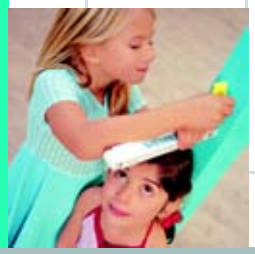
10 Measuring Devices



Introduction

Overview

Devices	Application	Standards	Usage		
			Non-res. bldgs.	Res. bldgs.	Industry
 **Time and pulse counters** • 7KT5 80 and 7KT5 82 time counters • 7KT5 81 and 7KT5 83 pulse counters	Monitoring of operating hours and starting operations of devices or plants	IEC 60255-6, EN 60255-6 (VDE 0435 T 301)	•	•	•
			•	•	•
 **Time counters for front-panel mounting** 7KT5 5 and 7KT5 6	Monitoring of operating hours of devices or plants	IEC 60255-6, EN 60255-6 (VDE 0435 T 301)	•	•	•
 **Analog measuring devices** 7KT1 0	For measuring voltages and currents, for monitoring input and output currents or device currents	IEC 60051-2, EN 60051-2	•		•
 **Digital measuring devices** 7KT1 1	For measuring voltages and currents, for monitoring input and output currents or device currents	DIN 43751-1, DIN 43751-2	•		•
 **Multimeters** 7KT1 30	For the display and assessment of 23 electrical measured values in switchgear, incoming supplies and outgoing feeders	IEC 60051-2, EN 60051-2 IEC 61010-1, DIN EN 61010-1 (VDE 0411 T 1)	•		•
 **Multicounters** 3KT1 31, 3KT1 34, 3KT1 35	For the display and assessment of 35 electrical measured values and consumption values in switchgear, incoming supplies and outgoing feeders	IEC 60051-2, EN 60051-2 IEC 61010-1, EN 61010-1 (VDE 0411 T 1) IEC 62053-21, EN 62053-21 (VDE 0418 T 3-21)	•		•

Overview

Devices	Application	Standards	Usage		
			Non-res. bldgs.	Res. bldgs.	Industry
 **E-counters, single-phase** 7KT1 14	For the measurement of kWh in single-phase systems, e.g. in industrial plants, offices and apartments in apartment houses	IEC 62053-11, EN 62053-11 (VDE 0418 T 3-11) IEC 62053-21, EN 62053-21 (VDE 0418 T 3-21)	•	•	•
 **E-counters, three-phase** 7KT1 50, 7KT1 51, 7KT1 52	For the measurement of kWh in single and three-phase systems, e.g. in industrial plants, offices and apartments in apartment houses	IEC 61010-1, EN 61010-1 (VDE 0411 T 1) IEC 62053-11, EN 62053-11 (VDE 0418 T 3-11) IEC 62053-21, EN 62053-21 (VDE 0418 T 3-21)	•	•	•
 **E-counters, three-phase,** ***instabus* KNX *EIB*** 7KT1 16	With *instabus* KNX *EIB* interface, for the measurement of kWh in single and three-phase systems, e.g. in industrial plants, offices and apartments in apartment houses	IEC 61036 EN 61036 (VDE 0418 T7)	•		•
 **LAN server** 3KT1 390	Worldwide data communication with measuring devices using LAN/Internet	IEEE 802	•		•
 **Current transformers** 7KT1 2	For non-contact measuring of primary currents of a 3-phase system	IEC 60044-1, EN 60044-1 (VDE 0414 T 44-1)	•		•

Definitions

I_e = Rated operational current
U_e = Rated operational voltage
I_c = Rated control supply current
U_c = Rated control supply voltage
P_s = Rated operational capacity
1 MW = 18 mm modular width

7KT5 8 time and pulse counters

Overview

The counters are designed for installation in switching, control and distribution boards and can be snapped onto standard mounting rails 35 mm acc. to EN 60715.

Function

Time counters count the time in hours with an accuracy of two decimal places (hundredths of hours). The pulse counter adds the number of pulses, e.g. the making operations of devices.

In the case of electronic counters, the counting result is saved indefinitely in the event of a power failure (EEPROM). On recovery of the power, the counting is continued from the saved value.

Technical specifications

Data acc. to DIN VDE 0435-110, EN 60255-6			7KT5 801	7KT5 802	7KT5 803	7KT5 804	7KT5 806	7KT5 807
Rated control supply voltage U_c		V AC V DC	– 12 ... 24	24 –	115	230	115	230
Operating range	at 50/60 Hz	× U_c	0.9 ... 1.1					
Rated frequency		Hz	–	50			60	
Rated power dissipation P_v		VA	< 1		< 2			
Method of operation	counting of		hours					
Display	drum-type register	h	00000.00					
Terminals	± screw (Phillips)		1					
Conductor cross-sections	rigid	mm^2	1.5					
	flexible with sleeve, min.	mm^2	0.75					
Permissible ambient temperature		°C	-10 ... +70					
Degree of protection	acc. to EN 60529		IP20					
Protection class	acc. to EN 60730-1		II					
Permissible humidity		%	< 80					

Data acc. to DIN VDE 0435-110, EN 60255-6			7KT5 811	7KT5 812	7KT5 814	7KT5 821	7KT5 822	7KT5 823	7KT5 833
Rated control supply voltage U_c		V AC V DC	– 12 ... 24	24 –	230 –	24 ... 240 12 ... 150			
Operating range	at 50/60 Hz	× U_c	0.9 ... 1.1						
Rated frequency		Hz	–	50/60					
Rated power dissipation P_v		VA	< 1		< 2	< 1			
Method of operation	counting of		pulses			hours			pulses
Display	drum-type register	⎍⎍	0000000			–			–
	LCD	h	–			000000.0			–
		⎍⎍	–			–			0000000
Counting frequency		Hz	10			–			10
Pulse duration		ms	50			–			50
Resetting	electrical		–				•	•	•
	mechanical		–					•	•
Terminals	± screw (Phillips)		1						
Conductor cross-sections	rigid	mm^2	1.5						
	flexible with sleeve, min.	mm^2	0.75						
Permissible ambient temperature		°C	-10 ... +70						
Degree of protection	acc. to EN 60529		IP20						
Protection class	acc. to EN 60730-1		II						
Permissible humidity		%	< 80						

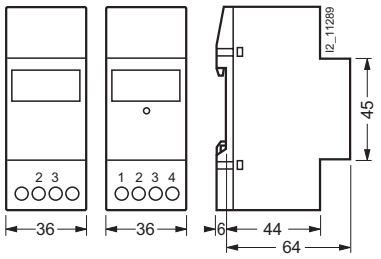
Selection and ordering data

	U_c	Frequency	MW	Order No.	Weight 1 item	PS*/ P. unit
	V	Hz			kg	Items
 7KT5 801	**Time counters**					
	Mechanical register, display 00000.00 h without resetting					
	12 ... 24 DC	–	2	**7KT5 801**	0.095	1
	24 AC	50		**7KT5 802**	0.095	1
	115 AC			**7KT5 803**	0.095	1
	230 AC			**7KT5 804**	0.095	1
	115 AC	60		**7KT5 806**	0.095	1
	230 AC			**7KT5 807**	0.095	1
	Pulse counters					
	Mechanical register, display 0000000 ⎍⎍ without resetting					
	10 ... 24 DC	–	2	**7KT5 811**	0.095	1
	24 AC	50/60		**7KT5 812**	0.095	1
	230 AC			**7KT5 814**	0.095	1
 7KT5 823	**Electronic time counters**					
	LCD 000000.0 h without resetting					
	12 ... 150 DC, 24 ... 240 AC	50/60	2	**7KT5 821**	0.080	1
	with electrical resetting					
	12 ... 150 DC, 24 ... 240 AC	50/60		**7KT5 822**	0.080	1
	with electrical and mechanical resetting					
	12 ... 150 DC, 24 ... 240 AC	50/60		**7KT5 823**	0.080	1
	Electronic pulse counter					
	LCD display 0000000 ⎍⎍					
	with electrical and mechanical resetting					
	10 ... 150 DC, 24 ... 240 AC	50/60	2	**7KT5 833**	0.080	1

Dimensional drawings

7KT5 801
7KT5 802
7KT5 803
7KT5 804
7KT5 806
7KT5 807
7KT5 821
7KT5 811
7KT5 812
7KT5 814

7KT5 821
7KT5 822
7KT5 823
7KT5 833



Schematics

Connections

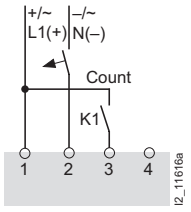
7KT5 801
7KT5 821

7KT5 802
7KT5 803
7KT5 804
7KT5 806
7KT5 807

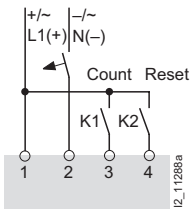
7KT5 811

7KT5 812
7KT5 814

7KT5 821



7KT5 822
7KT5 823
7KT5 833



Electronic counters

A power supply is required at terminals 1 and 3 so that the device can continuously show the measured value.

Once terminal 3 is supplied with voltage (for DC "+"), the counting procedure starts. If terminal 4 is supplied short-time with voltage (for DC "+"), the counter is reset.

In the event of a power failure, the counting result is indefinitely stored in EEPROM. On recovery of the power, the counting is continued from the saved value.

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* You can order this quantity or a multiple thereof.

7KT5 5 and 7KT5 6
time counters for front-panel mounting

Application

Areas of application are time and pulse recording for switchgear cabinets, control and mechanical engineering, e.g. boilers, machine tools or compressors.

Preventive maintenance

Time counters provide support when planning preventive maintenance. In-time and regular maintenance is the best protection against unexpected shutdowns and ensures high plant availability.

Function

Time counters count the time in hours with an accuracy of two decimal places (hundredths of hours).

Technical specifications

Data acc. to DIN VDE 0435-110, EN 60255-6			7KT5 500	7KT5 501	7KT5 502	7KT5 503	7KT5 504	7KT5 505
Rated control supply voltage U_c		V AC V DC	– 10 ... 80	115 –	230	115	230	24
Operating range		× U_c	0.9 ... 1.1					
Rated frequency		Hz	–	50		60		50
Rated power dissipation P_V		VA	< 1	0.2	1.8	0.9	1.8	0.2
Method of operation	counting of		hours					
Display	drum-type register	h	00000.00					
Pulse duration	pulse length, pulse interval	ms	50					
Front-panel mounting • without cover 55 mm × 55 mm • with cover 55 mm × 55 mm	Switchboard cutout	 mm × mm Ø mm	 $45.2 \times 45.2^{+0.3}$ $50.2^{+0.3}$					
Terminals	± screw (Phillips)		1					
Conductor cross-sections	rigid flexible with sleeve, min.	mm^2 mm^2	1.5 0.75					
Permissible ambient temperature		°C	-10 ... +70					
Degree of protection • front panel • installation with seal • terminals	acc. to EN 60529		 IP65 IP43 IP20					
Protection class	acc. to EN 60730-1		II					
Permissible humidity		%	< 93					

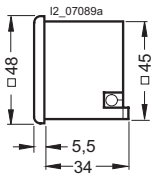
Data acc. to DIN VDE 0435-110, EN 60255-6			7KT5 600	7KT5 601	7KT5 602	7KT5 603	7KT5 604
Rated control supply voltage U_c		V AC V DC	– 10 ... 50	115 –	230	115	230
Operating range × U_c			0.9 ... 1.1				
Rated frequency		Hz	–	50		60	
Rated power dissipation P_V		VA	< 1				
Method of operation	counting of		hours				
Display	drum-type register	h	00000.00				
Pulse duration	pulse length, pulse interval	ms	50				
Front-panel mounting	Switchboard cutout	mm × mm	$68^{+0.5} \times 68^{+0.5}$				
Terminals	± screw (Phillips)		1				
Conductor cross-sections	rigid flexible with sleeve, min.	mm^2 mm^2	1.5 0.75				
Permissible ambient temperature		°C	-10 ... +70				
Degree of protection • front panel • terminals	acc. to EN 60529		 IP52 IP00				
Protection class	acc. to EN 60730-1		II				
Permissible humidity		%	< 93				

Selection and ordering data

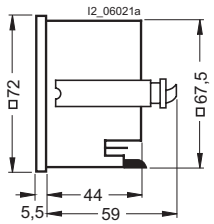
		U_c	Frequency	MW	Order No.	Weight 1 item	PS*/ P. unit
		V	Hz			kg	Items
 7KT5 500	**Time counters**						
	mechanical register, display 00000.00 h, for front-panel mounting, front frame 48 mm x 48 mm						
		10 ... 80 DC	–		**7KT5 500**	0.045	1
		24 AC	50		**7KT5 505**	0.045	1
		115 AC			**7KT5 501**	0.045	1
		230 AC			**7KT5 502**	0.045	1
		115 AC	60		**7KT5 503**	0.045	1
		230 AC			**7KT5 504**	0.045	1
 7KT5 600	for front-panel mounting, front frame 72 mm x 72 mm with narrow frame according to DIN 43700						
		10 ... 50 DC	–	2	**7KT5 600**	0.120	1
		115 AC	50		**7KT5 601**	0.120	1
		230 AC			**7KT5 602**	0.120	1
		115 AC	60		**7KT5 603**	0.120	1
		230 AC			**7KT5 604**	0.120	1
	Cover for 7KT5 5 time counter						
	55 mm × 55 mm				**7KT9 020**	0.015	5
	Sealing ring for 7KT9 020 cover						
	IP 43-installation in switchboards with smooth surfaces (1 set = 5 pcs)				**7KT9 000**	1 set 0.020	1 set
	Terminal cover for 7KT5 6 time counter						
	degree of protection IP20				**7KT9 021**	0.010	5

Dimensional drawings

7KT5 5



7KT5 6



Schematics

Connections

7KT5 5, 7KT5 6

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* You can order this quantity or a multiple thereof.

7KT1 0 analog measuring devices

Overview

These devices for measuring voltages and currents can be used for monitoring input and output currents or device currents. They are suitable for direct connection in a single-phase network or, together with a measuring selector switch, for three-phase networks. Depending on the transformer, the ammeter for transformer connection can be fitted with interchangeable scales of 60, 100, 250, 400, 600 and 1000 A AC.

Main features of the devices are:
- extensive scale,
- continuous overload up to 20 %

Technical specifications

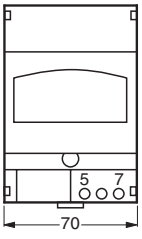
Data acc. to EN 60051-2			7KT1 000	7KT1 01.	7KT1 020
Measuring ranges					
• direct measurement		V AC	0 ... 500	–	–
		A AC	–	0 ... 25	–
		A AC	–	0 ... 40	–
		A AC	–	0 ... 60	–
• transformer measurement		A AC	–	–	0 ... 150/5
Max. permissible measuring frequency		Hz	45 ... 65		
Display			pointer		
Measuring accuracy	at 23 ±1 °C	%	±3	±1.5	
Rated operational capacity P_s		VA	< 2	< 1.1	
Temperature influence		%/ °C	±0.03		
Overload capability	continuous short-time for 1 s		1.2 × U_{meas} 2 × U_{meas}	1.2 × I_{meas} 10 × I_{meas}	
Test voltage	50 Hz, 1 min	kV	> 2		
Terminals	+/- screw (Pozidrive)		1	2	1
Conductor cross-sections	rigid, max. flexible with sleeve, min.	mm^2 mm^2	1 x 6/2 x 4 0.75	1 × 25 / 2 × 16	1 x 6/2 x 4 0.75
Permissible ambient temperature		°C	-10 ... +55		
Degree of protection			IP20		

Selection and ordering data

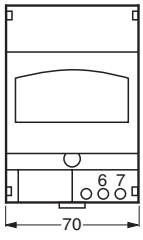
		U_c	U_{meas}	I_{meas}	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	V AC	A AC			kg	Items
 7KT1 000	**Analog voltmeter**							
			500		4	**7KT1 000**	0.105	1
	Analog ammeter for direct connection							
				25	4	**7KT1 010**	0.110	1
				40		**7KT1 011**	0.125	1
				60		**7KT1 012**	0.135	1
	Analog ammeter for transformer connection with AC scale 0 to 150 A							
				0 ... 150/5	4	**7KT1 020**	0.105	1
 7KT9 001	**Changeable scales for 7KT1 020 ammeter**							
	easy on-site replacement			60		**7KT9 001**	0.005	1
				100		**7KT9 002**	0.005	1
				250		**7KT9 004**	0.005	1
				400		**7KT9 005**	0.005	1
				600		**7KT9 006**	0.005	1
				1000		**7KT9 007**	0.005	1

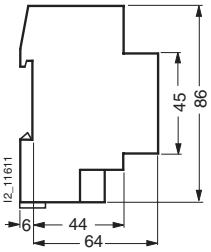
Dimensional drawings

7KT1 000



7KT1 010,
7KT1 011,
7KT1 012,
7KT1 020





Schematics

Connections

7KT1 000

7KT1 01., 7KT1 020

* You can order this quantity or a multiple thereof.

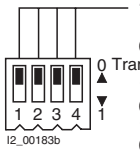
Overview

These devices for measuring voltages and currents can be used for monitoring input and output currents or device currents. They are suitable for direct connection in a single-phase network or, together with a measuring selector switch, for three-phase networks.

The measuring ranges of the ammeter are set at the device with a coding switch.

Function

Range selector switch for 7KT1 120 digital ammeter



1 2 3 4	Direct measurement		
0 0 0 0	20 A AC		
0 Transformer measurement			
1 0 0 0	25/5A AC	0 0 0 1	200/5A AC
0 1 0 0	40/5A AC	1 0 0 1	250/5A AC
1 1 0 0	50/5A AC	0 1 0 1	400/5A AC
0 0 1 0	60/5A AC	1 1 0 1	500/5A AC
1 0 1 0	80/5A AC	0 0 1 1	600/5A AC
0 1 1 0	100/5A AC	1 0 1 1	800/5A AC
1 1 1 0	150/5A AC	0 1 1 1	999/5A AC

Technical specifications

Data in compliance with DIN 43751-1 and DIN 43751-2			7KT1 110	7KT1 120
Rated control supply voltage U_c		V AC	230	
Operating range		× U_c	0.9 ... 1.15	
Rated frequency		Hz	45 ... 65	
Rated operational capacity P_s		VA	< 2	
Measuring range				
• voltage	direct measurement	V AC	12 ... 600	–
• current	direct measurement	A AC	–	0.4 ... 20 direct
	transformer measurement	A AC	–	0.1 ... 1000/5
Display			3 LEDs red; height 10 mm	
• voltage	voltage > 600 V		H H H	–
	voltage 12 V		– – –	–
• current	direct current > 20 A		–	H H H
	current transformer > 5 A		–	H H H
	direct current < 0.4 A		–	– – –
	current transformer < 0.1 A		–	– – –
Measuring cycle		/s	4 times	
Measuring accuracy	at 23 °C	%	±0.5 ± 1 digit	
Temperature influence		%/ °C	±0.03	
Overload capability				
• voltage	continuous	V	720	–
	short-time for 1 s	V	780	–
• current	continuous, direct	A	–	22
	continuous transformer	A	–	5.5
	short-time for 1 s, direct	A	–	200
	short-time for 1 s, transformer	A	–	50
Electrical isolation				
• clearances		mm	≥3	≥1.5
• creepage distances in the device		mm	≥4.3	≥2.1
• creepage distances on the printed board	printed boards not installed	mm	≥3.0	≥1.5
Test voltage	50 Hz, 1 min	kV	2.2	1.35
Terminals	+/- screw (Pozidrive)		1	
Conductor cross-sections	rigid, max.	mm^2	1 x 6/2 x 4	
	flexible with sleeve, min.	mm^2	0.75	
Permissible ambient temperature		°C	-10 ... +55	
Degree of protection			IP20	

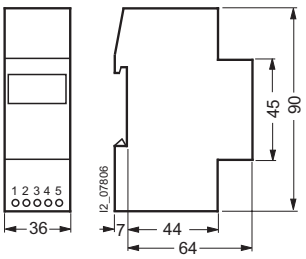
7KT1 1 digital measuring devices

Selection and ordering data

		U_c	U_{meas}	I_{meas}	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	V AC	A AC			kg	Items
	**Digital voltmeter**	230	600		2	**7KT1 110**	0.190	1
	**Digital ammeter for direct and transformer connection**	230		0 ... 20 transformer/5	2	**7KT1 120**	0.200	1

Dimensional drawings

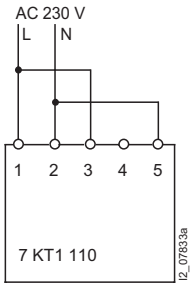
7KT1 110,
7KT1 120

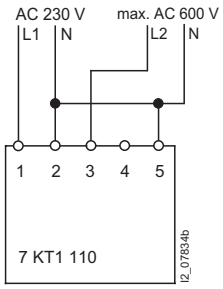


Schematics

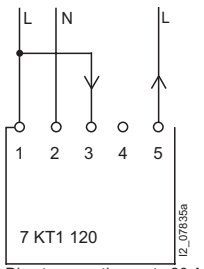
Switching examples

Digital voltmeter

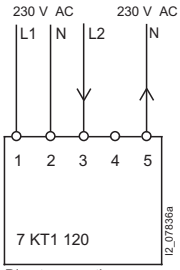




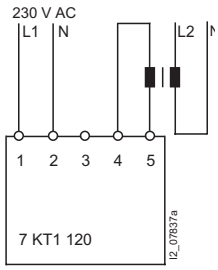
Digital ammeter



Direct connection up to 20 A



Direct connection
of different phases
up to 20 A



Transformer connection
Transformer …/5 A

* You can order this quantity or a multiple thereof.

Overview

- All required measuring values of an installation clearly visible at a glance
- Innovative matrix selection of assignment and selection of measurement data of the display registers
- For direct connection 63 A or for transformer /1A or /5A
- For transformer primary current of 10 to 5000 A. Input is in 5 A increments
- Size, 11 mm high, attractive green 7-segment display for measured values
- Clearly recognizable orange text display of units assigned to the displays where the measured value appears
- Representation of measured values on 5 triple 7-segment displays and an auxiliary 7-segment display for input of primary current.
- Detection of connection errors (phase transposition)
- With error detection in the case of incorrect connection
- Measuring accuracy for voltage, current and output: ±2 % ±1 digit

Application

Extremely compact multifunction display for direct or transformer connection in a three-phase network with star-delta measurement for the display of up to 31 different electrical measured values in a switchgear or incoming or outgoing feeders.

A special feature is the analysis of the different loads on the phases. Phase displacement, unsymetrical or unbalanced loads can cause partial overloads. In this case, the multimeter offers a range of different options to combine measured values and assess them.

Function

Voltage measurement

The multimeter measures the delta voltages L1 against L2; L2 against L3 and L3 against L1 or the star voltages L1, L2, L3 against N.

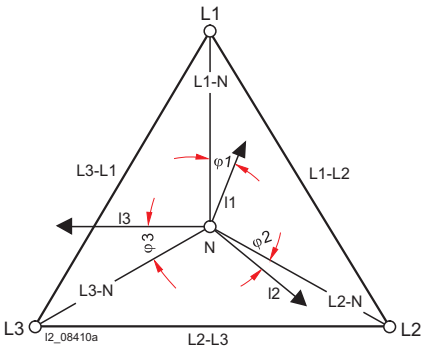
Readout data

Of the following 23 options, you can continuously display 5 indicated values.

Number	Measured value	Display	Unit	Assignment
1	Active power	D1	W	L1
2	Voltage	D1	V	L1
3	Current	D1	A	L1
4	Apparent power	D1	VA	L1
5	p. f.	D1	p. f.	L1
6	Voltage	D1	V	L1 – L2
7	Active power	D2	W	L2
8	Voltage	D2	V	L2
9	Current	D2	A	L2
10	Apparent power	D2	VA	L2
11	p. f.	D2	p. f.	L2
12	Voltage	D2	V	L2 – L3
13	Active power	D3	W	L3
14	Voltage	D3	V	L3
15	Current	D3	A	L3
16	Apparent power	D3	VA	L3
17	p. f.	D3	p. f.	L3
18	Voltage	D3	V	L3 – L1
19	Active power	D5	W	SL
20	Apparent power	D1, D2, D3, D5	VA	SL
21	Reactive power	D5	var	SL
22	Frequency	D4	Hz	SL
23	p. f.	D1, D2, D3, D4	p. f.	SL
2 set values are also indicated				
24	Transformer setting	D5	CT/A	/1 or /5
25	Transformer setting	D5	CT/A	10 ... 5000

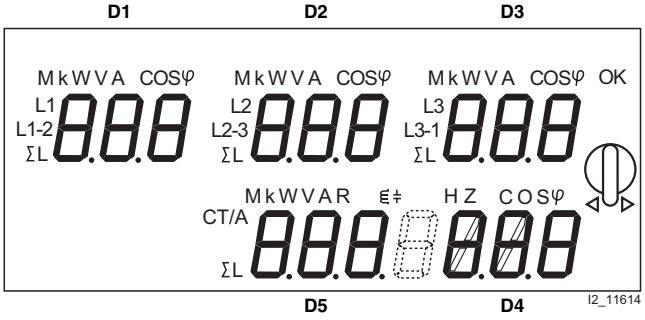
ΣL symbol for the 3-phase system

This indicates that all physical units shown under this symbol are always 3-phase.



Display

The multimeters have a covered brightly lit LED display. The measured values are indicated on an 11-mm high, green, 7-segment LED, the physical units are indicated on an orange LED. Both colors are easier to read than the previously used red LED. Capacitive loads are automatically indicated by a capacitor, inductive loads by a coil.



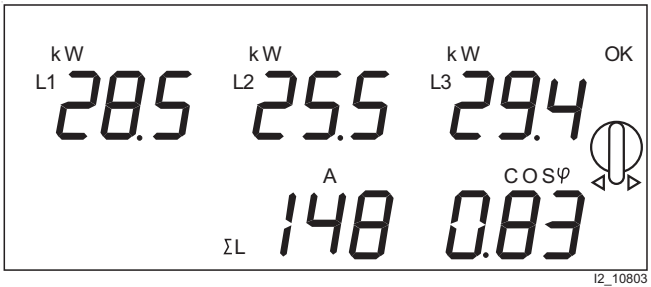
Matrix selection

Conventional measuring instruments usually provide voltage, current or other similar values for three phases. Multimeters with their matrix selection are considerably more flexible and more universal.

The 3-fold indications are selected using the rotary and the desired indications confirmed with OK. This is followed by the horizontal selection e.g. W – V – A or p. f. , and then the vertical selection, e.g. L1 – L1-L2 – SL. Your matrix selection is set.

The vertical data on the display can be assigned to any measured value in the horizontal data. The letters M and k are automatically assigned according to measuring range, i.e. measured value, e.g.: kW or MW. Capacitive loads are automatically indicated by a capacitor, inductive loads by a coil.

The following diagram shows an example of what your matrix selection might look like.



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7KT1 30 multimeters

Technical specifications

Data in compliance with DIN 43751-1, DIN 43751-2 and EN 61010-1			7KT1 300	7KT1 301	7KT1 302
Supply					
• Rated control supply voltage U_c		V AC	230		
• Operating range		× U_c	0.8 ... 1.2		
• Rated frequency		Hz	50		
• Frequency range		Hz	45 ... 65		
• Rated power dissipation		VA	≤10		
Overload capability					
• Voltage	continuous: phase/phase 1 second: phase/phase	V V	480 800		
	continuous: phase/N 1 second: phase/N	V V	276 460		
• Current	continuous 0.5 s 10 ms	A A A	76 – 1000	6 110 –	
Measuring input					
• Type of connection			direct	transformer /1 A or /5 A	
• Voltage U_e	phase/phase phase/N	V V	400 230		
• Operating range voltage	phase/phase phase/N	V V	87 ... 400 50 ... 230		
• Current I_e		A	63	1 or 5	
• Operating range current		A	0.1 ... 63	0.01 ... 5	
• Transformer current	primary current of the transformer smallest input step	A A	– –	10 ... 5000 5	
• Frequency • Operating range frequency		Hz Hz	50 45 ... 65		
Display					
• Connection errors	inverted phases		Err		
• Voltage: 3 displays, 3-digit	delta L1–L2, L2–L3, L3–L1 star L1/N – L2/N – L3/N voltage > 480/276 V voltage 87/50 V	V V	87 ... 480 50 ... 276 H H H – – –		
• Current: 3 displays, 3-digit	L1–L2–L3	A or kA	0.1 ... 76	1.2 or 0.1 ... 6 x transformer conversion ratio	
	for current > 76; 1.2 or 6 A x transformer conversion ratio for current < 0.1; 0.01 A x transformer conversion ratio		H H H – – –		
• Frequency: 1 display, 3-digit	ΣL	Hz	45.0 ... 65.0		
• Active power: 3 displays, 3-digit or 1 display, 3 of 7 digits	L1 – L2 – L3; ΣL display with floating decimal point	W, kW or MW	0 ... 999		
• Reactive power: 1 display, 3-digit	ΣL, with capacitive or inductive indication; display with floating decimal point	var, kvar or Mvar	0 ... 999		
• Apparent power: 3 displays, 3-digit or 1 display, 3-digit	L1 – L2 – L3; ΣL display with floating decimal point	VA, kVA or MVA	0 ... 999		
• p. f. : 3 displays, 3-digit or 1 display, 3-digit	L1 – L2 – L3; ΣL, display with floating decimal point		0.01 ... 1.00		
• Transformer primary current	only if set	A	–	10 ... 5000	
• Transformer secondary current	only if set	A	–	1 or 5	
• Display period		/s	2		
• Storage of setting			EEPROM		
Measuring accuracy					
• Voltage		%	2 ±1 digit		
• Current		%	2 ±1 digit		
• Power output		%	2 ±1 digit		
• p. f.		%	2 ... 10 ± 1 digit		
• Frequency		%	1 ±1 digit		

Technical specifications

Data in compliance with DIN 43751-1, DIN 43751-2 and EN 61010-1			7KT1 300	7KT1 301	7KT1 302
Safety acc. to EN 61010-1					
• Degree of pollution			2		
• Overvoltage category			II		
• Operational voltage		V	600		
• Clearances		mm	≥3.0		
• Creepage distances	in device	mm	≥4.3		
	on printed boards (not installed)	mm	≥3.0		
• Test surge voltage	1.2/50 µs	kV	4		
• Test voltage	50 Hz, 1 min	kV	2.2		
Terminals					
• Main current paths	± screw (Pozidrive)		2	1	
• Supply terminals	blade for slotted screw	mm × mm	4 × 2.5		
• Conductor cross-sections main current paths	rigid, max.	mm^2	1 × 25 or 2 × 16	1 × 6 or 2 × 4	
	rigid, min.	mm^2	1 × 1.5		
• Conductor cross-sections for supply terminals	rigid, max.	mm^2	1 × 2.5 or 2 × 1.5		
	flexible with sleeve, min.	mm^2	1 × 0.75		
Environmental conditions					
• Temperature		°C	0 ... +55		
• Relative humidity		%	≤ 80		
• Vibrations	sine amplitude at 50 Hz	mm	±0.25		
• Protection class	acc. to EN 61010-1		II		
• Degree of protection	acc. to EN 60529		IP20		
	front panel, 96 mm × 96 mm		IP54		

Selection and ordering data

	U_c	I_e	U_e	MW	Order No.	Weight 1 item	PS*/ P. unit
	V AC	A AC	V AC			kg	Items
Multimeters							
for the display of 23 electrical values, of which 5 values can be continuously displayed. for 3-phase, 3/4-wire connection							
for direct connection							
	230	63	3 x 230/400	6	**7KT1 300**	0.400	1
for transformer connection of 10 to 5000 A, adjustable in 5 A increments secondary current, optionally 1 A or 5 A							
	230	/1 or /5	3 x 230/400	6	**7KT1 301**	0.400	1
for front-panel mounting 96 mm × 96 mm for transformer connection of 10 to 5000 A, adjustable in 5 A increments secondary current, optionally 1 A or 5 A							
	230	/1 or /5	3 x 230/400		**7KT1 302**	0.410	1

7KT1 300

7KT1 302

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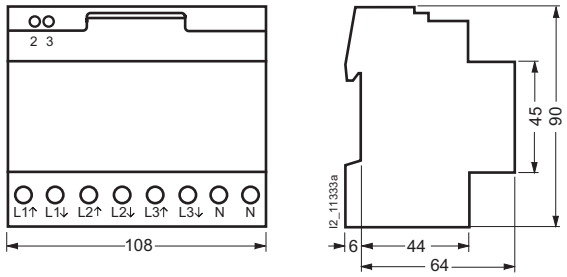
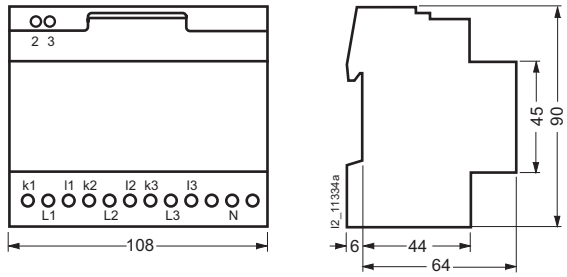
7KT1 30 multimeters

Dimensional drawings

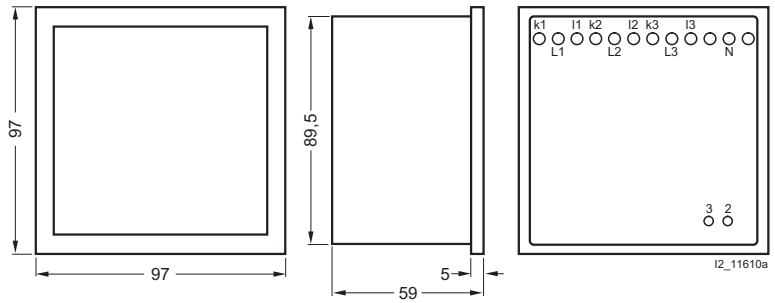
7KT1 300



7KT1 301



7KT1 302

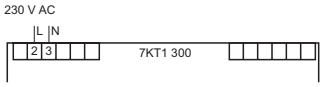


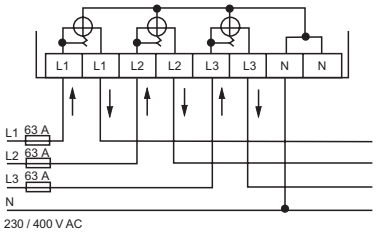
Schematics

Instructions for the connection of transformer counters

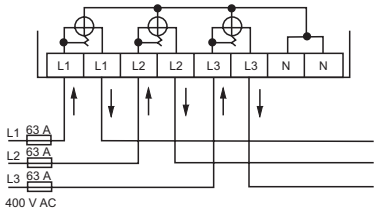
In the case of cross-section reduction, a short-circuit resistant cable is required for the power supply of terminals 2, 5 and 8, depending on the fusing for phases L1, L2, L3. A fuse of 6 A is recommended for line protection.

Current transformers must not be operated with open terminals as dangerously high voltages can occur, which may result in personal injuries and property damages. It may also lead to a thermal overload of the transformers.

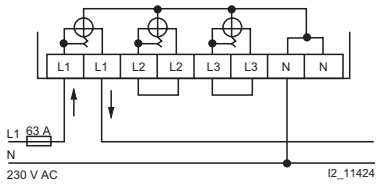




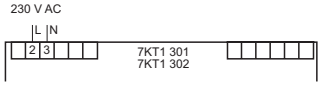
Direct connection 63 A, 4-wire circuit

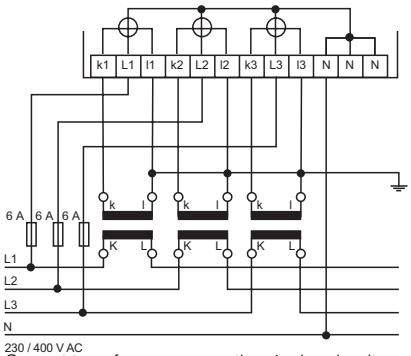


Direct connection 63 A, 3-wire circuit

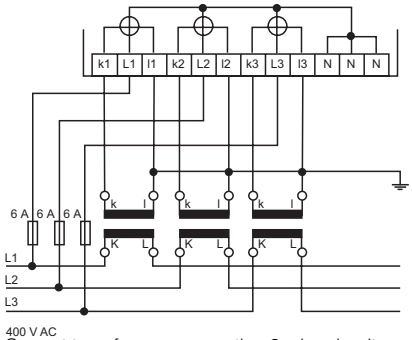


Direct connection 63 A, single-phase

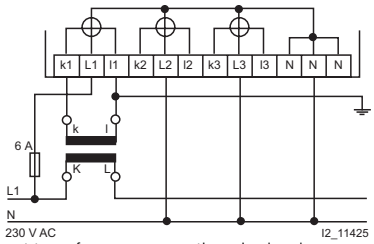




Current transformer connection 4-wire circuit



Current transformer connection 3-wire circuit



Current transformer connection single-phase

7KT1 3 multicounters

Overview

- All required measuring values of an installation clearly visible at a glance
- Innovative matrix selection of assignment and selection of measurement data of the display registers
- For direct connection 63 A or for transformer /1A or /5A
- For transformer primary current of 10 to 5000 A. Input is in 5 A increments
- Size, 11 mm high, attractive green 7-segment display for measured values
- Clearly recognizable orange text display of units assigned to the displays where the measured value appears
- Display of measured values on 4 three-fold 7-segment displays and a 7-fold 7-segment display
- Selection of display for active, reactive and apparent energy value, 3 or 7-digit
- Detection of connection errors (phase transposition)
- Accuracy class 2 acc. to IEC 62053-21, -23
- Version with LAN and MS user interface
- Versions with PROFIBUS DP V1 interface

Application

Extremely compact multifunction display for direct or transformer connection in a three-phase network with star-delta measurement for the display of up to 35 different electrical measured values in a switchgear, incoming or outgoing feeders.

A special feature is the analysis of the different loads on the phases. Phase displacement, unsymetrical or unbalanced loads can cause partial overloads. In this case, the multicounter offers a range of different options to combine measured values and assess them.

You will find information on LAN operation and the MS Excel user interface under "LAN Server".

Function

Voltage measurement

The multicounter measures the delta voltages L1 against L2; L2 against L3 and L3 against L1 or the star voltages L1, L2, L3 against N.

Readout data

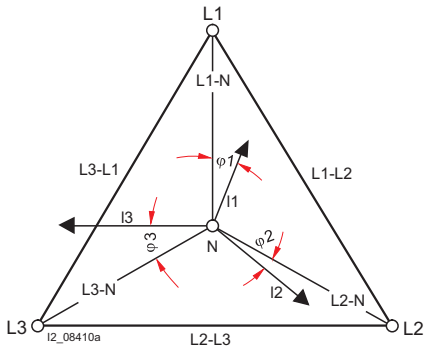
Of the following 35 options, you can continuously display 5 indicated values.

Number	Measured value	Display	Unit	Assignment
1	Active power	D1	W	L1
2	Voltage	D1	V	L1
3	Current	D1	A	L1
4	Apparent power	D1	VA	L1
5	p. f.	D1	p. f.	L1
6	Voltage	D1	V	L1 – L2
7	Active power	D2	W	L2
8	Voltage	D2	V	L2
9	Current	D2	A	L2
10	Apparent power	D2	VA	L2
11	p. f.	D2	p. f.	L2
12	Voltage	D2	V	L2 – L3
13	Active power	D3	W	L3
14	Voltage	D3	V	L3
15	Current	D3	A	L3
16	Apparent power	D3	VA	L3
17	p. f.	D3	p. f.	L3
18	Voltage	D3	V	L3 – L1
19	Temperature	D6	°C	–
20	Current, N-conductor	D6	A	ΣL
21	Active power	D4	W	ΣL
22	Reactive power	D5	var	ΣL
23	Apparent power	D5	VA	ΣL
24	Frequency	D6	Hz	ΣL
25	p. f.	D1, D2, D3, D6	p. f.	ΣL
26	Active energy rate 1	D4	Wh	ΣL→
27	Active energy rate 2	D4	Wh	ΣL→
28	Active energy rate 1	D4	Wh	ΣL←
29	Active energy rate 2	D4	Wh	ΣL←
30	Reactive energy rate 1	D5	varh	ΣL, ind.
31	Reactive energy rate 2	D5	varh	ΣL, ind.
32	Reactive energy rate 1	D5	varh	ΣL, cap.
33	Reactive energy rate 2	D5	varh	ΣL, cap.
34	Apparent energy rate 1	D5	VAh	ΣL
35	Apparent energy rate 2	D5	VAh	ΣL
2 set values are also indicated				
36	Transformer setting	D4	CT/A	/1 or /5
37	Transformer setting	D5	CT/A	10 ... 5000

Function

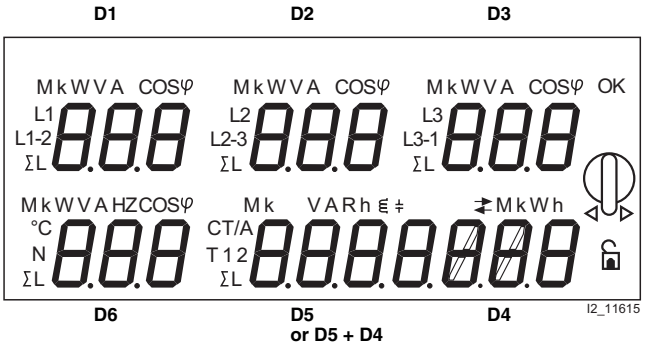
ΣL symbol for the 3-phase system

This indicates that all physical units shown under this symbol are always 3-phase.



Display

The multicounters have a covered brightly lit LED display. The measured values are indicated on an 11-mm high, green, 7-segment LED, the physical units are indicated on an orange LED. Both colors are easier to read than the previously used red LED.



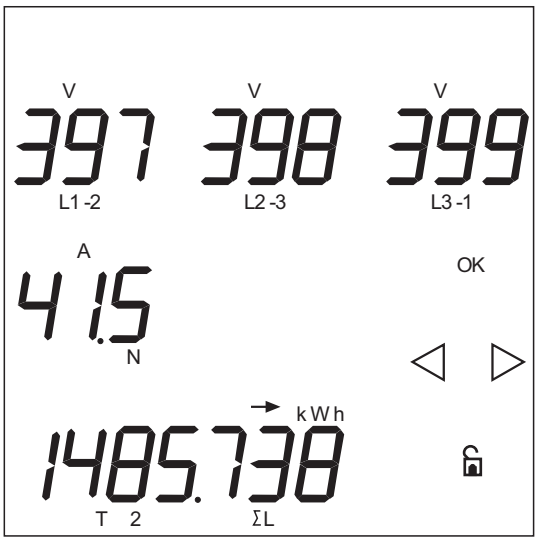
Matrix selection

Conventional measuring instruments usually provide voltage, current or other similar values for three phases. Multicounters with their matrix selection are considerably more flexible and more universal.

The 3-fold indications are selected using the rotary and the desired indications confirmed with OK. This is followed by the horizontal selection e.g. W – V – A– VA or p. f., and then the vertical selection, e.g. L1 – L1-L2 – ΣL. Your matrix selection is set.

The vertical data on the display can be assigned to any measured value in the horizontal data. The letters M and k are automatically assigned according to measuring range, i.e. measured value, e.g.: kW or MW. Capacitive loads are automatically indicated by a capacitor, inductive loads by a coil.

The following diagram shows an example of what your matrix selection might look like.



7KT1 3 multicounters

Technical specifications

Data in compliance with EN 61010-1, EN 62053-21, -23, -31			7KT1 310	7KT1 311, 7KT1 312	7KT1 340	7KT1 341, 7KT1 342	7KT1 350	7KT1 351, 7KT1 352
Supply								
• Rated control supply voltage U_c		V AC	230					
• Operating range		× U_c	0.8 ... 1.2					
• Rated frequency		Hz	50					
• Frequency range		Hz	45 ... 65					
• Rated power dissipation		VA	≤10					
Overload capability								
• Voltage	continuous: phase/phase 1 second: phase/phase	V V	480 800					
	continuous: phase/N 1 second: phase/N	V V	276 460					
• Current	continuous 0.5 s 10 ms	A A A	76 – 2000	6 110 –	76 – 2000	6 110 –	76 – 2000	6 110 –
Measuring input								
• Type of connection			direct	transformer /1 A or /5 A	direct	transformer /1 A or /5 A	direct	transformer /1 A or /5 A
• Voltage U_e	phase/phase phase/N	V V	400 230					
• Operating range voltage	phase/phase phase/N	V V	87 ... 400 50 ... 230					
• Current I_e		A	63	1 or 5	63	1 or 5	63	1 or 5
• Operating range current		A	0.1 ... 6.3	0.01 ... 5.5	0.1 ... 6.3	0.01 ... 5.5	0.1 ... 6.3	0.01 ... 5.5
• Transformer current	primary current of the transformer	A	–	10 ... 5000	–	10 ... 5000	–	10 ... 5000
	smallest input step	A	–	5	–	5	–	5
• Frequency		Hz	50					
• Operating range frequency		Hz	45 ... 65					
Display								
• Connection errors	inverted phases		Err					
• Voltage: 3 displays, 3-digit	delta L1–L2, L2–L3, L3–L1 star L1/N – L2/N – L3/N voltage > 480/276 V voltage < 87/50 V	V AC V AC	87 ... 480 50 ... 276 H H H L L L					
• Current	L1 – L2 – L3 – neutral conductor	A or kA	0.1 ... 76	(0.1 ... 1.2 or 6) × transformer conversion ratio	0.1 ... 76	(0.1 ... 1.2 or 6) × transformer conversion ratio	0.1 ... 76	(0.1 ... 1.2 or 6) × transformer conversion ratio
	for current > 76; (1.2 or 6 A) × transformer conversion ratio for current <0.1 A; 0.01 A x transformer conversion ratio		H H H L L L					
• Frequency: 1 display, 3-digit	ΣL	Hz	45.0 ... 65.0					
• Active power: 3 displays, 3-digit	L1 – L2 – L3, display with floating decimal point	W, kW or MW	0 ... 999					
• Active power: 1 display, 3-digit , 3 of 7 digits + display import or export	ΣL display with floating decimal point	W, kW or MW	0 ... 999					
• Reactive power: 1 display, 3 of 7 digits + capacitive or inductive indication	ΣL display with floating decimal point	var, kvar or Mvar	0 ... 999					
• Apparent power: 3 displays, 3-digit	L1 – L2 – L3, display with floating decimal point	VA, kVA or MVA	0 ... 999					
• Apparent power: 5 displays, 3-digit, adjustable	ΣL display with floating decimal point	VA, kVA or MVA	0 ... 999					
• Active energy: 1 display, 7-digit + display import or export, + display tariff 1 or 2	ΣL display with floating decimal point	Wh, kWh or MWh	0 ... 9999999 or 0 ... 999					
• Reactive energy: 1 indicator, 7-digit + capacitive or inductive indication	ΣL display with floating decimal point	varh, kvarh or Mvarh	0 ... 9999999 or 0 ... 999					
• Apparent energy: 5 displays, 3-digit, adjustable tariff	ΣL display with floating decimal point	VAh, kVAh or MVAh	0 ... 9999999 or 0 ... 999					
• p. f.: 3 displays, 3-digit	L1 – L2 – L3 ($U \geq 0.1\ U_e$, $I \leq I_e$)		0.01 ... 1.00					
• p. f.: 5 displays, 3-digit, adjustable	ΣL, ($U \geq 0.1\ U_e$, $I \leq I_e$)		0.01 ... 1.00					

Technical specifications

Data in compliance with EN 61010-1, EN 62053-21, -23, -31			7KT1 310	7KT1 311, 7KT1 312	7KT1 340	7KT1 341, 7KT1 342	7KT1 350	7KT1 351, 7KT1 352
Display (contd.)								
• Transformer primary current	only if set	A	–	10 ... 5000	–	10 ... 5000	–	10 ... 5000
• Transformer secondary current	only if set	A	–	1 or 5	–	1 or 5	–	1 or 5
• Temperature		°C	0 ... +99					
• Display period		/s	2					
• Storage of setting and energy values			EEPROM					
S0 interface	acc. to IEC 62053-31		•					
• Terminal output	for direct connection 63 A, adjustable and automatic	Imp/kWh	10–1–0.1–0.01–0.001	–				
	depending on transformer factor, adjustable and automatic	Imp/kWh	–	10–1–0.1–0.01–0.001	–			
• Pulse duration		ms	125					
• Minimum interval between 2 pulses		ms	125					
• Required voltage		V DC	5 ... 30					
• Current		mA	10 ... 20					
LAN interface			–		•		–	
• Plug-and-play technology					•			
• terminals					+, –, shielding			
PROFIBUS DP interface	RS 485		–		–		•	
• Transmission rate		kbit/s					9.6–64–256–1000	
• Connection							9-Pin Sub-D	
Measuring accuracy								
• Voltage		%	2 ±1 digit					
• Current		%	2 ±1 digit					
• Power output		%	2 ±1 digit					
• Energy		%	2 ±1 digit					
• p. f.		%	2 ... 10 ± 1 digit					
• Frequency		%	1 ±1 digit					
• Temperature		%	3 ±1 digit					
Safety acc. to EN 61010-1								
• Degree of pollution			2					
• Overvoltage category			II					
• Operational voltage		V	600					
• Clearances		mm	≥3.0					
• Creepage distances	in device	mm	≥4.3					
	on printed boards (not installed)	mm	≥3.0					
• Test pulse voltage	1.2/50 µs	kV	4					
• Test voltage	50 Hz, 1 min	kV	2.2					
Terminals								
• Main current paths	± screw (Pozidrive)		2	1	2	1	2	1
• Supply and control terminals	blade for slotted screw	mm × mm	4 × 2.5					
• Conductor cross-sections main current paths	rigid, max.	mm^2	1 × 25 or 2 × 16	1 × 6 or 2 × 4	1 × 25 or 2 × 16	1 × 6 or 2 × 4	1 × 25 or 2 × 16	1 × 6 or 2 × 4
	rigid, min.	mm^2	1 × 1.5					
• Conductor cross-sections supply and control terminals	rigid, max.	mm^2	1 × 6 or 2 × 4					
	flexible with sleeve, min.	mm^2	1 × 0.75					
Environmental conditions								
• Temperature		°C	0 ... +55					
• Relative humidity		%	≤ 80					
• Vibrations	sinus amplitude at 50 Hz	mm	±0.25					
• Protection class	acc. to EN 61010-1		II					
• Degree of protection	acc. to EN 60529		IP20					
	front panel, 96 mm × 96 mm		–	IP54	–	IP54	–	IP54

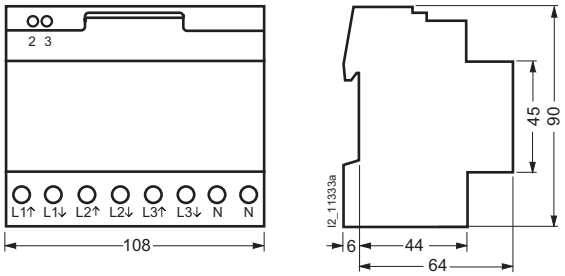
7KT1 3 multicounters

Selection and ordering data

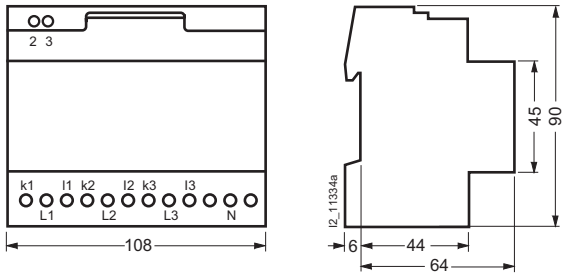
	U_c V AC	I_e A AC	U_e V AC	MW	Order No.	Weight 1 item kg	PS*/ P. unit Items
 7KT1 310							
Multicounters							
for the display of 38 electrical values, of which 5 or 6 values can be continuously displayed for 3-phase, 3/4-wire connection							
With S0 interface							
for direct connection							
	230	63	3 × 230/400	6	**7KT1 310**	0.410	1
for transformer connection of 10 ... 5000 A, adjustable in 5 A increments, secondary current optionally 1 or 5 A							
	230	/1 or /5	3 × 230/400	6	**7KT1 311**	0.410	1
for transformer connection of 10 ... 5000 A, adjustable in 5 A increments, secondary current optionally 1 or 5 A for front-panel mounting 96 mm × 96 mm							
	230	/1 or /5	3 × 230/400		**7KT1 312**	0.420	1
 7KT1 312							
With LAN-Interface							
for direct connection							
	230	63	3 × 230/400	6	**7KT1 340**	0.420	1
for transformer connection of 10 ... 5000 A, adjustable in 5 A increments, secondary current optionally 1 or 5 A							
	230	/1 or /5	3 × 230/400	6	**7KT1 341**	0.420	1
for transformer connection of 10 ... 5000 A, adjustable in 5 A increments, secondary current optionally 1 or 5 A for front-panel mounting 96 mm × 96 mm							
	230	/1 or /5	3 × 230/400		**7KT1 342**	0.430	1
With PROFIBUS DP Interface							
for direct connection							
	230	63	3 × 230/400	6	**7KT1 350**	0.420	1
for transformer connection of 10 ... 5000 A, adjustable in 5 A increments, secondary current optionally 1 or 5 A							
	230	/1 or /5	3 × 230/400	6	**7KT1 351**	0.420	1
for transformer connection of 10 ... 5000 A, adjustable in 5 A increments, secondary current optionally 1 or 5 A for front-panel mounting 96 mm × 96 mm							
	230	/1 or /5	3 × 230/400		**7KT1 352**	0.430	1

Dimensional drawings

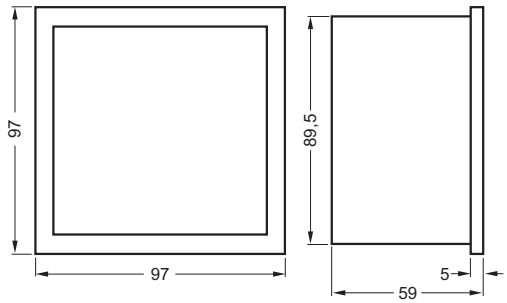
7KT1 3.0



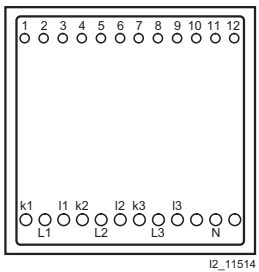
7KT1 3.1



7KT1 3.2



Rear panel



* You can order this quantity or a multiple thereof.

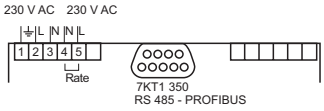
Schematics

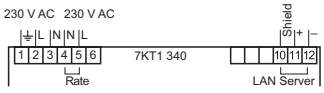
S0 interface

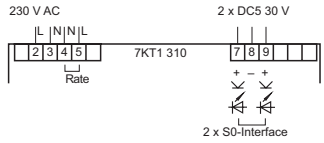
The short-circuit resistant optocoupler is operated at 5 to 30 V DC. The current must be selected within a range of max. 20 mA. The pulse duration is 125 ms. The minimum pulse interval is also 125 ms.

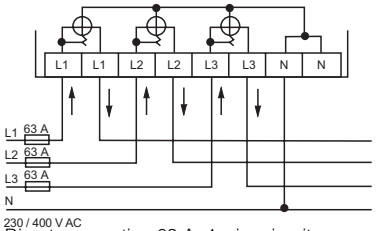
Grounding terminal

The interpolation point grounding terminals required for the transmission technology only serve to shield the transmission cables and do not have a protective function.

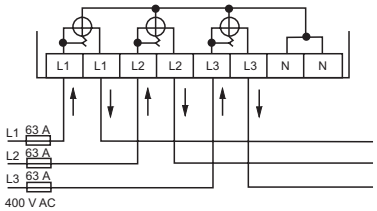




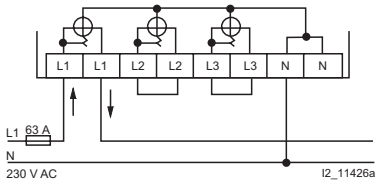




Direct connection 63 A, 4-wire circuit

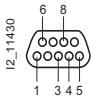


Direct connection 63 A, 3-wire circuit



Direct connection 63 A, single-phase

RS 485-PROFIBUS socket



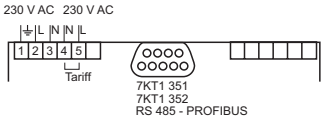
RS 485 - PROFIBUS-Socket

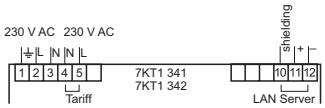
1= ⏚
3= +RxTx
4= RTS
5= ⏚
6= DC +5 V
8= -RxTx

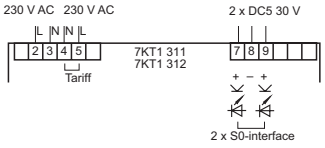
Instructions for the connection of transformer counters

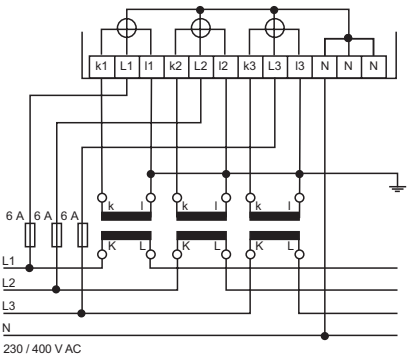
In the case of cross-section reduction, a short-circuit resistant cable is required for the power supply of terminals 2, 5 and 8, depending on the fusing for phases L1, L2, L3. A fuse of 6 A is recommended for the line protection.

Current transformers must not be operated with open terminals as dangerously high voltages can occur, which may result in personal injuries and property damages. It may also lead to a thermal overload of the transformers.

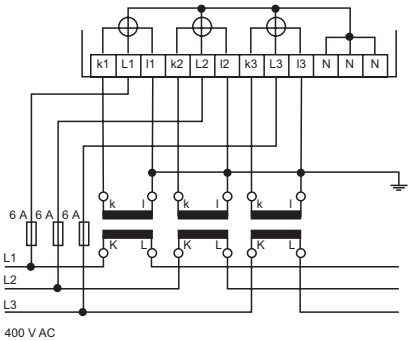




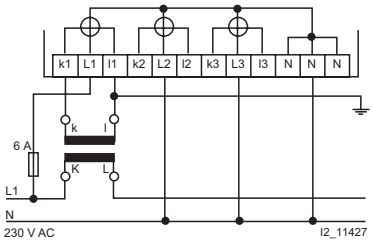




Current transformer connection 4-wire circuit



Current transformer connection 3-wire circuit



Current transformer connection single-phase

7KT1 14 E-counters, single-phase

Overview

Features

- Accuracy class 2 acc. to IEC 62053-11
- With drum-type register 4 × 1.2 mm
- Short-circuit resistant pulse output

Application

E-counters serve the measurement of kWh in single-phase systems, e.g. in industrial plants, offices and apartments in apartment houses

Technical specifications

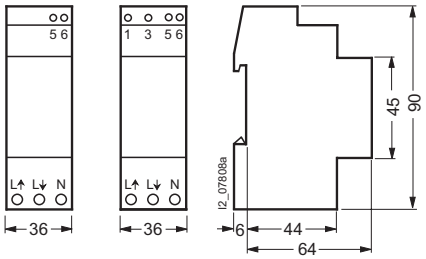
Data acc. to EN 62053-11, -31			7KT1 140	7KT1 141
Supply				
• Rated control supply voltage U_c		V AC	230	
• Operating range U_c		× U_c	0.80 ... 1.20	
• Rated frequency		Hz	50	
• Operating range frequency		Hz	45 ... 65	
• Rated power dissipation P_v		VA	1	
Measuring input				
• Type of connection			direct	
• Voltage		V	230	
• Operating range voltage		V	184 ... 276	
• Current		A	63	
• Operating range current	direct connection	A	0.005 ... 63	
• Minimum operating current		mA	5	
• Frequency		Hz	50	
• Operating range frequency	intermodulation distortion 3 %; symmetric sinusoid curve	Hz	45 ... 65	
Overload capability				
• Voltage U_e	continuous: phase/N 1 second: phase/N	V V	276 300	
• Current I_e	continuous 1 second	A A	63 126	
Display				
• Rate			single	double
• Active energy	drum-type register H × W	mm × mm	4 × 1.2	2 x (4 x 1.2)
	7-digit with 1 decimal		0 ... 999999.9	2 x (0 ... 999999.9)
Measuring accuracy				
Active energy	at 23 °C ±1 °C	%	±2	
Safety				
• Separation of current and voltage circuit			electrical	
• Rated insulation voltage		V	600	
• Rated impulse withstand voltage	inputs against ground for 1 min. at 50 Hz	kV	4	
• Overvoltage category	acc. to EN 60664-1		III	
Pulse output				
• S0 interface acc. to DIN 43864, IEC 62053-31	IR test output LED	Imp/Wh	10	
	terminals, output	Imp/kWh	10	
	Pulse duration	ms	125	
	Minimum interval between 2 pulses	ms	125	
	Required voltage	V DC	5 ... 30	
	Permissible current range	mA	10 ... 20	
Terminals				
• Main current paths	± screw (Pozidrive)		2	
• S0 interface/control terminals	blade for slotted screw	mm	0.4 × 2.5	
• Conductor cross-sections main current paths	rigid, max. rigid, min.	mm^2 mm^2	1 × 35 1 × 1.5	
• Conductor cross-sections S0 interface/control terminals	rigid, max. flexible with sleeve, min.	mm^2 mm^2	1 × 2.5 1 × 0.75	
Ambient conditions				
• Temperature	storage operation	°C °C	-40 ... +70 0 ... + 55	
• Relative air humidity	storage operation	% %	≤ 98 ≤ 80	
• Minimum vibration	amplitude at 50 Hz	mm	±0.25	
• Degree of pollution	acc. to EN 60664-1		2	
• Degree of protection			IP20	

Selection and ordering data

	U_c	I_e	U_e	MW	Order No.	Weight 1 item	PS*/ P. unit
	V AC	A AC	V AC			kg	Items
 7KT1 140	**E-counters for active energy**						
	with drum-type register 4 × 12 mm, with S0 interface, for single-phase operation						
	direct connection, single rate						
	230	63	230	2	**7KT1 140**	0.185	1
	direct connection, double rate						
	230	63	230	2	**7KT1 141**	0.220	1

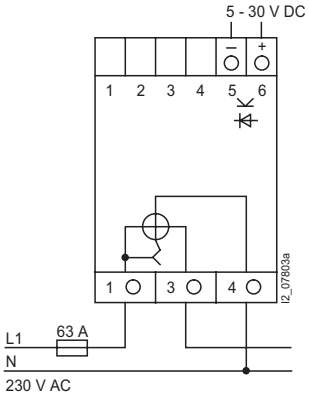
Dimensional drawings

7KT1 141 7KT1 140

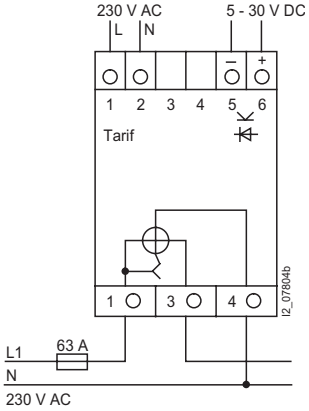


Schematics

7KT1 140

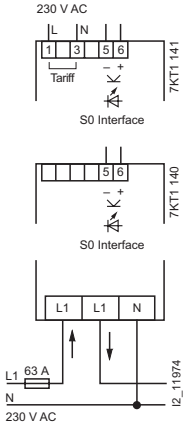


7KT1 141



Rate switchover

If there is a voltage of 230 V AC at terminal 1, the rate must be switched to 2.



10

7KT1 5 E-counters, three-phase

Overview

Features

- 1- or 3-phase measurement for 3- or 4-wire connection and center-tap calculation for 3-wire connection
- For direct connection 63 A or for transformer /5A
- For transformer primary current of 10 A to 5000 A. Input is in 5 A increments
- 7-fold 7-segment display for energy values and additional function indication
- Detection of connection errors (phase transposition)
- Versions with LAN interface and MS Excel user interface
- Accuracy class 2 according to IEC 61036
- PTB test started.

Application

E-counters serve the measurement of kWh in single and three-phase systems, e.g. in industrial plants, offices and apartments in apartment houses.

Versions with LAN interface with LCD are used for consumption analysis and minimization of operating costs in industrial plants and office buildings. For information on LAN operation and the MS Excel user interface, see "LAN Server" on page 10/32.

Function

Display

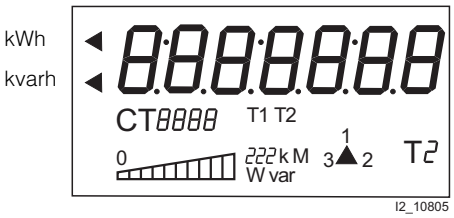
		Unit	ID
Active energy	Rate 1	kWh	Arrow and T1
	Rate 2	kWh	Arrow and T2
Reactive energy	Rate 1	kvarh	Arrow and T1
	Rate 2	kvarh	Arrow and T2
Active power		kW	Utilization and instantaneous value
Reactive power		kvar	Utilization and instantaneous value
Phase-sequence indication	1–2–3		Flashing triangle next to left-hand phase sequence
Primary transformer current	10 ... 5000	A	CT (current transformer)

LAN communication

6 measured values, active energy rate 1 and rate 2, reactive energy rate 1 and rate 2, active power and reactive power are transmitted.

Transformer setting

The primary transformer current is set at the device switch. With regard to the transformer setting, the device display is internally converted. This setting can be sealed on certification.



I2_10805

Technical specifications

Data in compliance with EN 61010-1, EN 62053-11, -21, -31			7KT1 500, 7KT1 502, 7KT1 510, 7KT1 512, 7KT1 520	7KT1 501, 7KT1 503, 7KT1 511, 7KT1 513, 7KT1 521
Supply				
• Rated control supply voltage U_c		V AC	230	
• Operating range		× U_c	0.80 ... 1.20	
• Rated frequency		Hz	50	
• Operating range frequency		Hz	45 ... 65	
• Rated power dissipation P_v		VA	≤10	
Measuring input				
• Type of connection			direct	transformer /5 A
• Voltage U_e	phase/phase phase/N	V V	400 230	
• Operating range voltage	phase/phase phase/N	V V	87 ... 400 50 ... 230	
• Current I_e		A	63	5
• Operating range current	direct connection transformer connection	A	0.1 ... 69.3 –	– 0.01 ... 5.5
• Transformer current	primary current smallest input step	A A	– –	10 ... 5000 5
• Frequency		Hz	50	
• Operating range frequency		Hz	45 ... 65	
Overload capability				
• Voltage U_e	continuous: phase/phase 1 second: phase/phase	V V	480 800	
	continuous: phase/N 1 second: phase/N	V V	276 460	
• Current I_e	continuous 0.5 seconds 10 ms	A A A	76 – 2000	6 110 –

Technical specifications

Data in compliance with EN 61010-1, EN 62053-11, -21, -31			7KT1 500, 7KT1 502, 7KT1 510, 7KT1 512, 7KT1 520	7KT1 501, 7KT1 503, 7KT1 511, 7KT1 513, 7KT1 521
Display				
• Connection errors	discernible from phase-sequence indication		•	
• Active energy: 1 display, 7-digit + display import or export (arrow)		kWh	000000.0 ... 999999.9	
• Reactive energy: 1 display, 7-digit + display import or export (arrow)		kvarh	000000.0 ... 999999.9	
• Active power: 1 display, 3-digit + display import or export (arrow)		kW or MW	000 ... 999	
• Reactive power: 1 display, 3-digit + display import or export (arrow)		kvar or Mvar	000 ... 999	
• Instantaneous rate measurement: 1 display, 1-digit	for 7KT1 500, 7KT1 501, 7KT1 502, 7KT1 503		1	
	for 7KT1 510, 7KT1 511, 7KT1 512, 7KT1 513, 7KT1 520, 7KT1 521		1 or 2	
• Display rate identifier	for 7KT1 510, 7KT1 511, 7KT1 512, 7KT1 513, 7KT1 520, 7KT1 521		T1 or T2	
• Transformer primary current	adjustable in 5 A steps	A	–	10 ... 5000
• Display period		/s	2	
• Storage of setting and energy values			EEPROM	
Measuring accuracy				
• Active or reactive energy		%	2 ± 1 digit	
• Active or reactive power		%	2 ± 1 digit	
S0 interface	acc. to IEC 62053-31			
• Terminal output	for 7KT1 500 fixed for 7KT1 502, 7KT1 510, 7KT1 512 for direct connection 63 A, adjustable	Imp/kWh Imp/kWh	10 10–1–0.1–0.01–0.001	– –
	for 7KT1 501 fixed for 7KT1 503, 7KT1 511, 7KT1 513 depending on the transformer factor, adjustable	Imp/kWh Imp/kWh	– –	1 10–1–0.1–0.01–0.001
• Pulse duration		ms	125	
• Minimum interval between 2 pulses		ms	125	
• Required voltage		V DC	5 ... 30	
• Permissible current range		mA	10 ... 20	
LAN interface	only for 7KT1 520, 7KT1 521			
• Plug-and-play technology			•	
• Terminals			+, –, shielding	
Safety acc. to EN 61010-1				
• Degree of pollution			2	
• Overvoltage category			II	
• Operational voltage		V	600	
• Clearances		mm	≥3.0	
• Creepage distances	in device on printed boards (not installed)	mm mm	≥4.3 ≥3.0	
• Test pulse voltage	1.2/50 µs	kV	4	
• Test voltage	50 Hz, 1 min	kV	2.2	
Terminals				
• Main current paths	± screw (Pozidrive)		2	1
• Supply and control terminals	blade for slotted screw	mm × mm	0.4 × 2.5	
• Conductor cross-sections main current paths	rigid (max.) rigid (min.)	mm^2 mm^2	1 x 2.5 or 2 x 16 1 x 1.5	1 x 6 or 2 x 4 1 x 0.95
• Conductor cross-sections supply and control terminals	rigid (max.) flexible with sleeve (min.)	mm^2 mm^2	1 x 2.5 or 2 x 1.5 0.75	
Ambient conditions				
• Ambient temperature		°C	0 ... +55	
• Relative humidity	storage	%	≤ 80	
• Vibration	sine amplitude at 50 Hz	mm	± 0.25	
• Degree of protection	(terminal area)		IP40 (IP20)	
• Protection class	acc. to EN 61010-1		II	

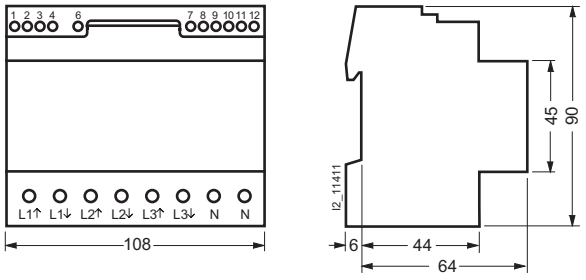
7KT1 5 E-counters, three-phase

Selection and ordering data

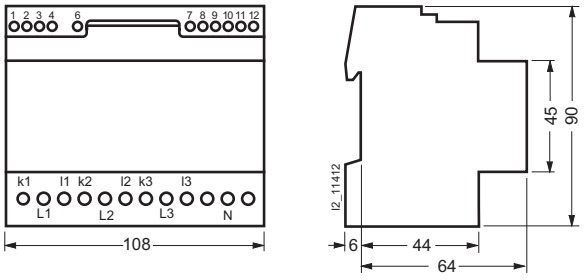
	U_c	I_e	U_e	MW	Order No.	Weight 1 item	PS*/ P. unit
	V AC	A AC	V AC			kg	Items
	**E-counters for active energy**						
	with S0 interface and IR interface, for 3-phase, 3/4-wire connection						
	for direct connection, single rate						
	230	63	3 × 230/400	6	**7KT1 500**	0.400	1
	for transformer connection, single rate						
	230	transformer /5	3 × 230/400	6	**7KT1 501**	0.390	1
	for direct connection, double rate						
	230	63	3 × 230/400	6	**7KT1 510**	0.400	1
	for transformer connection, double rate						
	230	transformer /5	3 × 230/400	6	**7KT1 511**	0.390	1
	E-counters for active and reactive energy						
	with S0 interface and IR interface, for 3-phase, 3/4-wire connection						
	for direct connection, single rate						
	230	63	3 × 230/400	6	**7KT1 502**	0.400	1
	for transformer connection, single rate						
	230	transformer /5	3 × 230/400	6	**7KT1 503**	0.390	1
	for direct connection, double rate						
	230	63	3 × 230/400	6	**7KT1 512**	0.400	1
	for transformer connection, double rate						
	230	transformer /5	3 × 230/400	6	**7KT1 513**	0.390	1
	E-counters for active and reactive energy						
	with LAN interface and IR interface, for 3 phase, 3/4-wire connection						
	for direct connection, double rate						
	230	63	3 × 230/400	6	**7KT1 520**	0.410	1
	for transformer connection, double rate						
	230	transformer /5	3 × 230/400	6	**7KT1 521**	0.400	1

Dimensional drawings

7KT1 500, 7KT1 502, 7KT1 510, 7KT1 512, 7KT1 520



7KT1 501, 7KT1 503, 7KT1 511, 7KT1 513, 7KT1 521



Schematics

Grounding terminal

The grounding terminals required for the transmission technology for 7KT1 520 and 7KT1 521 versions only serve to shield the transmission cables and do not have a protective function.

Instructions for the connection of transformer counters

In the case of cross-section reduction, a short-circuit resistant cable is required for the power supply of terminals L1, L2 and L3 depending on the fusing for phases L1, L2 and L3. A fuse of 6 A is recommended for the line protection.

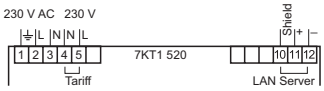
Current transformers must not be operated with open terminals since dangerous high voltages might occur which may result in personal injuries and property damages. In addition to this, the transformers are exposed to thermal overload.

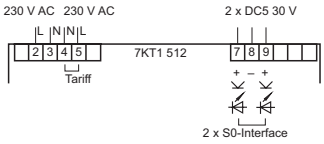
Rate switchover

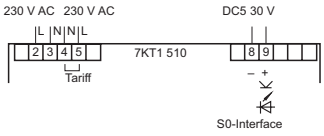
If there is a voltage of 230 V AC at terminals 4 and 5, the rate is switched to 2.

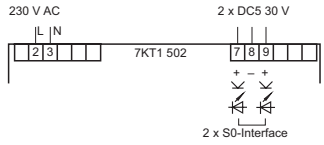
*** You can order this quantity or a multiple thereof.**

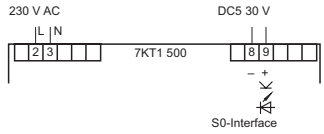
7KT1 5 E-counters, three-phase

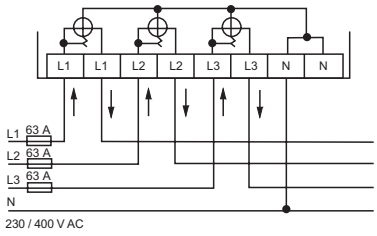




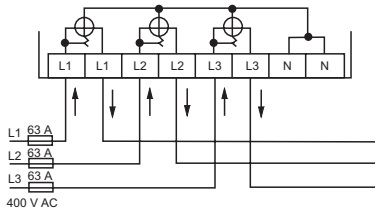




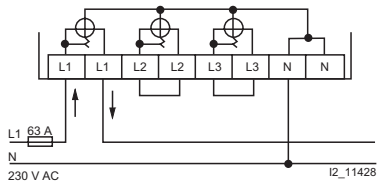




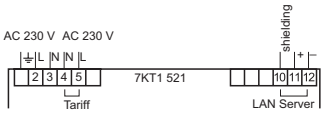
Direct connection 63 A, 4-wire circuit

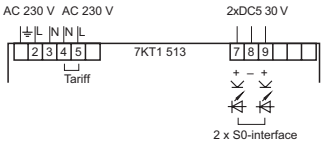


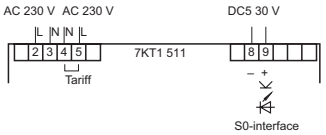
Direct connection 63 A, 3-wire circuit

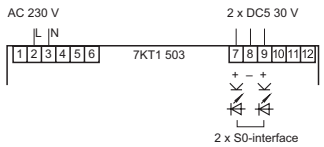


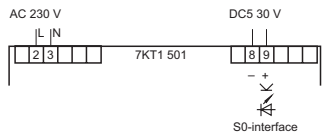
Direct connection 63 A, single-phase

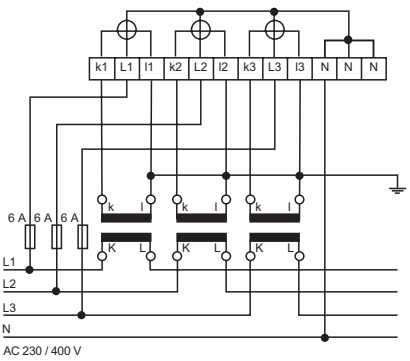




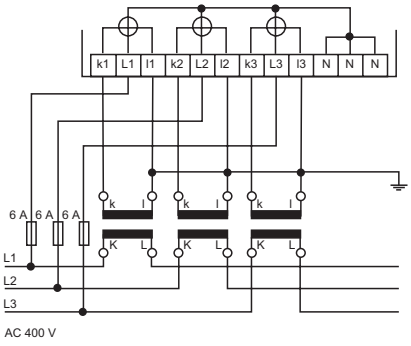




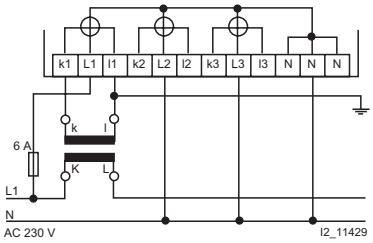




Current transformer connection 4-wire circuit



Current transformer connection 3-wire circuit

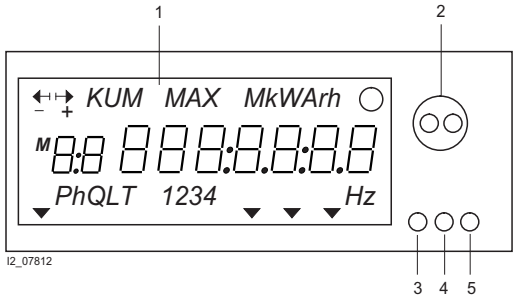


Current transformer connection single-phase

7KT1 16 E-counters, three-phase, *instabus* KNX *EIB*

Overview

E-counter with LCD display



1 Large-size 7-digit LCD 8 × 4 mm
2 IR readout interface for mounting the readout measuring head
3 Display pushbutton
4 IR test output LED (10 IMP./W)
5 Sealable Set/Reset pushbutton

Readout data for consumption analysis

Manual readout

The above data can be called up and manually displayed directly on the E-meter by pressing pushbuttons 5) Set/Reset pushbutton and 3) Display pushbutton. The E-counter calculates the consumption costs when the price per kWh has been entered. The ability to input the device number facilitates assignment to a number system and cost assignment to one of the various cost centers.

Readout software for the IR measuring head

The data of the above table are read into a PC using the magnetic IR measuring head and stored in an ASCII file in compliance with IEC 61107.
This ASCII file can be further processed in an Excel or Access file. The product range can run under Windows 95, 98 and Windows NT.

Readout data on the LCD or over IR interface

			7KT1 162 7KT1 165
Active energy	rate 1/2	kWh	x/x
Price per kWh, adjustable	rate 1/2	Cost/ kWh	x/x
Total costs	rate 1/2	Total cost	x/x
Reactive energy	rate 1/2	kvarh	x/x
Apparent energy	rate 1/2	kVAh	–
Maximum active power	rate 1/2	kW	–
Integration periods, adjustable	rate 1/2	min	–
Instantaneous active power	sum total phase L1/L2/L3	kW kW	x x
Instantaneous voltage	phase L1/L2/L3	V	–
Instantaneous imported kWh	sum total phase L1/L2/L3	A A	– –
Instantaneous current factor		FA I	x[1)]
Instantaneous reactive power	sum total phase L1/L2/L3	kvar kvar	– –
Instantaneous apparent power	sum total phase L1/L2/L3	kVA kVA	– –
Instantaneous p. f.	phase L1/L2/L3	p.f.	–
Instantaneous frequency		Hz	–
Device number, adjustable		No.	x

x = data are displayed

1) Only for transformer meters

Data transmission instabus KNX EIB

The 7KT1 162 and 7KT1 165 counters are intended for the following data transmission:

Active energy (kWh) rate 1
Active energy (kWh) rate 2
Device number
Active power (kW) phase L1
Active power (kW) phase L2
Active power (kW) phase L3

Visualization software "Recording of consumption data and maximum time analysis" (available soon)

The software can read out and assign counter readings, and prepare the data for accounting.
The system does not differentiate between counters that are read out manually or in online operation.
A maximum time analysis can be carried out over several days on the PC in online operation. Graphical analyses are also available.

Energy flow direction

Counting is only carried out in the specified energy flow direction. For meters with transformer connection, the energy flow direction of the transformer (primary and secondary) as well as the correct assignment of the voltage and current paths must be taken into account.

Benefits

- PTB-approved
- Accuracy class 2
- LCD
- Short-circuit resistant pulse output
- With network analysis functions and direct cost display

Application

For the measurement of kWh in single and three-phase systems, e.g. in industrial plants, offices and apartments in apartment houses. The versions with LCD display are used as network analysis devices for consumption analysis and minimization of operating costs in industrial plants and office buildings.

Technical specifications

			7KT1 162	7KT1 165
Supply				
Rated control voltage U_e		V AC	230	
Operating range U_e			0.80 ... 1.20	
Rated frequency		Hz	50	
Operating range frequency		Hz	45 ... 65	
Power consumption	per phase	VA	0.8	
Measuring input				
Type of connection			direct	transformer
Voltage		V	400	
Operating range voltage		V	320 ... 480	
Current		A	63	5
Operating range current	direct connection transformer connection	A A	0.005 ... 63	 0.005 ... 6
Minimum operating current		mA	5	
Current factor	of transformer, input in full digits	FAI	0 ... 255	
Frequency		Hz	50	
Operating range frequency	Intermodulation distortion ≤3 %; symmetric sine curve	Hz	45 ... 65	
Overload capability				
Voltage	duration: phase/N 1 second: phase/N duration: phase/phase 1 second: phase/phase	V V V V	276 460 480 800	
Current	duration 1 second	A A	76 126	6 10
Display				
Rate			double	
	LCD H x W readout data 7-digit with decimal points	mm x mm	8 x 4 1) Active/reactive	
Active energy	drum-type register H x W: 7-digit with 1 decimal	mm x mm		
Display period		/s	0.5	
Storage of measured values		kWH	EEPROM	
Measuring accuracy	at 23° C ± 1° C			
Active energy	acc. to IEC 61036	class	2	
Safety				
Supply measuring circuit isolation			electrical	
Rated insulation voltage		V	600	
Rated impulse withstand voltage	inputs against ground for 1 min. at 50 Hz	kV	4	
Overvoltage category	VDE 0110 T1		III	
Pulse output, S0 interface	acc. to IEC 61393/ DIN 43864			
	IR test output LED	Imp/Wh	10	
	terminals, output	Imp/kWh	10	1
	minimum pulse duration	ms	125	
	external voltage	V DC	5 ... 30	
	current	mA	10 ... 20	
	resistance	kΩ	0.5 ... 1.5	
instabus KNX *EIB* interface				
Standard			EIS 9	
Readout data			1)	
Terminals				
Main current paths	± screw (Pozidrive)		2	
Supply/control-circuit terminals	blade for slotted screw	mm	0.4 x 2.5	
Conductor cross-sections main current paths	rigid (max.) rigid (min.)	mm^2 mm^2	1 x 10 1 x 1.5	
Conductor cross-sections supply/control terminals	rigid (max.) flexible with sleeve	mm^2 mm^2	1 x 2.5 1 x 0.75	

1) See table on page 10/28.

7KT1 16 E-counters, three-phase, *instabus* KNX *EIB*

Technical specifications

			7KT1 162	7KT1 165
Ambient conditions				
Temperature	storage	°C	-40 ... +70	
	operation	°C	0 ... +55	
Relative air humidity	storage	%	≤98	
	operation	%	≤80	
Minimum vibration	amplitude at 50 Hz	mm	±0.25	
Degree of pollution	VDE 0110-1		2	
Degree of protection	(terminal area)		IP40 (IP20)	

Selection and ordering data

	Display	I_e	U_e	MW	Order No.	Weight 1 item	PS*/ P. unit
		A AC	V AC			kg	Items
 7KT1 162	**E-counters for 3/4 wire connection, with LCD, with IR interface for double rate**						
	Direct connection, with 2 S0 pulse outputs and *instabus* KNX *EIB* interface						
	Active and reactive power 10 (63)		3 × 230/400	6	**7KT1 162**	0.450	1
	Transformer connection, with 2 S0 pulse outputs and *instabus* KNX *EIB* interface						
	Active and reactive power transformers/5(6)		3 × 230/400	6	**7KT1 165**	0.390	1

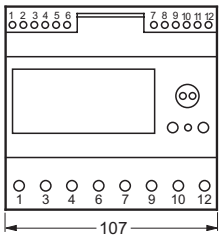
Accessories

		Order No.	Weight 1 item	PS*/ P. unit
			kg	Items
	**IR measuring head** for reading out the data acc. to IEC 61107 with 9-pole COM connector and readout software	**7KT9 030**	0.170	1

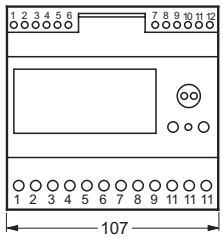
Dimensional drawings

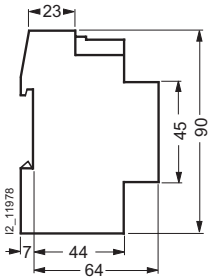
E-counters

7KT1 162



7KT1 165

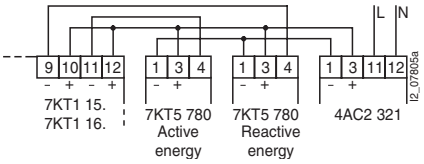




* You can order this quantity or a multiple thereof.

Schematics

S0 interface



RC circuit of S0 interface

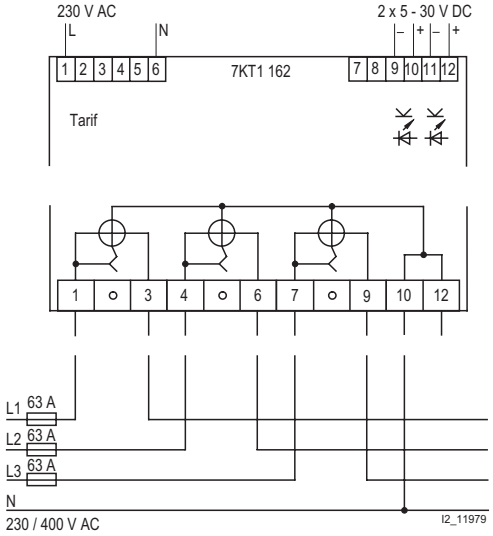
The short-circuit resistant optocoupler is operated at 5 ... 30 V DC.
The current must be selected within a range of max. 20 mA.
The pulse duration is 125 ms.

The circuit diagram shows the RC circuit with 7KT5 780 or 7KT5 751 pulse counters and the 4AC2 321 power supply unit for the external display of rates 1 and 2.

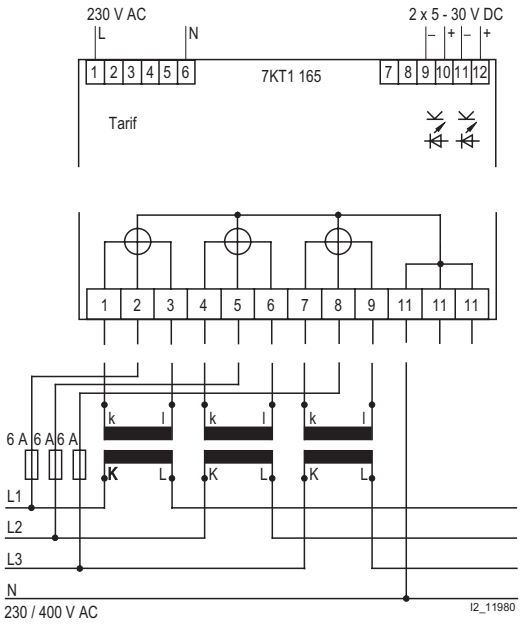
Instructions for the connection of transformer counters

In the case of cross-section reduction, a short-circuit resistant cable is required for the power supply of terminals 2, 5 and 8, depending on the fusing for phases L1, L2, L3. A 6 A fuse is recommended for the line protection.

Direct connection 10 (63) A



Transformer connection 5 (6) A



7KT1 390 LAN server

Overview

- Worldwide communication with measuring devices
- TCP/IP data protocol
- One LAN server for 10 devices
- Plug-and-play technology
- Microsoft Excel user interface
- Limit value signals can be set for all measured values
- Limit violations are signaled with time information
- Analysis of 35 measured values with the 7KT1 340 or 7KT1 341 multicounters

Application

LAN servers are the data communication link between a PC and a group of up to 10 measuring devices (multicounters or E-counters) with one LAN interface. The LAN server can either be linked directly to a PC or in a company-specific LAN.

All devices are switched in parallel with a shielded 2-wire LAN interface line. The hardware interface between the devices and the LAN server supports plug-and-play technology.

Function

Operator interface

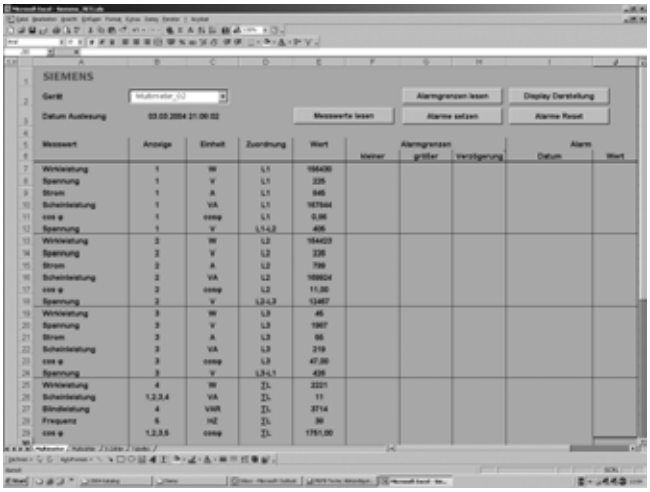
The operator interface is already well-known and widely used for office communications. It enables all operators to configure their own programs to suit individual requirements. The integrated macros are based on MS Visual Basic and are disclosed. This enables all software manufacturers to create their own company software or to integrate their devices in an existing software.

The MS Excel operator interface supports:

- Selection of any device that is connected to a LAN server
- Definition of limit values (alarm tripping) for up to 10 measured values for each device
- Running diagnostics of a system
- Copying and separate storage of instantaneous measured values for documentation purposes.

Measured values

The measured values vary according to the measuring device specifications of the multicounters and E-counters. The following applies: All manually read out measured values are transmitted from the LAN server and listed in MS Excel.



Plug and play

Each device has a factory-set 12-digit software number. This number allows the LAN server to recognize the connected device and initialize the appropriate data protocol. This software number is entered on the device and can be read in MS Excel. This enables the identification of a device and its installation location.

Limit value signal

Microsoft Excel supports the setting of any limit values as minimum and maximum values. The delay specifies how long a measured value should be pending before a signal indicates that it is exceeded.

Data protocol

The data communication between the LAN server and PC uses the TCP/IP protocol. This also supports integration in PROFINET.

Date and time

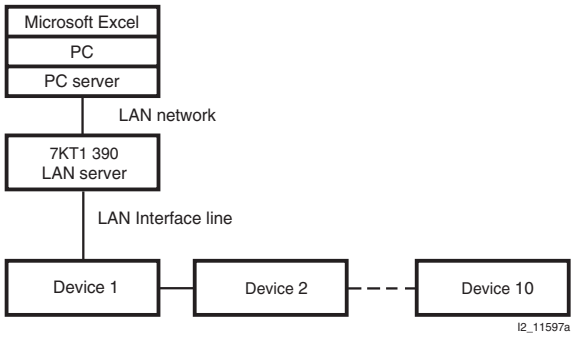
The date and time of the PC is used.

Transmission rate

The data transmission rate is limited due to the LAN characteristic, e.g. the internet or the internal network. The transmission rate of data between the LAN server and the connected devices is considerably higher and does not reduce the overall results.

Data storage

Address data of the devices and the PC and the continuously received measured values are stored in the LAN server for a minimum of 10 years. In the event of a power failure, a warning is sent over the LAN. On power recovery, the LAN server automatically restarts and the saved data are automatically sent to the PC.



Block diagram of a system

Technical specifications

Data acc. to EN 61010-1			7KT1 390
Supply			
• Rated control supply voltage U_c		V AC	230
• Operating range		× U_c	0.8 ... 1.2
• Rated frequency		Hz	50
• Frequency range		Hz	45 ... 65
• Rated power dissipation P_v		VA	≤5
Function			
• System start			automatic when the control supply voltage is switched on
• LAN server identification			through IP of the PC
• Device identification	automatic		plug and play
• Transmission rate	limited due to LAN	Mbit/s	≤100
• Operator interface	Microsoft Excel		version 6 or higher
• Operating system			MS Windows 2000 and XP
LAN interface			
• Line	design minimum max. line capacity impedance	 mm^2 pF/m Ω	STP (shielded twisted pair) 2 × 0.2; 24 AWG <50 100
• Cable length	max.	m	100
• Type of installation			parallel connection
• Data storage	flash memory	years	10
Safety acc. to EN 61010-1			
• Degree of pollution			2
• Overvoltage category			II
• Operating voltage category		V	600
• Material			II
• Clearances		mm	>3
• Creepage distances	in device on printed board, not installed	mm mm	>4.3 >3
• Test pulse voltage	1.2/50 µs	kV	4
• Test voltage	50 Hz, 1 min	kV	2.2
Terminals	± screw (Pozidrive)		1
• Conductor cross-sections	rigid, max. flexible with sleeve, min.	mm^2 mm^2	1 x 2.5 or 2 x 1.5 1 x 0.75
Ambient conditions			
• Ambient temperature	in operation	°C	0 ... +55
• Relative humidity	in operation	%	≤80
• Vibration	sine amplitude at 50 Hz	mm	±0.25
• Degree of protection	acc. to EN 60529		IP20
• Protection class	acc. to EN 61010-1		II

Selection and ordering data

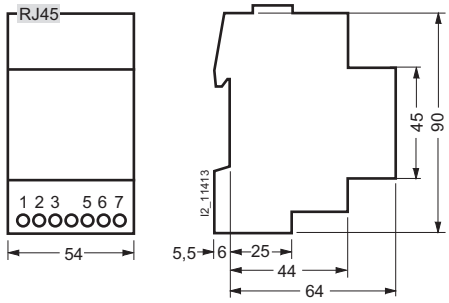
		U_c	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC			kg	Items
	**LAN server** for connection of 10 devices with LAN interface, with software for installation and startup routines and Microsoft Excel and tables for operating, setting limit values and monitoring	230	3	**7KT1 390**	0.300	1

* You can order this quantity or a multiple thereof.

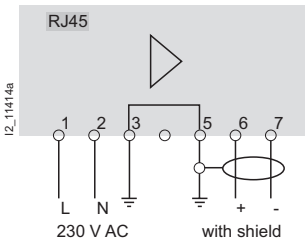
7KT1 390 LAN server

Dimensional drawings

7KT 390



Schematics

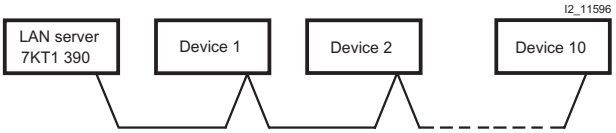


Connection of devices to the LAN server

All devices are switched in parallel with a shielded 2-wire line. Point-to-point installations, junctions or ring installations are not possible.

Grounding potential

Both the LAN cable with the RJ45 connector and the shielded cable of the LAN interface must be grounded. This also applies to devices connected to the LAN server.



Overview

- Three-phase current transformer set
- Accuracy class 1 according to EN 60044-1
- Straight-through transformer for conductors with a diameter of up to 13 mm, e.g. H07V-R with 50 mm^2 conductor cross-section
- Primary rated current 60 A, 100 A and 150 A
- Transformer ratio 60/5 A, 100/5 A and 150/5 A

Application

Straight-through transformer set in modular distribution board design acc. to DIN 43880 for installation in distribution boards. It is possible to route the measuring leads straight through the transformer and vertically to the standard mounting rail acc. to EN 60715. With this type of construction, the current transformer is suitable for supply systems or outgoing conductors in connection with the installation of a 5TE8 switch or a 5TE1 disconnector as the primary connecting leads do not have to be interrupted.

Note:

Current transformers must not be operated with open terminals as dangerous high voltages can occur, which may result in personal injuries and property damage. It also exposes the transformer to thermal overload.

Technical specifications

Data acc. to EN 60044-1			7KT1 200	7KT1 201	7KT1 202
Rated operational current I_e		A AC	3 × 60	3 × 100	3 × 150
Secondary rated current strength		A	5		
Accuracy class		Cl.	1		
Rated operational voltage U_e		V AC	720		
Rated frequency		Hz	50/60		
Thermal current limit I_{th}	short-time	A	60 × I_e		
Thermal continuous current		A	1 × I_e		
Overcurrent limit factor		FS	5		
Rated impulse withstand voltage U_{imp}		kV	>3		
Creepage and clearances		mm	>3		
Terminals	+/- screw (Pozidrive)		1		
Conductor cross-sections	rigid flexible with sleeve	mm^2 mm^2	0.5 ... 4 0.5 ... 2.5		
Permissible ambient temperature		°C	-5 ... +60		
Resistance to climate	acc. to EN 60068-1		20/60/4		

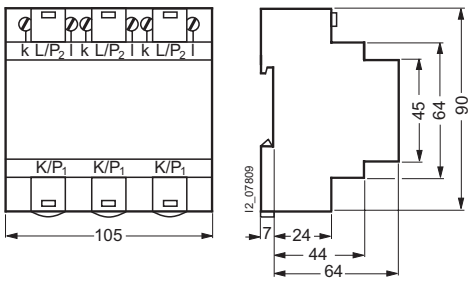
Selection and ordering data

		U_e	I_{sec}	Measuring range	MW	Order No.	Weight 1 item	PS*/ P. unit
		V AC	A	A AC			kg	Items
	**Current transformers**	720	5	3 × 60 3 × 100 3 × 150	6	**7KT1 200** **7KT1 201** **7KT1 202**	0.460 0.460 0.465	1 1 1

7KT1 200

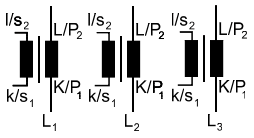
Dimensional drawings

7KT1 200
7KT1 201
7KT1 202



Schematics

7KT1 200
7KT1 201
7KT1 202



* You can order this quantity or a multiple thereof.

Notes