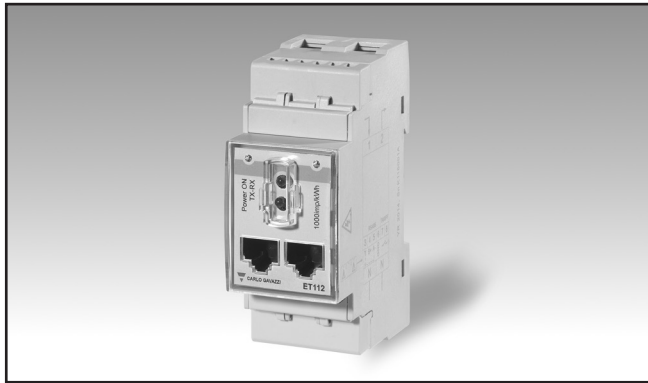# Energy Management
# Energy Transducer
Type ET112

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- Single phase energy transducer
- Class 1 (kWh) according to EN62053-21
- Accuracy ±0.5% RDG (current/voltage)
- Direct current measurement up to 100AAC
- 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: 2-DIN module
- Protection degree (front): IP20
- RS485 Modbus port (screw terminals and RJ45 connection)
- Optical port
- Digital input (for tariff management)
- Easy connection or wrong current direction detection
- Run hour meter

Product description

Single-phase energy transducer. 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 IP20 front degree protection. The transducer is provided with RS485 Modbus port (available through screw terminals, dual RJ45 connectors or optical infrared communication port). A run-hour meter is available to link the energy to the relevant working hours.

How to order   ET112-DIN AV0 1 X S1 X

Model
Range code
System
Power supply
Output
Option
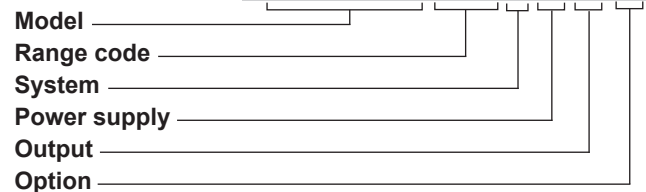
Type Selection

Range code	System	Power supply	Output
AV0: 230VLN AC - 5(100)A (Direct connection)	**1:** 1-phase 2-wire	**X:** Self power supply -30% +20% of the rated measuring input voltage, 45 to 65Hz	**S1:** RS485 Modbus port
AV1: 120VLN AC - 5(100) A (Direct connection). Available on request (MOQ 100 pcs).			

Option

X: none

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Input specifications

Rated Inputs	
Current type	1-phase loads, direct connection
Current range	5(100)A
Nominal voltage	230VLN AC (AV0 option), 120 VLN (AV1 option)

Accuracy	
(@25°C ±5°C, R.H. ≤60%, 45 to 65 Hz)	
AV1	Imin=0.25A; Ib: 5A, Imax: 100A; Un: 120VLN -30% +30%
AV0	Imin=0.25A; Ib: 5A, Imax: 100A; Un: 230VLN -30% +20%
Energies	
Active energy	Class 1 according to EN62053-21
Reactive energy	Class 2 according to EN62053-23
Start-up current:	40mA (AV0, AV1), positive or negative
	Self-consumption is not measured.
Start-up voltage	84VLN (AV1), 161VLN (AV0)

Resolution (via serial port)	
Current	0.001 A
Voltage	0.1 V
Power	0.1 W or var
Frequency	0.1Hz
PF	0.001
Energies (positive)	0.1 kWh or kvarh
Energies (negative)	0.1 kWh or kvarh
Run hour meter	0.01 h

Energy additional errors	
Influence quantities	According to EN62053-21

Temperature drift	≤200ppm/°C

Sampling rate	4096 samples/s @ 50Hz
	4096 samples/s @ 60Hz

Max. and Min. data values	
Energies	Max. 99 999 999
	Min. 0.01
Variables	Max. 9999
	Min. 0.01
Run hour meter	Max 999 999.99
	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	
Right LED	Flashing red light pulses according to EN62052-11, 1000 pulse per kWh (min. period: 90ms)
Left LED	Fix green light: power-on Blinking red light: power-on and communication in progress

Current overloads	
Continuous	100A, @ 50Hz
For 10ms	3000 A

Voltage Overloads	
Continuous	1.2 Un
For 500ms	2 Un

Input impedance	
Voltage input 230VL-N	1.2Mohm
Voltage input 120VL-N	1.2Mohm
Current inputs: 5(100) A	< 1.25VA

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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 or RS485 by standard female RJ45 connectors (not shielded).	Baud rate	9.6, 19.2 kbaud, even or no parity
Function	For communication of measured data, programming parameters	Address	1
		Data refresh time	1 sec
Protocol	ModBus RTU (slave function)	Read command	50 words available in 1 read command
Baud rate	9.6, 19.2, 38.4, 57.6, 115.2 kbaud, even or no parity,	Optical port LEDs	
Address	1 to 247 (default: 01)	LED axial distance	6.5 mm
Driver input capability	1/8 unit load. Maximum 247 transceivers on the same bus.	LED function	- Upper LED is a receiver (from the master to the transducer
Data refresh time	1sec		- Lower LED is a transmitter (from the trasducer to the master).
Read command	50 words available in 1 read command		
RJ45 pin-out	According to Modbus standard: A- (pin5), B+ (pin4), GND (pin8)		
Other ports	All the Modbus ports (screw terminals, two RJ45) are in parallel. Only one port at a time can be used.		
Optical port			
Description	Frontal bi-directional infrared optical coupling with CG optical reader device "Opto-prog"		
Function	For remote communication of measured data and setting of programming parameters		
Protocol	ModBus RTU (slave function)		

General specifications

Operating temperature	-25 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)
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
EMC Electrostatic discharges Immunity to irradiated electromagnetic fields	According to EN62052-11 15kV air discharge; 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 Metrology	EN62052-11 EN62053-21
Approvals	CE
Connections Cable cross-section area	Measuring inputs: max. 25 mm², min. 5 mm² with/without metallic cable ferrule; Max. screw tightening torque: 2.8 Nm
Other terminals	1.5 mm², Min./Max. screws tightening torque: 0.5 Nm
Housing Dimensions (WxHxD) Material	35 x 63 x 90 mm Noryl, self-extinguishing: UL 94 V-0
Sealing covers	Included
Mounting	DIN-rail
Protection degree Front Screw terminals (cable inputs)	IP20 IP20
Weight	Approx. 160 g (packing included)

Power supply specifications

Self power supply AV0	230VAC VL-N, -30% +20% 50/60Hz
AV1	120VAC VL-N, -30% +30% 50/60Hz

Power consumption	≤ 1.0W, ≤ 8VA

Insulation (for 1 minute) between inputs and outputs

	Measuring input	Serial output	Digital input
Measuring input	-	4 kV	4 kV
Serial output	4 kV	-	0 kV
Digital input	4 kV	0 kV	-

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Accuracy (according to 62053-21 and EN62053-23)

kWh, accuracy (RDG) depending on the current

Percentage error limits for class index B

```
+1.5%
+1%
0%
-1%
-1.5%
```

PF=1	0.25A(I_{min})	0.5A(I_{tr})	5A(I_n)	100A(I_{max})
	0.05A(I_{ref})	(0,1I_{ref})		
PF=L0.5 or C0.8		0.5A(I_{tr})	5A(I_n)	100A(I_{max})
		(0,1I_{ref})		

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

kvarh, accuracy (RDG) depending on the current

Error

```
+2.5%
+2%
0%
-2%
-2.5%
```

sinφ =1	0.25A (0.05lb)	0.5A (0.1lb)	5A(lb)	100A(I_{max})
sinφ=0.5	0.5A (0.1lb)	1A (0.25lb)	5A(lb)	100A(I_{max})

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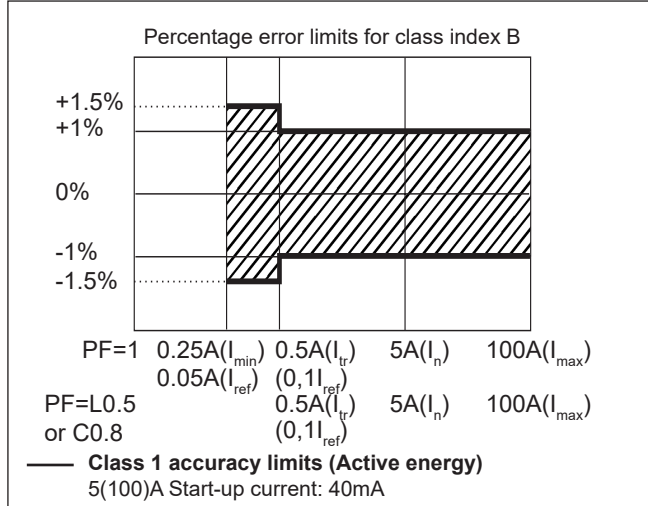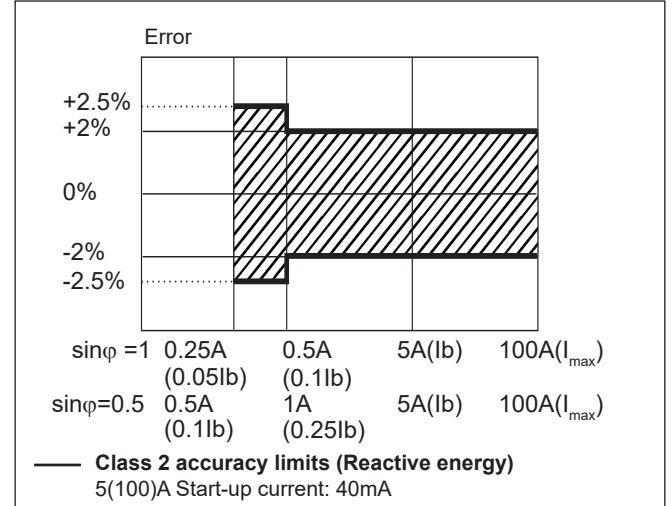
Available variables

1	kWh+ (imported)
2	kWh- (exported)
3	kWh (t1 and t2)
4	kW
5	kW dmd
6	kW dmd peak
7	kvar
8	kVA
9	V
10	A
11	PF
12	Hz
13	Run hour meter

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List of programming parameters

Menu name and description		Range	Default setting
Measure	Measurement type (A=easy connection; B=bidirectional, imported and exported energy). Not available in PFA and PFB versions (MID)	A; b	A
P int	Integration time for Wdmd calculation	1 to 30 min	1
Tariff	Tariff enabling	Yes/No	No
Address	Modbus serial address	1 to 247	01
Kbaud	Modbus baud rate	9.6; 19.2; 38.4; 57.6, 115.2 kbps	9.6
ParItY	Modbus parity	No/even	No
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

Specification are subject to change without notice ET112 DS 090620

Wiring diagrams

1-ph, 2-wire (F 315mA)   **Fig.1**
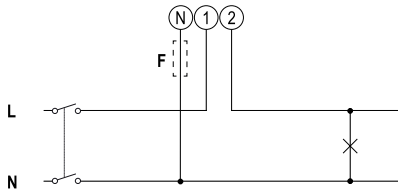
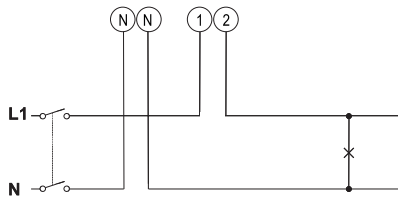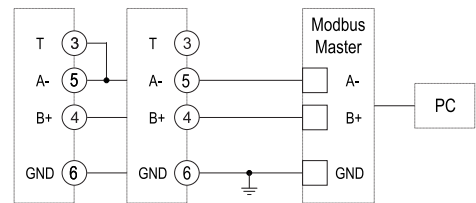

Digital Input   **Fig.2**
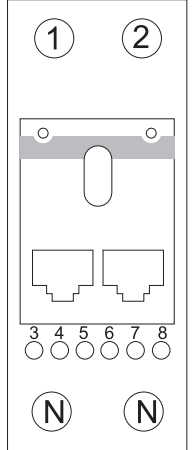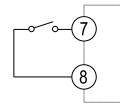
1-ph, 2-wire (F 315mA)   **Fig.3**

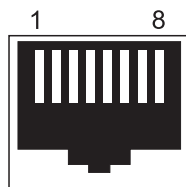RS485 (screw terminals) Modbus communication port   **Fig.4**

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.
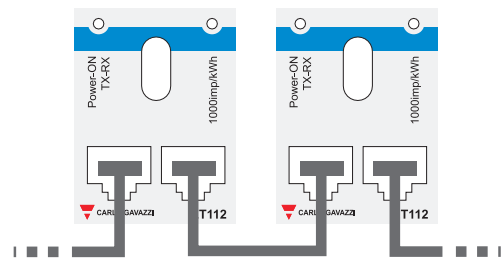

Modbus RJ45 female connector connection diagram   **Fig.5**

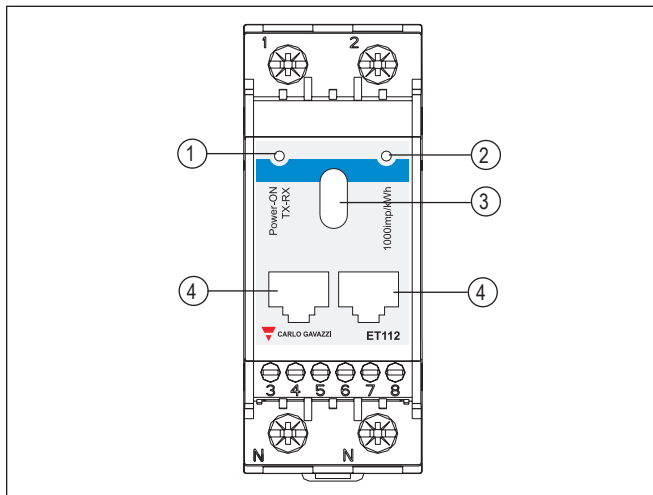| 4	B+
5	A-
8	GND

RS485 (RJ45) Modbus connection   **Fig.6**

The serial output must only be terminated on the last network device connecting terminals A- (5) and T (3). For connections longer than 1000 m use a signal repeater. Maximum 247 transceivers on the same bus.

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Front panel description

1. **LED**
   Power-ON LED with communication indication (when blinking)

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

3. **Optical port**
   Optical port for data transmission or programming

4. **RJ45 Modbus RTU ports (RS485)**
   Modbus ports for fast bus connection. The ports are in parallel. The screw terminals can be used as well (same Modbus port).

Dimensions (mm)

Specification are subject to change without notice ET112 DS 090620