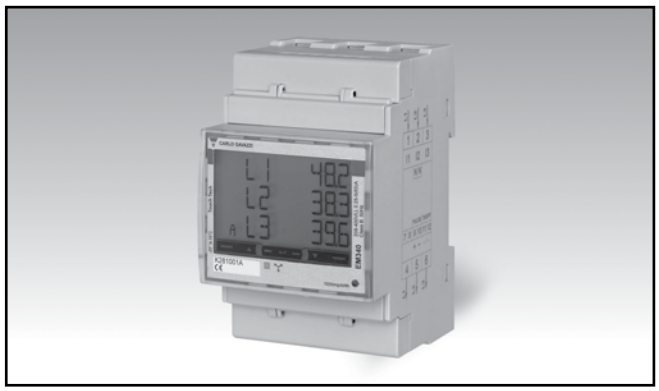
Energy Management
Energy Meter
Type EM340

CARLO GAVAZZI



- **RS485 Modbus port (optional)**
- **M-bus port (optional)**
- **Digital input (for tariff management)**
- **Easy connection or wrong current direction detection**

- **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) 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 opto-mosfet)**

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).

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**

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	
X:	none

CARLO GAVAZZI

Input specifications

Rated Inputs	
Current type	3-phase loads, direct connection
Current range	5(65)A
Nominal voltage	208 to 230 VLL AC
Accuracy	
(@25°C ±5°C, R.H. ≤60%, 45 to 65 Hz)	
AV2	Imin=0.25A; Ib: 5A, Imax: 65A; Un: 113 to 265VLN (196 to 460VLL)
	Imin=0.25A; Ib: 5A, Imax: 100A; Un: 230VLN -30% +20%
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)
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
Reactive energy	Class 2 according to EN62053-23
Start-up current:	20mA (AV2) Self-consumption is not measured.
Start-up voltage	90VLN (AV2)
Resolution (also via serial port)	
Current	0.1A
Voltage	0.1V
Power	0.1kW or kvar
Frequency	0.1 Hz
PF	0.01
Energies (positive)	0.01kWh or kvarh (display: autoranging up to 1 kWh or kvarh) 0.01kWh or kvarh (serial comm.)
Energies (negative)	0.1kWh or kvarh (display: autoranging up to 1 kWh or kvarh) 0.01kWh or kvarh (serial comm.)

Energy additional errors	
Influence quantities	According to EN62053-21
Temperature drift	≤200ppm/°C
Sampling rate	4096 samples/s @ 50Hz 4096 samples/s @ 60Hz
Display and touch key-pad	
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).
Max. and Min. indication	
Energies	Max. 9 999 999 Min. 0.01
Variables	Max. 9999 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 according to EN50470-3, EN62052-11, 1000 imp./kWh (min. period: 90ms) Fix orange light: wrong current direction (only with PF option or with "B" measurement selection in case of X option)
Current overloads	
Continuous	65A, @ 50Hz
For 10ms	8450 A
Voltage Overloads	
Continuous	1.2 Un
For 500ms	2 Un
Input impedance	
230VL-N	1.2Mohm
120VL-N	1.2Mohm
5(100) A	< 1.25VA
Wrong connection detection	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)
Correct current direction	Indicates if the current direction is not the right one (only with PFB option or with type "B" measurement selection in case of X option).

CARLO GAVAZZI

Input specifications (cont.)

Load conditions	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)

Digital input specifications

Digital inputs	Free of voltage contact
Function	Tariff management (switch between t1-t2)
Number of inputs	1
Contact measurement voltage	5 V
Input impedance	1kohm
Contact resistance	1kohm, close contact
Overload	100kohm, open contact In case a voltage is erroneously 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 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: 01)
Driver input capability	1/8 unit load. 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
M-bus port	M-bus by screw connection.
Function	For communication of measured data
Protocol	M-bus according to EN13757-1
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
Identification number range	from 9000 0000 to 9999 9999
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. VIF, VIFE, DIF and DIFE: see protocoll
Static output	
Purpose	For pulse output proportional to the active energy (kWh)
Pulse rate	Selectable in multiple of 100 Max 500 or 2000 kWh according to pulse ON duration

CARLO GAVAZZI

Output specifications (cont.)

Pulse ON duration	Selectable: 30ms or 100 ms according to EN62052-31	Load	V_{ON} 2.5 VAC/DC max. 100mA V_{OFF} 260 VAC max.
Output type	Opto-mosfet		

General specifications

Operating temperature	-20 to +65 °C, indoor, (R.H. from 0 to 90% non-condensing @ 40°C)
Storage temperature	-30°C to +80°C (R.H. < 90% noncondensing @ 40°C)
Installation category	Cat. III (IEC 60664, EN60664)
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
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

Standard compliance	
Safety	IEC60664, IEC61010-1 EN60664, EN61010-1 EN62052-11
Metrology	EN62053-21, EN50470-3
Approvals	CE (cULus pending)
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
Housing	
Dimensions (WxHxD)	53 x 63 x 90 mm
Material	Noryl, self-extinguishing: UL 94 V-0
Sealing covers	Included
Mounting	DIN-rail
Protection degree	
Front	IP51
Screw terminals	IP20
Weight	Approx. 240 g (packing included)

Power supply specifications

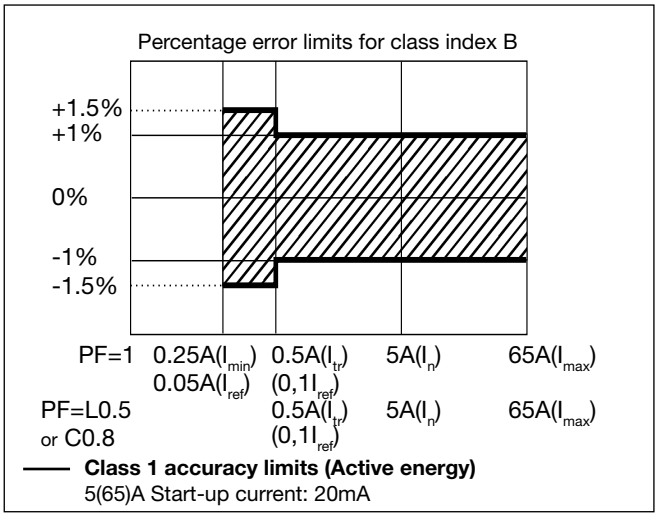
Auxiliary power supply AV2	208 to 400VAC VLL-N, -20% +20% 50/60Hz	**Power consumption**	≤ 1W, ≤ 10VA

Insulation (for 1 minute) between inputs and outputs

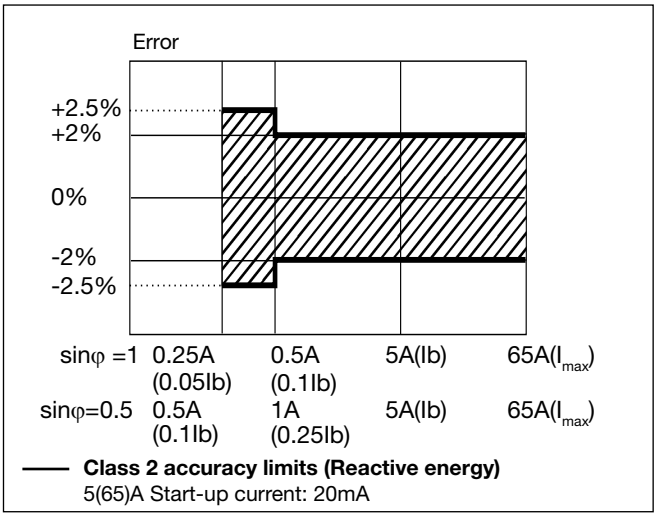
	Measuring input	Auxiliary power supply	Digital or serial output	Digital input
Measuring input	-	0 kV	4 kV	4 kV
Auxiliary power supply	0 kV	-	4 kV	4 kV
Digital or serial output	4 kV	4 kV	-	4 kV
Digital input	4 kV	4 kV	4 kV	-

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

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



CARLO GAVAZZI

Display pages

No	1st row	2nd row	3rd row	"Full" mode	"Easy" mode	Note
0	kWh+ (imported)		kW system	X	X	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		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.
7	kvarh- (exported)			X		Only in X version, with Measurement menu set to "B"
8	kWh+ (imported)		Kvar system	X		
9	kWh+ (imported)	kWdmd peak		X		
10	kWh (t1)	"t1"	kVA system	X	X	Only relevant to kWh+, with Tariff menu set to ON.
11	kWh (t2)	"t2"	kVA system	X	X	Only relevant to kWh+, with Tariff menu set to ON.
12	kWh L1	kWh L2	kWdmd	X		In PFA version and 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	kW system	X		
14	kvar L1	kvar L2	kWh L3	X		
15	PF L1	PF L2	kVA L3	X		
16	V L-N L1	V L-N L2	kvar L3	X		
17	V L-L L1	V L-L L2	PF L3	X		
18	A L1	A L2	V L-N L3	X	X	
19	kW L1	kW L2	V L-L L3	X		

X= available

CARLO GAVAZZI

List of available menus

Menu name and description			Range	Default setting
P1	PASS	Password request	From 0000 to 9999	0000
P2	nPASS	New password	From 0000 to 9999	0000
P3	System	System type (3Pn=3-phase 4-wire, 3P=3-phase 3-wire, 2P=2-phase 3-wire)	3Pn, 3P, 2P	3Pn
P4	CT	Not available		
P5	VT	Not available		
P6	Measure	Measurement type (A=easy connection; B=bidirectional, imported and exported energy).	A; b	A
P7	Install	Wrong connection detection function	Yes/No	Yes
P8	P int	Integration time for Wdmd calculation	1 to 30 min	1
P9	Mode	Selection of complete or simplified set of variables on display	Full or Easy	Full
P10	Tariff	Tariff enabling	Yes/No	No
P11	Home	Home page selection (default page at power-on and after 120 s time-out from other pages).	0 to 19	0
P12-1	Pulse (O1 option)	Selection of pulse ON duration	30 or 100 ms	30
P12-2	Pulse (O1 option)	Selection of the pulse rate	100 to 500 (if duration is 100ms) or to 2000 (if 30 ms)	100
P13	Primary address (M1 option)	M-bus primary address	1 to 250	1
P14	Address (S1 option)	Modbus serial address	1 to 247	01
P15	Kbaud (M1)	M-bus baud rate	0.3; 2.4; 9.6 kbps	2.4
P15	Kbaud (S1)	Modbus baud rate	9.6; 19.2; 38.4; 57.6, 115.2 kbps	9.6
P16	Parity (S1)	Modbus parity	No/even	No
P17	Reset	Allow the reset of tariff meters and W dmd peak and of the kWh/kvarh partial meter available only via serial communication	Yes/No	No
P18	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.

CARLO GAVAZZI

Additional available information on the display (*)

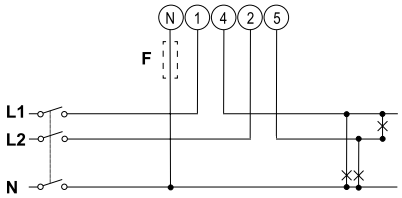
Type	Description	Note
Info 1	Year (2013)	Year of production
Info 2	Serial (dddnnnA)	Serial number (ddd= day of the year; nnn=progressive number; A= production line, internal use only)
Info 3	Rev (A.01)	Firmware revision
Info 4	Not available	
P3	System	System type
P6	Measure	Measurement type
P7	Not available	
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
P16	Parity	Modbus parity
Info 5	Secondary address	M-bus secondary address

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

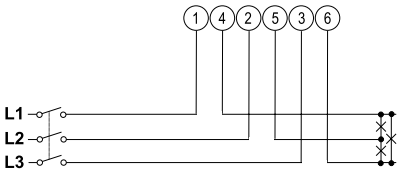
CARLO GAVAZZI

Wiring diagrams

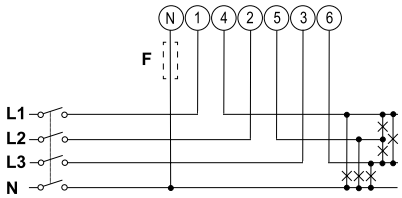
Two-phase system, 3-wire (F 315mA) **Fig.1**



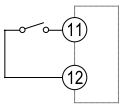
Three-phase system, 3-wire. (F 315mA) **Fig.2**

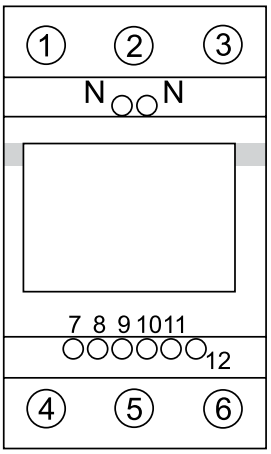


Three-phase system, 4-wire. (F 315mA) **Fig.3**

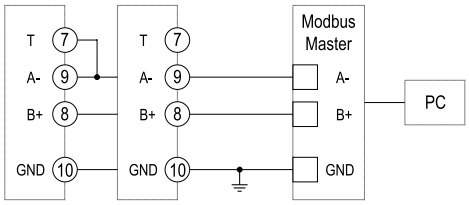


Digital Input **Fig.4**



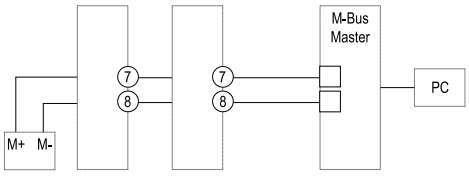


RS485 Modbus communication port **Fig.5**

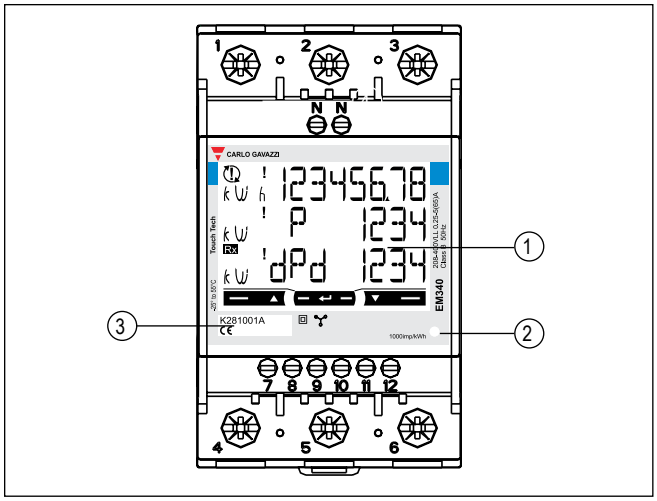


Additional instruments with RS485 are connected in parallel. The serial output must only be terminated on the last network device connecting terminals B+ and T. For connections longer than 1000 m or networks with more than 160 instruments, use a signal repeater.

M-Bus communication port **Fig.6**



Front panel description



1. **Display**
   Backlit LCD display with touch key-pad.
   Centre key (“E”): enter
   Left key (“up”): UP
   Right key (“down”): DOWN
   Scroll in right direction: UP
   Scroll in left direction: DOWN

2. **LED**
   LED proportional to kWh reading

3. **Serial number**
   Area reserved to serial number

Dimensions