Nbr of bytes to be enfor.</th>
<th>Value of words to be enforced</th>
<th>CRC 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 byte</td>
<td>1 byte</td>
<td>2 bytes</td>
<td>2 bytes</td>
<td>1 byte</td>
<td>n bytes</td>
<td>2 bytes</td>
</tr>
</tbody>
</table>

  **Response pattern** :

<table>
<thead>
<tr>
<th>Slave number</th>
<th>Function 16</th>
<th>1st word address</th>
<th>Nbr of W. to be enforced</th>
<th>CRC 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 byte</td>
<td>1 byte</td>
<td>1 byte</td>
<td>2 bytes</td>
<td>2 bytes</td>
</tr>
</tbody>
</table>

p22
9.3 Reading in double integer format

Example: Reading of displayed measure

Request:

<table>
<thead>
<tr>
<th>Slave Number</th>
<th>Function 6</th>
<th>Word address</th>
<th>Value of W. to be enforced</th>
<th>CRC 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>254</td>
<td>03</td>
<td>0</td>
<td>206</td>
<td>0</td>
</tr>
</tbody>
</table>

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 positive measure:

<table>
<thead>
<tr>
<th>Slave Number</th>
<th>Function 6</th>
<th>Word address</th>
<th>Value of W. to be enforced</th>
<th>CRC 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>254</td>
<td>3</td>
<td>4</td>
<td>236</td>
<td>120</td>
</tr>
</tbody>
</table>

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 algorithm:

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).