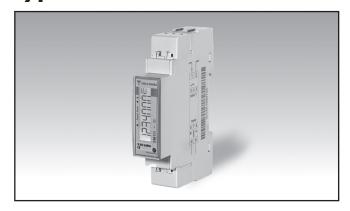
Energy Management Energy Analyzer Type EM111





- M-Bus port (optional)
- Digital input (for tariff management)
- Easy connection or wrong current direction detection
- Certified according to MID Directive (option PF only): see "how to order" below

- · Single phase energy analyzer
- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Accuracy ±0.5% RDG (current/voltage)
- Current measurement via CT up to 300 A (AV5)
- Rated primary current: 32 A (AV7, AV8)
- Max primary current: 45 A (AV7, AV8)
- Max cable cross section: 6 mm²
- · Backlit LCD display with integrated touch key-pad
- Energy readout on display: 7 digit
- · Variable readout on display: 4 digit
- Energy measurement: kWh and kvarh (imported/ exported); kWh+ by 2 tariffs
- System variables, kW, kvar, V, A, PF, Hz, kWdmd, kWdmd peak
- Self power supply
- Dimensions: 1-DIN module
- Protection degree (front): IP51
- Pulse output (optional, by open collector PNP)
- RS485 Modbus port (optional)

Product description

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 32 A (direct connection) or up to 300 A (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, RS485 Modbus port or M-Bus port.

Certified according to MID Directive, Module B and Module D of Annex II, for legal metrology relevant to active electrical energy meters (see Annex V, MI003, of MID). Can be used for fiscal (legal) metrology.

How to order EM111-DIN AV8 1 X O1 PF B

Model —	 ΤT
Range code ———	
System —	
Power supply ——	
Output —	
Option —]
Magauramant	

Type Selection

Range code		Syst	System Power supply		Output		
AV8:	230VLN AC - 5(45)A (Direct connection up to 32 A)	1:	1-phase 2-wire	X:	Self power supply	O1: S1: M1:	pulse output RS485 Modbus port M-Bus port

Option

F: Certified according to MID Directive. Can be used for fiscal (legal) metrology.

Measurement

- A: The power is always integrated (both in case of positive imported and negative exported power) and the total energy meter is certified according to MID. Operating temperature: from -25 to +55°C/from -13 to +131°F
- **B:** Only the total positive energy meter is certified according to MID. Operating temperature: from –25 to +55°C/from –13 to +131°F
- **A70:** The power is always integrated (both in case of positive imported and negative exported power) and the total energy meter is certified according to MID. Operating temperature: from –25 to +70°C/from –13 to +158°F
- **B70:** Only the total positive energy meter is certified according to MID. Operating temperature: from –25 to +70°C/from –13 to +158°F

STANDARD

Not certified according to MID Directive. Cannot be used for fiscal (legal) metrology.

Type Selection

Rang	e code	Syst	tem	Pow	er supply	Outp	ut
AV8:	230VLN ac - 5(45)A (Direct connection up to 32 A)	1:	1-phase 2-wire	X:	Self power supply	01: S1:	pulse output RS485 Modbus port
AV7:	120VLN ac - 5(45) A (Direct connection up to 32 A). Available on request (MOQ 100 pcs)					М1:	M-Bus port
AV5:	230VLN ac - 5(6)A (CT connection), S1 output only						

Option -

Option

X: none

Input specifications

				2.224
Rated Inputs			PF	0.001
Current type			Energies (positive)	0.001 kWh or kvarh
	AV7, AV8	1-phase loads, direct	Energies (negative)	0.001 kWh or kvarh
		connection up to 32 A	Energy additional errors	
	AV5	1-phase loads, CT	Influence quantities	According to EN62053-21
		connection (5A)	Temperature drift	≤200ppm/°C
		Note: max CT ratio = 60	Sampling rate	4096 samples/s @ 50Hz
		(300 A)	-	4096 samples/s @ 60Hz
Nominal curren	it range	` '	Display and touch key-pad	
	AV7, AV8	5(45)A, lb 5 A, lmax 45 A,		Backlit LCD, 7-digit, h 6
	,	Imin 0.25 A	Туре	
	AV5	5 (6) A, In 5A, Imax 6 A,	Dead and	mm
	,,,,	Imin 0.25	Read-out	Energy: 7 digit. Variables: 4
Nominal voltage	۵	111111 0.20	-	digit
Norminal Voltage	AV5, AV8	230 VLN -30% +20 %	Touch key	2 (Enter/DOWN and UP).
	AV3, AV6 AV7	120 VLN -20% +20%	Max. and Min. indication	Max. 9 999 999
Nata	AVI			Min. 0.00
Note		EM111 with direct	Memory energy storage	
		connection (AV7, AV8) can	Energy	10^10 cycles. Energy value
		be used up to 45 A if a 6		is saved every time the less
		mm2 section wire complies		significant digit increases.
		with local regulations and/	Programming parameters	10^10 cycles. When a
		or installation needs.		parameter is modified, only
Accuracy				the relevant memory cell is
(@25°C ±5°C,	R.H. ≤60%,			overwritten
45 to 65 Hz)			LEDs	Flashing red light pulses
Energies				according to EN50470-3,
Active energy	V	Class 1 according to		EN62052-11
0.	,	EN62053-21	Pulse weight AV7, AV8	1000 pulses/kWh (min.
		Class B (kWh) according to	Fulse Weight AV1, AV0	period: 90ms, max.
		EN50470-3 (AV8 only)		
Reactive ene	erav	Class 2 according to	A) /F	frequency: 11 Hz)
redelive ene	199	EN62053-23	AV5	Depending on CT ratio:
Start-up curren	+	L1402000-20		CT ≤ 25: 1000 pulse/kWh
Start-up curren	AV7, AV8	20 mA, positive or negative		25 < CT < 60: 100 pulses/kWh
	AV7, AV6 AV5		Note	Fix orange light: wrong
	AVS	10 mA, positive or negative		current direction only with
		Self-consumption is not		PFB option or with "B"
01 1 11		measured.		measurement selection in
Start-up voltage				case of X option
	AV5, AV8	161 VLN	Current overloads	
	AV7	96 VLN	Continuous AV7, AV8	45 A
Resolution		Display	AV5	6 A
Current		0.1 A	For 10ms AV7, AV8	1350 A
Voltage		0.1 V	AV5	120 A
Power		0.01 kW or kVar	Voltage Overloads	
Frequency		0.1 Hz	Continuous	1.2 Un
PF		0.01	For 500ms	2 Un
Energies (posit	ive)	0.01 kWh or kvarh		2 0
Energies (nega	ıtive)	0.01 kWh or kvarh	Input impedance	0.0 M 1
	·	Serial communication	Voltage input	2.8 Mohm
Current		0.001 A	Current input	< 0.5 VA
Voltage		0.1 V		
Power		0.1 kW or kvar		
Frequency		0.1Hz		
. 104401109		5		

Digital input specifications

Digital inputs

Function

Number of inputs Contact measurement voltage Input impedance Contact resistance

Free of voltage contact Tariff management (switch between t1-t2)

1 5 V 1kohm

≤ 1kohm, close contact ≥ 100kohm, open contact Overload

In case a voltage is erroneously applied to the digital input, the input is not damaged up to 30 V ac/dc.

Output specifications

RS485 serial port	RS485 by screw	
	connection.	
Function	For communication	
	of measured data,	
	programming parameters	
Protocol	Modbus RTU (slave	
	function)	
Baud rate	9.6, 19.2, 38.4, 57.6, 115.2	
	kbaud, even or no parity,	
Address	1 to 247 (default: 1)	
Driver input capability	1/8 unit load. Maximum 247	
	transceivers on the same	
	bus.	
Data refresh time	1 s	
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	
M-Bus port	M-Bus by screw	
	connection.	
Function	For communication of	
	measured data	
Protocol	M-Bus according to	
	EN13757-3	
Baud rate	0.3, 2.4, 9.6 kbaud	
Meters in the M-Bus network	250	
Primary address	Selectable	
Secondary address	Univocally defined in each	
	unit	
Secondary address	from 50000000 to	
	6999999	

Other	Available functions: wild card, header, initialisation SND_NKE, and req_udr management. Managemen of primary address modification via M-Bus. VIF, VIFE, DIF and DIFE: see protocol not available with AV5 range code
Static output	
Purpose Pulse rate	For pulse output proportional to the active energy (kWh) Selectable in multiple of
	Max 1000 or 3000 pulses/kWh according to pulse ON duration
Pulse ON duration	Selectable: 30ms or 100 ms according to EN62052-31
Output type Load	open collector PNP V _{ON} 1 VDC max. 100mA V _{OEF} 80 VDC max.
Note	not available with AV5 range code

General specifications

Operating temperature PF option (standard or with		Metrology	EN62053-21, EN50470-3 (PF option only)
suffixes from 01 to 60)	From –25 to +55°C/from –13 to +131°F	Approvals	CE, MID (PF option only), cULus (AV7 option only)
PF option (with suffixes from 61 to 99)	From –25 to +70°C/from –13 to +158°F	Connections Cable cross-section area	Measuring inputs: max. 6 mm² with/without metallic cable ferrule: Max. screw
X option	From -25 to +65°C/from -13 to +149°F indoor, (R.H. from 0 to 90%	Other terminals	tightening torque: 1.1 Nm 1.5 mm², Min./Max. screws tightening torque: 0.4 Nm
Storage temperature	noncondensing @ 40°C) -30°C to +80°C (R.H. < 90% noncondensing @ 40°C)	Housing Dimensions (WxDxH) Material	17,5 x 63 x 91,5 mm PBT, self-extinguishing: UL 94 V-0
Overvoltage category	Cat. III	Sealing covers	Included
Insulation (for 1 minute)	4000 VAC RMS between	Mounting	DIN-rail
,	measuring inputs and	Protection degree	
	digital/serial output (see	Front	IP51
	table) 4000 VAC RMS	Screw terminals (cable inputs)	IP20
Dielectric strength	4000 VAC RMS for 1 minute	Weight	Approx. 80 g (packing included)
EMC	According to EN62052-11		
Standard compliance Safety	EN62052-11		

Power supply specifications

Power supply	self power supply	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	-	-

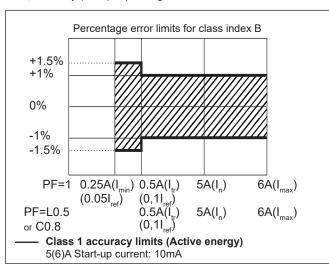
AV5 model	Voltage input	Serial output
CT input	2 kV	4 kV
Voltage input	-	4 kV

MID compliance (PF option only)

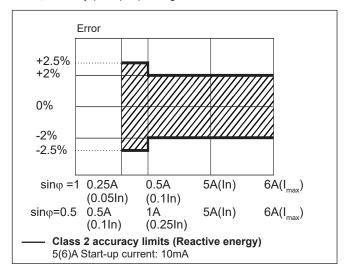
Accuracy	y 0.9 Un ≤ U ≤ 1.1 Un; 0.98 fn ≤ f ≤ 1.02 fn; fn: 50 Hz; cosφ: 0.5 inductive to 0.8 capacitive. Class B Considering listed lb or In values	
Operating temperature PF option (standard or with suffixes from 01 to 60): from -25 to +55°C/from -13 to +13 PF option (with suffixes from 61 to 99): from -25 to +70°C/from -13 to +158°F X option: from -25 to +65°C/from -13 to +149°F indoor (R.H. from 0 to 90% non-condensin 40°C)		
EMC compliance	E2	
Mechanical compliance	M2	

Accuracy (according to EN62053-21 and EN62053-23) - AV5 model

kWh, accuracy (RDG) depending on the current

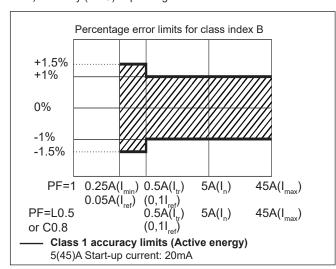


kvarh, accuracy (RDG) depending on the current

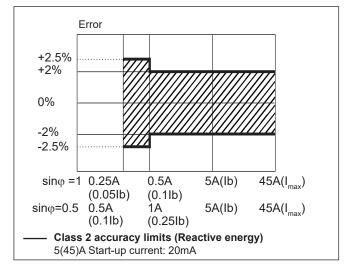


Accuracy (according to EN50470-3 and EN62053-23) - AV7/AV8 model

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



Display pages

No	Variable	"Full" mode	"Easy" mode	Note
0	kWh+ (imported)	Х	Х	In PF version (MID) this is the only certified energy meter. In PFA version and in X version with Measurement menu set to "A", this is considering the total energy without considering the current direction.
1	kWh- (exported)	X	X	In PFB version and in X version with Measurement menu set to "B"
2	kW	X	X	
3	V	Х	Х	
4	A	Х	Х	
5	PF	Х		
6	Hz	Х		
7	kvarh+ (imported)	X		In PFA version and in X version with Measurement menu set to "A", this is considering the total positive reactive energy without considering the current direction.
8	kvarh- (exported)	Х		In PFB version and in X version with Measurement menu set to "B"
9	kvar	X		
10	kW dmd	X		
11	kW dmd peak	Х		
12	kWh (t1)	Х	Х	Only relevant to kWh+, with Tariff menu set to ON
13	kWh (t2)	Х	Х	Only relevant to kWh+, with Tariff menu set to ON

X= available

List of available menus

Menu name and description		Range	Default setting
PASS	Password request	From 0000 to 9999	0000
nPASS	New password From 0000 to 9999		0000
Ct Ratlo (AV5)	Current transformer ratio	From 1 to 60	1
MEASurE	Measurement type (A=easy connection; A; b B=bidirectional, imported and exported energy). Not available in PFA and PFB versions (MID)		A
P int	Integration time for Wdmd calculation 1 to 30 min		1
Mode	Selection of complete or simplified set of variables on display		Full
Tariff	Tariff enabling Yes/No		No
PULSE (O1 option)	Selection of pulse ON duration	30 or 100 ms	30
	Selection of the pulse weight (multiplies of 100 pulses/kWh)	100 to 1000 (if duration is 100ms) 100 to 3000 (if 30 ms)	1000
Address (S1 option)	Modbus serial address	1 to 247	01
Baud (S1)	Modbus baud rate 9.6; 19.2; 38.4; 57.6, 115.2 kbps		9.6
Parity (S1)	Modbus parity	No/even	No
Prl Add (M1 option)	M-Bus primary address 1 to 250		0
Baud (M1)	M-Bus baud rate	0.3; 2.4; 9.6 kbps	2.4
RESEt	Et Allow the reset of tariff meters and W dmd peak (kWh/ kvarh partial meter reset available only via serial communication)		No
End	Exit to measuring mode		

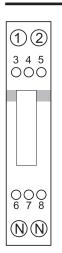
Note: after the confirmation of a new parameter value, the value is stored in the memory without the need to exit the programming mode.

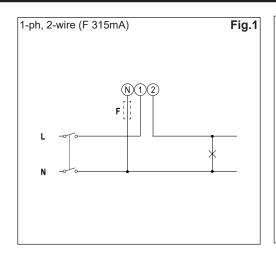
Additional available information on the display (*)

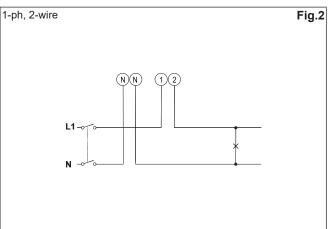
Туре	Page	Description	
Info page 1	YEAr (2013)	Year of production	
Info page 2	SErIAL (dddnnnA)	Serial number (ddd= day of the year; nnn=progressive number; A= production line, internal use only)	
Info page 3	rEV (A.01)	Firmware revision	
Info page 4	Ct Ratlo	Current transformer ratio	
Info page 5	MEASurE	Measurement type	
Info page 6	P int	Integration time for Wdmd calculation	
Info page 7	ModE	Set of variables on display	
Info page 8	tArIFF	Tariff enabling	
Info page 9 (O1)	PULSE	Pulse ON duration	
		Pulse weight	
Info page 9 (S1)	AddrESS	Modbus serial address	
Info page 10 (S1)	bAud	Modbus baud rate	
Info page 11 (S1)	PArItY	Modbus parity	
Info page 9 (M1)	Prl Add	M-Bus primary address	
Info page 10 (M1)	bAud	M-Bus baud rate	
Info page 12	ChECkSuM	FW checksum	

^(*) can be reached by pressing simultaneously the 2 touch keys

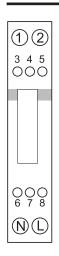
AV7, AV8 wiring diagrams

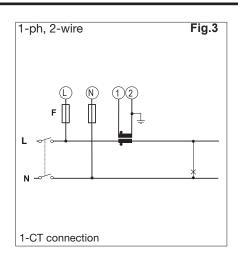




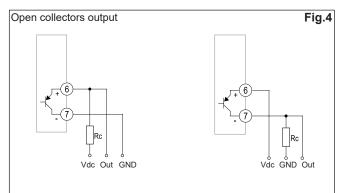


AV5 wiring diagrams

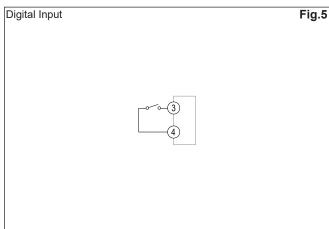


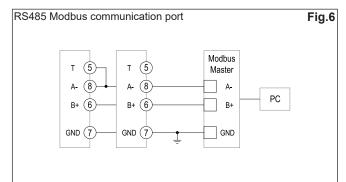


Input/output communication

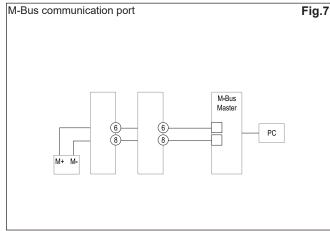


The load resistance (Rc) must be designed so that the closed contact current is under 100 mA (V $_{\rm on}$ is equal to 1 V dc). DC voltage (V $_{\rm off}$) must be less than or equal to 80 V.

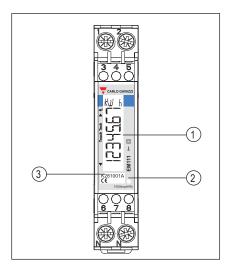




Additional instruments with RS485 are connected in parallel. The serial output must only be terminated on the last network device connecting terminals A- and T. For connections longer than 1000 m use a signal repeater. Maximum 247 transceivers on the same bus.



Front panel description



1. Display

Backlit LCD display with touch key-pad. Upper part: enter

2 | FF

LED proportional to kWh reading

3. Serial number and MID data

Area reserved to serial number and MID-relevant data in PF versions

Dimensions (mm)

