

ZxXi3x0xQ (Firmware version V9x.xx.xx.xx)

## E450 Series 4 G3-PLC IDIS 3-phase Technical data



E450 Series 4 G3-PLC OFDM IDIS is an advanced, integrated residential electricity meter that incorporates such core functionalities as powerful e-metering, multi-energy data collection, remote and local communication, as well as end-user interaction.

E450 Series 4 is based on open and interoperable standards, such as high-speed G3-PLC OFDM communication technology.

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## Revision history

Version	Date	Comments
a.01	12.02.2015	First draft.
a.02	06.03.2016	Corrected permeability level.
a.03	19.03.2015	Updated operating temperature range of the LCD display.
a (1.0)	12.05.2015	First edition.
b (1.1)	22.05.2015	Updated supply control switch specifications.
1.2	02.06.2015	Updated inputs in the type designation.
c (1.3)	30.07.2015	Updated case material. Updated main terminal descriptions.
d (1.4)	09.02.2016	Added UC3 to supply control switch. Added OMS application protocol to wireless M-Bus. Added G3-500 band (150-500 kHz).
e	21.04.2016	Updated switching terminology. Added fast transient burst test.
f	09.06.2016	Updated pulse input variant 2.
g	07.08.2017	Updated ingress protection to IP54.
h	13.06.2019	Added tightening torque and G3-PLC signal injection.
k	06.09.2019	Updated ingress protection. Updated DLMS/COSEM standards.

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## E450 Series 4 G3-PLC IDIS 3-phase ZxXi3x0xQ – Technical data

### General

#### Functions

Measurement:

- Combined bi-directional measurement
- Three-phase/four-wire (ZMXi3x0) or three-phase/three-wire (ZFXi3x0)

Communication module:

- Two-way communication to the metering system with an integrated G3-PLC transceiver

M-Bus interface:

- Wired and wireless M-Bus interfaces support up to 4 multi-energy devices (gas, water, district heating)

Inputs and outputs:

- One digital input parameterised as S0, alarm or remote Supply Control Switch command
- 0 to 2 load/auxiliary control switch outputs  
Output 1: Solid-state auxiliary control switch or mechanical, on-off latching load control switch  
Output 2: Mechanical, normally-open load control switch
- Optical port for local reading, configuration and parameterisation

Control buttons:

- Scroll button for display
- Supply Control button
- Sealable reset button

LCD display:

- 8 digits for register value display
- Phase, energy direction, no-load mode, alarm, units of measure, supercapacitor state and Supply Control Switch state indicators on display
- Multi-energy units of measure

Internal Supply Control Switch:

- Disconnection of energy
- Neutral disconnection (optional)
- 5 operating modes
- Can be controlled remotely from an AMM system, manually with a push-button or via local communication interfaces
- According to IEC 62052-21 and EN 62053-21

### Voltage and frequency

Nominal voltage  $U_n$

ZMXi3x0	3 x 230/400 VAC
ZFXi3x0	3 x 230/230 VAC

Extended operating voltage range 80% – 115%  $U_n$

Nominal frequency  $f_n$  50 Hz ( $\pm 2\%$ )

### IEC-specific data

#### Current

Base current  $I_b$  5 A

Maximum current  $I_{max}$

Metrological 100 A

Thermal 100 A

Short-circuit  $\leq 10$  ms  $30 \times I_{max}$

#### Measurement accuracy

ZMXi3x0 or ZFXi3x0

Active energy, to IEC 62052-11/62053-21 class 1 or 2

Reactive energy, to IEC 62053-23 class 2

#### Measurement behaviour

Starting current

According to IEC 0.4%  $I_b$

Typical approximately 0.25%  $I_b$

### MID-specific data

#### Current

Reference current  $I_{ref}$  5 A

Minimum current  $I_{min}$  0.25 A

Maximum current  $I_{max}$  100 A

Thermal current  $I_{th}$  100 A

#### Measurement accuracy

ZMXi3x0 or ZFXi3x0

According to EN 50470-1/50470-3 class B or A

Reactive energy (EN 62053-23) class 2

#### Measurement behaviour

Starting current  $I_{st}$  0.4 % of  $I_{ref}$  ( $\leq 20$  mA)

### General data

#### Operating behaviour

Voltage failure (power-down)

Voltage (for  $U_n=230/400$  V)  $<175$  V

Voltage (for  $U_n=230/230$  V)  $<175$  V

<b>Voltage restoration (power-up)</b>	
Function standby 3-phases	< 5 s
Detection of energy direction / phase voltage	< 3 s
Voltage	> 180 V

### Power consumption

<b>Total power consumption of the meter</b>	
Active power at $U_n$ (typical)	< 2.5 W
Apparent power at $U_n$ (typical)	< 8.5 VA

### Environmental influences

<b>Temperature range</b>	
Operation (meter)	-40 °C to +70 °C
Operation (LCD display)	-25 °C to +70 °C
Storage	-40 °C to +85 °C

### Temperature coefficient

<b>Range</b>	
Range	-40 °C to +70 °C
Average value (typical)	$\pm 0.01\%$ per K
At $\cos\varphi=1$ (from 0.1 $I_b$ to $I_{max}$ )	$\pm 0.05\%$ per K
At $\cos\varphi=0.5$ (from 0.2 $I_b$ to $I_{max}$ )	$\pm 0.07\%$ per K

### Ingress protection according to IEC 60529

IP54 (without breakouts)  
This meter is intended for indoor use only.

### Electromagnetic compatibility

<b>Electrostatic discharges according to IEC 61000-4-2</b>	
Contact discharge	8 kV
Air discharge	15 kV

<b>Electromagnetic RF fields acc. to IEC 61000-4-3</b>	
80 MHz to 2 GHz	10 and 30 V/m

<b>Radio interference suppression according to IEC/CISPR 22</b>	
	class B

<b>Fast transient burst test acc. to IEC 61000-4-4</b>	
Current and voltage circuits under load according to IEC 62053-21	4 kV
Auxiliary circuits > 40 V	1 kV

<b>Surge test acc. to IEC 61000-4-5</b>	
Current and voltage circuits	4 kV
Auxiliary circuits > 40 V	1 kV

### Insulation strength

Insulation strength	4 kV at 50 Hz during 1 minute
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### Impulse voltage 1.2/50 $\mu$ s

According to IEC 62052-11	6 kV
According to SP 1618	12 kV

Protection class II acc. to IEC 62052-11 

### Calendar clock

#### Normal operation

Accuracy (at +23 °C)  $\pm 0.2$  s/day  
(EN 62054-21 requirement for time switches: 0.5 s)

#### Reserve running

Accuracy (at +23 °C) < 1 s/day  
(EN 62054-21 requirement for time switches: 1.0 s)

#### Back-up time (power reserve)

With supercapacitor 7 days

### Display

#### Characteristics

Type	LCD liquid crystal display
Digit size value field	8 mm
Number of digits value field	8
Digit size index field	6 mm
Number of digits index field	6

### Inputs and outputs

#### Pulse input – Variant 1 (only one variant selectable)

Type	S0
Terminals	30 (+) and 31 (-)
According to IEC 62053-31	class B (class A possible with resistor value change)
Configurable as pulse counter, alarm, remote Supply Control Switch button or tariff control	

#### Pulse input – Variant 2 (only one variant selectable)

Type	Bi-stable maximum 230 VAC Input logical "high" when voltage above 80 VAC Input logical "low" when voltage below 50 VAC
Terminals	30 and 31
Configurable as tariff control	

#### Optical pulse output active and reactive energy

Type	red LED
Pulse length	settable from 2 to 40 ms
Meter constant	500 or 1000 imp/kWh

#### Output 1 (1st terminal block from left)

Terminals	23 and 24
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#### Output 1 – Variant 1 (only one variant selectable)

Type	solid-state auxiliary control switch
Nominal voltage	230 VAC/DC
Maximum voltage	250 VAC/DC
Maximum switching current	90 mA

**Output 1 – Variant 2 (only one variant selectable)**

Type	mechanical, on-off latching load control switch
Nominal voltage	230 VAC
Maximum voltage	250 VAC
Resistive load	5 A

**Output 2 (2nd terminal block from left)**

Terminals	25 and 26
Type	mechanical, normally-open, non-latching load control switch
Nominal voltage	250 VAC
Maximum voltage	400 VAC
Resistive load	8 A (6 A at $\cos\phi$ 0.4)
Switching current	5 A at 30 VDC

**Phase connections**

Material of terminal	brass
Type	terminal with two screws
Diameter	9.5 mm
Minimum conductor cross-section	4.0 mm <sup>2</sup>
Maximum conductor cross-section	35.0 mm <sup>2</sup>

For wires with small conductor cross-sections ( $\leq 6$  mm<sup>2</sup>), the connecting line must be placed carefully in the middle of the terminal, so that it cannot move sideways when lightening the terminal screws. When tightening, ensure that the connecting line remains between the copper inside the terminal and the screw.

Stranded wires must be fitted with ferrules.

## - Type of screw:

- Steel zinc-plated Pozidriv combi screws (default)
- Steel tin-plated Pozidriv combi screws (optional)

- Screw dimensions	M6 x 14
- Maximum screw head diameter	$\leq 6.6$ mm
- Cross-slot	type Z, size 2 (ISO4757-1983)
- Slot width	0.8 mm
- Slot length	minimum 6 mm
- Tightening torque	< 3 Nm

**Communication interfaces****Optical interface**

Type	serial, bi-directional interface
Protocol	according to IEC 62056-21

**G3-PLC interface**

Frequency band 1	CENELEC A
Frequency band 2	G3-500 (150-500 kHz FCC)

- G3-PLC with COSEM/DLMS communication protocol according to EN50065-1 supporting the following OSI Layers:

- ITU-T G.9903 physical layer for modulation, adaptive tone mapping and notching
- MAC layer IEEE 802.15.4 ; time domain and collision management; CSMA/ARQ

- 6LoWPAN adaptation sub-layer Plug and Play network management to choose “Best Path” (Full Mesh Support)
  - IPv6 IETF RFC4291/4862 addressing and networking
  - DLMS application layer 62056-5-3
  - COSEM application model: 62056-6-1 (OBIS) and 62056-6-2 (interface classes)
- G3-PLC signal injection between L1 and N

**Wired M-Bus interface**

Terminals	28 and 29
“Point-to-Point” or “Point-to-Multipoint” bus system	
Standard	EN 13757-2: 2005
Maximum transmission rate	2400 bps
Maximum unit loads (1 unit load = 1.5 mA)	$\leq 16$
Maximum wiring length	$\leq 50$ m
Transmission from master:	
MARK:	H = SPACE voltage + $\geq 10$ V but < 42 V
SPACE:	L $\geq 12$ V
Transmission from slave:	
MARK:	L = 0 mA to 1.5 mA
SPACE:	H = (11 mA to 20 mA + MARK current)

**Wireless M-Bus interface**

Frequency	868 MHz according to EN 13757-4
Range up to 200 metres (with integrated antenna)	
Read-out frequency	max. every 8 seconds (impact on reserve energy)
Application protocol	DSMR 2.2+ and OMS 4.0+

**Internal supply control switch****Contact data**

Poles	3 poles
Short-circuit $\leq 10$ ms to EN 62053-21	3000 A
Maximum switching power	25 kVA
General load switching capacity according to	UC3 (EN 62055-31)

**Material****Case**

Case material is glass-filled polycarbonate.  
Flame retardant and self-extinguishing class V0 according to IEC 60695-11-10.  
High temperature deflection, UV stabilised and can withstand applicable environmental tests defined in IEC 60068.

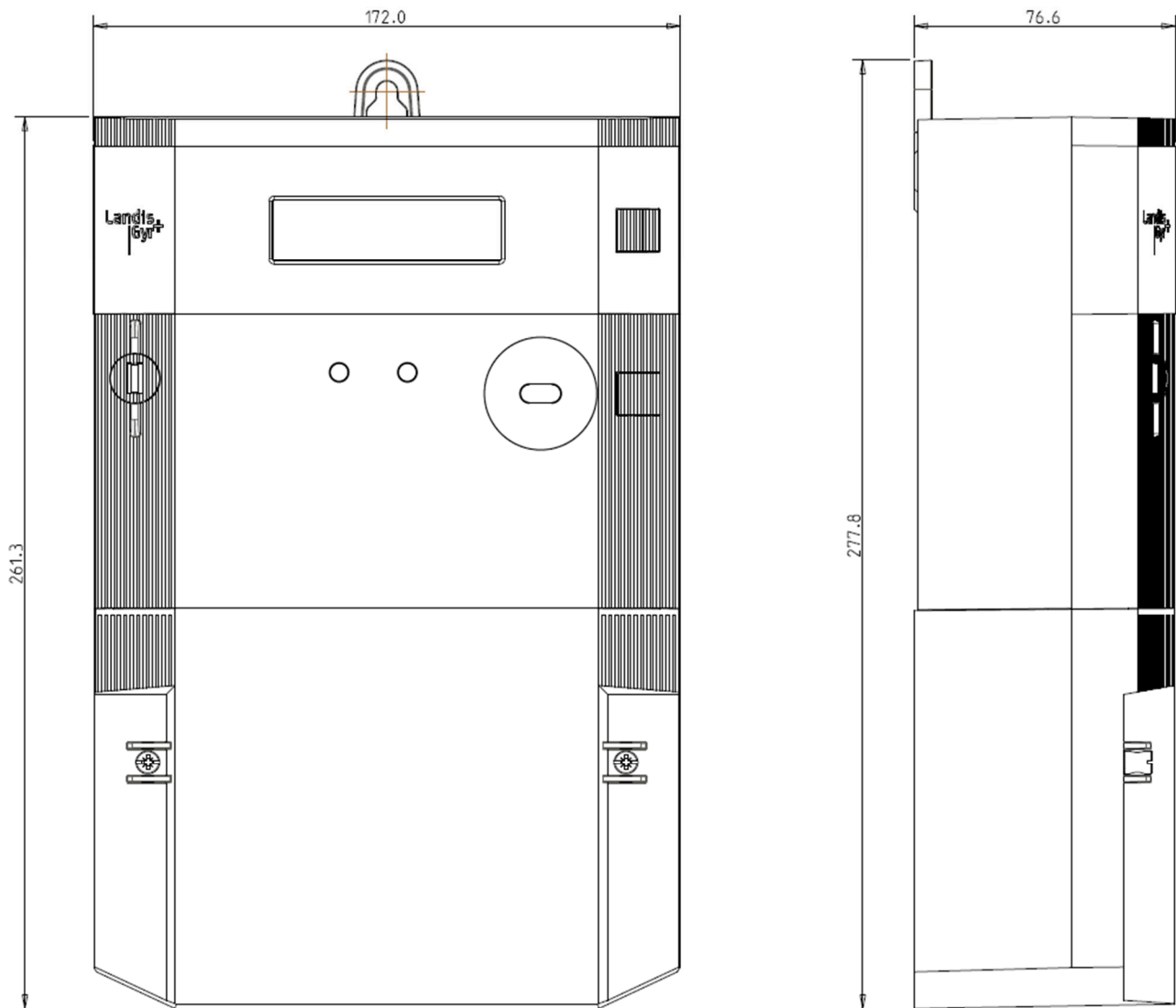
**Weight and dimensions****Weight**

approximately 1.5 kg

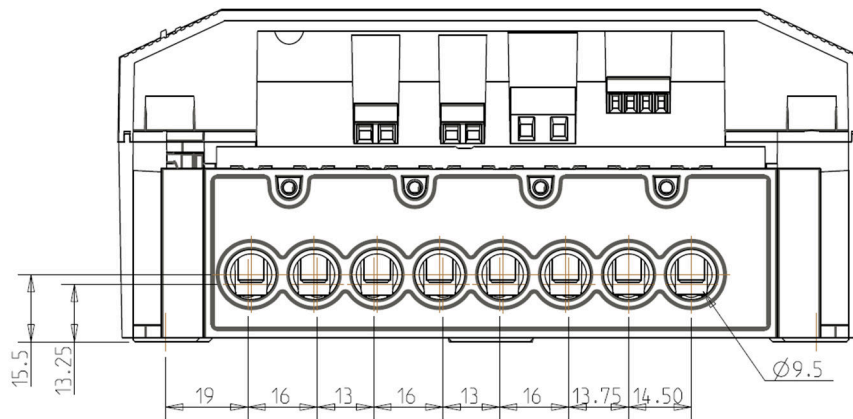
**Width/height/depth**

172.0 / 261.3 / 76.6 mm

## Dimensions (with terminal cover)



## Dimensions of connection terminals



## Type designation

	<b>Example</b>	<b>ZMX</b>	<b>i</b>	<b>3</b>	<b>10</b>	<b>C</b>	<b>Q</b>	<b>U1</b>	<b>L1</b>	<b>D3</b>	<b>.3</b>	<b>1</b>	<b>S4</b>
<b>Network type</b>	_____												
ZMX	3-phase, 4-wire (M-connected)												
ZFX	3-phase, 3-wire (F-connected)												
ZCX	1-phase, 2-wire (C-connected)												
<b>Build option</b>	_____												
-	Non-IDIS-compliant variant												
i	IDIS-compliant variant												
<b>Connection type</b>	_____												
1	Direct connected (1-phase)												
3	Direct connected (3-phase)												
<b>Accuracy class</b>	_____												
10	MID class B; IEC class 1												
20	MID class A; IEC class 2												
<b>Measured quantities</b>	_____												
A	Active energy, bi-directional												
C	Active and reactive energy (combi)												
<b>System communication</b>	_____												
Q	G3-PLC OFDM												
<b>Built-in local communication options</b>	_____												
U0	Optical port												
U1	Optical port + wireless M-Bus (868 MHz)												
<b>Extension port options</b>	_____												
L0	Not in use												
L1	Wired M-Bus												
<b>Supply control switch options</b>	_____												
D0	0 pole SCS (supply control switch)												
D1	1-pole SCS (1-phase meters only)												
D2	2-pole SCS (1-phase meters only)												
D3	3-pole SCS (3-phase 3-wire and 4-wire meters)												
<b>Load and auxiliary control switch options</b>	_____												
0	No load or auxiliary control switches												
2	90 mA OptoMOS solid-state auxiliary control switch + 8 A mechanical load control switch												
3	5 A mechanical, latching load control switch + 8 A mechanical load control switch												
<b>Other options</b>	_____												
0	Not in use												
1	Digital input												
5	Control input												
S4	Series 4 HW (E450 G3-PLC OFDM)												

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