

# Energy Management Energy Meter Type EM340

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- Compliant with the international accuracy standard IEC/EN62053-21, and the IEC/EN61557-12 performance requirements (active power and active energy).
- 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)
- 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

## 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

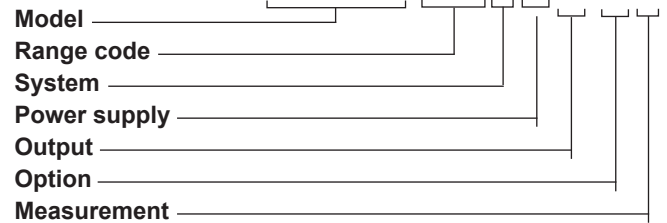
applications up to 65 A (direct connection), with dual tariff management availability. It can measure imported and exported energy or be programmed to consider only

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



## Type Selection

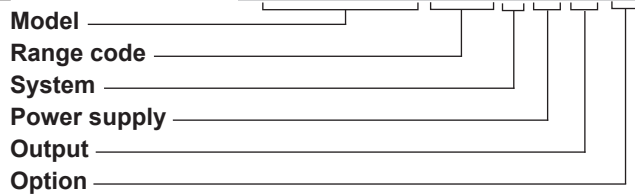
Range code	System	Power supply	Output
<b>AV2:</b> 208 to 400 VLL AC - 5(65)A (Direct connection)	<b>3:</b> 3-phase, 3 or 4 wire; 2-phase 3 wire	<b>X:</b> Self power supply -20% +20% of the rated measuring input voltage, 45 to 65Hz	<b>O1:</b> pulse output <b>S1:</b> RS485 Modbus port <b>M1:</b> M-bus port
Option	Measurement		
<b>PF:</b> Certified according to MID Directive. Can be used for fiscal (legal) metrology.	<b>A:</b> 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>B:</b> Only the total positive energy meter is certified according to MID. Operating temperature: from -25 to +55°C/from -13 to +131°F. <b>A70:</b> 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. <b>B70:</b> 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.

**How to order** **EM340-DIN AV2 3 X O1 X**



**Type Selection**

Range code	System	Power supply	Output
<b>AV2:</b> 208 to 400 VLL AC - 5(65)A (Direct connection)	<b>3:</b> 3-phase, 3- or 4-wire; 2-phase 3-wire	<b>X:</b> self power supply -20% +20% of the rated measuring input voltage, 45 to 65Hz	<b>O1:</b> pulse output <b>S1:</b> RS485 Modbus port <b>M1:</b> M-bus port

**Option**

**X:** none

## Input specifications

<b>Rated Inputs</b>		<b>Energy additional errors</b>	
Current type	3-phase loads, direct connection	Influence quantities	According to EN62053-21
Current range	5(65)A	<b>Temperature drift</b>	≤200ppm/°C
Nominal voltage	208 to 400 VLL AC	<b>Sampling rate</b>	4096 samples/s @ 50Hz 4096 samples/s @ 60Hz
<b>Accuracy</b> (@25°C ±5°C, R.H. ≤60%, 45 to 65 Hz)		<b>Display and touch key-pad</b>	
	Imin=0.25A; Ib: 5A, Imax: 65A; Un: 113 to 265VLN (196 to 460VLL) Imin=0.25A; Ib: 5A, Imax: 65A; from 208 to 400 VLL AC	Type	Backlit LCD, 3 rows by 8-digit each, h 7 mm
Current	From 0.04Ib to 0.2Ib: ±(0.5%RDG+1DGT) From 0.2Ib to Imax: ±(0.5%RDG)	Read-out	Energy: 8 digit. Variables: 4 digit
Phase-neutral voltage	In the range Un: ±(0.5% RDG)	Touch key	3 (DOWN, Enter and UP).
Phase-phase voltage	In the range Un: ±(1% RDG)	<b>Max. and Min. indication</b>	
Frequency	Range: 45 to 65Hz.	Energies	Max. 99 999 999 Min. 0.01
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)	Variables	Max. 9999 Min. 0.01
Power factor	±[0.001+1%(1.000 - "PF RDG")]	<b>Memory</b>	
Reactive power	From 0.05 In to Imax, within Un range, sinphi=1: ±(2% RDG) From 0.1 In to Imax, within Un range, sinphi=0.5L or 0.8C: ±(2% RDG)	Energy	10 <sup>12</sup> cycles. Energy value is saved every time the less significant digit increases.
Energies		Programming parameters	10 <sup>12</sup> cycles. When a parameter is modified, only the relevant memory cell is overwritten
Active energy	Class 1 according to EN62053-21 Class B (Class B (kWh) according to EN50470-3)	<b>LEDs</b>	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)
Reactive energy	Class 2 according to EN62053-23	<b>Current overloads</b>	
Start-up current:	20mA Self-consumption is not measured.	Continuous	65A, @ 50Hz
Start-up voltage	90VLN	For 10ms	1950 A
<b>Resolution</b>	Display	Short circuit withstand	4.5kA 10 ms according to IEC62052-31:2015
Current	0.1 A	<b>Voltage Overloads</b>	
Voltage	0.1 V	Continuous	1.2 Un
Power	0.01 kW or kVar	For 500ms	2 Un
Frequency	0.1 Hz	<b>Input impedance</b>	
PF	0.01	230VL-N	1.2Mohm
Energies (positive)	0.01 kWh or kvarh	120VL-N	1.2Mohm
Energies (negative)	0.01 kWh or kvarh	5(65) A	< 1.5 VA per channel
Serial communication		<b>Wrong connection detection</b>	Installation guide to indicate if connections are correctly carried out. Can be disabled.
Current	0.001 A	Phase sequence	Indicates if the phase sequence is not the correct one (L1-L2-L3)
Voltage	0.1 V	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
Power	0.1 W or var		
Frequency	0.1Hz		
PF	0.001		
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 (<math><40^\circ</math>) power factor if inductive or PF>0.996 (<math><5^\circ</math>) 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

<b>Digital inputs</b>	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

<b>RS485 serial port</b>	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	<b>Static output</b>	
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)
<b>M-bus port</b>	M-bus by screw connection.	Pulse rate	Selectable in multiple of 100 Max 500 or 1500 kWh according to pulse ON duration
Function	For communication of measured data		

## Output specifications (cont.)

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

## General specifications

<b>Operating temperature</b>		<b>Standard compliance</b>	
PF option (standard or with suffixes from 01 to 60)	From -25 to +55°C/from -13 to +131°F	Safety	EN62052-11
PF option (with suffixes from 61 to 99)	From -25 to +70°C/from -13 to +158°F	Metrology	EN62053-21, EN50470-3. IEC/EN61557-12 (active power and active energy, MID models only).
X option	From -25 to +65°C/from -13 to +149°F indoor, (R.H. from 0 to 90% non-condensing @ 40°C)	<b>Approvals</b>	CE, MID (PF option only)
<b>Storage temperature</b>	From -30 to +80°C/from -22 to +176°F (R.H. < 90% non-condensing @ 40°C)	<b>Connections</b>	
<b>Overvoltage category</b>	Cat. III	Cable cross-section area	Measuring inputs: max. 16 mm <sup>2</sup> , min. 2.5 mm <sup>2</sup> with/without metallic cable ferrule; Max. screw tightening torque: 2.8 Nm
<b>Utilisation category</b>	UC2	Other terminals	1.5 mm <sup>2</sup> , Min./Max. screws tightening torque: 0.4 Nm
<b>Insulation (for 1 minute)</b>	4000 VAC RMS between measuring inputs and digital/serial output (see table) 4000 VAC RMS	<b>Housing</b>	
<b>Dielectric strength</b>	4000 VAC RMS for 1 minute	Dimensions (WxHxD)	54 x 90 x 63 mm
<b>EMC</b>		Material	Noryl, self-extinguishing: UL 94 V-0
Electrostatic discharges	According to EN62052-11 15kV air discharge;	Sealing covers	Included
Immunity to irradiated electromagnetic fields	Test with current: 10V/m from 80 to 2000MHz;	<b>Mounting</b>	DIN-rail
Electromagnetic fields	Test without any current: 30V/m from 80 to 2000MHz;	<b>Protection degree</b>	
Burst	On current and voltage measuring inputs circuit: 4kV	Front	IP51
Immunity to conducted disturbances	10V/m from 150KHz to 80MHz	Screw terminals	IP20
Surge	On current and voltage measuring inputs circuit: 4kV;	<b>Weight</b>	Approx. 240 g (packing included)
Radio frequency	According to CISPR 22		

## Power supply specifications

### Self power supply

208 to 400VAC VLL, -20%  
+20% 50/60Hz

### Power consumption

$\leq 1W, \leq 10VA$

## Insulation (for 1 minute) between inputs and outputs

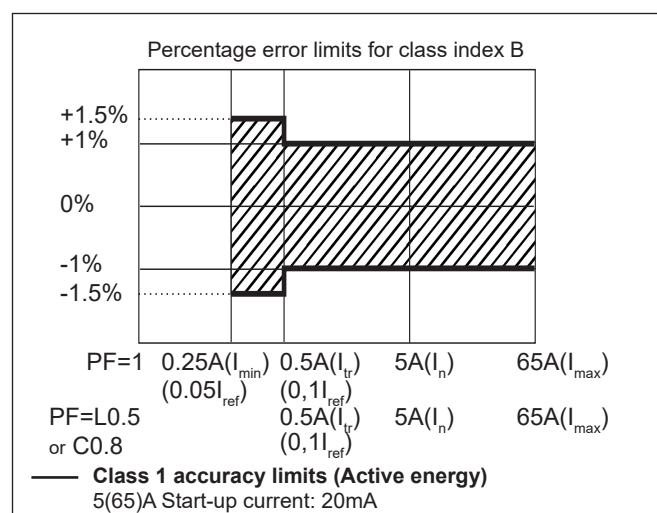
	Measuring input	Digital or serial output	Digital input
Measuring input	-	4 kV	4 kV
Digital or serial output	4 kV	-	0 kV
Digital input	4 kV	0 kV	-

## MID compliance (PF option only)

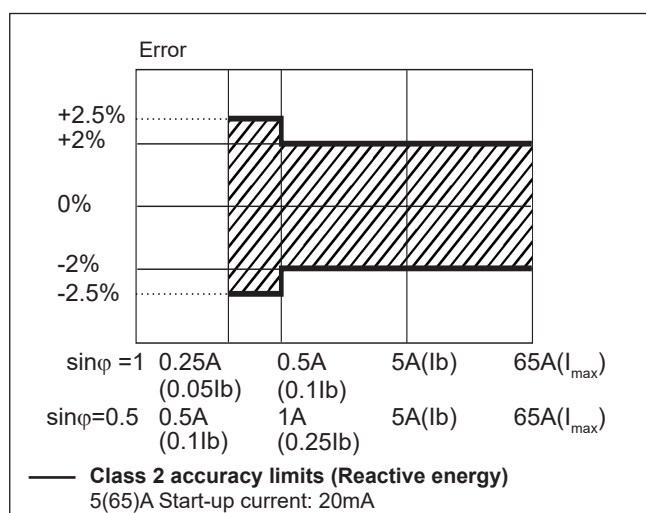
<b>Accuracy</b>	0.9 $U_n \leq U \leq 1.1 U_n$ ; 0.98 $f_n \leq f \leq 1.02 f_n$ ; $f_n$ : 50 Hz; cos $\phi$ : 0.5 inductive to 0.8 capacitive. Class B Considering listed $I_b$ or $I_n$ values
<b>Operating temperature</b>	PF option (standard or with suffixes from 01 to 60): from $-25$ to $+55^\circ\text{C}$ /from $-13$ to $+131^\circ\text{F}$ PF option (with suffixes from 61 to 99): from $-25$ to $+70^\circ\text{C}$ /from $-13$ to $+158^\circ\text{F}$ X option: from $-25$ to $+65^\circ\text{C}$ /from $-13$ to $+149^\circ\text{F}$ indoor (R.H. from 0 to 90% non-condensing @ $40^\circ\text{C}$ )
<b>EMC compliance</b>	E2
<b>Mechanical compliance</b>	M2

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

kWh, accuracy (RDG) depending on the current



kvarh, accuracy (RDG) depending on the current



## Measurement accuracy according to IEC/EN61557-12 (MID versions)

Active power

Performance class 1

Active energy

Performance class 2

## Display pages

No	1 <sup>st</sup> row	2 <sup>nd</sup> row	3 <sup>rd</sup> 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		

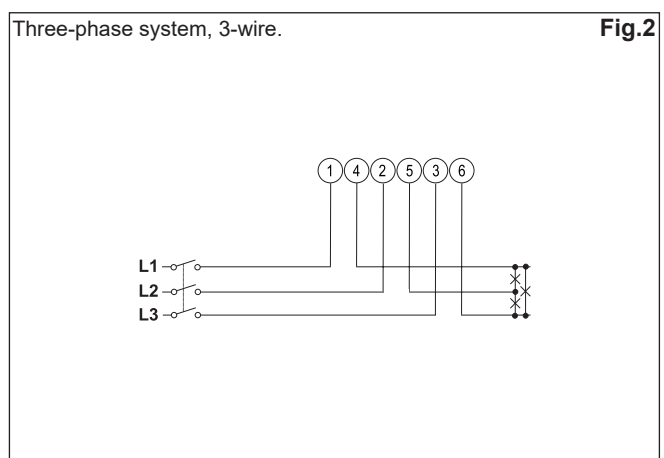
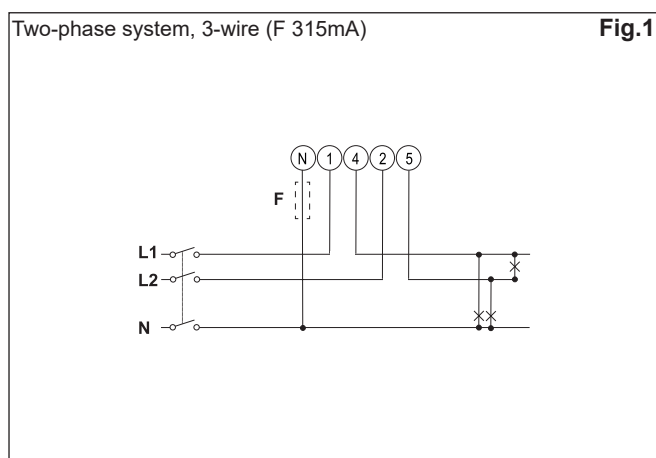
X= available

Specification are subject to change without notice EM340 DS 031120

## Additional available information on the display

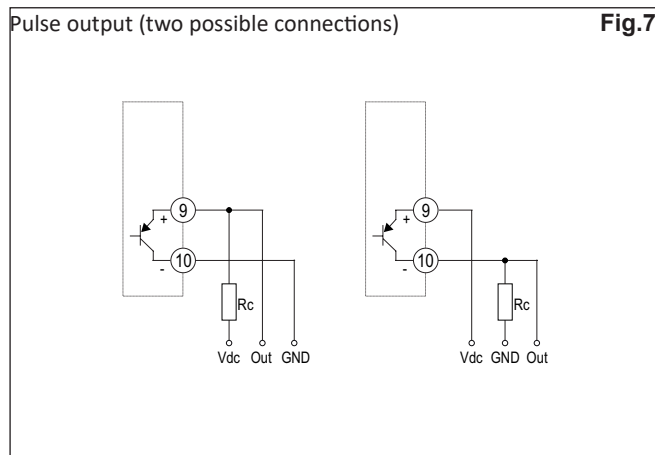
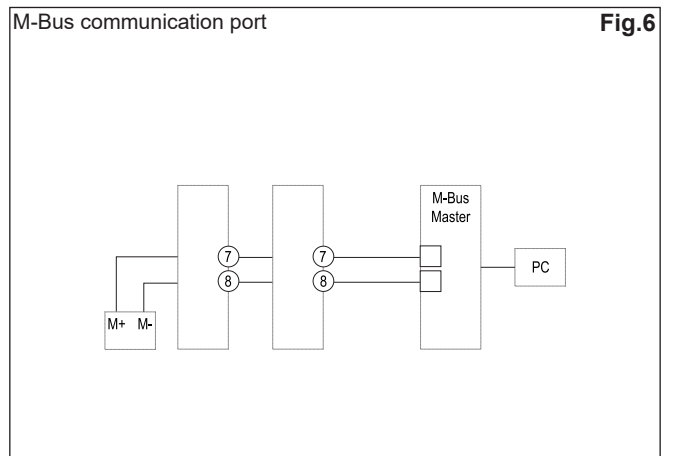
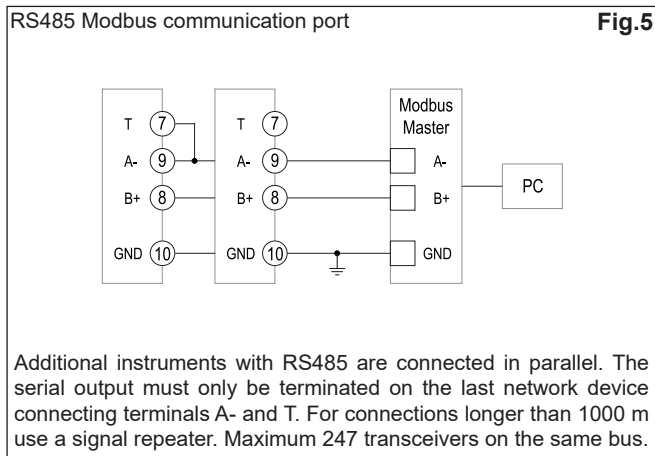
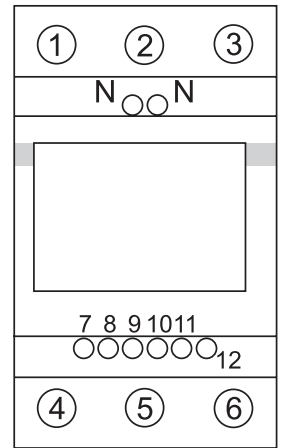
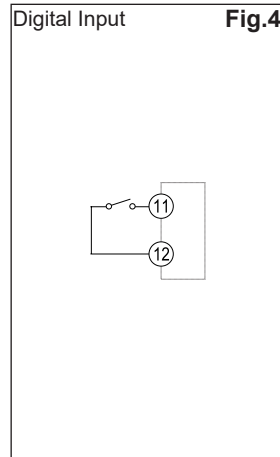
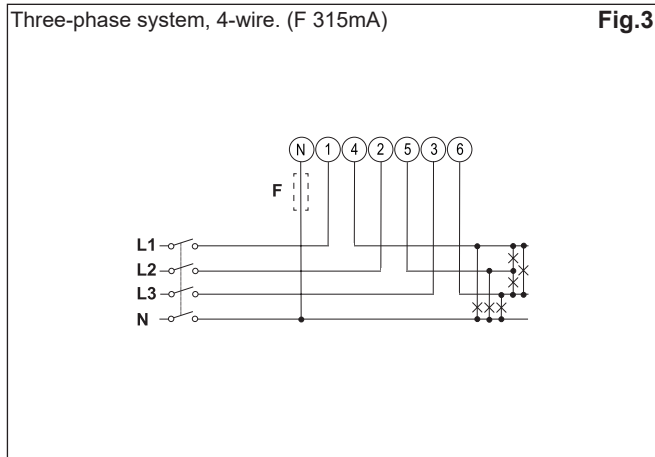
Type	Description	Note
Info 1	Year (2016)	Year of production
Info 2	Serial (dddnnnA)	Serial number (ddd= day of the year; nnn=progressive number; A= production line, internal use only)
Info 3	Rev (A.01)	Firmware revision
Info 4	Puls led	Led pulsed/kWh
P3	System	System type
P6	Measure	Measurement type
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

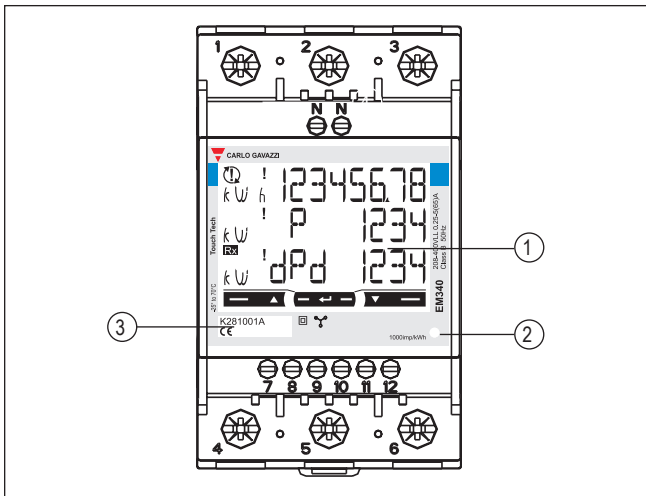




## Wiring diagrams (cont.)



## 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

