socomec
Innovative Power Solutions

551888B

COUNTIS M44/M46
THREE-PHASE AND SINGLE-PHASE DIGITAL ENERGY METERS
MEASURE VIA CT UP TO 10000A

COUNTIS M44 (MID)
ref. **48C0 3144**

COUNTIS M46 (MID)
ref. **48C0 3146**

Certificate of conformity with MID Directive.

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Safety instruction

Information for your own safety
Important Safety Information is contained in the Maintenance section. Familiarize yourself with this information before attempting installation or other procedures. Symbols used in this document:

⚠ **Warning**
This means that failure to observe the instruction can result in death, serious injury or considerable material damage.

⚠ **Caution**
This means hazard of electric shock and failure to take the necessary safety precautions will result in death, serious injury or considerable material damage.

Proper handling
The equipment (device, module) may only be used for the application specified in the catalogue and the user manual, and only be connected with devices and components recommended and approved by Socomec.
- Use only insulating tools.
- Do not connect while circuit is live (hot).
- Install and use the meter only in a dry, indoor environment.
- Do not mount the meter in an explosive area or expose the meter to dust, mildew and insects.
- Make sure the used wires are suitable for the maximum current of this meter.
- Make sure the AC wires are connected correctly before applying current/voltage to the meter.
- Do not touch the meter connecting clamps directly with your bare hands, with metal, blank wire or other material as you may get an electrical shock.
- Make sure the protection cover is placed after installation.
- Installation, maintenance and reparation should only be done by qualified personnel.
- Never break the seals and open the front cover as this might influence the functionality of the meter, and will avoid any warranty.
- Do not drop, or allow physical impact to the meter as there are high precision components inside that may break.

Introduction
This document provides operating, maintenance and installation instructions. This device measures and displays the characteristics of single-phase (two-wires, 1P+N), three-phases (3 wires, 3P) and three-phases (4 wires, 3P+N) networks. The measuring parameters include voltage (V), frequency (Hz), current (A), power (kW/kVA/kVAr), import, export and total Energy(kWh/kVArh). The unit can also measure Maximum demand of current and power. This is measured over preset periods of up to 60 minutes.

These units are 1A or 5A current transformers operated and can be configured to work with a wide range of CTs. 2 built-in pulse outputs and either RS485 Modbus or M-bus communication. Configuration is password protected. These units have to be powered by a separate auxiliary (AC or DC) supply. Alternatively they can be powered from the monitored supply by wiring the voltage reference and neutral reference to terminals 5 and 6 (Please refer to wiring diagram).

Characteristics
This series covers 2 models

| Model	Current Input	Communication	MID
COUNTIS M44	1A or 5A CT	RS485 Modbus	•
COUNTIS M46	1A or 5A CT	M-Bus EN 13757-3	•

RS485 Modbus RTU / M-Bus
Countis M44 has a RS485 port with Modbus RTU protocol. Countis M46 has a M-Bus port complying with EN13757-3. Refer to section "Communication".

Current Transformer Primary Current
Countis M44/M46 are CT operated. You will need to set the correct CT rate. Refer to section "CT".

Pulse Output 1
Pulse output 1 is configurable. The pulse output 1 can be set to generate pulses to represent total kWh or kVArh.
The pulse constant can be set to generate 1 pulse per: 0.01(default)/0.1/1/10/100/1000 kWh/kVArh.
Pulse duration: 200 (default)/100/60ms.
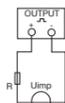
ATTENTION!
Pulse output must be fed as shown in the wiring diagram on the left. Scrupulously respect polarities and the connection mode. Opto-coupler with potential-free SPST-NO Contact.
Contact range: 5~27 VDC / Max. current Input: 27mA DC

Pulse output 2
Pulse output 2 is non-configurable. It is fixed to total kWh. The weight is 3200imp/kWh. The Pulse duration is 100ms

Start Up Screens

T -8.8.8.8. / ☰ -8.8.8.8. / -8.8.8.8.	The first screen lights up all display segments and can be used as a display check.
SoFt 11 01.03	Software version information. (The information depicted in the screenshot here is only for example).
InSt tESt PASS	The interface performs a self-test and indicates the result if the test passes.

After a short delay, the screen will display active energy measurements.

Measurements

U I ESC	Selects the Voltage, Current and THD display screens. In Set-up Mode, this is the "Left" or "Back" button.
F PF	Select the Frequency, Power factor and max demand display screens. In Set-up Mode, this is the "Up" button.
P	Select the Power display screens. In Setup Mode, this is the "Down" button.
E	Select the Energy display screens. In Setup mode, this is the "Enter" or "Right" button.

Voltage and Current
Each successive press of the **U I** ESC button selects a new parameter:

L1 L2 L3	000.0 / 000.0 / 000.0 V	Phase to neutral voltages (1P+N and 3P+N).
L1-2 L2-3 L3-1	380.0 / 380.0 / 380.0 V	Phase to phase voltages (3P and 3P+N).
L1 L2 L3	0.000 / 0.000 / 0.000 A	Current on each phase.
N	00.00 A	Neutral current. (ref. 48C03134).

Frequency, Power Factor and Demand
Each successive press of the **F PF** button selects a new parameter:

L1 L2 L3	00.00 V %THD / 00.00 / 00.00	Phase to neutral voltage THD% (3P+N).
L1-2 L2-3 L3-1	00.10 V %THD / 00.10 / 00.10	Phase to phase voltage THD% (3P and 3P+N).
L1 L2 L3	00.00 I %THD / 00.00 / 00.00	Current THD% for each phase.

M	00.00 Hz / 0.999 PF	Frequency and Power Factor (total).
L1 L2 L3	0.999 / 0.999 / 0.999 PF	Power Factor of each phase.
MD L1 L2 L3	0.000 / 0.000 / 0.000 A	Maximum Current Demand.
MD M	0.000 kW	Maximum Power Demand.

Power
Each successive press of the **P** button selects a new parameter:

L1 L2 L3	0.000 kW / 0.000 / 0.000	Instantaneous Active Power in kW.
L1 L2 L3	0.000 kVAr / 0.000 / 0.000	Instantaneous Reactive Power in kvar.
L1 L2 L3	0.000 / 0.000 / 0.000 kVA	Instantaneous Volt-Amps in KVA.
M	0.000 kW / 0.000 kVAr / 0.000 kVA	Total kW, kvar, kVA.

Energy Measurements
Each successive press of the **E** button selects a new parameter:

M	0000 kWh / 031.4	Total Active Energy in kWh.
M	0000 kVArh / 000.0	Total Reactive Energy in kVArh.
IMPORT	0000 kWh / 0.314	Import Active Energy in kWh (Ea+).
EXPORT	0000 kWh / 000.0	Export Active Energy in kWh (Ea-).
IMPORT	0000 kVArh / 000.0	Import Reactive Energy in kVArh (Er+).
EXPORT	0000 kVArh / 000.0	Export Reactive Energy in kVArh (Er-).

Set Up
To enter set-up mode, press the **E** button for 3 seconds until the password screen appears.

PASS 0000	Set-up is password protected. The user should enter the correct password (default '1000') before processing.
PASS Err	If an incorrect password is entered, the display will show: **PASS Err**

To exit set-up mode, press **U I** ESC repeatedly until the measurement screen is restored.

Menu Option Selection
1. Use **U I** ESC and **P** buttons to scroll through the different options of the set up menu.
2. Press **E** to confirm your selection
3. If an item flashes, then it can be adjusted by the **F PF** and **P** buttons.
4. Having selected an option from the current layer, press **E** to confirm your selection.
5. Having completed a parameter setting, press **U I** ESC to return to a higher menu level. You will be able to use the **F PF** and **P** buttons for further menu selection.
6. On completion of all setting-up, press **U I** ESC repeatedly until the measurement screen is restored.

Number Entry Procedure
When set-up the unit, some screens require the entering of a number. In particular, on entry to the set-up section, a password must be entered. Digits are set individually, from left to right. The procedure is as follows:
1. The current digit to be set flashes and is set using the **F PF** and **P** buttons.
2. Press **E** to confirm each digit setting.
3. After setting the last digit, press **U I** ESC to exit the number setting routine.

Communication
Modbus or M-bus Primary Address

SEt Addr 001	(The range is from 001 to 247 for Modbus and 001 to 250 for Mbus)
SEt Addr 001	From the set-up menu, press **F PF** and **P** buttons to select the address ID.
SEt Addr 101	Press **E** button to enter the selection routine. The current setting will flash.
SEt Addr 101	Use **F PF** and **P** buttons to choose Modbus or M-bus primary address.

Procedure, press **E** button to confirm the setting and press **U I** ESC button to return the main set-up menu.

Mbus Secondary Address

-Id- 9999 9999	**Secondary address:** 00 00 00 01 to 99 99 99 99. From the set-up menu, use **F PF** and **P** buttons to find the setting page.
-Id- 9999 9999	Press **E** to enter the selection routine. The current setting will flash.
-Id- 1193 8171	Use **F PF** and **P** buttons to set the secondary adress.

Press **E** to confirm the setting and press **U I** ESC to return to the main set up menu.

Baud Rate
Baud rate range for Modbus RTU: 2.4k, 4.8k, 9.6k, 19.2k, 38.4k (default : 9600). For Mbus: 0.3k, 0.6k, 2.4k, 4.8k, 9.6k (default : 2400).

SEt bAud 9.6 k	From the set-up menu, use **F PF** and **P** buttons to select the baud rate option.
SEt bAud 9.6 k	Press **E** to enter the selection routine. The current setting will flash.
SEt bAud 38.4 k	Use **F PF** and **P** buttons to choose baud rate 2.4k, 4.8k, 9.6k, 19.2k, 38.4k

Press **E** to confirm the setting and press **U I** ESC to return to the main set-up menu.

Parity

SEt PAri EUEn	From the set-up menu, use **F PF** and **P** buttons to select the parity option.
SEt PAri EUEn	Press **E** to enter the selection routine. The current setting will flash.
SEt PAri nOnE	Use **F PF** and **P** buttons to choose parity (EVEN / ODD / NONE (default)).

Press **E** to confirm the setting and press **U I** ESC to return to the main set-up menu.

Stop Bits

SEt StoP 2	From the set-up menu, use **F PF** and **P** buttons to select the stop bit option.
SEt StoP 2	Press **E** to enter the selection routine. The current setting will flash.
SEt StoP 1	Use **F PF** and **P** buttons to choose stop bit (2 or 1). Note: default is 1, can only be set to 2 if the parity is previously set to NONE.

Press **E** to confirm the setting and press **U I** ESC to return to the main set-up menu.

CT

CT2 is the secondary current of the CT current transformer used with the meter (1A or 5A), while the CT rate is the ratio between primary and secondary current.
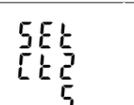
SEt CT2 5	From the set-up menu, use F PF▲ and P▼ buttons to select the CT option.
SEt CT2 5	Secondary CT setting: Press E↵ to enter the CT secondary current selection routine:5A/1A
Ct rAtE 0001	Set CT rate value: Press E↵ to enter the CT rate setting screen. The range is from 0001 to 2000

For example, if using a 100/5A current transformer you will enter 0020, as you need to divide the primary by the secondary to get the ratio (CT rate).

* Please note for the MID approved version device,you will only have one opportunity to set the CT rate.

PT

The PT option sets the secondary voltage (PT2 100 to 500V) of the voltage transformer (PT) that may be connected to the meter.

SEt PT2 400	Use F PF▲ and P▼ buttons to select the PT option. The screen will show the voltage PT secondary voltage value. The default value is 400V.
SEt PT2 400	Secondary PT setting: Press E↵ to enter the PT secondary voltage selection routine. The range is from 100 to 500V.
Pt rAtE 0001	Set PT rate value: Press E↵ to enter the PT rate screen. The range is from 0001 to 2000.

For example, if set the rate to 100,it means the primary voltage equals secondary voltage x100.

Pulse Output

The option allows you to configure the pulse output 1. The output can be set to provide a pulse for a defined amount of energy active or reactive energy. Use this section to set up the pulse for:

- Total kWh / Total kVARh
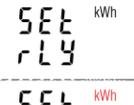
SEt rLY kWh	From the set-up menu, use F PF▲ and P▼ buttons to select the Pulse Output option.
SEt rLY kWh	Press E↵ to enter the selection routine. The unit symbol will flash.
SEt rLY kVARh	Use F PF▲ and P▼ buttons to choose kWh or kVARh.
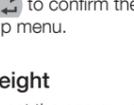
Press E↵ to confirm the setting and press U I ESC to return to the main set up menu.

Pulse weight

Use this to set the energy represented by each pulse.
Rate can be set to 1 pulse per 0.01/0.1/1/10/100/1000 kWh or kVARh.

SEt rAtE 10	(It shows 1 impulse = 10 kWh or kVARh)
SEt rAtE 10	From the set-up menu, use F PF▲ and P▼ buttons to select the pulse rate option.
SEt rAtE 10	Press E↵ to enter the selection routine. The current setting will flash. 0.001/0.01/0./1/10/100kWh/ kVARh per pulse.

Use F PF▲ and P▼ buttons to choose pulse rate. Press E↵ to confirm the setting and press U I ESC to return to the main set-up menu.

Pulse Duration

The energy monitored can be active or reactive and the pulse duration can be set to 200 (default), 100 or 60ms.

SEt PULS 200	(It shows pulse width of 200ms)
SEt PULS 200	From the set-up menu, use F PF▲ and P▼ buttons to select the pulse duration option.
SEt PULS 200	Press E↵ to enter the selection routine. The current setting will flash.

Use F PF▲ and P▼ buttons to choose pulse duration.
Press E↵ to confirm the setting and press U I ESC to return to the main set-up menu.

DIT Demand Integration Time

This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement.
The options are: 0, 5, 8, 10,15, 20, 30, 60 minutes.

SEt dit 10	From the set-up menu, use F PF▲ and P▼ buttons to select the DIT option. The screen will show the currently selected integration time.
SEt dit 10	Press E↵ to enter the selection routine. The current time interval will flash.
SEt dit 20	Use F PF▲ and P▼ to select the time required. Press E↵ to confirm your selection.

Use F PF▲ and P▼ buttons to choose the selection. Press E↵ to confirm the setting and press U I ESC to return to the main set-up menu.

Backlight Set-up

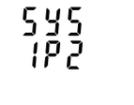The meter provides a function to set the backlight lasting time (0/5/10/30/60/120 minutes).
Option 0 means the backlight will remain always on.

SEt LP 60	Default: 0
SEt LP 60	Use F PF▲ and P▼ buttons to choose the time.

Press E↵ to confirm the setting and press U I ESC to return to the main set-up menu.

Electrical network

The unit has a default setting of 3 phases-4wires (3P+N).
Use this section to set the type of electrical system.
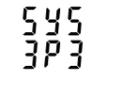
SYS 3P3	From the set-up menu, use F PF▲ and P▼ buttons to select the system option. The screen will show the currently selected system type.
SYS 3P3	Press E↵ to enter the selection routine. The current selection will flash.
SYS 1P2	Use F PF▲ and P▼ buttons to select the required system option: 1P2 : 1 phase + neutral 3P3 : 3 phases without neutral 3P4 : 3 phases with neutral

Press E↵ to confirm the selection. Press U I ESC to exit the system selection routine and return to the menu.

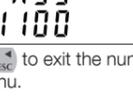## CLR

The meter provides a function to reset the maximum demand value of current and power.

CLr	From the set-up menu, use F PF▲ and P▼ buttons to select the reset option.
MD CLr	Press E↵ to enter the selection routine. The "MD" will flash.

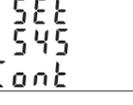Press E↵ to confirm the reset and press U I ESC to return to the main set-up menu.

Change Password

SEt PASS 1000	Use the F PF▲ and P▼ to choose the change password option.
SEt PASS 1000	Use the F PF▲ and P▼ to choose the change password option.
SEt PASS 1000	Press the E↵ to enter the change password routine. The new password screen will appear with the first digit flashing.
SEt PASS 1000	Use F PF▲ and P▼ to set the first digit and press E↵ to confirm your selection. The next digit will flash.
SEt PASS 1100	Repeat the procedure for the remaining three digits.
SEt PASS 1100	After setting the last digit, Press E↵ to confirm the selection.

Press U I ESC to exit the number setting routine and return to the Set-up menu.

CT Reversal

If the CT connections are incorrectly wired (if you invert the current flow), they can be reversed through the set-up menu:

SEt SYS Cont	Use the F PF▲ and P▼ buttons to select the menu option.Hold the E↵ button to view the sub-menu.
SEt IA Frd	This screen will be displayed, you can set Forward (current flows in the proper direction through the meter) or Reverse (current flows backwards through the meter, it will then assume it's the correct direction) on each individual CT connection.
SEt IA rEU	Hold the E↵ button to confirm your adjustment. You can then move on to IB or IC using the F PF▲ and P▼ buttons.

Hold the U I ESC button for 3 seconds to exit the set-up menu.

Note : IA is current on phase 1, IB is current on phase 2, IC is current on phase 3.

Specifications

Measured Parameters

The unit can monitor and display the following parameters of a single phase two wires (1P+N), three phase three wires (3P) or three phase four wires (3P+N) system.

Voltage and Current

- Phase to neutral voltages 100 to 276V a.c. (in case of neutral present).
- Voltages between phases 173 to 480V a.c. (not available in single phase).
- Percentage total voltage harmonic distortion (THD%) for each phase to N (in case of neutral present).
- Percentage voltage THD% between phases (in case of neutral present).
- Current THD% for each phase

Power Factor, Frequency and Max. Demand

- Frequency in Hz
- Power factor
- Instantaneous power:
  - Power 0 to 3600 MW
  - Reactive power 0 to 3600 MVAr
- Volt-amps 0 to 3600 MVA Max. Demand
- Maximum demand power since last reset
- Maximum neutral current demand

Energy Measurements

- Import/Export active energy (Ea+/Ea-) 0 to 9999999.9 kWh
- Import/Export reactive energy (Er+/Er-) 0 to 9999999.9 kVARh
- Total active energy 0 to 9999999.9 kWh
- Total reactive energy 0 to 9999999.9 kVARh

| General	
Voltage AC (Un)	3x230 / 400VAC
Voltage range	80%~120% of Un
Primary Current	1-6000 A
Secondary Current	1 A or 5 A
Power consumption	<2W/10VA
Frequency	50Hz ±2%
Input waveform	Sinusoidal (distortion factor < 0.005)
AC voltage withstand	4KV for 1 minute
Impulse voltage withstand	6KV~1.2 μs waveform
Overcurrent withstand	20Imax for 0.5s
Pulse output 1	configurable : 0.001, 0.01, 0.1, 1, 10, 100 pulses per kWh/kVARh
Pulse output 2	non-configurable : 3200 pulses per kWh
Display	LCD with white backlight
Max. Reading	9999999.9 kWh/kVARh
Auxiliary supply	85-275 VAC 50/60Hz ±10% 120-380 VDC. ±20%.
Consumption	< 10 W
Accuracy	
Voltage	0.2%
Current	0.2%
Frequency	0.2%
Power factor	1%
Active power	0.5%
Reactive power	1%
Apparent power	1%
Active energy	Class C EN50470-1/3
Reactive energy	Class 2 IEC 62053-23
Total harmonic distortion	1% up to 31st harmonic
Values refresh rate	1s, typical, to >99% of final reading, at 50 Hz
Environment	
Operating temperature	-40°C to +70°C
Storage and transportation temperature	-40°C to +70°C
Reference temperature	23°C ±2°C
Relative humidity	0 to 95%, non-condensing
Altitude	Up to 2000m
Warm up time	3s
Mechanical environment	M1
Electromagnetic environment	E2
Degree of pollution	2
Mechanics	
Din rail dimensions	72 x 94.5 x 65 mm (WxHxD) DIN 43880
Mounting	DIN rail 35mm
Ingress protection	IP51
Material	Self-extinguishing UL94V-0

Interfaces for External Monitoring

Three interfaces are provided:
- RS485 Modbus RTU or M-bus for remote communication.
- Pulse output (Pulse 1) indicating real-time measured energy (configurable).
- Pulse output (Pulse 2) 3200 pulses per kWh (non-configurable).

The Modbus configuration (baud rate etc.) and the pulse output assignments (kWh / kVARh, etc.) are configured through the set-up screens.
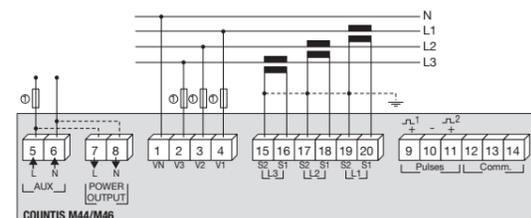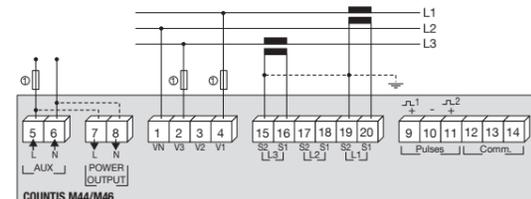

Dimensions

mm
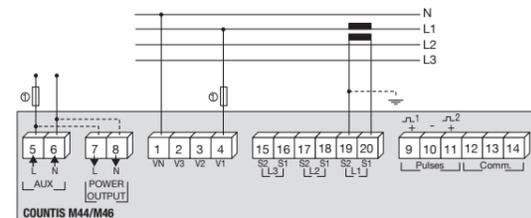72 · 65
94.5 · 35
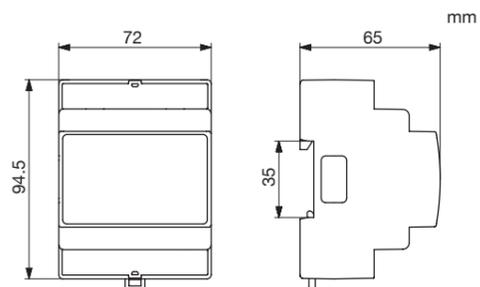
Installation

Wiring diagram

Three phases four-wires (3P+N) with 3CT

Three phases three-wires (3P) with 2 CT

Single phase two-wires (1P+N) with 1CT

N - L: network input.
N' - L': network output.

Comm. terminals for RS485: NC - +

Comm. terminals for M-bus: MBUS1 MBUS2

① 1 A fast blow fuse.

Cable dimensions and tightening torque

Cables dimensions	COMM / Pulse	0.5~2.5mm²
	Voltage / Current / Aux. supply	1.5~2.5mm²
Tightening torque	COMM / Pulse	0.4Nm
	Voltage / Current / Aux. supply	0.4Nm

Declaration of Conformity for the MID approved version meter only

Certificate of conformity with MID Directive.

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