Product overview

Overview

Devices		Page	Field of application	Standards	Used in		
					Non-residential buildings	Residential buildings	Industry
	**Multimeters**	11/3	Display of 23 electrical measured values for switchgear assemblies, infeed or outgoing feeders. Easy commissioning due to fault detection if connected incorrectly.	IEC 60051-2, EN 60051-2 IEC 61010-1, EN 61010-1 (VDE 0411 T 1)	✓	--	✓
	**Multicounters**	11/8	Display of 35 electrical measured values and consumption values in switchgear assemblies, infeed or outgoing feeders. Easy commissioning due to fault detection if connected incorrectly. Transmission of measured values over Profibus DP, Modbus RTU or LAN.	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)	✓	--	✓
	**LAN couplers**	11/16	Up-to-date consumption data of the multicounter and E-counter available worldwide over LAN data communication. Microsoft Excel operator interface. Signaling of limit violations with time stamp.	IEEE 802	✓	--	✓
	**E-counters**	11/19	Measurement of consumption data and plant capacity utilization in three-phase systems of system components, offices or holiday apartments. Transmission of measured values over LAN using LAN couplers.	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 *instabus* KNX *EIB***	11/23	Measurement of consumption data and plant capacity utilization in three-phase systems of system components, offices or holiday apartments. Transmission of measured values over *instabus* KNX *EIB* interface	IEC 61036 EN 61036 (VDE 0418 T7)	✓	--	✓
	**Current transformers**	11/27	Straight-through transformers for installation in distribution boards and non-contact measuring of primary currents. Ideal for combining with switch disconnectors, multimeters, multicounters and E-counters.	IEC 60044-1, EN 60044-1 (VDE 0414 T 44-1)	✓	--	✓
	**Measuring selector switches**	11/28	For switching over the phases for voltmeters and ammeters		✓	--	✓

Multicounters

Overview

Multicounters are mainly used by switchgear engineers in power distribution boards for infeeds into buildings and plants. They replace the more common analog voltmeters and ammeters with measuring point changeover, as well as measuring devices for power outputs and power factor p.f.

The standard measured quantity to be indicated in the 6 display fields of the multicounter can be tailored to customer requirements. The measured values of all measured quantities can also be displayed quickly and easily over the operator buttons. Versions for direct connection (63 A) or for transformers (/5 A) with adjustable transformer primary current from 5 to 5000 A, enable a wide range of applications.

The green 7-segment displays for the measured values and the orange indicators of the units of measurement directly alongside the measured values make for easy reading.

Benefits

- Clear display of all necessary measured values.
- All measured values can be read from a distance.
- Customized setting of the measured quantities for the standard display. Fast display of all measured quantities over operator buttons.
- Wide range of applications thanks to flexible adaptation to measuring current transformers
- Detection of incorrect connections during installation
- Communication with LAN, Modbus or PROFIBUS DP enables integration in an energy management system
- Software package for data transmission over LAN and visualization of measurement data with Microsoft EXCEL enables implementation of customized solutions.

Technical specifications

Multicounters without communication interface Multicounters with RS485 interface (Modbus RTU, for LAN couplers) Multicounters with PROFIBUS DP V0 interface			**7KT1 310** **7KT1 340** **7KT1 350**	**7KT1 311** **7KT1 341** **7KT1 351**	**7KT1 312** **7KT1 342** **7KT1 352**
Standards			EN 61010-1, EN 62053-21, -23, -31		
Supply					
• Rated control supply voltage U_c		V AC	230		
• Operating range		x U_c	0.8 ... 1.2		
• Rated frequency		Hz	50		
• Frequency ranges		Hz	45 ... 65		
• Rated power dissipation P_v		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 --	
Measuring inputs					
• Connection type			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 ... 480 50 ... 276		
• Current I_e		A	63	5	
• Operating range current		A	0.3 ... 63	0.012 ... 5	
• Transformer current	primary current of the transformer smallest input step	A A	-- --	5 ... 5000 5	
• Frequency		Hz	50		
• Operating frequency range		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		0.3 ... 76 A	0.1 A ... 1.2 kA or 0.1 ... 6 A × transformer conversion ratio	
	for current > 76 A or 6 A x transformer conversion ratio for current < 0.3 A or 0.012 A x transformer conversion ratio		H H H O O O		
• 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: 3 displays, 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 load	ΣL, display with floating decimal point	var, kvar or Mvar	0 ... 999		
• Apparent power: 3 displays, 3-digit	L1 – L2 – L3, ΣL display with floating decimal point	VA, kVA or MV	0 ... 999		
• Apparent power: 5 displays, 3-digit, adjustable	ΣL, display with floating decimal point	VA, kVA or MV	0 ... 999		
• Active energy: 1 display, 7-digit display import or export, + display rate 1 or 2	ΣL, display with floating decimal point	Wh, kWh or MW	0 ... 9999999 or 0 ... 999		
• Reactive energy: 1 indicator, 7-digit + capacitive or inductive load	ΣL, display with floating decimal point	varh, kvarh or Mvarh	0 ... 9999999 or 0 ... 999		
• Apparent energy: 5 displays, 3-digit, adjustable rate	ΣL, display with floating decimal point	VAh, kVAh or MVh	0 ... 9999999 or 0 ... 999		
• p.f.: 3 displays, 3-digit	L1 – L2 – L3, display with floating decimal point		0.01 ... 1.00		
• p.f.: 4 displays, 3-digit, adjustable	ΣL		0.01 ... 1.00		

Multicounters

Multicounters without communication interface Multicounters with RS485 interface (Modbus RTU, for LAN couplers) Multicounters with PROFIBUS DP V0 interface			**7KT1 310** **7KT1 340** **7KT1 350**	**7KT1 311** **7KT1 341** **7KT1 351**	**7KT1 312** **7KT1 342** **7KT1 352**
Standards			EN 61010-1, EN 62053-21, -23, -31		
Display (contd.)					
• Transformer primary current	only if set	A	--	5 ... 5000	
• Transformer secondary current	only if set	A	--	5	
• Temperature		°C	0 ... +99		
• Display period		/s	2		
• Storage of setting and energy values			EEPROM		
S0 interfaces	acc. to IEC 62053-31		Class A		
• Terminal output	for direct connection 63 A, adjustable	Imp/kWh	10–1–0.1–0.01–0.001	--	
	depending on the transformer factor, adjustable	Imp/kWh	--	10–1–0.1–0.01–0.001	
• Pulse duration		ms	125 ... 300		
• Minimum interval between 2 pulses		ms	300		
• Required voltage		V DC	5 ... 30		
• Current ON/OFF		mA	10 ... 27/0 ... 2		
Measuring accuracy					
• Voltage		%	1		
• Current		%	1		
• Power outputs		%	2		
• Active energy	acc. to IEC 62053-21		Class 2		
• Reactive energy	acc. to IEC 62053-23		Class 2		
• p.f.		%	2		
• Frequency		%	1		
Safety according to EN 61010-1					
• Degree of pollution			2		
• Overvoltage category			II		
• Operating voltage category		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 (Pozidriv)		2	1	
• Supply and control terminals	blade for slotted screw	mm × mm	0.4 × 2.5		
• Conductor cross-sections, main current paths	rigid, maximum	mm^2	1 × 25 or 2 × 16	1 × 6 or 2 × 4	
	rigid, minimum	mm^2	1 × 1.5		
• Conductor cross-sections supply and control terminals	rigid, maximum	mm^2	1 × 6 or 2 × 4		
	flexible, with end sleeve, minimum	mm^2	1 × 0.75		
Ambient conditions					
• Temperature		°C	0 ... +55		
• Relative humidity		%	≤ 80		
• Vibrations	sinus amplitude at 50 Hz	mm	± 0.25		
• Degree of protection - front panel, 96 mm × 96 mm	acc. to EN 60529		IP20, with connected conductors --		IP54
• Safety class	acc. to EN 61010-1		II		

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Selection and ordering data

	U_e V AC	I_e A AC	U_c V DC	MW	DT	Order No.	Price per PU	PG	PU Unit(s)	PS*/ P. unit Unit(s)	Weight per P. unit approx kg
 7KT1 310	**Multicounters**										
	For the display of 35 electrical values, of which 5 or 6 values can be continuously displayed. For three-phase, 3/4-wire connection, with S0 interface										
	Without communication interface										
	For direct connection										
	3 × 230/400	63	230	6	B	**7KT1 310**		027	1	1	0.420
	For transformer connection of 5 ... 5000 A, adjustable in 5 A increments, secondary current 5 A										
	3 × 230/400	trans-former /5	230	6	B	**7KT1 311**		027	1	1	0.410
	For transformer connection of 5 ... 5000 A, adjustable in 5 A increments, secondary current 5 A, for front-panel mounting 96 mm x 96 mm										
	3 × 230/400	trans-former /5	230	--	B	**7KT1 312**		027	1	1	0.410
 7KT1 312	**With RS485 interface and RTU Modbus protocol or for connection to LAN networks over 7KT1 390 LAN coupler**										
	For direct connection										
	3 × 230/400	63	230	6	B	**7KT1 340**		027	1	1	0.470
	For transformer connection of 5 ... 5000 A, adjustable in 5 A increments, secondary current 5 A										
	3 × 230/400	trans-former /5	230	6	B	**7KT1 341**		027	1	1	0.423
	For transformer connection of 5 ... 5000 A, adjustable in 5 A increments, secondary current 5 A, for front-panel mounting 96 mm x 96 mm										
	3 × 230/400	trans-former /5	230	--	B	**7KT1 342**		027	1	1	0.397
	With PROFIBUS DP V0 interface										
	For direct connection										
	3 × 230/400	63	230	6	B	**7KT1 350**		027	1	1	0.415
	For transformer connection of 5 ... 5000 A, adjustable in 5 A increments, secondary current 5 A										
	3 × 230/400	trans-former /5	230	6	B	**7KT1 351**		027	1	1	0.415
	For transformer connection of 5 ... 5000 A, adjustable in 5 A increments, secondary current 5 A, for front-panel mounting 96 mm x 96 mm										
	3 × 230/400	trans-former /5	230	--	B	**7KT1 352**		027	1	1	0.460

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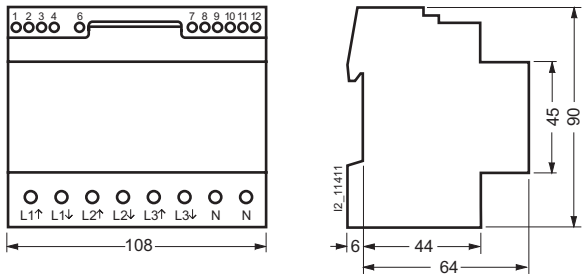
*** You can order this quantity or a multiple thereof.**

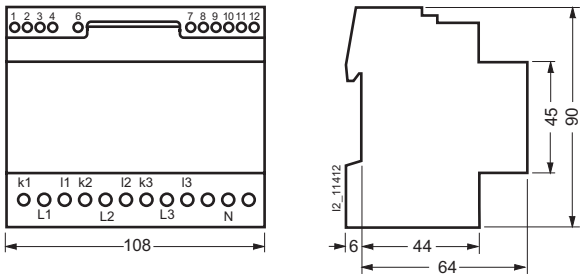
Multicounters

Dimensional drawings

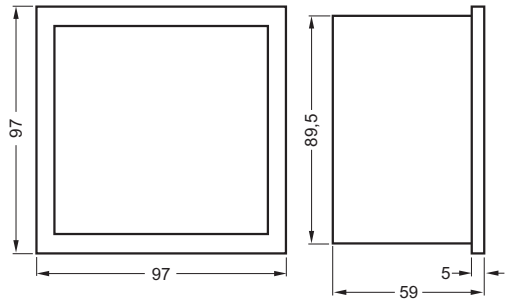
7KT1 3.0



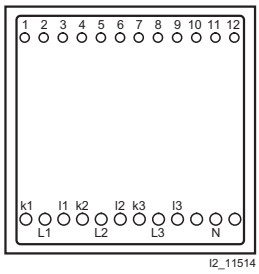
7KT1 3.1



7KT1 3.2



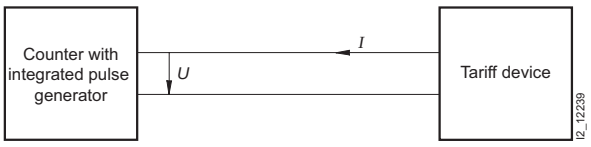
Rear panel



Schematics

S0 interfaces

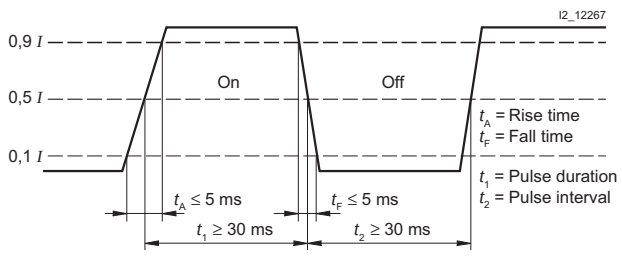
The S0 interface is a current interface for pulse transmission between a counter with integral pulse generator device and tariff rate device.



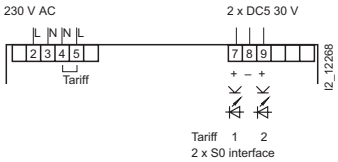
U: Voltage at terminals of tariff device
I: Current via counter with integrated pulse generator

The tariff rate device is connected to the S0 interface of the counter over a 2-wire conductor and - acting as a passive electrical two-pole - supplies the pulse generator with a direct current.

The following diagram shows the dependency of the current path on the time according to DIN 43864.



The following diagram shows the pulse output (S0-interface) for a 2-tariff counter: e.g. rate 1 –> normal rate, rate 2 –> special rate.



For pulse recording with devices from other manufacturers (pulse counters or digital inputs), a voltage within the range of 5 ... 30 V DC must be applied to the output terminals of the S0 interface. The optocoupler operates as the switch. In order to prevent overloading, the current must not exceed a max. of 20 mA.

The pulse duration is 125ms. The minimum pulse interval is also 125 ms.

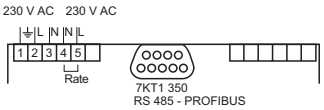
Grounding terminal

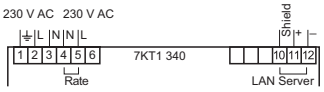
The interpolation point grounding terminals required for transmission only serve to shield the transmission cables and do not have a protective function.

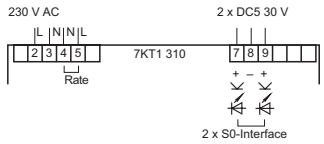
Instructions for the connection of transformer counters

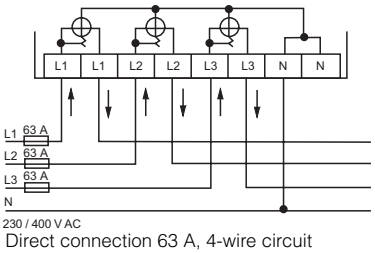
In the case of cross-section reduction, a short-circuit resistant cable is required for the power supply of terminals 2, 5 and 8, depending on the fusing for phases L1, L2, L3. A fuse of 6 A is recommended for line protection.

Current transformers must not be operated with open terminals as this can result in dangerously high voltages, which may cause personal injury and/or property damage. It can also lead to a thermal overload of the transformers.

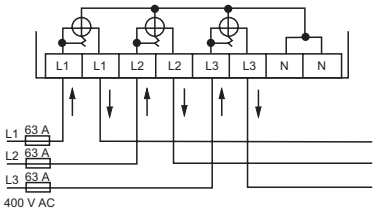




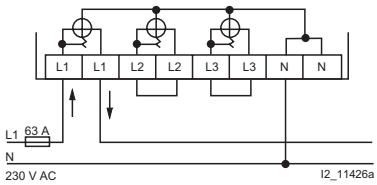




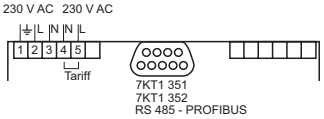
Direct connection 63 A, 4-wire circuit

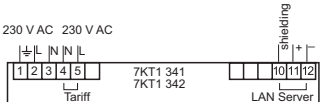


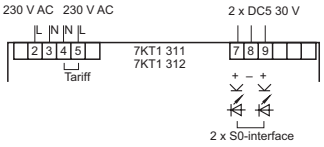
Direct connection 63 A, 3-wire circuit

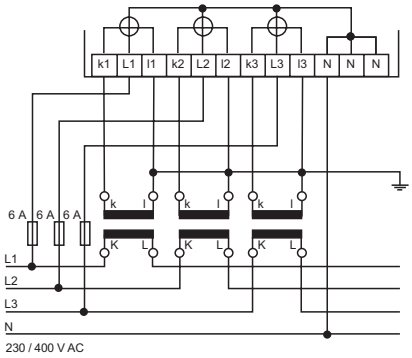


Direct connection 63 A, single-phase

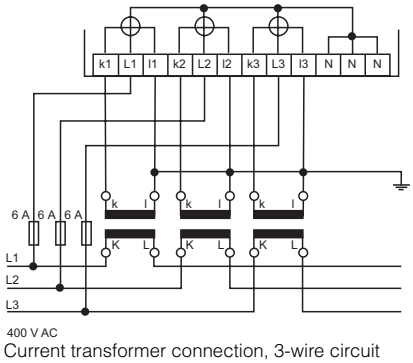




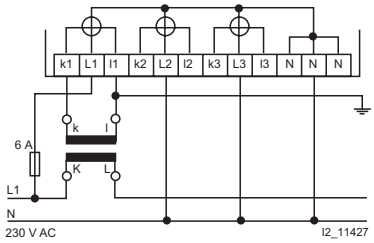




Current transformer connection, 4-wire circuit



Current transformer connection, 3-wire circuit



Current transformer connection, single-phase

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More information

Communication interfaces

Multicounters with PROFIBUS interface

Multicounters are also available with PROFIBUS interface. In a PROFIBUS network, the multicounters act as PROFIBUS DP slave according to the usual standard V0 (cyclic communication only).

In a PROFIBUS network, several PROFIBUS slaves are always assigned to a single master A PC with a PROFIBUS communication module or PLC, such as the PLCs of the SIMATIC range from Siemens, can be used as the master. The master communicates with the connected slaves cyclically at extremely brief intervals. The master sends the slaves a request message to which the slave replies with a response message. The communication frame of the message (e.g. number of send and receive bytes) is slave-specific and is defined in a standardized text file; the device data base file (DDBF). This DDBF file is read in by the software configuration tools of the various PROFIBUS masters, whereby the master knows which communication frame the respective slave requires.

In normal cyclic mode, the multicounter sends a response message in the specified communication frame in reply to the request message from the master. This communication frame contains all 35 measured quantities in encoded form as user data. The master receives the message, decodes it and then uses the measurement data for a range of tasks.

As well as the DDBF file, a detailed description of the communication and the configuration of the user data are also required for the configuration and implementation of a PROFIBUS network with multicounters. For more information please visit us on the Internet at: http://www.siemens.de/beta

Multicounters with Modbus interface

The Modbus RTU is a very common communications solution. It is a serial, asynchronous form of communication, which requires RS 485 networks as the hardware platform. RS 485 networks can be set up with 2-wire copper or optical fiber cables and, compared to the RS 232 serial interface, offer fast transmission rates.

In a Modbus network, each bus station has a bus address within the range from 1 to 255. All stations within a network must be set to the same transmission speed. We recommend transmission speeds of 9600 or 19200 bit/s. The address and transmission speed can be set in the user menu of the multicounters.

In order to customize a Modbus installation, it is necessary to implement the appropriate software application for the master. This requires specific information about communication with multicounters. You will find further information on the Internet at: http://www.siemens.com/beta

Multicounters with LAN coupler on LAN

The 7KT1 390 LAN couplers support connection of up to ten 7KT1 34 multicounters to a LAN network. The LAN couplers and multicounters are interlinked over an RS 485 network. Setting the bus address in the 7KT1 34 multicounters to "0" specifies that it is operating in "LAN" mode. It is not necessary to set the transmission speed, as a fixed transmission rate is always used in this mode. It is also not necessary to set the address of the bus stations, as the LAN coupler automatically detects and identifies the multicounter connected.

The server components run on the PC in the background and handle the data transmission and storage of the most recent measured values from all the multicounters connected over one or more LAN couplers.

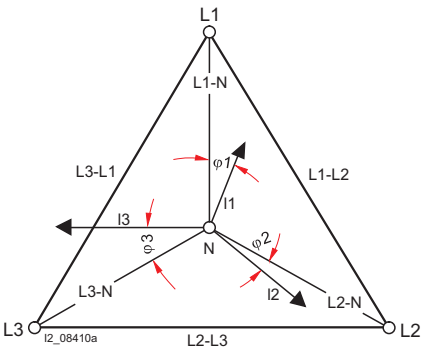
For more information on LAN operation and the MS Excel operator interface, see 7KT1 390 LAN couplers on page 11/16 ff.

Voltage measurement

Depending on the selected connection type, 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.

ΣL symbol for the 3-phase system

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



Temperature

The temperature indication of the multicounter is not suitable for an exact measurement of the ambient temperature. The device does not have a temperature sensor. It is also not possible to connect an external temperature sensor.

The temperature information merely enables a rough estimate of the temperature conditions in the device interior and immediate surroundings.

Readout data

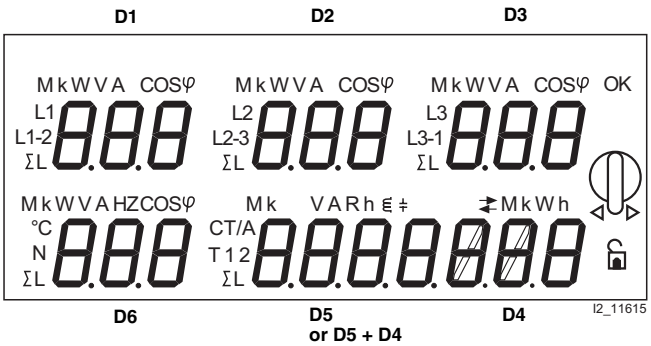
You can continuously display 6 measured quantities from the following 35 options.

No.	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	var	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	/5
37	Transformer setting	D5	CT/A	5 ... 5000

All the measured values are transmitted via LAN.

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 by orange text abbreviations. Both colors are easier to recognize than the red LEDs used for conventional displays. Capacitive loads are automatically indicated by a capacitor symbol, inductive loads by a coil symbol – also in orange.



Matrix selection

Conventional measuring instruments display voltages, currents, powers, etc. in a rigid sequence on several "screens". These multicounters allow users to define their own standard for measured quantities per display field, thus allowing more universal and flexible application.

A special feature is the analysis of the different loads on the phases. Phase displacement and unsymmetrical 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.

The display fields are selected using rotary switches and the desired indications confirmed with OK. By making the horizontal selection e.g. W V A or p.f, and the vertical selection, e.g. L1, L1–L2 or ΣL, users can then define the desired measured quantities for this display field.

The vertical data on the display can be assigned to any measured value in the horizontal data. The letters M(ega) and k(ilo) 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 is an example of what your matrix selection might look like: