Energy Meter

EM Energy Meter

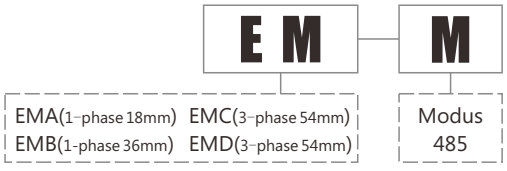
Leading Manufacturer Protects Solar Power Safety

Rev2.0 2022/12/27

EM Energy Meter

• Today, energy costs are impacting more and more importantly on the budgeting of any economic activity.
To ensure optimum energy efficiency, the only way is by measuring the energy consumption of different loads in departments, offices, and so on.For a simple house, the need is to check and prove its efficiency class by calculating and allocating the correct energy costs for heating and/or heat pump, whereas for a big building such as a hospital, a detailed energy profile of each ward or department and of each service (lifts, HVAC,heating, gas distribution system) is required.
The cost of manufacturing goods is also higher than ever,therefore measuring energy consumption in different types of production means that costs can be allocated and controlled in a more accurate manner.

• The EM Series are very easy and straightforward to use. The exclusive TOUCH TECH display allows a greater and more rational use of available space, wear-free operation, and very simple access to all the available data, the set parameters and the programming procedure.



The ten advantages of the EM

- Innovative and unique touch display
- LCD display with 7 to 8 digits according to the different models. Up to 3 variables in a single page. Active and reactive energy, active,reactive and apparent power, power demand and peak, currents, voltages, power factors and frequency are available.
- LCD backlight with self-switching off
- Single-phase energy analysers with extended direct current inputs from 45A to 100A
- Single-phase energy analysers with RS485 Modbus communication
- Integrated M-Bus communication
- Single-phase energy meter with electromechanical display
- Dual tariff management
- Only a two DIN modules housing for a three-phase energy analyser with external current transformer connection
- Only a three DIN modules housing for a three-phase direct connection energy analyser

TOUCH TECH display

- The EM are the first energy analysers in the market to have the TOUCH TECH system, a display-integrated touch key-pad. The TOUCH TECH display makes page scrolling and programming simpler and more straightforward, avoiding all the issues related to mechanical keys. In this way the LCD area, backlit after the first touch, can display a complete set of variables and data.

Compact size, extended current inputs

- Thanks to their innovative measuring technique, the EM can manage a high direct current in a very compact housing, with an extended accuracy range.The nominal current of the 1-DIN module-housing EMAM is 45A; EMBM can reach 100A (1-phase) in just 2-DIN modules, EMDM up to 65A (3-phase) in a 3-DIN modules. The EMCM is a compact 3-phase analyser by external current transformers.

Developed to communicate

- Together with accurate measurement and a clear data display, communication is the most valuable benefit of the EM. The energy analysers are available with an integrated Modbus RTU or M-bus port. External M-bus gateways are no longer needed.All the energy data and instantaneous values can be easily read by any supervisory system using the same driver for all the models of the EM Series.The EM can also be optionally equipped with a pulse output to retransmit the consumed active energy to a supervisory PLC.

class 1 single-phase bidirectional and dual-tariff energy meters

EMAM 120V or 240V; 45 A direct connection Backlit LCD display, 7-digit, Pulse output, Modbus RTU or M-bus port Digital input for dual tariff management 1-DIN module.

EMBM 120V or 240V; 100 A direct connection Backlit LCD display, 8-digit, Pulse output, Modbus RTU or M-bus port Digital input for dual tariff management 2-DIN module.

class 1 three-phase bidirectional and dual-tariff energy meters

EMCM 220V or 400VLL; 5 A CT connection Backlit LCD display, 3x8-digit Pulse output, Modbus RTU or M-bus port Digital input for dual tariff management 2-DIN module.

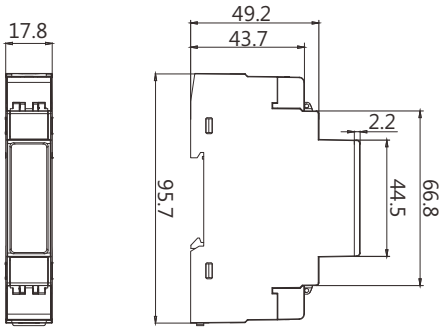
EMDM 220V or 400VLL; 65 A direct connection Backlit LCD display, 3x8-digit Pulse output, Modbus RTU or M-bus port Digital input for dual tariff management 3-DIN module.

Type EMAM

Description of Drawing Parameters

Product Benefits

- Single phase energy analyzer
- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Accuracy ±0.5% RDG (current/voltage)
- Direct current measurement up to 45AAC
- Backlit LCD display with integrated touch key-pad
- Energy readout on display: 6 digit
- Variable readout on display: 2 digit
- Energy measurement: kWh ; kWh+by 2tariffs
- System variables, kW, kvar, V, A, PF, Hz, kWdmd, kWdmd peak
- Self power supply
- Dimensions: 1-DIN module
- Protection degree (front): IP51
- RS485 Modbus port



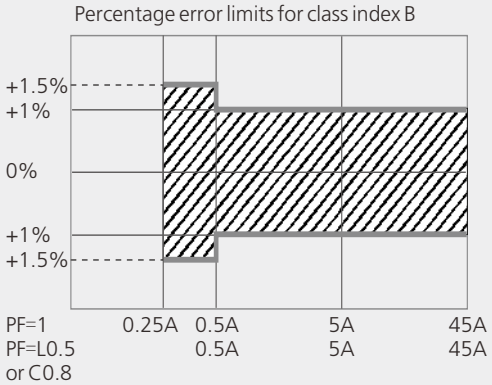
Product Application

• Single-phase energy analyzer with backlit LCD display with integrated touch keypad. Particularly indicated for active energy metering and for cost allocation in applications up to 45 A (direct connection), with dual tariff management availability. It can measure imported and exported energy or be programmed to consider only the imported one. Housing for DIN-rail mounting, with IP51 front degree protection.The meter with RS485 communication.

Accuracy

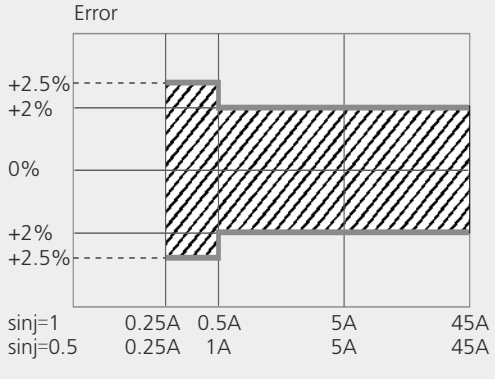
According to EN50470-3 and EN62053-23

• kWh



Class 1 accuracy limits (Active energy)
5(45)A Start-up current: 20mA

• kvarh, accuracy (RDG) depending on the current



Class 2 accuracy limits (Reactive energy)
5(45)A Start-up current: 20mA

Input specifications

• Rated Inputs

Current type	1-phase loads direct connection
Current range	5(45)A
Nominal voltage	220VLN AC (AV8 option)

• Accuracy

(@20°C ±5°C, R.H. 60%, 45 to 65 Hz)	
AV8	220V
Energies Active energy	Class 1 according to EN62053-21 Class B (Class B (kWh) according to EN50470-3)
Reactive energy	Class 2 according to EN62053-23
Start-up current	20mA (AV8) -20mA (Av8) positive or negative Self-consumption is not measured.
Start-up voltage	161VLN (AV8)

• Voltage Overloads

Continuous For 500ms	1.2 Un
Overload	In case a voltage iserroneously applied to the digital input, the input is not damaged up to

• Current overloads

Continuous For 10ms	45A @50Hz 1350A

• Resolution

	Display/serial communication
Current	0.001 A
Voltage	0.01 V
Power	0.01 kW or kVar
Frequency	0.1Hz
PF	0.01
Energies (positive)	0.01 kWh or kvarh
Energies (negative)	0.01 kWh or kvarh

• Energy additional errors

Influence quantities	According to EN62053-21
Temperature drift	⩽200ppm/°C
Sampling rate	4096samples/s @50Hz 4096samples/s @60Hz

• Digital inputs

	Free of voltage contact Tariff
Function	management (switch between t1-t2)
Number of inputs	1
Contact measurement voltage	5 V
Contact resistance	1kohm close contact 100kohm open contact

• Display and touch key-pad

Type	Backlit LCD 8-digit, h 4.5 mm
Read-out	Energy: 6digit Variables: 2digit
Touch key	1UP
Max. and Min. indication	Max. 999 999.99 Min. 0.00
Memory energy storage Energy	10^1 cycles Energy value is saved every time the less significant digit increases
Programming parameters	10^10 cycles. When a parameter is modified, only the relevant memory cell is overwritten
LEDs	Flashing red light pulses according to EN50470-3 EN62052-11 1600 imp./kWh (min. period: 80ms, max. frequency: 11 Hz) of X option

• Input impedance

Voltage input 220VL-N	1.2 Mohm
Voltage input	1.2 Mohm
Current input 5(45) A	< 0.5 VA

Output specifications

Description of Parameters

• RS485 serial port

	Rs485 by screw connection.
Function	For communication of measured data programming
Protocol	ModBus RTU (slave function)
Baud rate	1.2 , 2.4 , 4.8 , 9.6 kbaud,
Address Driver input	1 to 247 (default: 01) 1/8 unit load.
capability	Maximum 247 transceivers on the same bus.
Data refresh time	1sec
Read command	50 words available in 1 read command
Rx/Tx indication	Rx segment on display is shown when a valid Modbus command is sent to that specific meter Tx segment on display is shown when a valid Modbus reply is sent back to the master

General specifications

Parameter introduction

• Operating temperature

−20 to +70 °C, indoor,(R.H. from 0 to 90% non-condensing @ 40°C)	
Storage	−25°C to +80°C (R.H. < 90% non-condensing @ 40°C)
Overvoltage category	Cat. III
Insulation (for 1 minute)	4000 VAC RMS between measuring inputs and digital/ serial output (see table) 4000 VAC RMS
Dielectric strength	4000 VAC RMS for 1 minute

• Housing

Dimensions	17,8 x 95.5 x 65mm
Material	Noryl self-extinguishing: UL 94 V-0
Sealing covers	Included
Mounting	DIN-rail
Weight	Approx. 80 g (packing included)

• EMC

	According to EN62052-11
Electrostatic discharges	15kV air discharge
Immunity to irradiated electromagnetic fields	Test with current: 10V/m from 80 to 2000MHz; Test without any current: 30V/m from 80 to 2000MHz;
Burst	On current and voltage measuring inputs circuit: 4kV
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz
Surge	On current and voltage measuring inputs circuit: 4kV
Radio frequency	According to CISPR 22

• Self power supply

Av8	220VAC VL-N -30% +20% 50 Hz

• Standard compliance

Safety	EN62052-11
Metrology	EN62053-21 EN50470-3

• Connections

Cable cross-section area	Measuring inputs: max. 6 mm² with/without metallic cable ferrule; Max. screw tightening torque: 1.1 Nm
Other terminals	1.5 mm² Min./Max. screws tightening torque: 0.4 Nm

• Protection degree

Front	Ip51
Screw terminals (cable inputs)	Ip20

• Power consumption

⩽ 1.0W, ⩽ 8VA

Insulation (for 1 minute)

Between inputs and outputs

	• Measuring input	• Digital or serial output	• Digital input
Measuring input	-	4 kV	4 kV
Digital or serial output	4 kV	-	-
Digital input	4 kV	-	-

MID compliance

PF option only

Accuracy	0.9 Un ⩽ U ⩽ 1.1 Un; 0.98 fn ⩽ f ⩽ 1.02 fn; fn: 50 Hz; cosj: 0.5 inductive to 0.8 capacitive. Class BConsidering listed Ib or In values
Operating temperature	−25 to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C)
EMC compliance	E2
Mechanical compliance	M2

Display pages

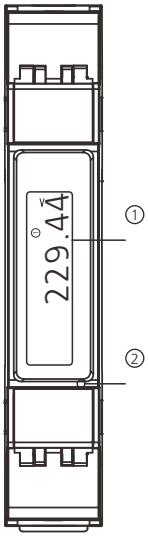
Display content introduction

• NO	• Variable
1	Total kWh
2	Total kWh+ (positive)
3	Total kWh- (exported)
4	Total kvarh
5	Total kvarh+ (positive)
6	Total kvarh- (negative)
7	Peak power kWh+ (positive) T1
8	Peak power kWh+ (positive) T2
9	Peak power kWh+ (positive) T3
10	Peak power kWh+ (positive) T4
11	V
12	A

• NO	• Variable
13	Hz
14	kW
15	kvar
16	kva
17	PF
18	CODE
19	IMP
20	Serial number
21	Communication address
22	Baud rate
23	Software version

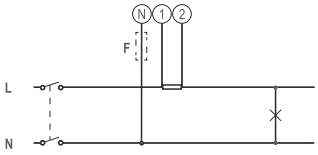
Wiring diagrams

Drawing introduction

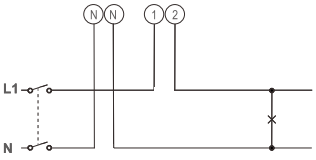


1. Display
Backlit LCD display with touch key-pad.
Upper part: enter
2. LED
LED proportional to kWh reading

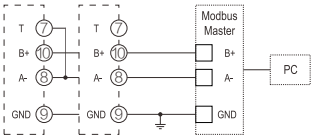
1-ph, 2-wire (F 315mA)



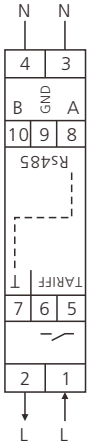
1-ph, 2-wire



Rs485 Modbus communication port



Interface diagram



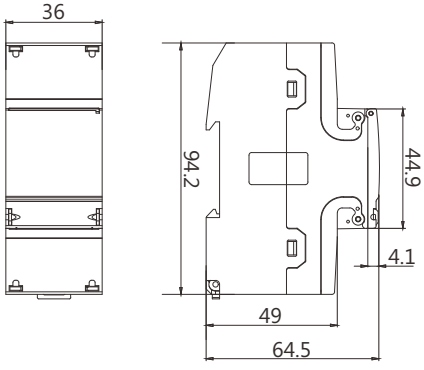
Tariff for choice

Type EMBM

Description of Drawing Parameters

Product Benefits

- Single phase energy analyzer
- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Accuracy ±0.5% RDG (current/voltage)
- Direct current measurement up to 100AAC
- Backlit LCD display (3x 8-digit) with integrated touch key-pad
- Energy readout on display: 6 digit
- Variable readout on display: 2 digit
- Energy measurement: kWh and kvarh (imported/exported); kWh+ by 2 tariffs
- System variables, kW, kvar, V, A, PF, Hz, kWdmd, kWdmd peak
- Dimensions: 2-DIN module
- Pulse output (optional, by open collector PNP)
- RS485 Modbus port (optional)
- M-bus port (optional)



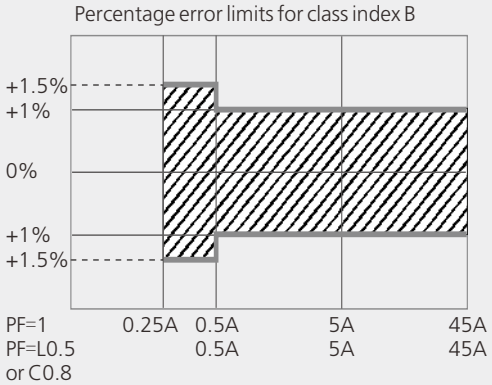
Product Application

- Single-phase energy analyzer with backlit LCD display with integrated touch keypad. Particularly indicated for active energy metering and for cost allocation in applications up to 100 A (direct connection), with dual tariff management availability. It can measure imported and exported energy or be programmed to consider only the imported one. Housing for DIN-rail mounting, with IP51 front degree protection.The meter with RS485 communication.

Accuracy

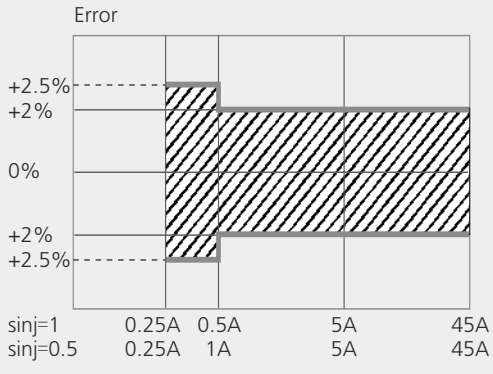
According to EN50470-3 and EN62053-23

• kWh



Class 1 accuracy limits (Active energy)
5(100)A Start-up current: 40mA

• kvarh, accuracy (RDG) depending on the current



Class 2 accuracy limits (Reactive energy)
5(100)A Start-up current: 40mA

Input specifications

• Rated Inputs

Current type	1-phase loads direct connection
Current range	5(100)A
Nominal voltage	220VLN AC

• Accuracy

(@25°C ±5°C, R.H. 60%, 45 to 65 Hz)	
Energies Active energy	Class 1 according to EN62053-21 Class B (Class B (kWh) according to EN50470-3)
Reactive energy	Class 2 according to EN62053-23
Start-up current	20mA positive or negative Self-consumption is not measured.
Start-up voltage	161VLN

• Voltage Overloads

Continuous For 500ms	1.2 Un
Overload	In case a voltage iserroneously applied to the digital input, the input is not damaged up to

• Input impedance

Voltage input 220VL-N	1.2 Mohm
Voltage input 120VL-N	1.2 Mohm
Current input 5(100) A	< 1.25 VA

• Resolution

	Display/serial communication
Current	0.001 A
Voltage	0.01 V
Power	0.01 kW or kVar
Frequency	0.1Hz
PF	0.01
Energies (positive)	0.01 kWh or kvarh
Energies (negative)	0.01 kWh or kvarh

• Energy additional errors

Influence quantities	According to EN62053-21
Temperature drift	⩽200ppm/°C
Sampling rate	4096samples/s @50Hz 4096samples/s @60Hz

• Digital inputs

	Free of voltage contact Tariff
Function	management (switch between 7-8)
Number of inputs	1
Contact measurement voltage	5 V
Contact resistance	≥ 1kohm close contact 100kohm open contact

• Display and touch key-pad

Type	Backlit LCD.3 rows by 8-digit each, h4.5mm
Read-out	Energy: 5digit Variables: 4digit
Touch key	2 (Enter and UP).
Max. and Min. indication	Max. 99 999 999 Min. 0.01
Variables	Max. 9999 Min. 0.01
Memory energy storage Energy	10^10 cycles Energy value is saved every time the less significant digit increases
Programming parameters	10^10 cycles. When a parameter is modified, only the relevant memory cell is overwritten
LEDs	Flashing red light pulses according to EN50470-3 EN62052-11 1000 imp./kWh (min. period: 80ms, max. frequency: 11 Hz) Fix orange light: wrong current direction only with PFB option or with "B" measurement selection in case of X option

• Current overloads

Continuous For 10ms	100A @50Hz 3000A

Output specifications

Description of Parameters

• RS485 serial port

	Rs485 by screw connection.
Function	For communication of measured data programming
Protocol	ModBus RTU (slave function)
Baud rate	1.2 , 2.4 , 4.8 , 9.6 kbaud,
Address Driver input	1 to 247 (default: 01) 1/8 unit load.
capability	Maximum 247 transceivers on the same bus.
Data refresh time	1sec
Read command	50 words available in 1 read command
Rx/Tx indication	Rx segment on display is shown when a valid Modbus command is sent to that specific meter Tx segment on display is shown when a valid Modbus reply is sent back to the master

General specifications

Parameter introduction

• Operating temperature

−20 to +70 °C, indoor,(R.H. from 0 to 90% non-condensing @ 40°C)	
Storage	−25°C to +80°C (R.H. < 90% non-condensing @ 40°C)
Overvoltage category	Cat. III
Insulation (for 1 minute)	4000 VAC RMS between measuring inputs and digital/ serial output (see table) 4000 VAC RMS
Dielectric strength	4000 VAC RMS for 1 minute

• Weight

Approx. 160 g (packing included)

• Housing

Dimensions	36 x 94 x 65mm
Material	Noryl self-extinguishing: UL 94 V-0
Sealing covers	Included
Mounting	DIN-rail
EMC	According to EN62052-11

• Standard compliance

Safety	EN62052-11
Metrology	EN62053-21 EN50470-3
Approvals	CE, MID (PF option only), cULus (AV1 option only)

• Power consumption

1.0W, 8VA

• Connections

Cable cross-section area	Measuring inputs: max. 25mm², min. 5mm² with/without metallic cable ferrule; Max. screw tightening torque: 2.8 Nm
Other terminals	1.5 mm² Min./Max. screws tightening torque: 0.5 Nm

• Protection degree

Front	Ip51
Screw terminals (cable inputs)	Ip20

• Self power supply

Av8	230VAC VL-N -30% +20% 50 Hz

Insulation (for 1 minute)

Between inputs and outputs

	• Measuring input	• Digital or serial output	• Digital input
Measuring input	-	4 kV	4 kV
Digital or serial output	4 kV	-	0 kV
Digital input	4 kV	0 kV	-

MID compliance

PF option only

Accuracy	0.9 Un U 1.1 Un; 0.98 fn f 1.02 fn; fn: 50 Hz; cosj: 0.5 inductive to 0.8 capacitive. Class B Considering listed Ib or In values
Operating temperature	−25 to +55°C (-13°F to 131°F) (R.H. from 0 to 90% non-condensing @ 40°C)
EMC compliance	E2
Mechanical compliance	M2

Display pages

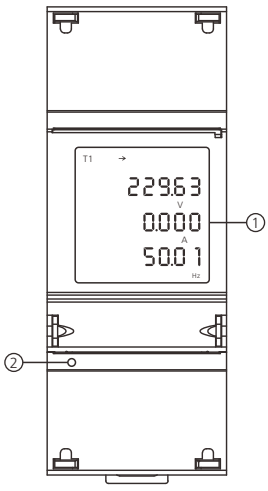
Display content introduction

• NO	• Variable
1	Total kWh
	Total kWh+ (positive)
	Total kWh- (exported)
2	Total kvarh
	Total kvarh+ (positive)
	Total kvarh- (negative)
3	Peak power kWh+(positive) T1
	Peak power kvarh+ (positive) T1
4	Peak power kWh+ (positive) T2
	Peak power kvarh+ (positive) T1
5	U
	A
	Hz

• NO	• Variable
6	kW
	Kvar
	Kva
7	PF
	CODE
	IMP
8	Communication address
	Baud rate
9	Software version
	Serial number

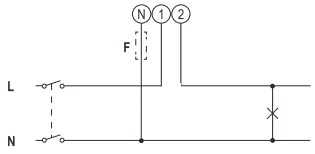
Wiring diagrams

Drawing introduction

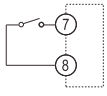


1. Display
Backlit LCD display with touch key-pad.
Upper part: enter
2. LED
LED proportional to kWh reading

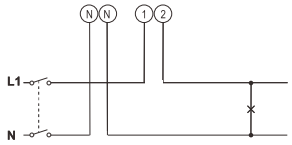
1-ph, 2-wire (F 315mA)



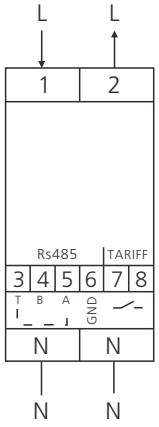
Tariff for choice



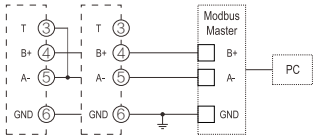
1-ph, 2-wire



Interface diagram



Rs485 Modbus communication port

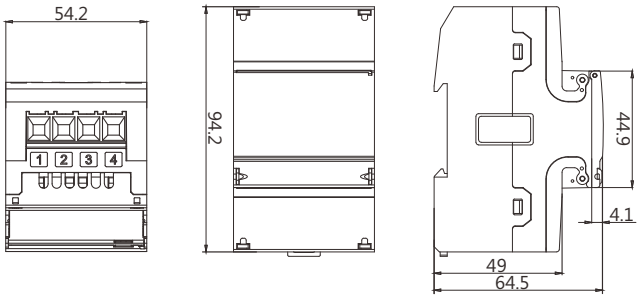


Type EMCM

Description of Drawing Parameters

Product Benefits

- Three phase energy meter
- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Accuracy ±0.5% RDG (current/voltage)
- Current measurement via CT
- Backlit LCD display (3x 8-digit)
- Energy readout on display: 6 digit
- Variable readout on display: 2 digit
- Energy measurement: kWh and kvarh (imported/exported); kWh per phase
- System variables: kW, kvar, kVA, VLN, PF, Hz
- Phase variables: kW, kvar, kVA, VLN, A, PF
- Auxiliary power supply
- Dimensions: 3-DIN module
- Protection degree (front): IP51
- RS485 Modbus port



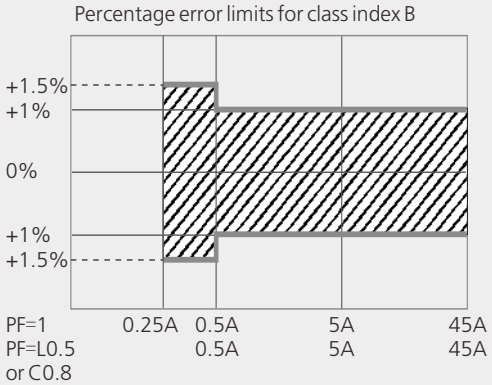
Product Application

- Three-phase energy meter with backlit LCD display. Particularly indicated for active energy metering and for cost allocation (CT connection)with dual tariff management availability. It can measure imported and exported energy or be programmed to consider only the imported one. Housing for DIN-rail mounting, with Ip51 front degree protection. The meter is optionally provided with pulse output proportional to the active energy being measured.

Accuracy

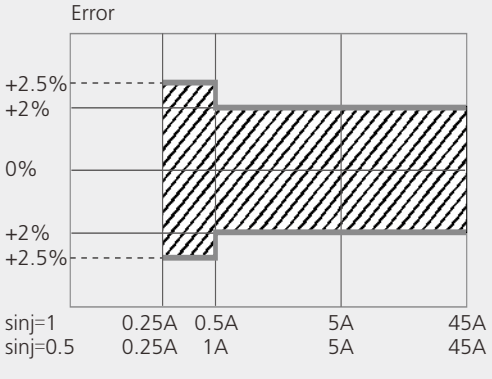
According to EN50470-3 and EN62053-23

• kWh



Class 1 accuracy limits (Active energy)
5(45)A Start-up current: 20mA

• kvarh, accuracy (RDG) depending on the current



Class 2 accuracy limits (Reactive energy)
5(45)A Start-up current: 20mA

Input specifications

• Accuracy

(@25°C ±5°C, R.H. ⩽60%, 45 to 65 Hz)	
Av5	AV5: Imin=0.25A; In: 5A, Imax: 6A; Un: 230 to 277 VLN (400 to 480 VLL)
Current	From 0.04In to 0.2In: ±(0.5%RDG+1DGT) From 0.2In to Imax: ±(0.5%RDG)
Phase-neutral voltage	In the range Un: ±(0.5% RDG)
Phase-phase voltage	In the range Un: ±(1% RDG)
Frequency	Range: 45 to 65Hz.
Active power	From 0.05 In to Imax, within Un range, PF= 1: ±(1% RDG) From 0.1 In to Imax, within Un range, PF=0.5L or 0.8C: ±(1% RDG)
Power factor	±[0.001+1% (1.000 - "PF RDG")]
Reactive power	From 0.05 In to Imax, within Un range, sinphì=1: ±(2% RDG) From 0.1 In to Imax, within Un range, sinphì=0.5L or 0.8C: ±(2% RDG)
Energies Active energy	Class 1 according to EN62053-21 and MID Annex MI-003 Class B(Class B (kWh) according to EN50470-3)
Reactive energy	Class 2 according to EN62053-23
Start-up current	10mA
Start-up voltage	90VLN

• Digital inputs

	Free of voltage contact Tariff management (switch between t1-t2)
Function	
Number of inputs	1

• Resolution

	Display/serial communication
Current	0.001 A
Voltage	0.01 V
Power	0.001 kW or kVar
Frequency	0.01Hz
PF	0.01
Energies (positive)	0.01 kWh or kvarh
Energies (negative)	0.01 kWh or kvarh

• Energy additional errors

Influence quantities	According to EN62053-21
Temperature drift	⩽200ppm/°C
Sampling rate	6400samples/s @50Hz

• Input impedance

230VL-N	1.2 Mohm
5(45) A	< 0.5 VA

• Rated Inputs

Current type	3-phase loads, CT connection5(6)A
Current range	AV5: 400 to 480 VLL ac
Nominal voltage	AV5: 1000

• Voltage Overloads

Continuous For 500ms	1.2 Un 2 Un

• Digital inputs

Contact	5V
Input impedance Contact resistance	1kohm ⩽1kohm, close contact ⩾100kohm, open contact

• Display and touch key-pad

Type	Backlit LCD,3 rows by 8-digit each, h 7 mm
Read-out	Energy: 6digit Variables: 2digit
Touch key	3 (down.enter and up)
Max. and Min. indication	Max. 999 999.99 Min. 0.01
Variables	Max. 9999999.99 Min. 0.01
Memory energy storage Energy	10^12 cycles Energy value is saved every time the less significant digit increases
Programming parameters	10^12 cycles. When a parameter is modified, only the relevant memory cell is overwritten

• LEDs

Flashing red light pulses	Proportional to the product of the CT and VT ratios
Weight (pulses/kWh)	12000 (CT x VT)
Duration	80ms
Fix orange light	wrong current direction (only with PFB option or with "B" measurement selection in case of X option)

• Current overloads

Continuous For 500ms	6A, @ 50Hz 5 In

• Overload

In case a voltage iserroneously applied to the digital input, the input is not damaged up to 30 VAC/DC

• Output specifications RS485 serial port

	Rs485 by screw connection.
Function	For communication of measured data programming
Protocol	ModBus RTU (slave function)
Baud rate	1.2 , 2.4 , 4.8 , 9.6 kbaud,
Address Driver input	1 to 247 (default: 01) 1/8 unit load.
capability	Maximum 247 transceivers on the same bus.
Data refresh time	1sec
Read command	50 words available in 1 read command
Rx/Tx indication	Rx segment on display is shown when a valid Modbus command is sent to that specific meter Tx segment on display is shown when a valid Modbus reply is sent back to the master

General specifications

Parameter introduction

• Operating temperature

−25 to +65 °C, indoor,(R.H. from 0 to 90% non-condensing @ 40°C)	
Storage	−30°C to +80°C (R.H. < 90% non-condensing @ 40°C)
Overvoltage category	Cat. III
Insulation (for 1 minute)	4000 VAC RMS between measuring inputs and digital/ serial output (see table) 4000 VAC RMS
Dielectric strength	4000 VAC RMS for 1 minute

• Housing

Dimensions	54 x 94 x 65mm
Material	Noryl self-extinguishing: UL 94 V-0
Sealing covers	Included
Mounting	DIN-rail

• EMC

	According to EN62052-11
Electrostatic discharges	15kV air discharge
Immunity to irradiated electromagnetic fields	Test with current: 10V/m from 80 to 2000MHz; Test without any current: 30V/m from 80 to 2000MHz;
Burst	On current and voltage measuring inputs circuit: 4kV
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz
Surge	On current and voltage measuring inputs circuit: 4kV
Radio frequency	According to CISPR 22

• Protection degree

Front	Ip51

• Standard compliance

Safety	EN62052-11
Metrology	EN62053-21 EN50470-3
Approvals	CE, MID (PF option only), cULus (AV7 option only)

• Connections

Cable cross-section area	Measuring inputs: max. 4 mm² with/without metallic cable ferrule; Max. screw tightening torque: 0.6 Nm
Other terminals	1.5 mm² Min./Max. screws tightening torque: 0.4 Nm

• Weight

Approx. 240 g (packing included)

Display pages

Display content introduction

• NO	• display contents	• display format
1	total active energy	The first line: Absolute energy The second line: positive energy The third line: reverse energy
2	Total reactive energy	
3	Phase A active energy	
4	Phase A reactive energy	
5	Phase B active energy	
6	Phase B reactive energy	
7	Phase C active energy	
8	Phase C reactive energy	
9	Tariff 1	The second line: active positive power The third line: Reactive positive power
10	Tariff 2	
11	Total power	The first line: active power Second line: reactive power The third line: Apparent power
12	Phase A power	
13	Phase B power	
14	Phase C power	
15	Phase A eletrical parameter	First line: voltage Second line: current The third line: power factor
16	Phase B eletrical parameter	
17	Phase C eletrical parameter	
18		First line: grid frequency / Second line: total power factor / Third line: constant
19		Second line: Modbus address / The third line: baud rate
20		Second line: version number / Third line: serial number

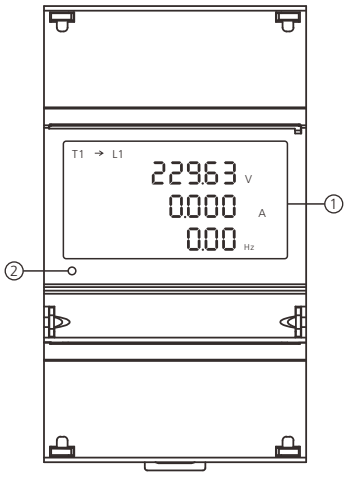
Insulation (for 1 minute)

Between inputs and outputs

	• Measuring input	• Digital or serial output	• Digital input
Measuring input	-	4 kV	4 kV
Digital or serial output	4 kV	-	0 kV
Digital input	4 kV	0 kV	-

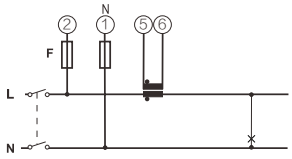
Wiring diagrams

Drawing introduction

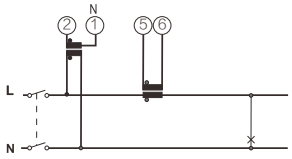


1. Display
Backlit LCD display
2. LED
LED proportional to kWh reading

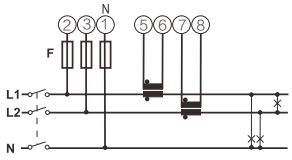
1-ph, 2-wire



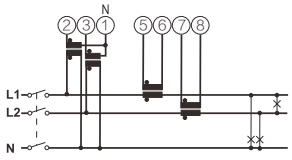
1-ph, 2-wire



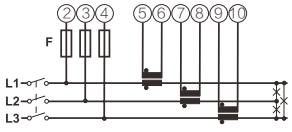
2-ph, 3-wire



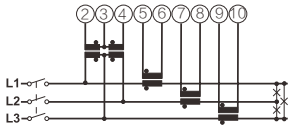
2-ph, 3-wire



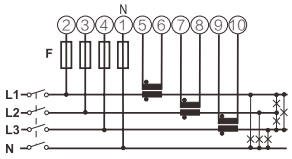
3-ph, 3-wire, unbalanced load



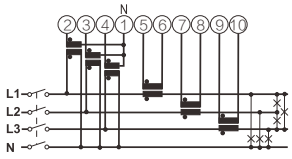
3-ph, 3-wire, unbalanced load



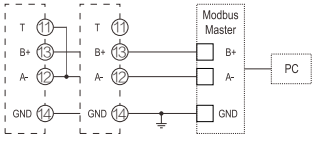
3-ph, 4-wire, unbalanced load



3-ph, 4-wire, unbalanced load



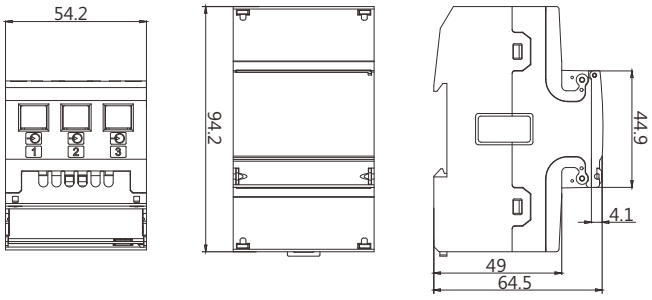
Rs485 Modbus communication port



Tariff for choice

Type EMDM

Description of Drawing Parameters



Product Benefits

- Three phase energy meter
- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Accuracy ±0.5% RDG (current/voltage)
- Direct current measurement up to 65AAC
- Backlit LCD display (3x 8-digit)
- Energy readout on display: 6 digit
- Variable readout on display: 2 digit
- Energy measurement: kWh and kvarh (imported/exported); kWh per phase
- System variables: kW, kvar, kVA, VLN, PF, Hz
- Phase variables: kW, kvar, kVA, VLN, A, PF
- Self power supply
- Dimensions: 3-DIN module
- Protection degree (front): IP51
- RS485 Modbus port (optional)

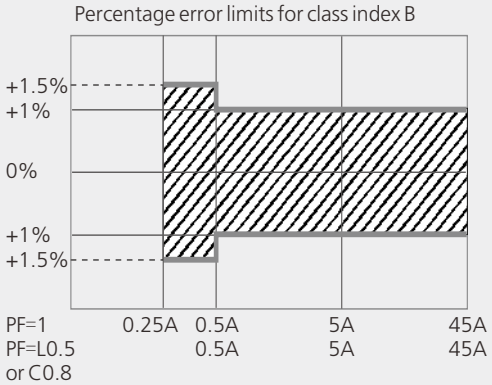
Product Application

- Three-phase energy meter with backlit LCD display . Particularly indicated for active energy metering and for cost allocation (CT connection)with dual tariff management availability. It can measure imported and exported energy or be programmed to consider only the imported one. Housing for DIN-rail mounting, with Ip51 front degree protection. The meter is optionally provided with proportional to the active energy being measured. The meter with Rs485 communication

Accuracy

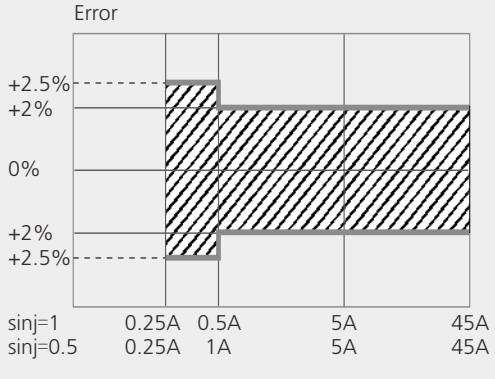
According to EN50470-3 and EN62053-23

• kWh



Class 1 accuracy limits (Active energy)
5(65)A Start-up current: 20mA

• kvarh, accuracy (RDG) depending on the current



Class 2 accuracy limits (Reactive energy)
5(65)A Start-up current: 20mA

Input specifications

• Rated Inputs

Current type	3-phase loads, direct connection
Current range	5(65)A
Nominal voltage	208 to 400 VLL AC

• Display and touch key-pad

Type	Backlit LCD,3 rows by 8-digit each, h 7 mm
Read-out	Energy: 6digit Variables: 2digit
Touch key	2 (down.enter and up)
Max. and Min. indication	Max. 99 9999.99 Min. 0.01
Variables	Max. 999999.99 Min. 0.01
Memory energy storage Energy	10^6 cycles Energy value is saved every time the less significant digit increases
Programming parameters	10^6 cycles. When a parameter is modified, only the relevant memory cell is overwritten

• Current overloads

Continuous For 10ms	65A, @ 50Hz 8450A

• Voltage Overloads

Continuous For 500ms	1.2 Un 2 Un

• Overload

	In case a voltage iserroneously applied to the digital input, the input is not damaged up to 30 VAC/DC

• Resolution

	Display/serial communication
Current	0.001 A
Voltage	0.01 V
Power	0.001 kW or kVar
Frequency	0.01Hz
PF	0.01
Energies (positive)	0.01 kWh or kvarh
Energies (negative)	0.01 kWh or kvarh

• Energy additional errors

Influence quantities	According to EN62053-21
Temperature drift	⩽200ppm/°C
Sampling rate	6400samples/s @50Hz 6400samples/s @60Hz

• Input impedance

230VL-N/120VL-N	1.2 Mohm
5(45) A	< 1.25 VA

• Digital inputs

	Free of voltage contact Tariff
Function	management (switch between t1-t2)
Number of inputs	1
Contact	5V
Input impedance Contact resistance	1kohm ⩽1kohm, close contact ⩾100kohm, open contact

• Accuracy

	Imin=0.25A; Ib: 5A
Av5	Imax: 65A; Un: 113 to 265VLN (196 to 460VLL) Imin=0.25A; Ib: 5A Imax: 65A; from 208 to 400 VLL AC
Current	From 0.04Ib to 0.2Ib: ±(0.5%RDG+1DGT) From 0.2Ib to Imax: ±(0.5%RDG)
Phase-neutral voltage	In the range Un: ±(0.5% RDG)
Phase-phase voltage	In the range Un: ±(1% RDG)
Frequency	Range: 45 to 65Hz.
Active power	From 0.05 In to Imax within Un range PF=1:±(1% RDG) From 0.1 In to Imax within Un range PF=0.5L or 0.8C: ±(1% RDG)
Power factor	±[0.001+1% (1.000 - "PF RDG")]
Reactive power	From 0.05 In to Imax within Un range sinphì=1: ±(2% RDG) From 0.1 In to Imax
	within Un range sinphì=0.5L or 0.8C: ±(2% RDG)
Energies Active energy	Class 1 according to EN62053-21 Class B (Class B (kWh) according to EN50470-3)
Reactive energy	Class 2 according to EN62053-23
Start-up current	20mA Self-consumption is not measured
Start-up voltage	90VLN

• Output specifications RS485 serial port

	Rs485 by screw connection.
Function	For communication of measured data programming
Protocol	ModBus RTU (slave function)
Baud rate	1.2 , 2.4 , 4.8 , 9.6 kbaud,
Address Driver input	1 to 247 (default: 01) 1/8 unit load.
capability	Maximum 247 transceivers on the same bus.
Data refresh time	1sec
Read command	50 words available in 1 read command
Rx/Tx indication	Rx segment on display is shown when a valid Modbus command is sent to that specific meter Tx segment on display is shown when a valid Modbus reply is sent back to the master

General specifications

Parameter introduction

• Operating temperature

−20 to +70 °C, indoor,(R.H. from 0 to 90% non-condensing @ 40°C)	
Storage	−25°C to +80°C (R.H. < 90% non-condensing @ 40°C)
Overvoltage category	Cat. III
Insulation (for 1 minute)	4000 VAC RMS between measuring inputs and digital/ serial output (see table) 4000 VAC RMS
Dielectric strength	4000 VAC RMS for 1 minute

• Housing

Dimensions	54 x 94 x 65mm
Material	Noryl self-extinguishing: UL 94 V-0
Sealing covers	Included
Mounting	DIN-rail

• EMC

	According to EN62052-11
Electrostatic discharges	15kV air discharge
Immunity to irradiated electromagnetic fields	Test with current: 10V/m from 80 to 2000MHz; Test without any current: 30V/m from 80 to 2000MHz;
Burst	On current and voltage measuring inputs circuit: 4kV
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz
Surge	On current and voltage measuring inputs circuit: 4kV
Radio frequency	According to CISPR 22

• Protection degree

Front	IP51

• Standard compliance

Safety	EN62052-11
Metrology	EN62053-21 EN50470-3
Approvals	CE, MID (PF option only),

• Connections

Cable cross-section area	Measuring inputs: max. 16 mm² min. 2.5 mm² with/without metallic cable ferrule; Max. screw tightening torque: 2.8 Nm
Other terminals	1.5 mm² Min./Max. screws tightening torque: 0.4 Nm

• Weight Mounting

	Approx. 240 g (packing included)

Display pages

Display content introduction

• NO	• display contents	• display format
1	total active energy	The first line: Absolute energy The second line: positive energy The third line: reverse energy
2	Total reactive energy	
3	Phase A active energy	
4	Phase A reactive energy	
5	Phase B active energy	
6	Phase B reactive energy	
7	Phase C active energy	
8	Phase C reactive energy	
9	Tariff 1	The second line: active positive power The third line: Reactive positive power
10	Tariff 2	
11	Total power	The first line: active power Second line: reactive power The third line: Apparent power
12	Phase A power	
13	Phase B power	
14	Phase C power	
15	Phase A eletrical parameter	First line: voltage Second line: current The third line: power factor
16	Phase B eletrical parameter	
17	Phase C eletrical parameter	
18		First line: grid frequency / Second line: total power factor / Third line: constant
19		Second line: Modbus address / The third line: baud rate
20		Second line: version number / Third line: serial number

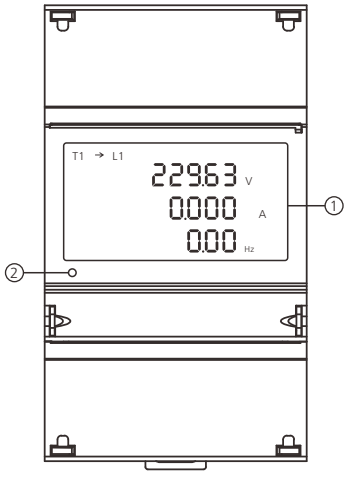
Insulation (for 1 minute)

Between inputs and outputs

	• Measuring input	• Digital or serial output	• Digital input
Measuring input	-	4 kV	4 kV
Digital or serial output	4 kV	-	0 kV
Digital input	4 kV	0 kV	-

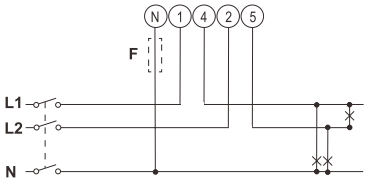
Wiring diagrams

Drawing introduction

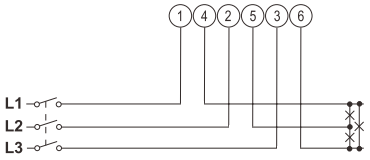


1. Display
Backlit LCD display
2. LED
LED proportional to kWh reading

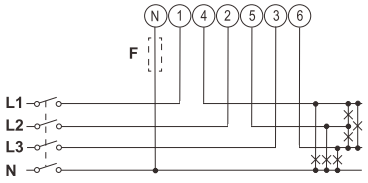
Two-phase system, 3-wire (F 315mA)



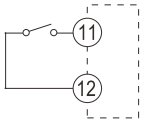
Three-phase system, 3-wire.



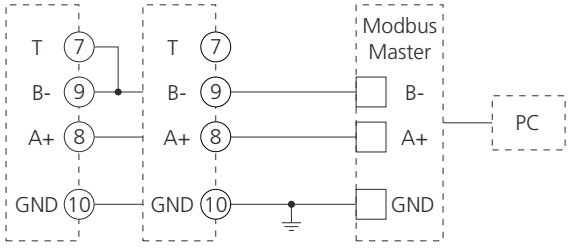
Three-phase system, 4-wire. (F 315mA)



Tariff for choice



Rs485 Modbus communication port



Additional instruments with RS485 are connected in parallel. The serial output must only be terminated on the last network device connecting terminals A- and T. For connections longer than 1000 m use a signal repeater. Maximum 247 transceivers on the same bus.