

Energy Management

Energy Meter

Type EM340

CARLO GAVAZZI



- 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
- Other versions available (not certified, option X): see "how to order" on the next page

- Three phase energy meter
- Class 1 (kWh) according to EN62053-21
- Class B (kWh) according to EN50470-3
- Accuracy $\pm 0.5\%$ RDG (current/voltage)
- Direct current measurement up to 65AAC
- Backlit LCD display (3x 8-digit) with integrated touch key-pad
- Energy readout on display: 8 digit
- Variable readout on display: 4 digit
- Energy measurement: kWh and kvarh (imported/exported); kWh+ by 2 tariffs; kWh per phase
- System variables: kW, kvar, kVA, VLL, VLN, PF, Hz, kWdmd, kWdmd peak
- Phase variables: kW, kvar, kVA, VLL, VLN, A, PF
- Self power supply
- Dimensions: 3-DIN module
- Protection degree (front): IP51
- Pulse output (optional, by open collector NPN)
- RS485 Modbus port (optional)
- M-bus port (optional)

Product description

Three-phase energy meter with backlit LCD display with integrated touch keypad. Particularly indicated for active energy metering and for cost allocation in

applications up to 65 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 is optionally provided with pulse output proportional to the active energy being

measured, RS485 Modbus port or M-bus port. Available for legal metrology (PF option, only for imported energy).

MID 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 EM340 DIN AV2 3 X O1 PF B

Model _____
 Range code _____
 System _____
 Power supply _____
 Output _____
 Option _____
 Measurement _____

Type Selection

Range code	System	Power supply	Output
AV2: 208 to 400 VLL AC - 5(65)A (Direct connection)	3: 3-phase, 3 or 4 wire; 2-phase 3 wire	X: Self power supply -20% +20% of the rated measuring input voltage, 45 to 65Hz	O1: pulse output S1: RS485 Modbus port M1: M-bus port
Option	Measurement		
PF: Certified according to MID Directive. Can be used for fiscal (legal) metrology.	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. B: Only the total positive energy meter is certified according to MID.		



STANDARD

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

How to order

EM340-DIN AV2 3 X O1 X

Model

Range code

System

Power supply

Output

Option

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Option			
X: none			

Input specifications

Rated Inputs		Energy additional errors	
Current type	3-phase loads, direct connection	Influence quantities	According to EN62053-21
Current range	5(65)A	Temperature drift	≤200ppm/°C
Nominal voltage	208 to 400 VLL AC	Sampling rate	4096 samples/s @ 50Hz 4096 samples/s @ 60Hz
Accuracy (@25°C ±5°C, R.H. ≤60%, 45 to 65 Hz)		Display and touch key-pad	
Current	I _{min} =0.25A; I _b : 5A, I _{max} : 65A; Un: 113 to 265VLN (196 to 460VLL) I _{min} =0.25A; I _b : 5A, I _{max} : 65A; from 208 to 400 VLL AC From 0.04I _b to 0.2I _b : ±(0.5%RDG+1DGT) From 0.2I _b to I _{max} : ±(0.5%RDG)	Type	Backlit LCD, 3 rows by 8-digit each, h 7 mm
		Read-out	Energy: 8 digit. Variables: 4 digit
		Touch key	3 (DOWN, Enter and UP).
Phase-neutral voltage	In the range Un: ±(0.5% RDG)	Max. and Min. indication	
Phase-phase voltage	In the range Un: ±(1% RDG)	Energies	Max. 99 999 999 Min. 0.01
Frequency	Range: 45 to 65Hz.	Variables	Max. 9999 Min. 0.01
Active power	From 0.05 I _n to I _{max} , within Un range, PF=1: ±(1% RDG) From 0.1 I _n to I _{max} , within Un range, PF=0.5L or 0.8C: ±(1% RDG)	Memory	
Power factor	±[0.001+1%(1.000 - "PF RDG")]	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
Reactive power	From 0.05 I _n to I _{max} , within Un range, sinφ=1: ±(2% RDG) From 0.1 I _n to I _{max} , within Un range, sinφ=0.5L or 0.8C: ±(2% RDG)	LEDs	
Energies	Class 1 according to EN62053-21 Class B (Class B (kWh) according to EN50470-3)	Flashing red light pulses according to EN50470-3, EN62052-11, 1000 imp./kWh (min. period: 90ms)	
		Fix orange light: wrong current direction (only with PFB option or with "B" measurement selection in case of X option)	
Active energy	Class 2 according to EN62053-23	Current overloads	
Reactive energy	20mA	Continuous	65A, @ 50Hz
Start-up current:	Self-consumption is not measured.	For 10ms	1950 A
Start-up voltage	90VLN	Short circuit withstand	4.5kA 10 ms according to IEC62052-31:2015
Resolution		Voltage Overloads	
Current	Display	Continuous	1.2 Un
Voltage	0.1 A	For 500ms	2 Un
Power	0.1 V	Input impedance	
Frequency	0.01 kW or kVar	230VL-N	1.2Mohm
PF	0.1 Hz	120VL-N	1.2Mohm
Energies (positive)	0.01	5(65) A	< 1.5 VA per channel
Energies (negative)	0.01 kWh or kvarh	Wrong connection detection	
Serial communication	0.001 A	Installation guide to indicate if connections are correctly carried out. Can be disabled.	
		Phase sequence	
		Indicates if the phase sequence is not the correct one (L1-L2-L3)	
Current	0.1 V	Correct current direction	
Voltage	0.1 W or var	Indicates if the current direction is not the right one (only with PFB option or with type "B" measurement selection in case of X)	
Power	0.1Hz		
Frequency	0.001		
PF	0.001 kWh or kvarh		
Energies (positive)	0.001 kWh or kvarh		
Energies (negative)	0.001 kWh or kvarh		

Input specifications (cont.)

Load conditions	option). The wrong connection detection works in case of loads with: - PF>0.766 (<40°) power factor if inductive or PF>0.996 (<5°) if capacitive - a current at least equal to 10% rated current (primary current transformer)	are summed to increase the total positive energy totalizer (kWh+), while the others increase the total negative totalizer (kWh-). Ex. P L1= +2kW, P L2 . +2kW, P L3 = -3 kW Integration time = 1 hour +kWh = (2+2) x1h = 4 kWh -kWh = 3 x 1h= 3kWh
Energy metering	in every measuring interval the single phase energies with positive sign	

Digital input specifications

Digital inputs	Free of voltage contact	Overload	In case a voltage is erroneously applied to the digital input, the input is not damaged up to 30 VAC/DC.
Function	Tariff management (switch between t1-t2)		
Number of inputs	1		
Contact measurement voltage	5 V		
Input impedance	1kohm		
Contact resistance	≤1kohm, close contact ≥100kohm, open contact		

Output specifications

RS485 serial port	RS485 by screw connection.	Protocol	M-bus according to EN13757-1
Function	For communication of measured data, programming parameters	Baud rate	0.3, 2.4, 9.6 kbaud
Protocol	ModBus RTU (slave function)	Meters in the M-bus network	250
Baud rate	9.6, 19.2, 38.4, 57.6, 115.2 kbaud,	Primary address	Selectable
Data format	even or no parity,	Secondary address	Univocally defined in each unit
Address	1 to 247 (default: 01)	Identification number range	from 9000 0000 to 9999 9999
Driver input capability	1/8 unit load. Maximum 247 devices on the same bus.	Other	Available functions: wild card, header, initialisation SND_NKE, and req_udr management. Management of primary address modification via M-bus and reset of partial energy via M-bus available.
Data refresh time	1sec		VIF, VIFE, DIF and DIFE: see protocol
Read command	50 words available in 1 read command	Static output	
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	Purpose	For pulse output proportional to the active energy (kWh)
M-bus port	M-bus by screw connection.	Pulse rate	Selectable in multiple of 100
Function	For communication of measured data		Max 500 or 1500 kWh according to pulse ON duration

Output specifications (cont.)

Pulse ON duration	Selectable: 30ms or 100 ms according to EN62052-31	Load	V_{ON} 1 VDC max. 100mA V_{OFF} 80 VDC max.
Output type	Open collector NPN		

General specifications

Operating temperature	From -25 to +70°C/from -13 to +158°F (PF option) From -25 to +65°C/from -13 to +149°F (X option), indoor, (R.H. from 0 to 90% non-condensing @ 40°C)	Standard compliance Safety Metrology	EN62052-11 EN62053-21, EN50470-3
Storage temperature	From -30 to +80°C/from -22 to +176°F (R.H. < 90% non-condensing @ 40°C)	Approvals	CE, MID (PF option only)
Overvoltage category	Cat. III	Connections Cable cross-section area	Measuring inputs: max. 16 mm ² , min. 2.5 mm ² with/without metallic cable ferrule; Max. screw tightening torque: 2.8 Nm
Utilisation category	UC2	Other terminals	1.5 mm ² , Min./Max. screws tightening torque: 0.4 Nm
Insulation (for 1 minute)	4000 VAC RMS between measuring inputs and digital/serial output (see table) 4000 VAC RMS	Housing Dimensions (WxHxD) Material	54 x 90 x 63 mm Noryl, self-extinguishing: UL 94 V-0
Dielectric strength	4000 VAC RMS for 1 minute	Sealing covers	Included
EMC		Mounting	DIN-rail
Electrostatic discharges	According to EN62052-11 15kV air discharge;	Protection degree Front Screw terminals	IP51 IP20
Immunity to irradiated electromagnetic fields	Test with current: 10V/m from 80 to 2000MHz;	Weight	Approx. 240 g (packing included)
Electromagnetic fields	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		



Power supply specifications

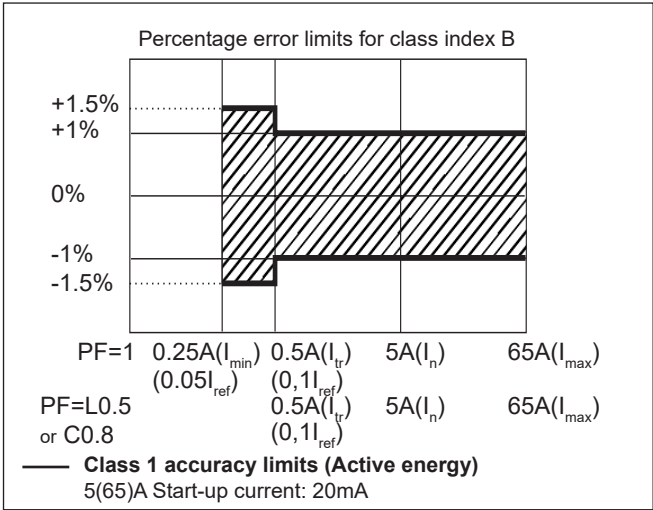
Self power supply	208 to 400VAC VLL, -20% +20% 50/60Hz	Power consumption	≤ 1W, ≤ 10VA
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Insulation (for 1 minute) between inputs and outputs

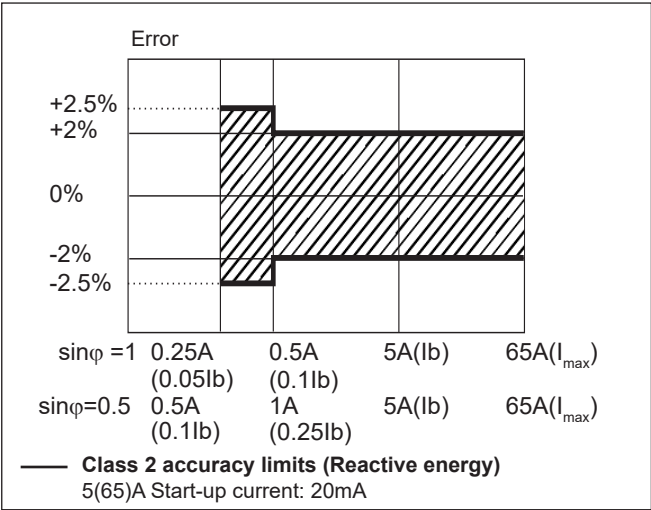
	Measuring input	Digital or serial output	Digital input
Measuring input	-	4 kV	4 kV
Digital or serial output	4 kV	-	0 kV
Digital input	4 kV	0 kV	-

Accuracy (according to EN50470-3 and EN62053-23)

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



Display pages

No	1 st row	2 nd row	3 rd row	“Full” mode	“Easy” mode	Note
0	kWh+ (imported)		kW system	X	X	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)		kW system	X	X	Only in X version, with Measurement menu set to “B”
2	kWh+ (imported)		V L-L system	X	X	
3	kWh+ (imported)		V L-N system	X	X	
4	kWh+ (imported)		PF system	X		
5	kWh+ (imported)		Hz	X		
6	kvarh+ (imported)		kvar system	X	X	In X version with Measurement menu set to “A”, this is considering the total positive reactive energy without considering the current direction.
7	kvarh- (exported)		kvar system	X	X	Only in X version, with Measurement menu set to “B”
8	kWh+ (imported)		kVA system	X		
9	kWh+ (imported)	kWdmd peak	kWdmd	X		
10	kWh (t1)	“t1”	kW system	X	X	Only relevant to kWh+, with Tariff menu set to ON.
11	kWh (t2)	“t2”	kW system	X	X	Only relevant to kWh+, with Tariff menu set to ON.
12	kWh L1	kWh L2	kWh L3	X		In X version with Measurement menu set to “A”, this is considering the total energy without considering the current direction. In PFB version and in X version with Measurement menu set to “B”, this is considering only the imported energy.
13	kVA L1	kVA L2	kVA L3	X		
14	kvar L1	kvar L2	kvar L3	X		
15	PF L1	PF L2	PF L3	X		
16	V L-N L1	V L-N L2	V L-N L3	X		
17	V L-L L1	V L-L L2	V L-L L3	X		
18	A L1	A L2	A L3	X	X	
19	kW L1	kW L2	kW L3	X		

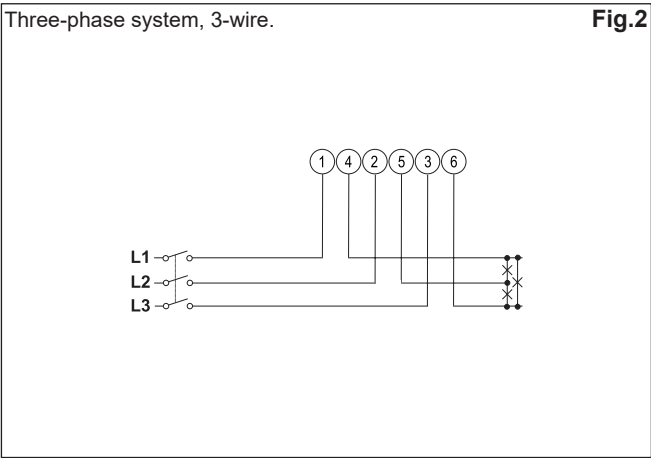
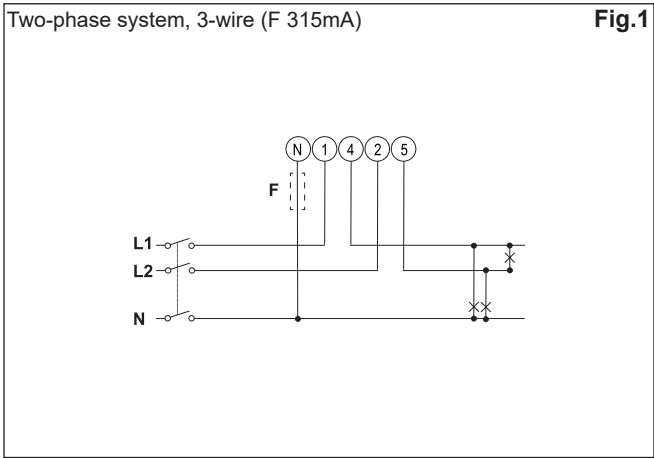
X= available



Additional available information on the display

Type	Description	Note
Info 1	Year (2016)	Year of production
Info 2	Serial (dddnnnA)	Serial number (ddd= day of the year; nnn=progressive number; A= production line, internal use only)
Info 3	Rev (A.01)	Firmware revision
Info 4	Puls led	Led pulsed/kWh
P3	System	System type
P6	Measure	Measurement type
P7	Install	Wrong connection detection
P8	P int	Integration time for Wdmd calculation
P9	Mode	Set of variables on display
P10	Tariff	Tariff enabling
P11	Home	Selected home page
P12-1	Pulse duration	Pulse ON duration
P12-2	Pulse rate	Pulse rate
P13	Primary address	M-bus primary address
P14	Address	Modbus serial address
P15	Kbaud	M-bus or Modbus baud rate
P16	Parity	Modbus parity
Info 5	Secondary address	M-bus secondary address

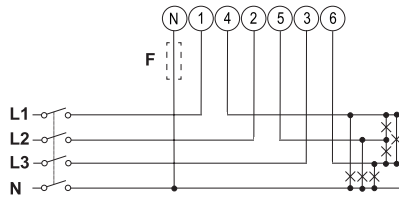
Wiring diagrams



Wiring diagrams (cont.)

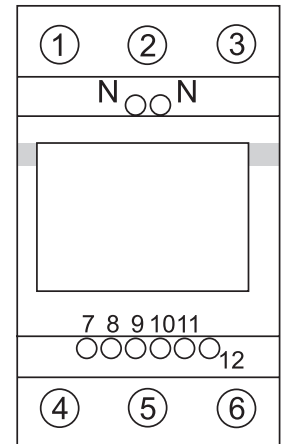
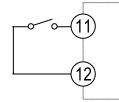
Three-phase system, 4-wire. (F 315mA)

Fig.3



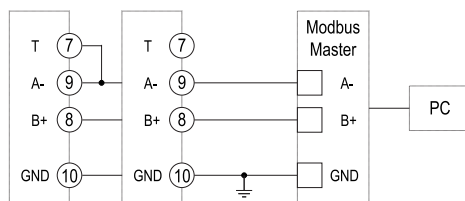
Digital Input

Fig.4



RS485 Modbus communication port

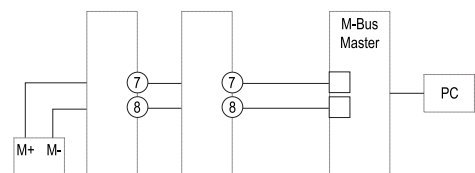
Fig.5



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.

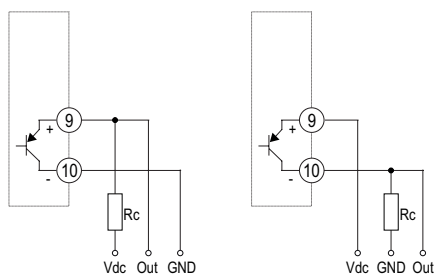
M-Bus communication port

Fig.6



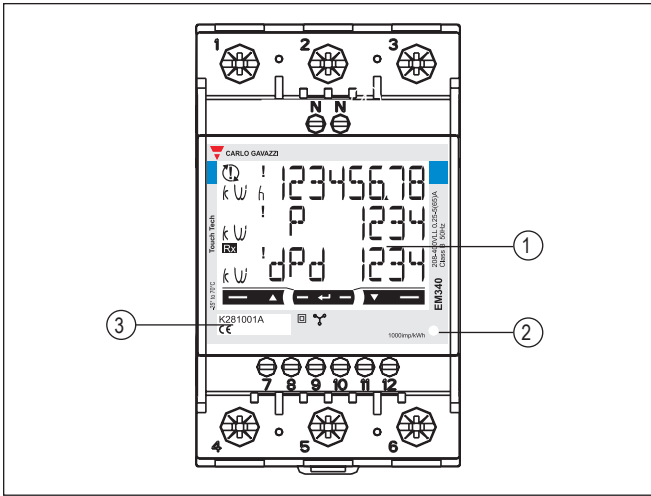
Pulse output (two possible connections)

Fig.7





Front panel description



- 1. **Display**
Backlit LCD display with touch key-pad.
- 2. **LED**
LED proportional to kWh reading
- 3. **Serial number**
Area reserved to serial number and MID-relevant data in PF versions

Dimensions

