**1. INTRODUCTION**

The C95 CI is a totalling digital panel meter. The totalling function allows converting any instant value, after integration, into a cumulated magnitude. It can be connected to a flowmeter to display the instant flow and the cumulated volume or weight, and also to a converter, for instance a power converter to display the instant power and the energy consumption of an installation.

**General features**

- Instant value display on 5 digits (14mm) with scale factor adjusting from -99 999 to 99 999
- Cumulated value display on a 6 digit counter (14mm) associated with a second overstepping counter, allows totalling from -99 999 999 to +999 999 999
- Totalizer memory saved in case of power supply cut
- Programming of the integration time (sec, min, hours) and of a conversion coefficient (from 0,0001 to 999999)
- A bargraph allows a quick evaluation either of the instant value or the cumulated value, and can also be used as indicator for various functions (overstepping, LOGIC input, RS, etc...)

**Input**

- Direct current or voltage, bidirectional ±100mV, ±1V, ±10V, ±300V, ±20mA
- Measurable scale overstepping from -5% to +5%
- Input impedance ≥ 1MΩ for voltage inputs drop 0.9V max for the current input
- Enlarging effect possible
- Linear input with or without square root extraction and special curve on 20 pt (programmable in X and in Y).
- Supply for 2 or 3 wire sensor for the current input : 26 VDC (±15%) 100mA protected from short-circuits.

**Transfer**

- Accuracy 0.05% of full scale at 25°C
- Thermic drift <150 ppm / °C
- Sampling time : 100ms
- Filtering : Programmable integration time (10 coefficients)
- Common mode rejection rate : 130 dB
- Serial mode rejection rate : 70 dB 50/60 Hz
- Insulation : Input / Power supply : 2.5kV 50 Hz 1 min
  Input / Output : 2.5kV eff. 50 Hz 1 min

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

**Insualted analog output**

- Programmable on the instant or cumulated value
- Active current output
- Programmable scale ratio with enlarging effect.

**Relay output** 2 relays (R)

- Programmable :
  - As Pulse output with adjusting of the pulse weight (-10 000 to +10 000) and of its duration (100, 200 or 400 ms)
  - In mode alarm on the instant or cumulated value
    Mode setpoint or window.
    Recording of alarms.
    Time delay and hysteresis adjustable on each setpoint.
    Alarm messages

**Insulated digital output**

- RS 485 2 wire, protocole MODBUS-JBUS.

**LOGIC input** 2 insulated LOGIC inputs with programmable functions

- Several types of totalizer zero reset
- Integration stop and start
- Display blocking
- Display switching (instant value / totalizer)
- Function tare, min. and max. zero reset
• **Protection**: (specify on order)
  - **Front face**: IP 65
  - **Case**: IP 20
  - **Terminals**: IP 20

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

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

• **Display**: (14 mm)
  - Electroluminescent red (green optional)
  - 4 alarm LEDs
  - Bargraph: 16 LEDs

• **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**: 7 W max. 10 VA max.

• **Complies** with standards EN 50081-2 on rejections 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

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### 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: IP 20
- Terminals: IP 20

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

**Display**
- (14 mm)
  - Electroluminescent red (green optional)
  - 4 alarm LEDs
  - Bargraph: 16 LEDs
3. WIRING

INPUTS

PROCESS

<table>
<thead>
<tr>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Location of terminals
(view of case rear side)

OUTPUTS (optional)

ACTIVE CURRENT

2-relays

LOGIC INPUTS (optional)

| 23 | LOG 1 | C or E |
| 24 | LOG 2 |
| 25 | COM |

2 channels

DATA LINK RS 485

DIGITAL

| 20 | B |
| 21 | A |
| 22 | COM |

AC ~
DC +

POWER SUPPLY
4. PROGRAMMING

4.1 Communication with the instrument

Functions available from the instant measure:

- Alarms
- Led 1
- Led 2
- Led 3
- Led 4

- Instant value display
- Min. value display
- Max. value display
- Access to the main menu
- Min. and max. zero reset

The Led under marking A blinks to indicate that the displayed value is the instant value.

Functions available from the totalizer:

- Alarms
- Led 1
- Led 2
- Led 3
- Led 4

- Totalizer display
- Display of the overstep-pings counter (Hi.tot)
- Access to main menu
- Access to menu totalizer zero reset

The Led under marking H blinks to indicate that the displayed value is the cumulated value.

Further functions can be reached by pressing several keys:

开关 Switching from instant value display to cumulated value display and vice-versa;

直接测量视图 Direct measure visualisation; (see p24)

视图和设置警报值 Visualisation and setting of alarm setpoints; (see p24)

4.2 Orientation through programming

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

- Move through menus: downwards, or decreasing of the displayed value
- Move through menus: upwards, or increasing of the displayed value
- 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

Only on the instant value display.

- Tare setting; (see p23)
- Down scale display setting; (see p23)
- Full scale display setting; (see p23)

Reading convention:

- Move through main menu
- Return to previous menu
- Blinking display: awaiting validation or setting
- Alternate information display

Entering of a parameter:

First start by increasing or decreasing 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.

The 5th from 0 to 9.

Between each entering, validate the cipher with key

Note: The totalizer parameters are entered on 6 digits.

Further functions can be reached by pressing several keys:

Note: In mode programming, the instrument will automatically resume measuring with the previous configuration if no key is pressed during 1min.
4.3 Main menu

Configuration reading mode

Access code programming

Display simulation
- Instant or cumulated value, according to type of display present before the access to the menu.
- Authorized by access code

Analog output simulation
- Authorized by access code

Erasing of recorded alarms
- Authorized by access code

Tare zero reset
- Authorized by access code

Entering of the access code.
- The access to the programming menu is protected by a 5-cipher code.
- The code on factory exit is 00000 (to change this code, see p20).

4.4 Programming menu (according to options)

- Access to input programming
- Access to the display factor programming (instant value)
- After programming the totalizer
- Access to the analog output programming (option analog output)
- Access to the communication parameters (option digital output)
- Access to the programming of the LOGIC inputs (option LOGIC inputs)
- Access to the programming of the relays (2 relays) (option relay output)
- Access to the programming of the output, the relays, in case of self-diagnosis and/or sensor rupture, and access to disconnecting the sensor rupture (option analog output or relays)
- Access to the display programming:
- Bargraph, display brightness
- Access to the programming exit menu with or without configuration saving

Note:
- Press \( \rightarrow \) to reach menu \( \text{SAVE} \)
- In mode programming, the instrument will automatically resume measuring with the former configuration if no key is pressed during 1min.
- Move through menus / choice

Menu exit / access
- Upwards move / increase
- Validation / Vertical move
- Downwards move / decrease
4.4.1 Input programming

- **Input programming**
- **Type**
  - U (voltage input)
  - MA (current input)
- **Caliber choice**
  - Down scale
    - Voltage input: -22.00 < x < 22.00 (mA)
    - Voltage input only: -11.00 < x < 11.00 (10V)
    - Voltage input: -320.0 < x < 320.0 (300V)
    - Voltage input: -110.0 < x < 110.0 (0.1V)
    - Voltage input: -1.100 < x < 1.100 (1V)
    - Current input: -888.88 (mA)
- **Function**
  - Li.SPE (special linear function)
  - LinEA (linear function)
  - Root (root extraction)
- **Special linearisation only**
  - From 1 to 18

Note: Press key to reach menu.

4.4.2 Display programming

- **Display programming** (instant value)
- **Point**
  - Decimal point location
- **Display corresponding to input down scale “d.in”**
  - Display corresponding to input full scale “F.in”
- **Display corresponding to input down scale “d.in”**
- **Display corresponding to input full scale “F.in”**
- **CutOff**
  - No
  - Yes
- **Integration indice**
  - Coefficient from 0 to 10
- **Output**
  - MA
  - Jbus
  - Tor
  - Relay
  - SECU

Changing this parameter requires re-programming following parameters related to the relays, the analog output, the bargraph according to their dedication, as well as following display parameters: SPxx, hystx, do.dSP, Fo.dSP, d.BarG, F.BarG, d.dSP, F.dSP, bxx, Cut.of.
4.4.3 Totalizer programming

- **dP:tot**: totalizer decimal point location
- **Auto.P**: automatic decimal pt
- **t.BASE**: integration time
- **Coeff**: coefficient setting from ±0.0001 to +999 999 or -99 999
- **M.def.**: time setting for the recording of defects from 0 to 25.0

4.4.4 Analog output programming

- **Out.MA**: parameter dedicated to the output
- **d.out**: analog output down scale
- **F.out**: analog output full scale
- **d0.diS**: display corresponding to output down scale
- **FO.diS**: display corresponding to output full scale

* Changing this parameter requires re-programming following parameters related to the relays, the analog output, the bargraph according to their dedication.*

SPxx, hystx, do.diS, Fo.diS, dBArG, FbArG,

See also output features p17

**Note:** Press to go on to next menu
Move through menus / choice
Menu exit / access
Downwards move / decrease
Upwards move / increase
Validation / vertical move
4.4.5 Programming of the digital output
Option digital output

SLAvE -8888 must be included between 1 and 255

transmission speed (baud rate)

baUd 19200 9600 4800 2400 1200

dELAY time delay before any response

On : delay = 75ms  On OFF OFF : delay = 20ms

tor or rELAY or SECU

See also the features of the digital data link

4.4.6 Programming of the LOGIC inputs
Option LOGIC inputs

switching between instant value / cumulated value
function min. and max. 0 reset (instant value)
function display hold
function tare (on instant value only)
function totalizer see p14

tor 1 dSP to CLR M HoLd tArE totAL Fct1 Fct5

tor 2 Idem Tor 1 rELAY or SECU

See also the features of the LOGIC input

Menu exit / access  Upwards move / increase
Downwards move / decrease  Validation / vertical move
**4.4.7 Programming of the relay outputs**

- **Act.1**: active/de-activated
- **Type.1**: operating mode
  - Alarm
  - Pulse
- **ParA.1**: parameter dedicated to the alarm
  - Instantaneous
  - Total
- **Mode.1**: mode setpoint
  - Access to SP1
  - Access to SP1.1
- **SP1**: setpoint if mode setpoint programmed
  - SP1.1 if mode window programmed
  - SP1.2 SPI.2 must be ≥ SPI.1
- **Hyst.1**: hysteresis
  - Adjustable in display points
- **Time.1**: time delay on the relay
  - 0 < Time < 25.0 in 0.1 s increases
- **Led1**: choice of the state of the relay associated Led
  - On: led lit when relay active
  - Off: led still when relay active
- **Mem.1**: function alarm recording
  - No
  - Yes
- **Messi**: function alarm message display
  - No
  - Yes
  - Enter 4 characters + decimal point
- **PrAt**: setting of the pulse weight from -10 000 to +10 000
- **PTime**: pulse time in ms
  - 100
  - 200
  - 400

See also the features of the relay outputs p17
4.4.8 Programming of the safeties

* If the relay is programmed in mode pulses, its state on sensor rupture or self-diagnosis is blocked on OFF.

See also the safety features p18
**4.4.9 Programming of the brightness, the displays and the bargraph**

- **Pr.diS**
  - br.diG
    - 1111 on 4 levels
  - L.dIG
    - state of the last digit (right hand side)
      - not enforced to zero
        - On
        - OFF (enforced to zero)
  - nuLL
    - erasing of unsignificant zeros
      - YES
      - no
  - b.bArG
    - bargraph and leds brightness
      - 1111 on 4 levels
  - PArA.b
  - InStA.
  - totAL.
  - Indic.

- **b.dArg**
  - display corresponding to 0% of the bargraph
  - 000200

- **d.bArg**
  - display corresponding to 100% of the bargraph
  - 000600

**Choice of the bargraph operating mode**

- **insta**: on the instant value
- **total**: on the totalizer
- **indic**: use of the bargraph to indicate some functions

- **LEdb**
  - function associated with led b
    - no
    - tor 1

- **LEdC**
  - function associated with led c
    - no
    - tor 2

- **LEdd**
  - function associated with led d
    - no
    - rS

- **LEdE**
  - function associated with led e
    - no
    - tArE.

- **LEdF**
  - function associated with led f
    - no
    - M.dEF

- **LEdG**
  - function associated with led g
    - no
    - dEP.to

- **SAvE**

*See also the display features p15*
4.4.10 Programming exit with or without saving

**SAvE**

revert to measure display

**YES** no exit with configuration saving

**SAvE**

exit without configuration saving

Note: Exit from mode programming with configuration saving (SAvE, YES) will automatically reset to zero the tare, the min. and max. and the recording of alarms, as well as the pulse output buffers.

In case of modification of the decimal point location of the instant value or of the totalizer, the instrument will propose after SAvE YES all the decimal point related parameters which have not been modified.

SAvE YES will not reset the totalizer to zero. If its parameters have been changed it will have to be reset to zero, in order to avoid an incoherent counting (see p22).

4.5 Input features and programming limits

4.5.1 Current input **MA**

**Linear:**

Features

<table>
<thead>
<tr>
<th>Caliber</th>
<th>Display resolution</th>
<th>Input stage resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>from -20 to +20 mA</td>
<td>± 1 digit</td>
<td>16 bits</td>
<td>0.05% of MR</td>
</tr>
</tbody>
</table>

Measurable input limits: -22 to 22 mA

**Unlinear:**

Square root extraction **root**

Note: The function square root extraction tends to amplify the input signal background noise on getting near zero.

To avoid the ripples caused by this noise, just programme a cut-off value (in display points), see p14.

Special linearisation **LI.SPE**

For specific applications such as volume measurements, the meter 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 abscises (x) have to go increasing d.in < value of A01 < value of A02...< F.in.

**Example:**

Say a laid cylindric tank, 1 meter high (h) and 1 meter long (l). A linear 0-20 mA sensor measures the height of the liquid surface line:

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

**Meter display**: Empty tank volume \( d.dISP = 0.000 \)
Full tank volume \( F.dISP = 0.785 \)

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

Hence a curve of 10 equally long segments:

Ectendue de mesure / nr of segments = 20mA/10 = 2mA length of the segment. For 10 segments nb = 9 (11 points to be programmed, including d.in and F.in).

<table>
<thead>
<tr>
<th>Input mA</th>
<th>Height m</th>
<th>Chord m</th>
<th>Volume m³</th>
<th>Outp. in mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>d.in</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.000</td>
</tr>
<tr>
<td>A01</td>
<td>2</td>
<td>0.1</td>
<td>73.74</td>
<td>0.60</td>
</tr>
<tr>
<td>A02</td>
<td>4</td>
<td>0.2</td>
<td>106.26</td>
<td>0.80</td>
</tr>
<tr>
<td>A03</td>
<td>6</td>
<td>0.3</td>
<td>132.84</td>
<td>0.92</td>
</tr>
<tr>
<td>A04</td>
<td>8</td>
<td>0.4</td>
<td>156.93</td>
<td>0.98</td>
</tr>
<tr>
<td>A05</td>
<td>10</td>
<td>0.5</td>
<td>180.00</td>
<td>1.00</td>
</tr>
<tr>
<td>A06</td>
<td>12</td>
<td>0.6</td>
<td>203.07</td>
<td>0.98</td>
</tr>
<tr>
<td>A07</td>
<td>14</td>
<td>0.7</td>
<td>227.16</td>
<td>0.92</td>
</tr>
<tr>
<td>A08</td>
<td>16</td>
<td>0.8</td>
<td>253.74</td>
<td>0.70</td>
</tr>
<tr>
<td>A09</td>
<td>18</td>
<td>0.9</td>
<td>286.76</td>
<td>0.60</td>
</tr>
<tr>
<td>F.in</td>
<td>20</td>
<td>1.0</td>
<td>360.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FdISP 0.785</td>
</tr>
</tbody>
</table>

p13
Programming:
d.in = 0 mA  F.in = 20 mA
nb = 9
d.disp = 0,000 m$^3$  F.disp = 0,785 m$^3$
Programming from A01 to A09 and from B01 to B09 according to table.

4.5.2 Voltage input

• Linear: Features

<table>
<thead>
<tr>
<th>Caliber</th>
<th>Display resolution</th>
<th>Input stage resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>-100 to +100 mV</td>
<td>± 1 digit</td>
<td>16 bits</td>
<td>0.05% of MR</td>
</tr>
<tr>
<td>-1 to +1 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-10 to +10 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-300 to 300 V</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Measurable limits: -5% to +5%
Example for caliber 1V: -1.1V to +1.1V

• Unlinear: (see p13)

4.5.3 Instant value display:

- Point: Decimal point location for the instant value display (4 decimals maximum).
- d.disp: Display corresponding to input down scale
- F.disp: Display corresponding to input full scale
- bXX: Setting in display points of the ordinate for point Axx for a special curve input (see unlinear input)
- Cutoff: 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 it is maintained at down scale.

• Response time:

<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></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<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></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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>

2 cycle times, i.e. 240 ms must be added to obtain the maximum response time.

Note: For the analog output response time, add 40 ms to the values shown in the table.
For the relays: add the time delay programmed on the alarms.
4.5.4 Totalizer

**Dp.tot**  Totalizer decimal point location
(4 decimal maximum)

**Auto.P**  
- **No**  Fix decimal point
- **Yes**  Automatic decimal point

Decimal point: The totalizer is displayed with a maximum of decimals, and the decimal point will move as the total increases, until the number of decimals programmed in **Dp.tot** is reached.

Eg.: programming of the decimal point = -.--
on starting the totalizer indicates 00.0000. When it reaches 99.9999 it will indicate 100.000, and then 1000.00.

**t.BASE**  Integration time basis
- 1 : 1 sec
- 60 : 60 sec
- 3600 : 3600 sec

**CoEFF**  Conversion coefficient: coefficient to be applied on the instant value to calculate the cumulated value, adjustable from ±0.0001 to 999 999 or -99 999.

Eg.: if the instant value represents m³ and you want to total up liters, the coefficient will be equal to 1000.

**M.dEF**  Recording of defects.
- **No**  No recording
- **Yes**  Recording of defects (input electrical oversteppings or sensor rupture) if defect present on the input during a time ≥ programmed time. Programming of the time from 0 to 25.0 sec, in 0.1 sec. increases.

Display of error messages alternating with the cumulated value if recording. To reset the recording to zero, see p22.

4.5.5 Display features:

- **Adjusting of the digits brightness**  **br.dIG**
  - 1111 Lowest brightness
  - 4444 Strongest brightness

- **Last digit inhibition** (low weight)  **L.dIG**
  In mode programming, the menu **L.dIG** allows suppressing of the last digit display, the latter being enforced to 0 if OFF is validated.

- **Erasing of unsignificant zeros**  **nuLL**
  - OFF = **YES**  Suppresses the display of unsignificant zeros on the left hand side.
  
  **Eg.** : Display value 0015
  - OFF = **no**  Display 0015
  - **YES**  Display 15

  **Eg.** : Display value 00.15
  - OFF = **no**  Display 00.15
  - **YES**  Display 0.15

- **Setting of the bargraph brightness**  **br.bAr**
  - Lowest brightness
  - Strongest brightness
  - 1111
  - 4444
  In case of overstepping, the bargraph will start to blink. A sensor rupture (if dedicated to the instant value) by the lighting of one led out of two.

**bAr.dI**
- **InStA**  Bargraph on the instant value
- **totAL**  Bargraph on the cumulated value

- **Bargraph display factor**
  - Display corresponding to the still bargraph (0%)
  - Display corresponding to the fully lit bargraph (100%)

  In case of overstepping, the bargraph will start to blink. A sensor rupture is indicated on the bargraph (if dedicated to the instant value) by the lighting of one led out of two.

**bAr.dI**
- **Indic**  Bargraph in mode indication
- **LEdb**  Led marking b
  - **No**  No dedication (led still)
  - **tor1**  Led lit when logic input 1 is active
4.5.6 LOGIC inputs (optional)

- Board of 2 LOGIC inputs : Input signal 24 Vdc

Possible functions:

Hold Holding of the instant value display in case of activation of the LOGIC function. The display and the analog output if it is dedicated to the instant value remain fixed in case of variation of the input signal. The relays and the totalizer carry on reacting to the input signal.

Clr.M Min. and max. zero reset. The activation of the LOGIC function resets the min. and max. to zero

tARE Activation of function tare. The meter switches to mode tare, the tare being the display value present at the time of this activation.
4.6 Output features and programming limits

4.6.1 Analog output

Current output 0/4-20mA active
- Accuracy 0.1% in relation to the display (at +25°C)
- Residual ripple ≤ 0.2%
- Admissible load 0Ω ≤ Lr ≤ 500Ω
- Programmable scale ratio with enlarging effect
- Response time: 40 ms in relation to the display

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA.x</td>
<td>Parameter applied to the output</td>
</tr>
<tr>
<td>InStA</td>
<td>Output on the instant value</td>
</tr>
<tr>
<td>TotAl</td>
<td>Output on the cumulated value</td>
</tr>
<tr>
<td>d.out</td>
<td>Analog output down scale (eg. 04.00 (4mA))</td>
</tr>
<tr>
<td>F.out</td>
<td>Analog output full scale (eg. 20.00 (20mA))</td>
</tr>
<tr>
<td>dO.diS</td>
<td>Display value corresponding to output down scale</td>
</tr>
<tr>
<td>F0.dIS</td>
<td>Display value corresponding to output full scale</td>
</tr>
</tbody>
</table>

In mode measurement, the analog 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 wire)
- Protocols MODBUS-JBUS format of data: integer and double integer
- Exclusive transmission format: 1 bit start
  8 bits without parity
  1 bit stop
- Slave number between 1 and 255
- Transmission speed between 1200 and 19200 bauds
- Time delay before any response

**Complete description of option MODBUS**: see annexe documentation: MODBUS/JBUS.

Including: table of modbus addresses, used functions, description of the configuration bytes and advanced functions.

4.6.3 Relay outputs:

2 relay outputs \( rEL.1 \) \( rEL.2 \)

- Relays programmable independently in mode alarm, or as pulses output
- NO-NC contact 8 A - 250 V on resistive load

<table>
<thead>
<tr>
<th>Act.X</th>
<th>Activation or de-activation of relay x</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>The state of relay x depends on the carried programming</td>
</tr>
<tr>
<td>OFF</td>
<td>Relay x remains still.</td>
</tr>
<tr>
<td>tYPEX</td>
<td>Choice of relay x operating mode</td>
</tr>
<tr>
<td>AlArM</td>
<td>Mode alarm</td>
</tr>
<tr>
<td>PuISE</td>
<td>Mode pulses</td>
</tr>
<tr>
<td>PA.x</td>
<td>Parameter applied to alarm x</td>
</tr>
<tr>
<td>InStA</td>
<td>Alarm X on the instant value</td>
</tr>
<tr>
<td>totAL</td>
<td>Alarm X on the cumulated value</td>
</tr>
</tbody>
</table>

**Mode alarm**

Choice of the operating mode \( ModEx \)

- **Mode setpoint**

<table>
<thead>
<tr>
<th>Legend</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>coil supplied</td>
</tr>
<tr>
<td>OFF</td>
<td>coil not supplied</td>
</tr>
</tbody>
</table>

- **Mode window**
Choice of the state of the relay associated led

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

Hysteresis setting in display points

The hysteresis is active on switching from lit led to still led; i.e. on switching out of alarm, as the led represents the alarm state.

### Mode setpoint

- **Mode setpoint**

  ![Diagram of Mode setpoint]

  - **led lit**
  - **led still**

  SPX - Hystx

  **SP.X**

### Mode window

- **Mode window**

  ![Diagram of Mode window]

  - **led lit**
  - **led still**

  SPX.1 - Hystx
  SPX.2 + Hystx

### Time delay on the alarm

The time delay on the relay is adjustable from 000.0 to 025.0s, in 0.1s increases.

It is active both on switching and switching back.

### Alarm recording

Allows recording of the alarm after a setpoint has been passed. Once 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](p21)).

**Note**: Exit from mode programming with configuration saving will reset alarm recordings to zero.

### Display of alarm messages

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

### Setting of setpoints

- **Setting of setpoints**: There are 2 ways to adjust setpoints.
  - either in mode programming entering the correct access code
  - or by pressing simultaneously on **Δ** and **∇** if the access to quick entering has been authorized during the code programming (see p20).

### Mode pulses

- **Mode pulses**

  ![Diagram of Mode pulses]

  **PrAt** Weight of the pulse to be applied on the totalizer unit adjustable from -10 000 to +10 000.

  eg.:
  - 1 : one pulse at each increase of the totalizer unit
  - -1 : one pulse at each decrease of the totalizer unit
  - 1000 : one pulse every 1000 increases of the totalizer unit
  - -1000 : one pulse every 1000 decreases of the totalizer unit

  **PtiME** Pulse duration: 100ms, 200ms or 400ms.

  **Note**: The programmed pulses duration applies both to the high and low level, in order to allow some time between two consecutive pulses. When the pulse frequency is too high in relation to the output capacity, they are stored in a buffer, and restituted as soon as the frequency drops again. A **(SAVE, YES)**, a totalizer zero reset or a power supply cut will reset the buffers to zero.

### 4.6.4 Safeties

- **Self-diagnosis**

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

  **The self-diagnosis error information can be reported**:

  - **On the display**: An error message appears alternating with measure; an error code is registered and can be read in menu About
On the analog output
If a return value has been programmed
Value included between : 0 and 22 mA

Sensor rupture
The sensor rupture can be detected on mV and current inputs if down and full scale > 3.5 mA.

The sensor rupture information can be reported :

- On the relay

  OFF  No influence of the sensor rupture on the relay
  LO   Relay de-activated (coil not supplied) in case of sensor rupture
  HI   Relay active (coil supplied) in case of sensor rupture

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

  If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Sensor rupture disconnection (If mV input)
The sensor rupture can be disconnected, in order not to disturb some calibrators which may be sensitive to the rupture detection current.

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

4.7 Configuration reading

In each reading sub-menu, use keys •• and ••• to move, and key •••• to visualise parameters

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

Coding :
1 : Programming error
2 : Gain error
4 : Offset error
8 : Input calibration error
16 : Output calibration error

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

  If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.

- On the analog output

  If a return value has been entered
  Value included between : 0 and 22 mA

Note : The sensor rupture detection has priority over the self-diagnosis.

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

In menu SECu :

CAPt  Activation of the sensor rupture, or not
On   Sensor rupture active
OFF  Sensor rupture disconnected

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

If the relay is programmed in mode pulses, its state on sensor rupture and self-diagnosis error is blocked on position OFF.
4.8 **Access code**

An access code adjustable from 00000 to 59999 serves to protect the meter from unauthorized programming, and to lock access to some functions.

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>00000</td>
<td>Factory code</td>
</tr>
<tr>
<td>0 to 5</td>
<td>Access to display shifting</td>
</tr>
<tr>
<td>6 to 9</td>
<td>No access</td>
</tr>
<tr>
<td>0 to 5</td>
<td>Access to display and output simulations</td>
</tr>
<tr>
<td>6 to 9</td>
<td>No access</td>
</tr>
<tr>
<td>0 to 5</td>
<td>Access to function “tare”</td>
</tr>
<tr>
<td>6 to 9</td>
<td>No access</td>
</tr>
<tr>
<td>0 to 5</td>
<td>Access to quick entering of alarm setpoints</td>
</tr>
<tr>
<td>6 to 9</td>
<td>No access</td>
</tr>
<tr>
<td>0 to 2</td>
<td>Access to the totalizer zero reset menu</td>
</tr>
</tbody>
</table>

### 4.9 Programming of a new access code

- **PCodE**

  - **Enter previous code**
    - If code incorrect (old), display during 2s. and revert to measure display
    - If new code ≥ 60 000 display during 2s.
  - **Enter new code**
    - If new code < 60 000, new code registered
  - **Revert to measure display**

**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

(available according to programmed access code and if option relays or analog output)

The display can be simulated with the meter in order to validate the configuration of the analog output, alarm and pulse outputs in the installation.

The simulated display corresponds to the one (instant or cumulated value) which was on display at the time of the access to this menu (the blinking led A or H indicates the type of this value).

- **Pressing on menu reverts to measure display.**
  - **Display value**
    - **Enter new display value**
4.10.2 Analog output simulation (mode generator)
(accessible according to programmed access code and if option analog output)

If the function recording of alarms has been programmed, the relay state will be recorded after a setpoint has been passed.

4.10.3 Menu CLEAR : Erasing of recorded alarms

If the function recording of alarms has been programmed, the relay state will be 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.

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

5. FUNCTIONS ACCESSIBLE DIRECTLY FROM DISPLAY

5.1 Functions which require pressing only 1 key :

5.1.1 On instant value display
a / min. value display   b/ Max. value display
c / Deleting of maximum and minimum values

Measure display

CLR.M

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

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

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

5.1.1 On the totalizer display

a) Totalizer upper part display

The cumulated value is:

Hi.tot x 1 000 000 + totalizer value if totalizer ≥ 0
and Hi.tot x -100 000 + totalizer value if totalizer < 0

5.2 Functions which require pressing several keys:

5.2.1 Display shifting (only on the instant value display)

(Display accessible according to programmed access code)

AdJ.Lo Display down scale shifting

AdJ.Hi Display full scale shifting

After injecting an input signal corresponding to the down (or full) display scale, press simultaneously on keys AdJ.Lo and AdJ.Hi (or AdJ.Lo and AdJ.Hi). The message AdJ.Lo (AdJ.Hi) will appear alternating with the value, to indicate you are in menu adjustment.

The display down and full scale can be increased or decreased by pressing AdJ.Lo or AdJ.Hi.

Keep pressing during 3s. on key AdJ.Lo or AdJ.Hi to access a fast increasing or decreasing of the display value.

Press AdJ.Hi to validate the shifting. Once all shifting are validated, the input thus shifted will keep its shifting even after a setting off tension.

Press CLR.M (or do not press any key during 20 s) to revert to the measure display without modifications.

b) Access to the totalizer zero reset menu

Totalizer display

rdEP

Zero reset of error recordings

Access only if user code < 30 000

r.totA

Zero reset of the totalizer, Hi.tot and of error recordings
5.2.2 Tare setting (only on instant value display)  
(accessible according to programmed access code)

Press D and V to enforce the signal present on the input as display down scale.

Note: The tare is not recorded in case of power supply cut. To suppress the tare, go into menu (accessible according to programmed access code) in the main menu p6. Exit from mode programming with configuration saving will automatically reset the tare to zero.

5.2.3 Changing of the displayed value

Press A and B to switch from the instant value to the totalizer, and vice-versa.

Led marking A blinking: instant value.
Led marking H blinking: totalizer.

5.2.4 Direct measure visualising

Press V and W to visualise the signal directly without any processing: scale factor, square root, linearisation
- in mV, V or mA.

5.2.5 Visualisation and setting of alarm setpoints  
Option 2 relays

Setting of setpoints: There are 2 ways to adjust setpoints.
- either in mode programming entering the correct safety access code
- or by simultaneous pressing on A and W

The meter will then show the message SP.x or SPx.x alternating with the value of the corresponding setpoint.

The various setpoint values can be accessed by V or W.

These setpoints can then be changed (according to the programmed access code, see p20) pressing D.

Once the setpoint is adjusted, press D to revert to the setpoints reading menu.

Once all setpoints are adjusted, just press W and the meter will revert to mode measure, taking the new values into account.

If no key is pressed during 60 s., the meter will revert to measuredisplay without taking the modifications of setpoint values into account.

6. ERROR or indication MESSAGES

<table>
<thead>
<tr>
<th>Err.1</th>
<th>Value set out of range</th>
</tr>
</thead>
</table>

- On instant value display
  - 2000 Value in overstepping
  - OPEN Sensor rupture
  - O.L. Displayable value overstepping
  - Er.xxx Self-diagnosis error

- On totalizer display
  - 01000 Counting overstepping > 999 999 999 or < -99 999 999
  - totalizer
  - OPEN or ----- Electrical overstepping or sensor rupture recorded.
7. GENERAL WARRANTY TERMS

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

Processing conditions *: 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, products will not be held.

* Complete warranty terms and details available on request.

8. LEXIQUE

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

**General access**
- **rEAd**: Access to the reading of the parameters
- **ProG**: Access to the programming of input and output parameters
- **CodE**: Code for access to the programming of input and output parameters
- **PCodE**: Programming of a new access code
- **SIMUL**: Access to display simulation
- **GEN**: Access to a simulation of the analog output
- **CLEAr**: Deleting of recorded alarms
- **CLrtA**: Tare suppressing

**Inputs**
- **InPut**: Access to the input programming sub-menu
  - **InPut tyPE**: Input type
    - **U**: Voltage input
    - **MA**: Current input
    - **CALib**: Choice of the voltage caliber

- **d.in**: Input down scale
- **F.in**: Input full scale
- **Funct**: Choice of the processing function
  - **LinEA**: Linear
  - **root**: Square root extraction
  - **LiSPE**: Special linearisation
- **nb**: Number of linearisation points
- **Axx**: Abscisse of a special linearisation point

**Instant value**
- **dPl**: Access to the display programming sub-menu
- **Point**: Choice of the decimal point location
  - **.**: Decimal point location
- **d.dSP**: Display down scale
- **f.dSP**: Display down scale
- **bxx**: Ordinate of a special linearisation point
- **Cut.oF**: Cut-off programmable or not
- **IntEG**: Integration indice

**Totalizer**
- **dPtot**: Choice of the decimal point location
  - **.**: Decimal point
- **Auto.P**: Choice of the decimal point operating mode
  - **no**: fixed decimal point
  - **yes**: automatic decimal point
**LOGIC inputs**
- **tor** Access to the LOGIC inputs programming sub-menu
- **tor 1** Programming of LOGIC input 1
- **tor 2** Programming of LOGIC input 2

  - **ClrM** Function erasing of min. and max.
  - **HoLd** Function display holding
  - **tArE** Function Tare
  - **dSPto** Totalizer display / instant value display
  - **totAL** Function on the totalizer
  - **FctX** Function type X

**Display parameters**
- **Pr.diS** Display features programming sub-menu
- **br.dIg** Adjusting of the digits brightness (4 levels)
  - 1 1 1 1 Lowest brightness  4444 Strongest brightness
- **br.bAr** Adjusting of the bargraph brightness
  - 1 1 1 1 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
- **PArA.b** Parameter applied to the bargraph
  - InStA Bargraph on the instant value
  - totAL Bargraph on the cumulated value

**Analog**
- **Out,MA** Access to the current output programming sub-menu
- **PArA,O** Parameter applied to the output
### Digital output

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>InStA</td>
<td>Output on the instant value</td>
</tr>
<tr>
<td>totAL</td>
<td>Output on the cumulated value</td>
</tr>
<tr>
<td>d.out</td>
<td>Analog output down scale</td>
</tr>
<tr>
<td>f.out</td>
<td>Analog output full scale</td>
</tr>
<tr>
<td>d0.diS</td>
<td>Access to programming of the display for output down scale</td>
</tr>
<tr>
<td>f0.diS</td>
<td>Access to programming of the display for output full scale</td>
</tr>
</tbody>
</table>

### Relay outputs: x : 1 à 2

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JbUS</td>
<td>Access to the RS output programming sub-menu</td>
</tr>
<tr>
<td>SLAuE</td>
<td>Slave number</td>
</tr>
<tr>
<td>bAud</td>
<td>Transmission speed (baud rate)</td>
</tr>
<tr>
<td>1200</td>
<td>Possible speeds</td>
</tr>
<tr>
<td>19200</td>
<td>Possible speeds</td>
</tr>
<tr>
<td>dELAY</td>
<td>Time delay before any response</td>
</tr>
<tr>
<td>On</td>
<td>Delay 75ms</td>
</tr>
<tr>
<td>OFF</td>
<td>Delay 20ms</td>
</tr>
</tbody>
</table>

### Safeties

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SECU</td>
<td>Access to the safeties programming sub-menu</td>
</tr>
<tr>
<td>rUPt</td>
<td>Programming of the sensor rupture safety</td>
</tr>
<tr>
<td>CAPt</td>
<td>Sensor rupture activation (or not)</td>
</tr>
<tr>
<td>OFF</td>
<td>De-activated</td>
</tr>
<tr>
<td>On</td>
<td>Active</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 the relay</td>
</tr>
<tr>
<td>LO</td>
<td>Relay de-activated in case of sensor rupture (coil not supplied)</td>
</tr>
<tr>
<td>HI</td>
<td>Relay active in case of sensor rupture (coil supplied)</td>
</tr>
</tbody>
</table>
About

Access to the internal features reading sub-menu

Instrument type : C95 CI

Identification number

Programme version

Programme version number

Option code

Option code value

Self-diagnosis error

Type of error

Check sum display

Check sum value

Further functions

Minimum value display

Maximum value display

Deleting of min. and Max.

Zero reset of the error recordings

Totalizer zero reset

Value of the oversteppings counter

Error messages

Value set out of range

Sensor rupture

Blinking measure : measure in overstepping

Displayable value overstepping

Upper or lower electrical overstepping on the input

Self-diagnosis error
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>196</td>
<td>State of the totalizer</td>
<td>integer 1</td>
</tr>
<tr>
<td>197</td>
<td>Value of the oversteppings counter</td>
<td>integer 1</td>
</tr>
<tr>
<td>198</td>
<td>Value of the totalizer</td>
<td>double integer 2</td>
</tr>
<tr>
<td>200</td>
<td>Value of the analog output in µA</td>
<td>double integer 2</td>
</tr>
<tr>
<td>202</td>
<td>Minimum value of the displayed value</td>
<td>double integer 2</td>
</tr>
<tr>
<td>204</td>
<td>Maximum value of the displayed value</td>
<td>double integer 2</td>
</tr>
<tr>
<td>206</td>
<td>Instant measure displayed</td>
<td>double integer 2</td>
</tr>
<tr>
<td>208</td>
<td>Direct measure</td>
<td>double integer 2</td>
</tr>
<tr>
<td>290</td>
<td>State of relay 1</td>
<td>integer 1</td>
</tr>
<tr>
<td>291</td>
<td>State of relay 2</td>
<td>integer 1</td>
</tr>
</tbody>
</table>

- **Direct measure** :
  Value without scale factor for inputs 100 mV, 1 V, 10 V, 300 V, 20 mA :
  - in mV for the 10 V input
  - in 10⁻³ of mV for the 1 V input
  - in µA for the mA input
  - in 10⁻³ of mV for the mV input
  - in 10⁻³ of V for the 300 V input

- **State of the relays** :
  bit 15 : Led lit
  bit 14 : Led blinking : mode recording and measure not in alarm area
  bit 13 : Relays ON
  bit 12 : Alarm recorded

- **Instant measure** :
  The instant measure value is shown on the display without the decimal point.
  To read the decimal point value, read the word at address 120.

- **Value of the totalizer** :
  The totalizer value is :
  if value negative :
  value of the oversteppings counter x -100 000 + totalizer value
  if value positive :
  value of the oversteppings counter x 1 000 000 + totalizer value
  To know the decimal point, read the word at address 138.

- **State of the totalizer** :
  totalizer overstepping (oversteppings counter Hi.tot ≠ 0)

Address 120 :

<table>
<thead>
<tr>
<th>bit 15</th>
<th>bit 2</th>
<th>bit 1</th>
<th>bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

*Decimal point location
  1 : Display with 4 decimals
  2 : Display with 3 decimals
  3 : Display with 2 decimals
  4 : Display with 1 decimal
  5 : Display with 0 decimals

Address 138 :

<table>
<thead>
<tr>
<th>bit 15</th>
<th>bit 2</th>
<th>bit 1</th>
<th>bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Location of the totalizer decimal point
  1 : Display with 4 decimals
  2 : Display with 3 decimals
  3 : Display with 2 decimals
  4 : Display with 1 decimal
  5 : Display with 0 decimals

Address 120 :

<table>
<thead>
<tr>
<th>bit 15</th>
<th>bit 4</th>
<th>bit 3</th>
<th>bit 2</th>
<th>bit 1</th>
<th>bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

1: sensor rupture error recorded
1: electrical overstepping error recorded
positive overstepping of the oversteppings counter Hi.tot > 1000
negative overstepping of the oversteppings counter Hi.tot < -1000
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 to be enf.</th>
<th>Value of the 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>2 bytes</td>
<td></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 MSB</th>
<th>2nd word value LSB</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>
<td></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 words to be enf.</th>
<th>Nbr of bytes to be enforced</th>
<th>Value of the 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></td>
</tr>
</tbody>
</table>

Response pattern:

<table>
<thead>
<tr>
<th>Slave number</th>
<th>Function 16</th>
<th>1st word address</th>
<th>Number of words to be enf.</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></td>
</tr>
</tbody>
</table>

Writing of 1 word: Function N°6:

Request pattern:

<table>
<thead>
<tr>
<th>Slave number</th>
<th>Function 6</th>
<th>Word address</th>
<th>Value of word 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></td>
</tr>
</tbody>
</table>

Response pattern:

<table>
<thead>
<tr>
<th>Slave number</th>
<th>Function 6</th>
<th>Word address</th>
<th>Value of word 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></td>
</tr>
</tbody>
</table>

Exception pattern:

<table>
<thead>
<tr>
<th>Slave number</th>
<th>Function requested with MSB=1</th>
<th>Error code</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>
</tr>
</tbody>
</table>

9.3 Reading in double integer format:
Example: Reading of the displayed measure

Request:

<table>
<thead>
<tr>
<th>254</th>
<th>03</th>
<th>0</th>
<th>206</th>
<th>0</th>
<th>2</th>
<th>CRC 16</th>
</tr>
</thead>
</table>

Response with a positive measure:

<table>
<thead>
<tr>
<th>Slave number</th>
<th>Reading of n words</th>
<th>Address</th>
<th>Number of words</th>
</tr>
</thead>
<tbody>
<tr>
<td>254</td>
<td>3</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Measure value:

<table>
<thead>
<tr>
<th>byte 3</th>
<th>byte 4</th>
<th>byte 1</th>
<th>byte 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>00000000</td>
<td>00000000</td>
<td>00010011</td>
<td>10001000</td>
</tr>
</tbody>
</table>

Sign: 0 positive
1 negative

Measure = byte 3 x 256³ + byte 4 x 256² + byte 1 x 256 + byte 2
= 0 x 256³ + 0 x 256² + 19 x 256 + 136
= 5000

Reading of address 120 => decimal point = 2 => displayed meas. 50.00

Response with a negative measure:

<table>
<thead>
<tr>
<th>254</th>
<th>3</th>
<th>4</th>
<th>236</th>
<th>120</th>
<th>255</th>
<th>255</th>
<th>CRC 16</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>byte 3</th>
<th>byte 4</th>
<th>byte 1</th>
<th>byte 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>11111111</td>
<td>11111111</td>
<td>11101100</td>
<td>01110000</td>
</tr>
</tbody>
</table>

Sign: 1 negative: inverting of bits and adding of 1.
Inversion

<table>
<thead>
<tr>
<th>byte 3</th>
<th>byte 4</th>
<th>byte 1</th>
<th>byte 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>00000000</td>
<td>00000000</td>
<td>00010011</td>
<td>10000111</td>
</tr>
</tbody>
</table>

Plus 1

<table>
<thead>
<tr>
<th>byte 3</th>
<th>byte 4</th>
<th>byte 1</th>
<th>byte 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>00000000</td>
<td>00000000</td>
<td>00010011</td>
<td>10001000</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 meas. -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 CRC 16, the 1st sent byte is the LSB.

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