

The E650 transformer connected I&C meters record active and reactive energy consumption in all three-phase four-wire and three-phase three-wire networks.

Range

E650 meters are the answer to a wide range of specific needs: from the reliable commercial meter to the complex measuring device with comprehensive additional functionality for sophisticated data acquisition and flexible tariff control of large industrial customers.

E650 Series 3 – ZxD400AT/CT

General

Voltage

Nominal voltage U_n ZMD400xT	3 x 58/100 V to 69/120 V 3 x 110/190 V to 133/230 V 3 x 220/380 V to 240/415 V
extended operating voltage range	3 x 58/100 to 240/415 V

Nominal Voltage U_n ZFD400xT	3 x 100 to 120 V 3 x 220 to 240 V
extended operating voltage range	3 x 100 to 415 V

Voltage range	80 to 115%
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Frequency

Nominal frequency f_n	50 or 60 Hz
tolerance	$\pm 2\%$

IEC-specific Data

Current

Nominal Current I_n	1 A, 2 A, 5 A, 5 1 A
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Maximal Current I_{max}	
metrological 1 A	2 A, 10 A
metrological 2 A	4 A
metrological 5 1 A	6 A
metrological 5 A	200% I_n or 400% I_n
thermal 1 A, 2 A, 5 1 A	12 A
thermal 5 A	12 A or 24 A
Short Circuit Current	0.5 s with 20 x I_{max}

Modular communication

AT/CT-type meters are equipped with modular communication units which provide the right choice for the best data channel at all times. «Plug+Play» modules also offer you full freedom of choice for deployment of new communication technologies.

Installation support

An indication of phase voltages, phase angles, rotating field and energy direction supports the installation.

Technical specifications

Measurement Accuracy

ZxD405xT	
active energy, to IEC 62053-22	class 0.5 S
reactive energy, to IEC 62053-23	accuracy 1%

ZxD410xT	
active energy, to IEC 62053-21	class 1
reactive energy, to IEC 62053-23	accuracy 1%

Measurement Behaviour

Starting current ZxD405xT	
according to IEC	0.1% I_n
typical	0.07% I_n
5 1 A	as 1 A meter

Starting current ZxD410xT	
according to IEC	0.2% I_n
typical	0.14% I_n
5 1 A	as 1 A meter

The startup of the meter is controlled by the starting power and not by the starting current.

Starting power in M-circuit	single phase
nominal voltage x starting current	

Starting power in F-circuit	all phases
nominal voltage x starting current x $\sqrt{3}$	

MID-specific Data

Current (for classes B and C)

Rated current I_n	1.0 A, 2.0 A, 5.0 A
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Minimum current I_{min}	0.01 A, 0.02 A, 0.05 A
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Transitional current I_{tr}	0.05, 0.1 A, 0.25 A
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Maximum current I_{max}	2.0 A, 4 A, 10.0 A or 20 A
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Measurement Accuracy	to EN 50470-3
ZxD400xT	classes B and C

Measurement Behaviour

Starting current I_{st}	
class B: I_{st}	0.002, 0.01 A
class C: I_{st}	0.001, 0.005 A

General

Operating Behaviour

Voltage failure (Power Down)	
bridging time	0.5 s
data storage	after another 0.2 s
switch off	after approx. 2.5 s

Voltage restoration (Power Up)	
function standby 3 phases	after 2 s
function standby 1 phase	after 5 s
detection of energy direction and phase voltage	after 2 to 3 s

Power Consumption

Power consumption per phase in voltage circuit			
phase voltage	58 V	100 V	240 V
active power (typical)	0.4 W	0.5 W	0.7 W
apparent power (typical)	0.8 VA	1.0 VA	1.7 VA

Power consumption per phase in current circuit			
phase current	1 A	5 A	10 A
active power (typical)	5 mW	0.125 W	0.5 W
apparent power (typical)	5 mVA	0.125 VA	0.5 VA

Environmental Influences

Temperature range	to IEC 62052-11
operation	-25 °C to +70 °C
storage	-40 °C to +85 °C

Temperature coefficient	
range	-25 °C to +70 °C
average value (typical)	± 0.012% per K
at $\cos\varphi=1$ (from 0.05 I_b to I_{max})	± 0.02% per K
at $\cos\varphi=0.5$ (from 0.1 I_b to I_{max})	± 0.03% per K

Impermeability to IEC 60529	IP51
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Electromagnetic Compatibility

Electrostatic discharges	to IEC 61000-4-2
contact discharge	15 kV

Electromagnetic RF fields	to IEC 61000-4-3
80 MHz to 2 GHz	10 and 30 V/m

Radio interference suppression	
according to IEC/CISPR 22	class B

Fast transient burst test	to IEC 61000-4-4
current and voltage circuits under load	
according to IEC 62053-21/23	4 kV
auxiliary circuits > 40 V	2 kV

Fast transient surge test	to IEC 61000-4-5
current and voltage circuits	4 kV
auxiliary circuits > 40 V	1 kV

Insulation Strength

Insulation strength	4 kV at 50 Hz during 1 min.
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Impulse voltage 1.2/50 μs	to IEC 62052-11
current and voltage circuits	8 kV
auxiliary circuits	6 kV

Protection class II	to IEC 62052-11	<input type="checkbox"/>
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Calendar Clock

Calendar type	Gregorian or Persian (Jalaali)
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Accuracy	< 5 ppm
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Backup time (power reserve)	
with supercap	> 20 days
charging time for max. backup time	300 h
with battery (optional)	10 years
battery type	CR-P2

Display

Characteristics	
type	LCD liquid crystal display
digit size in value field	8 mm
number of digits in value field	up to 8
digit size in index field	6 mm
number of digits in index field	up to 8

Inputs and Outputs

Control inputs	
control voltage U_s	100 to 240 V _{AC}
input current	< 2 mA ohmic at 230 V _{AC}

Output contacts	
type	solid state relay
voltage	12 to 240 V _{AC/DC}
max. current	100 mA
max. switching frequency (pulse length 20 ms)	25 Hz

Optical test outputs	
type	active and reactive energy
number	red LED
meter constant	2
	selectable

Communication Interface

Optical interface	to IEC 62056-21
type	serial, asynchronous, half-duplex
max. transmission rate	9600 bps
protocols	IEC 62056-21 and dlms

Communication Units

Exchangeable communication units for various applications.

Additional Power Supply (optional)

On Extension Board 045x

nominal voltage range	100 to 240 V _{AC/DC}
tolerance	80 to 115% U _n
frequency	50 or 60 Hz
max. power consumption	6.8 W

On Extension Board 046x

nominal voltage range	12 to 24 V _{DC}
tolerance	80 to 115% U _n
max. power consumption	3.5 W

Weight and Dimensions

Weight	approx. 1.5 kg
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External dimensions

width	177 mm
height (with short terminal cover)	244 mm
height (with standard terminal cover)	281.5 mm
height (with extended hook)	305.5 mm
depth	75 mm

Suspension triangle

height (with extended hook)	230 mm
height (suspension eyelet open)	206 mm
height (suspension eyelet covered)	190 mm
width	150 mm

Terminal cover

short	no free space
standard	40 mm free space
long (opaque, transparent)	60 mm free space
GSM	60 mm free space
ZxB-type 80 mm	80 mm free space
ZxB-type 110 mm	110 mm free space
ADP1 adapter	
RCR/FTY adapter	

Material housing

Polycarbonate, partly glass-fibre reinforced

Connections

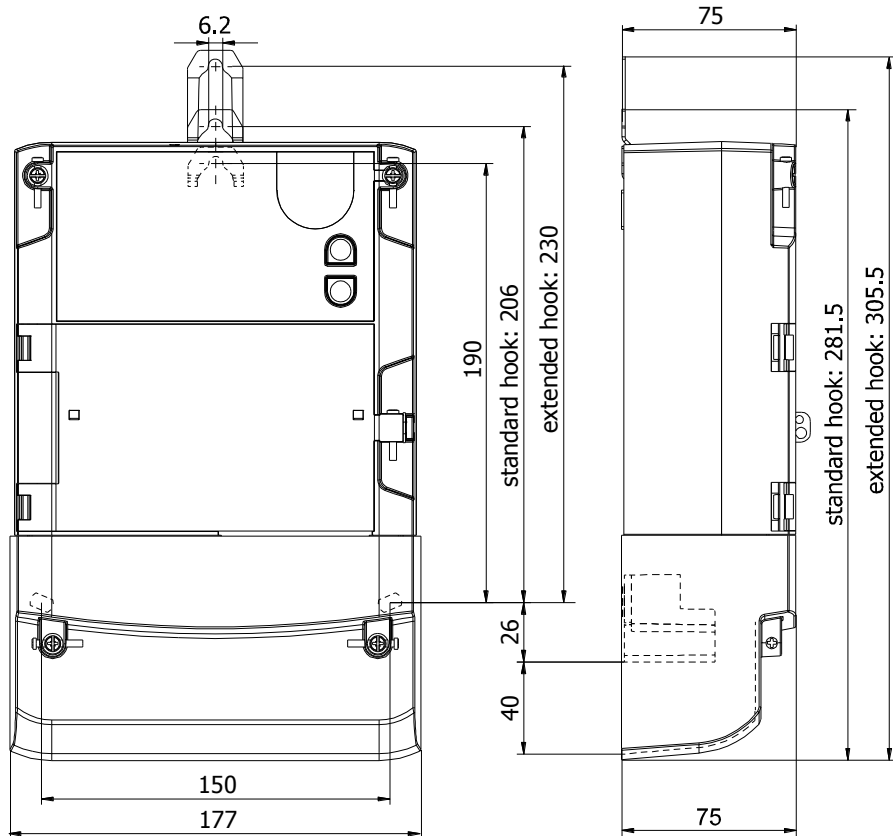
Phase connections

type	screw type terminals
diameter	5.2 mm
recommended conductor cross section	4 to 6 mm ²
screw head	Pozidrive Combi No. 2
screw dimensions	M4 x 8
screw head diameter	≤ 5.8 mm
tightening torque	< 1.7 Nm

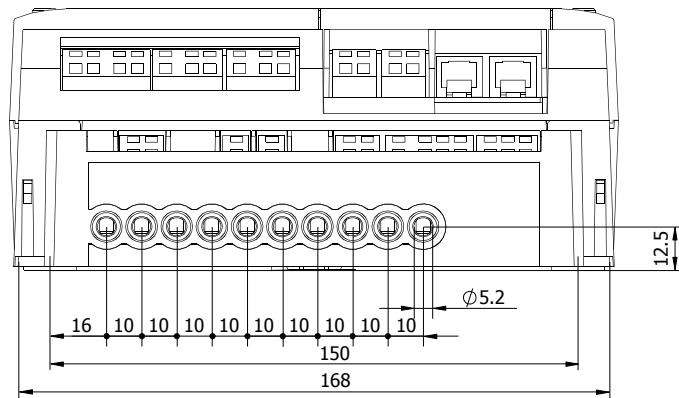
Other connections

type	screwless spring-type terminal
max. current of voltage outputs	1 A
max. voltage of inputs	250 V

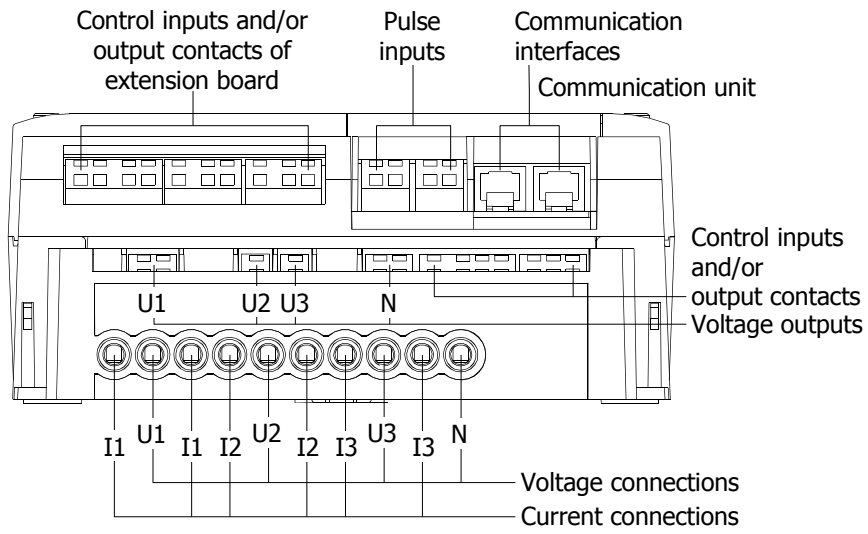
Meter Dimensions (standard terminal cover)



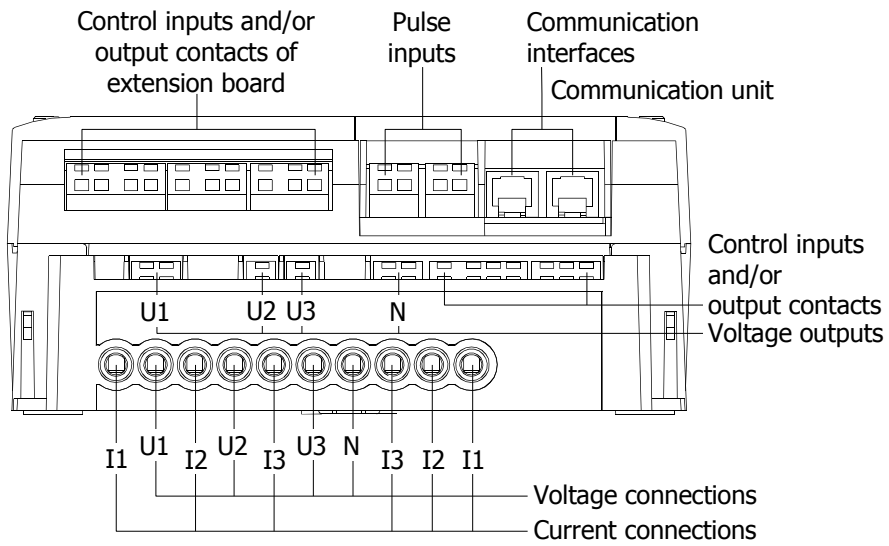
Terminal Dimensions



Terminal Layout according to DIN



Symmetrical Terminal Layout (optional, ZMD400 only)



Type designation	ZMD	4	10	C	T	44	4207	S3
Network Type								
ZFD	3-phase 3 wire network (F-circuit)							
ZMD	3-phase 4 wire network (M-circuit)							
Connection Type								
4	Transformer operated							
Accuracy Class								
10	Active energy class 1 (IEC), B (MID)							
05	Active energy class 0.5s (IEC), C (MID)							
Measured Quantities								
C	Active and reactive energy							
A	Active energy							
Construction								
T	With exchangeable communication units							
Tariffication								
21	Energy rates, external rate control via control inputs							
24	Energy rates, internal rate control via time switch (additionally possible via control inputs)							
41	Energy and demand rates, external rate control via control inputs							
44	Energy and demand rates, internal rate control via time switch (additionally possible via control inputs)							
	All versions with 3 control inputs and 2 output contacts							
Additional functions								
060x	6 outputs							
240x	2 control inputs, 4 outputs							
420x	4 control inputs, 2 outputs							
045x	4 outputs, auxiliary power supply 100 to 240 VAC							
046x	4 outputs, auxiliary power supply 12 to 24 VDC							
xxx0	no additional functions							
xxx2	DC-magnet-detection							
xxx7	load profile							
xxx9	DC-magnet-detection and load profile							
Series 3								

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