ENERGY kWh-METERS

DIMENSIONS AND "MID" NORMATIVE ................................................................. 2

SELECTION OF CURRENT TRANSFORMERS AND OUTPUT IMPULSES
96x96 Meters - 4 DIN modules - 6 DIN modules ............................................. 3

MONOPHASE ACTIVE ENERGY kWh-METERS
Insertion on CT 5A - 4 DIN modules ................................................................. 4
30A direct insertion with sealable terminal covers - 1 DIN module ......................... 4
30A direct insertion - 2 DIN modules ................................................................. 4
30A direct insertion with casing and sealable terminals for UTF certification - 3 DIN modules ................................................................. 5
63A direct insertion - 2 DIN modules ................................................................. 5
Insertion on CT 5A - switchboard version 96x96 mm ............................................ 5

3 WIRES WITHOUT NEUTRAL (ARON) THREE-PHASE ACTIVE ENERGY kWh-METERS
Insertion on CT 5A - 4 DIN modules ................................................................. 6
Insertion on CT 5A - 6 DIN modules ................................................................. 6
Insertion on CT 5A - switchboard version 96x96 mm ............................................ 6
Insertion on CT 5A with casing and sealable terminals for UTF certification - 6 DIN modules ................................................................. 6
Insertion on CT 5A with casing and sealable terminals for UTF certification - switchboard version 96x96 mm ................................................................. 6

4 WIRES WITH NEUTRAL THREE-PHASE ACTIVE ENERGY kWh-METERS
Insertion on CT 5A - 4 modules ................................................................. 7
Insertion on CT 5A - 6 DIN modules ................................................................. 7
Insertion on CT 5A - switchboard version 96x96 mm ............................................ 7
Insertion on CT 5A with casing and sealable terminals for UTF certification - 6 modules ................................................................. 7
Insertion on CT 5A with casing and sealable terminals for UTF certification - switchboard version 96x96 mm ................................................................. 7
30A direct insertion - 4 DIN modules ................................................................. 8
30A direct insertion - 6 DIN modules ................................................................. 8
63A direct insertion - 4 DIN modules ................................................................. 8

THREE-PHASE REACTIVE ENERGY kWh-METERS
Insertion on CT 5A - 3 wires without neutral (ARON) - 6 DIN modules .................... 9
Insertion on CT 5A - 3 wires without neutral (ARON) - switchboard version 96x96 mm ................................................................. 9
Insertion on CT 5A - 4 wires with neutral - 6 DIN modules ....................................... 9
Insertion on CT 5A - 4 wires with neutral - switchboard version 96x96 mm .................. 9

kWh-METERS WITH MINIMUM LOAD THRESHOLD AND ENABLING FOR HOUR-METER CERTIFIABLE (FISCAL USE)
Insertion on CT 5A with casing and sealable terminals for UTF certification - 4 DIN modules ................................................................. 10
Insertion on CT 5A with casing and sealable terminals for UTF certification - 6 DIN modules ................................................................. 10
Insertion on CT 5A with casing and sealable terminals for UTF certification - switchboard version 96x96 mm ................................................................. 10

INDUCTION ENERGY kWh-METERS

GENERAL DESCRIPTIONS AND DIMENSIONS ..................................................... 11

MONOPHASE - 2 wires ................................................................. 12

THREE-PHASE - Active Energy
3 wires without neutral (ARON) ................................................................. 12
4 wires with neutral ................................................................. 12

THREE-PHASE - Reactive Energy
3 wires without neutral (ARON) ................................................................. 13
4 wires with neutral ................................................................. 13

SEALABLE TERMINAL

GENERAL DESCRIPTIONS ................................................................................. 13

UTF CERTIFICATIONS / CUSTOMS AGENCY

GENERAL DESCRIPTIONS ................................................................................. 14

RECORDERS OF IMPULSES

GENERAL DESCRIPTIONS ................................................................................. 15
DIMENSIONS IN mm

1 DIN module

2 DIN modules

3 DIN modules

4 DIN modules

6 DIN modules

96x96 mm
Depth 50.5 mm

SEALABLE - 96x96 meters

Rear view of the sealable terminal cover

Rear view of the mindip sealable selection panel

TRANSFORMING FROM A 4 MODULES METER TO A 96x96 METER

ARAD964 + "MID" Meter with 4 modules = "MID" 96x96 Meter

SELECTION OF CURRENT TRANSFORMERS AND OUTPUT IMPULSES - 4 modules meters

Minidip view from behind the instrument

CT SELECTION

OUTPUT PULSE SELECTION

SELECTION OF CURRENT TRANSFORMERS AND OUTPUT IMPULSES - 6 modules meters

Minidip view from behind the instrument

CT SELECTION

OUTPUT PULSE SELECTION

Max 4000A

1 impulse = 100 Wh
1 impulse = 1 kWh
1 impulse = 10 kWh
**SELECTION OF CURRENT TRANSFORMERS AND OUTPUT IMPULSES - 96x96 meters**

**Minidip view from behind the instrument**

**C.T. SELECTION**

Max 1500A

**OUTPUT PULSE SELECTION**

- 1 impulse = 100 Wh
- 1 impulse = 1 kWh

**Rear panel**

**DETAILS FOR ORDERING**

- The three-phase energy meters are calibrated with the following standard values:
  - Input in 5A current and primary selected through minidip
  - Input in 400V voltage
- Upon request, it is possible to calibrate the meters with the following parameters which are to be indicated when ordering:
  - Input 1A current
  - Input under voltage: 100V/3V, 110V/3V, 100V, 110V, 230V, 440V, 500V

**"MID" NORMATIVE**

Taken from the Official Gazette of the European Union

The requisites of attachment I, the specific requisites of this attachment and the assessment and conformity procedures listed in this attachment, are applied to active electric energy meters destined for residential, trade and light commercial uses.

Note: the electric energy meters can be used together with the external transformers, depending on the measuring technique applied.

However, this attachment takes into account only electric meters and not the transformers.

**DEFINITIONS:**

- A active electric energy meter is a device which measures the active electric energy used in a circuit
- I = intensity of electric current which circulates in the meter
- I0 = specified reference current for which the transformer in function has been planned
- Iref = reference current (ex Ib)
- Imin = I value above which the error is kept within the tolerable minimum limits (balanced load polyphase meters). Minimum function current in class within the maximum limits from Itr to Iref
- Itr = I value above which the error is kept within the tolerable minimum limits
- Imax = I maximum value for which the error remains within the tolerable maximum limits
- U = electric energy voltage supplied to the meter
- Un = specified reference electric energy voltage
- f = electric voltage frequency supplied to the meter
- f0 = specified reference frequency
- PF = power factor = cosφ = phasing θ between I and U
- Uf0 = specified reference electric energy voltage
- U = electric energy voltage supplied to the meter
- θ = phasing between I and U
- ϕ = phase angle
- Itr / 20 (EN50470-3:2006-Table 15)
- 1 impulse = 100 Wh
- 1 impulse = 1 kWh
- 1 impulse = 10 kWh

**SPECIFIC REQUISITES**

1. Accuracy: the manufacturer specifies the class index of the meters. The class indexes are defined as follows: Class A, Class B and Class C.
2. Nominal functioning conditions: the manufacturer specifies the nominal functioning conditions of the meter, in particular the values of:
   - fn, Un, In, Ist, Imin, Itr, Imax applicable to the meter. For the chosen values, the meter must satisfy the conditions in the following table:

<table>
<thead>
<tr>
<th>Class A</th>
<th>Class B</th>
<th>Class C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iref</td>
<td>10 x Itr</td>
<td>I0</td>
</tr>
<tr>
<td>I0</td>
<td>I0</td>
<td>I0</td>
</tr>
<tr>
<td>Imin</td>
<td>0.05 x I0</td>
<td>0.04 x I0</td>
</tr>
<tr>
<td>Ist</td>
<td>0.5 x I0</td>
<td>0.5 x I0</td>
</tr>
<tr>
<td>Imax</td>
<td>50 x I0</td>
<td>50 x I0</td>
</tr>
<tr>
<td>For meters with direct connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For meters functioning through a transformer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Itr</td>
<td>Itr / 20</td>
<td>I0</td>
</tr>
<tr>
<td>Imin</td>
<td>0.06 x I0</td>
<td>0.04 x I0</td>
</tr>
<tr>
<td>Ist</td>
<td>0.4 x I0</td>
<td>0.2 x I0</td>
</tr>
<tr>
<td>I0</td>
<td>20 x I0</td>
<td>20 x I0</td>
</tr>
<tr>
<td>Imax</td>
<td>1.2 x I0</td>
<td>1.2 x I0</td>
</tr>
</tbody>
</table>

**EXAMPLE:** for class A monophase direct meters (Gazette EU-L135/51-30.04.2004-Table 1) = (EN50470-1:2006-Table 3)

```
Itr = 0.5-1-0.8 = ± 1%
Itr = 0.5-1-0.8 = ± 1%
Itr = 0.5-1-0.8 = ± 2%
```

- Standard values V = 230/400V (EN50470-1:2006-Table 1)
- Standard values I0 = 0.5-1-1.5-2A (EN50470-1:2006-Table 2)
- Standard values P = 50Hz (EN50470-1:2006-4.3)
- Max current measure circuit consumption at Iref = 2.5VA (EN50470-3:2006-Table 2)
- Measuring points to evaluate the % error (at least 3 measures per point = Imin, Itr, Iref, Imax (EN50470-3:2006-Table 13)
- Polyphase absolute errors with balanced voltage and load on single phase only between Itr and Imax cos ϕ ± 2.5%; between I0 and Imax cos 0.5-1-0.8 ± 2%
- Additional errors due to the frequency variation ± 3% (EN50470-3:2006-Table 5)
- Monophase absolute errors (EN50470-3:2006-Table 4):
  - between Imin and Itr only cos φ = ± 2.5%; between I0 and Imax cos 0.5-1-0.8 = ± 2%
  - Additional errors due to the temperature (EN50470-3:2006-Table 6):
    - between Imin and Imax cos 0.5-1-0.8 = ± 2.7%
    - Additional errors due to the load variation ± 10% (EN50470-3:2006-Table 6):
      - between Imin and Imax cos 0.5-1-0.8 = ± 1.5%
      - Additional errors due to the load variation ± 5% (EN50470-3:2006-Table 6):
        - between Imin and Imax cos 0.5-1-0.8 = ± 0.8%
        - between I0 and Imax cos 0.5-1-0.8 = ± 1%
- In 5°C...30°C range, the total sum of errors cannot exceed ± 3.5% (EN50470-3:2006-Table 8)
MONOPHASE ACTIVE ENERGY kWh-METERS

### 4 DIN MODULES - INSERTION ON CT 5A

- direct reading of energy consumption; it is not necessary to calculate any coefficient multiplication.
- the standard meter is calibrated at 5A-230V with the use of the coefficient multiplier to calculate depending on the primary value of the CT used. In this case, every flash of the front led corresponds to 1Wh.
- the input voltmetric and amperometric values are to be communicated when ordering.

#### AMPEROMETRIC / VOLTMETRIC SELFCONSUMPTION

- 1VA / 3VA for each phase
- PRECISION: Class A
- TEMPERATURE: functioning -5°C to +50°C / storage -25°C to +70°C
- DISPLAY: 99999,9 kWh (6 entries + 1 decimal)
- SIGNALLING LIGHT: flashing red led = active consumption (the flashing is proportional to the consumption) / pulse red led = connection error, verify the connections of the measuring circuit
- ENERGY READING: For all values of cosφ from 0.5 to 1
- PRIMARY CURRENT TRANSFORMERS: 5-10-15-20-25-30-40-50-60-80 (x10 and x100) selectable (max 4000A)
- NOMINAL VOLTAGE: Ue, 230V ± 10% self powered - 50 ÷ 60 Hz
- NOMINAL CURRENT: Ie 5A
- MAXIMUM CURRENT: Imax 6A
- MINIMUM START CURRENT: Imin 15mA
- MINIMUM FUNCTIONING CURRENT: Imin 0,30mA
- TRANSITION CURRENT: Ist 0,30mA
- PROGRAMMABLE OUTPUT IMPULSES: x1 = 1 impulse every 0.1 kWh - resolution 0.1 kWh
  - for x10 = 1 impulse every 1 kWh - resolution 1 kWh
  - for x100 = 1 impulse every 10 kWh - resolution 10 kWh
- relay normally open, 0,5A / 100V - impulse duration 100 ms
- Open-Collector System (SO, DIN43864), max 36V/20mA CC
- Impulse duration >80 ms - 1 impulse every 0.01 kWh
- Impulse duration 100 ms - 1 impulse every 0.01 kWh

#### CONNECTIONS AND AUTOMATIC TEST:
- firstly, choose the relationship of the CT and the output impulse by selecting the appropriate minidip (see above); subsequently connect current and voltage circuits as shown in the layout. Power and wait for at least 3 seconds, so that a current corresponding to the nominal one, passes through the circuit. At this point, verify that the front red led flashes to confirm the correct connection, in this case, by opening the upper panel. It can be noted that the green led (A) positioned near the minidip is switched on and that the red led (B corresponding to L1 phase) is switched off.
- Whereas, if the front red led throbs (the brightness gradually increases and decreases), it means there is an anomaly in the connection.
- In this case, by opening the small panel placed near the upper part of the instrument, it will be noted that the green led (A) is switched off and the red led (B ) is switched on. In this case, verify the correct connection of the current transformer (the current must enter from the P1 side and exit from the P2 side).

#### 1 DIN MODULE - 30A DIRECT INSERTION WITH SEALABLE TERMINAL COVERS

- AMPEROMETRIC / VOLTMETRIC SELFCONSUMPTION: 1W / 3W
- PRECISION: Class A
- TEMPERATURE: functioning -5°C to +50°C / storage -25°C to +70°C
- DISPLAY: 99999,99 kWh (5 entries + 2 decimals) with memory preservation even in the presence of a fault
- SIGNALLING LIGHT: yellow led OFF = correct connection
- yellow led ON = incorrect connection
- red flashing led = indicates active consumption
- The flashing is proportional to the consumption.
- ENERGY READING: For all values of cosφ from 0.5 to 1
- NOMINAL VOLTAGE: Ue, 230V ± 10% self powered - 50 ÷ 60 Hz
- NOMINAL CURRENT: Ie 30A
- MINIMUM START CURRENT: Ist 10mA
- MINIMUM FUNCTIONING CURRENT: Ist 15mA
- TRANSITION CURRENT: Ist 0,5mA
- OUTPUT IMPULSES: Open-Collector System (SO, DIN43864), max 36V/20mA CC
- Impulse duration >80 ms - 1 impulse every 0.01 kWh
- Protection against polarity inversion
- DIMENSIONS / WEIGHT kg: 1 DIN module / 0,08

#### 2 DIN MODULES - 30A DIRECT INSERTION

- AMPEROMETRIC / VOLTMETRIC SELFCONSUMPTION: 1W / 3W
- PRECISION: Class A
- TEMPERATURE: functioning -5°C to +50°C / storage -25°C to +70°C
- DISPLAY: 99999,99 kWh (5 entries + 2 decimals)
- SIGNALLING LIGHT: yellow led OFF = correct connection
- yellow led ON = incorrect connection
- red flashing led = active consumption (the flashing is proportional to the consumption)
- The indication is obtained after 1 flash of the red led; this is the automatic connection test, equivalent to a consumption of 10Wh
- For all values of cosφ from 0.5 to 1
- NOMINAL VOLTAGE: Ue, 230V ± 10% self powered - 50 ÷ 60 Hz
- NOMINAL CURRENT: Ie max 30A
- MINIMUM START CURRENT: Ist 0,30mA
- MINIMUM FUNCTIONING CURRENT: Ist 0,30mA
- TRANSITION CURRENT: Ist 0,60mA
- OUTPUT IMPULSES: Open-Collector System (SO, DIN43864), max 36V/20mA CC
- Impulse duration 100 ms - 1 impulse every 0.01 kWh
- Dimensions / Weight kg: 2 DIN modules / 0,13
CONNECTIONS AND AUTOMATIC TEST: firstly, choose the relationship of the CT and the output impulse by selecting the appropriate minidip (see above); subsequently, connect current and voltage circuits as shown in the layout. Power and wait at least 3 seconds, so that a current corresponding to the nominal one passes through the circuit. At this point, verify that the front red led flashes to confirm the correct connection, in this case, by opening the small upper panel, it can be noted that the green led (A) positioned near the minidip is switched on and that the red led (B corresponding to L1 phase) is switched off. Whereas, if the front red led throbs (the brightness gradually increases and decreases), it means there is an anomaly in the connection. In this case, by opening the small panel placed near the upper part of the instrument, it will be noted that the green led (A) is switched off and the red led (B) is switched on.

In this case, verify the correct connection of the current transformer (the current must enter from the P1 side and exit from the P2 side).
THREE-PHASE ACTIVE ENERGY kWh-METERS

3 Wires Without Neutral (Arca) - Insertion on CT 5A

4 DIN MODULES
1RCETM354 / 1RCETM354D (digital display)
6 DIN MODULES
1RCETM35
2RCET9635

SWITCHBOARD VERSION 96x96
- direct reading of energy consumption; it is not necessary to calculate any multiplication coefficient

4 DIN MODULES WITH SEALABLE TERMINAL COVERS FOR UTF CERTIFICATION
1RCETM354U

6 DIN MODULES WITH SEALABLE TERMINAL COVERS FOR UTF CERTIFICATION
1RCETM35U
2RCET9635U

SWITCHBOARD VERSION 96x96 WITH SEALABLE TERMINAL COVERS FOR UTF CERTIFICATION
2RCET9635U

- the standard meter is calibrated at 5A-400V with the use of the coefficient multiplier to be calculated depending on the primary value of the CT used.
- in this case, every flash of the front led corresponds to 1Wh.
- upon request, it can be supplied with the direct reading of energy consumption in which it is not necessary to calculate any coefficient multiplication
- the voltmetric and amperometric input values have to be communicated when being ordered as these models are without the minidip

- AMPEROMETRIC / VOLTMETRIC SELFCONSUMPTION: 1VA / 3VA for each phase
- TEMPERATURE: Class A (for model 1RCETM354 and 1RCETM354U) - Class 2 for all other models
- PRECISION: 5A-400V ± 10% self powered - 50 ÷ 60 Hz
- DISPLAY: 999999,9 kWh (6 entries + 1 decimals)
- SIGNALLING LIGHT: flashing red led = active consumption (the flashing is proportional to the consumption).
Each flashing is equal to 1 Wh for CT up to 80A; at 10 Wh between 100 and 800A; at 100 Wh > at 800A (only for 6 modules and 96x96)

- ENERGY READING: For all values of cosφ from 0.5 to 1
- PRIMARY OF CURRENT TRANSFORMERS: selectable (max 4000A)
- NOMINAL VOLTAGE: Un 400V ± 10%
- NOMINAL CURRENT: In 5A
- MAXIMUM CURRENT: Imax 6A
- MINIMUM START CURRENT: Ist 0.1mA
- MINIMUM FUNCTIONING CURRENT: Imin 15mA
- TRANSITION CURRENT: Itr 0.25A
- PROGRAMMABLE OUTPUT IMPULSES
  \[ \text{x1} = 1 \text{ impulse every 0.1 kWh} \quad \text{resolution: 0.1 kWh} \]
  \[ \text{x10} = 1 \text{ impulse every 1 kWh} \quad \text{resolution: 1 kWh} \]
  \[ \text{x100} = 1 \text{ impulse every 10 kWh} \quad \text{resolution: 10 kWh} \]
  relay normally open, 0.5A / 100V - impulse duration 100 ms
- DIMENSIONS / WEIGHT kg.

CONNECTIONS AND AUTOMATIC TEST:
- Firstly, choose the relationship of the CT and the output impulse by selecting the appropriate minidip (apart from model 2RCET9635U);
- Subsequently, connect current and voltage circuits as shown in the layout. Power and wait for at least 3 seconds, so that a current corresponding to the nominal one, passes through the circuit.
- At this point, verify that the red frontal led flashes to confirm the correct connection. In this case, by opening the upper small panel it can be noted that the green led (A) is switched on and the red led (B corresponding to phase L1 and D corresponding to phase L3) are switched off.
- Whereas, if the frontal red led throbs (the brightness gradually increases and decreases), it means there is an anomaly in the connection.
- In this case, by opening the small panel placed near the upper part of the instrument, it will be noted that the green led (A) is switched off and both red led (B and D) corresponding to the phase incorrectly connected, are switched on. In this case verify that the connections are correct.
- The following anomalies may have verified:
  - the current in an amperometric measuring circuit circulates in reverse mode due to errors in the CT connection (the current must enter from the P1 side and exit from the P2 side)
  - the connection between the two CT and the respective phases have been inverted (Example: CT on L1 instead of on L3 and vice-versa).
  - a connection in the voltmetric measuring circuit of the phase corresponding to the red led switched on is missing
  - the connection of the voltmetric circuit has been inverted (Example: L1 in place of L3 and vice-versa).

- In case of no L1 or L3 phase, the meter will not function as it is no longer powered.
- NOTE: In case the UTF certifier is required, the reading can be carried out by calculating the coefficient multiplier (k) in function of the CT used.
4 WIRE WITH NEUTRAL - INSERTION ON CT 5A

4 DIN MODULES
1RCETM454 / 1RCETM454D (digital display)
1RCETM45
2RCET9645

6 DIN MODULES
1RCETM454U
1RCETM45U
2RCET9645U

SWITCHBOARD VERSION 96X96
- direct reading of energy consumption; it is not necessary to calculate any multiplication coefficient

4 DIN MODULES WITH SEALABLE TERMINAL COVERS FOR UTF CERTIFICATION
1RCETM454
2RCET9645

6 DIN MODULES WITH SEALABLE TERMINAL COVERS FOR UTF CERTIFICATION
1RCETM45U
1RCETM45U
2RCET9645U

SWITCHBOARD VERSION 96X96 WITH SEALABLE TERMINAL COVERS FOR UTF CERTIFICATION
- the standard meter is calibrated at 5A-400V with the use of the coefficient multiplier to be calculated depending on the primary value of the CT used. In this case, every flash of the front led corresponds to 1Wh.
- upon request, it can be supplied with the direct reading of energy consumption in which it is not necessary to calculate any coefficient multiplication
- the voltmetric and amperometric input values have to be communicated when being ordered as these models are without the minidip

- AMPEROMETRIC / VOLTMETRIC SELFCONSUMPTION
  1VA / 3VA for each phase

- PRECISION
  Class A (for model 1RCETM454 and 1RCETM454U) - Class 2 for all other models

- TEMPERATURE
  functioning: -5°C ÷ +50°C / storage: -25°C ÷ +70°C

- DISPLAY
  999999,9 kWh (6 entries + 1 decimals)

- SIGNALLING LIGHT
  flashing red led = active consumption (the flashing is proportional to the consumption)

- ENERGY READING
  For all values of cosφ from 0.5 to 1

- PRIMARY OF CURRENT TRANSFORMERS
  5-10-15-20-25-30-40-50-60-80 (x10 e x100) selectable (max 4000A)

- NOMINAL VOLTAGE
  Un 3x230V/400V ± 10% self powered - 50 ÷ 60 Hz

- MAXIMUM CURRENT
  In 5A

- N.O. Output Impulse
  N.O. Output impulse

- PROGRAMMABLE OUTPUT IMPULSES
  x1 = 1 impulse every 0.1 kWh - resolution 0.1 kWh
  x10 = 1 impulse every 1 kWh - resolution 1 kWh
  x100 = 1 impulse every 10 kWh - resolution 10 kWh
  relay normally open, 0.5A / 100V - impulse duration 100 ms

- DIMENSIONS / WEIGHT kg.
  4 or 6 modules DIN / 0.40 (modular) - 96x96mm / 0.55 (switchboard version)

CONNECTIONS AND AUTOMATIC TEST: firstly, choose the relationship of the CT and the output impulse by selecting the appropriate minidip (apart from model 2RCET9645U); subsequently, connect current and voltage circuits as shown in the layout. Power and wait for at least 3 seconds, so that a current corresponding to the nominal one, passes through the circuit.

At this point, verify that the red frontal led flashes to confirm the correct connection. In this case, by opening the upper small panel it can be noted that the green led (A) is switched on and the red led (B corresponding to phase L1, C corresponding to phase L2 and D corresponding to phase L3) are switched off.

Whereas, if the frontal red led throb (the brightness gradually increases and decreases), it means there is an anomaly in the connection.

In this case, by opening the small panel placed near the upper part of the instrument, it will be noted that the green led (A) is switched off and one, two or all three red led (B, C and D) corresponding to the phase incorrectly connected, are switched on. In this case verify that the connections are correct. The following anomalies may have verified:
- the current in an amperometric measuring circuit circulates in reverse mode due to errors in the CT connection (the current must enter from the P1 side and exit from the P2 side)
- the connection between the three CT and the respective phases has been inverted (Example: CT on L1 instead of on L3 etc.)
- a connection in the voltmetric measuring circuit of the phase corresponding to the red led switched on is missing
- the connection of the voltmetric circuit has been inverted (Example: L1 in place of L3 etc.)

In case of no L1 or L3 phase, the meter will not function as it is no longer powered.

NOTE: in case the UTF certifier is required, the reading can be carried out by calculating the coefficient multiplier (k) in function of the CT used
CONNECTIONS AND AUTOMATIC TEST: firstly, choose the relationship of the CT and the output impulse by selecting the appropriate minidip; subsequently, connect current and voltage circuits as shown in the layout. Power and wait for at least 3 seconds, so that a current corresponding to the nominal one, passes through the circuit. At this point, verify that the red frontal led flashes to confirm the correct connection. In this case, by opening the upper small panel it can be noted that the green led (A) is switched on and the red led (B) corresponding to phase L1, C and D are switched off. Whereas, if the frontal red led stops (the brightness gradually increases and decreases), it means there is an anomaly in the connection. In this case, by opening the small panel placed near the upper part of the instrument, it will be noted that the green led (A) is switched off and one, two or all three red led (B, C and D) corresponding to the phase incorrectly connected, are switched on. In this case verify that the connections are correct. The following anomalies may have verified:

- the current in an amperometric measuring circuit circulates in reverse mode
- a connection in one or more phases has been inverted (Example: L1 instead of L3 etc.)
- a connection in the voltmetric measuring circuit of the phase corresponding to the red led switched on is missing
- the connection of the voltmetric circuit has been inverted (Example: L1 in place of L3 etc.)

Eventually the only dip to be moved are n°1 and n°2 for selecting the output impulse.
THREE-PHASE REACTIVE ENERGY kWh-METERS

INSERTION ON CT 5A

- Direct reading of energy consumption; it is not necessary to calculate any coefficient multiplication
- Amplometric/Voltmetric Self-consumption: 1VA/3VA for each phase
- Nominal Voltage: 400V (±10%) self powered - 50 ÷ 60 Hz
- Precision: Class 3
- Temperature:
  - Functioning: -5°C ÷ +50°C
  - Storage: -25°C ÷ +70°C
- Display: 999999.9 kWh (6 entries + 1 decimals)
- Signalling Light: flashing red led = active consumption (the flashing is proportional to the consumption)
- Energy Reading
- Nominal Current: 5A
- Primary of Current Transformers: 5-10-15-20-25-30-40-50-60-80 (x10 e x100) selectable (max 4000A)
- Maximum Current: allowed: 6A - acceleration 5 times the In for 0.5 seconds
- Minimum Start Current: 15mA
- Programmable Output Impulses:
  - 1 impulse every 0.1 kvarh - resolution 0.1 kWh
  - 1 impulse every 1 kvarh - resolution 1 kWh
  - 1 impulse every 10 kvarh - resolution 10 kWh
  - Relay normally open, 0.5A / 100V - impulse duration 100 ms
- Dimensions / Weight kg

CONNECTIONS AND AUTOMATIC TEST
Firstly, choose the relationship of the CT and the output impulse by selecting the appropriate minidip; subsequently connect current and voltage circuits as shown in the layout.

Power and wait for at least 3 seconds, so that a current corresponding to the nominal one, passes through the circuit.

Eventually, to check the correct connection, open the small panel placed in the upper part of the instrument and verify that:
- the green led (A) is switched on (it indicates that the meter is powered)
- that one, two or three red led (B, C or D) are switched off (indicates that the meter is measuring an inductive energy)
- that one, two or three red led (B, C or D) are switched on (indicates that the meter is measuring a capacitive energy)

In case of no L1 or L3 phase, the meter will not function as it is no longer powered.

To be powered, the meter requires that the neutral and at least one of the three phases, be present.
**kWh-METERS WITH MINIMUM LOAD THRESHOLD AND ENABLING FOR HOUR-METER CERTIFIABLE (FISCAL USE)**

**INSERTION ON CT 5A**

4 DIN MODULES WITH SEALABLE TERMINAL COVERS FOR UTF CERTIFICATION

6 DIN MODULES WITH SEALABLE TERMINAL COVERS FOR UTF CERTIFICATION

- the standard meter is calibrated at 5A-400V with the use of the coefficient multiplier to be calculated depending on the primary value of the CT used. In this case, every flash of the front led corresponds to 1Wh.
- upon request, it can be supplied with the direct reading of energy consumption in which it is not necessary to calculate any coefficient multiplication
- the voltmetric and amperometric input values have to be communicated when being ordered as these models are without the minidip.
- AMPEROMETRIC / VOLTMETRIC SELF-CONSUMPTION 1VA / 3VA for each phase
- PRECISION Class A (for 1RCETM454C) - Class 2 for other models
- TEMPERATURE functioning -5°C ÷ +50°C / storage -25°C ÷ +70°C
- DISPLAY
  - signalling light flashing red led = active consumption (the flashing is proportional to the consumption)
  - each flashing is equal to: 1 Wh for CT up to 80A
  - 10 Wh for CT including between 100 and 800A
  - 100 Wh for CT > at 800A
  - pulse red led = connection error, it is necessary to verify the connections of the measuring circuit
  - energy reading
  - primary of current transformers
  - Nominal voltage
  - Nominal current
  - Maximum current
  - Minimum start current
  - Minimum functioning current
  - Transition current
  - Relay
  - Dimensions / Weight kg

SWITCHBOARD VERSION 96X96 WITH SEALABLE TERMINAL COVERS (UTF CERTIFICATION)

- direct reading of energy consumption; it is not necessary to calculate any coefficient multiplication
- NOTE: in case the UTF certifier is required, the reading can be carried out by calculating the coefficient multiplier (k) in function of the CT used. In this case, every flashing of the frontal led corresponds to 1Wh.
- the voltmetric and amperometric input values have to be communicated when being ordered as these models are without the minidip.

- In case of no L1 or L3 phase, the meter will not function as it is no longer powered.
- To be powered, the meter requires that the neutral and at least one of the three phases, be present.

The minimum load threshold is calibrated in factory at 1/200 of the nominal current. Therefore: 0.025A in case of nominal current 5° 0.005A in case of nominal current 1A

**CONNECTIONS AND AUTOMATIC TEST:** connect the current and voltage circuits as shown in the layout. Power and wait for at least 3 seconds, so that a current corresponding to the nominal one, passes through the circuit.

At this point, verify that the red frontal led flashes to indicate the correct connection.

If the frontal red led throbs (the brightness gradually increases and decreases), it means there is an anomaly in the connections which therefore need to be verified.

The following anomalies may have verified:
- the current in an amperometric measuring circuit circulates in reverse mode due to errors in the CT connection (the current must enter from the P1 side and exit from the P2 side)
- the connection between the two CT and the respective phases has been inverted (CT on L1 instead of on L3 and vice-versa)
- a connection in the voltmetric measuring circuit of the phase corresponding to the red led switched on is missing
- the connection of the voltmetric circuit has been inverted (L1 in place of L3 and vice-versa)
INDUCTION kWh-METERS

TECHNICAL CHARACTERISTICS

RULES
The meters listed in this catalogue have been realised according to rules: IEC 13-13 / IEC 521, 145, and 529 / VDE 0418 / DIN 40040 / SEN 0601 / BS5685.

TESTING VOLTAGE
The instruments are tested according to the rules with sinusoidal alternate voltage of 2000 V eff. to frequency between 40 and 60Hz, applied for one minute between the circuits and the mass. This testing voltage corresponds to a reference maximum nominal voltage for the isolation of 0.6kV.

PRECISION CLASS
The precision class of the meters for active energy is 2, for reactive energy is 3.

OVERLOADING
The amperometric winding support 400% of permanent overloads, whereas the voltmetric ones, support 120% of continuous overloads.

FUNCTIONING TEMPERATURE
The instruments satisfy the rules requisites, for which the functioning temperature is of 20°C +/- 10°C. They can however function in continuous service, without deterioration and with an acceptable class error, with temperatures between 0 and +40°C. In any case, the meter must not present an over-temperature of the windings above 50°C.

STORAGE TEMPERATURE
The storage temperature must be between -40°C and +65°C. Temperature exceeding the two limits can alter the functioning conditions.

HUMIDITY
The standard meters function with ambient relative humidity of 95% without condensation, with temperature at 35°C for a maximum of 65 days/year. The average yearly value of relative humidity must not exceed 65%.

CASINGS
The casings are in bakelite with a IP52 protection degree, whereas on the terminals, the protection degree is IP30.

EMPTY RUNNING
If only the voltmetric circuits are powered with nominal voltage +/- 20% at nominal frequency +/- 5%, the mobile equipment must perform less than one turn. This rule cautions the user in that it tends to detect if without load, meaning with the amperometric circuit disconnected, the disk still rotates. However, as the presence of an empty residual torque cannot be excluded initially, even if very small, to avoid the continuous rotation of the disk, a stop wind vane of the reverse start has been applied.

START
The meter mobile equipment must start and turn continuously with 0.5% of the nominal current and cos = 1 to the nominal voltage and frequency. This rule tends to protect the distributing company in that it assures the meter functioning above a minimum load. To verify the said rule, apply a load corresponding to the above said value, in this way assuring that the disk accomplishes at least three complete turns.

CALCULATION OF THE COEFFICIENT MULTIPLIER
When it is necessary to calculate the coefficient multiplier (constant k) for the meter reading which uses:
- only the CT (example 400/5A) it is necessary to divide the primary and secondary value 400: 5 = 80 (k)
- the CT and the TV (example CT of 400/5A and TV of 380/100V) the CT as above and multiply the two obtained values 400:5x 380:100 = 3,8 (k) 80x3,8 = 304 (k)

Remember that the CT to match with the meters must be in class 0.5 and have a minimum power of 6VA.

MOUNTING POSITION
The only possible position is the vertical one. It is suggested to place the meters in this position, even if only to try them. If laid down, the same disk weight stops any movement simulating a non functioning.

DIMENSIONS in mm
### MONOPHASE ACTIVE ENERGY - 2 WIRES

- **Functioning Voltage**
  - 3RCEMI100: 100V
  - 3RCEMI20230: 230V
  - 3RCEMI400: 400V

- **Current (Ib / Imax)**
  - 3RCEMI100: 5 / 20A
  - 3RCEMI20230: 10 / 40A
  - 3RCEMI400: 20 / 80A

- **Self-Consumption**
  - Voltmetric circuit: 0.11W
  - Amperometric circuit: 0.23VA

- **Acceleration Current**
  - 0.5% Ib

- **Frequency**
  - 50Hz

- **Display**
  - 5 entries + 1 decimal

- **Weight**
  - Kg.

---

### 3 WIRES WITHOUT NEUTRAL (ARON) THREE-PHASE ACTIVE ENERGY

- **Functioning Voltage**
  - 3RCETI351: 3x100V
  - 3RCETI354: 3x230V/400V

- **Current (Ib / Imax)**
  - 3RCETI351: 5 / 20A
  - 3RCETI354: 10 / 40A

- **Self-Consumption**
  - Voltmetric circuit: 0.10W
  - Amperometric circuit: 0.12VA

- **Acceleration Current**
  - 0.5% Ib

- **Frequency**
  - 50Hz

- **Display**
  - 5 entries + 1 decimal

- **Weight**
  - Kg.

---

### 4 WIRES WITH NEUTRAL THREE-PHASE ACTIVE ENERGY

- **Functioning Voltage**
  - 3RCETI451: 3x100V/100V
  - 3RCETI454: 3x230V/400V

- **Current (Ib / Imax)**
  - 3RCETI451: 5 / 20A
  - 3RCETI454: 10 / 40A

- **Self-Consumption**
  - Voltmetric circuit: 0.10W
  - Amperometric circuit: 0.12VA

- **Acceleration Current**
  - 0.5% Ib

- **Frequency**
  - 50Hz

- **Display**
  - 5 entries + 1 decimal

- **Weight**
  - Kg.
THREE-PHASE REACTIVE ENERGY

- FUNCTIONING VOLTAGE
- CURRENT (Ib / Imax)
- SELF-CONSUMPTION
- amperometric circuit
- ACCELERATION CURRENT
- FREQUENCY
- DISPLAY
- WEIGHT Kg.

<table>
<thead>
<tr>
<th>3 WIRES</th>
<th>4 WIRES</th>
</tr>
</thead>
<tbody>
<tr>
<td>3RCETRI351</td>
<td>3RCETRI354</td>
</tr>
<tr>
<td>3RCETRI451</td>
<td>3RCETRI454</td>
</tr>
<tr>
<td>2x100V</td>
<td>3x100V / 100V</td>
</tr>
<tr>
<td>2x400V</td>
<td>3x230/400V</td>
</tr>
<tr>
<td>5 / 20A</td>
<td>5 / 20A</td>
</tr>
<tr>
<td>2x0.10W</td>
<td>3x0.10W</td>
</tr>
<tr>
<td>2x0.12VA</td>
<td>3x0.12VA</td>
</tr>
<tr>
<td>0.5% Ib</td>
<td>50Hz</td>
</tr>
<tr>
<td>5 entries + 1 decimal</td>
<td>3.5</td>
</tr>
</tbody>
</table>

SEALABLE TERMINAL

GENERAL DESCRIPTIONS

With the sealable terminal boards it is possible to realise: The upstream and downstream sectioning of the measuring instruments; the insertion of a sample equipment, before or after a measuring instrument; the derivation through common sockets from the four connecting terminals and the voltage passage from the amperometric input to the knife, through a jumper to be arranged.

- In normal service, the voltmetric powers are inserted on the R-S-T terminals, whereas the amperometric ones on terminals countersigned R1-R2, S1-S2, T1-T2.
- The instruments are to be connected to terminals 1 and 2.
- The vertical cursor bridges are closed, those at horizontal cursor are open.
- In case of control apparatus insertion, operate as follows: Using normal plugs, derive the voltmetrics of the same apparatus on the voltage sockets of the separating knives or the connection blocks of the fuse holders. Insert the amperometrics of the control apparatus, through plugs on sockets 1 and R1 or 2 and R2 and analogously on the other phases. Select the corresponding vertical cursor.

In case of replacing the measuring instruments, it is necessary to pre-emptively close the horizontal cursors, section the vertical cursors and open the knives.

FOR MONOPHASE METERS

ARMS1
Encumbering dimensions: 95x85x48 mm

FOR THREE-PHASE METERS

ARMS2
Two Systems
Encumbering dimensions: 170x85x48 mm

ARMS3
Three Systems
Encumbering dimensions: 245x85x48 mm
Revalco is able to supply the certification of the measuring groups in case the Customs Technical Department requests it. The certification of the whole plant is to be requested at the competent UTF offices of the area. In case of a measuring group with three systems composed of 3 current transformers and one meter, 5 inspection certificates are necessary. When the measuring group to be inspected is a 2 system, 4 certificates are requested as the interested CT are only two. One for each current transformer (in this example TAR8V 800/5A)

- One for each current transformer (in this example TAR8V 800/5A)
- One for the meter
- One for the transformers complex + meter
**RECORDERS OF IMPULSES**

**5 INPUTS WITH OUTPUT RS485**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>230V +/- 10%, 50/60Hz</td>
</tr>
<tr>
<td>Self-consumption</td>
<td>2 VA</td>
</tr>
<tr>
<td>Galvanic isolation</td>
<td>inputs/power/output</td>
</tr>
<tr>
<td>Testing voltage</td>
<td>3kV</td>
</tr>
<tr>
<td>Number of inputs</td>
<td>5</td>
</tr>
<tr>
<td>Type of inputs</td>
<td>Free contact (NPN)</td>
</tr>
<tr>
<td>Polarity</td>
<td>NO or NC (programmable from Software)</td>
</tr>
<tr>
<td>Max. resistance of contact</td>
<td>600 Ω</td>
</tr>
<tr>
<td>Max. residual voltage upon contact</td>
<td>1.5 V</td>
</tr>
<tr>
<td>Serial interface</td>
<td>RS485 (iso. 3kV)</td>
</tr>
<tr>
<td>Serial communication protocol</td>
<td>ModBus RTU</td>
</tr>
<tr>
<td>Serial communication speed</td>
<td>9600-19200-38400-57600-115200 (programmable)</td>
</tr>
<tr>
<td>Serial communication parameters</td>
<td>8, N, 1 No flow control</td>
</tr>
<tr>
<td>Addressing</td>
<td>1 - 255 through minidip</td>
</tr>
<tr>
<td>Number of totalizers</td>
<td>5</td>
</tr>
<tr>
<td>Capacity of totalizers</td>
<td>9999999999 (9 digits)</td>
</tr>
<tr>
<td>Minimum duration tot impulses</td>
<td>55 microSec (1)</td>
</tr>
<tr>
<td>Max. frequency tot impulses</td>
<td>9000 / sec. (1)</td>
</tr>
<tr>
<td>Number of accumulators</td>
<td>5</td>
</tr>
<tr>
<td>Capacity of accumulators</td>
<td>99999999.9999 (9 entires + 4 decimals)</td>
</tr>
<tr>
<td>Minimum duration cont impulses</td>
<td>500 microSec (2)</td>
</tr>
<tr>
<td>Max. frequency cont impulses</td>
<td>1000 / sec. (2)</td>
</tr>
<tr>
<td>Programmable filters</td>
<td>5 fields of 0 to 25.5 milliseconds resolution. 100 microSec</td>
</tr>
<tr>
<td>Dimensions / Weight</td>
<td>3 DIN modules / 0.30 kg</td>
</tr>
<tr>
<td>(1) Duty cycle 50%, accumulators=off, filters=off. When the accumulators are on, this limit is also applied to the totalizers</td>
<td></td>
</tr>
<tr>
<td>(2) Duty cycle 50%, filters=OFF, When the accumulators are OFF, this limit is also applied to the totalizers</td>
<td></td>
</tr>
</tbody>
</table>

**MECHANICAL CHARACTERISTICS**

- Type of mounting: guide DIN50022
- Protection degree: complete apparatus IP20/ frontal IP30

**ENVIRONMENTAL CONDITIONS**

- Ambient temperature: 0...+45 °C
- Relative humidity: 10...95 %
- External field: -5...+55 °C
- Atmospheric pressure: 70...110 kPa
- Warehousing temperature: -10...+70 °C

**REFERENCE STANDARDS**

- IEC Rules:
  - Electromagnetic compatibility (emission): IEC EN 61000-6-4 (ex EN 50081-2)
  - Electromagnetic compatibility (immunity): IEC EN 61000-6-2 (ex EN 50082-2)
  - Safety: IEC EN 61010-1 CAT II

**GENERAL DESCRIPTIONS**

- Diagnostic: two led for the control of the insertion and the functioning
- Interface RS485 optoisolated at 3kV, protocol MODBUS RTU (Full Compliance) with 5 programmable speeds, up to 115200 bps.
- Inputs compatible with relay contact or static output (Open Collector) at very high speed
- Possibility to program counting with closed or open contact
- Access password for the programming of the parameters/ pre-set, totalizers and accumulators zeroing
- Input filters programmable with 100 microSec resolution.
- Possibility to permanently memorise the totalizers and accumulators (in EEPROM mode).
- Possibility to activate accumulators with programmable impulse weight from 0 to 9999.9999 (at fourth decimal).
- Possibility to block the totalizers and accumulators at maximum counting value (9999.9999 without subsequent zeroing).
- Free software that can be unloaded from site with demo

Device for the collection of impulses coming from: energy meters, water meters, gas meters, heat recorders, step count, people count, access count, piece count or any other count application equipped with a free relay count from potential or from an "Open Collector" (example: photocell or proximity sensor). The impulses received on the 5 independent channels can be counted inside the device so that the totals are available to a "Master" Modbus requesting it. The counting of every channel is deposited in appropriate dedicated registers, one for the totalisation and the others to supply "Weighed" measures.

During programming, through a provided software (updates available on the site), a "Weight" can be associated to every impulse, that is, the register increasing numerical quantity to every received impulse.

Example: if the water weight of 10m3 is associated to channel 1, at every received impulse the internal meter will increase by 10 meaning 0....10....20....30...

The counting of every channel is deposited in appropriate dedicated registers, one for the totalisation and the others to supply "Weighed" measures.

The impulses received on the 5 independent channels can be counted inside the device so that the totals are available to a "Master" Modbus requesting it.

The device is equipped with a permanent memory (EEPROM).

For every channel it can be chosen whether to save the data permanently or to loose them when switching off (saving in the permanent memory occurs when switching the instrument off). When switching on again, the accumulators saved will be found intact. By removing the small upper panel, access is gained to the settings of the MODBUS addresses (from 1 to 255) of the device through 8 microswitches, two led make a simple diagnostic available.

The cold led flashes when it receives impulses on any one of the 5 channels. The duration of every flash and every pause is 10 0mSec. In case of simultaneous impulses from more channels or fast impulses, the flashing looses meaning, that is, it no longer follows the inputs flow but indicates in general that there is activity. This led is mainly used to verify the connections and instrument functioning.

- The yellow led flashes when the device, after having received a valid question in Modbus through the RS485 interface to the address programmed with the microswitches, answers with the requested data.

**ADDRESS SELECTION**

<table>
<thead>
<tr>
<th>Switch in 'ON' position</th>
<th>address n°</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>7</td>
<td>64</td>
</tr>
<tr>
<td>8</td>
<td>128</td>
</tr>
</tbody>
</table>

Addresses above number 8 are obtained by summing up the single switches. Examples:

<table>
<thead>
<tr>
<th>Address n° 1</th>
<th>Address n° 9</th>
<th>Address n° 128</th>
<th>Address n° 255</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 8</td>
<td>1 2 3 4 5 6 8</td>
<td>1 2 3 4 5 6 8</td>
<td>1 2 3 4 5 6 8</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

15
After a few seconds from switching on, during which both Led are switched on, the instrument is able to acquire impulses simultaneously from 5 counting channels, which can be programmed singularly to accept contact NO or NC and each can be filtered from disturbances with a digital filter programmable from 0.0 to 25.5mSec (resolution 100uSec).

The valid impulses are always sent to the respective TOTALIZATORS, which count, increasingly, each single impulse (1:1). The capacity of each totalizator is of one billion impulses (999,999,999) and it can be decided if once this limit is reached, the counting should block or if the totalizator should restart from zero.

It can also be decided whether the counting value of each totalizator should be permanently saved or whether it should be zeroed after switching off and switching on again.

The same impulses can be sent to the respective ACCUMULATORS, which can be personalised so that they can count the weighed units in a different way from the single impulse. These accumulators represent the size, also chosen one decimal part with resolution 1/10000.

The counting capacity is one billion comma 9999 (999,999,999.9999).

As for the totalizators, it can be decided whether to permanently save or not (singularly) the counting values.

The physical acquisition limit of the impulses is of 9000 imp/Sec (9 KHz) for each channel. This limit can be reached only on the TOTALIZATORS when:
1. The input filters are switched off (0.0mSec)
2. The ACCUMULATORS are switched off
3. The arriving impulses have a duty cycle 50% (impulse time = pause time)
4. The serial communication is at maximum speed (115.200bps)

The requested calculation operations to elaborate the impulse and record it in weighed mode on the accumulators, drastically effect the acquisition performances.

The serial communication speed also influences the performances, and in optimal conditions at 9600bps the maximum acquisition frequency is just above 2 KHz.

To be able to interact by sending configuration controls to the instrument or zeroing/pre-selection controls, it is COMPULSORY to supply the PASSWORD, which 'opens a time window of 10 seconds during which the configuration can be amended (password included).

If the password is not supplied, any writing access attempted is refused.

Even if switching the instrument off, this time is not zeroed.

The factory PASSWORD is 0 (zero). The values accepted are numerical and go from 0 to 65535.

USE OF DIGITAL FILTERS

They can be applied to avoid that disturbance or mechanical contacts rebounds alter the counting. The filters have a resolution of 100uSec per unit.

The minimum duration of the nominal impulse to be recorded is that in the chosen state for the counting, meaning Normally Open or Normally Closed (Ton).

The duration of the ‘pause between one impulse and another must be at least equal or greater than the duration of the impulse (Toff). If not, the following argument no longer stands and the application of the filters can be ‘experimental’.

The maximum applicable filter to an input without loss of impulses is equal to (Ton) – 100uSec.

In fact, on the filter limits, if the arriving impulse did not have a regular duration, it would risk losing it.

Against an erroneous setting of the filters and consequent under-counting, the instrument does not supply any error indication.

USE OF ACCUMULATORS

They are normally kept switched off to maximise the instrument performances, which it can better and more quickly manage its main function, meaning that, to concentrate the counting of the single impulses from 5 lines at the same time and quickly communicate on the serial line.

In fact, the ‘weighing’ of that totalised, can very easily be followed from the remote control unit, which surely has a higher calculating power.

However, in particular cases and when the acquisition of the impulses must not happen with elevated frequency (less than 1000imp/sec for each line), it is possible to singularly enable the accumulators and establish the impulse value for each of them.

The value ("weight") of the impulse has a whole part which can be chosen between 0 and 9999 and a decimal part between 0.0000 and 0.9999.

When a meter is enabled, the decimal and whole part of the impulse weight is added to the counting value, which is also expressed with a whole part up to 9999999999 and a decimal part between 0.0000 and 0.9999.

Seeing as the ‘load’ of the calculation which the instrument has to carry out is not constant but it depends on the numbers and on how many accumulators it must manage, OVERLOAD flags for each measuring line have been introduced, which indicate the exceeded calculation capacity and also that part of the arriving impulses have been lost.

In the presence of this indication, it must be known that both the totalizator and the counter of that channel contain an incorrect number of impulses lower...