kamstrup

Data sheet

OMNIPOWER® CT

- Current transformer meter
- Apparent power values per phase and total (KVA, PF)
- Power Quality Measurements according to EN 50160
- Optimized for Smart Metering systems
- Secured against tampering
- Resistant to errors in the supply network
- Ultra-low power consumption
- Built-in radio communication
- Transformer ratio up to 3000A/5A or 600A/1A
- Type approved according to:
  - Active energy
    EN 50470-1 (MID)
    EN 50470-3 (MID)
  - Active energy
    and reactive energy
    IEC 62052-11
    IEC 62053-22
    IEC 62053-23
- Communication protocol:
  - DLMS/COSEM



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Application

OMNIPOWER® CT is a 3-phased current transformer electricity meter for registration of electric energy. The meter is fully electronic without movable parts. Thus, energy registration is not affected by shock or impact during transport and mounting. Furthermore, measurements are correct no matter the physical mounting direction.

Energy is determined by simultaneously measuring voltage and current. The current is measured via current transformers.

The easily readable display scrolls automatically between readings, or readings can be changed manually by activating the left push button. The required display readings as well as their order are configurable.

In addition to being read from the display, data can be collected via Radio Mesh network, optical output or from the module area. The unique module area also permits external changing of tariffs, pulse inputs and outputs, and configuration as well as a wide range of communication media.

A Consumer Communication Channel is available for data exchange with Smart Home products.

From the factory, the meter can be configured to measure both imported and exported energy. The meter makes accurate measurements whether it measures 1, 2 or 3 phases. Measurements are saved in a permanent memory.

As default, the OMNIPOWER® CT meter can generate load profiles in all four quadrants.

A load profile provides detailed information about consumed and produced energy. An additional logger with 24 channels contains data for analysis purposes.

The OMNIPOWER® CT meter is also designed to support extended analysis of the main grid using measurements of THD (voltage), Power Factor, Voltage unbalance, Voltage variations and sags and swells.

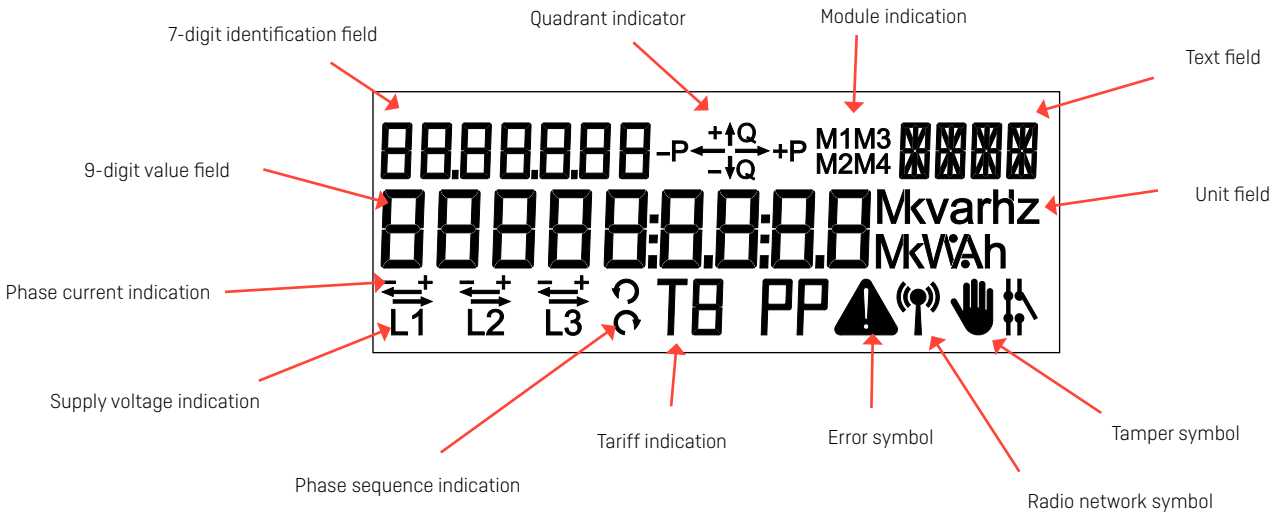
In order to minimise the manual configuration during installation, the meter is preconfigured from the factory. Furthermore, the meter can be reconfigured via a Smart Metering system.

Functions

Display

OMNIPOWER® CT is provided with a Liquid Crystal Display (LCD). The registers that can be read from the display depend on the chosen configuration. It is also possible to remotely configure the display.

The display configuration is constructed as three independent display lists: One for automatic shift function, one for manual shift function and one for back-up-powered shift function. The display is constructed of segments as shown in the figure below.



9-digit value field:	This field is used for displaying register values.
Unit field:	This field is used for displaying the units that are related to the value field.
7-digit identification field:	OBIS code identification of the value in the value field.
Quadrant indicator:	Indicates the current load type.
Text field:	Contains additional text in connection with the meter's function.
Module indication:	Indicates if and which modules that communicate in the display.
Error symbol:	Indicates critical internal errors.
Tamper symbol:	Indicates magnetic influence or opening of the terminal cover, either temporary or permanent.
Radio Network symbol:	Indicates communication with AMR system.
Tariff indication:	Indicates the current tariff if tariffs have been selected.
Phase sequence indication:	Indicates the phase sequence of the input phases. ↻ = L1L2L3 ↺ = L1L3L2
Supply voltage indicator:	Indicates that voltage is above the minimum threshold (160 V).
Phase current indication:	Indicates that the load is above the minimum threshold (0,6 W).

Functions

Display

The automatic shift function (scroll) changes between the selected readings every 10 seconds. Historical data cannot be selected in the automatic shift function. Up to 16 readings can be selected.

The manual shift function changes through activation of the left push button. Up to 30 readings and the reading order can be selected. However, it is not possible to deselect the legal readings.

If the back-up-operated shift function is selected, it becomes possible to read the display, also when the meter is not power supplied. Up to 8 readings can be selected, and shifts between readings are made by activating the left push button.

The meter automatically returns from manual shift function to automatic scroll function two minutes after the last activation of the left push button.

Energy reading

OMNIPOWER® CT has one current transformer per measuring system and resistance division for voltage measurement. Energy consumption is calculated as an expression of the current compared to the phase voltage and time.
The energy registration per measuring system is communicated to the meter's legal processor via the meter's own internal bus system and is summed in the meter's main registers.

Permanent memory

Measured and calculated data are stored in the meter's permanent memory. Data are stored by every change of energy register values.

Furthermore, the below mentioned values are stored at the end of a debiting period:

Various	Energy registers	Power registers
RTC/Quality info	Active positive primary energy A+	Peak power P+max
Hour counter	Active negative primary energy A-	Peak power P+ max RTC
Debiting stop counter	Reactive positive primary energy R+	Accumulated peak power P+max acc
Power threshold counter (A+)	Reactive negative primary energy R-	Accumulated peak power P+max acc Tariff 1
Pulse input	Apparent positive energy E+	Accumulated peak power P+max acc Tariff 2
Current transformer ratio	Apparent negative energy E-	Peak power Q+max
	Active positive primary energy A+ Tariff 1	Peak power Q+ max RTC
	Active positive primary energy A+ Tariff 2	Accumulated peak power Q+max acc
	Active positive primary energy A+ Tariff 3	Peak power P+max Tariff 1
	Active positive primary energy A+ Tariff 4	Peak power P+ max Tariff 1 RTC
	Reactive positive primary energy R+ Tariff 1	Peak power P+max Tariff 2
	Reactive positive primary energy R+ Tariff 2	Peak power P+ max Tariff 2 RTC
	Reactive positive primary energy R+ Tariff 3	Peak power Q+max Tariff 1
	Reactive positive primary energy R+ Tariff 4	Peak power Q+ max Tariff 1 RTC
		Peak power Q+max Tariff 2
		Peak power Q+ max Tariff 2 RTC
		Peak power S+max
		Peak power S+ max RTC
		Peak power S-max
		Peak power S- max RTC

Functions

Plug-in modules

OMIPOWER CT can be mounted/retrofitted with plug-in modules without subsequent reverification.

The module communicates with the meter's microprocessor via an internal data bus. This provides innumerable functional possibilities such as extra pulse output, tariff, load control and data communication via e.g. GSM/GPRS and M-Bus.

Optical reading

An optical sender/receiver is placed on the front of the meter. This optical connection can be used to read data or configure e.g. display set-up, meter number and other settings.

Changes via the optical connection can be made by using the software program METERTOOL OMNIPOWER®.

It is not possible to change the meter's legal data.

S0 pulse output

Emits pulses of secondary active energy at 5000 pulses per kWh. The maximum voltage, which may be connected to the S0 output, is 27 V DC (at 1 kΩ), and the maximum current, which can be drawn through the output, is 27 mA. The pulse time is 30 msec.

Load profile*

Load profiles can be configured to 15, 30 or 60 min. according to the integration period and for all four quadrants. The number of generated profiles corresponds to the selected energy type for the meter.

Integration period Energy type	15 min. days	30 min. days	60 min. days
A+	278	556	1113
A+/A-	235	470	941
A+/R+	235	470	941
A+/A-/R+/R-	180	360	720
A+/A-/R1/R2/R3/R4	145	291	583
A+/A-/R+/R-/R1/R2/R3/R4	122	244	489

* Load profile for Austria is limited to 60 days with a fixed integration period of 15 min

The logging depths listed above apply to OMNIA 3.0 firmware and newer.

Analysis logger

OMNIPOWER® CT is provided with a configurable analysis logger. The logging depth is depending on the configuration of the meter as well as the number of registers. The analysis logger can register data from up to 24 different registers at a time. OMNIPOWER® CT is available with default setting which can be reconfigured subsequently via METERTOOL OMNIPOWER® or a Smart Metering system.

Tamper proof

Apart from the mechanical sealing, the meter also reveals tampering (including opening of the meter cover). In case of attempts of tampering (mechanical or magnetic), an alarm is activated which is time and date stamped and saved to the permanent memory. Alarms can be automatically transferred via the communication infrastructure and, indicated on the display.

Power quality measurments

The OMNIPOWER® CT meter is also designed to support extended analysis of the main grid using measurements of the THD (voltage), Power Factor, Voltage unbalance, Voltage variations and sags and swells.

Approvals

OMNIPOWER® CT is type approved according to the Measuring Instruments Directive (MID)
for active energy and according to the national requirements for other energy types, where required.

Approval	**Norm**
Type test according to:	
– Active energy	EN 50470-1 EN 50470-3
– Reactive energy and active energy	IEC 62052-11 IEC 62053-22 IEC 62053-23

Various	**Norm**
Terminal	DIN 43857
S0 pulse output	DIN 43864
Optical reading	DLMS/COSEM
OBIS/EDIS codes	IEC 62056-61
Interface classes	IEC 62056-62
Data link layer	IEC 62056-72

Technical data

Measuring principle	
– Current	Single-phased current measurements via current transformers
– Voltage	Single-phased voltage measurements by voltage divider
Nominal voltage U_n	3 x 230 VAC -20 % ... +15 % (for Aron meter only) 3 x 230/400 VAC -20 % - +15 %
Current	

X_5	I_{min} – I_n (I_{max})
1	0.01 – 1(6) A
5	0.05 – 5(6) A

Accuracy class	Class 1 (IEC) / Class B (MID) Class 0,5 (IEC) / Class C (MID) Reactive energy: class 2 (IEC)
Nominal frequency f_n	50 Hz ± 5 % or 60 Hz ± 5 %
Phase displacement	Unlimited (however, not for Aron meters)
Operating temperature	-40 °C - +70 °C
Storage temperature	-40 °C - +85 °C

Technical data

Protection class	IP54
Protection class	II
Relative humidity	< 75 % year's average at 21 °C < 95 % less than 30 days/year, at 25 °C
Weight	0.90 kg
Application area	Indoors or outdoors in suitable meter cabinet

Internal consumption*

Maximum power consumption of the current circuits with basic current	0.02 VA
Maximum power consumption of the voltage circuits	0.2 VA 0.1 W

Measured by notified body during type test. Measured at phase L1.

Materials	Glass reinforced polycarbonate
Data storage	Permanent memory, > 10 years without voltage
Display	LCD, 7 mm digit height (value field) LCD, 5 mm digit height (OBIS-field, Text-field and Tariff readings) LCD, 3 mm digit height (voltage and power readings)
Meter constant	10000 imp/kWh
S0 pulse diode	10000 imp/kWh, kvarh Pulse time 30 ms ± 10 %
S0 pulse output	5000 imp/kWh Pulse time 30 ms ± 10 %

Real Time Clock (RTC)

Accuracy	Typically 5 ppm at 23 °C
Backup	Battery life > 10 years at 23 °C Supercap life > 10 years at 23 °C
Supercap operating time	7 days fully charged

Connections

Main terminals

Size	2.5 – 10 mm² elevating connections
Screws	Ph2 or (4x1) straight slot Torque 1,8 Nm +/- 10%
Voltage output	0.25 – 1.5 mm², 5 mm cable terminal forks
Screws	TORX Tx 10
Torque	1.0 Nm +/- 10 %

Communication

OMNIPOWER® CT can be supplied or retrofitted with communication modules. The modules function as inputs and outputs for the meter. Mounting of modules does not require subsequent verification of the meter.

Communication Modules

Serial	Serial RS-485 or RS-232 communication or current loop with pulse inputs, tariff inputs or load control.
M-Bus	Reading via wired M-Bus system.
TCP/IP	Collection of consumption data via TCP/IP communication.
GSM/GPRS	Collection of consumption data via GSM/GPRS communication. Supports SMS reading.

Integrated radio

OMNIPOWER® CT can be provided with built-in radio communication for Kamstrup Radio Mesh Network.
Radio communication therefore requires no mounting/retrofitting of communication module. If the meter's module area is used for another type of communication, the built-in radio communication can be deactivated.

Consumer communication channel (CCC) module

In OMNIPOWER® CT it is possible to mount a CCC- (Consumer Communication Channel) module. The module can be used for communication and data exchange with Smart Home products such as energy displays and external relays. The CCC-module is mounted without using tools or breaking the seal of the meter. The mounting may be done by e.g. the consumer himself.

Transformer ratio

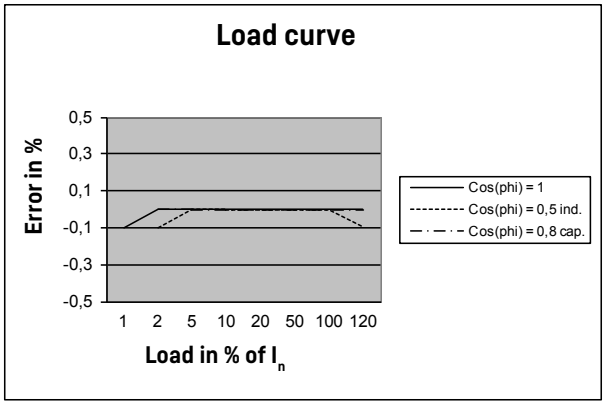
The transformer ratio in the OMNIPOWER® CT can be configured depending on the current transformer installed with the meter.

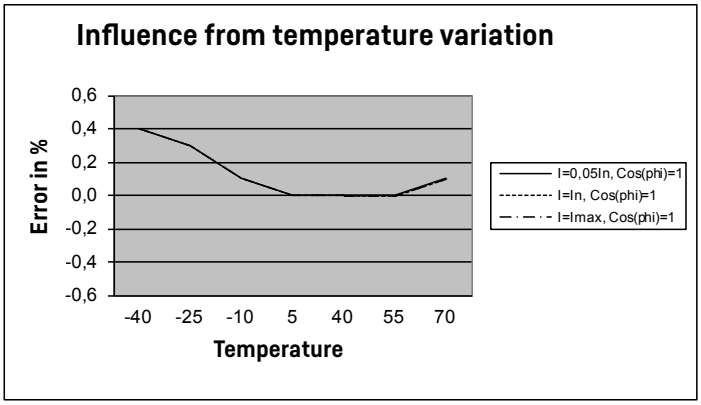
The ratio can be configured from 1 to 600 without reverifying the meter.

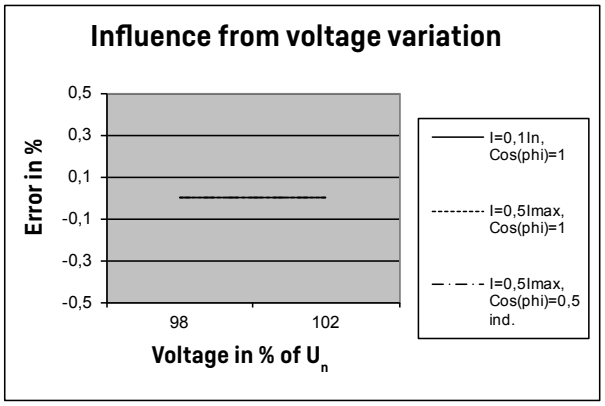
The primary energy is displayed in the display when entering the transformer ratio of the current transformer. The secondary energy reading always indicates the total consumption for the energy types chosen.

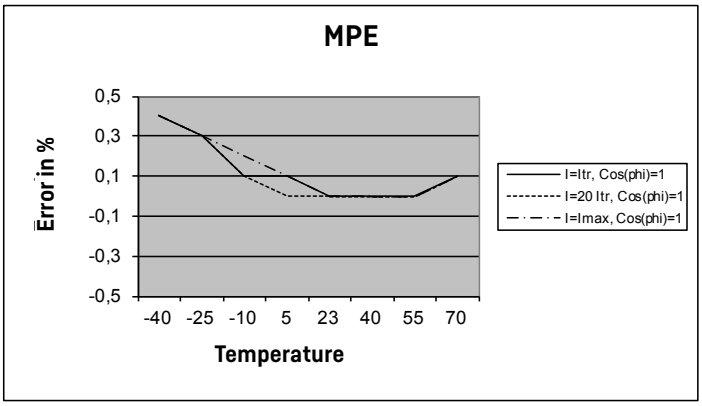
Changes in the ratio are stored in the permanent memory of the meter.

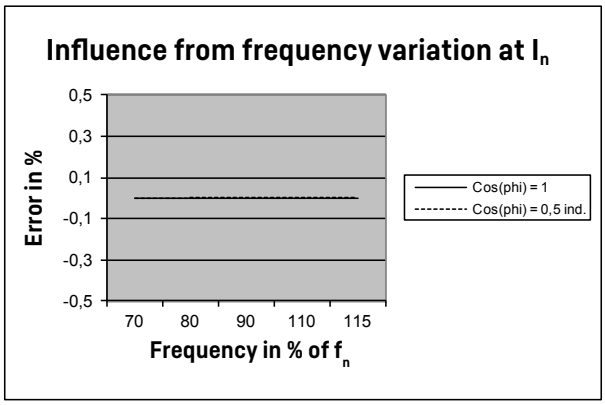
Typical accuracy charts (In = 5A)











MPE (Maximum Permissible Error)

Error composed of:

- current load
- voltage variation
- frequency variation
- temperature variation

Configuration – hardware

68	X_1 - X_2	X_3 - X_4	X_5	X_6 - X_7	X_8	X_9 - X_{10}	X_{11}	X_{12}	X_{13} - $X_{14}X_{15}X_{16}$
X_1 Meter type									
CT meter	5								
X_2 Type no. version									
OMNIPOWER®	1								
X_3 Housing									
Standard		1							
X_4 Measuring systems									
2 systems – Aron		2							
3 systems		3							
X_5 Current range									
0.01 – 1(6) A			1						
0.05 – 5(6) A			5						
X_6 Accuracy Class									
Class B				B					
Class C				C					
Class 1				1					
Class 0.5				5					
X_7 Generation									
Generation					D				
X_8 Variant									
1. Variant						1			
2. Variant						2			
X_9 Energy type									
A+							1		
A+/A-							2		
A+/R+							3		
A+/A-/R+/R-							4		
X_{10} Breaker									
No breaker								0	
X_{11} Communikation									
No radio									0
Radio (for OMNIA)									1
X_{12} Supply backup									
Supercap + battery								1	
X_{13} Interface									
S0 output									1
$X_{14}X_{15}X_{16}$ Country code									
See order form or contact Kamstrup									XXX

Configuration – software

			Z1	Z2	Z3	Z4
Z1 Decimals in display						
7.0 (Default)			1			
7.1 (Country specific)			2			
7.2 (Country specific)			3			
Z2 LED configuration						
LED switched off without consumption				1		
LED switched on without consumption				2		
Z3 Primary module configuration	**I/O 1**	**I/O 2**				
No function	-	-			00	
4-tariff	Input	Input			01	
4-tariff inverted	Input	Input			02	
Pulse in / Alarm in	Input	Input			03	
Pulse in / Alarm in inverted	Input	Input			04	
Pulse in / A+ out	Input	Output			05	
R+ out / A+ out	Output	Output			06	
2-tariff / Alarm in	Input	Input			07	
2-tariff inverted / Alarm in	Input	Input			08	
2-tariff / Alarm in inverted	Input	Input			09	
2-tariff inverted / Alarm in inverted	Input	Input			10	
2-tariff / A+ out	Input	Output			11	
2-tariff inverted / A+ out	Input	Output			12	
Pulse in / 2-tariff	Input	Input			13	
Pulse in / 2-tariff inverted	Input	Input			14	
Debiting stop pulse / -	Input	-			15	
A- out / A+ out	Output	Output			16	
Load control load / Status control	Input	Output			17	
Pulse in / Load tariff sync	Input	Output			18	
Pulse in inv. / Load tariff sync	Input	Output			19	
Pulse in / Load tariff sync inverted	Input	Output			20	
Pulse in inv. / Load tariff sync inverted	Input	Output			21	
4-tariff sync load control	Input	Input			22	
4-tariff sync load control inverted	Input	Input			23	
Load control 1 / Load control 2	Output	Output			26	
Pulse in / Load control	Input	Output			27	
Pulse in / Toggle Load control 1 & 2	Input	Output			28	
Z4 Integration period / Load profile period						
15 min.						2
30 min.						3
60 min.						4

Configuration – software

	Z5	Z6
Z5 Display configuration		
See display order form or contact Kamstrup	-	
Z6 Debiting stop date		
1		01
2		02
3		03
4		04
5		05
6		06
7		07
8		08
9		09
10		10
11		11
12		12
13		13
14		14
15		15
16		16
17		17
18		18
19		19
20		20
21		21
22		22
23		23
24		24
25		25
26		26
27		27
28		28

	Z7	Z8
Z7 Debiting logging interval		
None (externally controlled)	00	
Monthly	01	
Every second month, January	02	
Every second month, February	03	
Every third month, January	04	
Every third month, February	05	
Every third month, March	06	
Half-yearly, January	07	
Half-yearly, February	08	
Half-yearly, March	09	
Half-yearly, April	10	
Half-yearly, May	11	
Half-yearly, June	12	
Yearly, January	13	
Yearly, February	14	
Yearly, March	15	
Yearly, April	16	
Yearly, May	17	
Yearly, June	18	
Yearly, July	19	
Yearly, August	20	
Yearly, September	21	
Yearly, October	22	
Yearly, November	23	
Yearly, December	24	
Z8 Pulse out length / Alarm input		
30 msec pulse length / Alarm input deactivated		1
30 msec pulse length / Alarm input active		2
80 msec pulse length / Alarm input deactivated		3
80 msec pulse length / Alarm input active		4

Configuration – software

		Z10	Z11	Z12
Z10 Analysis logger setup				
Default setup		000		
Z11 Greenwich Mean Time (GMT)				
0	GMT		00	
1	+ 1 Hour (DK/NO/SE/DE/FR/ES)		01	
2	+ 2 Hours (FI)		02	
3	+ 3 Hours		03	
4	+ 4 Hours		04	
5	+ 5 Hours		05	
6	+ 6 Hours		06	
7	+ 7 Hours		07	
8	+ 8 Hours		08	
9	+ 9 Hours		09	
10	+ 10 Hours		10	
11	+ 11 Hours		11	
12	+ 12 Hours		12	
-11	- 11 Hours		13	
-10	- 10 Hours		14	
-9	- 9 Hours		15	
-8	- 8 Hours		16	
-7	- 7 Hours		17	
-6	- 6 Hours		18	
-5	- 5 Hours		19	
-4	- 4 Hours		20	
-3	- 3 Hours		21	
-2	- 2 Hours		22	
-1	- 1 Hours		23	
Z12 Unit pulse input				
None				00
kWh				01
m^3				02
L				03

Configuration – software

	Z13	Z14	Z15	Z16	Z17	Z18	Z20
Z13 Tariff control plan							
See tariff order form or contact Kamstrup	–						
Tariff disabled	000						
Module Port control	001						
Register control	002						
Z14 Load control plan							
See load control order form or contact Kamstrup		–					
Load control disabled		000					
Register control		001					
Z15 Daylight saving time / Summer-winter time table							
None			000				
EU			001				
Z16 Frequency code Protocol							
None				000			
CH 318 K				318			
EU 319 K				319			
SE 326 K				326			
SE 328 K				328			
SE 329 K				329			
NO 337 K				337			
NO 338 K				338			
NO 339 K				339			
DK 348 K				348			
DK 349 K				349			
FI 359 K				359			
PL 369 K				369			
AT 378 K				378			
AT 379 K				379			
Z17 Push button 2 setup							
See PB2 order form or contact Kamstrup					–		
No PB2 setup					000		
Z18 1107 configuration							
See 1107 order form or contact Kamstrup						–	
Disabled						000	
Mode A and C, UD (only available for variant 1)						001	
Mode A and C, UD2 (only available for variant 1)						002	
Z20 Calendar setup							
See Calendar setup order form or contact Kamstrup							–

Configuration – software

		Z21	Z22	Z23	Z24	Z25
Z21 Transformer ratio						
5 A/5 A	1 A/1 A	001				
10 A/5 A	2 A/1 A	002				
15 A/5 A	3 A/1 A	003				
20 A/5 A	4 A/1 A	004				
50 A/5 A	10 A/1 A	010				
75 A/5 A	15 A/1 A	015				
100 A/5 A	20 A/1 A	020				
120 A/5 A	24 A/1 A	024				
150 A/5 A	30 A/1 A	030				
160 A/5 A	32 A/1 A	032				
200 A/5 A	40 A/1 A	040				
300 A/5 A	60 A/1 A	060				
500 A/5 A	100 A/1 A	100				
1 000 A/5 A	200 A/1 A	200				
1 500 A/5 A	300 A/1 A	300				
2 000 A/5 A	400 A/1 A	400				
3 000 A/5 A	600 A/1 A	600				
Z22 Transformer ratio (unlocked / locked)						
Unlocked			1			
Locked			2			
Z23 Load profile, based on						
Primary energy				1		
Secondary energy				2		
Z24 Pulse output (module)						
Based on secondary energy					0	
Based on primary energy					1	
Z25 Debitlogger 2 interval						
Daily						1
Weekly						2
Monthly						3

Configuration – software

	Z26	Z27	Z28	Z29	Z30
Z26 – Alarm configuration					
No alarms enabled	000				
Z27 – Load profile data (DLMS)					
Absolute values		1			
Delta values (only available for variant 2)		2			
Z28 – Local interface encryption					
N/A (only for variant 1)			0		
Enabled (only available for variant 2)			1		
Disabled (only available for variant 2)			2		
Z29 – Load profile configuration					
A+				1	
A+/A-				2	
A+/R+				3	
A+/A-/R+/R-				4	
A+/A-/R1/R2/R3/R4 (only available for variant 2)				5	
A+/A-/R+/R-/R1/R2/R3/R4 (only available for variant 2)				6	
Secondary A+				11	
Secondary A+/A-				12	
Secondary A+/R+				13	
Secondary A+/A-/R+/R-				14	
Secondary A+/A-/R1/R2/R3/R4 (only available for variant 2)				15	
Secondary A+/A-/R+/R-/R1/R2/R3/R4 (only available for variant 2)				16	
Z30 – Debit 2 logger configuration					
Profile 01					1
Profile 02 (only available for variant 2)					2

Installation

Connect the meter in accordance with the installation diagram on the meter's type label.

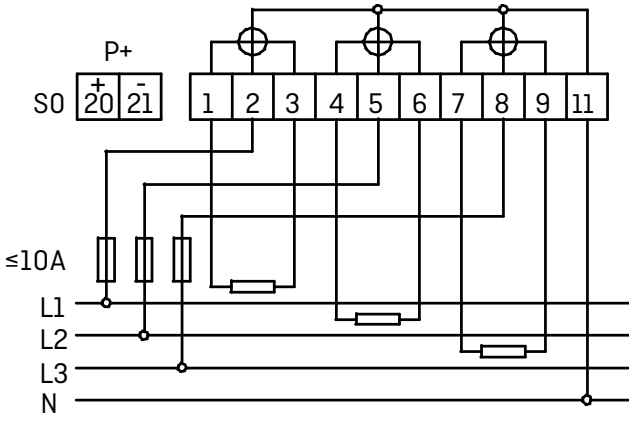
Depending on the configuration, a fixed value will be displayed, or the display will change automatically between selected indications every 10 seconds.

It is possible to change the display reading manually by activating the left push button on the meter. The available readings will depend on the meter's configuration.

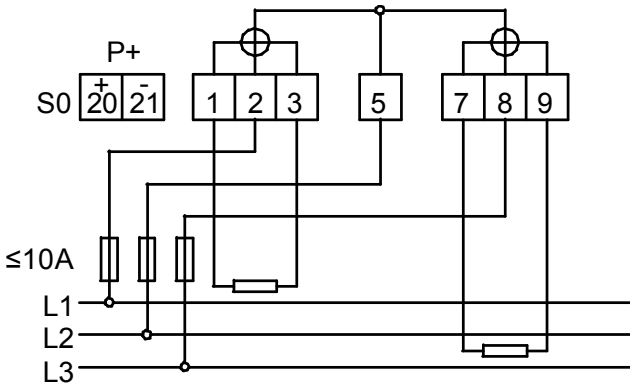
Connection diagrams

The valid connection diagram appears from the type label on the front of the meter.

3-phase, 4-wire



3-phase, 3-wire (Aron)



Safety and installation guidelines

The meter shall only to be used for measuring electrical energy and shall operate within the specified values only.

The meter must be switched off when working on it. It can be highly dangerous to touch connected meter parts.

Current local standards, guidelines, regulations and instructions must be observed. Only authorized personnel are permitted to install electricity meters.

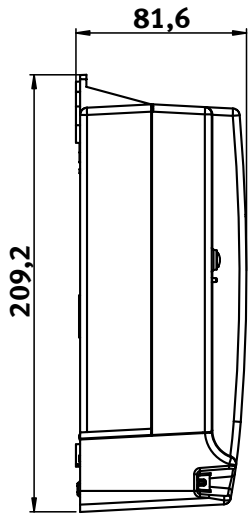
Meters for direct connection must be protected against short circuit by a backup fuse in accordance with the maximum current stated on the meter.

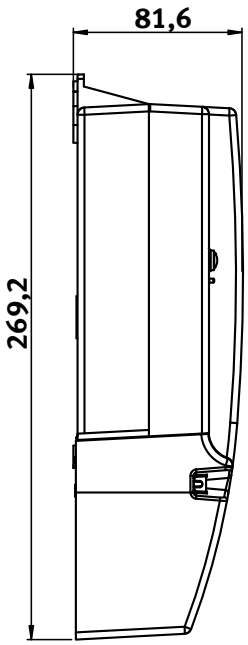
The relevant backup fuse must therefore be removed and kept in a place where it cannot be inserted by unauthorized personnel.

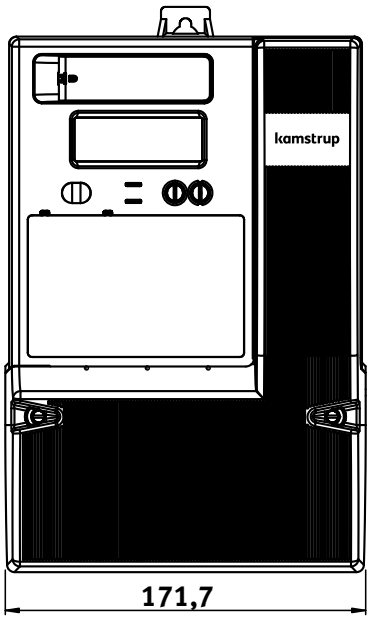
The meter constant LED flashes proportionally to the consumed active energy.

Only authorized personnel must break the utility sealing.

Dimensions







Accessories

Modules

IP101i, TCP/IP-module*	68 50 040
GSM8i 2G*	6819x0xxxxx
GSM8i 2G m/ 2x5A Load Control*	6819x5xxxxx
GSM8i 2G m/ RS-485 add-on*	6819x6xxxxx
OMNICON GSM**	681Axxxxxxx
5A Load control module	68 50 058
M-Bus module, secondary addressing*	68 50 068
2 x 5A load control modules	68 50 069
RS485-module, multi drop*	68 50 072
Data-/pulse module, dual pulse, 9600	68 50 075
Tariff control, 4-tariff, 230 V input, current loop	68 50 076
Tariff control, 4-tariff, 230 V input	68 50 078
OMNICON MUC-module**	68 50 079
Earth fault module**	68 50 080
Earth fault module with MUC module**	68 50 081
Wireless M-Bus, Sub-metering	68 50 083

Software

Configurations SW, METERTOOL	68 99 580

VariousStandard meter cover	59 60 370
Long meter cover, 60mm	59 60 316
Optical reading head with USB plug	66 99 099
Optical reading head with 9-pole D-sub connector	66 99 102
METERTOOL kit for CT ratio programming	68 30 017

* for non-Kamstrup systems only

** for OMNIA system only

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