



PRODUCT CATALOG

MEASURING TRANSDUCER • MAINS AND LIMIT MONITORING • ENERGY METERS • UNIVERSAL MEASURING INSTRUMENTS • PANEL METERS ANALOG AND DIGITAL • SWITCH POSITION INDICATORS ANALOG AND LED • CURRENT TRANSFORMERS • ELECTRIC SHUNTS • TEST APPARATUS

// Precision for all and maximum requirements are our strength //

**MÜLLER
ZIEGLER** 
Elektrische
Messgeräte

LÜBERG
TECHNOLOGIE-HOLDING

Measure us by our benefit for you!
Much has been changed, developed and renewed in over 100 years history. But the good tradition was preserved!

In 1911 Müller+Ziegler is founded Max Müller and Karl Ziegler.

In 1930 Georg Beck becomes Managing Director and in 1950 sole owner of the company.
The company was three generations under the management of the Beck Family.

In 2020 became part of a regulated Successor solution from Lüberg Technologieholding GmbH accepted.

"Precision and Service" are based on long-standing experience: Quality assurance and the competence for individual solutions.



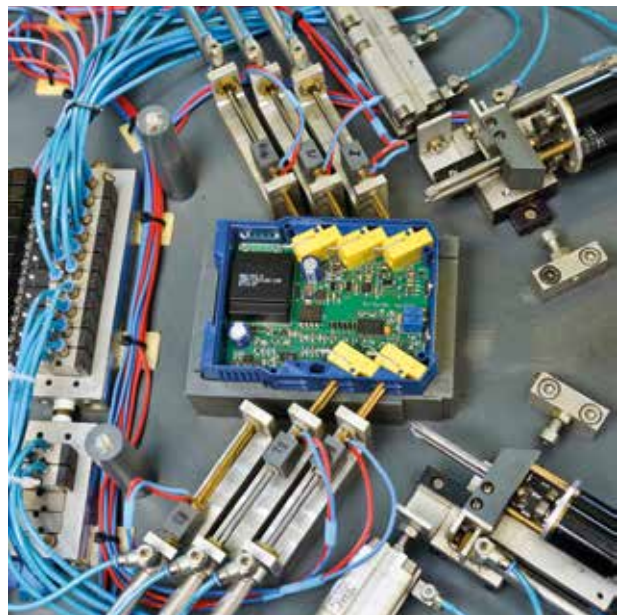
Good tradition has a future!

Much has changed in over 100 years: From the continuous development of the products in cooperation with our customers it became **innovative measurement technology for the global market!**



Our thinking - our actions

Our **fair and committed cooperation** with customers and suppliers are the solid basis for a trusting partnership. We owe this success not least to our competent and highly motivated team.



Development and quality assurance

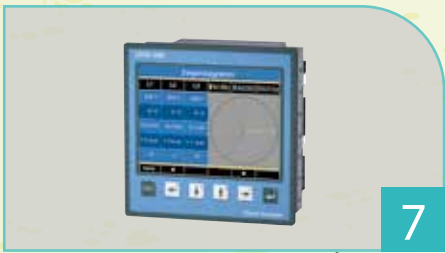
Find an innovative solution for every requirement, whether modern multifunctional instruments or analog measurement technology: We are continuously developing our products.

Assuring quality: This is what we work for every day!



made in germany

We focus on production **"Made in Germany"** from day one - for **fast and lossless communication between all company areas**, from development to production, the sales up to the management.



High voltage with transformer station

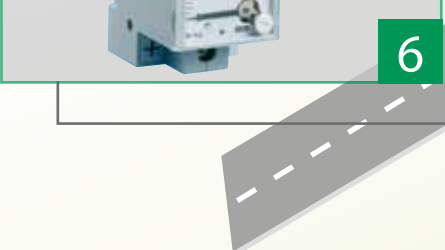
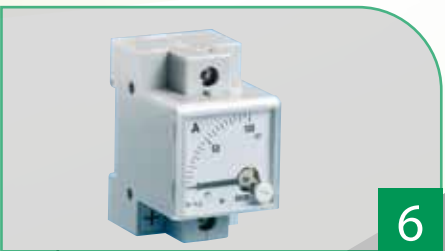
Production area

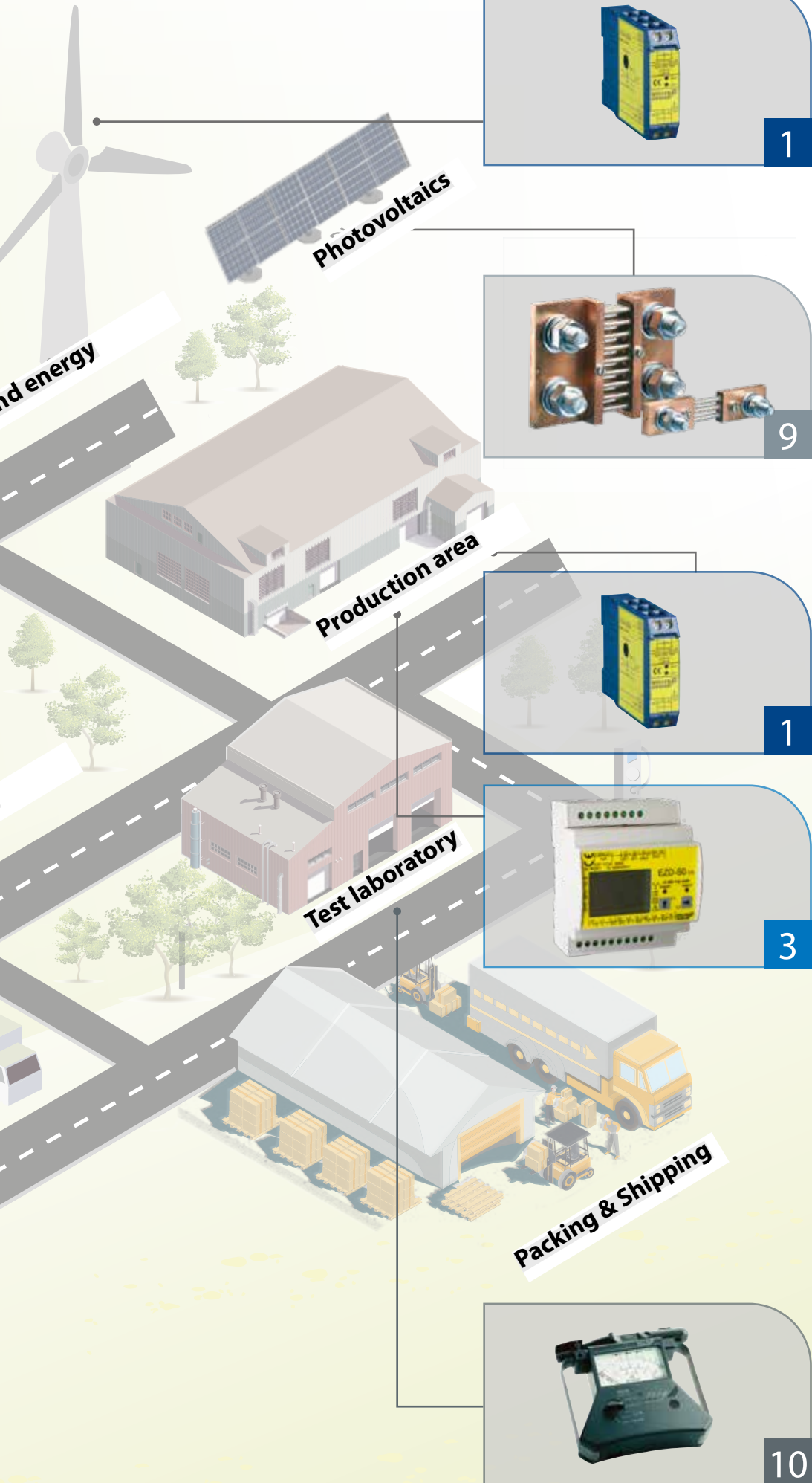


Storage area



Development





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DIW-MU



Iw-MU



Uw-MU



Ieff-MU, Ueff-MU



IeffT-MU, UeffT-MU



F-MU



Phwd-MU



Pw-MU, Pz-MU, Pnz-MU, Pd-MU, Pdr-MU



PwB-MU, PzB-MU, PnzB-MU, PdB-MU, PdrB-MU



MFPw-MU, MFPz-MU, MFPnz-MU, MFPd-MU, MFPdr-MU



Multi-E4-MU



Multi-E11-MU



Multi-E-MU



PGs-MU



PGt-MU



Igt-MU, UgT-MU



IgtT-MU, UgTT-MU



NgT-MU



NoH-MU



Pt-MU



Th-MU



W-MU



TSM-MU



DMS-MU



D-MU



Sum-MU

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General description of measuring transducers

Application

Measuring transducers are designed for the conversion and galvanic isolation of varied measuring signals in heavy-current and weak-current engineering. The input variable is converted to a proportional output signal to standard values of e.g. 20 mA and (or) 10 V. A frequency or pulse output is possible as well. Measuring transducers are indispensable where measuring values must be transmitted over long distances or at different locations for indication and evaluation.

Type and function

The output signal is an impressed direct current and (or) direct voltage; it is nonsensitive to interference signals, external magnetic fields as well as to distortion due to signal lines of varying lengths. Within the load range, the accuracy remains uninfluenced by different internal resistances of individual or also several evaluation instruments, like e.g. switchgear and measuring devices, controlling equipment, recorders, PLC systems etc. (when using both outputs simultaneously, the max. current which may be supplied to the voltage output is 1 mA, connecting both outputs is not permissible). In case of most measuring transducers, an auxiliary voltage is generated from the measuring voltage, an additional auxiliary voltage is not required.

Measuring transducers have a fully electronic design and dispose of no mechanical parts; they are thus largely immune to environmental influences and suited for use under rough operating conditions.

Special features

- Simple installation, no programming required
- Accuracy class 0,5
- Analog (continuous) measurement
- Analog output immune to noise
- Setting option of zero point and span from front side
- Double output
- Calibrated double output switchable at the front using switch between 0-20 mA / 0-10 V and 4-20 mA / 2-10 V for transducers for direct current variables, rms value, process parameters and operands.
- To be combined with frequency output and relay module
- 4 kV up to 7,2 kV test voltage, also in case of DC auxiliary voltage between input, output and auxiliary voltage
- All transducers also with auxiliary voltage for 36-265 V AC + DC or 6-30 V AC + DC and 4 kV test voltage
- Small design (22.5 mm housing width)

Technical data

General specifications	EMC	DIN EN 61 326
	(for DC auxiliary voltage and multi voltage power supply)	DIN EN 61 326 class A
	Mechanical strength	DIN EN 61 010 part 1
	Electrical safety	DIN EN 61 010 part 1 and DIN EN 61 010 part 2-030
		Housing insulated, protection class II,
		● for working voltages up to 300 V (phase to neutral) pollution degree 2, measuring category CAT III
		● for working voltages up to 600 V (phase to neutral) pollution degree 2, measuring category CAT III
		● for working voltages up to 1000 V (phase to neutral) pollution degree 2, measuring category CAT III
		for types IeffT-MU / UeffT-MU / IgTT-MU / UgTT-MU / PGsT-MU
	Accuracy, overload	DIN EN 60 688
	Isolation	DIN EN 61 010 part 1, 3,7 kV 50 Hz, 10 sec.
	Air and creep distances	DIN EN 61 010 part 1
	IP code	DIN EN 60 529, housing IP 30, terminals IP 20
	Connection	DIN 43807
	Housing	Polycarbonat (self extinguishing acc. to UL 94 V-0)
	Max. tightening torque of terminals	0,8 Nm

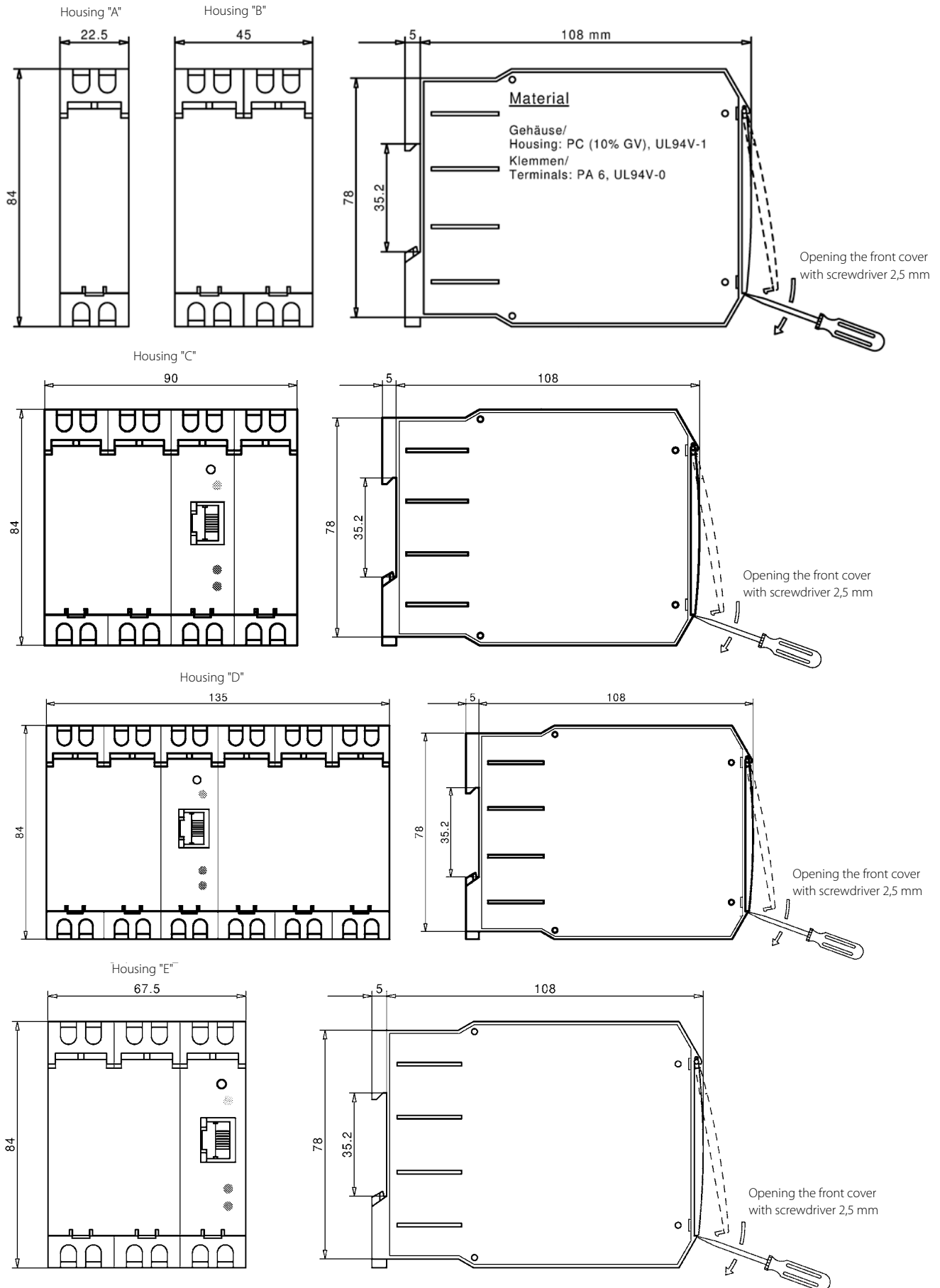
Test report

Measuring transducer	X
Universal measuring transducer:	
Multi-E11-MU	X
Multi-E4-MU	X
Multi-E-MU	X



Dimensions

for measuring transducers



Frequency output for measuring transducers

(frequency module)

Type:
FM



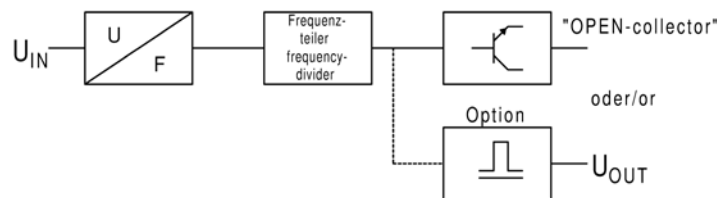
Application

The frequency module is integrated in a measuring transducer and serves for converting the input variable of the measuring transducer into a frequency.



Function

The variable generated by the measuring transducer proportionally to the input is transmitted to a voltage frequency converter and is converted into a pulse train there. A subsequent divider determines the frequency. It is made available as a square-wave signal or as "open-collector" output.



Technical data

Input	Arbitrary measuring transducer	
Output	Output variable	Frequency
	Nominal value	a value from 0- 5Hz to 0-10 kHz
	OPEN collector	NPN, max. 30 V, max. load 100 mA
	Option	square-wave signal 5 V, max. load 10 mA
	Pulse / pause	50 / 50 %
Transfer behavior	Accuracy	± 0,5 %
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,3 % at 10 K
	Auxiliary voltage influence	no
	Burden influence	no
	External magnetic field influence	no (400 A/m)
	Response time	< 400 ms
	Limiting	max. 2-fold in case of overload
Test voltage	4 kV between input, output, auxiliary voltage	

Remarks:

The frequency module is installed in the measuring transducer used. This does not cause any changes to the housing dimensions. **By installing the frequency module in the measuring transducer, further outputs are not available!**



Types and variants

FM



Relay module for measuring transducers

for limit value monitoring

Type:
GWM

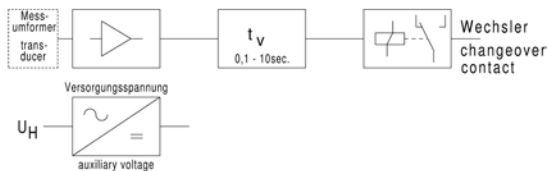


Application

The relay module can only be used in connection with a measuring transducer and serves for monitoring of a set limit value triggering a relay when being exceeded.



Function

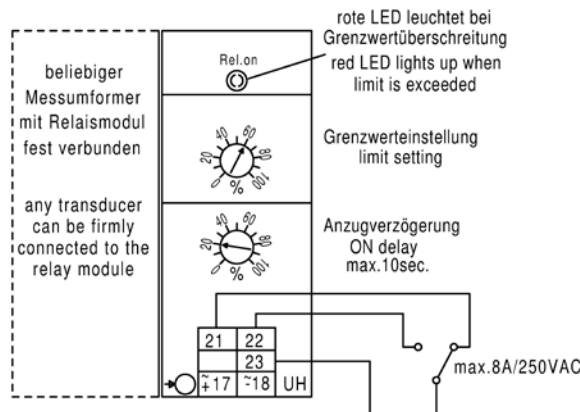


The variable generated by the measuring transducer proportionally to the input is transmitted to a comparator and is compared to the set limit value (0-100 %) there. Thereafter, the comparative value is sent to a driver stage via an adjustable timing element (0.1-10 s) where the stage then activates the output relay and the LED display.

The relay module is permanently connected to the measuring transducer.



Connection



Technical Data

Input	Arbitrary measuring transducer	
	Limit value adjustment	0-100 %
	Relay contact	1 changeover contact
	Function indicator	red LED lights up with relay energized
	Test voltage	4 kV between measuring input and relay contact
Switching characteristics	Switching accuracy	± 5 % of full scale
	Hysteresis	approx. 2 % of full scale
	Response delay	0,1-10 sec., adjustable
	Temperature range	- 15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,1 % at 10 K
	Switching capacity	max. 8 A, 250 V AC, 2000 VA
	Dimensions	Housing
Weight		170 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²



Types and variants

GWM



Measuring transducer for alternating current (AC)

(sinusoidal)
for direct connection
up to 50 A , 60 A, 100 A or 150 A

Type:
DIW-MU



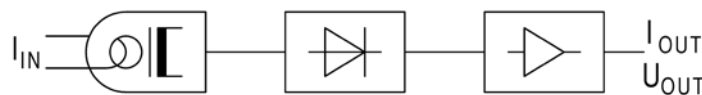
Application

The measuring transducer DIW-MU is used for the direct transformation of a sinusoidal alternating current into an impressed direct current or direct voltage signal.

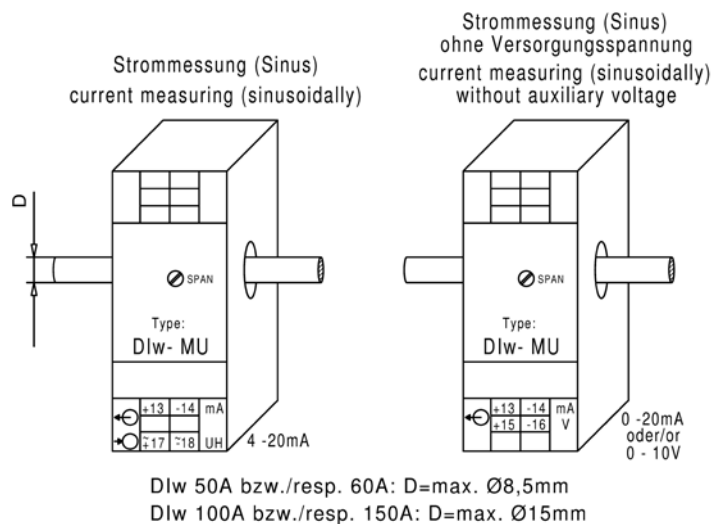


Function

The alternating current to be measured is transmitted to a current transformer - serving for galvanic isolation and transformation - via a through hole and from there to the downstream rectifier circuit. The direct voltage generated there is amplified and transformed into an impressed direct current or in an impressed direct voltage. The output is no-load proof and short-circuit proof. Only for "live zero", an auxiliary voltage is required.



Connection



Types and variants

Input	50 A or 60 A (please specify value in case of order)
Output	0-20 mA (without auxiliary voltage) 0-10 V (without auxiliary voltage) 4-20 mA (with auxiliary voltage)
Input	100 A oder 150 A (please specify value in case of order)
Output	0-20 mA (without auxiliary voltage) 0-10 V (without auxiliary voltage) 4-20 mA (with auxiliary voltage)
Surcharges	Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC



Technical data

Input	Input variables	sinusoidal alternating current			
	Rated values	Inputs			
		0-50 A	0-60 A	0-100 A	0-150 A
		0-10 A	0-12 A	0-20 A	0-30 A Pass trough prim. cond. 5 times
		0-12,5 A	0-15 A	0-25 A	0-37,5 A Pass trough prim. cond. 4 times
		0-25 A	0-30 A	0-50 A	0-75 A Pass trough prim. cond. twice
	0-50 A	0-60 A	0-100 A	0-150 A Pass trough prim. cond. once	
	Rated frequency	50 Hz, 60 Hz or 400 Hz, 16 2/3 Hz (auxiliary voltage required)			
	Overload permanent	2-fold			
	High surge load	20-fold, 1 s			
Output	Output variables	Single output			
	Rated values	0-20 mA / 500 Ω load or 0-10 V / max. load 10 mA			
	Option	● „live zero“ 4-20 mA / 500 Ω load (auxiliary voltage required)			
Transfer behavior	Accuracy	± 0,5 % at 5-100 % of rated value (with auxiliary voltage 0-100 % of rated value)			
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C			
	Temperature influence	< 0,1 % at 10 K			
	Auxiliary voltage influence	no			
	Load influence	no			
	External magnetic field influence	no (400 A/m)			
	Residual ripple	< 30 mVss			
	Response time	< 400 ms			
	Open circuit voltage	max. 24 V			
	Current limiting	max. 2-fold in case of overload			
	Test voltage	4 kV between input, output, auxiliary voltage			
Auxiliary voltage (with „live zero“ only)		230 V AC ± 20 %, 45-65 Hz, 2,5 VA			
	Options	<ul style="list-style-type: none"> ● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA 			
Dimensions	Housing	Housing A, (22,5 mm wide) page A1			
	Through hole	8,5 mm at 50 A and 60 A 15 mm at 100 A and 150 A			
Weight		250 g			
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715			
	Electrical connection	Screw terminal max. 4 mm ²			

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Measuring transducer for alternating current (AC)

(sinusoidal)

at current transformer and direct measurement
1 A or 5 A or 10 A

Type:
Iw-MU



Application

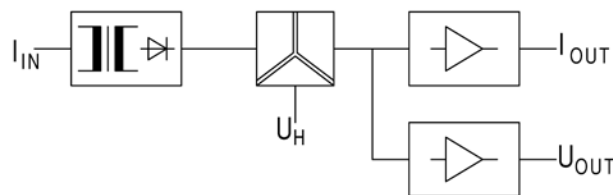
The measuring transducer Iw-MU is used for the direct transformation and isolation of a sinusoidal alternating current into an impressed direct current and/or direct voltage signal. For types with double output, these outputs are switchable between 0-20 mA and 0-10 V or 4-20 mA and 2-10 V.



Function

The alternating current to be measured is transmitted to the downstream rectifier circuit via an internal current transformer serving for galvanic isolation. The direct voltage generated there is amplified and transformed into an impressed direct current or in an impressed direct voltage. The output is no-load proof and short-circuit proof.

Only for „live zero“ or double output, an auxiliary voltage is required. Connecting the two outputs is not permissible.

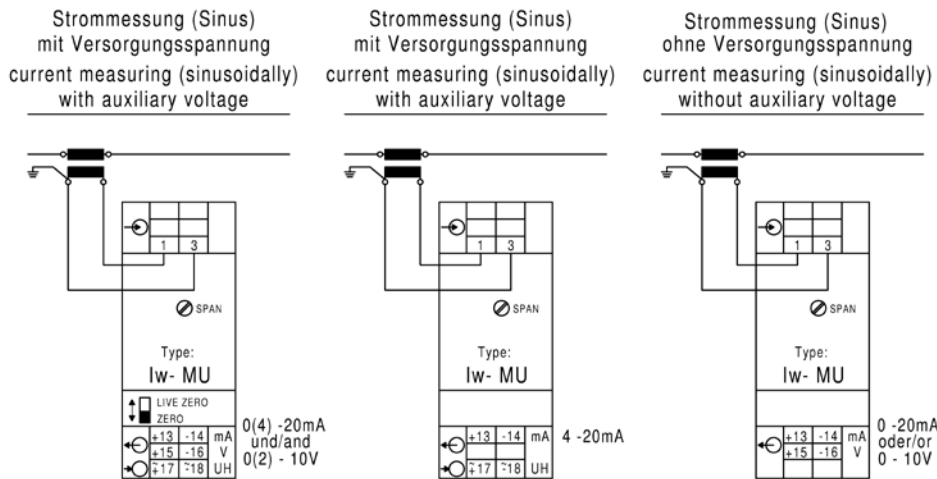


Types and variants

Input	1 A or 5 A (please specify value in case of order)
Output	0-20 mA (without auxiliary voltage) 0-10 V (without auxiliary voltage) 4-20 mA (with auxiliary voltage) 0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V switchable on front side (with auxiliary voltage)
Surcharges	Input directly up to 10 A (only with auxiliary voltage) Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) (Description page 10) can only be realized based on Iw-MU and double output
Relay module	For limit monitoring type GWM (Description page 11) can only be realized based on Iw-MU and double output



Connection



Technical data

Input	Input variables	sinusoidal alternating current
	Rated values	0-1 A or 0-5 A or 0-10 A
	Rated frequency	50 Hz, 60 Hz or 400 Hz, 16 2/3 Hz (only with auxiliary voltage)
	Energy consumption	1 VA, with „live zero“ 0,3 VA
	Overload permanent	2-fold
	High surge load	20-fold, 1 s
Output	Output variables	Single output or double output
	Rated values	0-20 mA / 500 Ω load or 0-10 V / max. load 10 mA
	Options	<ul style="list-style-type: none"> ● „live zero“ 4-20 mA / 500 Ω load (auxiliary voltage required) ● 0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA switchable on front side (auxiliary voltage required)
Transfer behavior	Accuracy	± 0,5 % at 5-100 % rated value (with auxiliary voltage 0-100 % of rated value)
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,1 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 40 mVss
	Response time	< 400 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	4 kV between input, output, auxiliary voltage
Auxiliary voltage (with „live zero“ and double output only)		230 V AC ± 20 %, 45-65 Hz, 2,5 VA
	Options	<ul style="list-style-type: none"> ● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) page A1
Weight		190 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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Measuring transducer for alternating voltage

(sinusoidal)

Type:
Uw-MU



Application

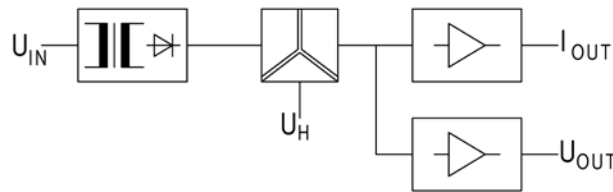
The measuring transducer Uw-MU is used for the transformation and isolation of a sinusoidal alternating voltage into an impressed direct current and/or direct voltage signal. For types with double output, these outputs are switchable between 0-20 mA and 0-10 V or 4-20 mA and 2-10 V.



Function

The alternating voltage to be measured is transmitted to the downstream rectifier circuit via an internal voltage transformer serving for galvanic isolation. The direct voltage generated there is amplified and transformed into an impressed direct current or in an impressed direct voltage. The output is no-load proof and short-circuit proof.

Only for „live zero“ or double output, an auxiliary voltage is required. Connecting the two outputs is not permissible.

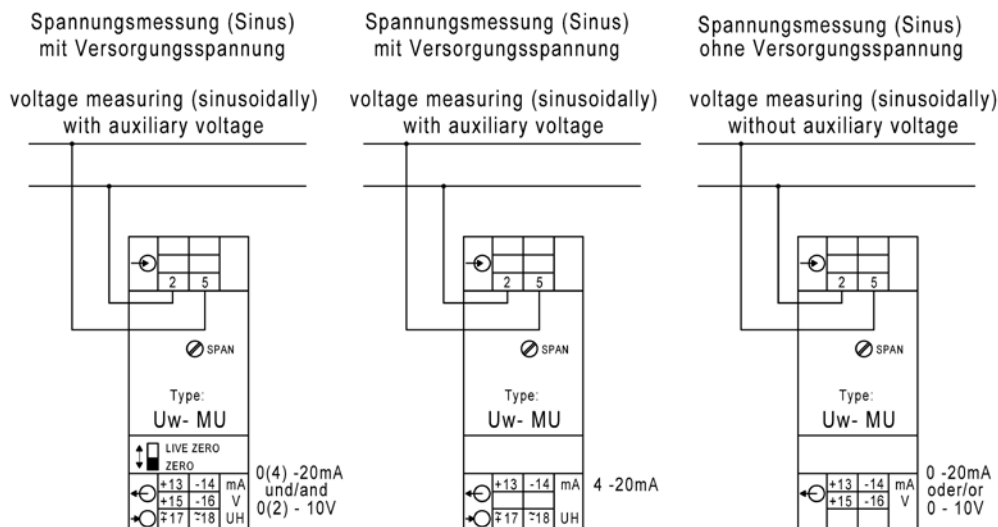


Types and variants

Input	100 V, 250 V, 500 V and 600 V (for voltages above 500 V an auxiliary voltage is requested)
Output	0-20 mA (without auxiliary voltage) 0-10 V (without auxiliary voltage) 4-20 mA (with auxiliary voltage) 0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V switchable on front side (with auxiliary voltage)
Surcharges	Auxiliary voltages other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) (Description page 10) can only be realized based on Uw-MU and double output
Relay module	For limit monitoring type GWM (Description page 11) can only be realized based on Uw-MU and double output



Connection



Technical data

Input	Input variables	sinusoidal alternating voltage
	Rated values	0-100 V, 0-250 V, 0-500 V and 0-600 V
	Rated frequency	50 Hz, 60 Hz or 400 Hz, 16 2/3 Hz (only with auxiliary voltage)
	Energy consumption	2-5 VA, with „live zero“ 0,3-2 VA
	Overload permanent	1,2-fold
	High surge load	2-fold, 1 s
Output	Output variables	Single output or double output
	Rated values	0-20 mA / 500 Ω load or 0-10 V / max. load 10 mA
	Options	<ul style="list-style-type: none"> ● „live zero“ 4-20 mA / 500 Ω load (auxiliary voltage required) ● 0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA switchable on front side (auxiliary voltage required)
Transfer behavior	Accuracy	± 0,5 % at 5-100 % rated value (with auxiliary voltage 0-100 % of rated value)
	Frequency influence	< 0,05 % with 10 Hz frequency change
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,1 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 40 mVss
	Response time	< 400 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	≤ 500 V: 4 kV between input, output, auxiliary voltage > 500 V: 5,2 kV between input and output 4 kV input / output to auxiliary voltage
	Auxiliary voltage (with „live zero“ and double output and voltages > 500 V only)	
Options		<ul style="list-style-type: none"> ● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) page A1
Weight		190 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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10 Test apparatus



Measuring transducer for current and voltage

True RMS

Type:
leff-MU / Ueff-MU



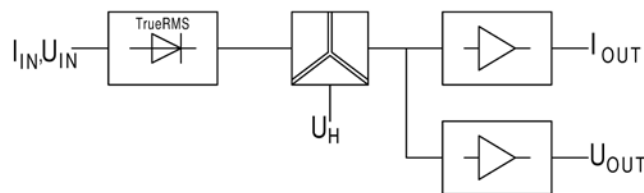
Application

The measuring transducers leff-MU and Ueff-MU are used for the transformation and isolation of a current or a voltage of arbitrary waveform into an impressed direct current and direct voltage signal. The calibrated double outputs are switchable between 0-20 mA and 0-10 V or 4-20 mA and 2-10 V.



Function

The measurand is transmitted to the rms rectifier via an input protective circuit and a filter. Crest factors (ratio between peak value and rms value) up to a value of 4 may be processed without problems. The direct voltage thus generated is galvanically isolated from the output by an optocoupler. A downstream amplifier effectuates the direct current and direct voltage impression. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required.



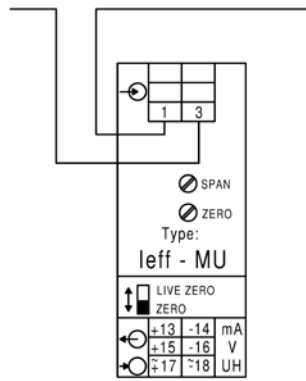
Types and variants

Input	leff-MU a value from 0-1 mA to 0-5 A Ueff-MU a value from 0-60 mV to 0-600 V
Output	0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V, switchable on front side
Surcharges	Input directly up to 10 A for type leff-MU Sub-range Frequency range DC / 40-1000 Hz Response time 70 ms Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) (Description page 10)
Relay module	For limit monitoring type GWM (Description page 11)

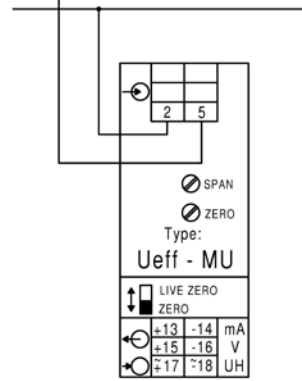


Connection

Strommessung (TrueRMS)
current measuring (TrueRMS)



Spannungsmessung (TrueRMS)
voltage measuring (TrueRMS)



Technical data

Input	Input variables	direct and alternating current of arbitrary waveform (True RMS)
	Rated values	<ul style="list-style-type: none"> ● a value from 0-1 mA to 0-5 A, voltage drop 60 mV ● a value from 0-60 mV to 0-600 V, Ri = 100 kΩ to 1 V, > 1 V 100 kΩ /V, however max. 2 MΩ
	Rated frequency	DC / 40-200 Hz
	Option	● DC / 40-1000 Hz (other values on request)
	Overload permanent	current: 1,2-fold voltage: 5-fold / max. 830 V
	High surge load	current: 20-fold, 1 s
Output	Output variables	double output
	Rated values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA switchable on front side
Transfer behavior	Accuracy	± 0,5 %
	Crest factor	4 with 0,5 % error
	Frequency influence	< 0,5 % with DC / 40-200 Hz
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,2 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 30 mVss
	Response time	< 300 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	≤ 500 V: 4 kV between input, output, auxiliary voltage > 500 V: 5,2 kV between input and output 4 kV input / output to auxiliary voltage
	Auxiliary voltage	
Options		<ul style="list-style-type: none"> ● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) page A1
Weight		190 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

1 Measuring transducers

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3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

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10 Test apparatus



Measuring transducer for current and voltage (True RMS) for installations up to 1000 V (CAT III)

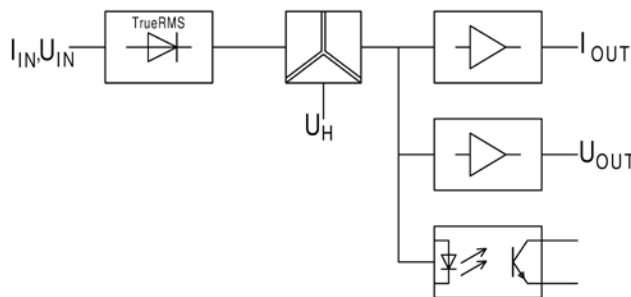
Type:
leffT-MU / UeffT-MU

Application

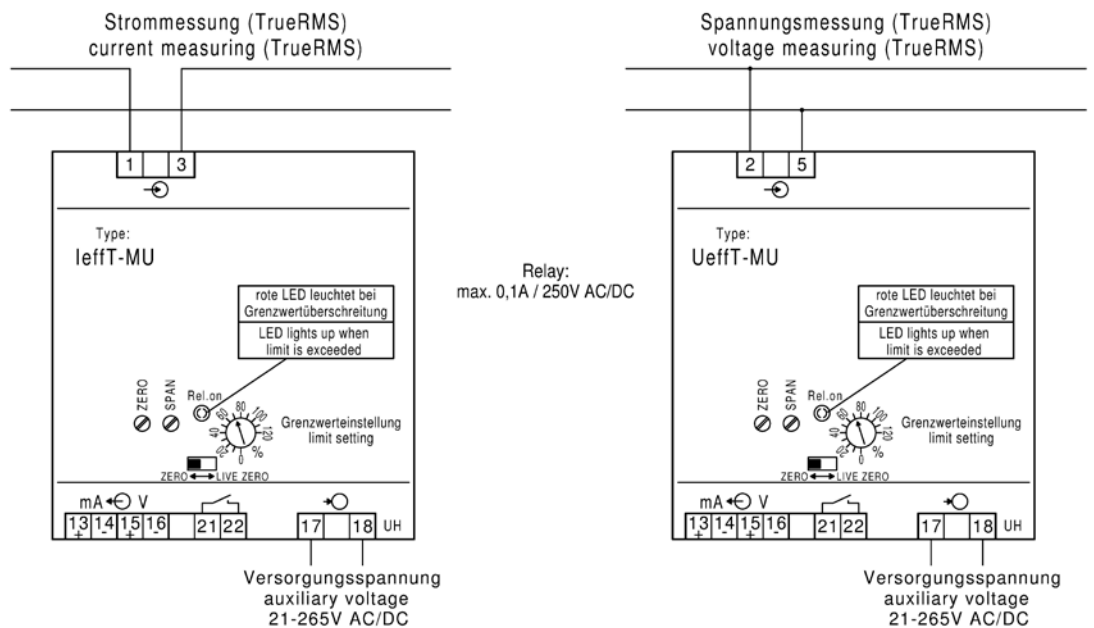
The measuring transducers leffT-MU and UeffT-MU are used for the transformation and isolation of a current or a voltage into an impressed direct current and direct voltage signal. An integrated limit monitoring serves for monitoring the input signal.

Function

The measurand is transmitted to the rms rectifier via an input protective circuit. Crest factors (ratio between peak value and rms value) up to a value of 4 may be processed without problems. The direct voltage thus generated is galvanically isolated from the output by an optocoupler. A downstream amplifier effectuates the direct current and direct voltage impression. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. The limit value may be adjusted within a range of 0-120 % of the input signal. Exceeding the limit value is indicated by an LED. An auxiliary voltage is required.



Connection



Types and variants

Input	leffT-MU a value from 0-1 mA to 0-5 A UeffT-MU 0-1000 V (other values on request)
Output	0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V, switchable on front side

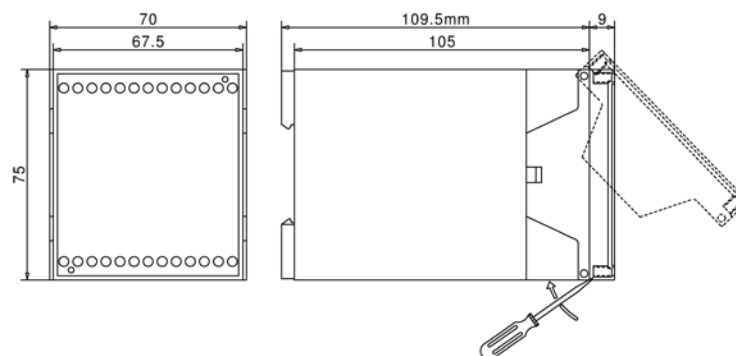
- 1 Measuring transducers
- 2 Mains and limit monitoring
- 3 Energy meters
- 4 Panel meters digital
- 5 Panel meters analog
- 6 Meas. instruments for top hat rail mounting
- 7 Universal measuring instruments
- 8 Current transformers
- 9 Shunts
- 10 Test apparatus



Technical data

Input	Input variables	direct and alternating voltage / direct and alternating current of arbitrary waveform	
	Rated values	I _{effT-MU} a value from 0-1 mA to 0-5 A, voltage drop 60 mV U _{effT-MU} a value from 0-1000 V, R _i = 2 M Ω	
	Rated frequency	DC / 40-200 Hz	
	Option	● DC / 40-1000 Hz	
	Overload permanent	for current 2-fold, for voltage 5-fold / max. 2000 V	
	High surge load	for current 20-fold 1 s	
Output	Output variables	double output	
	Rated values	0-20 mA / 0-500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 0-500 Ω load and 2-10 V / max. load 10 mA switchable on front side	
	Limit value output	1 NO contact, hysteresis approx. 4 % of limit value, contact load max. 0,1 A / 250 V AC/DC	
	Function indicator	red LED if limit value is exceeded	
Transfer behavior	Accuracy	± 0,5 %	
	Crest factor	4 with max. error of 0,5 %	
	Frequency influence	< 0,5 % with DC / 40-200 Hz	
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C	
	Temperature influence	< 0,2 % at 10 K	
	Auxiliary voltage influence	no	
	Load influence	no	
	External magnetic field influence	no (400 A/m)	
	Residual ripple	< 50 mV _{ss}	
	Response time	< 300 ms	
	Open circuit voltage	max. 24 V	
	Current limiting	max. 2-fold in case of overload	
	Test voltage		7,4 kV between input to output, input to auxiliary voltage and input to relay contacts
			4 kV between output to auxiliary voltage and relay contacts
Standards	EMC	DIN EN 61326	
	Mechanical strength	DIN EN 61010 part 1	
	Electrical safety		DIN EN 61010 part 1
			housing insulated, protection class II, for working voltages up to 1000V (phase to neutral) pollution level 2, measuring category CAT III
	Accuracy, overload	DIN EN 60688	
	Air and creep distances	DIN EN 61010 Part 1	
	IP code	DIN EN 60529 housing IP30, terminals IP20	
	Connection	DIN 43807	
Auxiliary voltage	21-265 VAC + DC, 2 VA		
Weight	220 g		

Dimensions



Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

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10 Test apparatus



Measuring transducer for frequency

Type:
F-MU



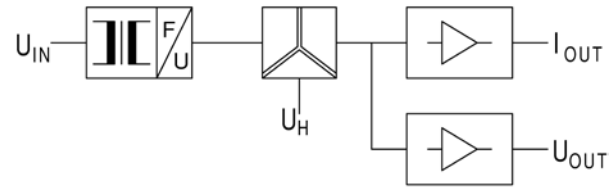
Application

The measuring transducer F-MU is used for the transformation and isolation of a frequency into an impressed direct current and direct voltage signal. Alternating voltages and pulsed direct voltages may be processed.

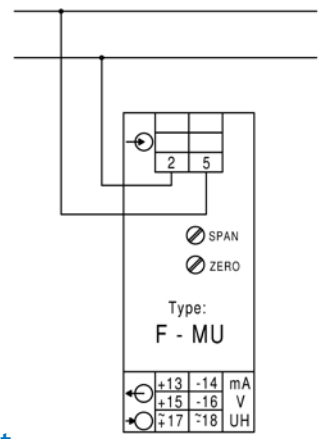


Function

The frequency to be measured is sent to a filter via an internal voltage transformer serving for galvanic isolation and from there to a microcontroller for evaluation. The direct voltage generated there is transformed into an impressed direct current and in an impressed direct voltage. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required in case of "live zero" as well as in case of significantly fluctuating rated voltage and frequency ranges with reference to zero.



Connection



Pr Types and variants ice

Input	45-55 Hz, 48-52 Hz, 55-65 Hz, 58-62 Hz, 360-440 Hz, 380-420 Hz, 0-100 Hz, 0-500 Hz or 0-1000 Hz (with auxiliary voltage only) Other values (measuring ranges) on request!
Output	0-20 mA and 0-10 V (without auxiliary voltage) 4-20 mA and 2-10 V (with auxiliary voltage) Please specify rated voltage (see page 23)!
Surcharges	Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC Other measuring ranges
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



Technical data

Input	Input variables	Frequency
	Rated values	45-55 Hz, 48-52 Hz, 55-65 Hz, 58-62 Hz, 360-440 Hz, 380-420 Hz, 0-100 Hz, 0-500 Hz or 0-1000 Hz (with separate auxiliary voltage only)
	Rated voltage	100 V, 110 V, 230 V, 400 V or 500 V ± 20 % 2-50 V, 25-250 V, 50-500 V or 75-690 V (with separate auxiliary voltage only)
	Energy consumption	2,5-5 VA, 0,5-1 VA with separate auxiliary voltage
	Overload permanent	1,2-fold
	High surge load	2-fold 1 s
Output	Output variables	double output
	Rated values Option	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA ● "live zero" 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA (auxiliary voltage required)
Transfer behavior	Accuracy	± 0,5 %
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,1 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 30 mVss
	Response time	< 300 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	< 500 V: 4 kV between input, output, auxiliary voltage > 500 V: 5,2 kV between input and output 4 kV input / output to auxiliary voltage
Auxiliary voltage (with „live zero“ only, nominal values from 0-..Hz and voltage ranges)		230 V AC ± 20 %, 45-65 Hz, 2,5 VA
	Option	● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) page A1
Weight		190 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

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Measuring transducer for phase angle

Type:
Phwd-MU



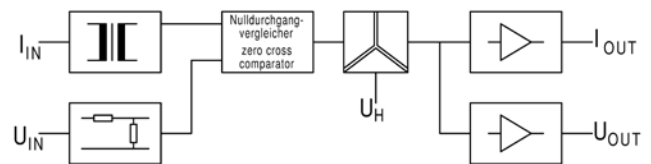
Application

The measuring transducer Phwd-MU is used for the transformation and isolation of the phase angle between current and voltage of an alternating current and three-phase power system of the same load into an impressed direct current and direct voltage signal.

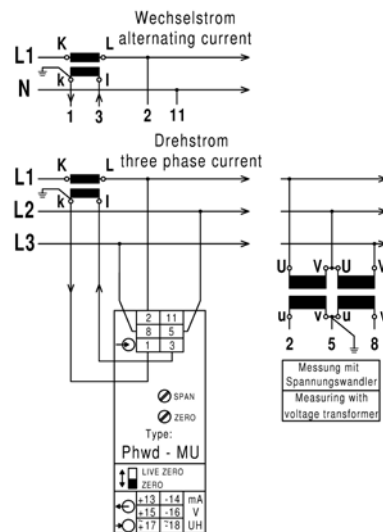


Function

The parameters to be measured are transmitted to the zero point comparator via internal current transformers and voltage dividers. At the comparator, a square-wave signal is available which is directly related to the phase angle. A downstream integration stage then generates the direct voltage mean value. This direct voltage is transformed into an impressed direct current and an impressed direct voltage. The galvanic isolation between input and output signals is done using optocoupler. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required.



Connection



Types and variants

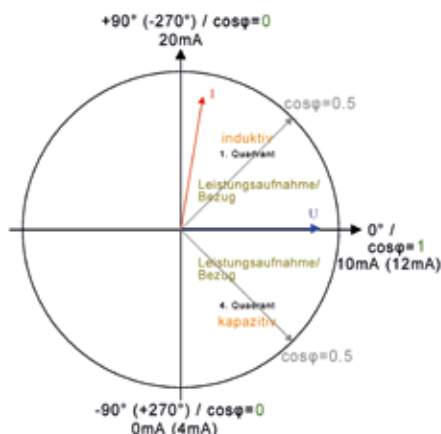
Input	<p>$\cos \varphi$ 0,5 cap - 1 - 0,5 ind or $\cos \varphi$ 0,7 cap - 1 - 0,3 ind for alternating current and three-phase power system of the same load</p> <p>100 / 110 / 230 / 400 / 500 / 600 V</p> <p>1 A or 5 A</p>
Output	<p>0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V, switchable on front side</p>
Surcharges	<p>Auxiliary voltage other than 230 V AC:</p> <p>24 V DC</p> <p>6-30 V AC + DC</p> <p>36-265 V AC + DC</p> <p>110 V AC</p> <p>... 4Q 4 quadrant operation for alternating and 3-phase current with bidirectional energy direction</p>
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



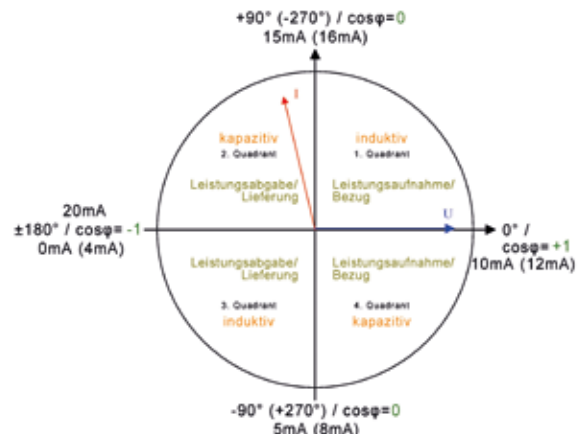
Technical data

Input	Input variables	Phase angle between sinusoidal voltages and currents in alternating current and 3-phase power system with auxiliary voltage
	Rated values	- 60° - 0 - + 60°, electrical $\cos \varphi$ 0,5 cap - 1 - 0,5 ind or - 45,6° - 0 - + 72,5°, electrical $\cos \varphi$ 0,7 cap - 1 - 0,3 ind
	Option	● Type ...4Q: 4-quadrant operation 1-0-1-0-1
	Rated voltage	100 V, 110 V, 230 V, 400 V, 500 V, 600 V \pm 20 %, max. 2,5 VA
	Rated current	1 A or 5 A, 0,3 VA
	Rated frequency	50 Hz, 60 Hz or 400 Hz
	Overload permanent	current: 2-fold voltage: 1,2-fold
	High surge load	current: 20-fold, 1 s voltage: 2-fold, 1 s
Output	Output variables	double output
	Rated values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA switchable on front side
Transfer behavior	Accuracy	\pm 0,5 % linear to angular degrees
	Current range	4-200 % of rated current
	Current influence	< 0,5 % with 0,15- to 2-fold rated current
	Voltage influence	< 0,1 % with \pm 20 % of rated voltage
	Frequency influence	< 0,1 % with 10 Hz frequency change
	Temperature range	-15 °C to +20 °C zo +30 °C to +55 °C
	Temperature influence	< 0,2 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 30 mVss
	Response time	< 400 ms
	Open circuit voltage	max. 24 V
Current limiting	max. 2-fold in case of overload	
Test voltage	4 kV between input, output, auxiliary voltage	
Auxiliary voltage		230 V AC \pm 20 %, 45-65 Hz, 2,5 VA
	Options	● 110 V AC \pm 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) Page A1
Weight		200 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

2 - Quadrantenbetrieb (Standard)



4 - Quadrantenbetrieb (Option)



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

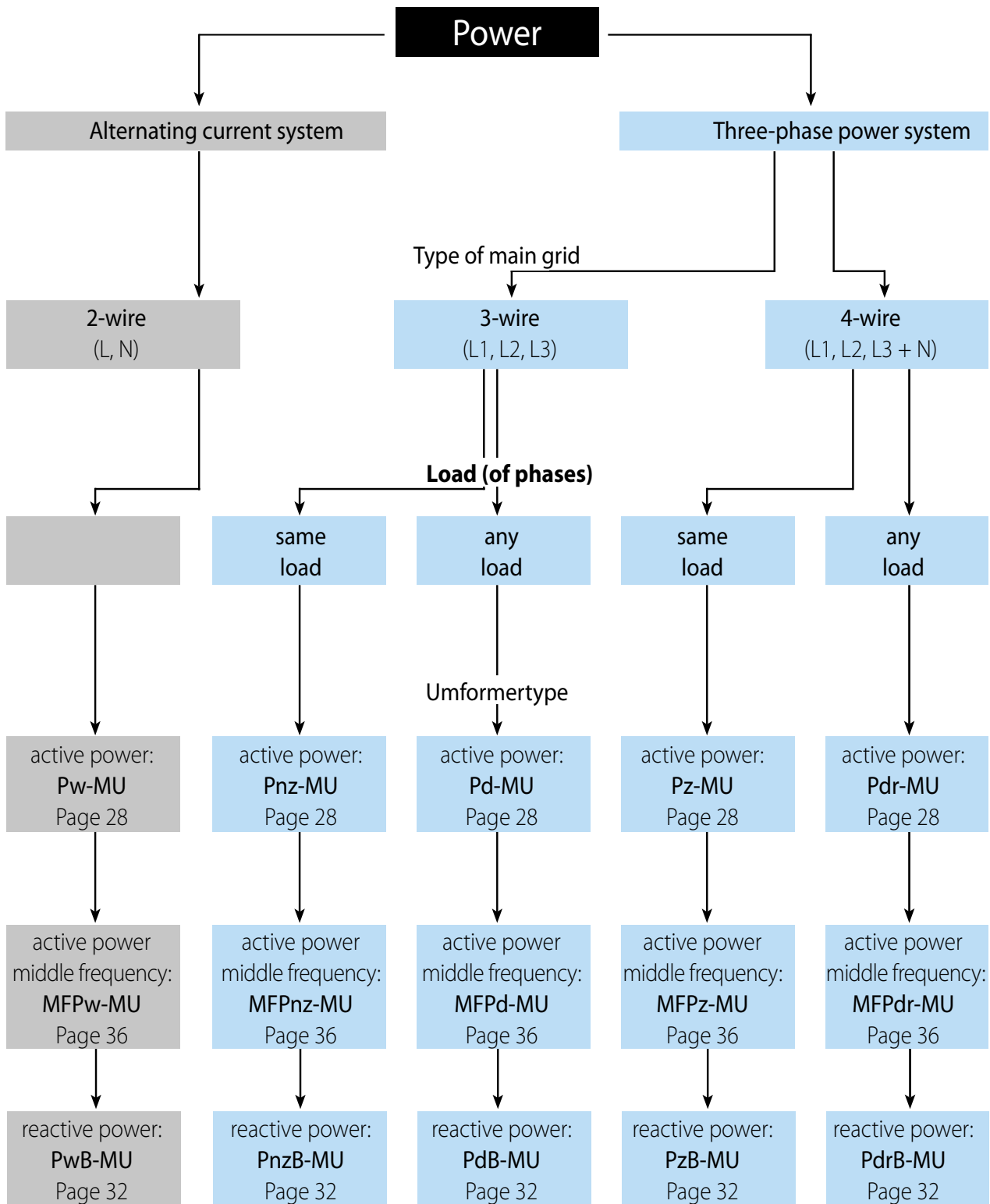
8 Current transformers

9 Shunts

10 Test apparatus

Measuring transducers for active power

Active power transducers - finding the right type



Short legend:	
P	Power measuring transducer for active power
MF	Middle frequency
w	Alternating current
z	accessible neutral, 4-wire 3-phase current of same load
nz	non-accessible neutral, 3-wire 3-phase current of same load
d	double power measuring transducer, 3-wire 3-phase current of any load
dr	triple power measuring transducer, 4-wire 3-phase current of any load
B	Reactive power



Measuring transducers for active power

Alternating current and 3-phase current

Type:

Pw-MU, Pnz-MU, Pz-MU, Pd-MU, Pdr-MU



Application

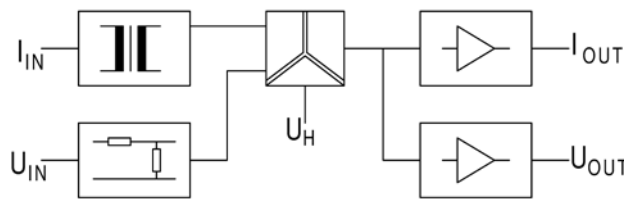
The measuring transducers Pw-MU, Pnz-MU, Pz-MU, Pd-MU and Pdr-MU are used for the transformation and isolation of the active power in alternating current or three-phase power systems into an impressed direct current and direct voltage signal.



Function

The parameters to be measured are transmitted to the analog multiplier via internal current transformers and voltage dividers. The instantaneous values of current and voltage are then multiplied and formed as the mean value of a direct voltage matching the active power in a downstream integration stage. Sinusoidal and non-sinusoidal alternating current parameters of any waveform may be measured. The galvanic isolation between input and output signals is done using optocoupler. A downstream amplifier supplies the impressed direct current and direct voltage signals. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible.

An auxiliary voltage is required for „live zero“ or rated voltage fluctuations $> \pm 20\%$.



Types and variants

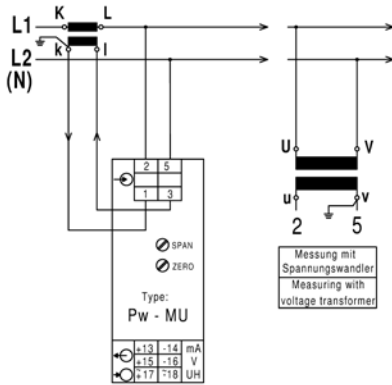
Input	50-150 % of the apparent power, 100 / 110 / 230 / 400 / 500 or 600 V 1 A or 5 A (please specify primary current!) Direct connection up to max. 10 A on request!
Output	<p>Pw-MU (alternating current system) or</p> <p>Pz-MU (4-wire 3-phase power system of same load) or</p> <p>Pnz-MU (3-wire 3-phase power system of same load): 0-20 mA and 0-10 V (without auxiliary voltage) 4-20 mA and 2-10 V (with auxiliary voltage)</p> <p>Pd-MU (3-wire 3-phase power system of any load): 0-20 mA and 0-10 V (without auxiliary voltage) 4-20 mA and 2-10 V (with auxiliary voltage)</p> <p>Pdr-MU (4-wire 3-phase power system of any load): 0-20 mA and 0-10 V (without auxiliary voltage) 4-20 mA and 2-10 V (with auxiliary voltage)</p>
Surcharges	<p>Bidirectional energy directions</p> <p>Auxiliary voltage required in case of rated voltage fluctuation $> \pm 20\%$ and voltages $> 500\text{ V}$</p> <p>230 V AC or 110 V AC</p> <p>24 V DC</p> <p>6-30 V AC + DC</p> <p>36-265 V AC + DC</p>
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



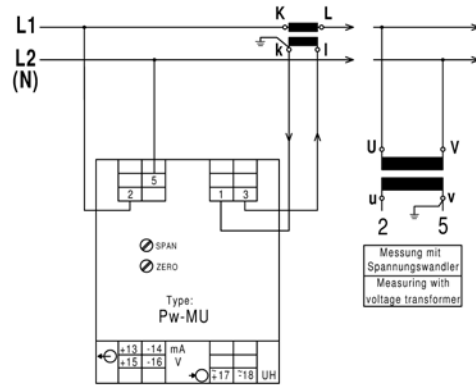
Connection

Type Pw-MU (Alternating current)

Working voltage up to 300 V (Phase to neutral L - N)

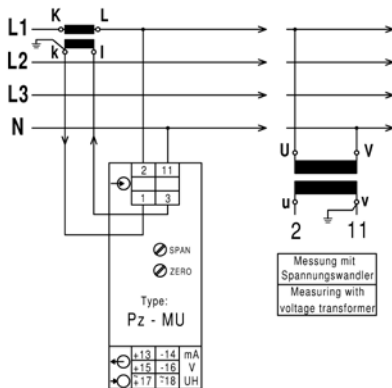


Working voltage up to 600 V (Phase to neutral L - N)

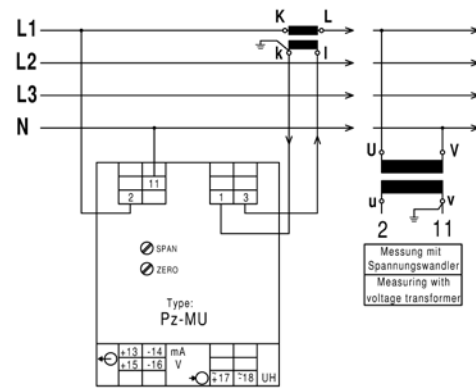


Type Pz-MU (4-wire 3-phase current same load)

Working voltage up to 300 V (Phase to neutral L - N)

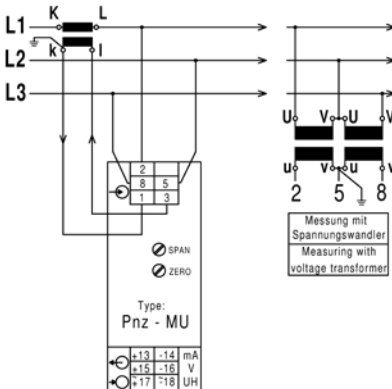


Working voltage up to 600 V (Phase to neutral L - N)

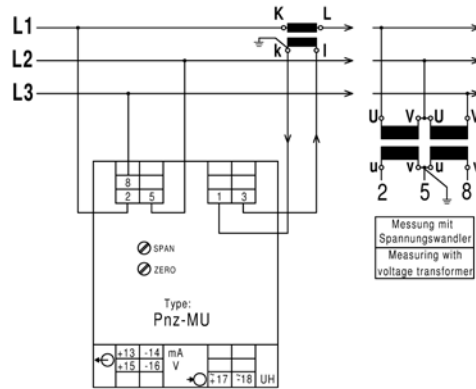


Type Pnz-MU (3-wire 3-phase current same load)

Working voltage up to 300 V (Phase to neutral L - N)

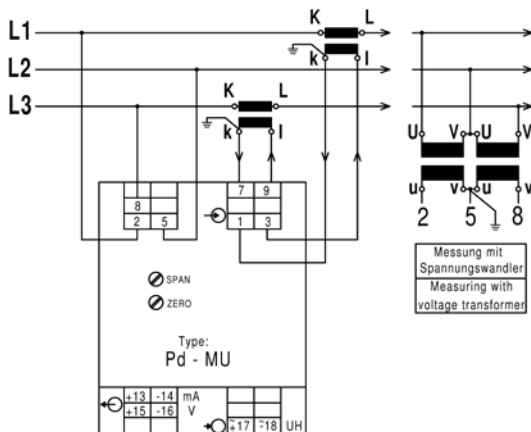


Working voltage up to 600 V (Phase to neutral L - N)



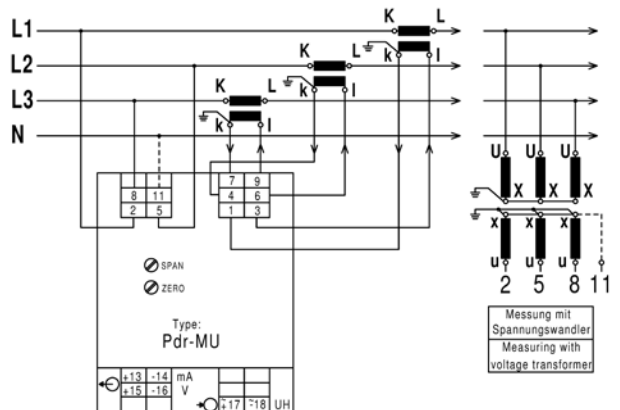
Type Pd-MU (3wire 3-phase current any load)

Working voltage up to 600 V (Phase to neutral L - N)



Type Pdr-MU (4-wire 3-phase current any load)

Working voltage up to 600 V (Phase to neutral L - N)



Technical data

Input	Input variables	active power for alternating and 3-phase current
	Rated values	50-150 % of apparent power with alternating current: $S = U \times I$ with 3-phase current: $S = U \times I \times 1,732$
	Rated voltage	100 V, 110 V, 230 V, 400 V, 500 V or 600 V $\pm 20 \%$, max. 3,5 VA
	Rated current	1 A or 5 A, 0,3 VA
	Rated frequency	50 Hz, 60 Hz or 400 Hz
	Overload permanent	current: 2-fold voltage: 1,2-fold
	High surge load	current: 20-fold, 1 s voltage: 2-fold, 1 s
Output	Output variables	double output
	Rated values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA
	Option	● „live zero“ 4-20 mA / 500 Ω load and 2-10 V max. load 10 mA (auxiliary voltage required)
	Bipolar output	● e.g. - 20 - 0 - + 20 mA / 500 Ω load and - 10 - 0 - + 10 V / max. load 10 mA
	Zero point rise	● e.g. 0-10-20 mA / 500 Ω load and 0-5-10 V / max. load 10 mA
Transfer behavior	Accuracy	$\pm 0,5 \%$
	Voltage influence	$< 0,1 \%$ with $\pm 10 \%$ of rated voltage
	Frequency influence	$< 0,3 \%$ with 10 Hz frequency change
	Phase angle influence	$< 0,5 \%$ for $\pm 90^\circ$
	Temperature range	-15 $^\circ\text{C}$ to <u>+20 $^\circ\text{C}$</u> to +30 $^\circ\text{C}$ to +55 $^\circ\text{C}$
	Temperature influence	$< 0,3 \%$ at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	$< 30 \text{ mVss}$
	Response time	$< 300 \text{ ms}$
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	$< 500 \text{ V}$: 4 kV between input, output, auxiliary voltage $> 500 \text{ V}$: 5,2 kV between input and output 4 kV between input / output and auxiliary voltage
Auxiliary voltage		230 V AC $\pm 20 \%$, 45-65 Hz, 2,5 VA
	(with „live zero“ or in case of rated voltage fluctuation or voltages $> 500 \text{ V}$)	Options ● 110 V AC $\pm 20 \%$, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	$< 500 \text{ V}$: Pw-MU, Pz-MU, Pnz-MU:	Housing A, (22,5 mm wide) Page A1
	$> 500 \text{ V}$: Pw-MU, Pz-MU, Pnz-MU:	Housing B, (45 mm wide) Page A1
	Pd-MU, Pdr-MU:	Housing B, (45 mm wide) Page A1
Weight	Pw-MU, Pz-MU, Pnz-MU:	250 g
	Pd-MU:	340 g
	Pdr-MU:	370 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²



Measuring transducers for reactive power

Alternating current and 3-phase current

Type:

PwB-MU, PnzB-MU, PzB-MU, PdB-MU, PdrB-MU



Application

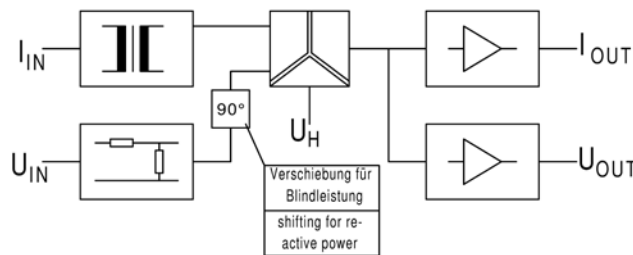
The measuring transducers PwB-MU, PnzB-MU, PzB-MU, PdB-MU and PdrB-MU are used for the transformation and isolation of the reactive power in alternating current or three-phase power systems into an impressed direct current and direct voltage signal.



Function

The parameters to be measured are transmitted to the analog multiplier via internal current transformers and voltage dividers. The instantaneous values of current and voltage are then multiplied and formed as the mean value of a direct voltage matching the reactive power in a downstream integration stage. Sinusoidal and non-sinusoidal alternating current parameters of any waveform may be measured. The galvanic isolation between input and output signals is done using optocoupler. A downstream amplifier supplies the impressed direct current and direct voltage signals. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible.

An auxiliary voltage is required for „live zero“ or rated voltage fluctuations $> \pm 20\%$.



Types and variants

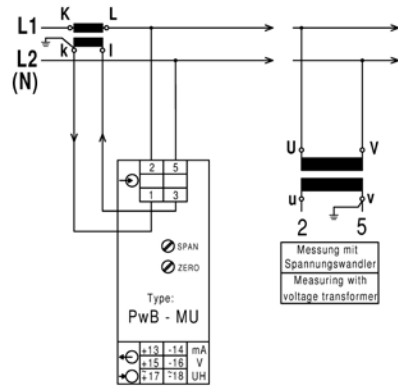
Input	50-150 % of the apparent power, 100 / 110 / 230 / 400 / 500 or 600 V 1 A or 5 A (please specify primary current!) Direct connection up to max. 10 A on request!
Output	<p>PwB-MU (alternating current system) or PzB-MU (4-wire 3-phase power system of same load) or PnzB-MU (3-wire 3-phase power system of same load): 0-20 mA and 0-10 V (without auxiliary voltage) 4-20 mA and 2-10 V (with auxiliary voltage)</p> <p>PdB-MU (3-wire 3-phase power system of any load): 0-20 mA and 0-10 V (without auxiliary voltage) 4-20 mA and 2-10 V (with auxiliary voltage)</p> <p>PdrB-MU (4-wire 3-phase power system of any load): 0-20 mA and 0-10 V (without auxiliary voltage) 4-20 mA and 2-10 V (with auxiliary voltage)</p>
Surcharges	<p>Bidirectional energy directions</p> <p>Auxiliary voltage required in case of rated voltage fluctuation $> \pm 20\%$ and voltages $> 500\text{ V}$</p> <p>230 V AC or 110 V AC</p> <p>24 V DC</p> <p>6-30 V AC + DC</p> <p>36-265 V AC + DC</p>
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



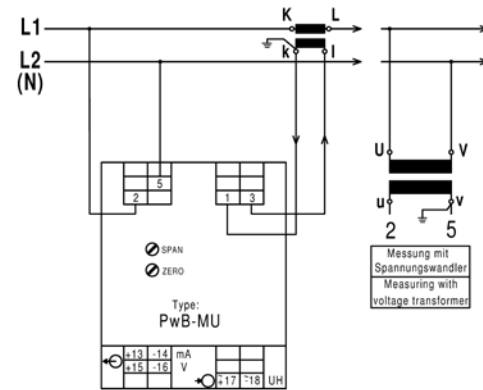
Connection

Type PwB-MU (Alternating current)

Working voltage up to 300 V (Phase to neutral L - N)

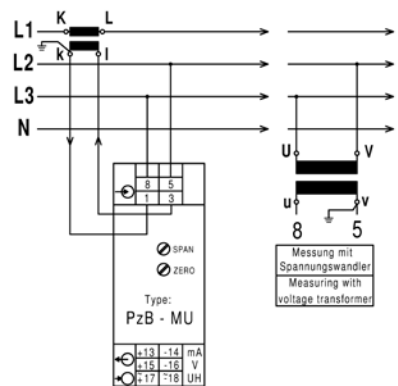


Working voltage up to 600 V (Phase to neutral L - N)

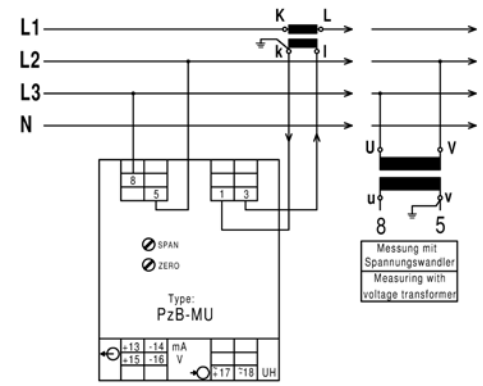


Type PzB-MU (4-wire 3-phase current same load)

Working voltage up to 300 V (Phase to neutral L - N)

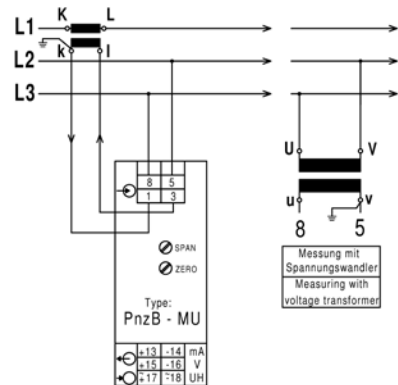


Working voltage up to 600 V (Phase to neutral L - N)

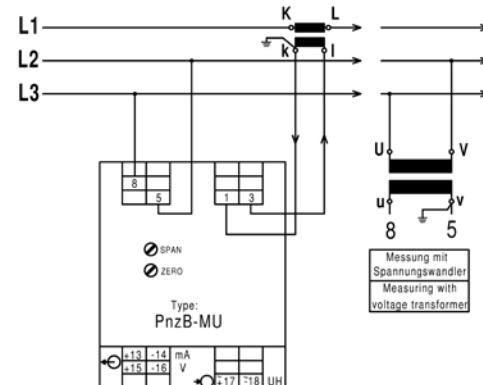


Type PnzB-MU (3-wire 3-phase current same load)

Working voltage up to 300 V (Phase to neutral L - N)

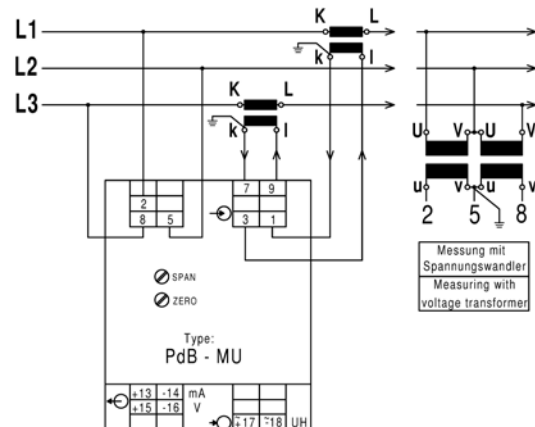


Working voltage up to 600 V (Phase to neutral L - N)

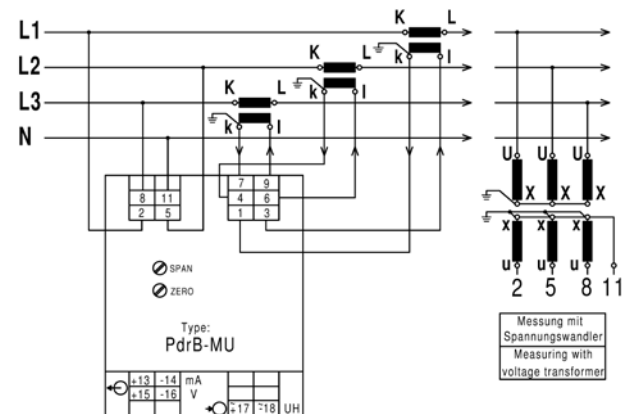


Type PdB-MU (3-wire 3-phase current any load)

Working voltage up to 600 V (Phase to neutral L - N)



Type PdrB-MU (4-wire 3-phase current any load)



Technical data

Input	Input variables	reactive power for alternating and 3-phase current
	Rated values	50-150 % of apparent power with alternating current: $S = U \times I$ with 3-phase current: $S = U \times I \times 1,732$
	Rated voltage	100 V, 110 V, 230 V, 400 V, 500 V or 600 V ± 20 %, max. 3,5 VA
	Rated current	1 A or 5 A, 0,3 VA
	Rated frequency	50 Hz, 60 Hz or 400 Hz
	Overload permanent	current: 2-fold voltage: 1,2-fold
	High surge load	current: 20-fold, 1 s voltage: 2-fold, 1 s
Output	Output variables	double output
	Rated values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA
	Option	● „live zero“ 4-20 mA / 500 Ω load and 2-10 V max. load 10 mA (auxiliary voltage required)
	Bipolar output	● e.g. - 20 - 0 - + 20 mA / 500 Ω load and - 10 - 0 - + 10 V / max. load 10 mA
	Zero point rise	● e.g. 0-10-20 mA / 500 Ω load and 0-5-10 V / max. load 10 mA
Transfer behavior	Accuracy	$\pm 0,5$ %
	Voltage influence	$< 0,1$ % with ± 10 % of rated voltage
	Frequency influence	$< 0,3$ % with 10 Hz frequency change except for PwB-MU and PdrB-MU $< 0,5$ % with 1 Hz frequency change
	Phase angle influence	$< 0,5$ % for $\pm 90^\circ$
	Temperature range	-15 $^\circ\text{C}$ to +20 $^\circ\text{C}$ to +30 $^\circ\text{C}$ to +55 $^\circ\text{C}$
	Temperature influence	$< 0,3$ % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 30 mVss
	Response time	< 300 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	< 500 V: 4 kV between input, output, auxiliary voltage > 500 V: 5,2 kV between input and output 4 kV between input / output and auxiliary voltage
	auxiliary voltage	
(with „live zero“ or in case of rated voltage fluctuation or voltages > 500 V)	Options	● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	< 500 V: PwB-MU, PzB-MU, PnzB-MU:	Housing A, (22,5 mm wide) Page A1
	> 500 V: PwB-MU, PzB-MU, PnzB-MU:	Housing B, (45 mm wide) Page A1
	PdB-MU, PdrB-MU:	Housing B, (45 mm wide) Page A1
Weight	PwB-MU, PzB-MU, PnzB-MU:	250 g
	PdB-MU:	340 g
	PdrB-MU:	370 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²



Measuring transducer for active power in the middle frequency range

Frequency range DC/10 Hz – 20kHz
Measurement of direct, alternating, pulsed and mixed currents

Type:
MFPw-MU, MFPz-MU, MFPnz-MU, MFPd-MU, MFPdr-MU



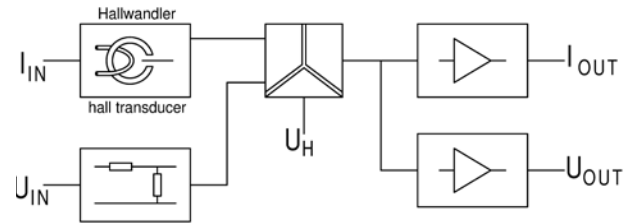
Application

The measuring transducer MFP.-MU is used for the transformation and isolation of the active power in the middle frequency range into an impressed direct current and direct voltage signal. It is used in power supplies of welding systems, UPS systems, switch-mode power supplies, induction furnaces, systems with frequency converters, three-phase and servo drives, generators and others.



Function

The parameters to be measured are transmitted to the analog multiplier via internal hall effect current transformers and voltage dividers. The instantaneous values of current and voltage are then multiplied and formed as the mean value of a direct voltage matching the active power in a downstream integration stage. Alternating current parameters of any waveform may be measured. The galvanic isolation between input and output signals is done using optocoupler. A downstream amplifier supplies the impressed direct current and direct voltage signals. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required.



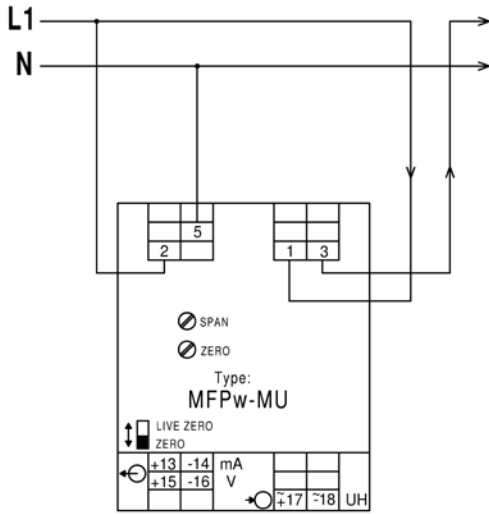
Types and variants

Input	50-150 % of the apparent power, 100 / 110 / 230 / 400 / 500 or 600 V direct current measurement, a value of 0-2 A to 0-15 A, indirect current measurement, if using separate CT's for hall effect or flexible CT's please specify technical data
Output	MFPw-MU (alternating current system) or MFPz-MU (4-wire 3-phase power system of same load) or MFPnz-MU (3-wire 3-phase power system of same load): MFPd-MU (3-wire 3-phase power system of any load): MFPdr-MU (4-wire 3-phase power system of any load): 0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V switchable on front side
Surcharges	Bidirectional energy directions
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)

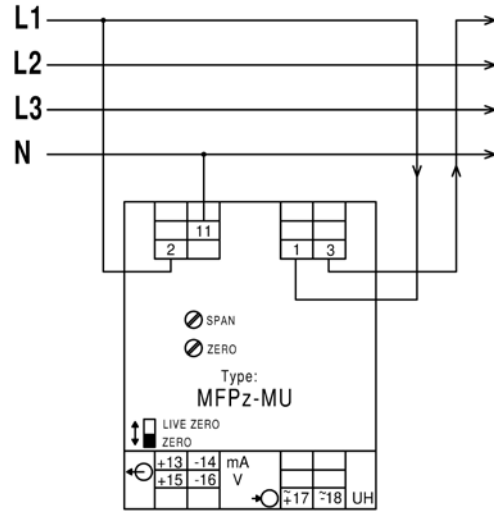


Connection

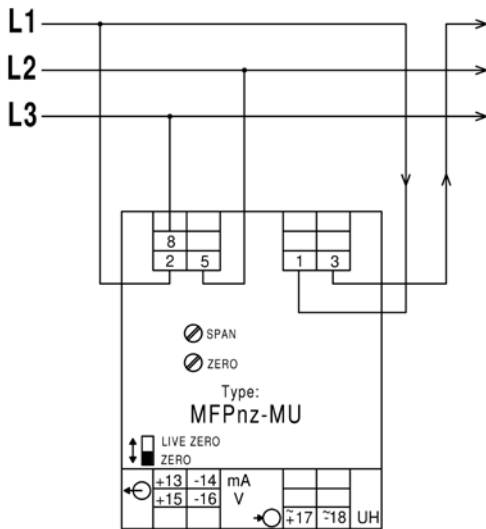
Type MFPw-MU (Alternating current)



Type MFPz-MU (4-wire 3-phase current same load)



Type MFPnz-MU (3-wire 3-phase current same load)

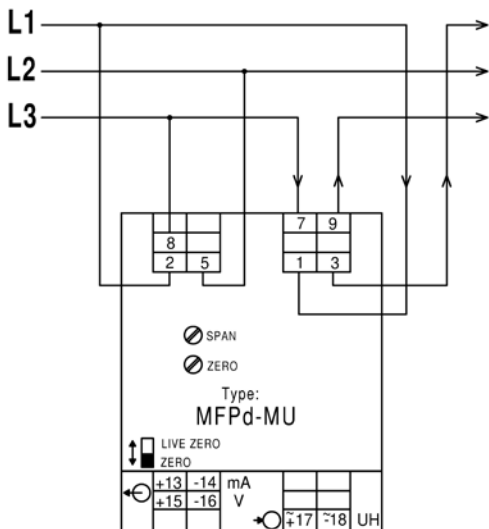


For devices with frequency module further outputs are not available. At terminal +13 and -14 the frequency output is available.

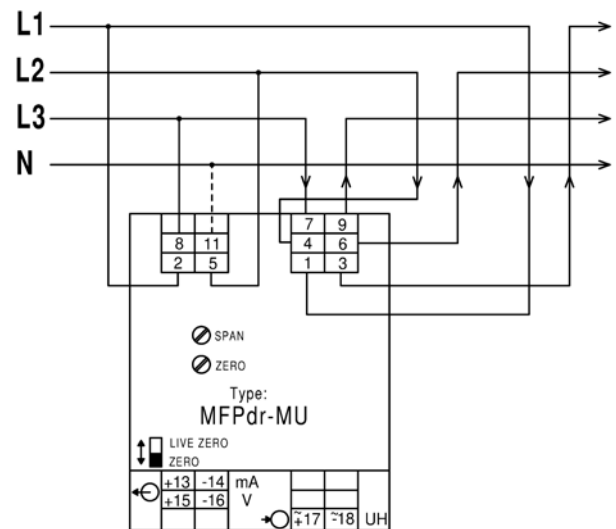
Current transformers for Power Quality Application up to 20 kHz XCTB-Series can be found in our individual catalog "XCTB" on our homepage at:

www.mueller-ziegler.de

Type MFPd-MU (3-wire 3-phase current any load)



Type MFPdr-MU (4-wire 3-phase current any load)



Technische Daten

Input	Input variables	active power with alternating and 3-phase current of same or any load, unidirectional or bidirectional energy direction
	Rated values	50-150 % of the apparent power for alternating current: $S = U \times I$ with 3-phase current: $S = U \times I \times 1,732$
	Rated voltage	0-100 V, 110 V, 230 V, 400 V, 500 V or 600 V, max. 0,3 VA
	Rated current	a value of 0-2 A to 0-15 A direct measurement, higher current values via indirect measurement using external current transformers (hall-effect or flexible CT's)
	Rated frequency	10 Hz – 20 kHz / DC
	Overload permanent	voltage 1,2-fold, current 2-fold (max. 20 A)
	High surge load	voltage 2-fold 1 s, current 20-fold 1 s
Output	Output variables	double output
	Rated values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA „live zero“ 4-20 mA / 500 Ω load und 2-10 V max. load 10 mA switchable on front side
	Options	<ul style="list-style-type: none"> ● bipolar output e.g. - 20 - 0 - + 20 mA / 500 Ω load and - 10 - 0 - + 10 V / max. load 10 mA ● zero point rise e.g. 0-10-20 mA / 500 Ω load and 0-5-10 V / max. load 10 mA ● frequency module, value from 0-5 Hz to 0-10 kHz ● „open -collector“ NPN, max. load 30V 100 mA, pulse/pause 50/50 % ● square-wave signal 5 V, max. load 10 mA, pulse/pause 50/50 %
Transfer behavior	Accuracy	± 0,5 %
	Voltage influence	< 0,5 % within rated voltage
	Frequency influence	< 3 % in frequency range of 10 Hz to 20 kHz or with DC
	Phase angle influence	< 0,5 % for ± 90° at 1000 Hz
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,3 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 40 mVss
	Response time	< 1 s
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
Test voltage	4 kV between input, output, auxiliary voltage	
Auxiliary voltage		230 V AC ± 20 %, 45-65 Hz, 3,5 VA
Dimensions	Housing	Housing B, (45 mm wide) Page A1
Weight	MFP.-MU	300 g
	MFPd-MU	340 g
	MFPdr-MU	360 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²



Universal measuring transducer with Ethernet interface

with HTTP, TCP/IP, Modbus-TCP protocol
with 4 bipolar configurable analog outputs
2 limit value or pulsed outputs

Type:
Multi-E4-MU

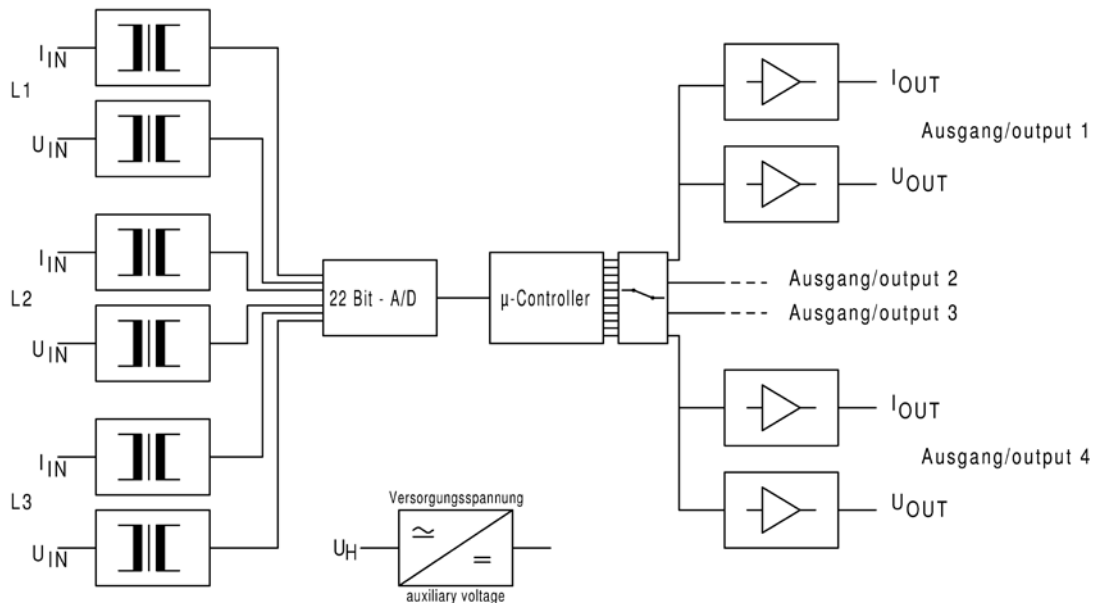
Application

The measuring transducer Multi-E4-MU is used for the simultaneous transformation and isolation of current, voltage, frequency, active and reactive power, apparent power and the power factor for sinusoidal quantities into 4 impressed direct current and direct voltage signals. The measurement is possible in alternating current systems and 3-wire or 4-wire three-phase power systems with same or any load. The 29 measurands may be displayed, stored and configured via a 10 Mbit/sec Ethernet LAN interface at the PC. Up to 13000 series of measured values may be stored in the internal memory of the measuring transducer. Furthermore, the measuring results may be displayed via web browser or be read and further processed via HTTP, TCP/IP or Modbus-TCP protocol. Two further outputs may be used as limit value or pulsed outputs. The switching status of the limit value or pulsed outputs is indicated by 2 LEDs.

Function

The parameters to be measured are sent to a 22 bit A/D converter with a sample rate of >20 kSPS via current and voltage transformers and are then further transmitted to a microcontroller which calculates the required values for the outputs from the measured parameters. The output values for current and voltage are rms-values. The frequency is calculated from the period of the voltage signal of phase L1. The active powers are calculated from the products of the samples of current and voltage of the three phases. The calculations of the reactive power of the three phases are done using the product of the samples of the currents and the 90° offset voltage signals. The apparent power is the sum of the products from the three rms-values of current and voltage.

The power factors are calculated from the apparent power values and the active power values. The output amplifiers supply impressed direct current and direct voltage signals. The output signals are galvanically isolated from the input signals and the auxiliary voltage, but linked to each other via a common ground wire. The outputs are no-load proof and short-circuit proof. The two limit value and pulsed outputs are galvanically isolated from all inputs and outputs and the auxiliary voltage. An auxiliary voltage is required.



Types and variants

Multi-E4-MU	incl. software download and LAN cable
Surcharge	Connection to hall-effect or flexible current transformers



Technical data

Input	Input variables	Alternating current and voltage, frequency, active power, reactive power apparent power and power factor in alternating current systems, 4-wire and 3-wire 3-phase power systems with same and any load, unidirectional and bidirectional energy direction, configurable
	Rated current	2 A and 6 A
	Current range	0,3-10 A, configurable
	Rated voltage	100-750 V
	Voltage range	40-750 V, configurable
	Rated frequency	50 Hz
	Frequency range	40-80 Hz
	Energy consumption	per current path 0,06 VA with 1A, 0,3 VA with 5 A per voltage path 0,02 VA with 100V, 1 VA with 750 V
	Overload permanent	voltage max. 750 V, current max. 12 A
	High surge load	voltage 1000 V 1 s, current 240 A 1 s
Analog outputs	Output variables	double output
	Rated values current	0-10 mA, 0-20 mA, 4-20 mA, configurable
	Rated load current	< 500 Ω
	Rated values voltage	0-5 V, 0-10 V, 2-10 V, configurable
	Rated load voltage	> 750 Ω
	Polarity	4 x unipolar or bipolar, configurable
Limit value and pulsed outputs	Type	Open collector, (NPN-Transistor)
	Operating voltage	5-24 V DC, max. 30 V DC
	Operating current	max. 40 mA
	Pulse length	ca. 40 ms
	Hysteresis	ca. 4 % of set limit value
	Accuracy	± 1 % of full scale
	Caution!	The valence of the pulses must be divided by the transmission ratio (K_N) of the current and voltage transformers used!
Transfer behavior	Accuracy	± 0,5 % (at power factor ± 0,5 % in the range >25 % of apparent power = U x I _{Nom} x 1,732, with apparent power <25 % the accuracy is ± 1 %, below 10 % of apparent power, (power factor is not measured)
	Current influence	< 0,5 % with 0,15 to 2-fold rated current
	Frequency influence	< 0,3 % within frequency range
	Phase angle influence	< 0,5 % with ± 90°
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,2 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (up to 400 A/m)
	Residual ripple	< 100 mV _{ss}
	Response time	ca. 200 ms (power factor approx. 600 ms)
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	4 kV between output and auxiliary voltage, 5,2 kV between input to output and input to auxiliary voltage, 2 kV between limit value or pulsed output to output
	Caution!	The Ethernet LAN interface is galvanically connected to the outputs!
	Auxiliary voltage	Wide range power supply
Dimensions	Housing	Housing C (90 mm wide) Page A 1
Weight		600 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus

Calibration

The measuring transducer is factory-calibrated. The calibration should be renewed in the manufacturer's plant every two years

Configuration

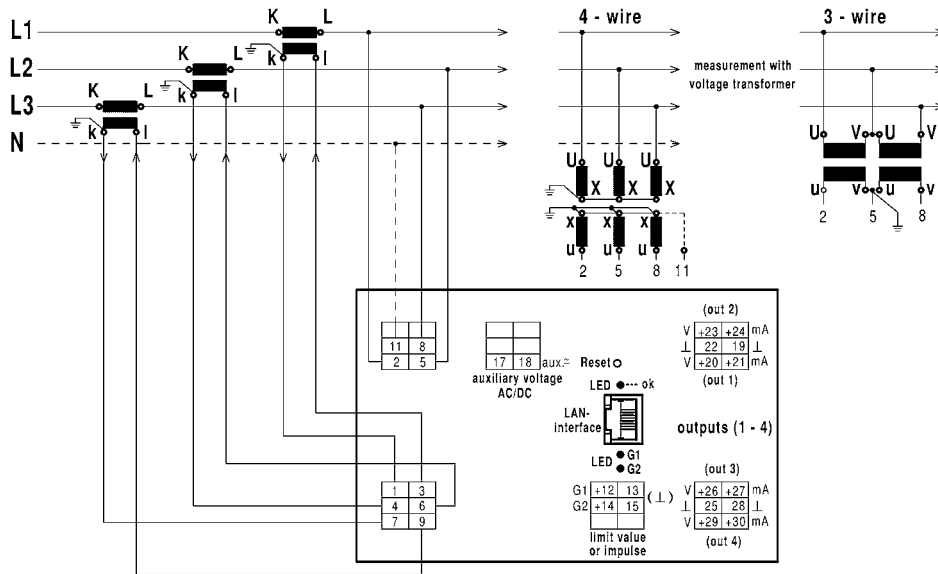
The measuring transducer is configured in the factory if the required data are known. A re-configuration is possible at any time. This will require the related software (download from www.mueller-ziegler.de) and a PC. The measuring transducer and the PC must be connected to each other using a LAN cable (accessory).

The auxiliary voltage must be connected to the measuring transducer. The various configuration options of the inputs and outputs are program-guided.

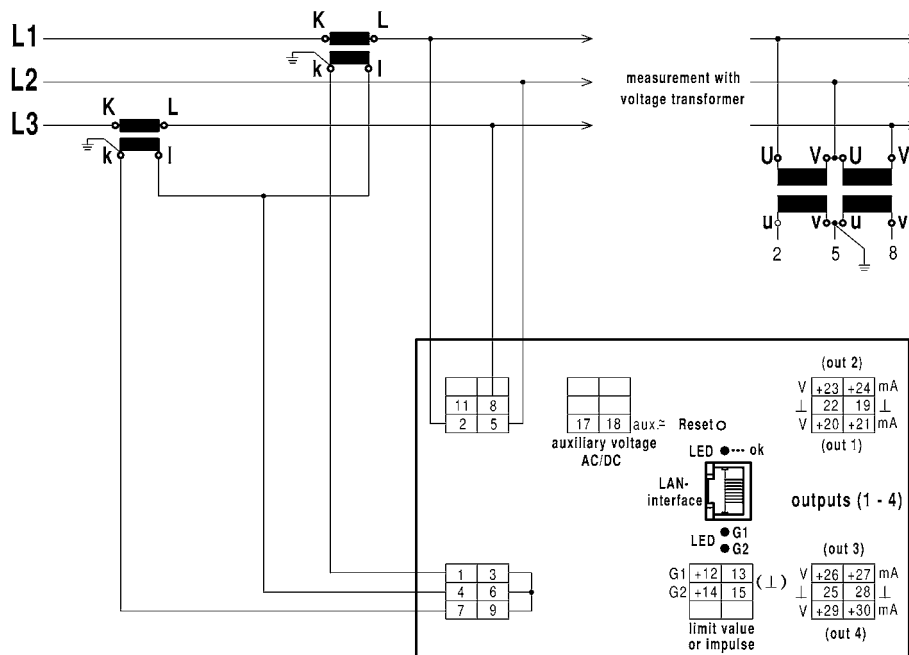


Connection

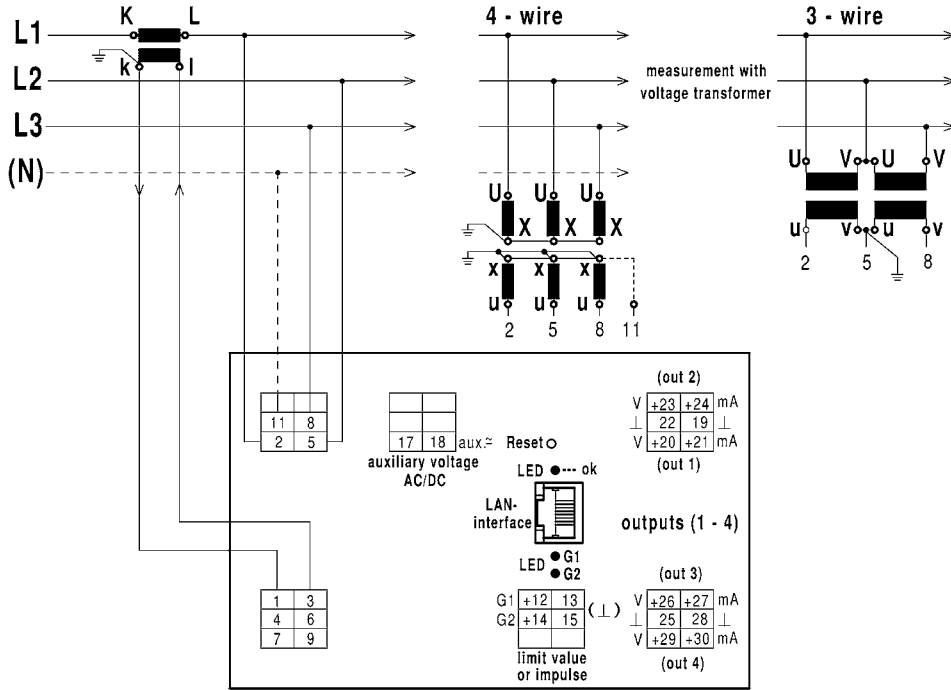
3-/ 4-wire 3-phase current, any load (inputs and outputs not used remain unconnected)



3-wire 3-phase current any load (inputs and outputs not used remain unconnected)



3- /4-wire 3-phase current same load (inputs and outputs not used remain unconnected)



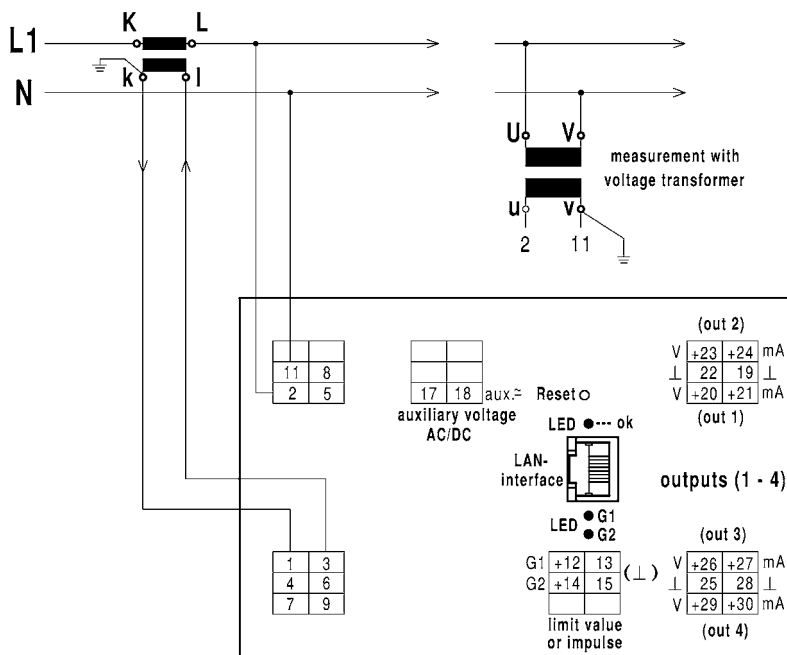
1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

Alternating current (inputs and outputs not used remain unconnected)



4 Panel meters analog

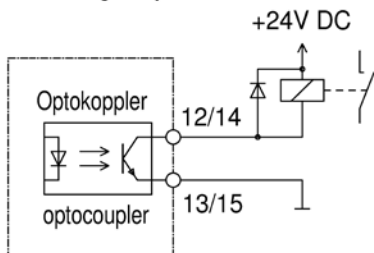
5 Panel meters analog

6 Meas. instruments for top hat rail mounting

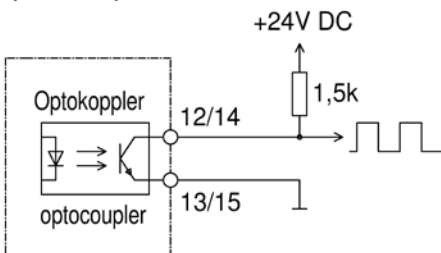
7 Universal measuring instruments

Limit value or pulsed output G1 and G2

Schaltausgang mit externem Relais
switching output with external relay



Impulsausgang mit Lastwiderstand
pulse output with load resistor



8 Current transformers

8

9 Shunts

9

10 Test apparatus

10

Notice

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Universal measuring transducer with Ethernet interface

with HTTP, TCP/IP, Modbus-TCP protocol
with 11 bipolar configurable analog outputs
2 limit value or pulsed outputs

Type:
Multi-E11-MU



Application

The measuring transducer Multi-E11-MU is used for the simultaneous transformation and isolation of current, voltage, frequency, active and reactive power, apparent power and the power factor for sinusoidal quantities into 11 impressed direct current and direct voltage signals. The measurement is possible in alternating current systems and 3-wire or 4-wire three-phase power systems with same or any load.

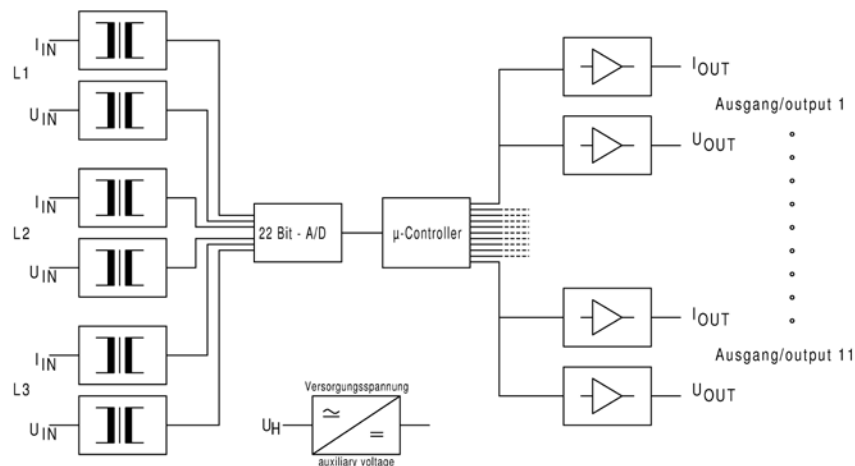
The 29 measurands may be displayed, stored and configured via a 10 Mbit/sec Ethernet LAN interface at the PC. Up to 13000 series of measured values may be stored in the internal memory of the measuring transducer. Furthermore, the measuring results may be displayed via web browser or be read and further processed via HTTP, TCP/IP or Modbus-TCP protocol. Two further outputs may be used as limit value or pulsed outputs. The switching status of the limit value or pulsed outputs is indicated by 2 LEDs.



Function

The parameters to be measured are sent to a 22 bit A/D converter with a sample rate of >20 kSPS via current and voltage transformers and are then further transmitted to a microcontroller which calculates the required values for the outputs from the measured parameters. The output values for current and voltage are rms-values. The frequency is calculated from the period of the voltage signal of phase L1. The active powers are calculated from the products of the samples of current and voltage of the three phases. The calculations of the reactive power of the three phases are done using the product of the samples of the currents and the 90° offset voltage signals. The apparent power is the sum of the products from the three rms-values of current and voltage.

The power factors are calculated from the apparent power values and the active power values. The output amplifiers supply impressed direct current and direct voltage signals. The output signals are galvanically isolated from the input signals and the auxiliary voltage, but linked to each other via a common ground wire. The outputs are no-load proof and short-circuit proof. The two limit value and pulsed outputs are galvanically isolated from all inputs and outputs and the auxiliary voltage. An auxiliary voltage is required.



Types and variants

Multi-E11-MU	incl. software download and LAN cable
Surcharge	Connection to hall-effect or flexible current transformers

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Technical data

Input	Input variables	Alternating current and voltage, frequency, active power, reactive power apparent power and power factor in alternating current systems, 4-wire and 3-wire 3-phase power systems with same and any load, unidirectional and bidirectional energy direction, configurable
	Rated current	2 A and 6 A
	Current range	0,3-10 A, configurable
	Rated voltage	100-750 V
	Voltage range	40-750 V, configurable
	Rated frequency	50 Hz
	Frequency range	40-80 Hz
	Energy consumption	per current path 0,06 VA with 1A, 0,3 VA with 5 A per voltage path 0,02 VA with 100V, 1 VA with 750 V
	Overload permanent	voltage max. 750 V, current max. 12 A
	High surge load	voltage 1000 V 1 s, current 240 A 1 s
Analog outputs	Output variables	double output
	Rated values current	0-10 mA, 0-20 mA, 4-20 mA, configurable
	Rated load current	< 500 Ω
	Rated values voltage	0-5 V, 0-10 V, 2-10 V, configurable
	Rated load voltage	> 750 Ω
	Polarity	4 x unipolar or bipolar, configurable, 7 x unipolar
Limit value and pulsed outputs	Type	Open collector, (NPN-Transistor)
	Operating voltage	5-24 V DC, max. 30 V DC
	Operating current	max. 40 mA
	Pulse length	ca. 40 ms
	Hysteresis	ca. 4 % of set limit value
	Accuracy	± 1 % of full scale
	Caution!	The valence of the pulses must be divided by the transmission ratio (K_N) of the current and voltage transformers used!
Transfer behavior	Accuracy	± 0,5 % (at power factor ± 0,5 % in the range >25 % of apparent power = U x I _{Nom} x 1,732 , with apparent power <25 % the accuracy is ± 1 %, below 10 % of apparent power, (power factor is not measured)
	Current influence	< 0,5 % with 0,15 to 2-fold rated current
	Frequency influence	< 0,3 % within frequency range
	Phase angle influence	< 0,5 % with ± 90°
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,2 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (up to 400 A/m)
	Residual ripple	< 100 mV _{ss}
	Response time	ca. 200 ms (power factor approx. 600 ms)
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	4 kV between output and auxiliary voltage, 5,2 kV between input to output and input to auxiliary voltage, 2 kV between limit value or pulsed output to output
	Caution!	The Ethernet LAN interface is galvanically connected to the outputs!
	Auxiliary voltage	Wide range power supply
Dimensions	Housing	Housing D (135 mm wide) Page A 1
Weight		850 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus

Calibration

The measuring transducer is factory-calibrated. The calibration should be renewed in the manufacturer's plant every two years

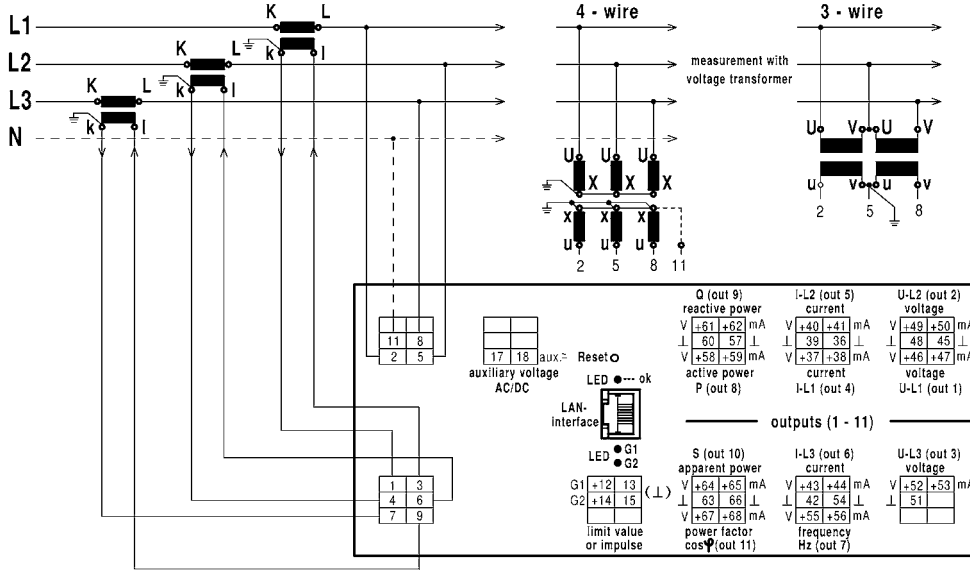
Configuration

The measuring transducer is configured in the factory if the required data are known. A re-configuration is possible at any time. This will require the related software (download from www.mueller-ziegler.de) and a PC. The measuring transducer and the PC must be connected to each other using a LAN cable (accessory).

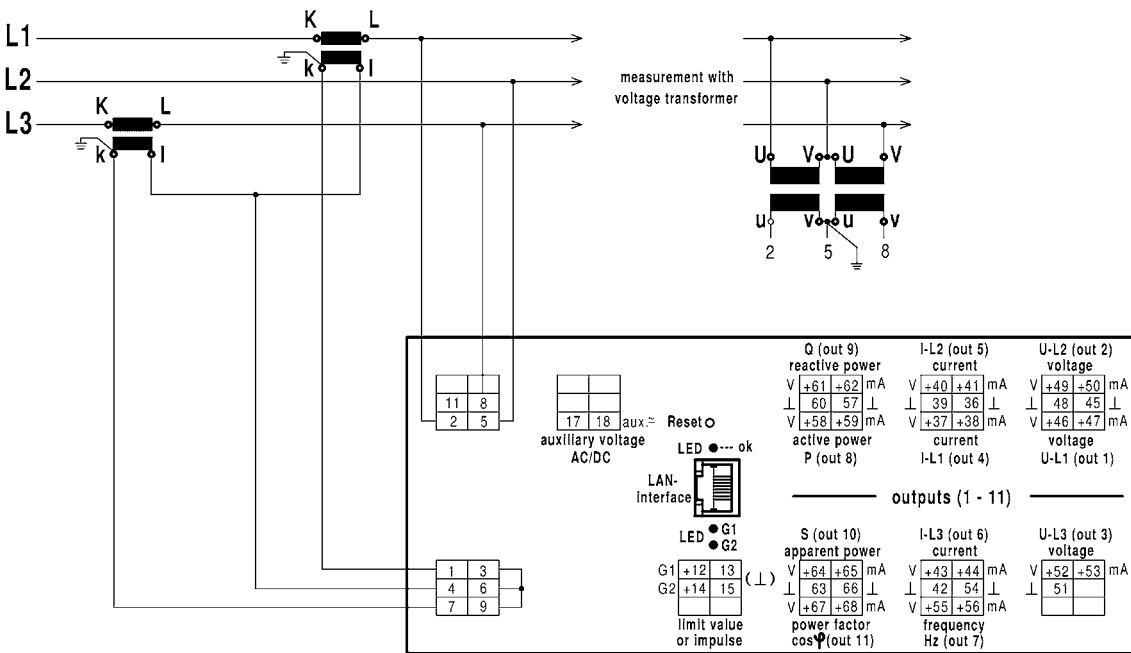
The auxiliary voltage must be connected to the measuring transducer. The various configuration options of the inputs and outputs are program-guided.

Connection

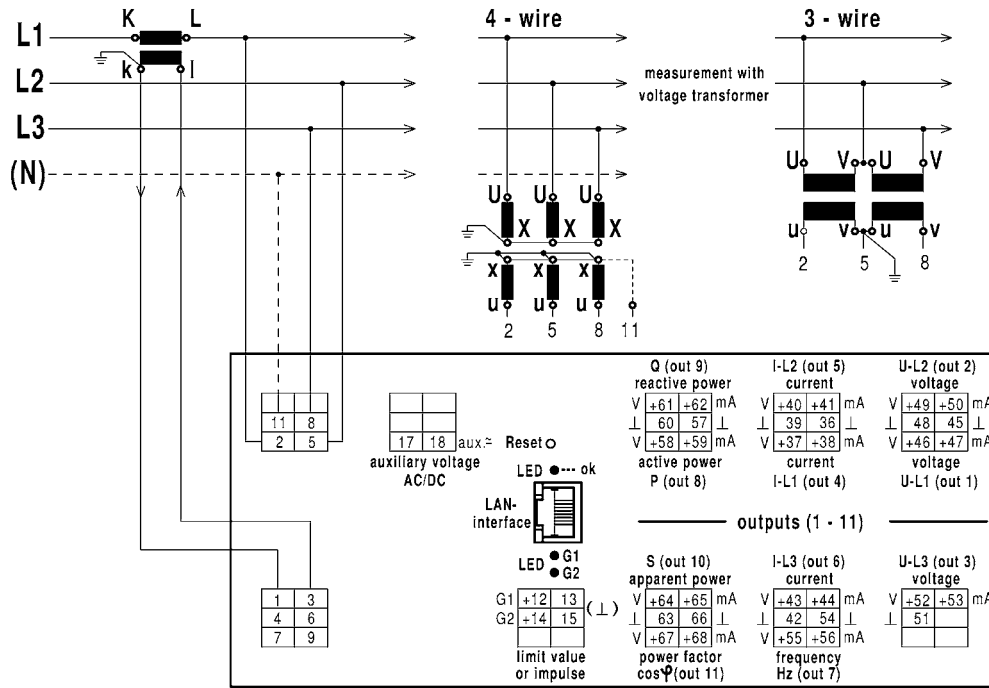
3-/ 4-wire 3-phase current, any load (inputs and outputs not used remain unconnected)



3-wire 3-phase current any load (inputs and outputs not used remain unconnected)



3- /4-wire 3-phase current same load (inputs and outputs not used remain unconnected)



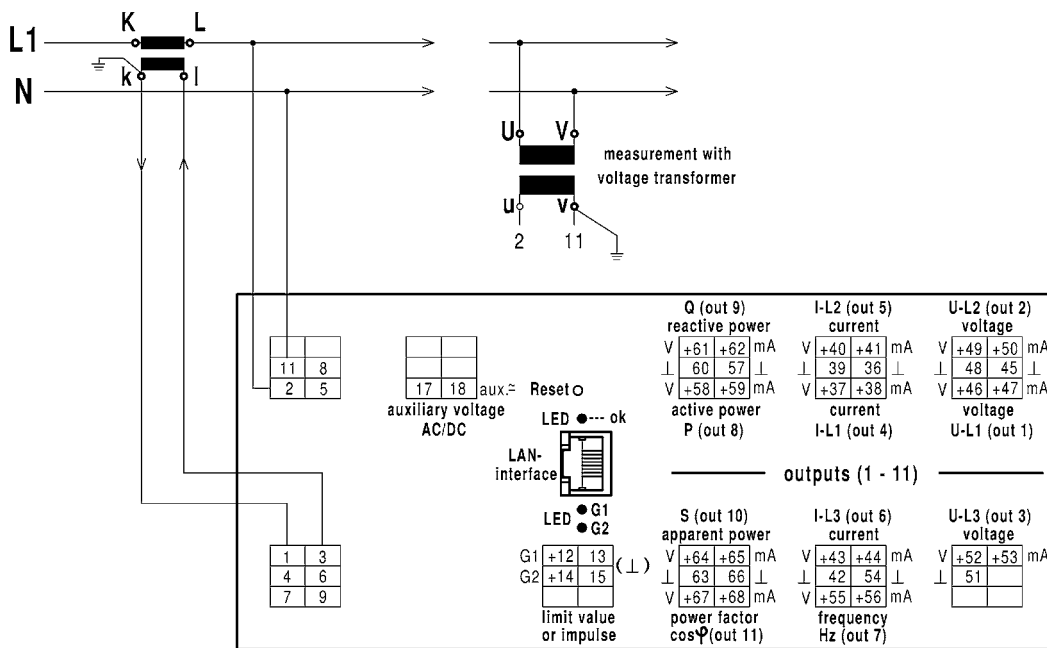
1 Measuring transducers

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3 Energy meters

4 Panel meters digital

Alternating current (inputs and outputs not used remain unconnected)



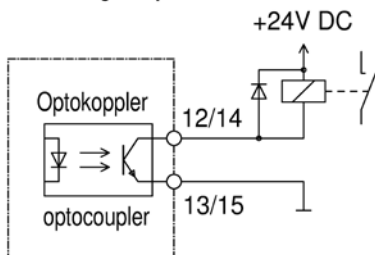
5 Panel meters analog

6 Meas. instruments for top hat rail mounting

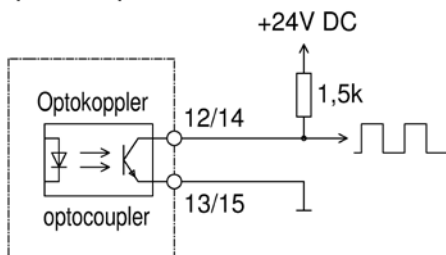
7 Universal measuring instruments

Limit value or pulsed output G1 and G2

Schaltausgang mit externem Relais
switching output with external relay



Impulsausgang mit Lastwiderstand
pulse output with load resistor



8 Current transformers

9 Shunts

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Universal measuring transducer with Ethernet interface

with HTTP, TCP/IP, Modbus-TCP protocol
2 limit value or pulsed outputs

Type:
Multi-E-MU



Application

The measuring transducer Multi-E-MU serves to measure current, voltage, frequency, active and reactive power, apparent power and the power factor in case of sinusoidal quantities. The measurement is possible in alternating current systems and 3-wire or 4-wire three-phase power systems with same or any load.

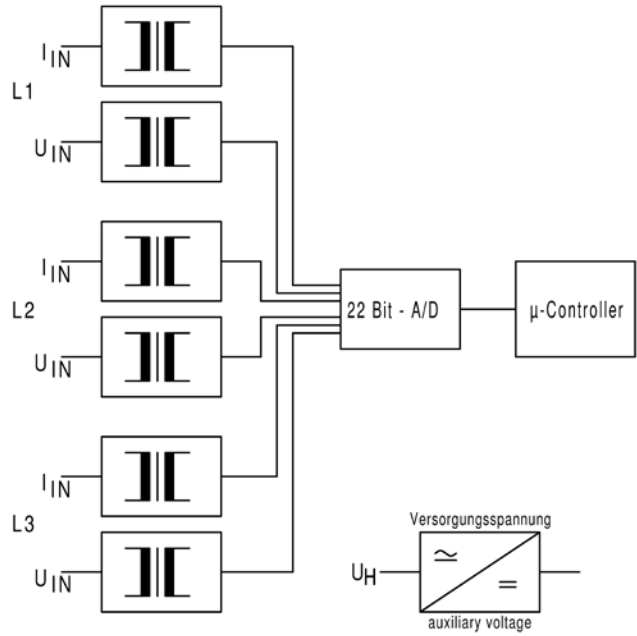
The 29 measurands may be displayed, stored and configured via a 10 Mbit/sec Ethernet LAN interface at the PC. Up to 13000 series of measured values may be stored in the internal memory of the measuring transducer. Furthermore, the measuring results may be displayed via web browser or be read and further processed via HTTP, TCP/IP or Modbus-TCP protocol. Two further outputs may be used as limit value or pulsed outputs. The switching status of the limit value or pulsed outputs is indicated by 2 LEDs.



Function

The parameters to be measured are transmitted to a 22 bit A/D converter with a sample rate of >20 kSPS via a current and voltage transformer. In a microcontroller, the required values for the outputs are calculated from the measured parameters. The output values for current and voltage are rms-values. The frequency is calculated from the period of the voltage signal of phase L1. The active powers are calculated from the products of the samples of current and voltage of the three phases. The calculations of the reactive power of the three phases are done using the product of the samples of the currents and the 90° offset voltage signals. The apparent power is the sum of the products from the three rms-values of current and voltage. The power factors are calculated from the apparent power values and the active power values.

The two limit value and pulsed outputs are galvanically isolated from all inputs and the auxiliary voltage. An auxiliary voltage is required.



Types and variants

Multi-E-MU	incl. software download and LAN cable
Surcharge	Connection to hall-effect or flexible current transformers



Technische Daten

Input	Input variables	Alternating current and voltage, frequency, active power, reactive power apparent power and power factor in alternating current systems, 4-wire and 3-wire 3-phase power systems with same and any load, unidirectional and bidirectional energy direction, configurable
	Rated current	2 A and 6 A
	Current range	0,3-10 A, configurable
	Rated voltage	100-750 V
	Voltage range	40-750 V, configurable
	Rated frequency	50 Hz
	Frequency range	40-80 Hz
	Energy consumption	per current path 0,06 VA with 1A, 0,3 VA with 5 A per voltage path 0,02 VA with 100V, 1 VA with 750 V
	Overload permanent	voltage max. 750 V, current max. 12 A
	High surge load	voltage 1000 V 1 s, current 240 A 1 s
Limit value and pulsed outputs	Type	Open collector, (NPN-Transistor)
	Operating voltage	5-24 V DC, max. 30 V DC
	Operating current	max. 40 mA
	Pulse length	ca. 40 ms
	Hysteresis	ca. 4 % of set limit value
	Accuracy	± 1 % of full scale
	Caution!	The valence of the pulses must be divided by the transmission ratio (K_N) of the current and voltage transformers used!
Transfer behavior	Accuracy	± 0,5 % (at power factor ± 0,5 % in the range >25 % of apparent power = U x I _{Nom} x 1,732 , with apparent power <25 % the accuracy is ± 1 %, below 10 % of apparent power, (power factor is not measured)
	Current influence	< 0,5 % with 0,15 to 2-fold rated current
	Frequency influence	< 0,3 % within frequency range
	Phase angle influence	< 0,5 % with ± 90°
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,2 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (up to 400 A/m)
	Test voltage	5,2 kV between input to auxiliary voltage 5,2 kV between input to interface, 2 kV between limit value or pulsed output and interface
Auxiliary voltage	Wide range power supply	10-30 V AC + DC, 5 VA or 60-265 V AC + DC, 5 VA (please specify at order)
Dimensions	Housing	Housing E (67,5 mm wide) Page A 1
Weight		500 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²
Calibration	The measuring transducer is factory-calibrated. The calibration should be renewed in the manufacturer's plant every two years	
Configuration	The measuring transducer is configured in the factory if the required data are known. A reconfiguration is possible at any time. This will require the related software (download from www.mueller-ziegler.de) and a PC. The measuring transducer and the PC must be connected to each other using a LAN cable (accessory). The auxiliary voltage must be connected to the measuring transducer. The various configuration options of the inputs and outputs are program-guided.	

1 Measuring transducers

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3 Energy meters

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7 Universal measuring instruments

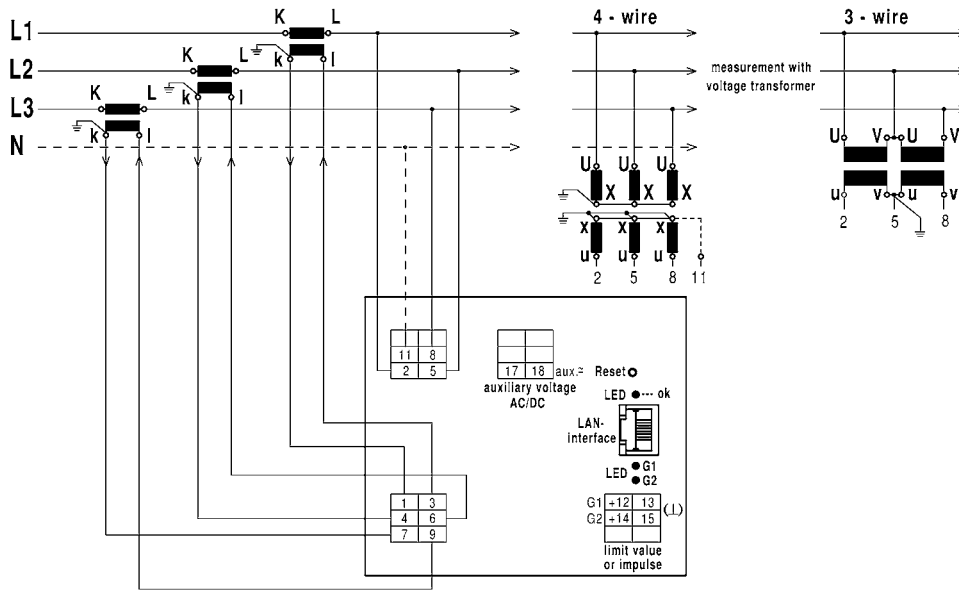
8 Current transformers

9 Shunts

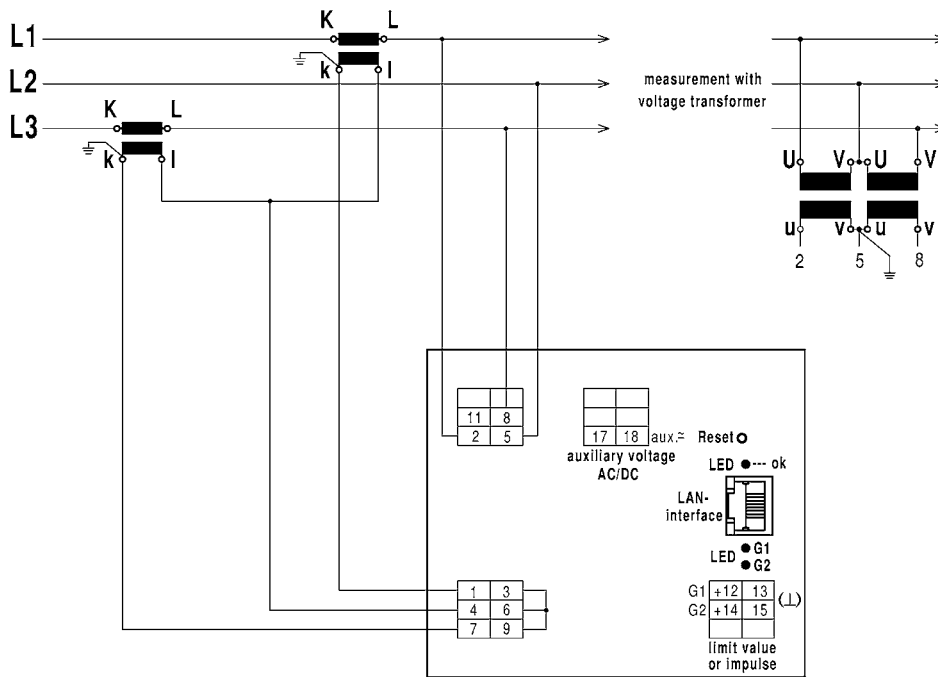
10 Test apparatus

Connection

3-/ 4-wire 3-phase current, any load (inputs and outputs not used remain unconnected)



3-wire 3-phase current any load (inputs and outputs not used remain unconnected)



1 Measuring transducers

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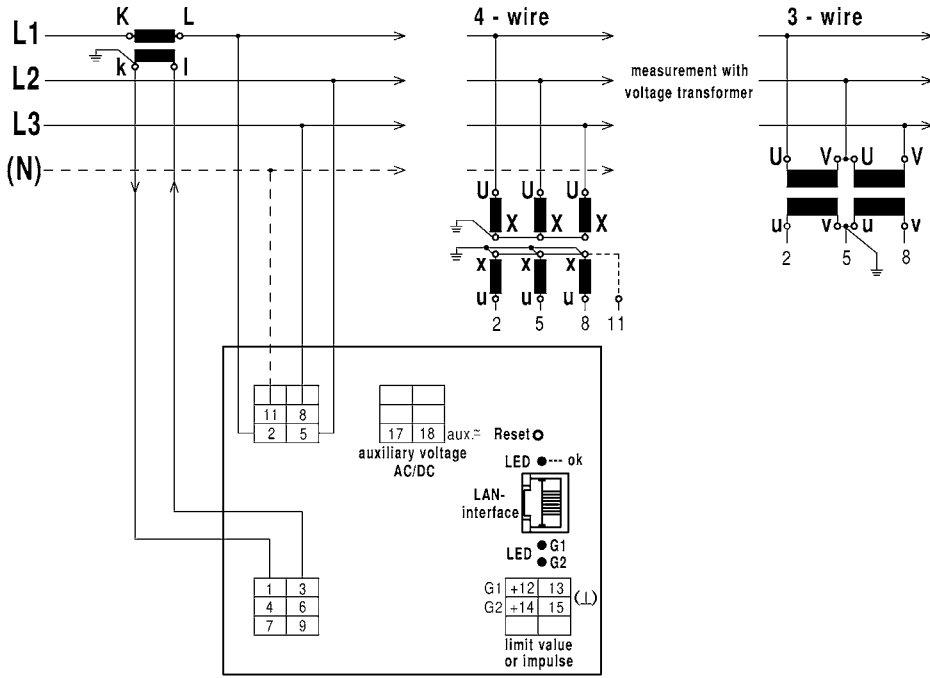
7 Universal measuring instruments

8 Current transformers

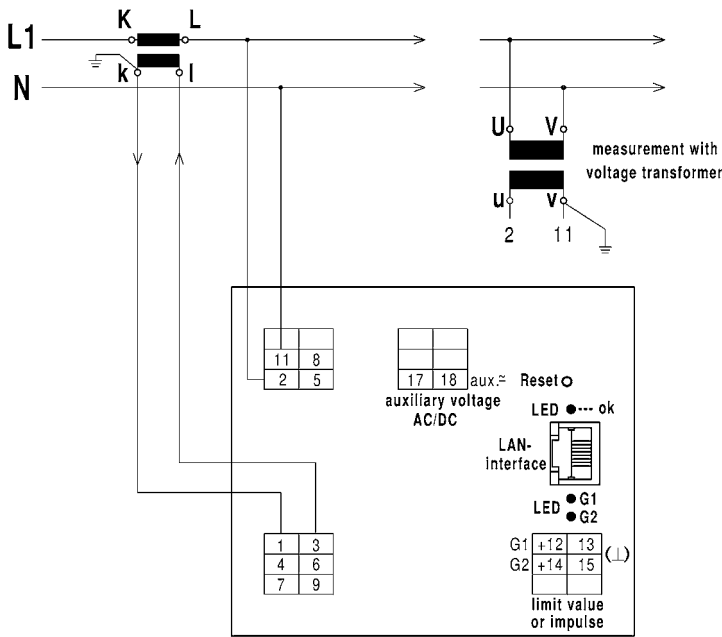
9 Shunts

10 Test apparatus

3- /4-wire 3-phase current same load (inputs and outputs not used remain unconnected)

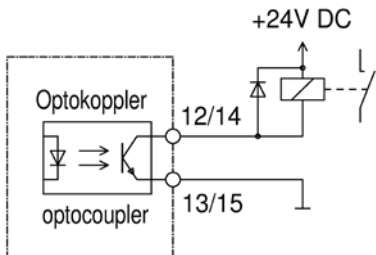


Alternating current (inputs and outputs not used remain unconnected)

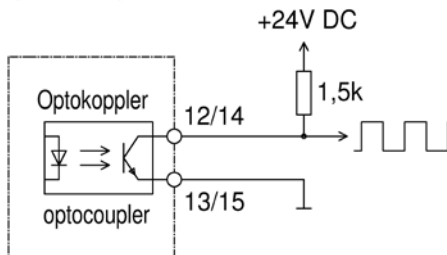


Limit value or pulsed output G1 and G2

Schaltausgang mit externem Relais
switching output with external relay



Impulsausgang mit Lastwiderstand
pulse output with load resistor



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Measuring transducer for direct current power

Type:
PGs-MU



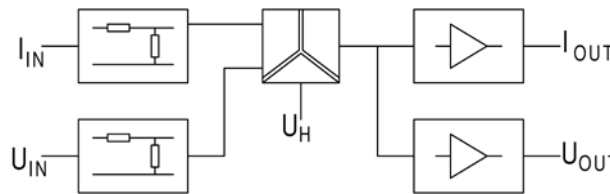
Application

The measuring transducer PGs-MU is used for the transformation and isolation of a DC power into an impressed direct current and direct voltage signal. The calibrated double outputs are switchable between 0-20 mA and 0-10 V or 4-20 mA and 2-10 V.



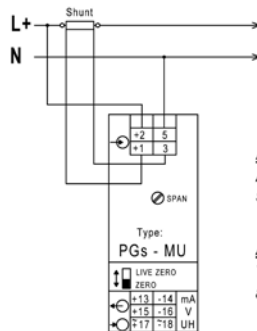
Function

The parameters to be measured are transmitted to the analog multiplier via internal voltage dividers or shunts. The instantaneous values are then multiplied and formed as the mean value of a direct voltage matching the active power in a subsequent integration stage. The galvanic isolation between input and output signals is done using optocoupler. A downstream amplifier supplies the impressed direct current and direct voltage signals. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required.

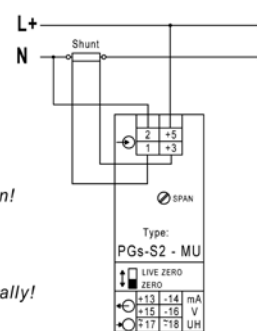


Connection

Strommessung mit Shunt in Plusleitung
current measurement with shunt in plus line



Strommessung mit Shunt in Minusleitung
current measurement with shunt in minus line



Achtung:
Anschlüsse 1 u. 2 sind intern verbunden!

Attention:
Terminals 1 and 2 are connected internally!



Types and variants

Input	50-150 % of the power, voltage: a value of 10-600 V current: shunt ... A/60 mV (please specify current!)
Output	0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V switchable on front side
Surcharges	Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



Technical data

Input	Input variables	direct current power (DC power)
	Nominal power	50-150 % of the DC power $P = U \times I$
	Rated current	via separate shunt with 0-60 mV, $R_i \geq 10 \text{ M}\Omega$
	Rated voltage	a value from 0-10 V to 0-600 V $R_i \geq 4 \text{ k}\Omega / \text{V}$
	Overload permanent	current input (shunt) 1,2-fold voltage input 5-fold / max. 830 V
Output	High surge load	current input 5-fold 5 s
	Output variables	double output
Transfer behavior	Rated values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA, switchable on front side
	Accuracy	$\pm 0,5 \%$
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,3 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 30 mVss
	Response time	< 300 ms
	Open circuit voltage	max. 24 V
Auxiliary voltage	Current limiting	max. 2-fold in case of overload
	Test voltage	4 kV between input, output, auxiliary voltage
	Options	230 V AC $\pm 20 \%$, 45-65 Hz, 2,5 VA <ul style="list-style-type: none"> ● 110 V AC $\pm 20 \%$, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) page A1
Weight		190 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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Measuring transducer for direct current power installations up to 1000 V (CAT III)

Type: **PGsT-MU**



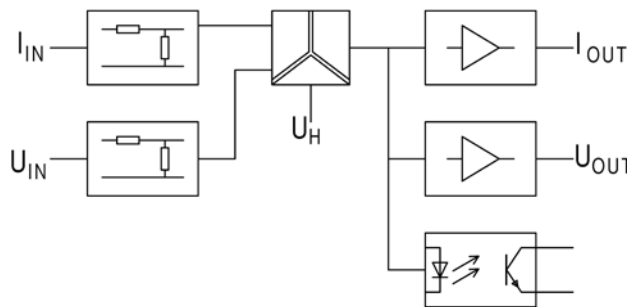
Application

The measuring transducer PGsT-MU is used for the transformation and isolation of a DC power into an impressed direct current and direct voltage signal. An integrated limit monitoring serves for monitoring the input signal.

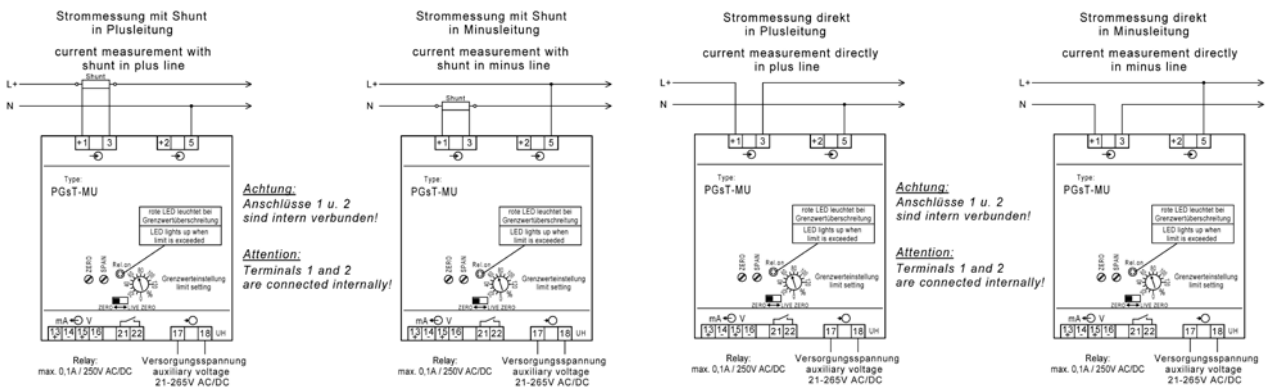


Function

The parameters to be measured are transmitted to the microcontroller via internal voltage dividers or shunts. The instantaneous values are then multiplied and formed as the mean value of a direct voltage matching the DC power in a subsequent integration stage. The galvanic isolation is realized using an optocoupler. An downstream amplifier supplies the impressed direct current and direct voltage signals. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. The limit value may be adjusted within a range of 0-120 % of the input signal. An auxiliary voltage is required.



Connection



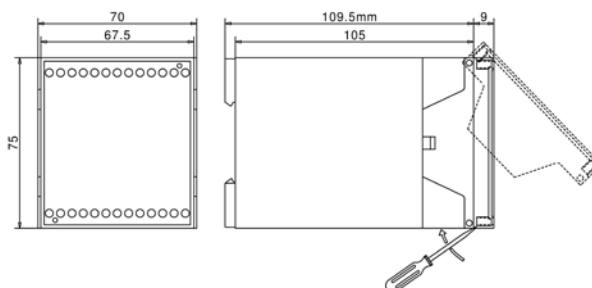
Types and variants

Input	50-150 % of the DC power $P = U \times I$ Voltage: a value of 0-1000 V or 0-1500 V (other values on request) Current: shunt ... A/60 mA (please specify current!) or direct measurement 0-5 A
Output	0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V switchable on front side
Surcharge	Bidirectional energy directions Note: There is no limit value monitoring with bidirectional energy direction!



Technical data

Input	Input variables	DC power, pulsed DC power (e.g. PWM) within a range of 20 Hz-30 kHz
	Nominal power	50-150 % of the DC power $P = U \times I$
	Rated current	via separate shunt with 0-60 mV, $R_i \geq 10 \text{ M}\Omega$ or direct measurement 0-5 A
	Rated voltage	a value of 0-1000 V or 0-1500 V (other values on request) $R_i \geq 2 \text{ M}\Omega$
	Overload permanent	current input (shunt) 1,2-fold
	High surge load	current input 5-fold 5 s
Output	Output variables	double output
	Rated values	0-20 mA/0-500 Ω load and 0-10 V max. load 10 mA as well as 4-20 mA/0-500 Ω load and 2-10 V max. load 10 mA switchable at front side <ul style="list-style-type: none"> ● bipolar output (e.g. -20 mA - 0 - +20 mA and -10 V - 0 - +10 V, without limit monitoring) ● zero point rise (e.g. 0-10-20 mA and 0-5-10 V)
	Limit value output	● NO contact, Hysteresis approx. 4 % of limit value, contact load max. 0,1 A AC/DC, 250 V AC/DC
	Function indicator	red LED if limit value is exceeded
	Transfer behavior	Accuracy $\pm 0,5 \%$ Temperature range -15 °C to +20 °C to +30 °C to +55 °C Temperature influence < 0,3 % at 10 K Auxiliary voltage influence no Load influence no External magnetic field influence no (400 A/m) Residual ripple < 50 mVss Response time < 300 ms Open circuit voltage max. 24 V Current limiting max. 2-fold in case of overload Test voltage 7,4 kV between input to output, input to auxiliary voltage and input to relay contact 4 kV between output to auxiliary voltage and to relay contacts
Standards	EMC	DIN EN 61326
	Mechanical strength	DIN EN 61010 part 1
	Electrical safety	DIN EN 61010 part 1 Housing insulated, protection class II, for working voltages up to 1000V (phase to neutral) pollution level 2, measuring category CAT III
	Accuracy, overload	DIN EN 60688
	Isolation	DIN EN 61010 part 1, 3,52 kV 50 Hz 10 s and 7,4 kV 50 Hz 10 s
	Air and creep distances	DIN EN 61010 part 1
	IP code	DIN EN 60529 housing IP30, terminals IP20
	Connection	DIN 43807
	Auxiliary voltage	21-265 VAC+DC, 2 VA
	Weight	220 g
Dimensions		



Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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5 Panel meters analog

6 Meas. instruments for top hat rail mounting

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8 Current transformers

9 Shunts

10 Test apparatus



Measuring transducers for direct current and direct voltage

Type:
IgT-MU, UgT-MU



Application

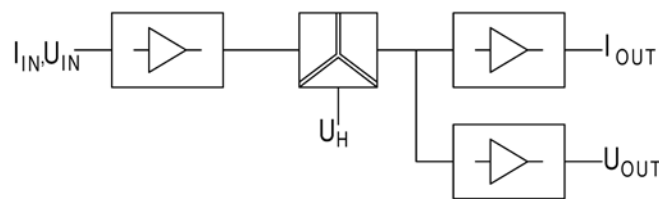
The measuring transducers IgT-MU and UgT-MU are used for the transformation and isolation of a direct current or a direct voltage into an impressed direct current and direct voltage signal. The calibrated double outputs are switchable between 0-20 mA and 0-10 V or 4-20 mA and 2-10 V.



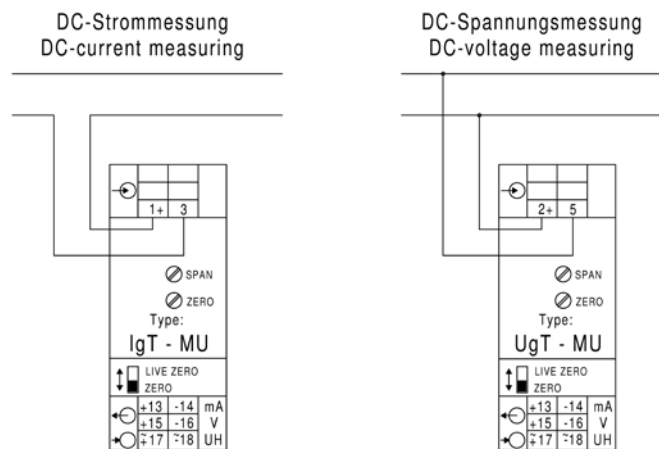
Function

The measurand is transmitted to the amplifier or impedance converter via an input protective circuit. The direct voltage generated there is transformed into an impressed direct current and in an impressed direct voltage. The galvanic isolation is realized using an optocoupler. Both outputs are no-load proof and short-circuit proof.

Connecting the two outputs is not permissible. An auxiliary voltage is required.



Connection



Types and variants

Input	IgT-MU	a value from 0-100 μ A to 0-5 A
	UgT-MU	a value from 0-5 mV to 0-600 V
Output	0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V switchable on front side	
Surcharges	Input directly up to 10 A for Type IgT-MU	
	Sub-range	
	Response time < 200 μ s	
	Input 4-20 mA	
	Both polarities	(e.g. input -20-0-20 mA, output 20-0-20 mA or e.g. input 20-0-20 mA, output 0-10-20 mA)
	Class 0,2	
	Auxiliary voltage other than 230 V AC:	
	24 V DC	
	6-30 V AC + DC	
	36-265 V AC + DC	
	110 V AC	
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)	
Relay module	for limit monitoring Type GWM - (description page 11)	



Technical data

Input	Input variables	direct current or direct voltage
	Rated values	IgT-MU a value from 0-100 µA to 0-5 A, voltage drop 60 mV UgT-MU a value from 0-5 mV to 0-600 V Ri = 100 k Ω up to 1 V, > 1 V 100 k Ω / V, but max. 2 M Ω
	Option	● transmission of both polarities
	Overload permanent	current: 2-fold voltage: 5-fold / max. 830 V
	High surge load	current: 20-fold, 1 s
Output	Output variables	double output
	Rated values	0-20 mA/ 500 Ω load and 0-10 V max. load 10 mA as well as 4-20 mA/ 500 Ω load and 2-10V max. load 10 mA, switchable at front side
	Options	● bipolar output e.g. - 20 - 0 - + 20 mA / 500 Ω load and, - 10 - 0 - + 10 V / max. load 10 mA ● zero point rise e.g. 0-10-20 mA / 500 Ω load and 0-5-10 V / max. load 10 mA
Transfer behavior	Accuracy	± 0,5 %
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,1 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 15 mVss
	Response time	< 300 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	< 500 V: 4 kV between input, output, auxiliary voltage > 500 V: 5,2 kV between input and output 4 kV input / output to auxiliary voltage
	Auxiliary voltage	
Options		● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) page A1
Weight		170 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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7 Universal measuring instruments

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9 Shunts

10 Test apparatus



Measuring transducers for direct current and direct voltage for installations up to 1000 V (CAT III)

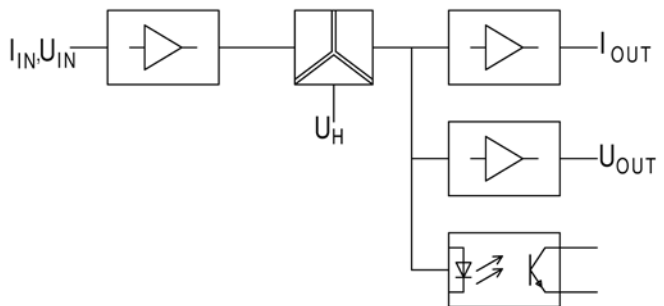
Type:
IgTT-MU / UgTT-MU

Application

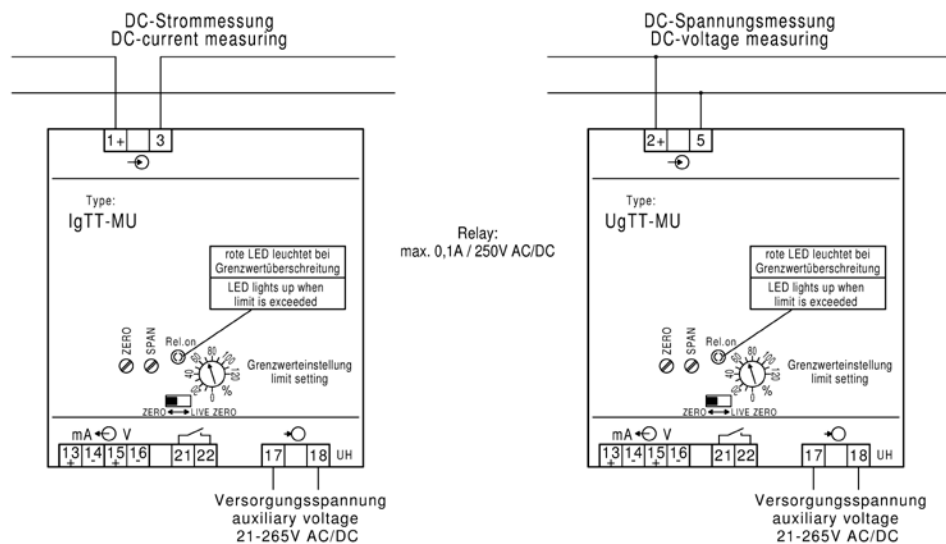
The measuring transducers IgTT-MU and UgTT-MU are used for the transformation and isolation of a direct current or a direct voltage into an impressed direct current and direct voltage signal. An integrated limit monitoring serves for monitoring the input signal.

Function

The measurand is transmitted to the amplifier or impedance converter via an input protective circuit. The direct voltage generated there is transformed into an impressed direct current and in an impressed direct voltage. The galvanic isolation is realized using an optocoupler. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. The limit value may be adjusted within a range of 0-120 % of the input signal. Exceeding the limit value is indicated by an LED. An auxiliary voltage is required.



Connection



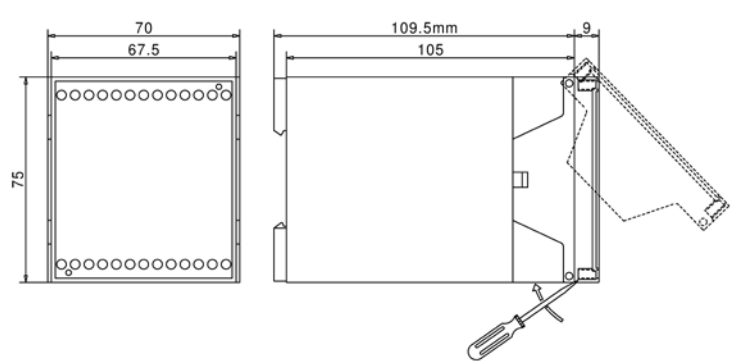
Types and variants

Input	IgTT-MU	a value from 0-100 μ A to 0-5 A
	UgTT-MU	a value of 0-1500 V (other values on request)
Ouput		0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V switchable on front side
Surcharges	Both polarities	(e.g. input -20-0-20 mA, output 20-0-20 mA or e.g. input 20-0-20 mA, output 0-10-20 mA)



Technical data

Input	Input variables	direct current of direct voltage	
	Rated values	I _{gTT-MU} a value from 0-100 µA to 0-5 A, voltage drop 60 mV U _{gTT-MU} a value of 0-1500V, R _i = 2 MΩ	
	Option	● Transmission of both polarities (no limit value monitoring!)	
	Overload permanent	for current 2-fold, for voltage 5-fold / max. 2000 V	
	High surge load	for current 20-fold 1 s	
Output	Output variables	double output	
	Rated values	0-20 mA/0-500 Ω load and 0-10 V max. load 10 mA as well as 4-20 mA/0-500 Ω load and 2-10 V max. load 10 mA, switchable on front side	
	Limit value output	1 NO contact, Hysteresis approx. 4 % of limit value, contact load max. 0,1 A AC/DC, 250 V AC/DC	
	Function indicator	red LED if limit value is exceeded	
Transfer behavior	Accuracy	± 0,5 %	
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C	
	Temperature influence	< 0,2 % at 10 K	
	Auxiliary voltage influence	no	
	Load influence	no	
	External magnetic field influence	no (400 A/m)	
	Residual ripple	< 50 mV _{ss}	
	Response time	< 300 ms	
	Open circuit voltage	max. 24 V	
	Current limiting	max. 2-fold in case of overload	
	Test voltage		7,4 kV between input to output, input to auxiliary voltage and input to relay contacts
			4 kV between output to auxiliary voltage and relay contacts
	Standards	EMC	DIN EN 61326
Mechanical strength		DIN EN 61010 part 1	
Electrical safety		DIN EN 61010 part 1	
		housing insulated, protection class II, for working voltages up to 1000V (phase to neutral)	
		pollution level 2, measuring category CAT III	
Accuracy, overload		DIN EN 60688	
Isolation		DIN EN 61010 part 1, 3,52 kV 50 Hz 10 s and 7,4 kV 50 Hz 10 s	
Air and creep distances		DIN EN 61010 part 1	
IP code		DIN EN 60529 housing IP30, terminals IP20	
Connection		DIN 43807	
Auxiliary voltage	21-265 VAC+DC, 2 VA		
Weight	220 g		
Dimensions			



Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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Measuring transducer for standard signals

with selectable calibrated inputs and outputs

Type:
NgT-MU



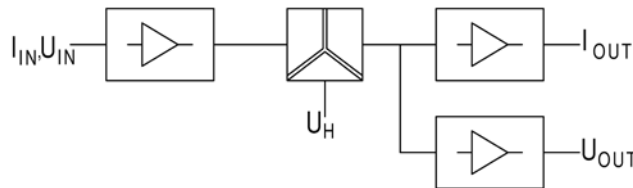
Application

The measuring transducer NgT-MU is used for the transformation and isolation of a direct current or direct voltage standard signal into an impressed direct current and direct voltage signal. The calibrated inputs are selectable between the standard signals 0-20 mA, 4-20 mA, 0-10 V or 2-10 V. The calibrated double outputs are switchable between 0-20 mA and 0-10 V, 4-20 mA and 2-10 V, 0-10 mA and 0-5 V or 2-10 mA and 1-5 V.



Function

The measurand is transmitted to the amplifier or impedance converter via an input protective circuit. The direct voltage generated there is transformed into an impressed direct current and in an impressed direct voltage. The galvanic isolation is realized using an optocoupler. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required.



Connection

2+	5-	V
1+	3-	mA
INPUT		
4-20mA or 2-10V		
0-20mA or 0-10V		
Type: NgT - MU		
OUTPUT		
10mA / 5V		
20mA / 10V		
LIVE ZERO		
ZERO		
+13	-14	mA
+15	-16	V
+17	-18	UH

Normsignaleingänge Inputs for standard signals

- 1+ / 3- = 0-20mA
- 1+ / 3- = 4-20mA
- 2+ / 5- = 0-10V
- 2+ / 5- = 2-10V



Types and variants

Input	0-20 mA, 4-20 mA, 0-10 V and 2-10 V
Output	0-20 mA and 0-10 V, 4-20 mA and 2-10 V, 0-10 mA and 0-5 V as well as 2-10 mA and 1-5 V switchable on front side
Surcharges	Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



Technical data

Input	Input variables	direct current or direct voltage
	Rated values	0-20 mA, 4-20 mA, Ri = 100 Ω, 0-10 V, 2-10 V, Ri = 50 k Ω
	Overload permanent	current: 2-fold voltage: 5-fold
	High surge load	current: 20-fold, 1 s voltage: 5-fold
Output	Output variables	double output
	Rated values	0-20 mA/ 500 Ω load and 0-10 V max. load 10 mA as well as 4-20 mA/ 500 Ω load and 2-10V max. load 10 mA, switchable on front side or 0-10 mA / 500 Ω load and 0-5 V / max. load 10 mA as well as 2-10 mA / 500 Ω load and 1-5 V / max. load 10 mA switchable on front side
Transfer behavior	Accuracy	± 0,5 %
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,1 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 15 mVss
	Response time	< 30 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	4 kV between input, output, auxiliary voltage
Auxiliary voltage		230 V AC ± 20 %, 45-65 Hz, 2,5 VA
	Options	<ul style="list-style-type: none"> ● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) page A1
Weight		180 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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5 Panel meters analog

6 Meas. instruments for top hat rail mounting

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Measuring transducer for standard signals

Type:
NoH-MU



Application

The measuring transducers NoH-MU are used for the galvanic isolation of one, two or three direct current standard signals. The standard signal may lie within a range of 0-20 mA.

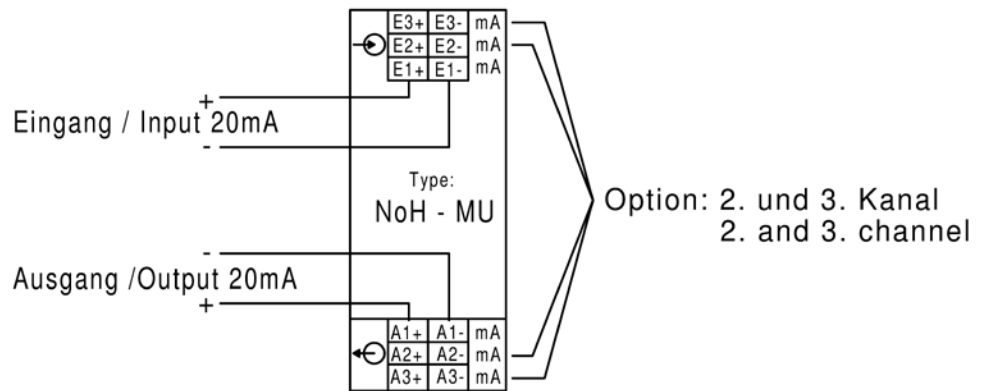


Function

The input current to be measured is transformed into a frequency signal and transmitted to the output side via a transformer after galvanic isolation. At the output side, the frequency signal is retransformed into a direct current. The auxiliary energy required for transformation and transmission is generated from the input signal. Therefore, the input resistance of the measuring transducer depends on the input current and the load connected to the output.



Connection



Types and variants

NoH-MU	1 transmission channel
NoH-MU	2 transmission channels
NoH-MU	3 transmission channels



Technical data

Input	Input variables	direct current	
	Rated values	0-20 mA	
	Max. input voltage	16 V	
	Energy consumption	2,7 V for 20 mA	
	Overload permanent	2-fold	
	High surge load	20-fold, 1 s	
Output	Output variables	impressed direct current (1, 2 or 3 outputs)	
	Rated output current	0-20 mA / 500 Ω load	
Transfer behavior	Accuracy	± 0,2 %	
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C	
	Temperature influence	< 0,2 % at 10 K	
	Load influence	≤ 0,1 % with 500 Ω load	
	External magnetic field influence	no (400 A/m)	
	Residual ripple	< 30 mVss	
	Response time	< 20 ms with 500 Ω load	
	Open circuit voltage	max. 24 V	
	Current limiting	max. 2-fold in case of overload	
	Test voltage		0,5 kV between input and output
			4 kV between the transmission channels
		Caution!	The NoH-MU is not suited for power grid applications!
Dimensions	Housing	Housing A, (22,5 mm wide) page A1	
Weight		120 g	
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715	
	Electrical connection	Screw terminal max. 4 mm ²	

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Measuring transducer for temperature

(resistance thermometer)

Type:
Pt-MU



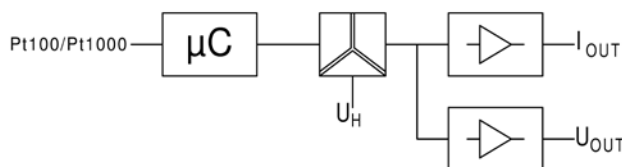
Application

The measuring transducer Pt-MU is used for the transformation and isolation of a change in resistance due to the temperature into an impressed direct current and direct voltage signal. The calibrated double outputs are switchable between 0-20 mA and 0-10 V or 4-20 mA and 2-10 V.

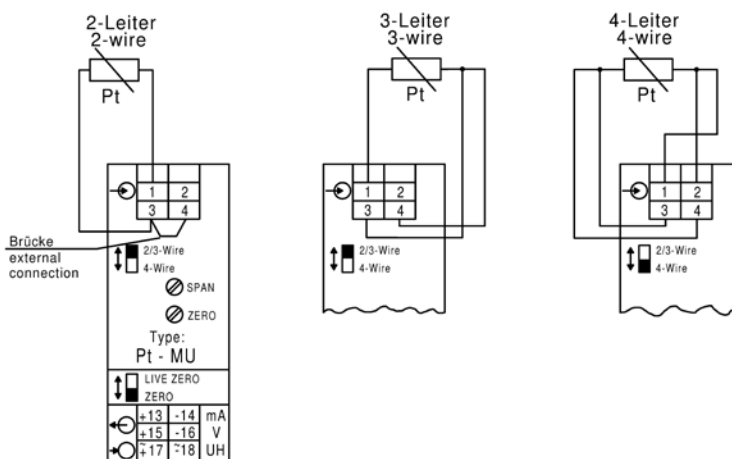


Function

The resistance thermometer Pt 100 is a resistance depending on the temperature. A constant measurement current flows via the resistance thermometer to a sensor resistor which is part of a bridge circuit. The direct voltage generated there is linearized and amplified. It is then transformed into an impressed direct current and in an impressed direct voltage in a subsequent circuit. The galvanic isolation is realized using an optocoupler. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required.



Connection



Types and variants

Input	arbitrary temperature range between -200 ... +850 °C (please specify when ordering, minimum range 40K)
Output	0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V switchable on front side
Surcharges	for Pt 1000 sensor Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



Technical data

Input	Input variables	resistance Pt 100
	Option	● resistance Pt 1000
	Rated values	-200 ... +850 °C, arbitrary temperature range (please specify when ordering, minimum range 40K), other values on request the constant current through the sensor is max. 1 mA
	Circuit type	two-wire, three-wire or four-wire circuit
Output	Input lead	two-wire: adjustment 0-10 Ω, using an installed spindle poti three-wire: no adjustment necessary, max. 100 Ω symmetrical four-wire: no adjustment necessary
	Output variables	double output
Transfer behavior	Rated output values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA switchable on front side
	Accuracy	± 0,5 %
Auxiliary voltage	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,2 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 30 mVss
	Response time	< 300 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	4 kV between input, output, auxiliary voltage
Dimensions	Options	230 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
	Housing	Housing A, (22,5 mm wide) page A1
	Weight	150 g
	Installation	Fastening: Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715 Electrical connection: Screw terminal max. 4 mm ²

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Measuring transducer for temperature

(thermocouple, according to DIN EN 60 584)

Type:
Th-MU



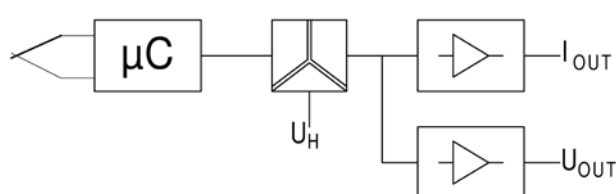
Application

The measuring transducer Th-MU is used for the transformation and isolation of a temperature-dependent voltage of a thermocouple into an impressed direct current and direct voltage signal. The calibrated double outputs are switchable between 0-20 mA and 0-10 V or 4-20 mA and 2-10 V.

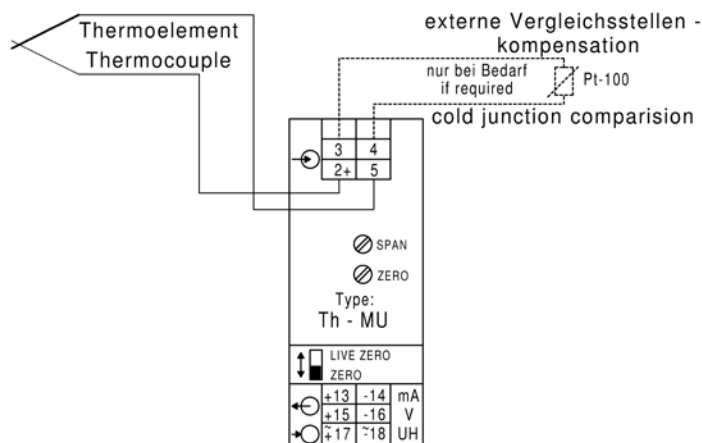


Function

The thermocouple constitutes a voltage source depending on the temperature. This voltage is supplied to an amplifier with integrated cold junction compensation. Following the linearization, the voltage is transformed into an impressed direct current and in an impressed direct voltage. The galvanic isolation is realized using an optocoupler. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required.



Connection



Types and variants

Input	Thermocouple (DIN EN 60584-1) J, K, N, B, E, R, T or S, arbitrary temperature range (please specify when ordering, minimum range 200K)
Output	0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V switchable on front side
Surcharges	Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



Technical data

Input	Rated values	Type J (DIN EN 60584-1) -210 ... +1200 °C, arbitrary temperature range Type K (DIN EN 60584-1) -270 ... +1372 °C, arbitrary temperature range Type N (DIN EN 60584-1) -270 ... +1300 °C, arbitrary temperature range Type B (DIN EN 60584-1) +100 ... +1820 °C, arbitrary temperature range Type E (DIN EN 60584-1) -270 ... +1000 °C, arbitrary temperature range Type R (DIN EN 60584-1) -50 ... +1768 °C, arbitrary temperature range Type T (DIN EN 60584-1) -270 ... +400 °C, arbitrary temperature range Type S (DIN EN 60584-1) -50 ... +1768 °C, arbitrary temperature range (please specify when ordering, minimum range 200K)	
	Input wire	no adjustment necessary	
	Cold junction	0-80 °C	
	Measuring circuit interruption	max. 2-fold output current	
Output	Output variables	double output	
	Rated output values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA switchable on front side	
Transfer behavior	Accuracy	± 0,5 %	
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C	
	Temperature influence	< 0,2 % at 10 K	
	Auxiliary voltage influence	no	
	Load influence	no	
	External magnetic field influence	no (400 A/m)	
	Residual ripple	< 30 mVss	
	Response time	< 300 ms	
	Open circuit voltage	max. 24 V	
Auxiliary voltage	Current limiting	max. 2-fold in case of overload	
	Test voltage	4 kV between input, output, auxiliary voltage	
	Auxiliary voltage	230 V AC ± 20 %, 45-65 Hz, 2,5 VA	
Options	Options	<ul style="list-style-type: none"> ● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA 	
	Dimensions	Housing	Housing A, (22,5 mm wide) page A1
	Weight		170 g
	Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
Electrical connection		Screw terminal max. 4 mm ²	

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Measuring transducers for potentiometers and resistors

Type:
W-MU



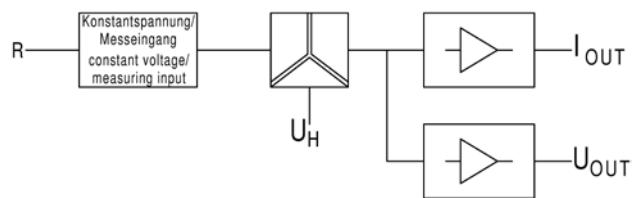
Application

The measuring transducer W-MU is used for the transformation and isolation of a change in resistance into an impressed direct current and direct voltage signal. The calibrated double outputs are switchable between 0-20 mA and 0-10 V or 4-20 mA and 2-10 V.

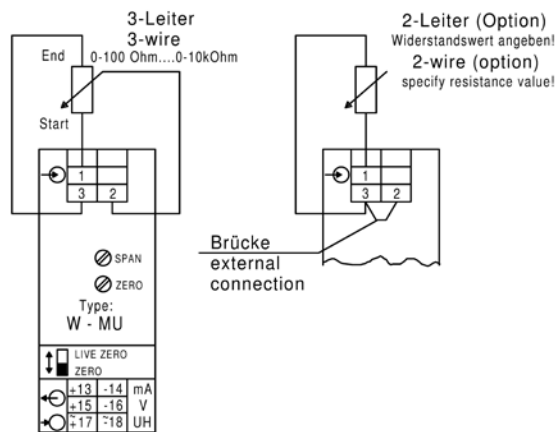


Function

A constant measuring voltage is applied to the potentiometer in case of 3-wire circuits. The measuring signal generated via the center tap is amplified and transformed into an impressed direct current or in an impressed direct voltage. In case of the 2-wire circuit, the measuring signal is generated using a constant current. The galvanic isolation is realized using an optocoupler. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required.



Connection



Types and variants

Input	3-wire conductor: 0-100 Ω to 0-10 k Ω
Output	0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V switchable on front side
Surcharges	2-wire conductor: please specify resistance value Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



Technical data

Input	Input variables	Resistance
	Rated values	3-wire: arbitrary value from 0-100 Ω to 0-10 k Ω 2-wire: 0-100 Ω, 0-500 Ω, 0-1000 Ω, other values on request
Output	Output variables	double output
	Rated values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA switchable on front side
Transfer behavior	Accuracy	± 0,5 %
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,2 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 30 mVss
	Response time	< 300 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
Auxiliary voltage	Test voltage	4 kV between input, output, auxiliary voltage
	Options	230 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) page A1
Weight		170 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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Measuring transducers for process parameters

parameterizable using USB

Type:
TSM-MU



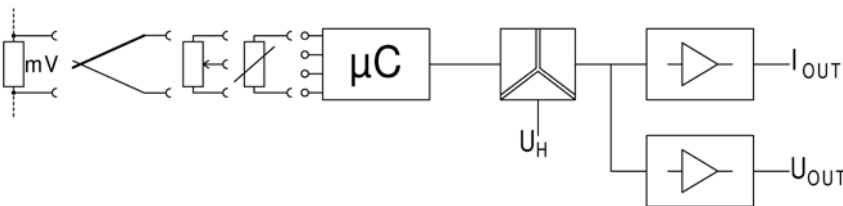
Application

The measuring transducer TSM-MU is used for the transformation and isolation of measurements at thermocouples, resistance thermometers, resistors, potentiometers and voltage measurement (e.g. shunt). In case of measurements at resistors (e.g. Pt100), the connection (2-, 3- or 4-wire connection) is automatically recognized when starting the instrument. Via an USB interface, the measuring transducer may be parameterized. The corresponding software may be downloaded under www.mueller-ziegler.com.

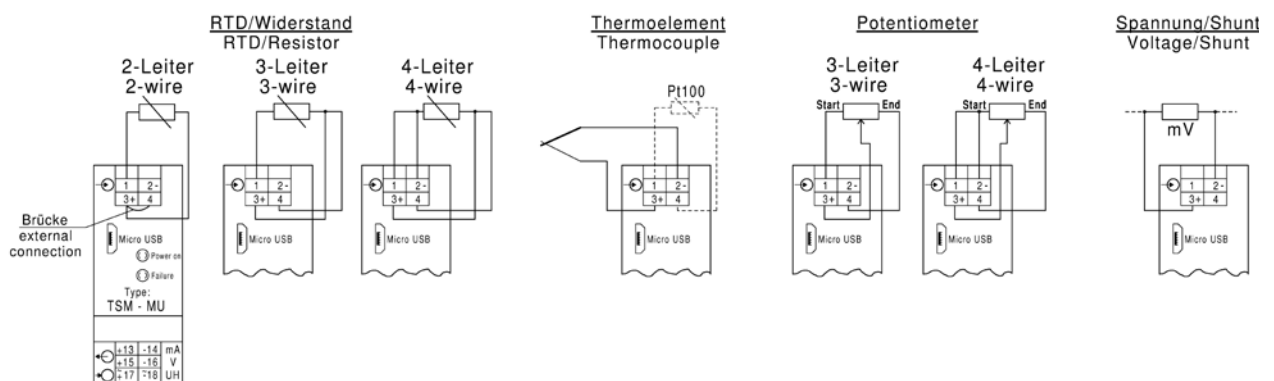


Function

The voltage values measured at the inputs are linearized and transformed into an impressed direct current and in an impressed direct voltage. When making measurements at a thermocouple, the cold junction compensation is done by an internal, external or constant temperature measurement. The galvanic isolation is realized using an optocoupler. An auxiliary voltage is required. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible.



Connection



Types and variants

Input	Thermocouples, Pt100, Pt1000, resistor, potentiometer or voltage
Output	0-20 mA + 0-10 V, 4-20 mA + 2-10 V, 0-10 mA + 0-5 V adjustable per software
Surcharges	Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



Technical data

Input	Input variables	<p>Thermocouples (DIN 60584-1)</p> <p>Type B +100 ... +1820 °C, Type E -270 ... +1000 °C, Type J -210 ... +1200 °C, Type K -270 ... +1372 °C, Type N -270 ... +1300 °C, Type R -50 ... +1768 °C, Type S -50 ... +1768 °C, Type T -270 ... +400 °C</p> <p>cold junction compensation internal: Pt 100, 0-80 °C external: Pt 100, sensor current max. 0,5 mA, detection of sensor break constant: 0-100 °C</p> <p>Resistance thermometer / resistance / potentiometer</p> <p>Type Pt100 (DIN 60751) -200 ... +850 °C Type Pt1000 (DIN 60751) -200 ... +850 °C</p> <p>resistance 0 ... 5 kΩ otentiometer 100 Ω ... 10 kΩ sensor current max. 0,5 mA max. 100 Ω wire resistance symmetrical (2-wire connection max. 10 Ω) connection 2-, 3-, 4-wire with automatic recognition when starting the instrument, detection of sensor break</p> <p>Voltage measurement -1000 ... + 1000 mV</p>	
	Overload	max. 5 V between inputs	
	Input resistance	10 MΩ	
	Sensor break	max. 2-fold output value	
	Parameterization	via micro USB port and software (www.mueller-ziegler.de)	
	Function indicators	1x green „Power“ LED and type of connection when starting the instrument and resistance measurement; 1x red "Fail" LED, error status display	
	Output	Output variables	double output
		Rated values	0-20 mA/500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA/500 Ω load and 2-10 V / max. load 10 mA and 0-10 mA/0-500 Ω load and 0-5 V / max. load 10 mA, adjustable via software
		Options	<ul style="list-style-type: none"> ● Frequency module a value from 0-5 Hz tp 0-10 kHz ● „Open-collektor“ NPN, max. load 30 V 100 mA, pulse/pause 50/50 % ● Square wave signal 5 V, max. load 10 mA, pulse/pause 50/50 %
		Resolution	16 bit
Transfer behavior	Accuracy	± 0,5 %	
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C	
	Temperature influence	< 0,2 % at 10 K	
	Auxiliary voltage influence	no	
	Load influence	no	
	External magnetic field influence	no (400 A/m)	
	Residual ripple	< 30 mVss	
	Response time	< 300 ms	
	Open circuit voltage	max. 24 V	
	Current limiting	max. 2-fold in case of overload	
	Test voltage	4 kV between input, output, auxiliary voltage	
Standards	EMC	DIN EN 61326	
	Mechanical strength	DIN EN 61010 part 1	
	Electrical safety	DIN EN 61010 part 1, housing insulated working voltage 300V (phase to neutral), pollution degree 2, measurement category CAT III	
	Accuracy, overload	DIN EN 60688	
	Isolation	DIN EN 61010 part 1, 3,52 kV 50 Hz 10 s	
	Air and creep distances	DIN EN 61010 part 1	
	IP code	DIN EN 60529 housing IP30, terminals IP20	
	Connections	DIN 43807	
Auxiliary voltage		230 V AC ± 20 %, 45-65 Hz, 2,5 VA	
	Options	<ul style="list-style-type: none"> ● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA 	
Dimensions	Housing	Housing A, (22,5 mm wide) Page A1	
Weight		150 g	
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715	
	Electrical connection	Screw terminal max. 4 mm ²	



Measuring transducers for strain gauge

(with 4-arm strain gauge full bridge)

Type:
DMS-MU



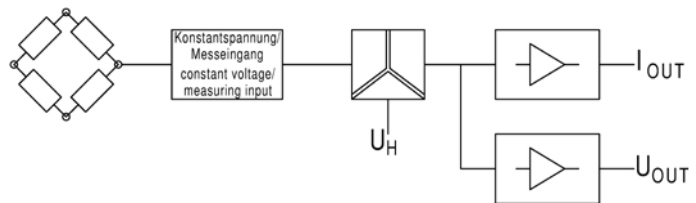
Application

The measuring transducer DMS-MU is used for the transformation and isolation of the change in resistance of a 4-arm strain gauge full bridge into an impressed direct current and direct voltage signal. The calibrated double outputs are switchable between 0-20 mA and 0-10 V or 4-20 mA and 2-10 V.

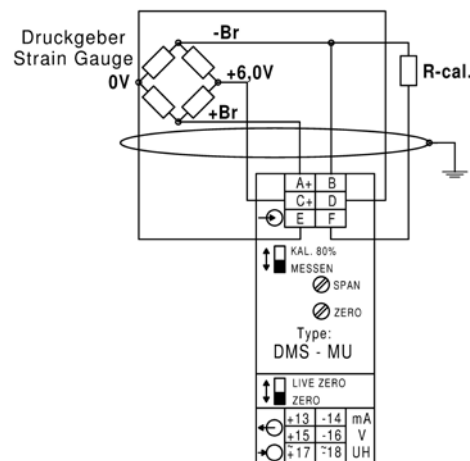


Function

The strain gauge measuring bridge is supplied with a constant reference voltage and the measuring signal is picked up in the form of a voltage difference. The input signal is amplified and transformed into an impressed direct current and in an impressed direct voltage. The input leads at terminals A, B, C and D are monitored for wire breakage. The galvanic isolation is realized using an optocoupler. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required.



Connection



Types and variants

Input	4-arm strain gauge full bridge with e.g. 350 Ω
Output	0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V, switchable on front side
Surcharges	Strain gauge full bridge 75 Ω - 450 Ω (housing width 45 mm) Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



Technische Daten

Input	Input variables	change of resistance from a 4-arm strain gauge full bridge with e.g. 350 Ω (170 Ω - 450 Ω)
	Rated values	differential input voltage 2-3,3 mV/V adjustable from 1,8 to 3,6 mV/V (corresponds to 12 to 24,5 mV)
	Bridge supply voltage	ca. 6,0 V
	Zero point	± 3 mV adjustable
Output	Output variables	double output
	Rated values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA switchable on front side
Transfer behavior	Accuracy	± 0,5 %
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,2 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 30 mV _{ss}
	Response time	< 300 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
	Test voltage	4 kV between input, output, auxiliary voltage
	Sensor break	if one of the input wires at the terminals A, B, C or D is interrupted, the output of the measuring transducer switches to maximum output signal
Auxiliary voltage		230 V AC ± 20 %, 45-65 Hz, 2,5 VA
	Options	<ul style="list-style-type: none"> ● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) Page A1
Weight		180 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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Measuring transducers for r.p.m

Type:
D-MU



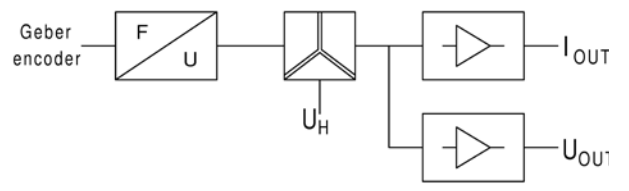
Application

The measuring transducer D-MU is used for the transformation and isolation of a rotation speed into an impressed direct current and direct voltage signal.

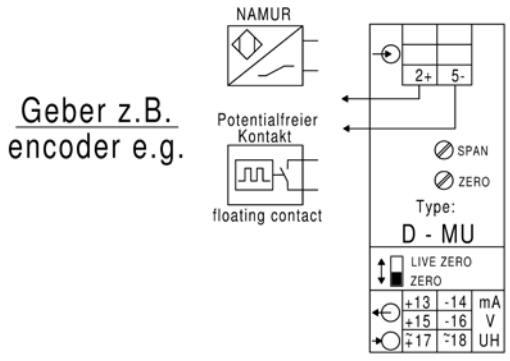


Function

The rotation speed to be measured is supplied to the input of the measuring transducer via a proximity switch (NAMUR), a mechanical contact or a passive switched transistor. Via a filter, the current changes pending in this case are fed to a microcontroller which will then take care of the evaluation. The direct voltage generated there is transformed into an impressed direct current and in an impressed direct voltage. Both outputs are no-load proof and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required.



Connection



Types and variants

Input	Rotation speed in a range of 1,6 to 1000 Hz (e.g. 1,6-100 Hz)
Output	0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V, switchable on front side
Surcharges	Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



Technical data

Input	Input variables	rotation speed, frequency
	Rated values	a value in the range of 1,6 Hz and 1000 Hz (e.g. 1,6-100 Hz)
	Encoder	proximity switch, mechanical contact or passive transistor
	Values of encoder	open circuit voltage 12 V (optionally 24 V or 5 V) short circuit current 10 mA, switching point 2 mA
Output	Output variables	double output
	Rated values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA switchable on front side
Transfer behavior	Accuracy	± 0,5 %
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,2 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 30 mVss
	Response time	< 300 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
Test voltage	4 kV between input, output, auxiliary voltage	
Auxiliary voltage		230 V AC ± 20 %, 45-65 Hz, 2,5 VA
	Options	<ul style="list-style-type: none"> ● 110 V AC ± 20 %, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) Page A1
Weight		190 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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Measuring transducers for summation

Type:
Sum-MU



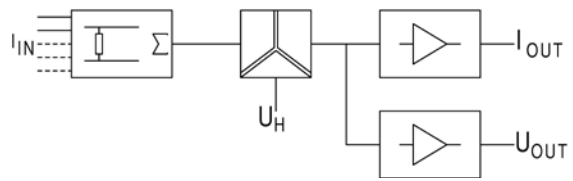
Application

The measuring transducer Sum-MU is used for the transformation and isolation of the sum of several direct currents into an impressed direct current and direct voltage signal. The calibrated double outputs are switchable between 0-20 mA and 0-10 V or 4-20 mA and 2-10 V.

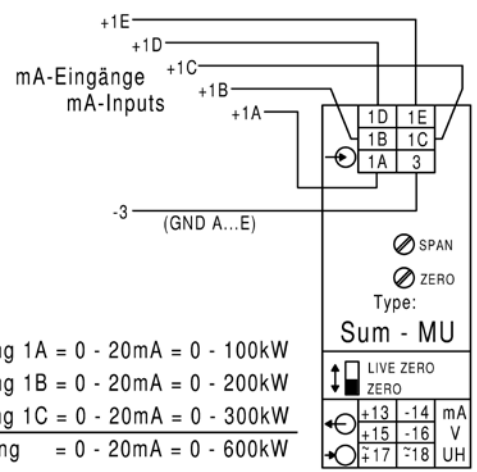


Function

The up to 5 direct currents are converted in direct voltages using shunts and added up. The direct voltage thus generated is galvanically isolated using an optocoupler, amplified and transformed into an impressed direct current or in an impressed direct voltage. The output is no-load and short-circuit proof. Connecting the two outputs is not permissible. An auxiliary voltage is required.



Connection



Types and variants

Input	(Please specify valences of the inputs to each other in the order) 2 direct currents of: 0-20 mA 4-20 mA
Output	0-20 mA and 0-10 V as well as 4-20 mA and 2-10 V, switchable on front side
Surcharges	Input: per additional input (max. 5 inputs possible) Auxiliary voltage other than 230 V AC: 24 V DC 6-30 V AC + DC 36-265 V AC + DC 110 V AC
Frequency module	Type FM (frequency output 0-5 Hz up to 0-10 kHz) - (description page 10)
Relay module	for limit monitoring Type GWM - (description page 11)



Technical data

Input	Input variables	Direct current
	Rated values	max. 5 direct currents of 0-20 mA or 4-20 mA, $R_i = 3 \Omega$ It is possible ex works to assign a value to each input e. g. Input 1A = 0-20 mA corresponds to 0-150 kW => value 0.25 Input 1B = 0-20 mA corresponds to 0-150 kW => value 0.25 Input 1C = 0-20 mA corresponds to 0-300 kW => value 0.5 Output 0-20 mA corresponds to 0-600 kW => value 1,0 Please specify when ordering!
	Overload permanent	2-fold
	High surge load	20-fold, 1 s
Output	Output variables	double output
	Rated values	0-20 mA / 500 Ω load and 0-10 V / max. load 10 mA as well as 4-20 mA / 500 Ω load and 2-10 V / max. load 10 mA switchable on front side
Transfer behavior	Accuracy	$\pm 0,5 \%$
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Temperature influence	< 0,2 % at 10 K
	Auxiliary voltage influence	no
	Load influence	no
	External magnetic field influence	no (400 A/m)
	Residual ripple	< 30 mVss
	Response time	< 300 ms
	Open circuit voltage	max. 24 V
	Current limiting	max. 2-fold in case of overload
Test voltage	4 kV between input, output, auxiliary voltage	
Auxiliary voltage		230 V AC $\pm 20 \%$, 45-65 Hz, 2,5 VA
	Options	<ul style="list-style-type: none"> ● 110 V AC $\pm 20 \%$, 45-65 Hz, 2,5 VA ● 24 V DC - 15 % to + 25 %, 2 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA
Dimensions	Housing	Housing A, (22,5 mm wide) Page A1
Weight		190 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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GMAT-2



GMA



DNW 100, DNW 400, DNW 500, DNW 690

Type:

Limit monitoring, limit value relay		
Direct and alternating current, direct and alternating voltage 2 limit values, installations up to 1000 V (CAT III)	GMAT-2	Page 84
Direct and alternating current, direct and alternating voltage 1 or 2 limit values	GMA	Page 86

Mains monitoring		
Three-phase mains monitoring	DNW 100, DNW 400, DNW 500, DNW 690	Page 88

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Limit value relay with indicator for installations up to 1000 V (CAT III)

for direct and alternating current as well as for direct and alternating voltage
2 limit values

Type:
GMAT-2



Application

The electronic limit value relay with indication GMAT-2 is used for monitoring the alternating or direct current and voltage. The alternating current parameters are measured as TrueRMS value with arbitrary waveform. The measured value or the limit values are indicated in a 2-digit LED display.

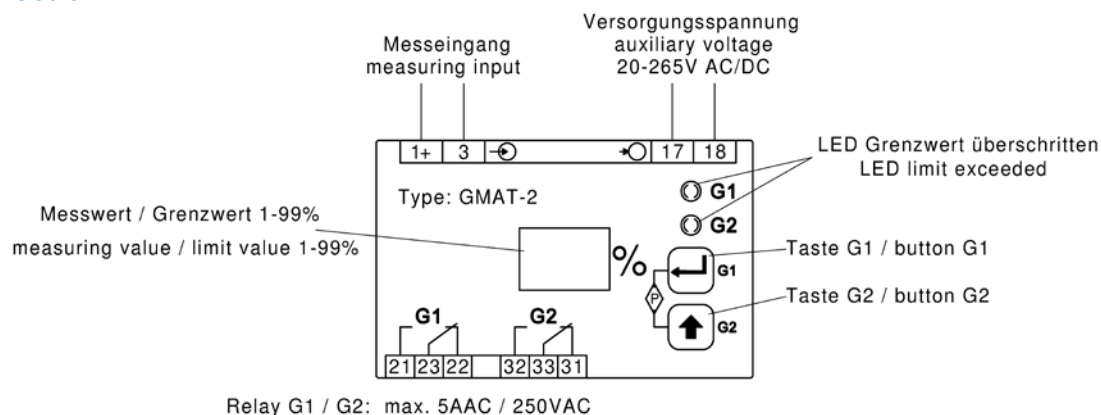


Function

The limit values are adjustable in 1% intervals using pushbuttons on the front panel. Hysteresis, switch on and switch off delay, closed circuit / open-circuit principle and min/max principle may also be set via the pushbuttons. If limit values are exceeded, this is indicated by LEDs. The limit value relay has a housing width of 71 mm and is designed for snap-on fastening on top hat rail.



Connection



Types and variants

Input

DC

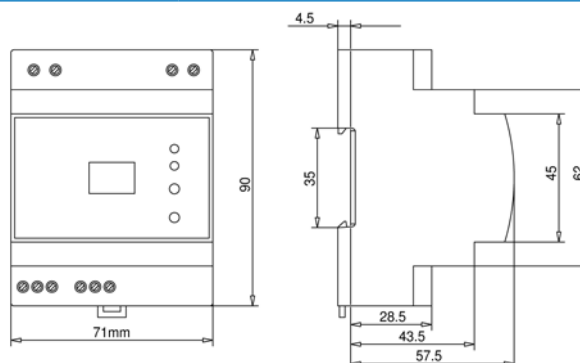
AC + DC True RMS



Technical data

Input	Input variables	direct current or direct voltage, alternating current or alternating voltage, the quantities are measured as true RMS value (up to crest factor 4) with arbitrary waveform in the range of DC and AC 40 - 1000 Hz			
	Limit value adjustment	0-99 %, adjustable in 1 % intervalls			
	Indicators	2 digit LED display for measuring values 0-99 % of full scale 2 red LEDs for limit value violation			
	Overflow	LED indicator shows dd			
	Accuracy	± 1 % of full scale			
	Test voltage	7,4 kV between measuring input and relay contact and auxiliary voltage, 4kV between relay G1 and relay G2			
	Switching characteristic	Switching accuracy	± 1 % of full scale		
Hysteresis		adjustable from 0-10 % of full scale			
Circuit time		< 400 ms for 10 % limit value exceedance			
Switching delay		adjustable range 0-99 s			
Switching state		selectable between close-circuit and open-circuit principle			
Relay contact		2 changeover contact			
Temperature range		-15 °C to +20 °C to +30 °C to +55 °C			
Temperature influence		< 0,1 % at 10 K			
Overload capacity		voltage 10-fold, max. 2000V, current 10-fold up to 20 mA, 2-fold for above			
Contact rating		max. 5 AAC, 250 VAC, 1250 VA			
Standards	EMC	DIN EN 61326			
	Mechanical strength	DIN EN 61 010 part 1			
	Electrical safety	DIN EN 61010 part 1 and DIN EN 61010 part 2-030 Housing insulated, protection calls II, for working voltages up to 1000V (phase to neutral), pollution level 2, measuring category CAT III			
Auxiliary voltage	20-265 VAC+DC, 2 VA				
Weight	200 g				
Measuring ranges	Alternating current	adjustable	from	to	internal resistance
	AC+DC True RMS	10 A	0,1 A	9,9 A	0,006 Ω
		5 A	0,05 A	4,95 A	0,012 Ω
		1 A	0,01 A	0,99 A	0,06 Ω
		100 mA	1 mA	99 mA	0,6 Ω
		10 mA	0,1 mA	9,9 mA	6 Ω
	Alternating voltage	1000 V	10 V	990 V	2 M Ω
	AC+DC True RMS				
	Direct current DC	10 A	0,1 A	9,9 A	0,006 Ω
		1 A	0,01 A	0,99 A	0,06 Ω
		100 mA	1 mA	99 mA	0,6 Ω
		10 mA	0,1 mA	9,9 mA	6 Ω
		20 mA	0,2 mA	19,8 mA	3 Ω
		4-20 mA	4 mA	19,84 mA	3 Ω
Direct voltage DC	1000 V	10 V	990 V	2 M Ω	

Dimensions



Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²



Limit value relay with indicator

for direct and alternating current as well as direct and alternating voltage
1 or 2 limit values

Type:
GMA



Application

The electronic limit value relay GMA is used for monitoring the alternating or direct current as well as the alternating or direct voltage. The alternating current parameters are measured as TrueRMS value with arbitrary waveform. The measured value or the limit values are indicated in a 2-digit LCD display.

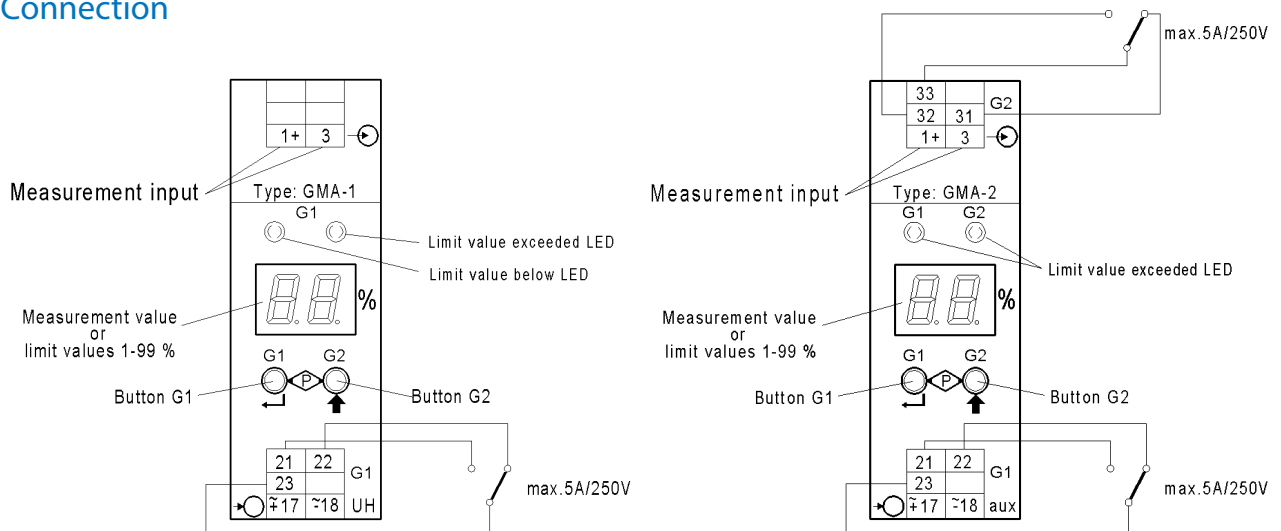


Function

The limit values are adjustable in 1% intervals using pushbuttons on the front panel. Hysteresis, switch on or switch off delay, closed-circuit/open-circuit principle and min/max principle may also be set via the pushbuttons. If limit values are exceeded, this is indicated by LEDs. The limit value relay is installed in a 22.5 mm wide housing and designed for snap-on fastening on top hat rail. An auxiliary voltage is required.



Connection



Types and variants

Input	GMA-1	DC
	(1 limit value)	AC + DC True RMS
	GMA-2	DC
	(2 limit values)	AC + DC True RMS
Surcharges	Auxiliary voltage other than 230 V AC:	
	24 V DC	
	6-30 V AC + DC	
	36-265 V AC + DC	
	110 V AC	



Technical data

Input	Input variables	direct current or direct voltage, alternating current or alternating voltage, the quantities are measured as true RMS value (up to crest factor 4) with arbitrary waveform in the range of DC and AC 40 - 1000 Hz			
	Limit value adjustment	0-99 %, adjustable in 1 % intervalls			
	Indicators	2 digit LED display for measuring values 0-99 % of full scale 2 red LEDs for limit value violation			
	Accuracy	± 1 %			
	Test voltage	4 kV between measuring input and relay contact			
	Switching characteristic	Switching accuracy	± 1 % of full scale		
Hysteresis		adjustable from 0-10 % of full scale			
Circuit time		< 400 ms for 10 % limit value exceedance			
Switching delay		adjustable range 0-99 s			
Relay contacts		1 (GMA-1) or 2 (GMA-2) changeover contacts			
Contact rating		max. 5 AAC, max. 250 V AC, 1250 VA			
Temperature range		-15 °C to +20 °C to +30 °C to +55 °C			
Temperature influence		< 0,1 % at 10 K			
Overload capacity		voltage 10-fold, max. 2000 V, current 10-fold up to 20 mA, 2-fold for above			
Standards		EMC	DIN EN 61326		
	Mechanical strength	DIN EN 61 010 part 1			
	Electrical safety	DIN EN 61 010 part 1, housing insulated, protection class II, measuring category CAT III for voltages up to 300 V (phase to neutral) as well as measuring category CAT II for rated voltages above 300 V to 600 V (phase to neutral)			
Auxiliary voltage		230 V AC ± 15 %, 45-65 Hz, 2 VA			
	Options	<ul style="list-style-type: none"> ● 110 V AC ± 15 %, 45-65 Hz, 2 ● 24 V DC - 15 % to + 25 %, 2,5 W ● 6-30 V AC + DC, 2 VA ● 36-265 V AC + DC, 2 VA 			
Dimensions	Housing	Housing A (22,5 mm wide), page A1			
Weight		200 g			
Measuring ranges	Alternating current AC+DC True RMS	adjustable	from	to	internal resistance
		10 A	0,1 A	9,9 A	0,006 Ω
		5 A	0,05 A	4,95 A	0,012 Ω
		1 A	0,01 A	0,99 A	0,06 Ω
		100 mA	1 mA	99 mA	0,6 Ω
	Alternating voltage AC+DC True RMS	10 mA	0,1 mA	9,9 mA	6 Ω
		500 V	5 V	495 V	1 M Ω
		100 V	1 V	99 V	1 M Ω
		10 V	0,1 V	9,9 V	100 M Ω
		1 V	0,01 V	0,99 V	10 M Ω
	Direct current DC	10 A	0,1 A	9,9 A	0,006 Ω
		1 A	0,01 A	0,99 A	0,06 Ω
		100 mA	1 mA	99 mA	0,6 Ω
		10 mA	0,1 mA	9,9 mA	6 Ω
		20 mA	0,2 mA	19,8 mA	3 Ω
		4-20 mA	4 mA	19,84 mA	3 Ω
		Direct voltage DC	500 V	5 V	495 V
	100 V		1 V	99 V	1 M Ω
	10 V		0,1 V	9,9 V	100 k Ω
	1 V		0,01 V	0,99 V	10 k Ω
100 mV	1 mV		99 mV	1 k Ω	
60 mV	0,6 mV		59,4 mV	1 k Ω	
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715			
	Electrical connection	Screw terminal max. 4 mm ²			

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Three-phase mains monitor

Type: **DNW 100, DNW 400, DNW 500, DNW 690**



Application

The three-phase mains monitor DNW is used for the comprehensive monitoring of a three-wire or four-wire power supply for phase failure, interruption of neutral, violation of the 3 phase voltages (above/below max/min value), asymmetry of the 3 phase voltages and the phase sequence (rotating field).

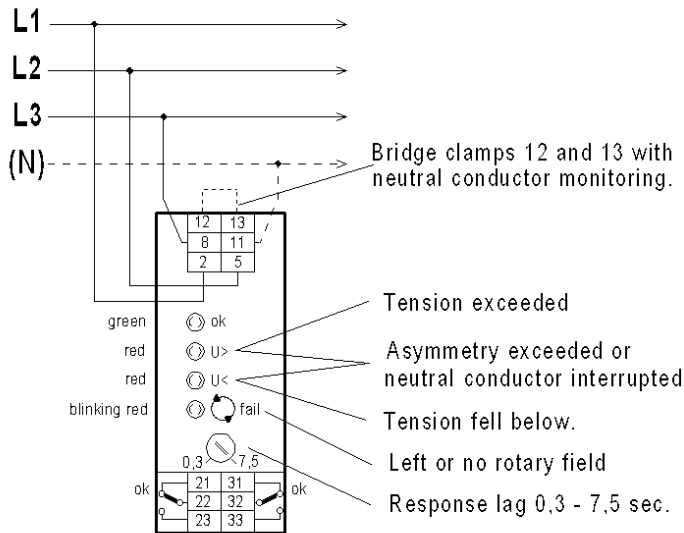


Function

The three-phase mains monitor continuously checks the voltage values of the 3 phases for violation of the set limit values, phase sequence, asymmetry as well as a complete phase failure or interruption of the neutral. If one of these errors occurs, the output relay is deenergized after a selectable delay time; if, however, one of the supply phases L2 or L3 fails completely, the relay is switched off immediately. As soon as all values have returned in the correct range, the output relay is energized without delay. The switching state of the output relay as well as the kind of the error that has occurred are indicated via LEDs. The supply is taken from the measuring voltage, an auxiliary voltage is not required.



Connection



limit values

DIL - switch	
ON	OFF
asymmetry	5 on 6 on = 5% 5 off 6 on = 7.5% 5 on 6 off = 10% 5 off 6 off = 15%
undervoltage	3 on 4 on = -5% 3 off 4 on = -10% 3 on 4 off = -15% 3 off 4 off = -20%
overvoltage	1 on 2 on = +5% 1 off 2 on = +10% 1 on 2 off = +15% 1 off 2 off = +20%

(↔ = factory setting)



Types and variants

Input	DNW 100 / DNW 400 / DNW 500 / DNW 690 three-phase mains monitor	€ 178,50
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Technical data

Input	Rated voltages	Type DNW 100 for 3 x 100 V, (without neutral) and 3 x 100/58 V, (with neutral) Type DNW 400 for 3 x 400 V, (without neutral) and 3 x 400/230 V, (with neutral) Type DNW 500 for 3 x 500 V, (without neutral) and 3 x 500/289 V, (with neutral) Type DNW 690 for 3 x 690 V, (without neutral) and 3 x 690/400 V, (with neutral)
	Rated frequency	50 Hz and 60 Hz
	Limit values	for overvoltage adjustable to +5 %, +10 %, +15 % or +20 % of rated value for undervoltage adjustable to -5 %, -10 %, -15 % or -20 % of rated value for asymmetry adjustable to 5 %, 7,5 %, 10 % or 15 % of rated value
	LED indication	U > (red), lights up if overvoltage limit value is exceeded U < (red), lights up if undervoltage limit value is exceeded U > (red) und U < (red), lights up if asymmetry value is exceeded or if neutral is interrupted fail (red), flashes in case of wrong phase sequence (left-hand or missing rotating field) ok (green), lights up if value is correct (relay energized)
	Hysteresis	2 % of rated value
	Relay release time	0,3-7,5 s adjustable
	Relay outputs	2 potential-free changeover contacts 250 V AC, 4 A, 1000 VA
	Test voltage	4 kV between contacts and measuring input
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
	Power input	between L2 and L3 1,5 VA (with 3 x 400 V power supply)
Standards	EMC	DIN EN 61326
	Mechanical strength	DIN EN 61 010 part 1
	Electrical safety	DIN EN 61010 part 1, housing insulated, protection class II, pollution degree 2, measuring category CAT III for rated voltages up to 300 V (phase to neutral) measuring category CAT II for rated voltages above 300 V to 600 V (phase to neutral)
	Isolation	DIN EN 61 010 part 1, 3,7 kV 50 Hz 10 s
	Air and creep distances	DIN EN 61 010 part 1
	IP code	DIN EN 60 529 housing IP 30, terminals IP 20
	Weight	180 g
Installation	Fastening	Snap-on fastening on top hat rail 35 mm acc. to DIN EN 60 715
	Electrical connection	Screw terminal max. 4 mm ²

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EZD-S0 1/5



EZD-S0 80



EZD-TCP 1/5



EZD-TCP 80



EZG-S0



EZG-TCP



SINUS 5/1 S0 MID



SINUS 85 S0 MID



Type:

General description		Page 93
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Energy meters for direct current

0 - 1500 Volt, 0 - 10 A direct / via shunt resistor, S0 output	EZG-S0	Page 94
0 - 1500 Volt, via shunt resistor, Ethernet interface	EZG-TCP	Page 96

Energy meters for alternating current

CT connection sec. 5 A and sec. 1 A, S0 output	EZD-S0 1/5	Page 98
Direct connection up to 80 A, S0 output	EZD-S0 80	Page 100
CT connection sec. 5 A und sec. 1 A, Ethernet interface	EZD-TCP 1/5	Page 102
Direct connection up to 80 A, Ethernet interface	EZD-TCP 80	Page 104

Energy meters for alternating current with MID conformity

General description and technical data		Page 107
CT connection sec. 5 A and sec. 1 A, S0 output	SINUS 5//1 S0 MID	Page 108
CT connection sec. 5 A and sec. 1 A, M-BUS interface	SINUS 5//1 M-BUS MID	Page 108
CT connection sec. 5 A and sec. 1 A, Modbus interface	SINUS 5//1 Modbus MID	Page 108
Direct connection up to 85 A, S0 output	SINUS 85 S0 MID	Page 110
Direct connection up to 85 A, M-BUS interface	SINUS 85 M-BUS MID	Page 110
Direct connection up to 85 A, Modbus interface	SINUS 85 Modbus MID	Page 110

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General description of energy meters

Application

The Müller + Ziegler energy meters are meters for direct current (EZG) or alternating three-phase current (EZD). The energy meters can be operated either for direct measurement or in connection with shunt resistors (EZG - direct current) or current transformers (EZD - alternating three-phase current). They are used, depending on the model, in photovoltaic systems, battery systems, charging stations, DC machines or industrial plants, workshops, machines and offices.

Special features

- S0 or Ethernet interface
- Analog output 20 mA in various types
- EZG types with wide-range power supply unit for auxiliary voltages from 21-265 VAC+DC
- EZD types can be operated without auxiliary voltage
- Adjustable ratio of shunt resistors and current transformers
- Direct connection possible
- Selectable value of pulses / kWh
- LEDs for function display
- Slim design with housing width 71 mm

Technical data

General data		
Operation temperature	-15 °C to +20 °C to +30 °C to + 55 °C	
Storage temperature	-25 °C to +85 °C	
Temperature influence	< 0,2 % at 10 K	
Ambient conditions	stationary application, indoor, rel. air humidity 5 .. 95%, no condensation, altitude up to 2000 m, water, rain, snow or hail excluded	
EMC	DIN EN 50470-1	
Electrical safety	DIN EN 61 010 part 1 housing insulated, protection class II, for rated voltages up to 1000V (phase to neutral), pollution degree 2, measuring category CAT III	
Fuse	The devices are equipped with short-circuit proofed transformers, an overcurrent protection device for the energy meter itself is not required.	
Test voltage EZG-S0	7,4 kV, 50 Hz input against auxiliary voltage and analog output and relay contact	
Test voltage EZG-TCP	7,4 kV, 50 Hz auxiliary voltage against input against Ethernet interface 4 kV, 50 Hz input against Ethernet interface	
Test voltage EZD-S0/-TCP	4 kV, 50 Hz input against analog output against pulse outputs against tariff control input	
IP code	DIN EN 60529, housing IP30, terminals IP20	
Installation	snap-on mounting on top hat rail 35 mm (DIN EN 60715) The equipment is suitable for tight on tight assembly, however with ambient temperatures of > 45 °C a distance apart of 10 mm is recommended. The assembly location should, if possible, free of vibration.	
Terminals	screw terminals max. 4 mm ² , tightening torque 0,5 Nm	
Housing material	PPO / Polyamid PA, self extinguishing acc. to UL 94 V-0	
Weight	220 g	

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9 Shunts

10 Test apparatus



Energy meter for direct current

for direct and indirect current measurement
voltage ranges 0 - 1500 VDC

Type:
EZG-S0



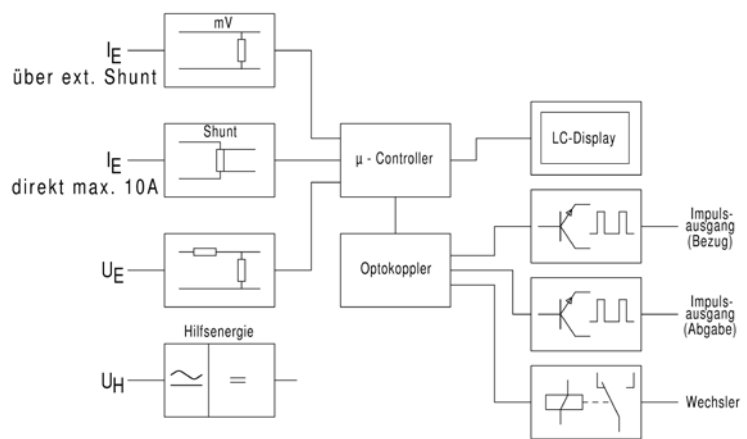
Application

The electronic direct current meter EZG-S0 is used for measuring the active energy for import and export currents in direct current installations. It is applied in photovoltaic installations, battery systems, charging stations, direct current machines etc. Measurements can also be made in installations with pulsed direct current controls (PWM controls). The energy meter may directly measure up to 10 A DC or be connected to a shunt. The energy values are indicated in a display, stored and provided as pulses for further processing. Furthermore, the values for current, voltage and instantaneous active power can be displayed. A programmable relay contact may be used for monitoring the instantaneous active power, current or voltage.

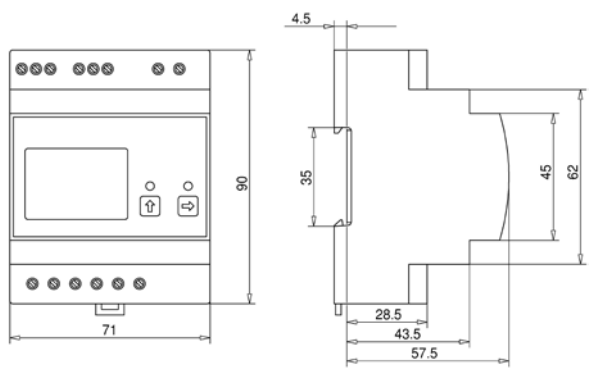


Function

The parameters to be measured are supplied to an integrated module via an external or internal shunt as well as via a voltage divider. There, the instantaneous values of current and voltage are multiplied and converted into active power and active energy. A microcontroller accepts the assessments, the output of the pulses as well as the storage of the measured values. The results are displayed on LCD display. The pulse output of import and export active energy is realized via two open-collector transistor outputs. An auxiliary supply voltage is required. The meter readings are stored in case of power failure.



Dimensions

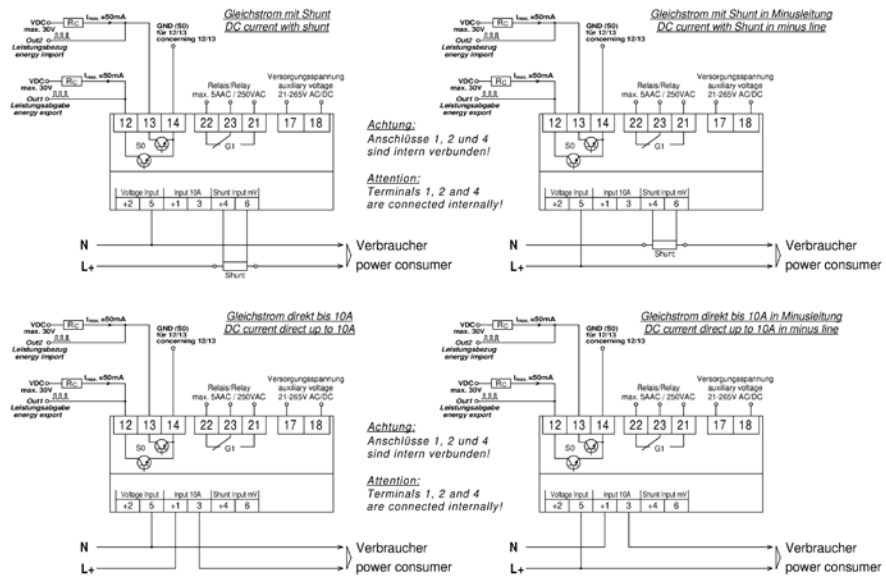


Types and variants

EZG-S0



Connection



Technical data

Input	Accuracy	± 1% class B acc. DIN EN 50470-3	
	Rated voltages	0-10 VDC, 0-25 VDC, 0-50 VDC, 0-100 VDC, 0-500 VDC, 0-1000 VDC 0-1500 VDC or by choice (please specify by ordering), Ri ≥ 2 MΩ	
	Rated current direct	direct measurement 0-10 A (voltage drop 60 mV)	
	Rated current external	measuring via external shunt 1-20.000 A/ 60 mV, 100 mV or 150 mV, selectable via button on front panel	
	Pulsed direct current (PWM)	20 Hz - 30 kHz	
	Overload permanent	current and voltage 1,2-fold	
	High surge load	voltage 2-fold 1 s, max. 2000 V, current 20-fold 0,5 s	
	Indicators	Display	LCD display active energy import 9 999 999,99 kWh/MWh (with return stop) active energy export 9 999 999,99 kWh/MWh (with return stop) ampere hours import 9 999 999,99 kWh (with return stop) ampere hours export 9 999 999,99 kWh (with return stop) instantaneous active power +9 999 999,99 kW with (-) in case of power, voltage, current
		Function indicators	LED for active energy (pulses/kWh equal to set pulses) LED for limit value G1 exceeded
		Update display	1 x per second
Update registers		1 x per second	
Pulse and relay outputs		Pulse output	npn-transistor, 24V DC (max. 30 V/50 mA), ON (activ) 10-27 mA OFF (inactiv) < 1 mA, switching state „open“ or „closed“ selectable
		Number of pulses	1-80.000 pulses/kWh, selectable via button on front panel, max. value depends on set current and voltage range
		Pulse length	adjustable from 10-120 ms
	Accuracy	± 1% class B acc. DIN EN 50470-3	
	Standards	DIN EN 50470-1	
	Limit range	0-(±) 120% of full scale	
	Switching accuracy	± 1 % of full scale	
	Hysteresis	adjustable from 0-10 % of full scale	
	Min. current time circuit	< 200 ms for 10% limit value exceedance	
	Switching delay	adjustable from 0-99 s	
	Switching state	closed circuit or open circuit principle, min- or max-contact selectable	
	Relay contact	1 changeover contact, 10 mA-5 A, 5-250 VDC / VAC, 1250 W(VA)	
	Min. switching capacity	60 mW	
Auxiliary voltage	Standard	21-265 VAC+DC, 2 VA, (EMC DIN EN 61326 class A)	

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3 Energy meters

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5 Panel meters analog

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10 Test apparatus



Energy meter for direct current

with HTTP, TCP/IP, Modbus-TCP protocol for indirect current measurement via shunt resistors
voltage ranges 0 - 1500 VDC

Type:
EZG-TCP



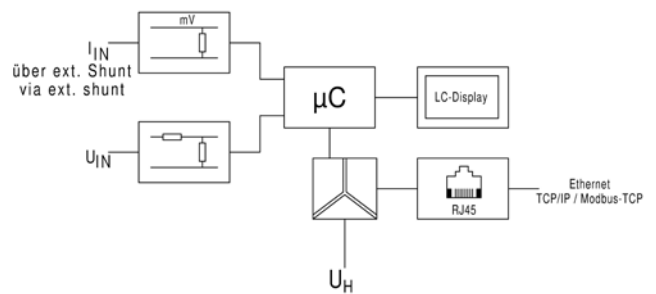
Application

The electronic direct current meter EZG-TCP is used for measuring the active power for incoming and outgoing currents in direct current installations. It is applied in photovoltaic installations, battery systems, charging stations, direct current machines etc. Measurement can be made in installations with pulsed direct current controls (PWM controls). The energy meter is connected to a shunt. All measuring values for current, voltage and energy are indicated in a display. The energy values are stored and provided on an Ethernet interface for further processing.

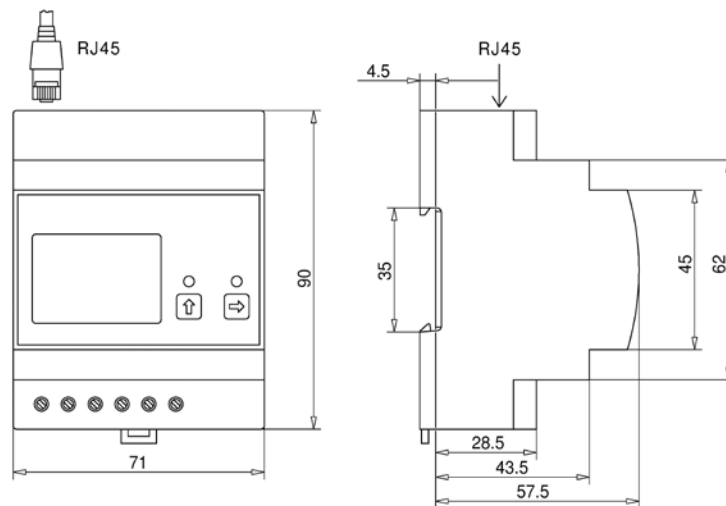


Function

The parameters to be measured are supplied to an integrated module via an internal shunt as well as via a voltage divider. There, the instantaneous values of current and voltage are multiplied and converted into active power and active energy. A microcontroller accepts the assessments, the output of the pulses as well as the storage of the measured values. The results are displayed on LC display. An auxiliary supply voltage is required. The meter readings are stored in case of power failure.



Dimensions

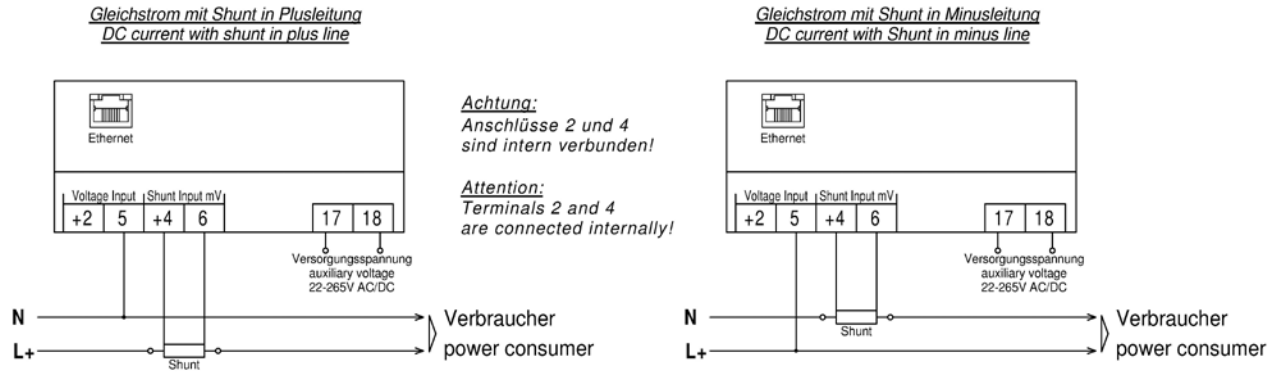


Types and variants

EZG-TCP



Connection



Technical data

Input	Accuracy	± 1% class B acc. DIN EN 50470-3
	Rated voltages	0-10 VDC, 0-25 VDC, 0-50 VDC, 0-100 VDC, 0-500 VDC, 0-1000 VDC 0-1500 VDC or by choice (please specify by ordering), $R_i \geq 2 \text{ M}\Omega$
	Rated current external	measuring via external shunt 1-20.000 A/ 60 mV, 100 mV or 150 mV, selectable via button on front panel
	Pulsed direct current (PWM)	20 Hz - 30 kHz
	Overload permanent	current and voltage 1,2-fold
	High surge load	voltage 2-fold 1 s, max. 2000 V, current 20-fold 0,5 s
Indicators	Display	LCD display active energy import 9 999 999,99 kWh/MWh (with return stop) active energy export 9 999 999,99 kWh/MWh (with return stop) ampere hours import 9 999 999,99 kWh (with return stop) ampere hours export 9 999 999,99 kWh (with return stop) instantaneous active power +9 999 999,99 kW with (-) in case of power, voltage, current
	Function indicators	LED for active energy import and export (pulses/kWh depending on set shunt)
	Interface	10 Mbits/s Ethernet LAN interface
	Update display	1 x per second
	Update register	1 x per second
	Auxiliary voltage	Standard

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6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Energy meter for alternating three-phase current

for current transformer connection secondary 1 / 5 A with S0 and analog output

Type:
EZD-S0 1/5



Application

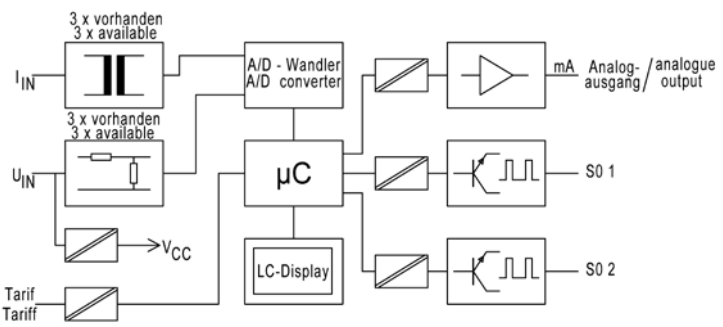
The electronic energy meter EZD-S0 is used to record the active and reactive energy during import and export in three-phase systems under any load. Their application covers for example industrial plants, workshops, machines and offices. The energy values are displayed, saved and made available as pulses for further processing. The current active or reactive power can be output via an analog output (20 mA). All values for current, voltage, frequency, power and energy can be read on an LCD display. The connection is made via current transformers with a nominal secondary current of 1 or 5 amps.



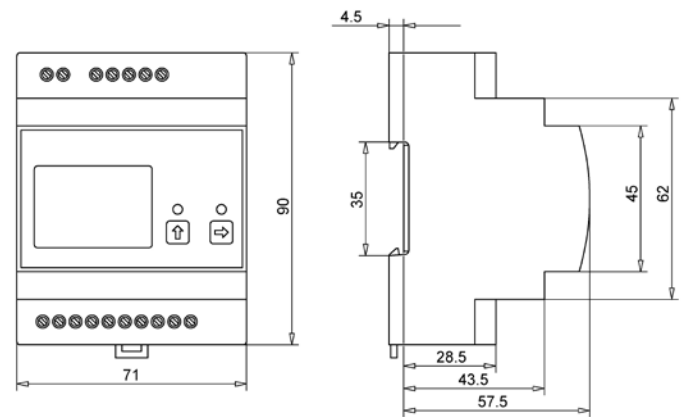
Function

The values to be measured are transferred to an integrated module via external and internal current transformers and voltage dividers. The instantaneous values of current and voltage are recorded here. A microcontroller takes over the evaluation, the output of the impulses as well as the storage of the measured values. The values are shown on an LCD display.

The pulse output of active or reactive energy is realized via two open collector transistor outputs (S0 interfaces). An analog output of 20 mA represents the current active or reactive power. A separate auxiliary voltage is not required, it is obtained from the measuring voltage. The meter readings and programming are saved in case of a power failure.



Dimensions

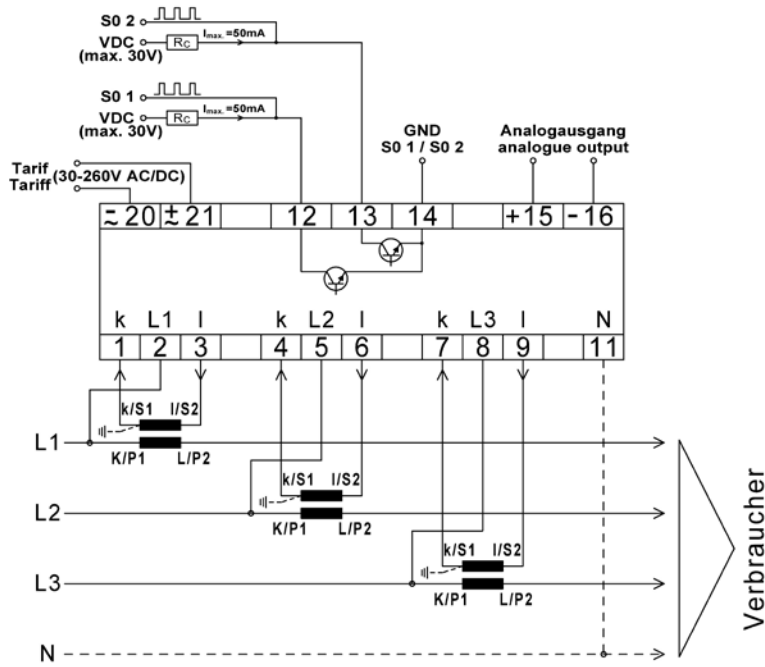


Types and variants

EZD-S0 1/5



Connection



Technical data

Input	Mains connection	3-phase 4-wire power system, current transformer measurement bidirectional meter, 2-tariff measurement
	Rated voltage	50-300 V / 87-520 V and 3 x 87-520 V
	Current information acc. to meter print	$I_{min} - I_{ref} (I_{max}) A$
	Starting current I_{st}	0,002 A (symmetrical per phase)
	Minimum current I_{min}	0,01 A
	Transition current I_{tr}	0,05 A
	Reference current I_{ref}	1 / 5 A
	Limit current I_{max}	7 A
	Rated frequency	40-70 Hz
	Energy consumption	voltage circuit approx. 0,7 VA; current circuit approx. 0,1 VA
	Accuracy	active energy class B acc. DIN EN 50470-3 reactive energy class 2 acc. DIN EN 62053-23
	Backstop	yes
	Indicators	Display
Function indicators		LED for active energy import and export 10.000 pulses/kWh both LED light up at current $< I_{min}$
Reset		via buttons on front panel
Pulse outputs (S0)	Pulse output	npn-transistor, 24V DC (max. 30 V/50 mA), ON (activ) 10-27 mA OFF (inactiv) $< 1 mA$, switching status open or closed selectable
	Number of pulses	selectable via button (number of pulses depend on the setting of current and voltage transformers)
	Pulse length	60 - 100 ms, selectable via button
	Accuracy	class B acc. DIN EN 50470-3
	Standards	DIN EN 62053-31
Tariff control input	Tariff 1	0 V or open
	Tariff 2	30 - 260V AC/DC, 0,4 VA
	Separation	4 kV
Analog output	Rated value	0-20 mA or 4-20 mA, load 0-500 Ohm
	Accuracy	$\pm 0,5\%$ of full scale ($\pm 1\%$ with spread $< 50\%$)
	Setting time	$< 1 s$
	Spread	30 - 120% from power $U \times I \times \sqrt{3}$

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Panel meters analog

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Shunts

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Test apparatus

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Energy meter for alternating three-phase current

for direct connection up to 80 amps with S0 and analog output

Type:
EZD-S0 80



Application

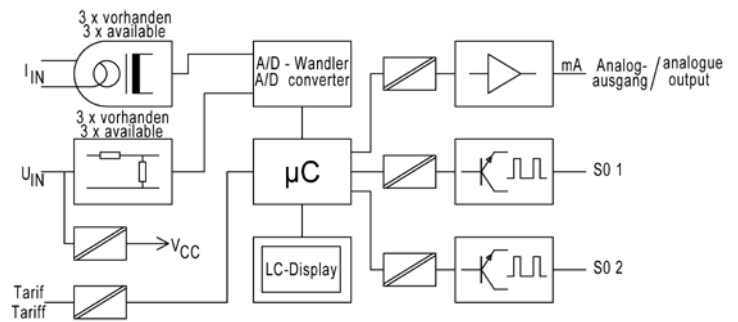
The electronic energy meter EZD-S0 is used to record the active and reactive energy during import and export in three-phase systems under any load. Their application covers for example industrial plants, workshops, machines and offices. The energy values are displayed, saved and made available as pulses for further processing. The current active or reactive power can be output via an analog output (20 mA). All values for current, voltage, frequency, power and energy can be read on an LCD display. The connection is made directly up to a maximum current of 80 amps.



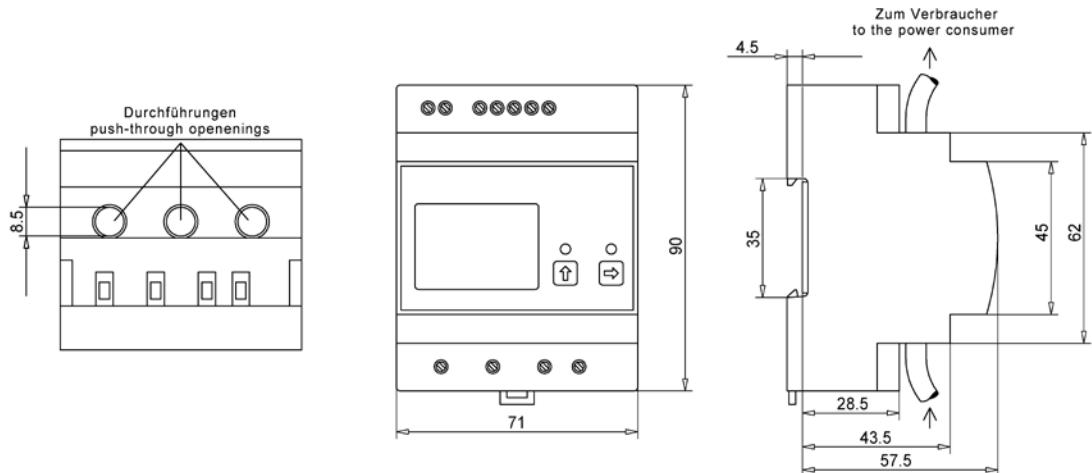
Function

The values to be measured are transferred to an integrated module via internal current transformers and voltage dividers. The instantaneous values of current and voltage are recorded here. A microcontroller takes over the evaluation, the output of the impulses as well as the storage of the measured values. The values are shown on an LCD display.

The pulse output of active or reactive energy is realized via two open collector transistor outputs (S0 interfaces). An analog output of 20 mA represents the current active or reactive power. A separate auxiliary voltage is not required, it is obtained from the measuring voltage. The meter readings and programming are saved in case of a power failure.



Dimensions

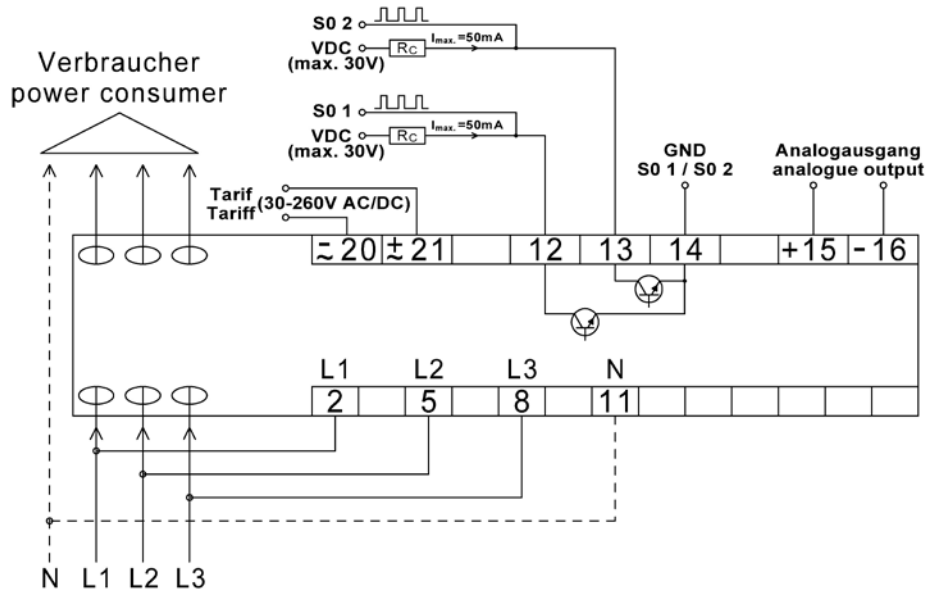


Types and variants

EZD-S0 80



Connection



Technical data

Input	Mains connection	3-phase 4-wire power system, direct measurement bidirectional meter, 2-tariff measurement
	Rated voltage	50-300 V / 87-520 V and 3 x 87-520 V
	Current information acc. to meter print	$I_{min} - I_{ref} (I_{max})$ A
	Starting current I_{st}	0,02 A (symmetrical per phase)
	Minimum current I_{min}	0,2 A
	Transition current I_{tr}	0,5 A
	Reference current I_{ref}	5 A
	Limit current I_{max}	80 A
	Rated frequency	40-70 Hz
	Energy consumption	voltage circuit approx. 0,7 VA; current circuit approx. 0,1 VA
	Accuracy	active energy class B acc. DIN EN 50470-3 reactive energy class 2 acc. DIN EN 62053-23
	Backstop	yes
	Indicators	Display
Funktionsanzeigen		LED for active energy import and export 600 pulses/kWh both LED light up at current $< I_{min}$
Reset		via buttons on front panel
Pulse outputs (S0)	Pulse output	npn-transistor, 24V DC (max. 30 V/50 mA), ON (activ) 10-27 mA OFF (inactiv) < 1 mA, switching status open or closed selectable
	Number of pulses	selectable via button (number of pulses depend on the setting of voltage transformers)
	Pulse length	60 - 100 ms, selectable via button
	Accuracy	class B acc. DIN EN 50470-3
	Standards	DIN EN 62053-31
	Tariff control input	Tariff 1
Tariff 2		30 - 260V AC/DC, 0,4 VA
Separation		4 kV
Analog output	Rated value	0-20 mA or 4-20 mA, load 0-500 Ohm
	Accuracy	$\pm 0,5\%$ of full scale ($\pm 1\%$ with spread $< 50\%$)
	Setting time	< 1 s
	Spread	30 - 120% from power $U \times I \times \sqrt{3}$

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7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Energy meter for alternating three-phase current

for current transformer connection secondary 1 / 5 A with Ethernet interface

Type:
EZD-TCP 1/5



Application

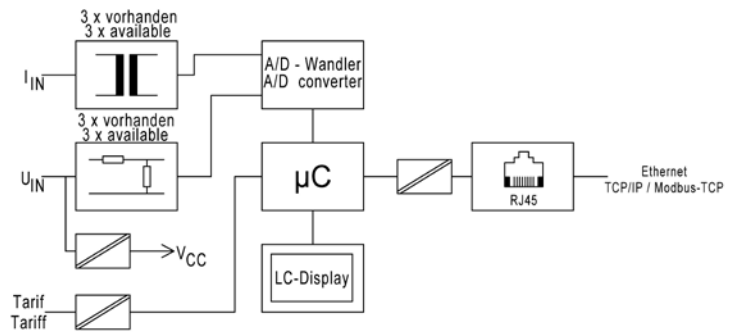
The electronic energy meter EZD-TCP is used to record the active and reactive energy during import and export in three-phase systems under any load. Their application covers for example industrial plants, workshops, machines and offices. The energy values are displayed, stored and provided on an Ethernet interface for further processing. All values for current, voltage, frequency, power and energy can be read on an LCD display. The connection is made via current transformers with a nominal secondary current of 1 or 5 amps.



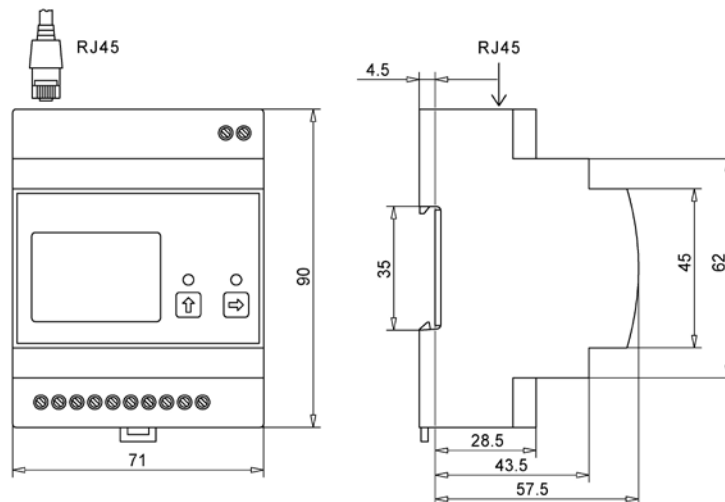
Function

The values to be measured are transferred to an integrated module via external and internal current transformers and voltage dividers. The instantaneous values of current and voltage are recorded here. A microcontroller takes over the evaluation and the storage of the measured values. The values are shown on an LCD display.

A separate auxiliary voltage is not required, it is obtained from the measuring voltage. The meter readings and programming are saved in case of a power failure.



Dimensions

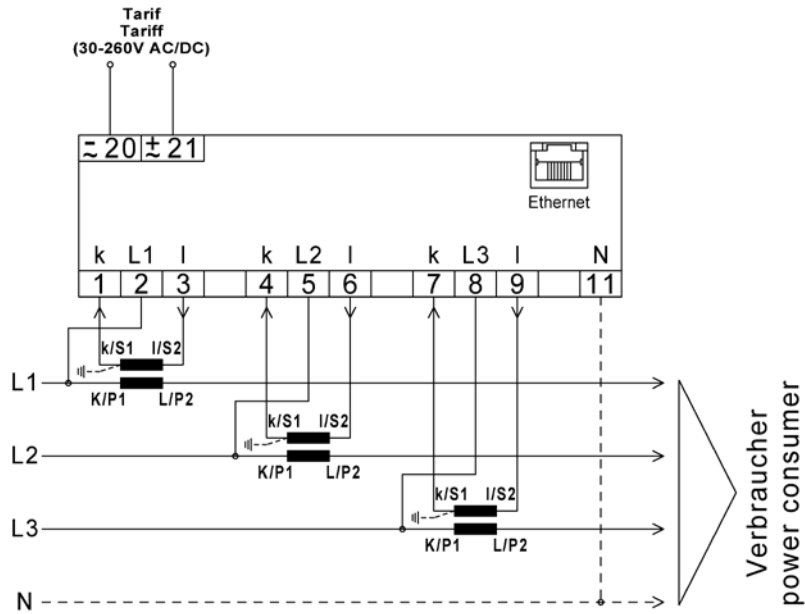


Types and variants

EZD-TCP 1/5



Connection



Technical data

Input	Mains connection	3-phase 4-wire power system, current transformer measurement bidirectional meter, 2-tariff measurement	
	Rated voltage	50-300 V / 87-520 V and 3 x 87-520 V	
	Current information acc. to meter print	$I_{min} - I_{ref} (I_{max})$ A	
	Starting current I_{st}	0,002 A (symmetrical per phase)	
	Minimum current I_{min}	0,01 A	
	Transition current I_{tr}	0,05 A	
	Reference current I_{ref}	1 / 5 A	
	Limit current I_{max}	7 A	
	Rated frequency	40-70 Hz	
	Energy consumption	voltage circuit approx. 0,7 VA; current circuit approx. 0,1 VA	
	Accuracy	active energy class B acc. DIN EN 50470-3 reactive energy class 2 acc. DIN EN 62053-23	
	Backstop	yes	
	Indicators	Display	LCD-display, update 2 times per second active energy in kWh or MWh with 7.2 digits reactive energy in kvarh or Mvarh with 5.2 digits
		Function indicators	LED for active energy import and export 10.000 pulses/kWh both LED light up at current $< I_{min}$
Reset		via buttons on front panel	
Interface	Interface	10 Mbits/s Ethernet LAN-interface	
	Protocol	TCP/IP protocol MODBUS-TCP-protocol	
Tariff control input	Tariff 1	0 V or open	
	Tariff 2	30 - 260V AC/DC, 0,4 VA	
	Separation	4 kV	

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Panel meters digital

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Panel meters analog

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6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Energy meter for alternating three-phase current

for direct connection up to 80 amps with Ethernet interface

Type:
EZD-TCP 80



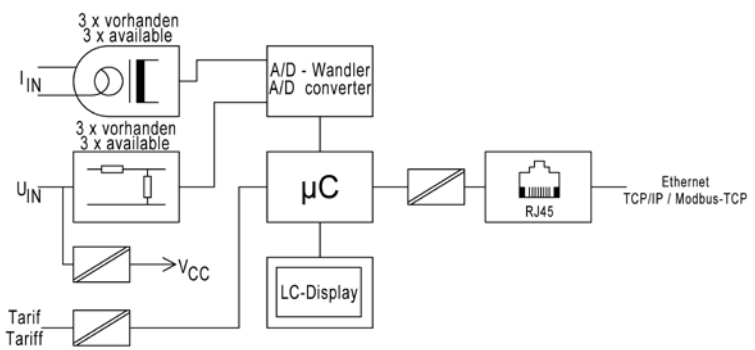
Application

The electronic energy meter EZD-TCP is used to record the active and reactive energy during import and export in three-phase systems under any load. Their application covers for example industrial plants, workshops, machines and offices. The energy values are displayed, stored and provided on an Ethernet interface for further processing. All values for current, voltage, frequency, power and energy can be read on an LCD display. The connection is made directly up to a maximum current of 80 amps.

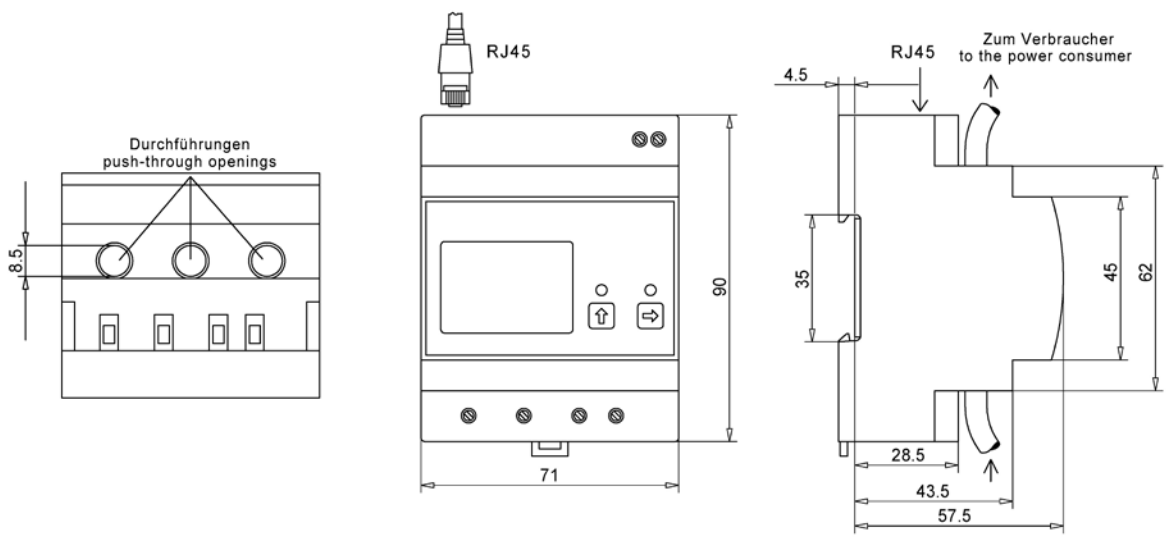


Function

The values to be measured are transferred to an integrated module via internal current transformers and voltage dividers. The instantaneous values of current and voltage are recorded here. A microcontroller takes over the evaluation and the storage of the measured values. The values are shown on an LCD display. A separate auxiliary voltage is not required, it is obtained from the measuring voltage. The meter readings and programming are saved in case of a power failure.



Dimensions

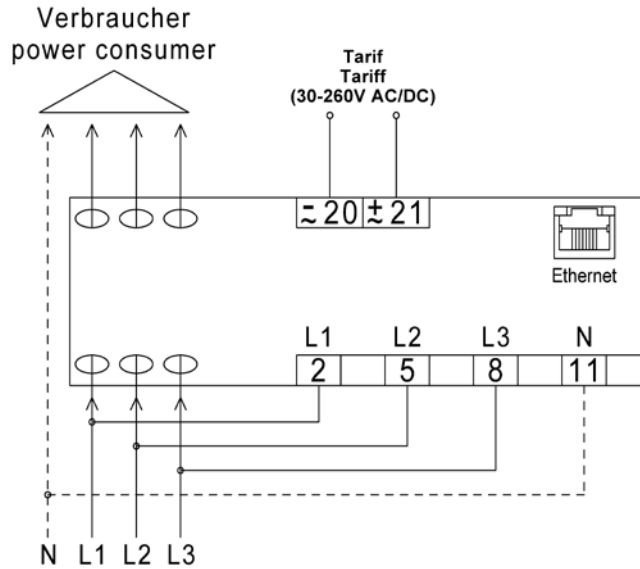


Types and variants

EZD-TCP 80



Connection



Technical data

Input	Mains connection	3-phase 4-wire power system, direct measurement bidirectional meter, 2-tariff measurement	
	Rated voltage	50-300 V / 87-520 V and 3 x 87-520 V	
	Current information acc. to meter print	$I_{min} - I_{ref} (I_{max})$ A	
	Starting current I_{st}	0,02 A (symmetrical per phase)	
	Minimum current I_{min}	0,2 A	
	Transition current I_{tr}	0,5 A	
	Reference current I_{ref}	5 A	
	Limit current I_{max}	80 A	
	Rated frequency	40-70 Hz	
	Energy consumption	voltage circuit approx. 0,7 VA; current circuit approx. 0,1 VA	
	Accuracy	active energy class B acc. DIN EN 50470-3 reactive energy class 2 acc. DIN EN 62053-23	
	Backstop	yes	
	Indicators	Display	LCD-display, update 2 times per second active energy in kWh or MWh with 7.2 digits reactive energy in kvarh or Mvarh with 5.2 digits
		Function indicators	LED for active energy import and export 600 pulses/kWh both LED light up at current < I_{min}
Reset		via buttons on front panel	
Interface	Interface	10 Mbits/s Ethernet LAN-interface	
	Protocol	TCP/IP protocol MODBUS-TCP-protocol	
Tariff control input	Tariff 1	0 V or open	
	Tariff 2	30 - 260V AC/DC, 0,4 VA	
	Separation	4 kV	

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Test apparatus

General description of types SINUS 5//1 und SINUS 85

Application

Energy meters of types SINUS 5//1 and SINUS 85 are three-phase four-wire alternating current meters for transformer and direct connection. They are used for measuring the electrical active and reactive energy in phases of any loads. It may be measured in installations with oscillation package controls (intermittent current consumption) as well as with distorted sine wave. The meters SINUS with MID conformity marking based on a type test are provided as offsetting measuring devices for the registration of electrical active energy. Their application covers industrial plants, workshops, machines, offices etc, and are designed for snap-on fastening on 35 mm top hat rails.

Type and function

The meters SINUS 5//1 and SINUS 85 are fully electronic independently functioning alternating current electricity meters for fixed installation in three-phase four-wire power supply systems and are designed for measuring the electrical active and reactive energy and register them in up to two energy tariffs.

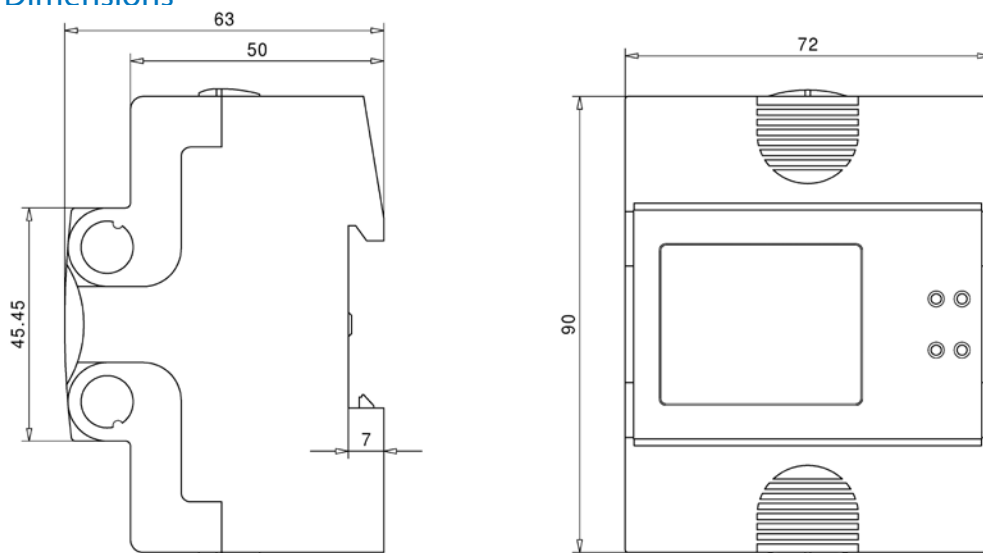
They are designed as indoor meters as housing type and as installation built-in type in 4 module widths and meant for snap-on fastening on top hat rails. One display, one tariff control input for tariff switchover and at least one pulsed output for the output of pulses proportional to the active energy are always available.

An additional auxiliary voltage for the meter is not necessary. The energy measured values are permanently stored in the meter in case of a power failure. Optionally, a second pulsed output for the output of pulses proportional to the reactive power or alternatively a M-Bus or Modbus communication interface for data transmission are available.

Special features

- Digital three-phase energy counter 5//1 A or 85 A direct measurement
- 2 x 230 / 400 V
- Module widths 72 mm
- with MID certificate valid in the EU
- optionally available with integrated M-BUS or Modbus
- Accuracy class 1 (class B)
- LC display 8-digit (6+2 decimal places)
- Installation self test
- two tariff meter HT/NT with tariff switchover input
- with 2 N terminals (loop through of the neutral)
- with 2 S0 pulsed outputs for active and reactive energy
- with 2 LED's for active and reactive energy, permanently lit after power ON without load and flashing proportionally to the load
- the menu indicates: consumption, voltage (V), current (A), power output (W), apparent power (VA), reactive power (var)
- Factory-set S0 pulse number and pulse length (Option)

Dimensions





Energy meter for alternating three-phase current

for current transformer connection secondary 1/5 A

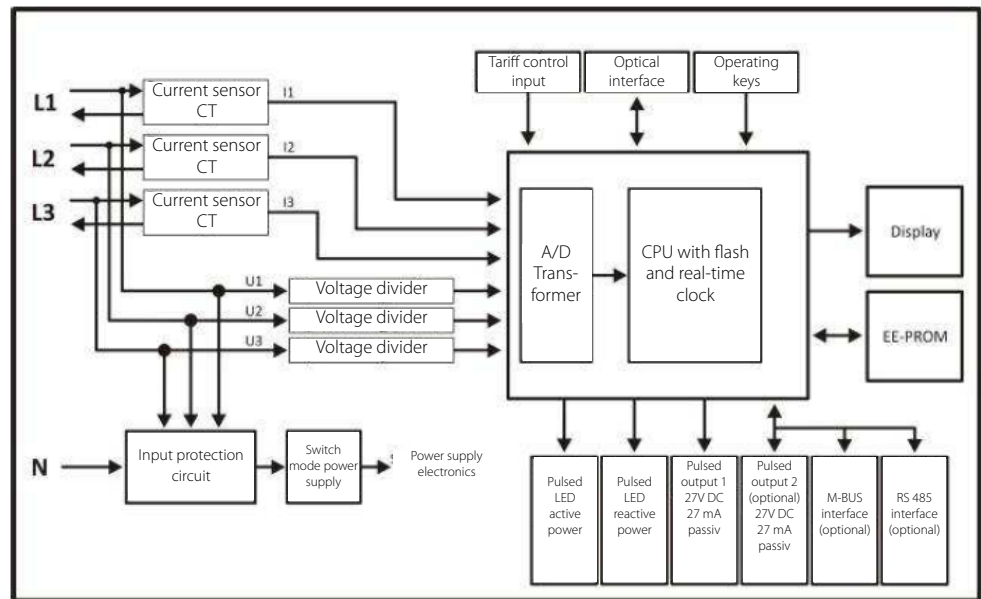
Type:

SINUS 5//1 50 MID
SINUS 5//1 M-BUS MID
SINUS 5//1 Modbus MID



Function

The meter consists of a multi-part plastic housing. One part is manufactured from transparent plastic and covers the LC display (liquid crystal display) below and the name plate. For connecting the meter, terminal screws accessible from the outside are provided. The electronic function circuit of the meter is installed on printed circuit boards and is located inside the plastic housing. The current to be measured is internally adapted to the input conditions of the electronic sensors via a current transformer per current circuit (per phase). The voltage to be measured is internally adapted to the input conditions of the electronic sensors via a voltage divider per voltage circuit (per phase). The current and voltage signals are transmitted to the A/D converter process via filter circuits. The digitalized measuring values are further processed in a downstream processor. Following the processing, the registered energy quantities are indicated in the display. The software controls the processing in the meter. In this way, functions for meter start/stop, pulse output, display control, storage and backup of measured values, start-up and switch-off behavior and error monitoring are realized.

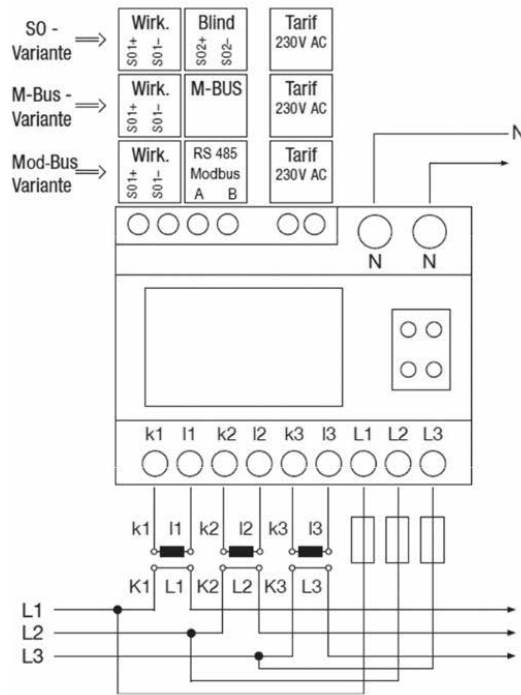


Types and variants

SINUS 5//1 50 MID
 SINUS 5//1 M-BUS MID
 SINUS 5//1 Modbus MID



Connection



Technical data

Types

SINUS 5//1 S0 MID; M-BUS MID; Modbus MID

Reference voltage range 3 x 230/400 (1 ± 10%) V - see meter imprint

Reference frequency range 50 (1 ± 2%) Hz - see meter imprint

Current information see meter imprint I_{min} - I_n (I_{max}) A

Meter imprint I_{min} - I_{ref} (I_{max}) A

Inrush current I_{st} 0,002 A (symmetrical per phase)

Minimum current I_{min} 0,01 A - see meter imprint

Transfer current I_{tr} 0,05 A

Rated current I_{ref} 1 A oder 5 A - see meter imprint

Maximum current I_{max} 6 A

Accuracy class A (MPE = ± 3,5%) or class B (MPE = ± 2%)

Operation indicator/test output dev. LED, red flashing, t_{min} = 30 ms

Detection of standstill/reverse motion LED, red permanent lit

Registration indication LC-display (liquid crystal display)

Display capacity 5 digits kWh and 3 decimal places

Pulse constant optical R_L , standard 20.000 imp/kWh (0,05 Wh/imp) - see meter imprint

Pulse constant electrical R_A , standard 5.000 imp/kWh (0,2 Wh/imp) - see meter imprint

Pulse number/measuring time min 2 pulses and 20 s integration time

Pulse output electric. passiv potential free acc. to DIN EN 62053-31 class A and B

Pulse parameters electrical U_{max} = 30 V, I_{max} = 30 mA, inverse-polarity protection

Pulse length (set) $t_{i max}$ = 35 ms (adjustable)

Operating voltage range 180 V to 265 V, voltage single-phase or three-phase

Operating frequency range 40 Hz to 65 Hz

Energy consumption voltage circuit approx. 0,6 VA, current circuit approx. 0,06 VA

Consideration of harmonic

wave energy content by measurement techniques up to approx. 4 kHz

Temperature range -25 °C to +55 °C, indoor

Protection class class II, protective insulation

Protection level housing IP 51 with terminal cover installed

Fastening snap on fastening on top hat rail 35 mm, DIN EN 60715

Electrical connection screw terminal max 6 mm²

Weight 230 g

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

Panel meters digital

4

Panel meters analog

5

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

Current transformers

8

Shunts

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Test apparatus

10



Energy meter for alternating three-phase current

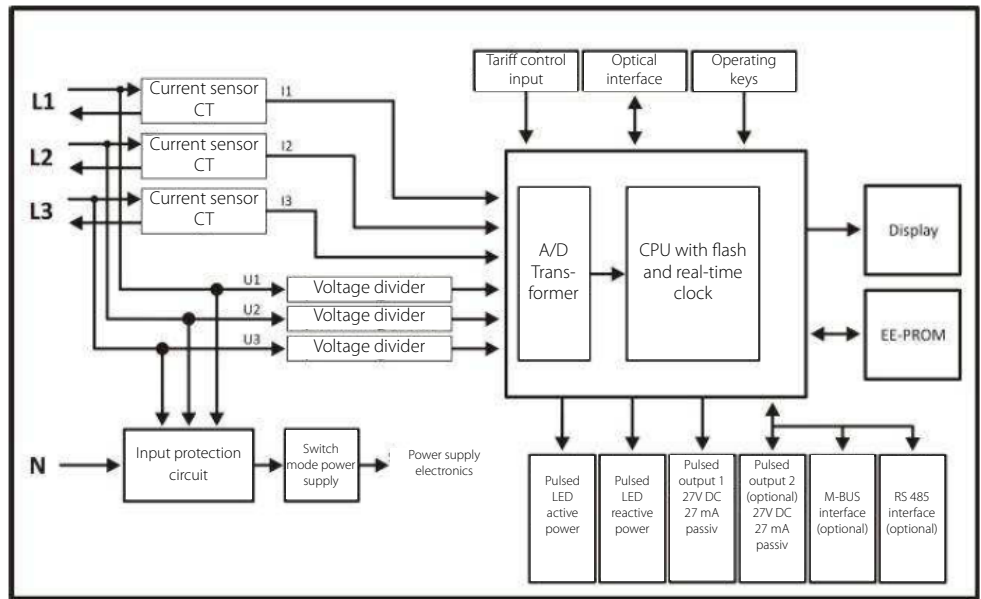
for direct connection up to 85 A

Type:
SINUS 85 50 MID
SINUS 85 M-BUS MID
SINUS 85 Modbus MID



Function

The meter consists of a multi-part plastic housing. One part is manufactured from transparent plastic and covers the LC display (liquid crystal display) below and the name plate. For connecting the meter, terminal screws accessible from the outside are provided. The electronic function circuit of the meter is installed on printed circuit boards and is located inside the plastic housing. The current to be measured is internally adapted to the input conditions of the electronic sensors via a current transformer per current circuit (per phase). The voltage to be measured is internally adapted to the input conditions of the electronic sensors via a voltage divider per voltage circuit (per phase). The current and voltage signals are transmitted to the A/D converter process via filter circuits. The digitalized measuring values are further processed in a downstream processor. Following the processing, the registered energy quantities are indicated in the display. The software controls the processing in the meter. In this way, functions for meter start/stop, pulse output, display control, storage and backup of measured values, start-up and switch-off behavior and error monitoring are realized.

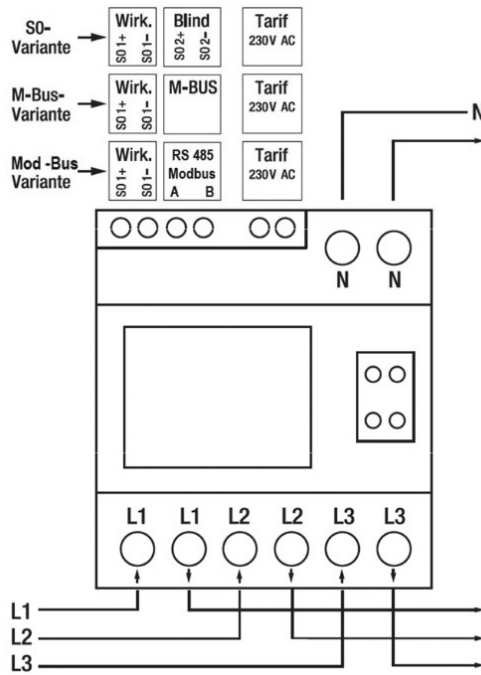


Types and variants

- SINUS 85 50 MID
- SINUS 85 M-BUS MID
- SINUS 85 Modbus MID



Connections



Technical data

Types	SINUS 85 S0 MID; M-BUS MID; Modbus MID
Reference voltage range	3 x 230/400 (1 ± 10%) V - see meter imprint
Reference frequency range	50 (1 ± 2%) Hz - see meter imprint
Current information	see meter imprint I _{min} - I _n (I _{max}) A
Meter imprint	I _{min} - I _{ref} (I _{max}) A
Inrush current I _{st}	0,002 A (symmetrical per phase)
Minimum current I _{min}	0,25 A - see meter imprint
Transfer current I _{tr}	0,5 A
Rated current I _{ref}	5 A
Maximum current I _{max}	85 A
Accuracy	class A (MPE = ± 3,5%) or class B (MPE = ± 2%)
Operation indicator/test output dev.	LED, red flashing, t _{min} = 30 ms
Detection of standstill/reverse motion	LED, red permanent lit
Registration indication	LC-display (liquid crystal display)
Display capacity	5 digits kWh and 3 decimal places
Pulse constant optical	R _L , standard 5.000 imp/kWh (0,2 Wh/imp) - see meter imprint
Pulse constant electrical	R _A , standard 500 imp/kWh (2 Wh/imp) - see meter imprint
Pulse number/measuring time	min 2 pulses and 20 s integration time
Pulse output electric. passiv	potential free acc. to DIN EN 62053-31 class A and B
Pulse parameters electrical	U _{max} = 30 V, I _{max} = 30 mA, inverse-polarity protection
Pulse length (set)	t _{i max} = 35 ms (adjustable)
Operating voltage range	180 V to 265 V, voltage single-phase or three-phase
Operating frequency range	40 Hz to 65 Hz
Energy consumption	voltage circuit approx. 0,6 VA, current circuit approx. 0,06 VA
Consideration of harmonic wave energy content	by measurement techniques up to approx. 4 kHz
Temperature range	-25 °C to +55 °C, indoor
Protection class	class II, protective insulation
Protection level	housing IP 51 with terminal cover installed
Fastening	snap on fastening on top hat rail 35 mm, DIN EN 60715
Electrical connection	screw terminal max 6 mm ²
Weight	270 g

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

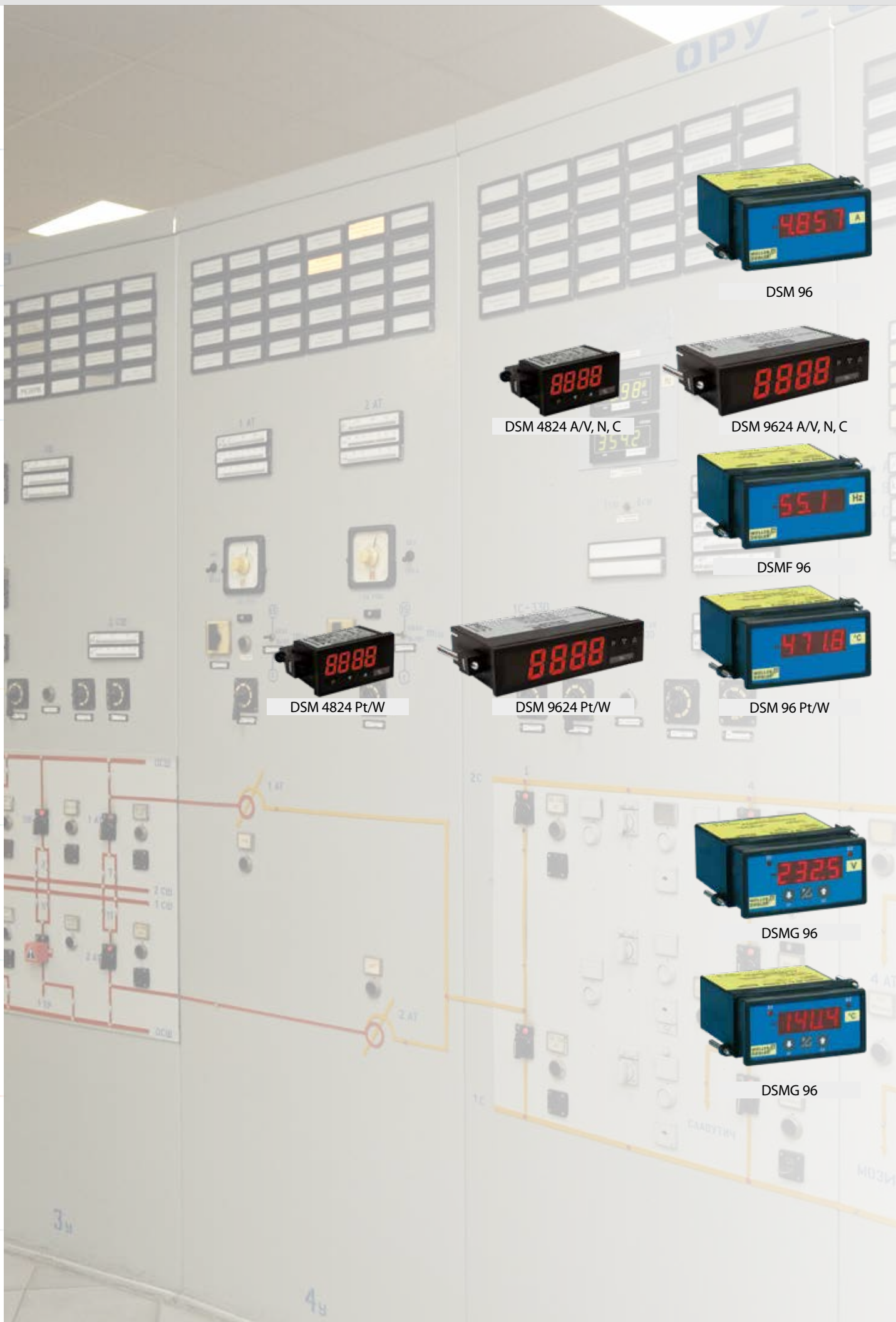
6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



DSM 96



DSM 4824 A/V, N, C



DSM 9624 A/V, N, C



DSMF 96



DSM 4824 Pt/W



DSM 9624 Pt/W



DSM 96 Pt/W



DSMG 96



DSMG 96

Panel meters digital

General description Page 114

Direct and alternating current and voltage

Direct current DSM 96 4-digit Page 116

Direct voltage

Alternating current AC + DC True RMS

Alternating voltage AC + DC True RMS

Heavy current and weak current variable

Direct current, direct voltage DSM 9624 A/V 5-digit Page 118

Direct current, direct voltage (standard signal) DSM 9624 N / 4824 N 4-digit Page 118

Direct voltage at shunt resistor DSM 9624 C / 4824 C 4-digit Page 118

Frequency DSMF 96 4-stellig Page 120

Process variables

Temperature Temperature resistance thermometer Pt 100 DSM 96 Pt 4-digit Page 122

Resistance DSM 96 W 4-digit Page 122

Temperature Temperature resistance thermometer Pt 100 DSM 9624 Pt / DSM 4824 Pt 4-digit Page 124

Resistance DSM 9624 W / DSM 4824 W 4-digit Page 124

Panel meters digital with limit values

Heavy current and weak current variable

Direct current DSMG 96 4-digit Page 126

Direct voltage

Alternating current AC + DC True RMS

Alternating voltage AC + DC True RMS

Process variables

Temperature Temperature resistance thermometer Pt 100 DSMG 96 Pt 4-digit Page 128

Resistance DSMG 96 W 4-digit

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus

General description

Application

Digital panel meters are used for the display and monitoring of various measuring signals in heavy-current and weak-current technique as well as different process variables. Our digital measuring instruments may directly be used for current, voltage, frequency, resistance or temperature measurements.

Furthermore, a measured value may be displayed in a switch room over larger distances using an upstream measuring transducer. Digital indicators may be applied everywhere where increased accuracy is required and reading errors are to be avoided.

Type and function

The digital measuring instruments are distinguished by 4-digit and 5-digit types according to their display capacity. In case of a 4-digit display, the largest presentable value is 9999, in case of a 5-digit display that value is 99999.

The values are shown in a 7-segment LED display. The front panel may be marked in a customer-specific or order-specific manner. Also, the zero point may be elevated or suppressed. A maximum of two limit values may be monitored, the minimum and maximum measured value may be stored and displayed. Decimal points, dark switching of the last digit, zero point as well as display range may be changed after removing the front panel.

Special features

DSM 96

- high accuracy of up to 0.1 % +/- 1 digit of measured value
- auxiliary voltages for 230 V AC, 24 V DC, 36-265 V or 6-30 V AC + DC are available
- 4 kV test voltage between measuring input and all available auxiliary voltages

DSM 9624 und DSM 4824

- high accuracy of up to 0.1 % +/- 1 digit of measured value
- min./max.-value recording
- adjustable support points
- display flashing at limit value exceedance/undershooting
- tara-function

Technical data

General data	EMC	DIN EN 61 326
	(for DC auxiliary voltage and multi voltage)	DIN EN 61 326 class A
	Mechanical strength	DIN EN 61 010 part 1
	Electrical safety	DIN EN 61 010 part 1 housing insulated, protection class II, DSM 96 <ul style="list-style-type: none"> ● for working voltages up to 300 V (phase to neutral) pollution degree 2, measurement category CAT III ● or working voltages up to 600 V (phase to neutral) pollution degree 2, measurement category CAT III DSM 9624 auxiliary voltage 100-240 V AC and 230 V AC <ul style="list-style-type: none"> ● for working voltages up to 300 V (phase to neutral) pollution degree 2, measurement category CAT III DSM 9624/4824 auxiliary voltage 24 V DC <ul style="list-style-type: none"> ● for working voltages up to 100 V (phase to neutral) pollution degree 2, measurement category CAT II
	Isolation	DIN EN 61 010 part 1, 3,7 kV 50 Hz, 10 s
	Air and creep distances	DIN EN 61 010 part 1
	Protection level	DIN EN 60 529, housing IP 50, terminals IP 10

Test report

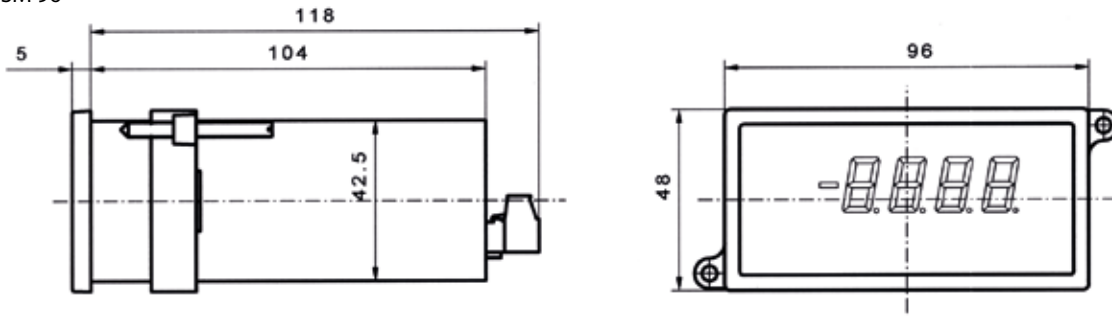
Up to 10 testpoints (depending on type)



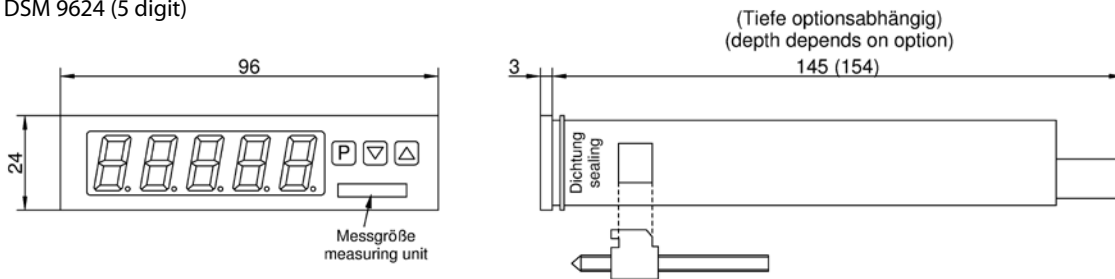
Dimensions

for digital panel meters

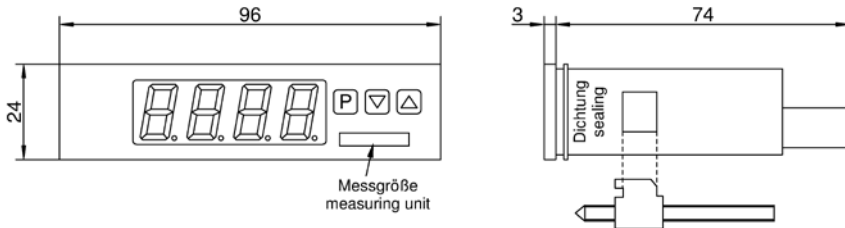
DSM 96



DSM 9624 (5 digit)



DSM 9624 (4 digit)



DSM 4824



Dimensions in brackets for DC version!

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

3

4 Panel meters digital

Panel meters analog

5

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

9

10 Test apparatus

10



Also available in black.
Please specify separately.



Digital measuring instruments

4 digit, 96 x 48 mm
for direct and alternating current and voltage
(True RMS)

Type:
DSM 96



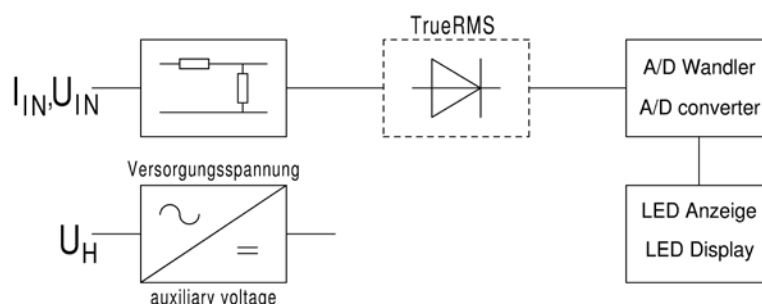
Application

The digital measuring instrument DSM 96 is used for measuring direct current, direct voltage, alternating current and alternating voltage as well as for indicating transformed non-electrical variables.



Function

The measurand is sent to a 4-digit A/D converter via series resistors and shunts (in case of alternating current via an rms rectifier). The conversion is made following the „Dual Slope“ principle. The values are indicated by 7-segment low-power LED displays. A hold function may be achieved by connecting two ports. The zero point compensation is done automatically. Decimal points, dark switching of the last digit, zero point as well as display range may be changed after removing the front panel.



Technical data

Display	LED seven-segment low-power, height 13mm, red; 4-digit
Decimal points	adjustable on front panel using DIP switch
Dark switching	of last digit, on front panel using DIP switch
Polarity	by negative (-) display
Resolution	maximum display +/- 9999 digit
Sampling rate	approx. 3 measurements per second
Measuring principle	Dual Slope integration
Accuracy	± 0,1 % of measured value ± 1 digit for direct voltage ± 0,2 % of measured value ± 2 digit for direct current ± 0,2 % of measured value ± 2 digit for alternating current variables of arbitrary waveform, rms value up to crest factor 4, DC, 40-1000 Hz
Hold function	by connecting terminals 1 + 4
Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
Temperature influence	< 0,05 % at 10 K
Overload capacity	voltage 10-fold, max. 850 V, current 10-fold up to 20 mA, above 2-fold
Test voltage	4 kV between measuring input and auxiliary voltage
IP code	Housing IP 50, terminals IP 10
Connection	plug-in 12-pin terminal block, screw terminal max. 2,5 mm ²
Auxiliary voltage	
Standard	230 V AC ± 20 %, 45-65 Hz, 3 VA
Options	24 V DC, -15 % to +25 %, 2,5 W 6-30 V AC + DC or 36-265 V AC + DC, 2,5 VA



Types and variants

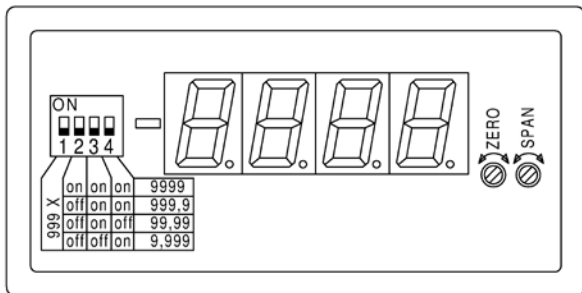
Type	DSM 96 4-digit		
Front panel (mm)	96 x 48		
Housing (mm)	90 x 42,5		
Cut-out (mm)	92 x 45		
Installation depth (mm)	118		
Weight (kg)	0,35		
Type of current	Measuring range	Display	Internal resistance
Direct voltage DC	± 60 mV	1000 bis 9999	> 100 M Ω
	± 100 mV	1000 bis 9999	> 100 M Ω
	± 1 V	1000 bis 9999	> 1 M Ω
	± 10 V	1000 bis 9999	1 M Ω
	± 100 V	1000 bis 9999	1 M Ω
	± 600 V	1000 bis 9999	1 M Ω
Direct current DC	± 1 µA	1000 bis 9999	100 k Ω
	± 10 µA	1000 bis 9999	10 k Ω
	± 100 µA	1000 bis 9999	1 k Ω
	± 1 mA	1000 bis 9999	100 Ω
	± 10 mA	1000 bis 9999	10 Ω
	± 20 mA	1000 bis 9999	10 Ω
	4 - 20 mA	1000 bis 9999	10 Ω
	± 100 mA	1000 bis 9999	1 Ω
	± 1 A	1000 bis 9999	0,1 Ω
	± 5 A	1000 bis 9999	0,02 Ω
Direct and alternating voltage DC + AC True RMS	0 - 100 mV	1000 bis 9999	> 100 M Ω
	0 - 1 V	1000 bis 9999	100 k Ω
	0 - 10 V	1000 bis 9999	1 M Ω
	0 - 100 V	1000 bis 9999	1 M Ω
	0 - 600 V	1000 bis 9999	1 M Ω
Direct and alternating current DC + AC True RMS	0 - 1 mA	1000 bis 9999	100 Ω
	0 - 10 mA	1000 bis 9999	10 Ω
	0 - 100 mA	1000 bis 9999	1 Ω
	0 - 1 A	1000 bis 9999	0,1 Ω
	0 - 5 A	1000 bis 9999	0,02 Ω
Surcharges	Outside of standard series		
	Different measuring unit (e.g. mm/h)		
	Auxiliary voltage	24 V DC	
		6-30 V AC + DC	
		36-265 V AC + DC	

- 1 Measuring transducers
- 2 Mains and limit monitoring
- 3 Energy meters
- 4 Panel meters digital
- 5 Panel meters analog
- 6 Meas. instruments for top hat rail mounting
- 7 Universal measuring instruments

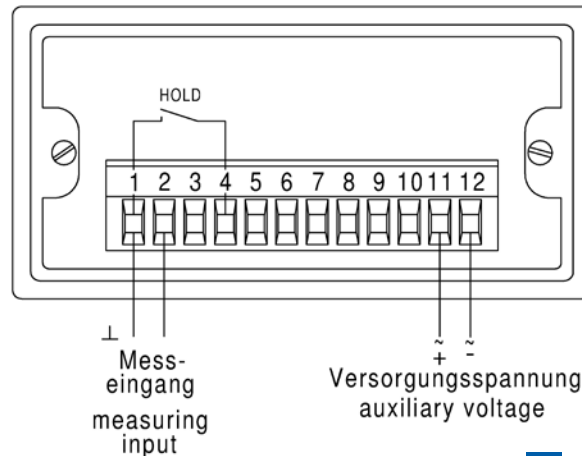


Connection

Front view
(without front panel)



Rear view



- 8 Current transformers
- 9 Shunts
- 10 Test apparatus



Digital measuring instruments

4 and 5 digit, 96 x 24 mm and 48 x 24 mm for direct current and direct voltage

Type:

DSM 9624 N, DSM 9624 A/V, DSM 9624 C, DSM 4824 N, DSM 4824 C



Application

The digital measuring instruments DSM 9624 N, DSM 4824 N and DSM 9624 A/V are used for measuring direct current variables as well as for the indication of transformed non-electrical parameters. Types DSM 9624 C and DSM 4824 C are used for measuring at electrical shunts.



Function

The panel meters serve as 4-digit or 5-digit display for direct voltage or direct current signals and as visual limit monitoring via the display. Programming is done via three front keys. An integrated programming interlock prevents unrequested changes of the parameter and can be unlocked again via an individual code. The electrical connection is at the rear via plug-in terminals. Further selectable functions like the recall of the min./max.-value, a zero point slowdown, a direct change of the limit value in operating mode and additional measuring supporting points for linearization are integrated into the device.



Technical data

Types	DSM 9624 N, DSM 9624 A/V, DSM 9624 C, DSM 4824 N, DSM 4824 C
Display	LED seven-segment low-power, DSM 9624: height 14mm, red; DSM 4824: height 10mm, red N and C: 4 digit adjustable from -1999 to 9999 A/V: 5 digit adjustable from -19999 to 99999
Decimal points	adjustable
Measuring range	adjustable via appropriate connection the rear side
Polarity	by negative (-) display
Overflow	horizontal bars above
Underflow	horizontal bars below
Limit values	optical display flashing at exceedance or undershooting
Resolution	approx. 18 bit at 1 s measuring time
Measuring time	0,1 to 10 s
Measuring principle	U/F-conversion
Accuracy	0/4-20 mA, 0-10 V DC: 0,1 % of measuring range, ± 1 digit remaining measuring ranges: 0,5 % of measuring range, ± 1 digit
Temperature range	-20 °C to 0 °C to +50 °C to +80 °C
Temperature influence	100 ppm/K
Test voltage	auxiliary voltage 100-240 VAC and 230 VAC: 2,5 kV 24 VDC: 1 kV
Auxiliary voltage	DSM 4824 N and C 24 VDC $\pm 10\%$ (max. 1 VA) DSM 9624 N and C 4-stellig 230 VAC $\pm 10\%$ (max. 3 VA) ● Option 24 VDC $\pm 10\%$ (max. 1 VA) DSM 9624 A/V 5-digit 100-240 VAC 50/60 Hz, DC $\pm 10\%$ (max. 10 VA)
IP code	at the front IP65, rear side IP00
Connection	plug-in screw terminal, max. 2,5mm ²
Material	housing: PC polycarbonate, black sealing: EPDM, 65 shore, black
Installation	screw mounting



Types and variants

Types	DSM 9624 N / DSM 9624 A/V / DSM 9624 C	DSM 4824 N / DSM 4824 C
Front panel (mm)	96 x 24	48 x 24
Housing (mm)	91,7 x 21,7	44,4 x 21,6
Cut-out (mm)	92 x 22,2	45 x 22,2
Installation depth (mm)	N and C max. 74; A/V max. 154	54
weight (kg)	N and C 0,15; A/V 0,25	0,1

Type DSM 9624 A/V	Measuring range selectable via connection	Display	Internal resistance
Direct current	±1 A	-19999 to 99999	0,2 Ω
Direct voltage	± 300 V	-19999 to 99999	1 MΩ

Type DSM 9624 N DSM 4824 N	Measuring range selectable via connection	Display	Internal resistance
Direct current	± 20 mA	-1999 to 9999	100 Ω
	4-20 mA	-1999 to 9999	100 Ω
Direct voltage	± 10 V	-1999 to 9999	200 kΩ

Type DSM 9624 C DSM 4824 C	Measuring range selectable via connection	Display	Internal resistance
Direct voltage	60 mV	-1999 to 9999	12 kΩ
at shunt resistor	150 mV	-1999 to 9999	30 kΩ

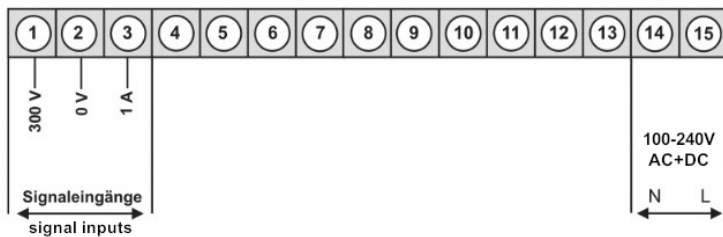
Type DSM 9624 A/V	auxiliary voltage 100-240 VAC
Type DSM 9624 N	auxiliary voltage 230 VAC/24 VDC
Type DSM 9624 C	auxiliary voltage 230 VAC/24 VDC
Type DSM 4824 N	auxiliary voltage 24 VDC
Type DSM 4824 C	auxiliary voltage 24 VDC

Other measuring ranges on request.

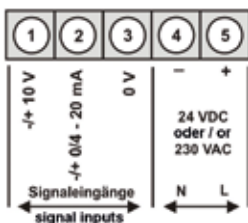


Connection

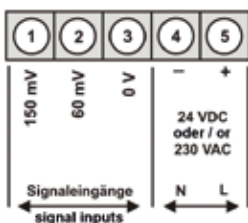
DSM 9624 A/V



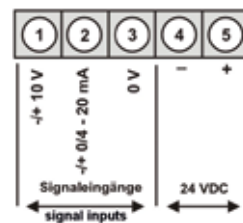
DSM 9624 N



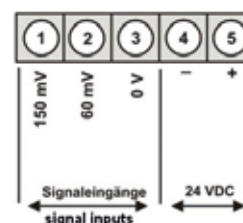
DSM 9624 C



DSM 4824 N



DSM 4824 C





Also available in black.
Please specify separately.

Digital measuring instruments

4-digit, 96 x 48 mm
for frequency

Type:
DSMF 96



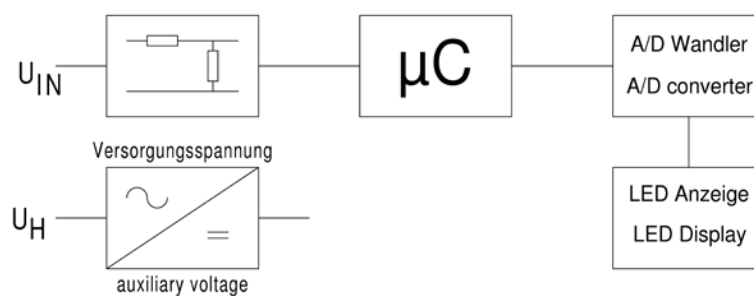
Application

The digital measuring instrument DSMF 96 is used for measuring the frequency of alternating voltage as well as for the measurement of the pulsed direct voltage signals.



Function

The measurand passes via resistors to a pulse shaper and then to a 4-digit A/D converter. The conversion is made following the „Dual Slope“ principle. The values are indicated by 7-segment low-power LED displays. A hold function may be achieved by connecting two ports. The zero point compensation is done automatically. Decimal points, dark switching of the last digit, zero point as well as display range may be changed after removing the front panel.



Technical data

Display	LED seven-segment low-power, height 13mm, red; 4-digit
Decimal points	adjustable on front panel using DIP switch
Dark switching	of last digit, on front panel using DIP switch
Overflow	by negative (-) display
Resolution	maximum display +/- 9999 digit
Sampling rate	approx. 3 measurements per second
Measuring principle	Dual Slope integration
Accuracy	± 0,5 % of measured value +/- 2 digit for arbitrary waveform
Hold function	by connecting terminals 1 + 4
Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
Temperature influence	< 0,05 % at 10 K
Overload capacity	voltage 10-fold, max. 850 V, current 10-fold up to 20 mA, above 2-fold
Test voltage	4 kV between measuring input and auxiliary voltage
IP code	Housing IP 50, terminals IP 10
Connection	plug-in 12-pin terminal block, screw terminal max. 2,5 mm ²
Auxiliary voltage	
Standard	230 V AC ± 20 %, 45-65 Hz, 3 VA
Options	24 V DC, -15 % to +25 %, 2,5 W 6-30 V AC + DC or 36-265 V AC + DC, 2,5 VA



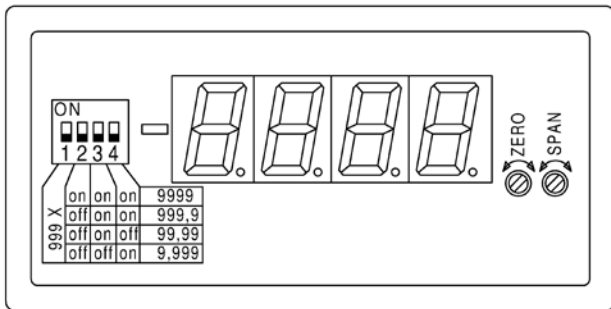
Types and variants

Types	DSMF 96 4-digit			
Front panel (mm)	96 x 48			
Housing (mm)	90 x 42,5			
Cut-out (mm)	92 x 45			
Installation depth (mm)	118			
weight (kg)	0,35			
Type of current	Measuring range	Display	Measuring voltage	Internal resistance
Alternating voltage or pulsed direct voltage	0 - 1000 Hz	0 - 999,9 Hz	5 - 50 V	50 k Ω
	0 - 1000 Hz	0 - 999,9 Hz	50 - 500 V	500 k Ω
Surcharges	Outside of standard series			
	Different measuring unit (e.g. mm/h)			
Auxiliary voltage	24 V DC			
	6-30 V AC + DC			
	36-265 V AC + DC			

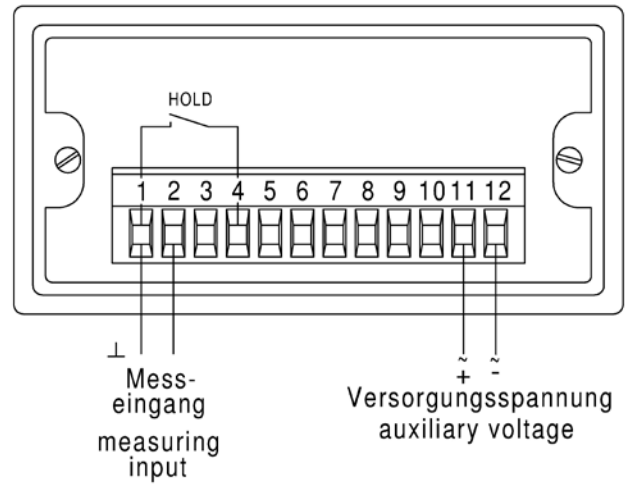


Connection

Front view
(without front panel)



Rear view





Also available in black.
Please specify separately.

Digital measuring instruments

4-digit, 96 x 48 mm
for temperature and resistance

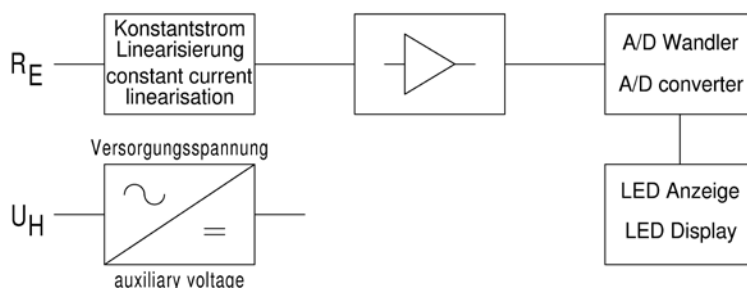
Type:
DSM 96 Pt / W

Application

The digital measuring instrument DSM 96 Pt is used for measuring the temperature in connection with a resistance thermometer Pt 100. Type DSM 96 W is designed for measuring resistances.

Function

The measurand is converted into a direct voltage in an evaluation circuit and fed to a 4-digit A/D converter. The conversion is made following the „Dual Slope“ principle. The values are indicated by 7-segment low-power LED displays. In case of line breakage of the Pt 100, the LED flashes. The measurement may be done in two-wire or three-wire technique. A hold function may be achieved by connecting two ports. The zero point compensation is done automatically. Decimal points, dark switching of the last digit, zero point as well as display range may be changed after removing the front panel.



Technical data

Types	DSM 96 Pt / W
Display	LED seven-segment low-power, height 13mm, red; 4-digit
Decimal points	adjustable on front panel using DIP switch
Dark switching	of last digit, on front panel using DIP switch
Sensor current	max. 3 mA
Sensor voltage	max. 4 V
Two-wire technique	max. input lead resistance 10 Ω (adjustment using „ZERO“ -potentiom.)
Three-wire technique	max. 100 Ω input lead resistance symmetrical
Polarity	by negative (-) display
Overflow	flashing LED
Resolution	maximum display +/- 9999 digit
Sampling rate	approx. 3 measurement per second
Measuring principle	Dual-Slope integration
Accuracy	± 0,2 % , ± 2 Digit of measuring range
Hold function	by connecting terminals 1 + 4
Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
Temperature influence	< 0,05 % at 10 K
Test voltage	4 kV between measuring input and auxiliary voltage
IP code	housing IP 50, terminals IP 10
Connection	plug-in 12-pin terminal block, screw terminal max. 2,5 mm ²
Auxiliary voltage	Standard 230 V AC ± 20 %, 45-65 Hz, 3 VA
	Options 24 V DC, -15 % to +25 %, 2,5 W
	6-30 V AC + DC or 36-265 V AC + DC, 2,5 VA



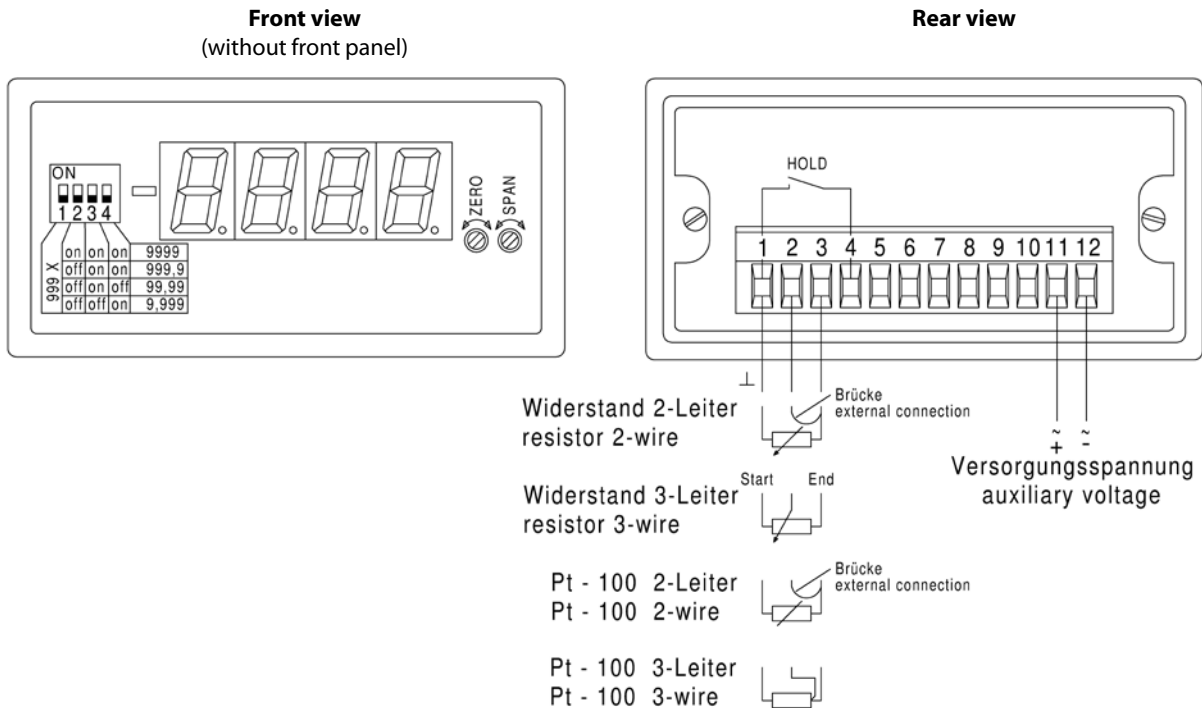
Types and variants

Types	DSM 96 Pt, DSM 96 W	
Front panel (mm)	96 x 48	
Housing (mm)	90 x 42,5	
Cut-out (mm)	92 x 45	
Installation depth (mm)	118	
weight (kg)	0,35	
DSM 96 Pt 4-stellig	Messbereich	Anzeige
Temperaturmessung Pt 100	-60 bis +850 °C	-60,0 bis +850,0 °C
DSM 96 W4-digit	Measuring range	Display
Resistance measurement	an arbitrary value between	
3-wire circuit	0-100 Ω to 0-10 kΩ	1000 to 9999
2-wire circuit	0-100 Ω	1000 to 9999
	0-1 kΩ	1000 to 9999
	0-10 kΩ	1000 to 9999
Surcharges	Outside of standard series	
	Different measuring unit (e.g. mm/h)	
Auxiliary voltage	24 V DC	
	6-30 V AC + DC	
	36-265 V AC + DC	

In case of resistance measurement: Please specify 2-wire or 3-wire circuit in order!



Connection





Digital measuring instruments

4 digit, 96 x 24 mm and 48 x 24 mm for temperature and resistance

Type:

DSM 9624 Pt, DSM 4824 Pt, DSM 9624 W, DSM 4824 W



Application

The digital measuring instruments DSM 9624 Pt and DSM 4824 Pt are used for measuring the temperature in connection with a resistance thermometer Pt 100. Types DSM 9624 W and DSM 4824 W are used for measuring resistances.



Function

The panel meters serve as 4-digit display for Pt 100 sensor signals and resistance and as visual limit monitoring via the display. Programming is done via three front keys. An integrated programming interlock prevents unrequested changes of the parameter and can be unlocked again via an individual code. The electrical connection is at the rear via plug-in terminals. Further selectable functions like e.g. the recall of the min./max.-value, a zero point slowdown, a direct change of the limit value in operating mode and an impedance matching up to 20 °C are integrated into the device.



Technical data

Types	DSM 9624 Pt, DSM 9624 4824 Pt, DSM 9624 W, DSM 4824 W	
Display	LED seven-segment low-power, DSM 9624: height 14mm, red; DSM 4824: height 10mm, red	
Decimal points	adjustable	
Overflow	horizontal bars above	
Underflow	horizontal bars below	
Limit values	optical display flashing at exceedance or undershooting	
Resolution	Pt100: approx. 0,1 °C resistance: ca. 18 bit at 1 s measuring time	
Measuring time	0,1 to 10 s.	
Measuring principle	U/F-conversion	
Accuracy	Pt 100: 0,1 % of measuring range, +/- 1 digit resistance: 0,5 % of measuring range, +/- 1 digit	
Temperature range	-20 °C to 0 °C to +60 °C to +80 °C	
Temperature influence	100 ppm/K	
Test voltage	auxiliary voltage 230 VAC: 2,5 kV 24 VDC: 1 kV	
Auxiliary voltage	DSM 4824 Pt and W	24 VDC ± 10 % (max. 1 VA)
	DSM 9624 Pt and W	230 VAC ± 10 % (max. 3 VA)
	● Option	24 VDC ± 10 % (max. 1 VA)
IP code	at the front IP65, rear side IP00	
Connection	plug-in screw terminal, max. 2,5mm ²	
Material	housing: PC polycarbonate, black sealing: EPDM, 65 shore, black	
Installation	screw mounting	



Types and variants

Types	DSM 9624 Pt / DSM 9624 W	DSM 4824 Pt / DSM 4824 W
Front panel (mm)	96 x 24	48 x 24
Housing (mm)	91,7 x 21,7	44,4 x 21,6
Cut-out (mm)	92 x 22,2	45 x 22,2
Installation depth (mm)	74	54
Weight (kg)	0,15	0,1
Types DSM 9624 Pt DSM 4824 Pt	Measuring range	Display
Temperature measurement Pt 100	-200 °C to +850 °C	-19999 to 99999
Types DSM 9624 W DSM 4824 W	Measuring range	Display
Resistance measurement	2-wire	
	0-1 kΩ	-1999 to 9999
	0-10 kΩ	-1999 to 9999
	0-100 kΩ	-1999 to 9999
Resistance measurement	3-wire	
	>1 kΩ to <1000 kΩ	-1999 to 9999
Type DSM 9624 Pt	auxiliary voltage 230 VAC/24 VDC	
Type DSM 9624 W	auxiliary voltage 230 VAC/24 VDC	
Type DSM 4824 Pt	auxiliary voltage 24 VDC	
Type DSM 4824 W	auxiliary voltage 24 VDC	

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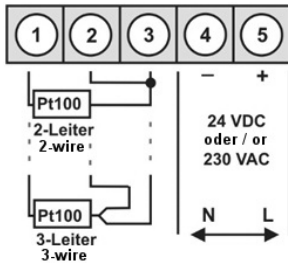
Test apparatus

10

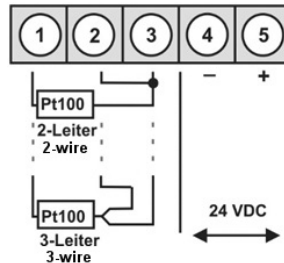


Connection

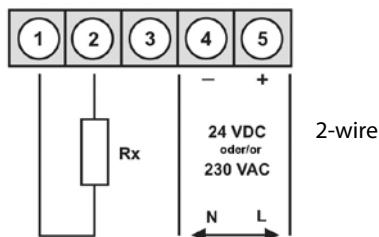
DSM 9624 Pt



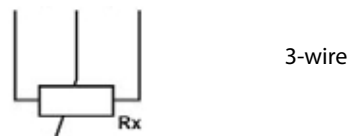
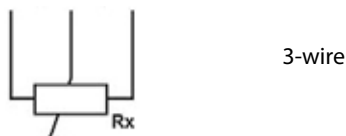
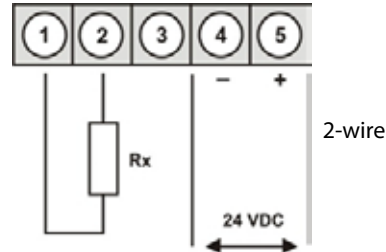
DSM 4824 Pt



DSM 9624 W



DSM 4824 W



(In case of order please specify 2-wire or 3-wire!)

(In case of order please specify 2-wire or 3-wire!)



Also available in black.
Please specify separately.

Digital measuring instruments

4 digit, 96 x 48 mm
with two adjustable limit values
for direct and alternating current and voltage
(True RMS)

Type:
DSMG 96



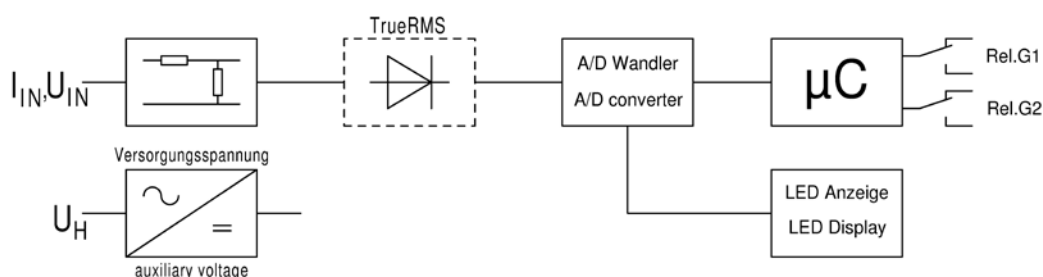
Application

The digital measuring instrument DSMG 96 may be used for measuring and monitoring two limit values with direct current and direct voltage, alternating current and alternating voltage as well as for the indication of transformed nonelectrical parameters.



Function

The measurand is sent to a 4-digit A/D converter via series resistors and shunts (in case of alternating current via an rms rectifier). The conversion is made following the „Dual Slope“ principle. The values are indicated by 7-segment low-power LED displays. The measurand is continuously compared to the set limit values. As soon as the limit values are reached, the related limit value contacts are switched. The programming of the limit values is done via the front panel using membrane keys. The measuring instrument is equipped with a min/max value memory. The zero point compensation is done automatically. Decimal points, dark switching of the last digit, zero point as well as display range may be changed after removing the front panel.



Technical data

Display	LED seven-segment low-power, height 13mm, red; 4-digit
Decimal points	adjustable on front panel using DIP switch
Dark switching	of last digit, on front panel using DIP switch
Polarity	by negative (-) display
Overflow	flashing LED
Resolution	maximum display +/- 9999 digit
Sampling rate	approx. 3 measurements per second
Measurement principle	Dual-Slope integration
Accuracy	± 0,1 % of measured value ± 1 digit for direct voltage ± 0,2 % of measured value ± 2 digit for direct current ± 0,2 % of measured value ± 2 digit for alternating current variables of arbitrary waveform, rms value up to crest factor 4, DC, 40-1000 Hz
Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
Temperature influence	< 0,05 % at 10 K
Overload capacity	voltage 10-fold, max. 850 V, current 10-fold up to 20 mA, above 2-fold
Limit values	
Switching accuracy	± 0 digit
Switching time	< 400 ms for 10 % limit value exceedance
Hysteresis	adjustable from 0-10 % off limit value
Switching delay	adjustable from 0-150 s
Relay contacts	2 changeover contacts
Switching capacity	max. 8 A, 250 V AC, 2000 VA
Test voltage	4 kV between measuring input and auxiliary voltage
IP code	housing IP 50, terminals IP 10
Connection	plug-in 12-pin terminal block, screw terminal max. 2,5 mm ²
Auxiliary voltage	
Standard	230 V AC ± 20 %, 45-65 Hz, 3 VA
Options	24 V DC, -15 % to +25 %, 2,5 W 6-30 V AC + DC or 36-265 V AC + DC, 2,5 VA



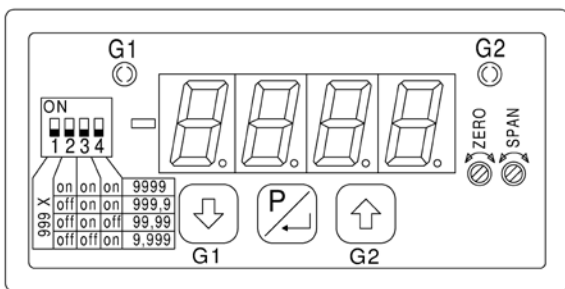
Types and variants

Type	DSMG 96 4-digit		
Front panel (mm)	96 x 48		
Housing (mm)	90 x 42,5		
Cut-out (mm)	92 x 45		
Installation depth (mm)	118		
Weight (kg)	0,35		
Type of current	Measuring range	Display	Internal resistance
Direct voltage DC	± 60 mV	1000 to 9999	> 100 M Ω
	± 100 mV	1000 to 9999	> 100 M Ω
	± 1 V	1000 to 9999	> 1 M Ω
	± 10 V	1000 to 9999	1 M Ω
	± 100 V	1000 to 9999	1 M Ω
	± 600 V	1000 to 9999	1 M Ω
Direct current DC	± 1 µA	1000 to 9999	100 k Ω
	± 10 µA	1000 to 9999	10 k Ω
	± 100 µA	1000 to 9999	1 k Ω
	± 1 mA	1000 to 9999	100 Ω
	± 10 mA	1000 to 9999	10 Ω
	± 20 mA	1000 to 9999	10 Ω
	4 - 20 mA	1000 to 9999	10 Ω
	± 100 mA	1000 to 9999	1 Ω
	± 1 A	1000 to 9999	0,1 Ω
	± 5 A	1000 to 9999	0,02 Ω
Direct and alternating voltage DC + AC True RMS	0 - 100 mV	1000 to 9999	> 100 M Ω
	0 - 1 V	1000 to 9999	100 k Ω
	0 - 10 V	1000 to 9999	1 M Ω
	0 - 100 V	1000 to 9999	1 M Ω
	0 - 600 V	1000 to 9999	1 M Ω
Direct and alternating current DC + AC True RMS	0 - 1 mA	1000 to 9999	100 Ω
	0 - 10 mA	1000 to 9999	10 Ω
	0 - 100 mA	1000 to 9999	1 Ω
	0 - 1 A	1000 to 9999	0,1 Ω
	0 - 5 A	1000 to 9999	0,02 Ω
Surcharges	Outside of standard series		
	Different measuring unit (e.g. mm/h)		
	Auxiliary voltage	24 V DC 6-30 V AC + DC 36-265 V AC + DC	

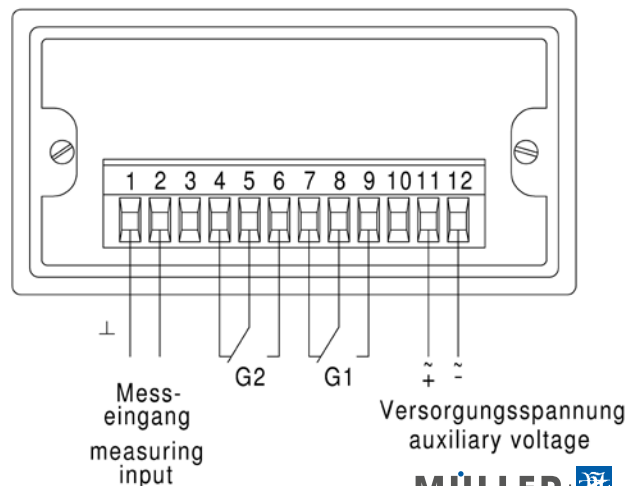


Connection

Front view
(without front panel)



Rear view



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Also available in black.
Please specify separately.

Digital measuring instruments

4 digit, 96 x 48 mm
with two adjustable limit values
for temperature and resistance

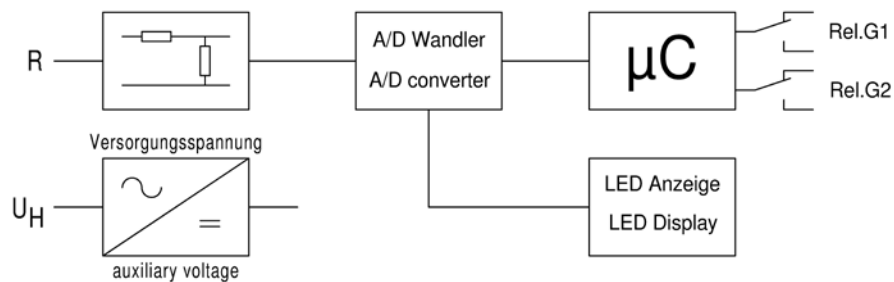
Type:
DSMG 96 Pt, DSMG 96 W

Application

The digital measuring instrument DSMG 96 Pt may be used for measuring and monitoring two limit values during temperature measurements in connection with a resistance thermometer Pt 100. Type DSM 96 W is designed for measuring resistances.

Function

The measurand is converted into a direct voltage in an evaluation circuit and fed to a 4-digit A/D converter. The conversion is made following the „Dual Slope“ principle. The values are indicated by 7-segment low-power LED displays. In case of line breakage of the Pt 100, the LED flashes. The measurement may be done in two-wire or three-wire technique. The measurand is continuously compared to the set limit values. As soon as the limit values are reached, the related limit value contacts are switched. The programming of the limit values is done via the front panel using membrane keys. The measuring instrument is equipped with a min/max value memory. The zero point compensation is done automatically. Decimal points, dark switching of the last digit, zero point as well as display range may be changed after removing the front panel.



Technical data

Display	LED seven-segment low-power, height 13mm, red; 4-digit
Decimal points	adjustable on front panel using DIP switch
Dark switching	of last digit, on front panel using DIP switch
Sensor current	max. 3 mA
Sensor voltage	max. 4 V
Two-wire technique	max. input lead resistance 10 Ω (adjustment using „ZERO“ potentiom.)
Three-wire technique	max. 100 Ω input lead resistance symmetrical
Polarity	by negative (-) display
Overflow	flashing LED
Resolution	maximum display +/- 9999 digit
Sampling rate	approx. 3 measurements per second
Measurement principle	Dual-Slope integration
Accuracy	± 0,2 %, ± 2 digit of measuring range
Temperature range	-15 °C to +20 °C to +30 °C to +55 °C
Temperature influence	< 0,05 % at 10 K
Test voltage	4 kV between measuring input and auxiliary voltage
Limit values	
Switching accuracy	± 0 digit
Switching time	< 400 ms for 10 % limit value exceedance
Hysteresis	adjustable from 0-10 % off limit value
Switching delay	adjustable from 0-150 s
Relay contacts	2 changeover contacts
Switching capacity	max. 8 A, 250 V AC, 2000 VA
Test voltage	4 kV between measuring input and auxiliary voltage
IP code	housing IP 50, terminals IP 10
Connection	plug-in 12-pin terminal block, screw terminal max. 2,5 mm ²

Auxiliary voltage	Standard	230 V AC \pm 20 %, 45-65 Hz, 3 VA
	Options	24 V DC, -15 % at +25 %, 2,5 W
		6-30 V AC + DC or 36-265 V AC + DC, 2,5 VA



Types and variants

Type	DSMG 96 Pt / W	
Front panel (mm)	96 x 48	
Housing (mm)	90 x 42,5	
Cut-out (mm)	92 x 45	
Installation depth (mm)	118	
Weight (kg)	0,35	

DSMG 96 Pt 4-digit	Measuring range	Display
Temperature measurement Pt 100	-60 to +850 °C	-60,0 to +850,0 °C

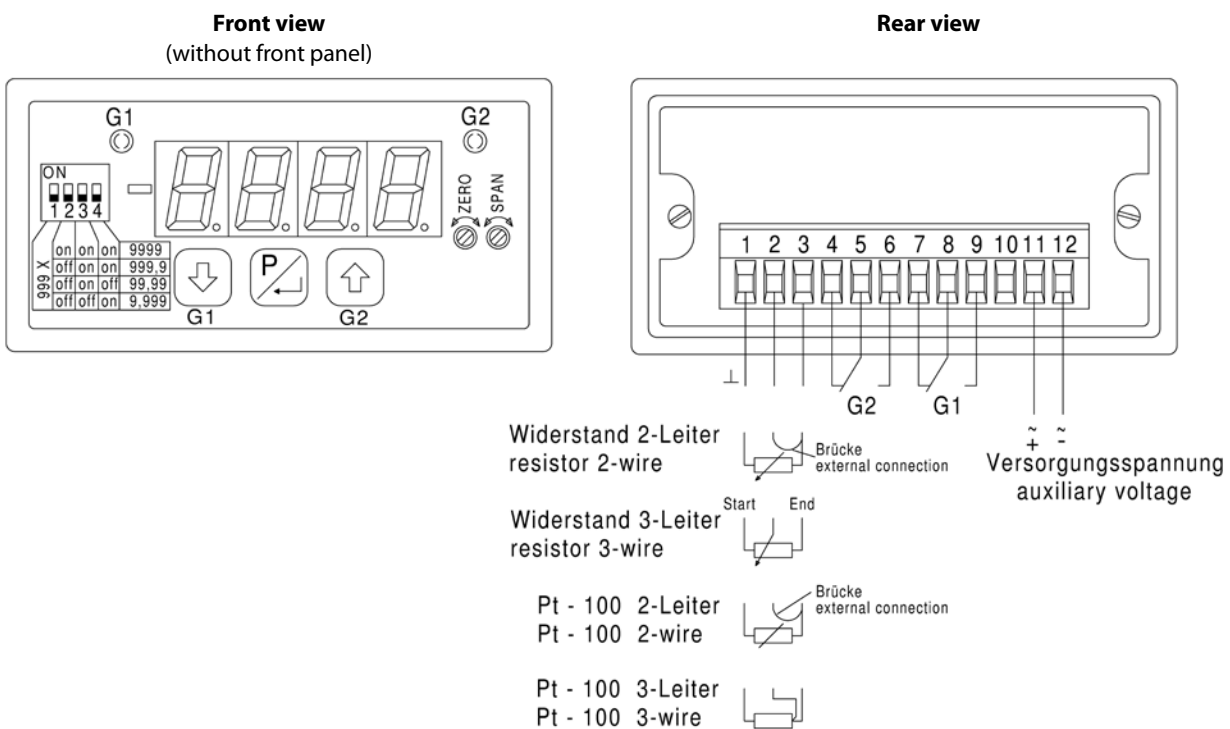
DSMG 96 W4-digit	Measuring range	Display
Resistance measurement	3-wire circuit	an arbitrary value between 0-100 Ω to 0-10 k Ω 1000 to 9999
	2-wire circuit	0-100 Ω 1000 to 9999 0-1 k Ω 1000 to 9999 0-10 k Ω 1000 to 9999

Surcharges	Outside of standard series	
	Different measuring unit (e.g. mm/h)	
Auxiliary voltage	24 V DC	
	6-30 V AC + DC	
	36-265 V AC + DC	

In case of resistance measurement: Please specify 2-wire or 3-wire circuit in order!



Connection





SZ



SZ ... Gs



NDR



SM8/SM16



DWQ .. DIN



DWQB .. DIN



LWQ .. DIN



WQ .. DIN



PQ .. DIN



NM / MQ .. DIN



NMW / MWQ .. DIN



NP / PQ .. DIN



PK



P



NPG / PQG .. DIN



NW / WQ .. DIN



NW .. SU

Panel meters analog

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Special versions		Page 140
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Voltmeter selector switch	SUAS 45/7	Page 227
Moving-coil measuring instruments		
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Special versions		Page 145
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Direct current and direct voltage slim profile	P	Page 150
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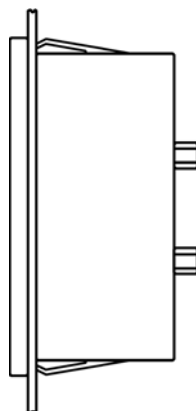
Test apparatus

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General description

Housing

Dimensions	For all types the housing dimensions and the required panel cut-outs comply with DIN 43 700.	
Material	N-Series 48 DIN, PK 72 DIN, PK 96 DIN 72 DIN, 96 DIN, 144 DIN	Lexan 500 (self extinguishing acc. to UL 94 V-0) PC / ABS Sheet steel galvanized
IP code	All housing follow DIN EN 60 529 and comply with IP 52 on front side or special moduls with IP 54 if possible	
Snap-on fastening	For types of N-series and 48 DIN for panel thickness 1 mm to 3 mm no seperat fastening element required	



Fastening acc. to DIN 43 835 with screw clamp
 panel thickness 1 mm to 4 mm (standard type, figure 1) with DIN screw clamp shape B,
 panel thickness 1 mm to 40 mm for types 72 DIN, 96 DIN, 144 DIN (figure 2) against surcharge

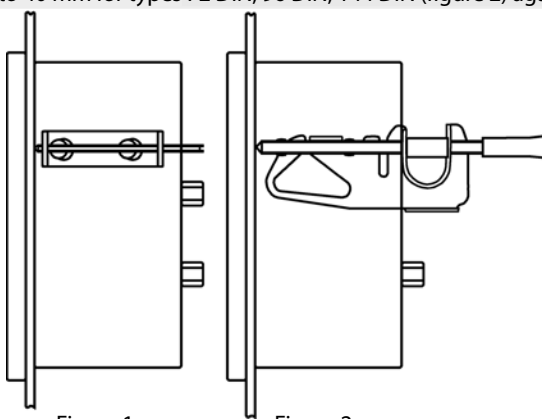


Figure 1

Figure 2

Contact protection sleeves



Technical data

Front panel	Dimensions acc. to DIN 43 718. The front frames are delivered as slim frame (black) for all types.
Scale, pointer	Design acc. to DIN 43 802. The scale graduation is designed as rough/fine division, the pointers as bar pointers.
Zero point setting	All analog measuring instruments offers a zero correction
Accuracy	Acc. to DIN EN 60 051. It is defined under reference conditions, referred to the full scale. With zero point offset, the sum of both full scale values applies. In case of power factor measuring instruments and resistance meters (scale characteristics highly nonlinear), the measuring error is referred to the scale length.
Reference conditions	Temperature 20°C ± 2K, nominal operating position ± 1°
Influencing quantities	Operating position normally vertical ± 5°, in case of deviating operating position, the angle of the horizontal position must be specified. Temperature influence, unless specified otherwise, is the additional error ≤ 1,5 % at 20 °C ± 10 K environmental temperature. Ferromagnetic control panels have no influence on the measuring accuracy.
Operating temperature	The measurement instruments operate faultlessly within a temperature range of -25°C bis +55°C (unless specified otherwise).
Mechanical strength	The measuring elements are designed with a steel tip bearing. Their mobile element is supported in spring-loaded ceramic stones. This guarantees a vibration resistance of up to 2.5 g and an impact resistance of up to 15. For higher levels of stress and loads, carbide tips are used.
EMC	EMC according to DIN EN 61 326
Safety regulations	According to DIN EN 61 010 part 1. Protection class acc. to DIN EN 60 529, connecting terminals with protection against contacts, back-of-hand-proof, IP10.

Types	Measuring category	Working voltage phase to neutral AC effective or DC	Test voltage/ Conditions
For all N ... types, WQ 48 DIN, PQ 48 DIN, WAS 45, SZAS 45 (Plastic housing)	CAT III	300 V	4 kV
For all PQ..., WQ..., MQ..., DWQ..., LWQ..., F..., SZ..., MWQ72, MWQ96 (Metal housing)		300 V	2,5 kV installed in grounded metal panel
Round scale indicator 240° of Pk typ Narrow profile of the device types P 48 x 24, P 72 x 24, P 96 x 24, P 144 x 36 (Plastic housing)		150 V	2,5 kV
MWQ144 (Metal housing)		150 V	2,5 kV installed in grounded metal panel
PAS 45 (Plastic housing)		100 V	2,5 kV

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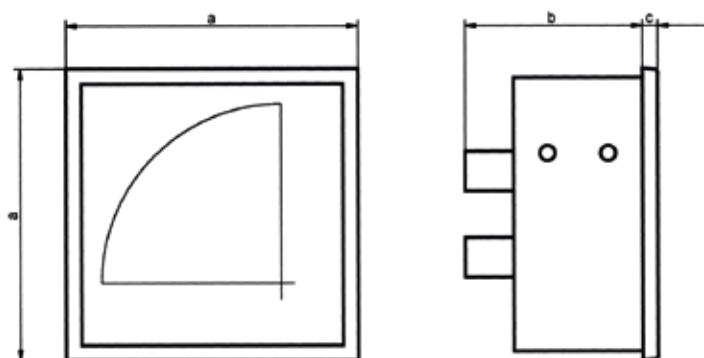
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10 Test apparatus

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Dimensions

for panel meters analog, square cut-out

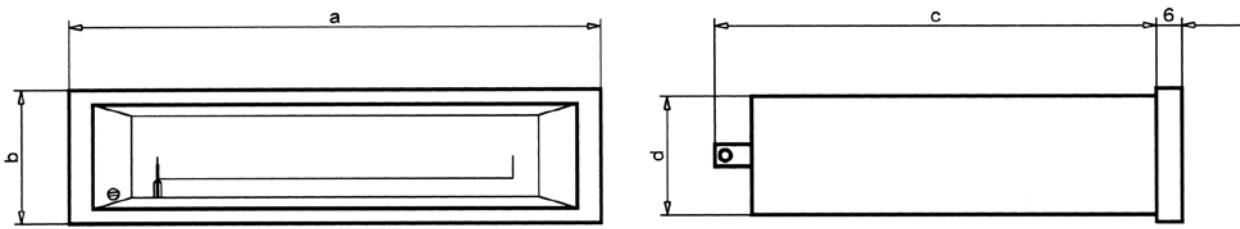


Types			a	b	c
NW, NP, NPG, NMW	72	-15 A	72	58	5
		> 15 - 60 A	72	64	5
NW, NP, NPG, NMW	96	-15 A	96	58	5
		> 15 - 60 A	96	64	5
WQ, PQ, PGQ	48 DIN	-15 A	48	47	5
		> 15 - 60 A	48	53	5
WQ, PQ, MQ, Fz, SZ, LWQ	72 DIN	-15 A	72	60	5
Fz, SZ, LWQ		> 15 - 60 A	72	66	5
WQ, PQ, MQ, LWQ, Fz, DWQ, SZ	96 DIN	-15 A	96	60	5
Fz, DWQ, SZ		> 15 - 60 A	96	66	5
WQ, PQ, MQ	144 DIN	-15 A	144	61	7
Fz		> 15 - 60 A	144	66	7
PK, PKG	48 DIN	-15 A	48	68	5
		> 15 - 60 A	48	73	5
PK, PKG	72 DIN	-15 A	72	54	5
		> 15 - 60 A	72	54	5
PK, PKG	96 DIN	-15 A	96	54	5
		> 15 - 60 A	96	54	5
PK, PKG	144 DIN	-15 A	144	69	7
		> 15 - 60 A	144	75	7
MWQ	72 DIN	/ 5 A	72	102	5
MWQ	96 DIN	/ 5 A	96	102	5
MWQ	144 DIN	/ 5 A	144	99	7
SM 8 / SM 16	96 DIN		96	56	5



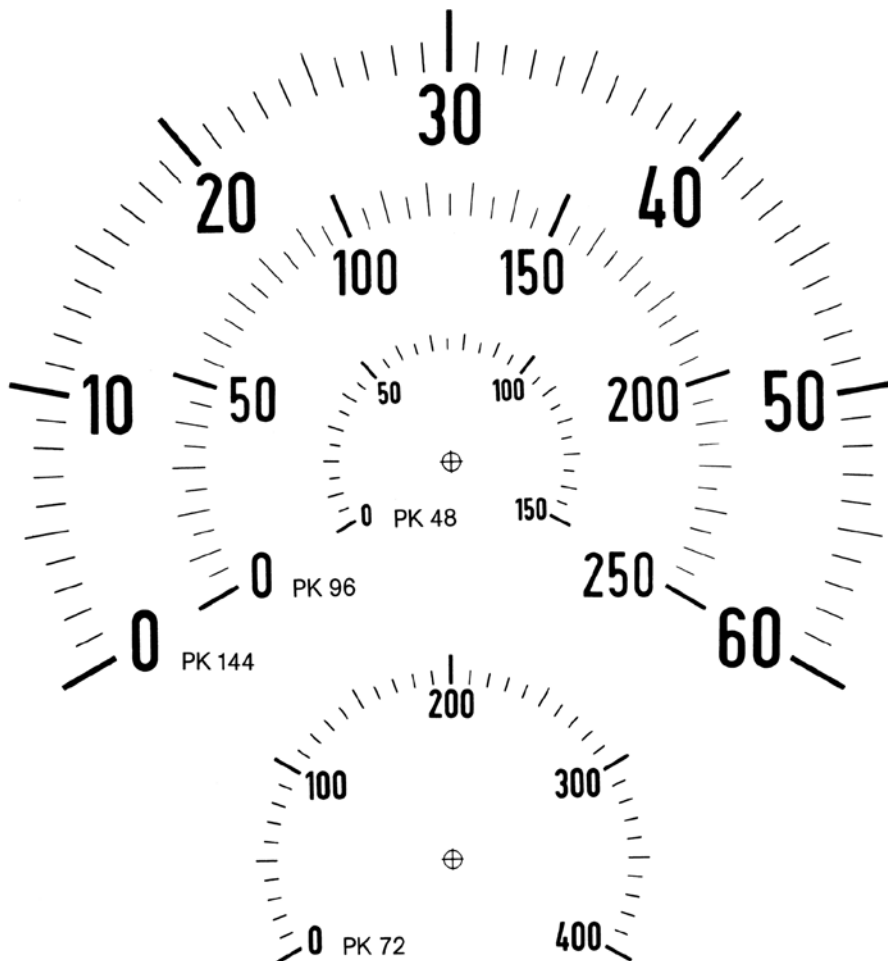
Dimensions

for panel meters analog, rectangular cut-out



Types	a	b	c	d	Durchbruch
P 48x24	48	24	70	18	45 x 22
P 72x24	72	24	86	18	68 x 22
P 72x36	72	36	105	32	68 x 34
P 96x24	96	24	102	18	92 x 22
P 96x48	96	48	126	42	92 x 46
P 144x36	144	36	202	32	138 x 33
P 144x72	144	72	168	68	138 x 69

Scale graduation in original size



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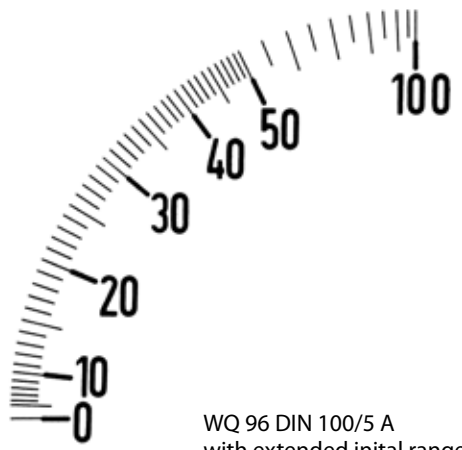
6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

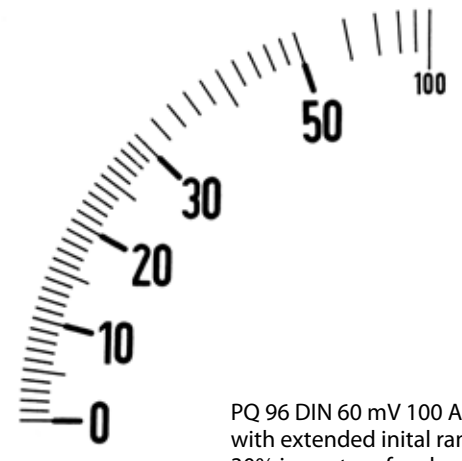
8 Current transformers

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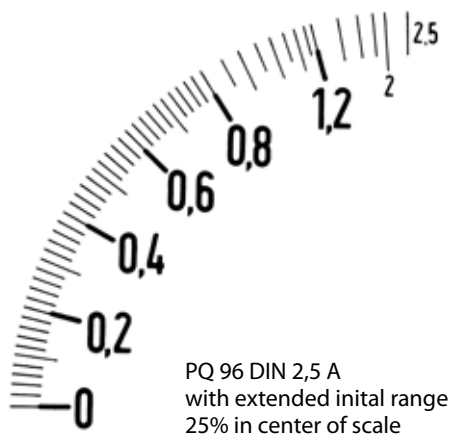
10 Test apparatus



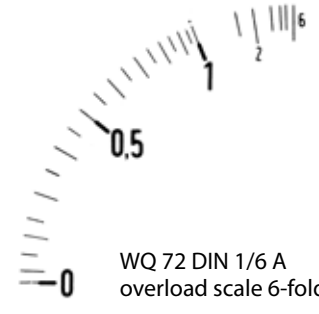
WQ 96 DIN 100/5 A
with extended initial range
30% in center of scale



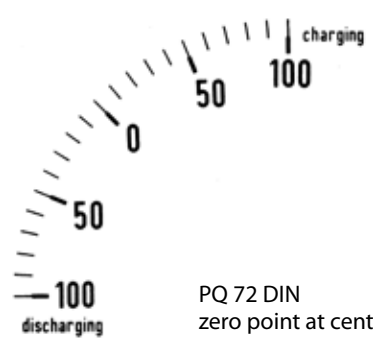
PQ 96 DIN 60 mV 100 A
with extended initial range
30% in center of scale



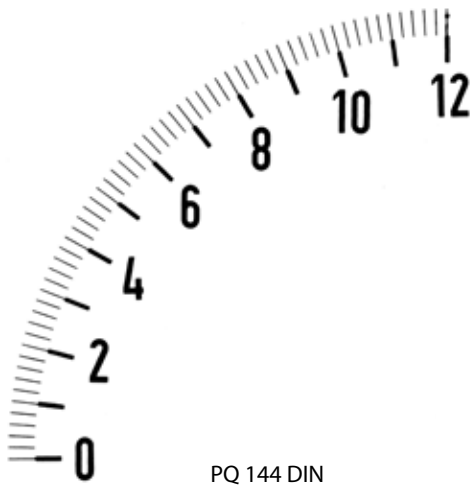
PQ 96 DIN 2,5 A
with extended initial range
25% in center of scale



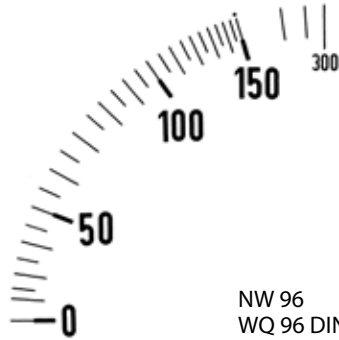
WQ 72 DIN 1/6 A
overload scale 6-fold



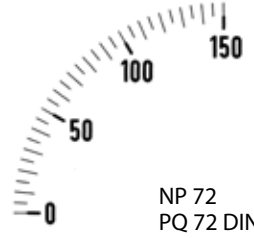
PQ 72 DIN
zero point at center



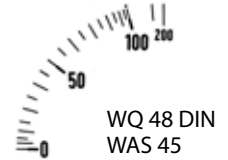
PQ 144 DIN



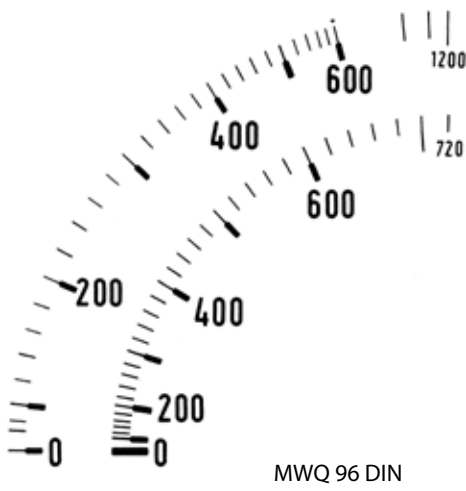
NW 96
WQ 96 DIN



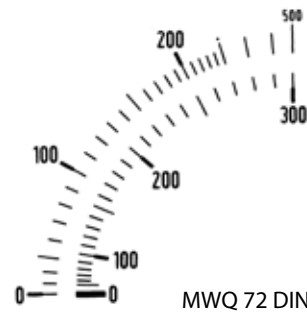
NP 72
PQ 72 DIN



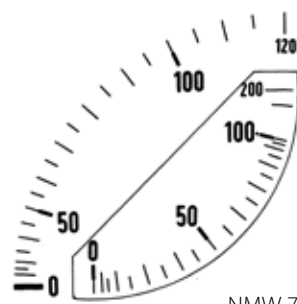
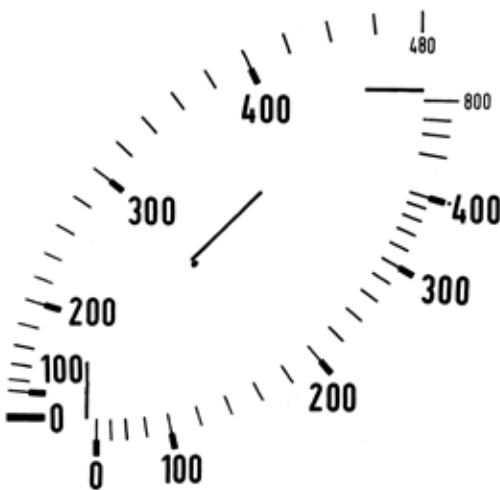
WQ 48 DIN
WAS 45



MWQ 96 DIN



MWQ 72 DIN



NMW 72

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog N+DIN-series

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus

General special versions

Increased requirements	Shakeproof > 2,5 g up to 5 g from 100 µA and 100 mV
	Acid-resistant and splash proof
	IP 54, front side ● Types 72 DIN and 96 DIN (with screw fixing only) ● N-Series
	conditionally tropicalized
Pointer	Red marker pointer, adjustable at front side, for sizes 72, 96, 144 only
Scales	Imprint
	red marking at arbitray position of scale
	colored sector at arbitray position of scale
	e.g. charge / discharge
	second scale numbering
	Double scale
	Special calibration
	according to curve or table
	in different measuring unit, e.g. min-1, bar, m/s
	Special scale
blanc scale (without scale graduation and measuring unit)	
scale black, pointer, graduation and numbering white or yellow (as far as possible)	
scale fine graduation	
Illumination	
by means of 12 V or 24 V lamp plugged at rear side (as far as possible)	
Fastening	screw clamp shape B acc. to DIN 43 835
Front frame	grey (similar to RAL 7037, as far as possible)
Front glass	low-glare glass
	plexiglas
Cover frame	with glass pane acc. to DIN 43 718 for cut-outs acc. to DIN 43 700
	68 mm x 68 mm
	92 mm x 92 mm
	138 mm x 138 mm
Blind cover	from black plastic material for cut-outs acc. to DIN 43 700
	45 mm x 45 mm (front 48 mm x 48 mm)
	68 mm x 68 mm (front 72 mm x 72 mm)
	92 mm x 92 mm (front 96 mm x 96 mm)
	92 mm x 22 mm (front 96 mm x 24 mm)
	92 mm x 45 mm (front 96 mm x 48 mm)
Protection cover	IP 65 protection for front 72 x 72 mm
	IP 65 protection for front 96 x 96 mm
Test report	up to 10 test points (depending on type)

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

Panel meters digital

4

Panel meters analog N+DIN-series

5

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus

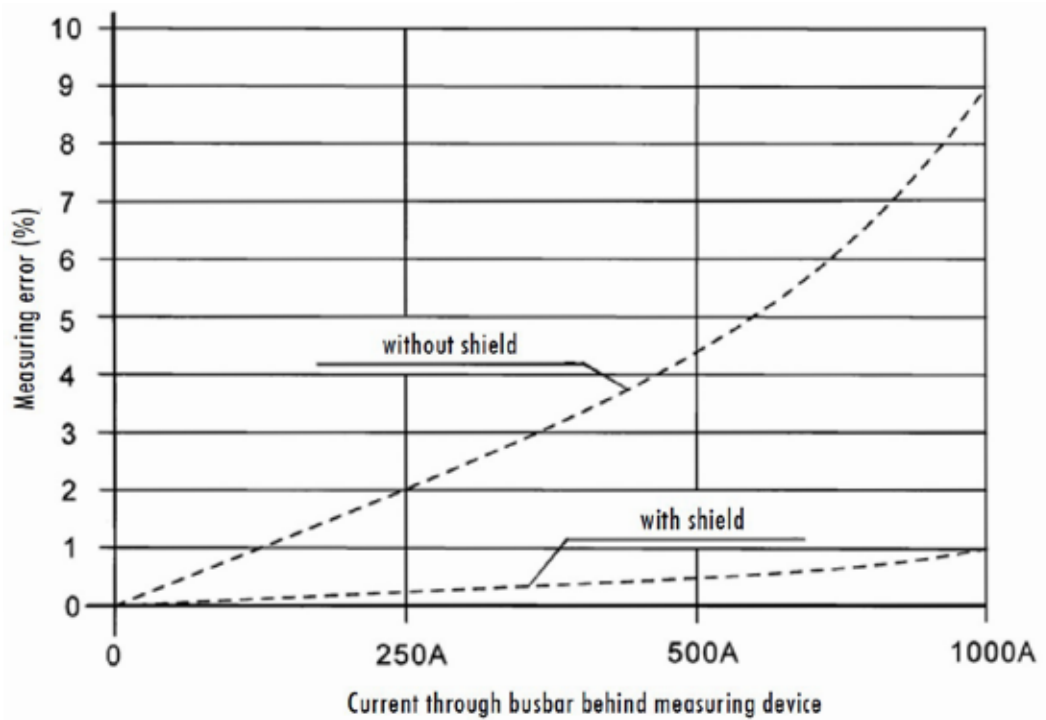
Moving-iron measuring instruments

Application	<p>Moving-iron measuring instruments are mainly used in heavy-current installation for the measurement of alternating currents and alternating voltages (direct measurement or via current or voltage transformer). Moving-iron measuring instruments also indicate the rms value in case of non-sinusoidal quantities within a frequency range of 15-100 Hz.</p> <p>With direct current and direct voltage, additional indication errors of approx. 1 % may occur due to magnetization errors inside the iron. As compared to moving-coil measuring instruments, the energy consumption is relatively high ranging between 0.6 VA and 2 VA. They are thus not suited for measuring small currents or voltages, like e.g. at shunts, speed sensor, thermoelements, measuring transducers.</p>																										
Measuring systems	<ul style="list-style-type: none"> ● Robust and electrically resistant to high overloads ● Spring loaded toe bearing in ceramic stones ● Damping through silicone bearings, setting time approx. 1 s ● High torque ● Shielding against external magnetic fields 																										
Design	<p>Moving-iron measuring instruments are manufactured according to DIN 60 051 as well as according to the other relevant VDE and DIN regulations. The accuracy amounts to 1.5 % referred to the full scale. The graduation of the scale of standard ammeters disposes of a 2-fold overload scale and starts at approx. 10% (20% for voltmeters) of the full scale.</p> <p>Moving-iron measuring elements are resistant to a permanent 1.2-fold overload, ammeters temporarily to a max. 50-fold overload, voltmeters to a max. 2-fold overload; for the rest, DIN EN 60 051 applies. Voltmeters and ammeters up to 5 A are provided with a shielding against external magnetic fields up to a strength of 4 kA/m, ammeters of 6 A up to 60 A offer a shielding up to a strength of (2 kA/m).</p> <p>The connection is realized using M4 screws for voltmeters and for ammeters up to 15 A max. 6 mm², M5 screws up to 60 A max. 16 mm² (back-of-hand-proof).</p>																										
Special versions	<table border="1"> <tr> <td>Measuring ranges</td> <td>without overload range outside of standard series</td> </tr> <tr> <td></td> <td>increased overload range for CT connection max. 6-fold, with direct measurement < 50 A max. 5-fold</td> </tr> <tr> <td></td> <td>extended initial range up to 30 % of full scale in center of scale (up to 25 A and 800 V) without overload</td> </tr> <tr> <td></td> <td>extended accuracy 1 %</td> </tr> <tr> <td>Special calibration</td> <td>for direct current</td> </tr> <tr> <td></td> <td>for frequency 16 2/3 Hz</td> </tr> <tr> <td></td> <td>fixed value between 100 Hz and 400 Hz</td> </tr> <tr> <td></td> <td>● for ammeters</td> </tr> <tr> <td></td> <td>● for voltmeters</td> </tr> <tr> <td></td> <td>fixed value between 400 Hz and 1000 Hz</td> </tr> <tr> <td></td> <td>● for ammeters</td> </tr> <tr> <td></td> <td>● for voltmeters</td> </tr> <tr> <td>Damping</td> <td>increased damping, strong aperiodic, setting time approx. 3 s</td> </tr> </table>	Measuring ranges	without overload range outside of standard series		increased overload range for CT connection max. 6-fold, with direct measurement < 50 A max. 5-fold		extended initial range up to 30 % of full scale in center of scale (up to 25 A and 800 V) without overload		extended accuracy 1 %	Special calibration	for direct current		for frequency 16 2/3 Hz		fixed value between 100 Hz and 400 Hz		● for ammeters		● for voltmeters		fixed value between 400 Hz and 1000 Hz		● for ammeters		● for voltmeters	Damping	increased damping, strong aperiodic, setting time approx. 3 s
Measuring ranges	without overload range outside of standard series																										
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	● for voltmeters																										
Damping	increased damping, strong aperiodic, setting time approx. 3 s																										

Größen 72, 96, 144

External magnetic field influence in case of moving-iron measuring instruments

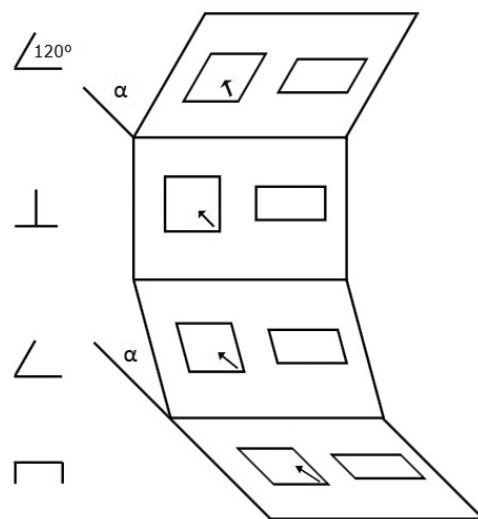
Influence of external magnetic field of a busbar at a horizontal distance of 100 mm and a vertical distance of 150 mm to the moving-iron ammeter.



Due to the capsuled measuring systems, Müller+Ziegler instruments still lie within the required accuracy class even in case of high external magnetic fields.

Operating position

In general, the operating position is indicated by a position symbol. For instruments without a position symbol, the reference area is any operating position between horizontal and vertical. The nominal operating position is 1° in each direction effect from the reference operating position, whereby the influencing effect (in addition to the display error) must not be greater than 50% of the corresponding class error.



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog N+DIN-series

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Moving-iron measuring instruments

for alternating current and alternating voltage

Type:
NW / WQ .. DIN

Square cut-out
40 - 100 Hz, class 1,5
Ammeter with 2-fold overload scale
Energy consumption:
Voltmeter 2 VA
Ammeter 0,6-2 VA

plastic housing



plastic housing



metal housing



Type	NW 72	NW 96	WQ 48 DIN	WQ 72 DIN	WQ 96 DIN	WQ 144 DIN
Front frame (mm)	72x72	96x96	48 x 48	72 x 72	96 x 96	144 x 144
Cut-out (mm)	68 x 68	92 x 92	45 x 45	68 x 68	92 x 92	138 x 138
Scale length (mm)	62	90	42	62	90	130
Weight (kg)	0,20	0,25	0,10	0,26	0,30	0,70



Types and variants

Measuring ranges

Alternating voltage

V		NW 72	NW 96	WQ 48 DIN	WQ 72 DIN	WQ 96 DIN	WQ 144 DIN
10				-			
15				-			
25		X	X	X	X	X	X
40							
60							
100							
150							
250		X	X	X	X	X	X
400							
500							
600				-			
for use with voltage transformer	sec. 100V sec. 110V	X	X	X	X	X	X

Alternating current

mA		NW 72	NW 96	WQ 48 DIN	WQ 72 DIN	WQ 96 DIN	WQ 144 DIN
40		X	X	-	X	X	X
60				-			
100							
150							
250		X	X	X	X	X	X
400							
600							
A							
1							
1,5							
2,5							
4		X	X	X	X	X	X
6							
10							
15							
25				-			
40		X	X	-	X	X	X
60				-			
for use with current transformer	sec. 5A sec. 1 A	X	X	X	X	X	X



Moving-iron measuring instruments

with integrated selector switch for measurement of the alternating voltage in 3-phase power systems phase against phase as well as phase against neutral with 6 switching positions

Type:
NW .. SU

Square cut-out
40 - 100 Hz, class 1,5
Energy consumption max. 4 VA

plastic housing



Type	NW 72 SU	NW 96 SU
Front frame (mm)	72x72	96x96
Cut-out (mm)	68 x 68	92 x 92
Scale length (mm)	62	90
Weight (kg)	0,20	0,25

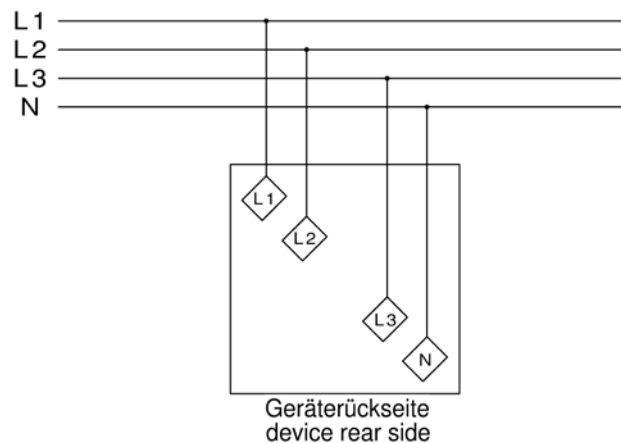


Types and variants

Measuring ranges

500 V	X	X
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Wiring diagram NW96SU and NW72SU



Measuring transducers

Mains and limit monitoring

Energy meters

Panel meters digital

Panel meters analog N+DIN-series

Meas. instruments for top hat rail mounting

Universal measuring instruments

Current transformers

Shunts

Test apparatus

Description moving-coil panel meters

Application	<p>Moving-coil measuring instruments serve for measuring direct current and direct voltage. For extending the measuring range, shunts, series resistors or voltage dividers are used. The energy consumption of moving-coil measuring instruments is very low; they may thus be connected to shunts, speed sensors, thermocouples, measuring transducers or similar.</p> <p>Moving-coil measuring instruments with rectifier serve for measuring alternating current and alternating voltage. They measure the arithmetic mean value, but are designed in a way to indicate the rms value in case of sinusoidal variables.</p> <p>In case of non-sinusoidal variables, an rms-value rectifier is provided. It is able to still process crest factors of max. 8 without problem. The max. error amounts to less than 1% in this case.</p>
Measuring systems	<ul style="list-style-type: none"> ● Core-magnet measuring system ● Spring loaded toe bearing in ceramic stones ● High damping ● Independent of external fields ● Linear scale characteristics
Design	<p>Moving-coil measuring instruments are manufactured according to DIN 60 051 as well as according to the other relevant VDE and DIN regulations. The accuracy amounts to 1.5 % referred to the full scale.</p> <p>The energy consumption lies between 5 μW and 50 μW, the smallest possible measuring ranges lie around 25 μA and 10 mV. In case of smaller values than stated above, a measuring amplifier is provided.</p> <p>When adjusting moving-coil measuring instruments for their connection to shunts, an input lead resistance of 0.06 Ω is principally accounted for; this corresponds to an input lead of 1.3 m, 2 x 0.75 mm².</p> <p>Moving-coil measuring instruments are resistant to a permanent 1.2-fold overload, ammeters temporarily to a max. 10-fold overload voltmeters to a max. 2-fold overload; for the rest, DIN EN 60 051 applies.</p> <p>The connection is made using M4 screws for voltmeters and for ammeters up to 15 A max. 6 mm² M5 screws up to 60 A max. 16 mm² (back-of-hand-proof), with slim profile moving-coil measuring instruments via blade terminal.</p>

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog N+DIN-series

General special designs

Measuring range	<p>Outside of standard series</p> <p>Second measuring range</p> <p>for voltmeters and ammeters up to 15 A with additional numbering with additional graduation and numbering</p> <p>Electrical suppressed initial range starting from 10V, max. 60 % of full scale</p> <p>Extended initial range, up to 10 % of full screen in center scale</p> <p>Zero point at any position of scale</p> <p>Extended accuracy 1 %</p> <p>Extended accuracy 0,5 % in case of direct current or direct voltage for sizes 96 and 144 only</p>
Special adjustment	<p>With ammeters $\Delta U \pm 1 \%$</p> <p>With voltmeters $R_i \pm 1 \%$</p> <p>Input lead when connected to shunt different to 0,06 Ω</p> <p>Installed potentiometer for voltmeters starting from 60 mV</p> <ul style="list-style-type: none"> ● setting rang $\pm 10 \%$ of full scale ● setting range $\pm 20 \%$ to $\pm 50 \%$ of full scale
Increased input resistance	<p>ca. 2000 Ω / V</p> <p>ca. 4000 Ω / V</p> <p>ca. 10000 Ω / V</p> <p>ca. 20000 Ω / V (as far as possible)</p> <p>> 20000 Ω / V with measuring amplifier</p>
Averager	<p>e.g. in case of pulse packing controls for measuring ranges from 1 A to 25 A incl. current transformer (for types PQ 72 DIN, PQ 96 DIN and PQ 144 DIN only, basic price</p>

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Moving-coil measuring instruments

for direct current

Type:
NP / PQ .. DIN

Square cut-out
Class 1,5

plastic housing

plastic housing

metal housing



Type	NP 72	NP 96	PQ 48 DIN	PQ 72 DIN	PQ 96 DIN	PQ 144 DIN
Front frame (mm)	72x72	96x96	48 x 48	72 x 72	96 x 96	144 x 144
Cut-out (mm)	68 x 68	92 x 92	45 x 45	68 x 68	92 x 92	138 x 138
Scale length (mm)	62	90	42	62	90	130
Weight (kg)	0,20	0,25	0,10	0,26	0,30	0,70



Types and variants

Measuring ranges								
μA	100	Ri / Δ U 4400 Ω	X	X	X	X	X	X
	150	2200 Ω						
	250	900 Ω						
	400	306 Ω	X	X	X	X	X	
	600	177 Ω						
mA	1	53 Ω						
	1,5	23 Ω						
	2,5	9 Ω	X	X	X	X	X	
	4	6,5 Ω						
	6	3,5 Ω						
	10	2,5 Ω						
	15	1,3 Ω						
	25	60 mV	X	X	X	X	X	
	40	60 mV						
	60	60 mV						
	100	60 mV						
	150	60 mV	X	X	X	X	X	
A	250	60 mV						
	400	60 mV						
	600	60 mV						
	1	60 mV						
	1,5	60 mV						
	2,5	60 mV	X	X	X	X	X	
	4	60 mV						
	6	60 mV						
	10	60 mV						
	15	60 mV			-			
	25	60 mV	X	X	-	X	X	
		60 mV						
for use with shunt								
mV	60	12 Ω						
	100	20 Ω	X	X	X	X	X	
	150	30 Ω						
for use with measuring transducer								
mA	0-20	2,2 Ω	X	X	X	X	X	
	4-20	5,0 Ω	X	X	X	X	X	
V	0-10	10 k Ω	X	X	X	X	X	



Moving-coil measuring instruments

for direct voltage

Type:
NP / PQ .. DIN

Square cut-out
Class 1,5

plastic housing

plastic housing

metal housing



Type	NP 72	NP 96	PQ 48 DIN	PQ 72 DIN	PQ 96 DIN	PQ 144 DIN
Front frame (mm)	72x72	96x96	48 x 48	72 x 72	96 x 96	144 x 144
Cut-out (mm)	68 x 68	92 x 92	45 x 45	68 x 68	92 x 92	138 x 138
Scale length (mm)	62	90	42	62	90	130
Weight (kg)	0,20	0,25	0,10	0,26	0,30	0,70



Types and variants

Measuring ranges							
mV	40	Ri / Δ U					
		200 Ω / V	X	X	X	X	X
	60	200 Ω / V	X	X	X	X	X
	100	200 Ω / V					
	150	200 Ω / V					
	250	200 Ω / V	X	X	X	X	X
V	400	1000 Ω / V					
	600	1000 Ω / V					
	1	1000 Ω / V					
	1,5	1000 Ω / V					
	2,5	1000 Ω / V					
	4	1000 Ω / V					
	6	1000 Ω / V					
	10	1000 Ω / V					
	15	1000 Ω / V					
	25	1000 Ω / V					
	40	1000 Ω / V	X	X	X	X	X
	60	1000 Ω / V					
	100	1000 Ω / V					
	150	1000 Ω / V					
	250	1000 Ω / V					
400	1000 Ω / V						
500	1000 Ω / V						
600	1000 Ω / V						



Moving-coil measuring instruments

for direct current

Type:
PK .. DIN

Square cut-out
class 1,5
240° scale

plastic housing

metal housing



Type	PK 48 DIN	PK 72 DIN	PK 96 DIN	PK 144 DIN
Front frame (mm)	48 x 48	72 x 72	96 x 96	144 x 144
Cut-out (mm)	45 x 45	68 x 68	92 x 92	138 x 138
Scale length (mm)	70	105	150	230
Weight (kg)	0,20	0,30	0,40	0,90



Types and variants

Measuring ranges

Unit	Value	Ri / Δ U	PK 48 DIN	PK 72 DIN	PK 96 DIN	PK 144 DIN
μA	100	4400 Ω				
	150	4000 Ω				
	250	2500 Ω	X	X	X	X
	400	2000 Ω				
	600	1400 Ω				
mA	1	300 Ω				
	1,5	250 Ω				
	2,5	120 Ω				
	4	80 Ω				
	6	60 mV	X	X	X	X
	10	60 mV				
	15	60 mV				
	25	60 mV				
	40	60 mV				
	60	60 mV				
V	100	60 mV				
	150	60 mV				
	250	60 mV	X	X	X	X
	400	60 mV				
	600	60 mV				
A	1	60 mV				
	1,5	60 mV	X	X	X	X
	2,5	60 mV				
	4	60 mV				
for use with shunt						
mV	60	12 Ω				
	100	20 Ω	X	X	X	X
	150	30 Ω				
for use with measuring transducer						
mA	0-20	3 Ω	X	X	X	X
	4-20	45 Ω	X	X	X	X
V	0-10	10 kΩ	X	X	X	X



Moving-coil measuring instruments

for direct voltage

Type:
PK..DIN

Square cut-out
class 1,5
240° scale

plastic housing

metal housing



Type	PK 48 DIN	PK 72 DIN	PK 96 DIN	PK 144 DIN
Front frame (mm)	48 x 48	72 x 72	96 x 96	144 x 144
Cut-out (mm)	45 x 45	68 x 68	92 x 92	138 x 138
Scale length (mm)	70	105	150	230
Weight (kg)	0,20	0,30	0,40	0,90



Types and variants

Measuring ranges

		Ri / Δ U	PK 48 DIN	PK 72 DIN	PK 96 DIN	PK 144 DIN
mV	60	200 Ω / V				
	100	200 Ω / V				
	150	200 Ω / V				
	250	200 Ω / V	X	X	X	X
	400	1000 Ω / V				
V	600	1000 Ω / V				
	1	1000 Ω / V				
	1,5	1000 Ω / V				
	2,5	1000 Ω / V				
	4	1000 Ω / V				
	6	1000 Ω / V				
	10	1000 Ω / V				
	15	1000 Ω / V				
	25	1000 Ω / V				
	40	1000 Ω / V	X	X	X	X
	60	1000 Ω / V				
	100	1000 Ω / V				
	150	1000 Ω / V				
250	1000 Ω / V					
400	1000 Ω / V					
500	1000 Ω / V					
600	1000 Ω / V					



Moving-coil measuring instruments

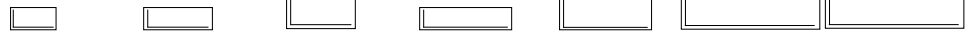
for direct current

Type:
P...

Rectangular cut-out
class 1,5
Horizontal scale (vertical
scale possible - please
specify at order)

plastic housing

metal housing



Type	P 48x24	P 72x24	P 72x36	P 96x24	P 96x48	P 144x36	P 144x72
Front frame (mm)	48x24	72x24	72x36	96x24	96x48	144x36	144x72
Cut-out (mm)	45x22	68x22	68x34	92x22	92x46	138x33	138x69
Scale length (mm)	32	52	52	60	60	95	95
Weight (kg)	0,08	0,10	0,12	0,15	0,25	0,50	0,80



Types and variants

Measuring ranges							
μA	100	X	X	X	X	X	X
	150						
	250						
	400	X	X	X	X	X	X
	600						
mA	1						
	1,5						
	2,5	X	X	X	X	X	X
	4						
	6						
	10						
	15						
	25	X	X	X	X	X	X
	40						
	60						
	100	X	X	X	X	X	X
	150						
A	250	X	X	X	X	X	X
	400						
	600						
for use with shunt							
mV	60						
	100	X	X	X	X	X	X
	150						
for use with measuring transducer							
mA	0-20	X	X	X	X	X	X
	4-20	X	X	X	X	X	X
V	0-10	X	X	X	X	X	X



Moving-coil measuring instruments

for direct voltage

Type:
P...

Rectangular cut-out
class 1,5
Horizontal scale (vertical
scale possible - please
specify at order)

plastic housing

metal housing



Type	P 48x24	P 72x24	P 72x36	P 96x24	P 96x48	P 144x36	P 144x72
Front frame (mm)	48x24	72x24	72x36	96x24	96x48	144x36	144x72
Cut-out (mm)	45x22	68x22	68x34	92x22	92x46	138x33	138x69
Scale length (mm)	32	52	52	60	60	95	95
Weight (kg)	0,08	0,10	0,12	0,15	0,25	0,50	0,80



Types and variants

Measuring ranges		P 48x24	P 72x24	P 72x36	P 96x24	P 96x48	P 144x36	P 144x72
mV	60	X	X	X	X	X	X	X
	100							
	150							
	250	X	X	X	X	X	X	X
	400							
V	600							
	1							
	1,5							
	2,5							
	4							
	6							
	10							
	15							
	25	X	X	X	X	X	X	X
	40							
	60							
	100							
150								
250								
400								
500								
600								



Moving-coil measuring instruments

with rectifier

for alternating current and alternating voltage

Type:
NPG / PGQ .. DIN

Square cut-out
40 - 100 Hz, class 1,5

plastic housing

plastic housing

metal housing



Type	NPG 72	NPG 96	PGQ 48 DIN	PGQ 72 DIN	PGQ 96 DIN	PGQ 144 DIN
Front frame (mm)	72x72	96x96	48 x 48	72 x 72	96 x 96	144 x 144
Cut-out (mm)	68 x 68	92 x 92	45 x 45	68 x 68	92 x 92	138 x 138
Scale length (mm)	62	90	42	62	90	130
Weight (kg)	0,20	0,25	0,10	0,26	0,30	0,60



Types and variants

Measuring ranges

V	10					
	15					
	25					
	40					
	60					
	100	X	X	X	X	X
	150					
A	250					
	400					
	500					
	600					
	1					
	1,5					
	2,5					
4	-	-	-	X	X	X
6						
10						
15						
25						



Moving-coil measuring instruments

with rectifier

for alternating current and alternating voltage

Type:
PKG .. DIN / PG

Square and rectangular cut-outs
40 - 100 Hz, Class 1,5
240° scale and slim profile

plastic housing

metal housing

plastic housing



Type	PKG 48 DIN*	PKG 72 DIN	PKG 96 DIN	PKG 144 DIN	PG 48 x 24	PG 72 x 24	PG 96 x 24
Front frame (mm)	48 x 48	72x72	96x96	144 x 144	48 x 24	72 x 24	96 x 24
Cut-out (mm)	45 x 45	68 x 68	92 x 92	138 x 138	45 x 22	68 x 22	92 x 22
Scale length (mm)	70	105	150	230	32	52	60
Weight (kg)	0,20	0,30	0,40	0,90	0,08	0,10	0,12



Types and variants

Measuring ranges								
V	10							
	15							
	25							
	40							
	60							
	100	X	X	X	X	X	X	X
	150							
	250							
mA	1							
	1,5							
	2,5							
	4							
	6	X	X	X	X	X	X	X
	10							
	15							
	25							
	40	-						
	60	-						
	100							
	150							
	250	-	X	X	X	X	X	X
A	400							
	600							
	1							
	1,5							
	2,5	-	X	X	X	X	X	X
	4							
5								
6								

* PKG 48 DIN - changes depth of instrument

Bimetal measuring instruments

Application	Bimetal measuring instruments are used for monitoring the load ratios and conditions of electrical distribution installations. Due to their thermal inertia, the displayed measured values equal the rms value of the current; a built-in slave pointer is used to show the maximum values.
Measuring systems	<ul style="list-style-type: none"> ● Highly robust ● Ultra high torque ● Trunnion bearing ● Setting time 8 min or 15 min
Design	Bimetal measuring instruments are manufactured according to DIN 60 051 as well as according to the other relevant VDE and DIN regulations. The accuracy amounts to 3 % referred to the full scale. The scale graduation starts at approx. 15 % of the full scale and has a 1.2-fold overload scale. Bimetal measuring instruments show the square mean value of the current, the measured value equals the rms value and is independent of the waveform. Due to the extremely high torque, a slave pointer showing the maximum current may be used. Using a sealable reset button, the maximum pointer (slave pointer) may be reset up to the measuring element pointer. Another model combines bimetal measuring elements with moving-iron measuring elements (class 1.5) inside one housing. This allows for measuring maximum value, mean value and instantaneous value of the current on one scale at the same time. The standard type allows for measuring currents within a frequency range of 15 Hz to 100 Hz. Bimetal measuring systems are resistant to a 1.2-fold overload and moving-iron systems to a 2-fold overload, temporarily also up to a 10-fold overload, for the rest DIN EN 60 051 applies. Moving-iron measuring elements are provided with a shielding against external magnetic fields up to a strength of 4 kA/m. The connection is made using M4 screws (back-of-hand-proof).
Measuring ranges	<p>Bimetal measuring instruments</p> <p>0-5 / 6 A. If connect to current transformer sec. 5 A the scale is designed in a way that the full scale is 20 % higher than the primary current of the current transformer, e.g. current transformer 250 / 5 A, display range 0-300 A.</p> <p>Moving-iron measuring instruments combined with bimetal measuring instruments</p> <p>0-5 / 10 A. If connect to current transformer sec. 5 A the scale is designed in a way that the full scale is 100 % higher than the primary current of the current transformer, e.g. current transformer 250 / 5 A, display range 0-500 A.</p>
Energy consumption	Bimetal measuring system 1,9 VA for 5 A, 0,9 VA for 1 A combined with moving-iron measuring system 2,5 VA for 5 A, 1,5 VA for 1 A
Special versions	<p>Fixed value between 100 Hz and 1000 Hz</p> <ul style="list-style-type: none"> at bimetal measuring instrument at combined bimetal / moving-iron measuring instrument <p>Extended initial range up to 30 % of full scale in center scale (moving-iron measuring element)</p>



Bimetal measuring instruments

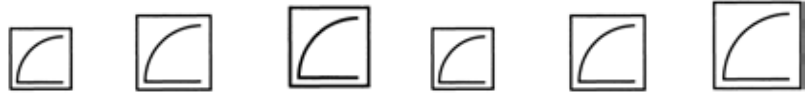
with slave pointer
(maximum current ammeter)

Type:
NM / MQ .. DIN

Square cut-out
Class 3
Energy consumption 1,9 VA for 5 A,
0,9 VA for 1 A
Setting time 8 min., 15 min. on request
Reset button sealable

plastic housing

metal housing



Type	NM 48	NM 72	NM 96	MQ 72 DIN	MQ 96 DIN	MQ 144 DIN
Front frame (mm)	48 x 48	72 x 72	96 x 96	72 x 72	96 x 96	144 x 144
Cut-out (mm)	45 x 45	68 x 68	92 x 92	68 x 68	92 x 92	138 x 138
Scale length (mm)	44	62	90	62	90	130
Weight (kg)	0,10	0,12	0,17	0,20	0,25	0,75



Types and variants

for use with current transformer	NM 48	NM 72	NM 96	MQ 72 DIN	MQ 96 DIN	MQ 144 DIN
sec. 5 A	X	X	X	X	X	X
sec. 1 A						



Bimetal measuring instruments

with slave pointer, combined with
moving-iron ammeter
(maximum and instantaneous current
ammeter)

Type:
NMW / MWQ .. DIN

Square cut-out
Class 3 (bimetal) / class 1,5 (moving iron)
Energy consumption 2,5 VA for 5 A,
1,5 VA for 1 A
Setting time 8 min., 15 min. on request
Reset button sealable

plastic housing

metal housing



Type	NMW 72	NMW 96	MWQ 72 DIN	MWQ 96 DIN	MWQ 144 DIN
Front frame (mm)	72 x 72	96 x 96	72 x 72	96 x 96	144 x 144
Cut-out (mm)	68 x 68	92 x 92	68 x 68	92 x 92	138 x 138
Scale length (mm)	62 / 43	90 / 70	50 / 46	95 / 74	135 / 100
Weight (kg)	0,16	0,25	0,34	0,42	0,90



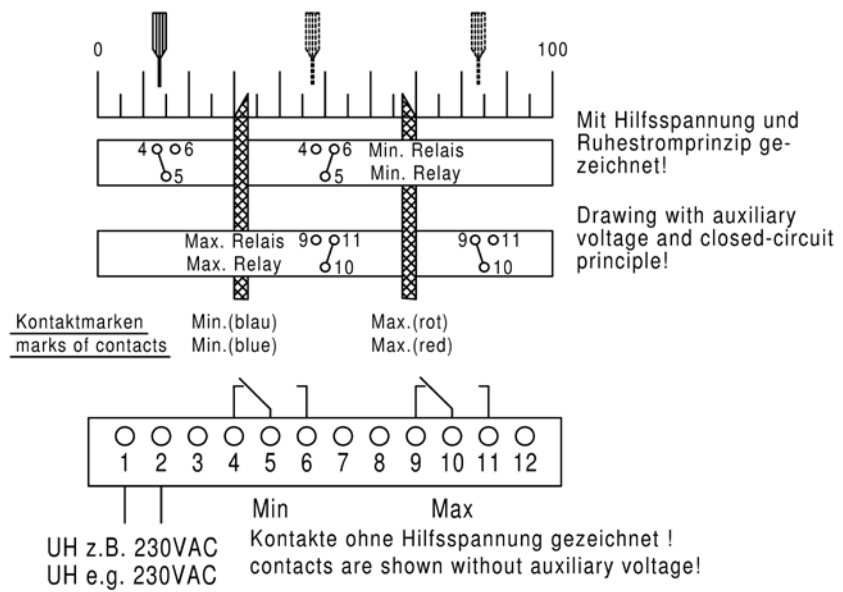
Types and variants

for use with current transformer	NMW 72	NMW 96	MWQ 72 DIN	MWQ 96 DIN	MWQ 144 DIN
sec. 5 A	X	X	X	X	X
sec. 1 A					

Limit controllers

Application	Limit controllers monitor one or two limit values to be set over the entire scale range. They can be used for electrical measurable values.
Measuring system	<ul style="list-style-type: none"> ● Moving-iron measuring system ● Moving-coil measuring system
Contact device	<ul style="list-style-type: none"> ● Optical sampling through infrared reflected light barrier ● Nonreactive sampling ● Setting range 0-100 % (also in case of two contact marks) ● Setting of limit values at the front side
Design	For limit controllers, the same technical data and special models as for normal indicators apply. They are available in sizes 96 DIN and 144 DIN. The following variables may be measured: Direct current, direct voltage, alternating current, alternating voltage, frequency, in connection with a measuring transducer power, power factor, temperature and all other transformed non-electrical quantities. The sampling of the position of the measuring element pointer is done via a noncontact infrared reflected light barrier. A maximum of two limit values may be monitored. In case of the standard type, the relays are energized and are deenergized if the max. contact mark is exceeded or the limit value drops below the min. contact mark (closed-circuit principle). Electronics, relays and 230 V auxiliary voltage are installed; the maximum mounting depth of the device amounts to 68 mm only. The connection is made via a 12-pin terminal block for cross sections up to 4 mm ² . The measuring element is connected to hexagon bolts with M4 screws in case of voltmeters and ammeters up to 15 A max. 6 mm ² , M5 screws up to 60 A max. 16 mm ² (back-of-hand-proof).

Function and connection diagram

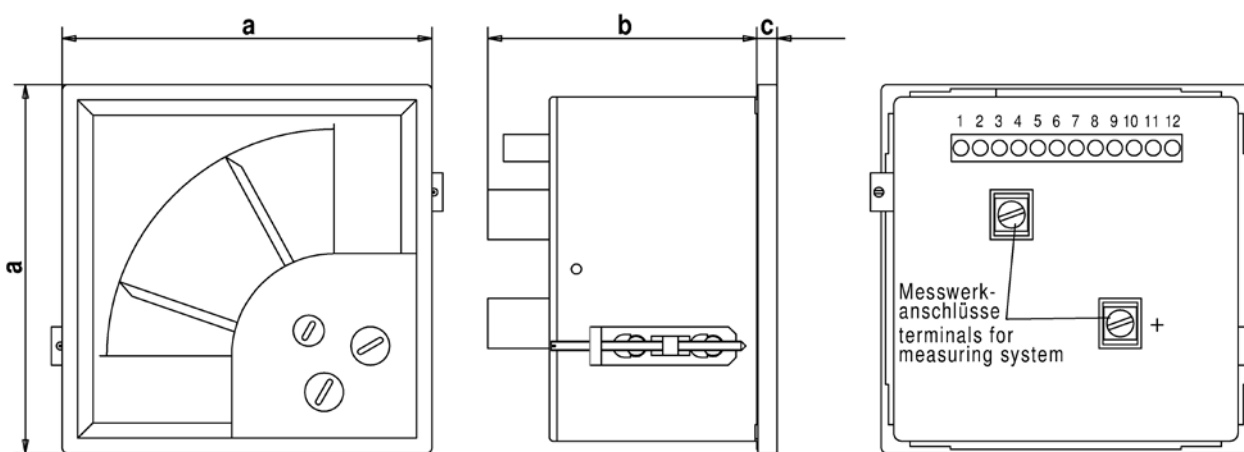




Technical data

	Switching accuracy	± 1 % of scale length, (± 0,9 mm for ..96 DIN.. or ± 1,3 mm for ..144 DIN..)	
	Hysteresis	± 0,5 % of scale length, (± 0,4 mm for ..96 DIN.. or ± 0,6 mm for ..144 DIN..)	
	Response delay	100 ms after limit value is exceeded	
	Sampling	optical, with reflected light barrier	
	Limit value adjustment	at front side via full scale range, using screwdriver	
	Temperature range	-25 °C to +20 °C to +30 °C to +55 °C	
	Relay contacts	1 changeover contact per limit value, max. 8 A, 250 V AC, 2000 VA	
	Switching state	closed-circuit principle, (Relay is deenergized if limit value is exceeded)	
	Auxiliary voltage	230 V AC ± 15 %, 45-65 Hz, 2 VA	
	Test voltage	2,5 kV, 50 Hz, 10 s, between measuring input, housing, auxiliary voltage and relay contacts	
Standards	EMC	DIN EN 61 326,	
	Mechanical strength	DIN EN 61 010 part 1	
	Electrical safety	DIN EN 61 010 part 1, pollution degree 2, measuring category CAT III, for working voltages up to 300 V (phase to neutral)	
	Accuracy, overload	DIN EN 60 051	
	IP code	DIN EN 60 529, housing IP 52, terminals IP 10	
Special versions	Measuring range	Moving-iron measuring instruments	Page 132
		Moving-coil measuring instruments	Page 137
	Auxiliary voltage	110 V AC ± 15 %, 45-65 Hz, 2 V	
		24 V AC + DC, -15 % to +25 %, 2 W,	
		6-30 V AC + DC, 2 VA, (EMC DIN EN 61 326 class A)	
		36-265 V AC + DC, 2 VA, (EMC DIN EN 61 326 class A)	
	Contacts	2 max contacts or 2 min contacts	
	Adjustment	using knurled knob, per contact	
	Relays	Reversed switching states (open-circuit principle), per contact	
	Relay contacts	2 changeover contacts (only possible for 1 contact)	
Relay delay	Fixed value between 1 and 30 s, per contact adjustable at rear side of housing 1-30 s, per contact		

Dimensions



Type	Cut-out	mm		
		a mm	b mm	c mm
WQ 96 DIN, PQ 96 DIN, PGQ 96 DIN	92 ^{+0,8} x 92 ^{+0,8}	96	70	5
WQ 144 DIN, PQ 144 DIN, PGQ 144 DIN	138 ⁺¹ x 138 ⁺¹	144	70	7

- 1 Measuring transducers
- 2 Mains and limit monitoring
- 3 Energy meters
- 4 Panel meters digital
- 5 Panel meters analog N+DIN-series
- 6 Meas. instruments for top hat rail mounting
- 7 Universal measuring instruments
- 8 Current transformers
- 9 Shunts
- 10 Test apparatus



Limit controllers

for direct current

Type:
PQ .. DIN

Square cut-out
Class 1,5
Moving-coil measuring system

metal housing



Type	PQ 96 DIN	PQ 96 DIN	PQ 144 DIN	PQ 144 DIN
	Min-contact or Max-contact	Min-contact and Max-contact	Min-contact or Max-contact	Min-contact and Max-contact
Front frame (mm)	96 x 96	96 x 96	144 x 144	144 x 144
Cut-out (mm)	92 x 92	92 x 92	138 x 138	138 x 138
Scale length (mm)	90	90	130	130
Weight (kg)	0,48	0,48	0,90	0,90



Types and variants

Measuring ranges						
μA	100	Ri / Δ U				
	150	2575 Ω				
	250	955 Ω	X	X	X	X
	400	420 Ω				
	600	167 Ω				
mA	1	77 Ω				
	1,5	28,6 Ω				
	2,5	14,2 Ω				
	4	7,6 Ω				
	6	3,8 Ω				
	10	1,9 Ω				
	15	1,4 Ω				
	25	1,3 Ω				
	40	60 mV	X	X	X	X
	60	60 mV				
	100	60 mV				
	150	60 mV				
A	250	60 mV				
	400	60 mV				
	600	60 mV				
	1	60 mV				
	1,5	60 mV				
	2,5	60 mV				
	4	60 mV	X	X	X	X
	6	60 mV				
for use with shunt						
mV	60	12 Ω				
	100	20 Ω	X	X	X	X
	150	30 Ω				
for use with measuring transducer						
mA	0-20	1,2 Ω	X	X	X	X
	4-20	50 Ω	X	X	X	X
V	0-10	10 kΩ	X	X	X	X

Alternating current: with rectifier, type PGQ 96 DIN or PGQ 144 DIN, 40 - 10000 Hz sinusoidal

Measuring ranges between 100 μA and 600 mA

Measuring ranges between 1 A and 25 A

Surcharge:

Surcharge:



Limit controllers

for direct voltage

Type:
PQ .. DIN

Square cut-out
Class 1,5
Moving-coil measuring system

metal housing



Type	PQ 96 DIN	PQ 96 DIN	PQ 144 DIN	PQ 144 DIN
	Min-contact or Max-contact	Min-contact and Max-contact	Min-contact or Max-contact	Min-contact and Max-contact
Front frame (mm)	96 x 96	96 x 96	144 x 144	144 x 144
Cut-out (mm)	92 x 92	92 x 92	138 x 138	138 x 138
Scale length (mm)	90	90	130	130
Weight (kg)	0,48	0,48	0,90	0,90



Types and variants

Measuring ranges		Internal resistance				
mV	25	200 Ω / V				
	40	200 Ω / V				
	60	200 Ω / V				
	100	200 Ω / V				
	150	200 Ω / V	X	X	X	X
	250	200 Ω / V				
V	400	1000 Ω / V				
	600	1000 Ω / V				
	1	1000 Ω / V				
	1,5	1000 Ω / V				
	2,5	1000 Ω / V				
	4	1000 Ω / V				
	6	1000 Ω / V				
	10	1000 Ω / V				
	15	1000 Ω / V				
	25	1000 Ω / V				
	40	1000 Ω / V	X	X	X	X
	60	1000 Ω / V				
	100	1000 Ω / V				
	150	1000 Ω / V				
	250	1000 Ω / V				
400	1000 Ω / V					
500	1000 Ω / V					
600	1000 Ω / V					

Alternating voltage: with rectifier, type PGQ 96 DIN or PGQ 144 DIN, 40 - 10000 Hz sinusoidal

Measuring ranges between 25 mV and 600 V

Surcharge:

Power meters

Application	Power meters are used for measuring active and reactive power in case of alternating current and three-phase current or the active power for direct current. Sinusoidal and non-sinusoidal quantities may be measured. The frequency range amounts to 40-100 Hz, in case of special types 40-400 Hz. Power meters show the import active power for standard types, or the import and export active power if the zero point is offset, i.e. in case of bidirectional energy directions.									
Measuring system and electronics	<ul style="list-style-type: none"> ● Core magnet moving-coil measuring system ● Integrated analog multiplier ● Linear scale characteristics ● Independent of waveform ● Independent of external fields 									
Design	<p>Power meters are manufactured according to DIN 60 051 as well as according to the other relevant VDE and DIN regulations. The accuracy amounts to 1.5 % referred to the full scale. The energy consumption lies at around 0.6 VA in the current path or at around 2 VA or 0.05 VA in the voltage path if a separate auxiliary voltage is used.</p> <p>The full scale values should be adapted to the standard series 1 / 1.2 / 1.5 / 2 / 2.5 / 3 / 4 / 5 / 6 / 7.5 / 8 or a decadic multiple of these values. In case of reactive power meters for alternating current and four-wire three-phase current, the frequency range is restricted to a fixed value, normally 50 Hz. The auxiliary voltage for the supply of the electronics is gained from the measuring voltage. If the measuring voltage fluctuates by more than ± 20 % of the rated voltage, a separate auxiliary voltage is required.</p> <p>In case of size 96, the electronic is installed in the housing (housing depth 57 mm). For all other sizes and models, a separate measuring transducer must be used. The output to the connection of the panel meter amounts to 0-20 mA. Further technical data of the measuring transducers are specified in the relevant data sheets (from page 24). The inputs are resistant to a permanent 1.2-fold overload, the current path withstands a temporary max. 20-fold overload. For the rest, DIN EN 60 051 applies. The electrical connection is done using clamping screws max. 4 mm².</p>									
Measuring ranges	<p>The full scale value may be selected between the 0,5-fold and 1,5-fold rated value of the apparent power.</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 30%;">Apparent power</td> <td style="width: 30%;">with alternating current</td> <td style="width: 40%;">$S = U \times I$</td> </tr> <tr> <td></td> <td>with three-phase current</td> <td>$S = U \times I \times \sqrt{3}$</td> </tr> <tr> <td></td> <td colspan="2">(U = external conductor voltage)</td> </tr> </table>	Apparent power	with alternating current	$S = U \times I$		with three-phase current	$S = U \times I \times \sqrt{3}$		(U = external conductor voltage)	
Apparent power	with alternating current	$S = U \times I$								
	with three-phase current	$S = U \times I \times \sqrt{3}$								
	(U = external conductor voltage)									
Special versions	<table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Measuring range</td> <td style="width: 75%;">zero point at any point of scale (bidirectional energy direction) increased accuracy 1 %</td> </tr> <tr> <td>Special calibration with active power</td> <td>fixed value between 100 Hz and 400 Hz range between 40 Hz and 400 Hz range between 40 Hz and 1000 Hz</td> </tr> <tr> <td>Special calibration with reactive power</td> <td>fixed value between 40 Hz and 400 Hz except for 50 Hz (standard)</td> </tr> <tr> <td>Auxiliary voltage</td> <td>separate auxiliary voltage 230 V or 110 V ± 20 % 45-65 Hz 2 VA</td> </tr> </table>	Measuring range	zero point at any point of scale (bidirectional energy direction) increased accuracy 1 %	Special calibration with active power	fixed value between 100 Hz and 400 Hz range between 40 Hz and 400 Hz range between 40 Hz and 1000 Hz	Special calibration with reactive power	fixed value between 40 Hz and 400 Hz except for 50 Hz (standard)	Auxiliary voltage	separate auxiliary voltage 230 V or 110 V ± 20 % 45-65 Hz 2 VA	
Measuring range	zero point at any point of scale (bidirectional energy direction) increased accuracy 1 %									
Special calibration with active power	fixed value between 100 Hz and 400 Hz range between 40 Hz and 400 Hz range between 40 Hz and 1000 Hz									
Special calibration with reactive power	fixed value between 40 Hz and 400 Hz except for 50 Hz (standard)									
Auxiliary voltage	separate auxiliary voltage 230 V or 110 V ± 20 % 45-65 Hz 2 VA									

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog N+DIN-series

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

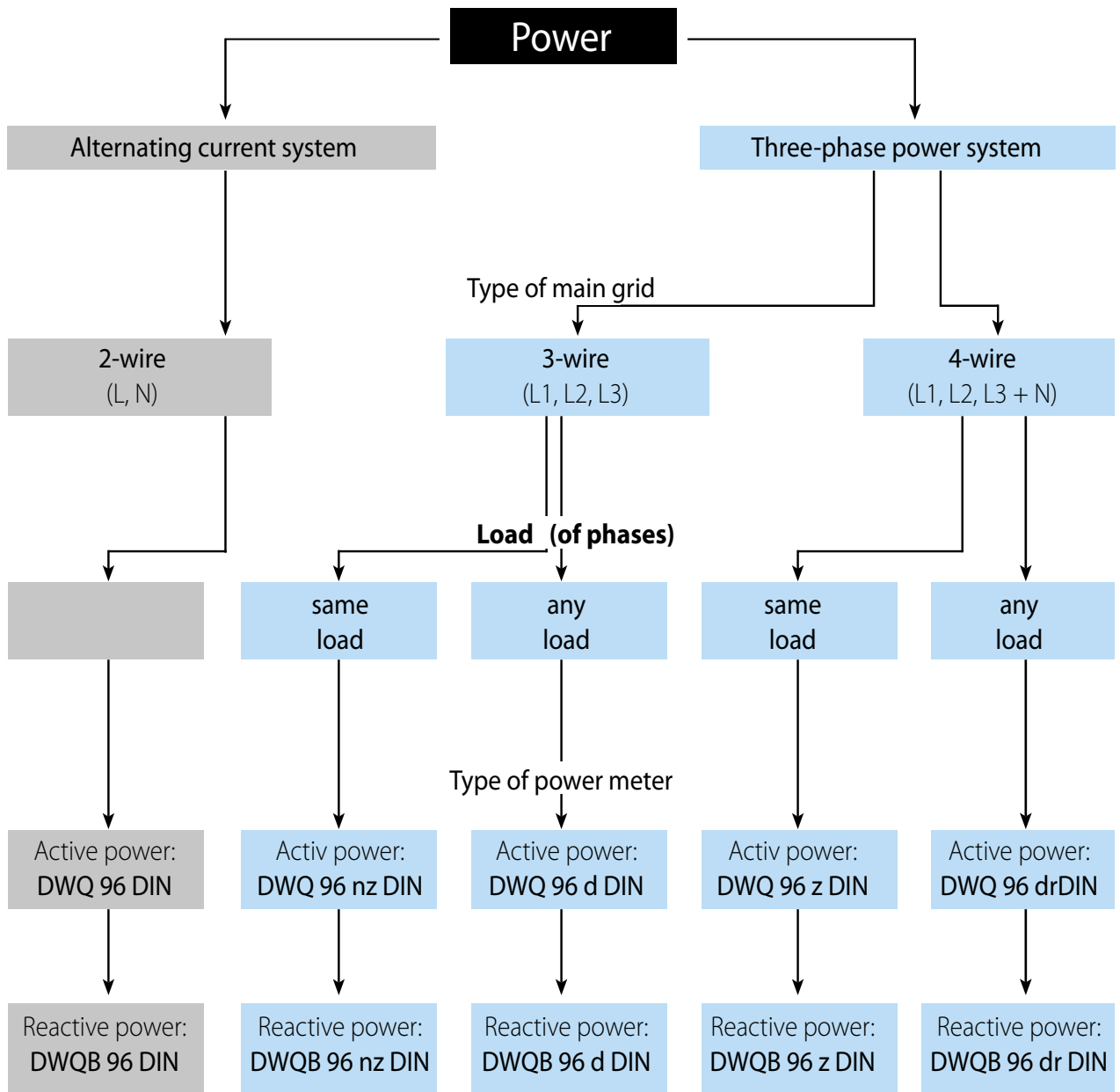
8 Current transformers

9 Shunts

10 Test apparatus

Power meters

Power meters - finding the right type



In case of these types (DWQ 96 ... DIN) electronics are installed in general (installation depth 57 mm).
 In connection with our power meter transducers (from page 27) all measuring instruments may be used for indicating the power.

Short legend	
DWQ	Power meter for active power
B	for reactive power
96	Front frame 96 x 96 mm
...	without abbreviation, alternating current
z	accessible neutral wire, 4-wire 3-phase current of same load
nz	non-accessible neutral wire, 3-wire 3-phase current of same load
d	double power meter, 3-wire 3-phase current of any load
dr	triple power meter, 4-wire 3-phase current of any load
DIN	built-in housing



Power meters

electronic, for alternating and three-phase current, for use with current transformers secondary 1 A and 5 A

Type:
DWQ .. DIN

Square cut-out
40 - 100 Hz, class 1,5
Installation depth 57 mm
Power consumption:
current path 0,6 VA
voltage path approx. 2 VA

metal housing



Type	D .. 96 DIN	D .. 96 DIN	D .. 96 DIN	D .. 96 DIN	D .. 96 DIN
Front frame (mm)	96 x 96	96 x 96	96 x 96	96 x 96	96 x 96
Cut-out (mm)	92 x 92	92 x 92	92 x 92	92 x 92	92 x 92
Scale length (mm)	90	90	90	90	90
Weight (kg)	0,40	0,40	0,40	0,40	0,40
	Alternating current	3-wire 3-phase current same load	3-wire 3-phase current any load	4-wire 3-phase current same load	4-wire 3-phase current any load



Types and variants

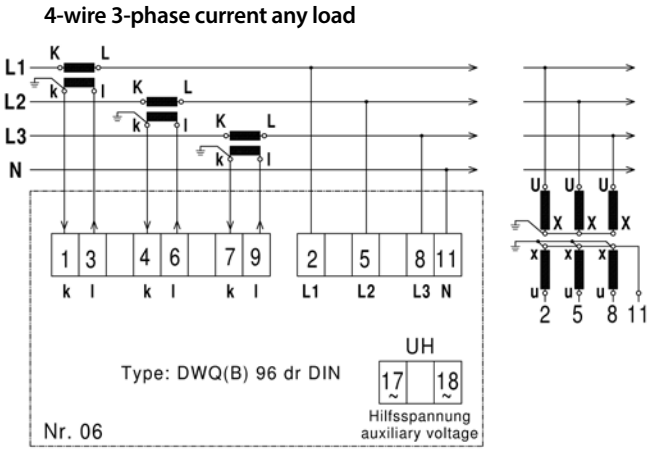
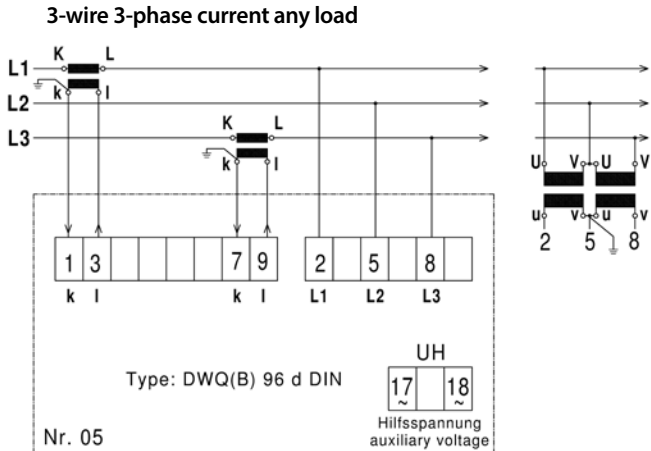
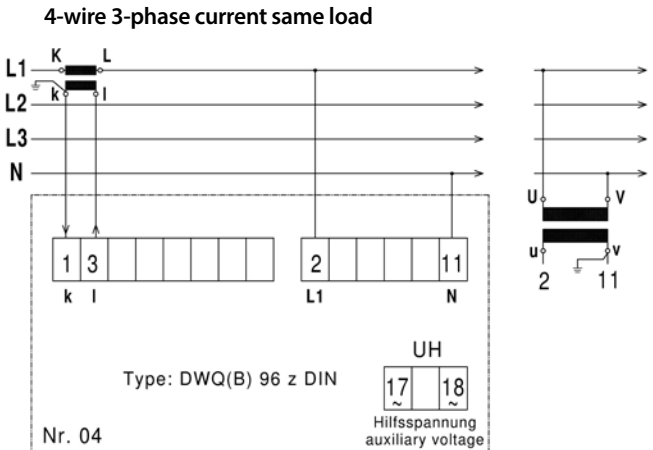
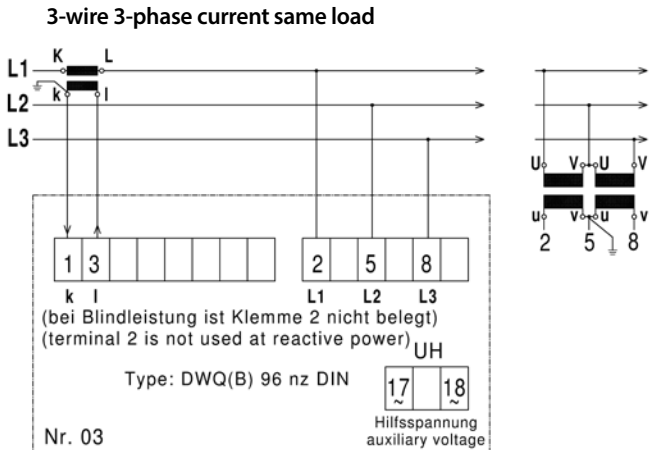
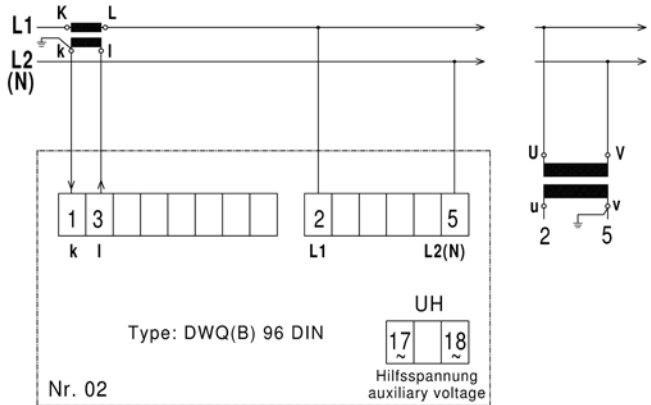
Rated voltage		DWQ 96 DIN	DWQ 96 nz DIN	DWQ 96 d DIN	DWQ 96 z DIN	DWQ 96 dr DIN
Active power	V					
	100					
	230	X	-	-	-	-
	400					
3 x 100	3 x 400	-	X	X	-	-
	3 x 500					
	100/58				X	X
Surcharge	400/230				X	X
	500/289				X	X
	10 A direkt	X	X	X	X	X
Reactive load		DWQB 96 DIN	DWQB 96 nz DIN	DWQB 96 d DIN	DWQB 96 z DIN	DWQB 96 dr DIN
Active power	V					
	100					
	230	X	-	-	-	-
	400					
3 x 100	3 x 400	-	X	X	-	-
	3 x 500					
	100/58				X	X
Surcharge	400/230				X	X
	500/289				X	X
	10 A direct	X	X	X	X	X

In connection with measuring transducers type P ... - MU (from page 28), all measuring instruments may be used for power measurement. The advantage is that only two lines (20 mA) must be connected to the panel meter and that the measuring transducer may be mounted at a central location.



Connection

Alternating current



Power factor meters

Application	Power factor meters serve for measuring the ratio between active and apparent power in alternating and three-phase current grids of 50 Hz, 60 Hz or 400 Hz sinusoidal.				
Measuring system and electronics	<ul style="list-style-type: none"> ● Core magnet moving-coil measuring system ● Zero point comparator of current and voltage ● Independent of external fields 				
Design	Power factor meters are manufactured according to DIN 60 051 as well as according to the other relevant VDE and DIN regulations. The accuracy amounts to 1.5 % referred to the scale length. The energy consumption lies at around 0.6 VA in the current path or around 2 VA in the voltage path. The auxiliary voltage for the supply of the electronics is gained from the measuring voltage. The voltage range amounts to $\pm 20\%$ of the rated voltage, the current range to 20 % to 120 % of the rated current. Exceeding these values may cause indication errors which are larger than the accuracy rating. Currents $< 5\%$ of the rated value result in an uncontrolled indication. The inputs are resistant to a permanent 1.2-fold overload, the current path withstands a temporary max. 20-fold overload. DIN EN 60 051 applies. The electrical connection is done using clamping screws max. 4 mm ² .				
Special versions	<table border="0"> <tr> <td>Measuring range</td> <td>deviating from standard measurement ranges</td> </tr> <tr> <td>Special calibration</td> <td>for 60 Hz or 400 Hz</td> </tr> </table>	Measuring range	deviating from standard measurement ranges	Special calibration	for 60 Hz or 400 Hz
Measuring range	deviating from standard measurement ranges				
Special calibration	for 60 Hz or 400 Hz				

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

Panel meters digital

4

Panel meters analog N+DIN-series

5

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

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Shunts

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Test apparatus



Power factor meters

electronic, for alternating and three-phase current

Type:
LWQ .. DIN

Square cut-out
50 Hz, class 1,5
Installation depth 57 mm
For use with CT sec. 1 A or 5 A
Power consumption current path 0,6 VA
voltage path approx. 2 VA

metal housing



Type	LWQ 72 DIN	LWQ 96 DIN	LWQ 72 nz DIN	LWQ 96 nz DIN
Front frame (mm)	72 x 72	96 x 96	72 x 72	96 x 96
Cut-out (mm)	68 x 68	92 x 92	68 x 68	92 x 92
Scale length (mm)	62	90	62	90
Weight (kg)	0,27	0,33	0,27	0,33
Measuring ranges	0,5 cap. - 1 - 0,5 ind. or 0,7 cap. - 1 - 0,3 ind alternating current		0,5 cap. - 1 - 0,5 ind. or 0,7 cap. - 1 - 0,3 ind 3-phase current	

Types and variants

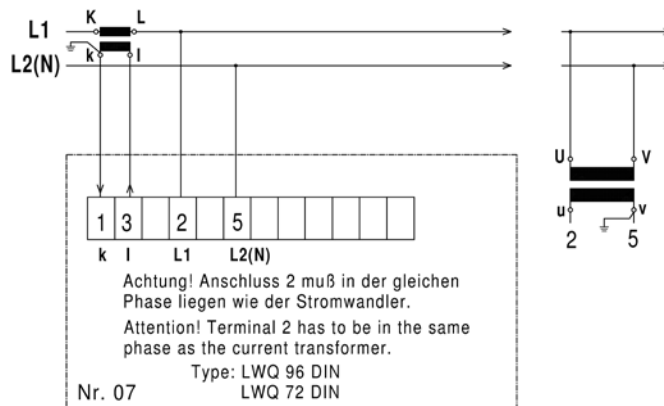
Rated voltage

100 V, 230 V, 400 V oder 500 V
3 x 100 V, 3 x 400 V, 3 x 500 V oder 3 x 690 V

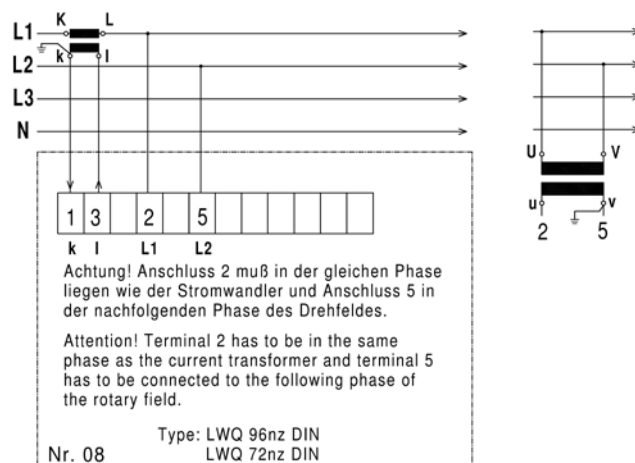
Surcharge 10 A direct

X	X	-	-
-	-	X	X
X	X	X	X

Connection for alternating current



Connection for three-phase current of same load



Frequency meters

Application	Frequency meters serve for measuring the mains frequency 50 Hz, 60 Hz, or 400 Hz. As measuring range just a selected partial range is used preferably.
Measuring systems	<p>Vibrating reed meter:</p> <ul style="list-style-type: none"> ● Vibrating reed movement <p>Pointer frequency meter:</p> <ul style="list-style-type: none"> ● Core magnet moving-coil measuring system ● Integrated microcontroller ● Independent of waveform ● Large voltage range
Design	<p>Frequency meters are manufactured according to DIN EN 60 051 as well as according to the other relevant VDE and DIN regulations.</p> <p>The accuracy amounts to 0.5 % referred to the full scale. The energy consumption lies between 1 VA and 4 VA depending on the rated voltage, measuring range and type. The measuring voltage may fluctuate between $\pm 20\%$ of the rated values without affecting the measured value indication. Pointer frequency meters offer two significant advantages over vibrating reed instruments:</p> <ul style="list-style-type: none"> ● clear readability ● large voltage range, $\pm 20\%$ of rated voltage <p>The linear scale characteristic is perfectly linear and starts at 5% of the scale length above the mechanical zero point.</p> <p>The temperature influence amounts to $< 0.1\%$ with 10 K within a temperature range of -25° to $+60^\circ\text{C}$. The auxiliary voltage for the supply of the electronics is gained from the measuring voltage. The current draw is approx. 10 mA.</p> <p>Pointer and vibrating reed meters are resistant to a 1.2-fold overload, temporarily up to a 2-fold overload, DIN EN 60 051 applies.</p> <p>The connection is made using M4 screws (back-of-hand-proof).</p>

Special versions

Measuring voltage	<table border="0"> <tr> <td>Vibrating reed meters</td> <td>400 V</td> </tr> <tr> <td></td> <td>500 V</td> </tr> <tr> <td></td> <td>600 V</td> </tr> <tr> <td>Pointer frequency meters</td> <td>between 12 V and 100 V</td> </tr> <tr> <td></td> <td>400 V</td> </tr> <tr> <td></td> <td>500 V</td> </tr> <tr> <td></td> <td>600 V</td> </tr> </table>	Vibrating reed meters	400 V		500 V		600 V	Pointer frequency meters	between 12 V and 100 V		400 V		500 V		600 V
Vibrating reed meters	400 V														
	500 V														
	600 V														
Pointer frequency meters	between 12 V and 100 V														
	400 V														
	500 V														
	600 V														
Auxiliary voltage	Pointer frequency meters with separate auxiliary voltage for measuring voltages 0-100 %, 230 V or 110 V $\pm 15\%$ 45-65 Hz 2 VA (not for size 72)														
Measuring range	Pointer frequency meters other than for standard measuring ranges e.g. 0-100 Hz														



Frequency meters

Vibrating reed meters

Type:
F .. DIN

Square cut-out
Vibrating reed movement
Class 0,5
Energy consumption 1-4 VA
Measuring voltage 100 V, 133 V, 230 V
(please specify in order)

metal housing



Type	F 72 DIN	F 96 DIN	F 144 DIN
Front frame (mm)	72 x 72	96 x 96	144 x 144
Cut-out (mm)	68 x 68	92 x 92	138 x 138
Weight (kg)	0,20	0,30	0,70



Types and variants

Hz	Number of reeds	Subdivision in Hz	F 72 DIN	F 96 DIN	F 144 DIN
45 - 50 - 55	13	1			
47 - 50 - 53	13	1/2	X	X	X
55 - 60 - 65	13	1			
57 - 60 - 63	13	1/2			



Frequency meters

Pointer frequency meters

Type:
FZQ .. DIN

Square cut-out
Moving-coil measuring system
Class 0,5 or 0,2
Energy consumption ca. 2 VA
Measuring voltage 100 V, 133 V, 230 V
(please specify in order)

metal housing



Type	FZQ 72 DIN	FZQ 96 DIN	FZQ 144 DIN
Front frame (mm)	72 x 72	96 x 96	144 x 144
Cut-out (mm)	68 x 68	92 x 92	138 x 138
Scale length	62	90	130
Weight (kg)	0,35	0,40	0,70



Types and variants

Hz	Measuring range	class	FZQ 72 DIN	FZQ 96 DIN	FZQ 144 DIN
50	45 - 50 - 55	0,5	132,70	132,70	161,10
50	48 - 50 - 52	0,2	144,30	144,30	172,70
60	55 - 60 - 65	0,5	132,70	132,70	161,10
60	58 - 60 - 62	0,2	144,30	144,30	172,70
400	360 - 400 - 440	0,5	132,70	132,70	161,10
400	380 - 400 - 420	0,2	144,30	144,30	172,70



SZ 72/96



SZ 48

Operating hour counter

for alternating and direct current

Type:
SZ .. DIN

Square cut-out

plastic housing



metal housing



Alternating current
synchronous motor 50 Hz

Type	SZ 48	SZ 72 DIN	SZ 96 DIN
Front frame (mm)	48 x 48	72 x 72	96 x 96
Cut-out (mm)	45 x 45	68 x 68	92 x 92
Weight (kg)	0,10	0,22	0,30
Counter range (hrs.)	99.999,99	99.999,99	99.999,99
Energy consumption	approx. 1 VA	approx. 2,5 VA	approx. 2,5 VA



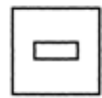
Types and variants

Operating voltage $\pm 15\%$				
230 V 50 Hz		X	X	X
400 V 50 Hz		X	X	X

plastic housing



metal housing



Direct current
Quartz-controlled

Type	SZ 48 Gs	SZ 72 Gs DIN	SZ 96 Gs DIN
Front frame (mm)	48 x 48	72 x 72	96 x 96
Cut-out (mm)	45 x 45	68 x 68	92 x 92
Weight (kg)	0,15	0,26	0,37
Counter range (hrs.)	99.999,99	99.999,99	99.999,99



Types and variants

Operating voltage $\pm 15\%$		Current draw				
V	12 - 80	mA	1,4 - 1,5	-	X	X
V	12 - 48	ca. 20 mW	at 12 V	X	-	-



Phase sequence indicator

Type:
NDR



Application

Phase sequence indicator are used for determining and monitoring the rotating field (phase sequence) in electrical systems.

Design and function

The instruments comply with DIN EN 61557-7. Indication is made by LEDs:

green = right-hand rotating field

red = left-hand rotating field

Additionally, three further LEDs indicate whether all three phase voltages are present or which phase is missing.



Technical data

	Voltage range	3 x 220 V - 3 x 500 V	
	Frequency range	15 Hz - 500 Hz	
	Current draw	max. 5 mA per phase	
	Temperature range	-15 °C to +20 °C to +30 °C to +55 °C	
	Switch-on time	100 %	
Dimensions	Type	NDR 72	NDR 96
	Front frame (mm)	72 x 72	96 x 96
	Cut-out (mm)	68 x 68	92 x 92



Types and var.

NDR	X
-----	---

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog N+DIN-series

6 Meas. instruments for top hat rail mounting

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Fault annunciators

96 x 96

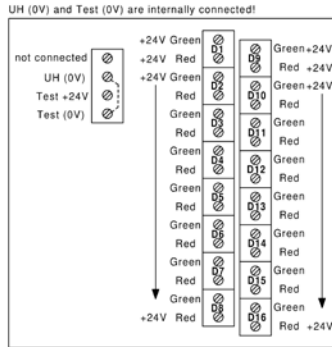
Types:
SM8 und SM16

Function

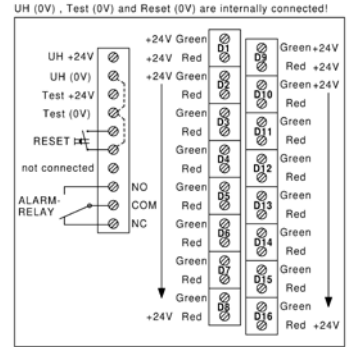
The fault annunciators use 8 (SM8) or 16 (SM16) two-color LEDs as a display. The LEDs may light up green or red. During the function test, the LEDs light up orange. The LEDs are controlled via connection terminals on the rear of the instrument. The control can take place with direct or alternating voltage, depending on the version. The scale can be easily removed and labeled through an opening on the side. The scale can also be labeled in the manufacturer's plant. An auxiliary voltage is always required for the collective alarm option. In the case of a collective alarm with storage, the reset button must be pressed to cancel the alarm and reset the alarm relay; without saving, the alarm is triggered by resetting the LEDs to green.

Connection

SM8 and SM16 at 24 VDC



SM8 and SM16 at 24 VDC with collective alarm and memory



Technical data

Input	Activation	24 VDC (Option: 60 VAC, 60 VDC or 24 V AC)
	Rated input current	6 mA per LED and colour (Option AC: 4,5 mA per LED and colour)
	Test input DC	24 VDC / 95 mA (SM16: 190 mA)
	Test input AC (Option)	24 VAC / 73 mA (SM16: 145 mA)
	Overload permanent	max. 30 V
	Temperature range	-25 °C to +20 °C to +30 °C to +55 °C
	External magnetic field influence	no (to 400 A/m)
	Electrical connection	screw terminal max. 4 mm ²
	Test voltage	2,2 kV between input and housing 2,2 kV between input and relay contacts

Caution! The inputs are not galvanically isolated from each other!

Alarm	Relay contacts	1 changeover contact
	Switching capacity	max. 250 VAC, 1250 VA

Weight		230g
--------	--	------

Types and variants

SM 8
SM 16
Surcharges: Operating with 24 VAC
Operating with 60 VAC or DC
Collective alarm with memory (auxiliary voltage required)
Collective alarm without memory (auxiliary voltage required)
Collective alarm for red LEDs only, with memory (auxiliary voltage required)
Collective alarm for red LEDs only, without memory (auxiliary voltage required)
Scale printed SM8
Scale printed SM16



EQX ... Strom



EQX ... Spannung



EQX/U6



EQX/2



DQX ... Normsignal



DQX ... Direkt



DQX ...-250 Normsig.



DQX ...-250 Direkt

Types DPX available soon! Please send your inquiry!

DPX ...

DPX ...



MOX ... an Wandler



MEQX ... an Wandler



LQX ...



FOX ...



FZQX ...



FOX/2 ...



SQX 96



NV ...



TSH ...

Panel meters analog

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Alternating current connected to current transformer	EQX	Page 181
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Alternating voltage with integrated selector switch	EQX/U6	Page 184
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Direct current for direct measurement 90°	DQX	Page 188
Direct voltage for direct measurement 90°	DQX	Page 189
Direct current and voltage for standard signals 240°	DQX-250	Page 190
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Direct voltage for direct measurement 240°	DQX-250	Page 192
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1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

Panel meters digital

4

5.1 Panel meters analog X-series

6 Meas. instruments for top hat rail mounting

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10 Test apparatus

Analog panel meters for alternating and direct current X-Series



Application

Moving-iron measuring instruments are mainly used in heavy-current installation for the measurement of alternating currents and alternating voltages (direct measurement or via current or voltage transformer). Moving-iron measuring instruments also indicate the rms value in case of non-sinusoidal quantities within a frequency range of 50 - 60 Hz.

With direct current and direct voltage, additional indication errors of approx. 1 % may occur due to magnetization errors inside the iron. As compared to moving-coil measuring instruments, the energy consumption is relatively high ranging between 0.6 VA and 2 VA. They are thus not suited for measuring small currents or voltages, like e.g. at shunts, speed sensor, thermoelements, measuring transducers.

Moving-coil measuring instruments serve for measuring direct current and direct voltage. For extending the measuring range, shunts, series resistors or voltage dividers are used. The energy consumption of moving-coil measuring instruments is very low; they may thus be connected to shunts, speed sensors, thermocouples, measuring transducers or similar. In case of non-sinusoidal variables, an rms-value rectifier is provided. It is able to still process crest factors of max. 8 without problem. The max. error amounts to less than 1% in this case.

Advantages of the X-series

- Robust plastic housing made of polycarbonate, self-extinguishing acc. to UL 94-V0
- Easily exchangeable scale
- Front frame and front glass easily to exchange
- Low glare front glass (clear glass optionally)
- Screw connections with clamps
- Simple mounting and fastening with lock clips
- Screw fastening with screw clamps possible
- Overall terminal cover included
- Protection class IP 52 on the front, IP 54 possible with accessories



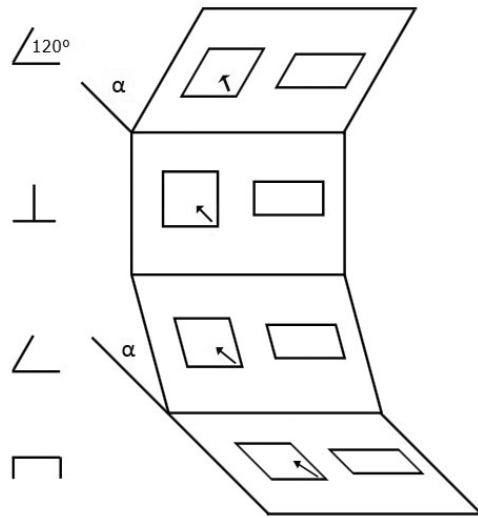
Technical data

Front frame	Dimensions acc. to DIN 43 718. The front frames are delivered als light frames in black colour for all types.
Scale, pointer	Execution acc. to DIN 43 802. The graduation is carried out as coarse graduation, the pointers as knife bar pointers.
Front glass	low glare glass
Zero point correction	All types have a zero point correction.
Connection	Screw connection with clamps
Accuracy	Acc. to DIN EN 60 051. It is defined under reference conditions, based on the measuring range end value. If the zero point is offset, the sum of the two full-scale values applies. In the case of power factor measuring devices and resistance measuring devices (scale curve strongly non-linear), the measurement error is related to the scale length.
Reference conditions	Temperature 20°C ± 2K, nominal position of use ± 1°
Influencing variables	Usage position normal vertical ± 5°, if the usage position deviates, the angle from the horizontal must be indicated. Influence of temperature, unless otherwise stated, the additional error is ≤ 1.5% at 20 °C ± 10 K ambient temperature. Ferromagnetic switchboards have no influence on the measurement accuracy.
Operating temperatur	All types work in a temperature range from -25 °C to + 55 °C (if not otherwise specified, trouble-free).
Relative humidity	75% annual mean, no condensation
Installation location	Interior, max. height of 2000 m above sea level
IP code	IP 52 on front side, IP 20 at terminals with terminal cover
	acc. to DIN EN 60529
Internal resistance	DC-voltmeters: 1000 Ω / V, higher internal resistance possible on request DC-ammeters: 0,6 to 250 Ω
Test voltage	5,3 kV AC for 1 min at 50 Hz acc. to IEC 61010-1
Vibrating resistance	1,5 g at 50 Hz
Impact resistance	15 g for 11 ms
EMC	EMC acc. to DIN EN 61 326
Overload behavior	Moving-iron meters: 2-, 5-, 6-fold overload (depending on type) continuous 10-fold overload for 2 seconds only once in lifetime Moving-coil meters: without overload Bimetall meters: 1,2-fold overload continuous



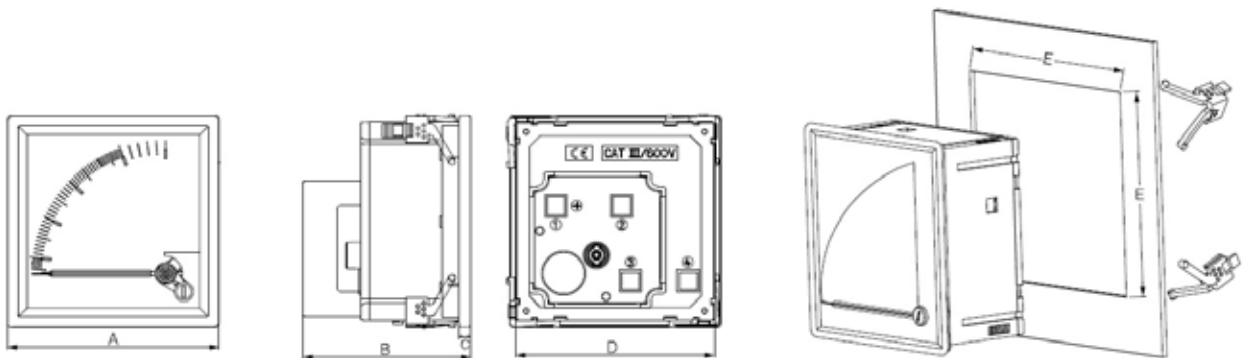
Operating position

In general, the operating position is indicated by a position symbol. For instruments without a position symbol, the reference area is any operating position between horizontal and vertical. The nominal operating position is 1° in each direction from the reference operating position, whereby the influencing effect (in addition to the display error) must not be greater than 50% of the corresponding class error.



Dimensions

for square measuring instruments



Types	Baugröße	„A“ mm	„B“ mm	„C“ mm	„D“ mm	„E“ mm
EQX, EQX-nL, DQX, DQX-250, FQX	48	48	71	5,5	44,2	45,0
EQX, EQX-nL, EQX/U6, DQX, DQX-250, MQX, MEQX, Lw(d)QX, FQX, FZQX	72	72	76	5,5	67,0	68,5
EQX, EQX-nL, EQX/U6, EQX/2, DQX, DQX-250, MQX, MEQX, Lw(d)QX, FQX, FQX/2, FZQX, FZDQX, SQX	96	96	76	5,5	90,5	92,0

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5.1 Panel meters analog X-series

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Special designs

Special designs		
Moving-iron	extended overload (range on request)	*
	changed measuring range	*
	* for special designs refer to WQ ... DIN - Series	
Moving-coil	changed measuring range	X
	extended internal resistance	X
	central 0-point for 90° meters (if possible)	X
General	red marking on scale (each)	X
	colored sector on scale (each)	X
	Companies logo (one time fixed price)	X
	additional labeling up to 15 characters	X
	additional labeling of more than 15 characters	X
	additional numbering	X
	additional division and numbering	X
	Illumination 24V DC (not for all types available)	X
	LED-Illumination 24V DC (not for all types available)	X

Accessories		
IP code		
	IP code IP54 for sizes 48, 72 and 96	X
Fixing	Set of fixing clamps	X
	Metal screw clamps	X
	Leaf spring fastening for size 48 only (2 leaf springs)	X
General	blanc scale size 48	X
	blanc scale size 72	X
	blanc scale size 96	X
	blanc scale for DPX rectangular meters (all sizes)	X
	printed scale size 48	X
	printed scale size 72	X
	printed scale size 96	X
printed scale for DPX rectangular meters (all sizes)	X	

Replacement parts		
Front glasses	Low glare glas size 48	X
	Low glare glas size 72	X
	Low glare glas size 96	X
	Low-glare gals for DPX rectangular meters (all sizes)	X
	Clear glas size 48	X
	Clear glas size 72	X
	Clear glas size 96	X
	Clear glas for DPX rectangular meters (all sizes)	X
	Low glare glas with adjustable red pointer size 72	X
	Low glare glas with adjustable red pointer size 96	X
Front frames	Front frame size 48	X
	Front frame size 72	X
	Front frame size 96	X
	Front frame for DPX rectangular meters (all sizes)	X
Terminal covers	Terminal cover size 48	X
	Terminal cover size 72	X
	Terminal cover size 96	X
	Terminal cover for DPX rectangular meters (all sizes)	X

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Panel meters analog X-series

5.1 Meas. instruments for top hat rail mounting

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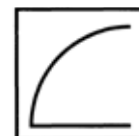


Moving-iron measuring instruments

for alternating current and alternating voltage

Type:
EQX

Square cut-out
45-65 Hz
EQX 48 class 2,5
EQX 72 / 96 class 1,5
Ammeter with 2-fold overload scale



Type	EQX 48	EQX 72	EQX 96
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	45 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	42 mm	62 mm	90 mm
Weight	0,1 kg	0,2 kg	0,25 kg



Types and variants

Alternating current direct measurement			
Measuring ranges			
mA	100 400 800	X	X
A	1 1,5 2,5 4 5 6 10 15 20 25 40 60	X	X

Other measuring ranges on request!

Alternating current for use with current transformer

Measuring ranges .../5 A			
.../5 A	50/5	0 - 50/100 A	
	60/5	0 - 60/120 A	
	100/5	0 - 100/200 A	
	150/5	0 - 150/300 A	
	200/5	0 - 200/400 A	
	250/5	0 - 250/500 A	
	300/5	0 - 300/600 A	X
	400/5	0 - 400/800 A	X
	500/5	0 - 500/1000 A	X
	600/5	0 - 600/1200 A	X
	800/5	0 - 800/1600 A	X
	1000/5	0 - 1000/2000 A	X
	1500/5	0 - 1500/3000 A	X
	2000/5	0 - 2000/4000 A	X

Other scale ranges to be specified!



Moving-iron measuring instruments

for alternating current and alternating voltage

Type:
EQX

Square cut-out
45-65 Hz
EQX 48 class 2,5
EQX 72 / 96 class 1,5
Ammeter with 2-fold overload scale



Type	EQX 48	EQX 72	EQX 96
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	45 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	42 mm	62 mm	90 mm
Weight	0,1 kg	0,2 kg	0,25 kg



Types and variants

Alternating current for use with current transformer					
Measuring ranges .../1 A					
.../1 A	50/1	0 - 50/100 A			
	60/1	0 - 60/120 A			
	100/1	0 - 100/200 A			
	150/1	0 - 150/300 A			
	200/1	0 - 200/400 A			
	250/1	0 - 250/500 A			
	300/1	0 - 300/600 A	X	X	X
	400/1	0 - 400/800 A			
	500/1	0 - 500/1000 A			
	600/1	0 - 600/1200 A			
	800/1	0 - 800/1600 A			
	1000/1	0 - 1000/2000 A			
	1500/1	0 - 1500/3000 A			
	2000/1	0 - 2000/4000 A			
Other scale ranges to be specified!					
Alternating voltage direct measurement					
Measuring ranges (without overload)					
V	30				
	60				
	100				
	110				
	150		X	X	X
	250				
	300				
	500				
	600		-		
Other measuring ranges on request!					
Alternating voltage for use with voltage transformers					
Measuring ranges (1,2-fold overload)					
... /... V	.../100		X	X	X
	.../110				
Scale ranges to be specified!					

Price group X



Moving-iron measuring instruments

for alternating current
with extended overload range

Type:
EQX-nL

Square cut-out
45-65 Hz
EQX 48 class 2,5
EQX 72 / 96 class 1,5
nL = n-fold overload



Type	EQX 48-nL	EQX 72-nL	EQX 96-nL
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	45 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	42 mm	62 mm	90 mm
Weight	0,1 kg	0,2 kg	0,25 kg



Types and variants

Alternating current for use with current transformer

Measuring ranges .../5 A with 5-fold overload	-5L	-5L	-5L
.../5 A			
50/5			
60/5			
100/5			
150/5			
200/5			
250/5			
300/5			
400/5			
500/5			
600/5			
800/5			
1000/5			
1500/5			
2000/5			
0 - 50/250 A			
0 - 60/300 A			
0 - 100/500 A			
0 - 150/750 A			
0 - 200/1000 A			
0 - 250/1250 A			
0 - 300/1500 A	X	X	X
0 - 400/2000 A			
0 - 500/2500 A			
0 - 600/3000 A			
0 - 800/4000 A			
0 - 1000/5000 A			
0 - 1500/7500 A			
0 - 2000/10000 A			

Other scale ranges to be specified!

Measuring ranges .../5 A with 6-fold overload	-6L	-6L	-6L
.../5 A			
50/5			
60/5			
100/5			
150/5			
200/5			
250/5			
300/5			
400/5			
500/5			
600/5			
800/5			
1000/5			
1500/5			
2000/5			
0 - 50/300 A			
0 - 60/360 A			
0 - 100/600 A			
0 - 150/900 A			
0 - 200/1200 A			
0 - 250/1500 A			
0 - 300/1800 A	X	X	X
0 - 400/2400 A			
0 - 500/3000 A			
0 - 600/3600 A			
0 - 800/4800 A			
0 - 1000/6000 A			
0 - 1500/9000 A			
0 - 2000/12000 A			

Other scale ranges to be specified!

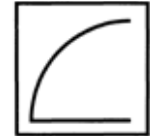


Moving-iron measuring instruments

for alternating current with extended overload range

Type:
EQX-nL

Square cut-out
45-65 Hz
EQX 48 class 2,5
EQX 72 / 96 class 1,5
nL = n-fold overload



Type	EQX 48-nL	EQX 72-nL	EQX 96-nL
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	45 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	42 mm	62 mm	90 mm
Weight	0,1 kg	0,2 kg	0,25 kg



Types and variants

Alternating current for use with current transformer				
Measuring ranges .../1 A with 5-fold overload		-5L	-5L	-5L
.../1 A	50/1	0 - 50/250 A		
	60/1	0 - 60/300 A		
	100/1	0 - 100/500 A		
	150/1	0 - 150/750 A		
	200/1	0 - 200/1000 A		
	250/1	0 - 250/1250 A		
	300/1	0 - 300/1500 A	X	X
	400/1	0 - 400/2000 A		
	500/1	0 - 500/2500 A		
	600/1	0 - 600/3000 A		
	800/1	0 - 800/4000 A		
	1000/1	0 - 1000/5000 A		
	1500/1	0 - 1500/7500 A		
	2000/1	0 - 2000/10000 A		
Other scale ranges to be specified!				
Measuring ranges .../1 A with 6-fold overload		-6L	-6L	-6L
.../1 A	50/1	0 - 50/300 A		
	60/1	0 - 60/360 A		
	100/1	0 - 100/600 A		
	150/1	0 - 150/900 A		
	200/1	0 - 200/1200 A		
	250/1	0 - 250/1500 A		
	300/1	0 - 300/1800 A	X	X
	400/1	0 - 400/2400 A		
	500/1	0 - 500/3000 A		
	600/1	0 - 600/3600 A		
	800/1	0 - 800/4800 A		
	1000/1	0 - 1000/6000 A		
	1500/1	0 - 1500/9000 A		
	2000/1	0 - 2000/12000 A		
Other scale ranges to be specified!				

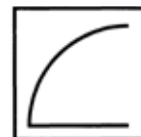


Moving-iron measuring instruments

with integrated selector switch for measurement of alternating voltage in three-phase power systems phase against phase as well as phase against neutral with 6 switching positions

Type:
EQX/U6

Square cut-out
45-65 Hz
Class 1,5



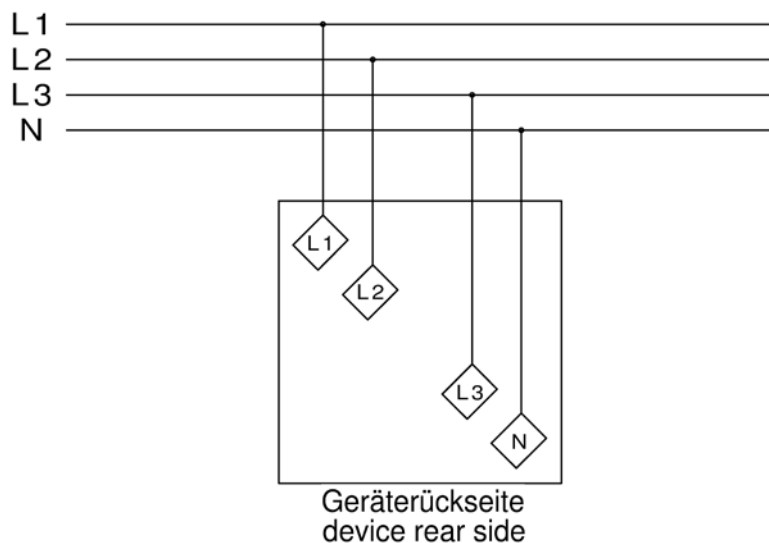
Type	EQX 72/U6	EQX 96/U6
Front frame	72 x 72 mm	96 x 96 mm
Cut-out	68 x 68 mm	92 x 92 mm
Scale length	62 mm	90 mm
Weight	0,2 kg	0,25 kg



Types and variants

Alternating voltage direct measurement			
Measuring range			
V	500	X	X
Other measuring ranges on request!			

Connection diagram EQX / U6





Moving-iron measuring instruments

double voltmeters with diagonal gauges

Type:
EQX/2

Square cut-out
45-65 Hz
Class 1,5



Type	EQX/2 96	EQX/2 144
Front frame	96 x 96 mm	144 x 144 mm
Cut-out	92 x 92 mm	138 x 138 mm
Scale length	--	--
Weight	0,4 kg	0,7 kg



Types and variants

Alternativ voltage direct measurement			
Measuring range (without overload)			
V	2 x 100 2 x 250 (230) 2 x 400 2 x 500 2 x 600	X	X
Scales ranges acc. to measuring range			
Alternating voltage with voltage transformer			
Measuring range (1,2-fold overload)			
... kV(V)/... V	2 x .../100V(120V) 2 x .../100V//√3(120V)√3 2 x .../110V(132V) 2 x .../110V//√3(132V) √3	X X X X	X X X X
Scale ranges to be specified with order			

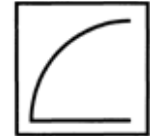


Moving-coil measuring instruments

for standard signals and connection to shunts resistors

Type:
DQX

Square cut-out
DQX 48 class 2,5
DQX 72 / 96 class 1,5



Type	DQX 48	DQX 72	DQX 96
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	45 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	42 mm	62 mm	90 mm
Weight	0,1 kg	0,2 kg	0,25 kg



Types and variants

Standard signals			
Measuring ranges			
V - „0“ left	0-10	X	X
V - „0“ at center	10-0-10	--	X
mA - „0“ left	0-20	X	X
mA - „0“ at center	20-0-20	--	X
mA	4-20	X	X

Please specify scale value and measured variable when order. If no values are specified the scale is executed with 0 - 100%.

Shunt resistors			
Measuring ranges			
mV - „0“ left	60 100 150 250	X	X
mV - „0“ at center	60-0-60 100-0-100 150-0-150 250-0-250	--	X

Please specify scale value and measured variable when order. If no values are specified, the scale is executed with the full scale value!

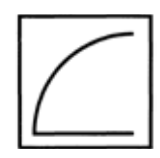


Moving-coil measuring instruments

for direct current

Type: **DQX**

Square cut-out
DQX 48 class 2,5
DQX 72 / 96 class 1,5



Type	DQX 48	DQX 72	DQX 96
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	45 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	42 mm	62 mm	90 mm
Weight	0,1 kg	0,2 kg	0,25 kg



Types and variants

Direct current direct measurement				
Measuring ranges				
μA	50			
	100			
	150	X	X	X
	200			
	400			
	600			
mA	1			
	2,5			
	4			
	6			
	10			
	15			
	25			
	40	X	X	X
	60			
	100			
	150			
	250			
A	1			
	1,5			
	2,5			
	4			
	6			
	10	X	X	X
	15			
	25			
	30			
	40			
50	--			
60	--			

Other measuring ranges on request!

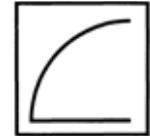


Moving-coil measuring instruments

for direct voltage

Type:
DQX

Square cut-out
DQX 48 class 2,5
DQX 72 / 96 class 1,5



Type	DQX 48	DQX 72	DQX 96
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	45 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	42 mm	62 mm	90 mm
Weight	0,1 kg	0,2 kg	0,25 kg



Types and variants

Direct voltage direct measurement				
Measuring ranges				
mV	50			
	100			
	150			
	200	X	X	X
	250			
	400			
	500			
V	600			
	1			
	1,5			
	2,5			
	4			
	6			
	10			
	15			
	25	X	X	X
	40			
	60			
	100			
	150			
	250			
	400			
500				
600				
Other measuring ranges on request!				

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5.1 Panel meters analog X-series

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Square cut-out
DQX-250 48 class 2,5
DQX-250 72 / 96 class 1,5

Moving-coil measuring instruments

for standard signals and connection to shunt resistors
with scale 240°

Type:
DQX-250



Type	DQX-250 48	DQX-250 72	DQX-250 96
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	645 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	70 mm	105 mm	150 mm
Weight	0,2 kg	0,2 kg	0,25 kg



Types and variants

Standard signals

Measuring ranges				
V - „0“ left	0-10	on request	X	X
V - „0“ at center	10-0-10	on request	X	X
mA - „0“ left	0-20	on request	X	X
mA - „0“ at center	20-0-20	on request	X	X
mA	0/4-20	on request	X	X

Please specify scale value and measured variable when order. If no values are specified the scale is executed with 0 - 100% (100 - 0 - 100%).

Shunt resistors

Measuring ranges				
mV - „0“ left	60	on request	X	X
	100	on request	X	X
	150	on request	on request	on request
	250	on request	on request	on request
mV - „0“ at center	60-0-60	on request	X	X
	100-0-100	on request	on request	on request
	150-0-150	on request	on request	on request
	250-0-250	on request	on request	on request

Please specify scale value and measured variable when order. If no values are specified, the scale is executed with the full scale value!



Moving-coil measuring instruments

for direct current with scale 240°

Type:
DQX-250

Square cut-out
DQX-250 48 class 2,5
DQX-250 72 / 96 class 1,5



Type	DQX-250 48	DQX-250 72	DQX-250 96
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	645 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	70 mm	105 mm	150 mm
Weight	0,2 kg	0,2 kg	0,25 kg



Types and variants

Direct current direct measurement		€	€	€
Measuring ranges				
μA	100	on request	on request	on request
	150			
	200			
	400			
	600			
mA	1	on request	X	X
	2,5			
	4			
	6			
	10			
	15			
	25			
	40			
	60			
	100			
	150			
A	1	on request	on request	on request
	1,5			
	2,5			
	4			
	6			
	10			
	15			
Other measuring ranges on request!				

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5.1 Panel meters analog X-series

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Moving-coil measuring instruments

for direct voltage with scale 240°

Type:
DQX-250

Square cut-out
DQX-250 48 class 2,5
DQX-250 72 / 96 class 1,5



Type	DQX-250 48	DQX-250 72	DQX-250 96
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	645 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	70 mm	105 mm	150 mm
Weight	0,2 kg	0,2 kg	0,25 kg



Types and variants

Direct voltage direct measurement		€	€	€
Measuring ranges				
mV	50	on request	X	x
	100			
	150			
	200			
	250			
	400			
	500			
	600			
V	1	on request	X	x
	1,5			
	2,5			
	4			
	6			
	10			
	15			
	25			
	40			
	60			
	100			
	150			
	250			
	400			
	500			
	600			
Other measuring ranges on request!				

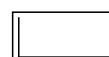
Types DPX available soon!
Please send your inquiry!

Moving-coil rectangular panel meters

for standard signals and connection to shunt resistors

Type:
DPX ...

Rectangular cut-out
Class 1,5 (DPX 4824 class 3)



Type	DPX-Q(H) 4824	DPX-Q(H) 7236	DPX-Q(H) 9624
Front frame	48 x 24 mm	72 x 36 mm	96 x 24 mm
Cut-out	45 x 22 mm	68 x 34 mm	92 x 22 mm
Scale length	32 mm	52 mm	60 mm
Weight	0,08 kg	0,12 kg	0,15 kg



Types and variants

Standard signals				
Measuring range landscape format		DPX-Q 4824	DPX-Q 7236	DPX-Q 9624
V - „0“ left	0-10	X	X	X
V - „0“ at center	10-0-10	X	X	X
mA - „0“ left	0-20	X	X	X
mA - „0“ at center	20-0-20	X	X	X
mA	0/4-20	X	X	X
Measuring range portrait format		DPX-H 4824	DPX-H 7236	DPX-H 9624
V - „0“ left	0-10	X	X	X
V - „0“ at center	10-0-10	X	X	X
mA - „0“ left	0-20	X	X	X
mA - „0“ at center	20-0-20	X	X	X
mA	0/4-20	X	X	X

Please specify scale value and measured variable when order. If no values are specified the scale is executed with 0 - 100% (100 - 0 - 100%).

Shunt resistors				
Measuring range landscape format		DPX-Q 4824	DPX-Q 7236	DPX-Q 9624
mV - „0“ left	60	X	X	X
	100	X	X	X
mV - „0“ at center	60-0-60	X	X	X
	100-0-100	X	X	X
Measuring range portrait format		DPX-H 4824	DPX-H 7236	DPX-H 9624
mV - „0“ below	60	X	X	X
	100	X	X	X
mV - „0“ at center	60-0-60	X	X	X
	100-0-100	X	X	X

Please specify scale value and measured variable when order. If no values are specified, the scale is executed with the full scale value!

Types DPX available soon!
Please send your inquiry!

Moving-coil rectangular panel meters

for direct voltage

Type:
DPX ...

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5.1 Panel meters analog X-series

6 Meas. instruments for top hat rail mounting

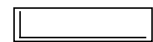
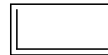
7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus

Rectangular cut-out
Class 1,5 (DPX 4824 class 3)



Type	DPX-Q(H) 4824	DPX-Q(H) 7236	DPX-Q(H) 9624
Front frame	48 x 24 mm	72 x 36 mm	96 x 24 mm
Cut-out	45 x 22 mm	68 x 34 mm	92 x 22 mm
Scale length	32 mm	52 mm	60 mm
Weight	0,08 kg	0,12 kg	0,15 kg



Types and variants

Direct voltage direct measurement		€		€		
Measuring range landscape or portrait forma		DPX-Q 4824 DPX-H 4824 (please specify when ordering)	DPX-Q 7236 DPX-H 7236 (please specify when ordering)	DPX-Q 9624 DPX-H 9624 (please specify when ordering)		
mV	0-50					
	0-150					
	0-200					
	0-250	X		X		X
	0-400					
	0-500					
	0-600					
V	0-1					
	0-1,5					
	0-2,5					
	0-4					
	0-6					
	0-10					
	0-15	X		X		X
	0-25					
	0-40					
	0-60					
	0-100					
	0-150					
	0-250					
	0-400					
0-500						
0-600						

Standard version ALWAYS with "0" left (DPX-Q) or below (DPX-H). Offset "0" on request.
Others measuring ranges on request!

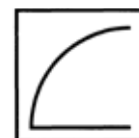


Bimetal measuring instruments

for alternating current
with slave pointer
(maximum current ammeter)

Type:
MQX

Square cut-out
45-65 Hz, class 3
Ammeter with 1,2-fold overload scale
Delay time 15 min, 8 min on request
with reset button



Type	MQX 48	MQX 72	MQX 96
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	45 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	42 mm	62 mm	90 mm
Weight	0,1 kg	0,2 kg	0,25 kg



Types and variants

Alternating current for use with current transformer					
Measuring ranges					
.../5 A	50/5	0 - 50/100 A			
	60/5	0 - 60/120 A			
	100/5	0 - 100/200 A			
	150/5	0 - 150/300 A			
	200/5	0 - 200/400 A			
	250/5	0 - 250/500 A			
	300/5	0 - 300/600 A	X	X	X
	400/5	0 - 400/800 A			
	500/5	0 - 500/1000 A			
	600/5	0 - 600/1200 A			
	800/5	0 - 800/1600 A			
	1000/5	0 - 1000/2000 A			
	1500/5	0 - 1500/3000 A			
	2000/5	0 - 2000/4000 A			
.../1 A	50/1	0 - 50/60 A			
	60/1	0 - 60/72 A			
	100/1	0 - 100/120 A			
	150/1	0 - 150/180 A			
	200/1	0 - 200/240 A			
	250/1	0 - 250/300 A			
	300/1	0 - 300/360 A	X	X	X
	400/1	0 - 400/480 A			
	500/1	0 - 500/600 A			
	600/1	0 - 600/720 A			
	800/1	0 - 800/960 A			
	1000/1	0 - 1000/1200 A			
	1500/1	0 - 1500/1800 A			
	2000/1	0 - 2000/2400 A			
Other scale ranges to be specified!					



Bimetal measuring instruments

with slave pointer, combined with moving-iron ammeter
(maximum and instantaneous current ammeter)

Type:
MEQX

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5.1 Panel meters analog X-series

6 Meas. instruments for top hat rail mounting

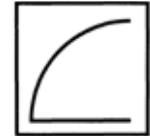
7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus

Square cut-out, 45-65 Hz
cl. 3 (Bimetal) / cl. 1,5 (Moving-iron)
1,2-fold OL(Bimetal) / 2-fold OL (Moving iron)
Delay 15 min, 8 min on request, with reset button



Type	MEQX 72	MEQX 96
Front frame	72 x 72 mm	96 x 96 mm
Cut-out	68 x 68 mm	92 x 92 mm
Scale length	62/43 mm	90/70 mm
Weight	0,2 kg	0,25 kg



Types and variants

Alternating current for use with current transformer			
Measuring ranges		Scale	
.../5 A	50/5	0 - 50/60/100 A	
	60/5	0 - 60/72/120 A	
	100/5	0 - 100/120/200 A	
	150/5	0 - 150/180/300 A	
	200/5	0 - 200/240/400 A	
	250/5	0 - 250/300/500 A	
	300/5	0 - 300/360/600 A	X
	400/5	0 - 400/480/800 A	
	500/5	0 - 500/600/1000 A	
	600/5	0 - 600/720/1200 A	
	800/5	0 - 800/960/1600 A	
	1000/5	0 - 1000/1200/2000 A	
	1500/5	0 - 1500/1800/3000 A	
	2000/5	0 - 2000/2400/4000 A	
.../1 A	50/1	0 - 50/60/100 A	
	60/1	0 - 60/72/120 A	
	100/1	0 - 100/120/200 A	
	150/1	0 - 150/180/300 A	
	200/1	0 - 200/240/400 A	
	250/1	0 - 250/300/500 A	
	300/1	0 - 300/360/600 A	X
	400/1	0 - 400/480/800 A	
	500/1	0 - 500/600/1000 A	
	600/1	0 - 600/720/1200 A	
	800/1	0 - 800/960/1600 A	
	1000/1	0 - 1000/1200/2000 A	
	1500/1	0 - 1500/1800/3000 A	
	2000/1	0 - 2000/2400/4000 A	

Other scale ranges to be specified!

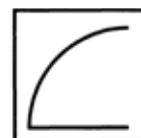


Power factor meters

for alternating and three-phase current

Type:
LwQX / LdQX

Square cut-out
50 Hz, class 2,5
Lw = alternating current
Ld = three-phase current



Type	L..QX 72	L..QX 96
Front frame	72 x 72 mm	96 x 96 mm
Cut-out	68 x 68 mm	92 x 92 mm
Scale length	62 mm	90 mm
Weight	0,25 kg	0,35 kg



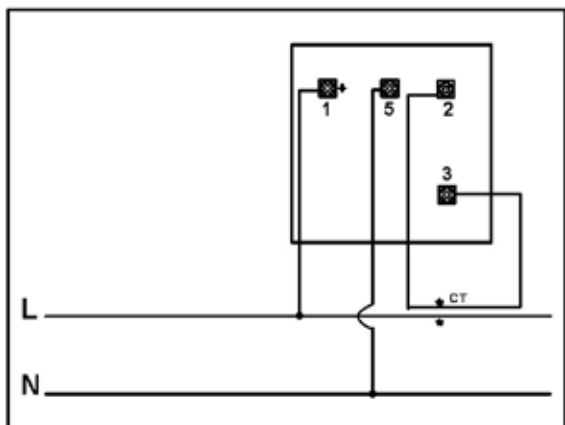
Types and variants

Alternating current			LwQX 72	LwQX 96
Measuring ranges		Scale		
5 A	230 V	0,5 cap. - 1 - 0,5 ind.	53,40	53,40
1 A	230 V	0,5 cap. - 1 - 0,5 ind.	53,40	53,40

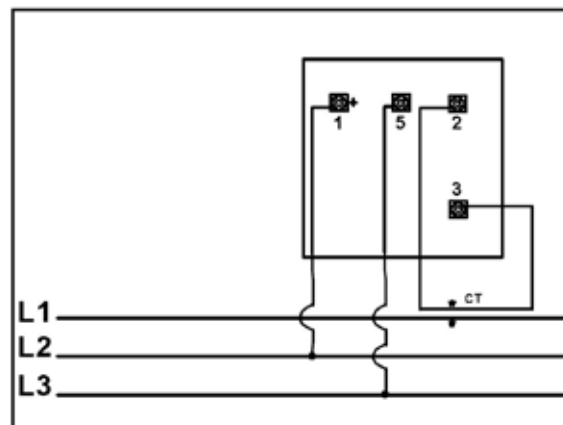
Three-phase current			LdQX 72	LdQX 96
Measuring ranges		Scale		
5 A	230 V 400 V	0,5 cap. - 1 - 0,5 ind. 0,5 cap. - 1 - 0,5 ind.	53,40	53,40
1 A	230 V 400 V	0,5 cap. - 1 - 0,5 ind. 0,5 cap. - 1 - 0,5 ind.	53,40	53,40

Connection diagrams

Alternating current



Three-phase current



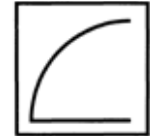


Frequency meters

Pointer frequency meters

Type:
FQX

Square cut-out
FQX 48 class 2,5
FQX 72 / 96 class 1,5



Type	FQX 48	FQX 72	FQX 96
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	45 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	42 mm	62 mm	90 mm
Weight	0,2 kg	0,35 kg	0,45 kg



Types and variants

Frequency / voltage				
Measuring range				
45 - 55 Hz	100 V	38,20	38,20	38,20
	230 V			
	400 V			
55 - 65 Hz	100 V	38,20	38,20	38,20
	230 V			
	400 V			
45 - 65 Hz	100 V	38,20	38,20	38,20
	230 V			
	400 V			

Other frequency and voltage range possible with type FZQ 72 / 96 DIN.

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5.1 Panel meters analog X-series

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



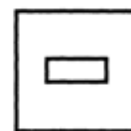
Square cut-out
Vibrating reed movement
Energy consumption 1 - 4 VA
FZQX and FZDQX 72 / 96 class 1,5

Frequency meters

Vibrating reed frequency meters

Vibrating reed double frequency meters

Type:
FZQX / FZDQX



Type	FZQX / FZDQX 72	FZQX / FZDQX 96
Front frame	72 x 72 mm	96 x 96 mm
Cut-out	68 x 68 mm	92 x 92 mm
Scale length	--	--
Weight	0,35 kg	0,45 kg



Types and variants

Frequency / voltage for 1 frequency		FZQX 72	FZQX 96
Measuring ranges	No. of reeds		
45 - 55 Hz	100 V		
	230 V	X	X
	400 V		
47 - 53 Hz	100 V		
	230 V	X	X
	400 V		
55 - 65 Hz	100 V		
	230 V	X	X
	400 V		
57 - 63 Hz	100 V		
	230 V	X	X
	400 V		

Other frequency and voltage ranges on request!

Frequency / voltage for 2 frequencies		FZDQX 72	FZDQX 96
Measuring ranges	No. of reeds		
2 x 45 - 55 Hz	100 V		
	230 V	-	X
	400 V		
2 x 47 - 53 Hz	100 V		
	230 V	-	X
	400 V		
2 x 55 - 65 Hz	100 V		
	230 V	-	X
	400 V		
2 x 57 - 63 Hz	100 V		
	230 V	-	X
	400 V		

Other frequency and voltage ranges on request!



Square cut-out class 0,5

Frequency meters

Double pointer frequency meters with diagonal gauges

Type:
FQX/2



Type	FQX/2 96	FQX/2 144
Front frame	96 x 96 mm	144 x 144 mm
Cut-out	92 x 92 mm	138 x 138 mm
Scale length	--	--
Weight	0,4 kg	0,7 kg



Types and variants

Frequency / voltage for 2 frequencies		FQX/2 96	FQX/2 144
Measuring ranges			
2 x 45 - 55 Hz	57 - 110 V	X	on request
	230 V	X	on request
	400 V	X	on request
	500 V	X	on request
2 x 48 - 52 Hz	57 - 110 V	X	on request
	230 V	X	on request
	400 V	X	on request
	500 V	X	on request
2 x 45 - 65 Hz	57 - 110 V	X	on request
	230 V	X	on request
	400 V	X	on request
	500 V	X	on request
2 x 55 - 65 Hz	57 - 110 V	X	on request
	230 V	X	on request
	400 V	X	on request
	500 V	X	on request
2 x 58 - 62 Hz	57 - 110 V	X	on request
	230 V	X	on request
	400 V	X	on request
	500 V	X	on request

Other frequency and voltage ranges on request!

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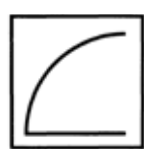


Power meters

for standard signals in connection with measuring transducers for active power or reactive power

Type:
DQX

Square cut-out
DQX 48 class 2,5
DQX 72 / 96 class 1,5



Type	DQX 48	DQX 72	DQX 96
Front frame	48 x 48 mm	72 x 72 mm	96 x 96 mm
Cut-out	45 x 45 mm	68 x 68 mm	92 x 92 mm
Scale length	42 mm	62 mm	90 mm
Weight	0,1 kg	0,2 kg	0,25 kg

Types and variants

Standard signal	€	€	€
Measuring ranges			
mA - „0“ left 0-20	X-	X	XX
mA - „0“ at center 20-0-20		X	

Standard values active power							
U [V]	I [A]	P [W/kW]	CT second.	Scale	Type of current	Load	Type Transducer
230	1	230 W	-	0-230 W	Alternating current	--	Pw-MU
	5	1,15 kW	-	0-1,15 kW			
	10	2,3 kW	-	0-2,3 kW			
	50	11,5 kW	1 / 5	0-11,5 kW			
	100	23 kW	1 / 5	0-23 kW			
400	1	692 W	-	0-700 W	3-wire 3phase current	same load	Pnz-MU
	5	3,46 kW	-	0-3,5 kW			
	10	6,92 kW	-	0-7 kW			
	50	34,6 kW	1 / 5	0-35 kW			
	100	69,2 kW	1 / 5	0-70 kW			
400	1	692 W	-	0-700 W	3-wire 3phase current	any load	Pd-MU
	5	3,46 kW	-	0-3,5 kW			
	10	6,92 kW	-	0-7 kW			
	50	34,6 kW	1 / 5	0-35 kW			
	100	69,2 kW	1 / 5	0-70 kW			
400	1	692 W	-	0-700 W	4-wire 3phase current	same load	Pz-MU
	5	3,46 kW	-	0-3,5 kW			
	10	10,38 kW	-	0-10,5 kW			
	50	34,6 kW	1 / 5	0-35 kW			
	100	69,2 kW	1 / 5	0-70 kW			
400	1	692 W	-	0-700 W	4-wire 3phase current	any load	Pdr-MU
	5	3,46 kW	-	0-3,5 kW			
	15	10,38 kW	-	0-10,5 kW			
	50	34,6 kW	1 / 5	0-35 kW			
	100	69,2 kW	1 / 5	0-70 kW			

Higher current / load values to be specified!

General information on power meters

The analog power meters are operated in combination with power measuring transducers. The power meters have a measuring input of 0-20 mA, which if fed via terminals 13 and 14 of the corresponding transducer. The combination is available for both alternating current and three-phase current. Up to 10 A a direct measurement can be carried out via the transducer, with current >10 A the use of current transformers is necessary. The power meters are also available for reactive power on request. The analog power meters can be designed with center zero-point (-20..0..20 mA) via the appropriate design of the transducer for bidirectional energy direction.



Further product information and technical data for measuring transducers for active power and reactive power can be found in the catalog from page 28.

Measuring transducers for active power

Alternating current and three-phase current

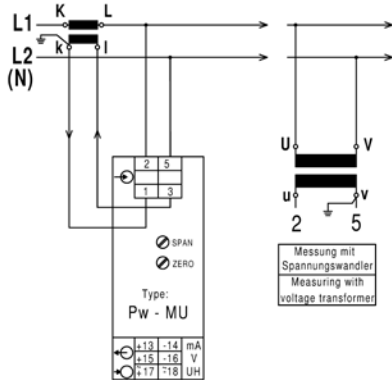
Type: **Pw-MU, Pnz-MU, Pz-MU, Pd-MU, Pdr-MU**

Input	50-150 % of the apparent power, 100 / 110 / 230 / 400 / 500 or 600 V 1 A or 5 A (primary current to be specified) Direct connection up to max. 10 A on request! Ausgang 0-20 mA und 0-10 V (auxiliary voltage not requested!)	
Output	Type	Application
	Pw-MU	Alternating current system
	Pz-MU	4-wire 3-phase power system of same load
	Pnz-MU	3-wire 3-phase power system of same load
	Pd-MU	3-wire 3-phase power system of any load
	Pdr-MU	4-wire 3-phase power system of any load
	Option	bidirectional energy direction 20-0-20 mA and 10-0-10 V

Connection measuring transducers

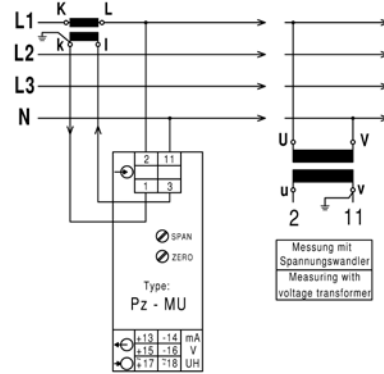
Type Pw-MU (Alternating current)

Working voltage up to 300 V (phase to neutral L - N)



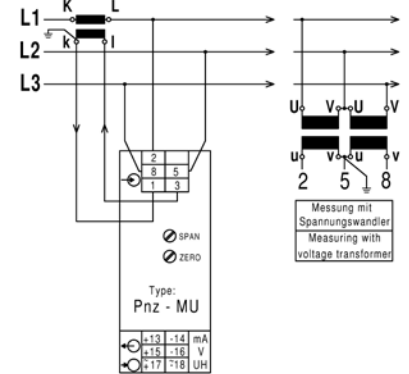
Type Pz-MU (4-wire 3-phase current, same load)

Working voltage up to 300 V (phase to neutral L - N)



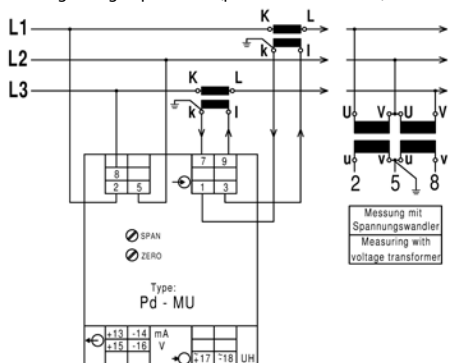
Type Pnz-MU (3-wire 3-phase current, same load)

Working voltage up to 300 V (phase to neutral L - N)



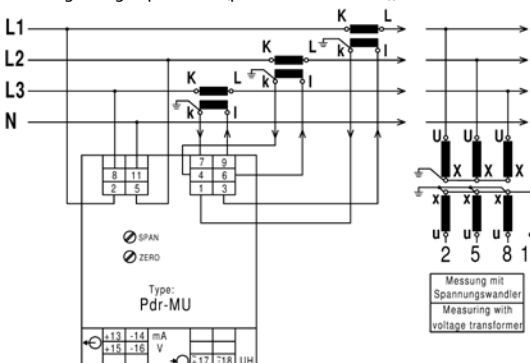
Type Pd-MU (3-wire 3-phase current, any load)

Working voltage up to 300 V (phase to neutral L - N)



Type Pdr-MU (4-wire 3-phase current, any load)

Working voltage up to 300 V (phase to neutral L - N)



Digital synchronoscope X-serie with or without display



Application

The SQX 96 without display is a microprocessor-controlled synchronoscope. It is supplied purely as a display and is used for manual or semi-automatic synchronizations. The integrated enable relay is activated as soon as the set synchronizing conditions are met. The connection is made via a terminal strip on the back of the device.

The SQX 96 with display is also equipped with an LC display. The LC display is used to show the mains voltage and the generator voltage and their frequencies. This allows two separate voltmeters and two frequency meters to be replaced.

The functions are identical to those of the SQX 96 without a display.



Function

The instrument has 24 LEDs arranged in a circle, which are used to display the instantaneous phase difference with a resolution of 20°. In the synchronization range between -20° and +20° the resolution is increased (5° el. degrees).

The green SYNC. LED lights up when synchronization conditions are met. A red ΔU LED lights up when the voltage difference exceeds the set value.

On the back of the instrument there are three potentiometers for setting the synchronization conditions:

- for setting the permissible phase difference $\Delta\varphi$
- for setting the permissible voltage difference ΔU
- for setting the switch-on delay of the relay (DELAY)

The enabling relay is activated (permanent contact) when the phase difference and the voltage difference are within the set ranges for the duration of the set delay time. The permanent contact opens again if only one value is outside this range. Activation of the relay is indicated by the instrument's SYNC LED.



Technical Data

Input values

Rated voltage Un	57 V (100 V/V ₃), 63,5 V (110 V/V ₃), 100 V, 110 V, 230 V, 400 V, 500 V, 600 V
Voltage range	+/- 10%
Frequency range	45 to 65 Hz
Power consumption (bus bar side)	< 4 VA
Overload conditions	1,2-fold Un continuous; 2-fold Un up to 3 sec.
Accuracy	2,5 %

LED-Display

Resolution phase difference display	20 °el. degrees
Loupe area	+/- 20 °el. degrees
Loupe area resolution	5 °el. degrees
Accuracy at $\Delta\varphi = 0$	+/- 3 °el degrees

Relay

Switching function	Permanent contact
Contact rating	10A/125V AC or 3A/250V AC or 5A/30V DC
Reaction time	< 10 ms

Synchronization settings

Voltage difference range ΔU	1 to 10%
Phase difference area $\Delta\varphi$	2 to 20 ° el. degrees
Switch-on delay of the relay	0,1 to 1,0 s

LC display

Display line 1	Mains (bus bar) voltage and mains frequency
Display line 2	Generator voltage and generator frequency

General data

Working temperature range	0 to 50 °C
Storage temperature range	-20 to 70 °C
Degree of protection	Housing IP52, terminals IP20
Position of use	vertical +/- 5°
Security	acc. to EN 61010-1, 400V CAT III, degree of pollution 2
Housing material	Hardly inflammable, self-extinguishing acc. to UL 94 V-0
Front dimensions	96 x 96 mm
Installation depth	80 mm
Panel cutout	90 x 90 mm +0,5 mm
Fixing	by snap-in clamps



Digital Synchronoscopes X-serie

with or without display

Type:
SQX 96

Square cut-out
Class 2,5



Type	SQX 96 without display	SQX 96 with display
Front frame	96 x 96 mm	96 x 96 mm
Cut-out	92 x 92 mm	92 x 92 mm
Weight	0,4 kg	0,4 kg



Types and variants

Input values				
Rated voltage +/- 10%	Frequency range			
100V/ $\sqrt{3}$ (57 V) 110V/ $\sqrt{3}$ (63,5 V) on voltage transf.	45 - 65 Hz		X	X
100 V 110 V on voltage transf.	45 - 65 Hz		X	X
230 V 400 V 500 V 600 V	45 - 65 Hz		X	X

Other voltages and frequency ranges on request!

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Operating hour counter

for alternating and direct current

Type:
BWQ / BGQ

Square cut-out



Type	B..Q 48		
Front frame	48 x 48 mm		
Cut-out	42 x 42 mm		
Digit height	4,4 mm		
Weight	0,1 kg		



Types and variants

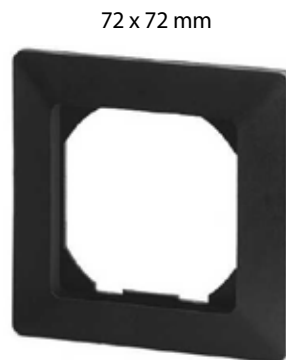
Alternating current				BWQ 48
Voltage range	Tolerance	Display	Accuracy	
230 V, 50 Hz	+/- 15%	99.999 h	0,01 h	X
Other voltage ranges on request!				

Direct current				BGQ 48
Voltage range	Tolerance	Display	Accuracy	
12 - 48 V	+/- 10%	999.999 h	0,1 h	X
Other voltage ranges on request!				

Panels / mounting frames

fortype	55 x 55 mm	72 x 72 mm
BWQ 48	X	X
BGQ 48	X	X

Design panels / mounting frames

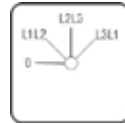




Voltmeter selector switch

Type:
NV

4-hole panel mouting



Type	NV 3	NV 6
Front plate	48 x 48 mm	48 x 48 mm
Fixing dimensions	36 x 36 mm	36 x 36 mm
No. of switching positions	4	7
Weight	0,15	0,15 kg



Types and variants

Alternating current				
No. of positions	Rated current	kW-rating	Switching positions	Type
NV 3 4 positions	25 A	7,5 kW	0 L1-L2 L2-L3 L3-L1	X
NV 6 7 positions	25 A	7,5 kW	L3-L1 L2-L3 L1-L2 0 L1-N L2-N L3-N	X

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Mounting kits

for analog meters

Type:
TSH-X



Application

The TSH-X mounting kit for analog meters is used to mount the devices of sizes 48, 72 and 96 on TH 25 top-hat rails in accordance with DIN EN 60715.



Function

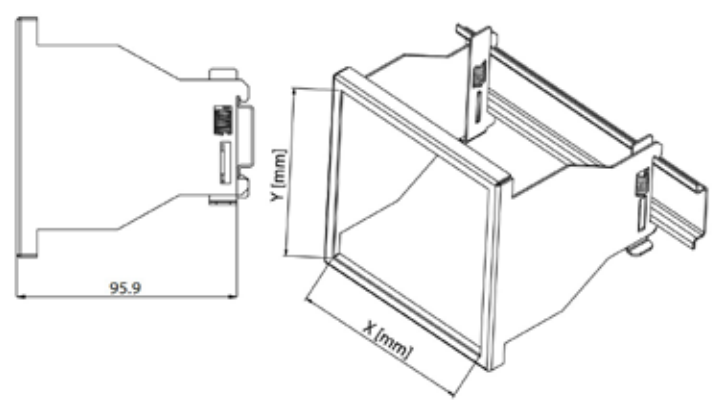
The analog device is attached to the TSH-X mounting kit with a form B screw mounting, DIN 43 835. The unit can now be snapped onto a top hat rail.

Types and variants

Type	TSH-X 48	TSH-X 72	TSH-X 96
for device size (X x Y)	48 x 48 mm	72 x 72 mm	96 x 96 mm
Total height from top of hat rail	95,9 mm	95,9 mm	96,9 mm
max. installation depth of analog device	85 mm	85 mm	85 mm
Material	Galvanized steel sheet		
Number of screw fixings	2	2	2
	X	X	X

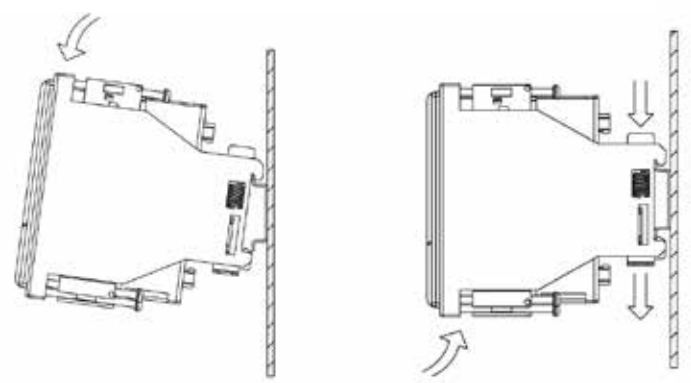


Dimensions / Mounting



Assembly

Disassembly





PI / PIR



PI...X-TR



PI 29X



PI 36X



PI...X-LED-ER



PI...X-LED-TR



PI...X-LED-KR



SUS-99-L



SUS-09-Q



SUS-02-Q



SUS-01

Schaltstellungsanzeiger

Schaltstellungsanzeiger analog		
für 24 - 230V DC mit Kreuzsymbol	PI	Seite 212
für 24 - 230V AC mit Kreuzsymbol	PIR	Seite 212
Schaltstellungsanzeiger analog		
für 24-60 und 90-240V AC+DC mit Kreuzsymbol	PI...X	Seite 214
für 24-60 und 90-240V AC+DC mit Trennsymbol	PI...X-TR	Seite 214
Schaltstellungsanzeiger mit LED		
für 24+60 oder 48-125 oder 110+220/230 V AC+DC mit Kreuzsymbol	PI...X-LED-KR	Seite 216
für 24+60 oder 48-125 oder 110+220/230 V AC+DC mit Trennsymbol	PI...X-LED-TR	Seite 216
für 24+60 oder 48-125 oder 110+220/230 V AC+DC mit Erdungssymbol	PI...X-LED-ER	Seite 216
Schaltstellungsanzeiger mit LED - Baureihe SUS		
für 12-230V AC und 12-220V DC, Front Ø 25 mm und 25x25 mm	SUS-01	Seite 219
für 12-230V AC und 12-220V DC, Front Ø 20 mm und 20x20 mm	SUS-02	Seite 220
für 12-230V AC und 12-220V DC, Front Ø 25 mm und 25x25 mm	SUS-03	Seite 221
für 12-230V AC und 12-220V DC, Front Ø 32 mm und 32x32 mm	SUS-09	Seite 221
für 12-230V AC und 12-220V DC, Front Ø 39 mm und 39x39 mm	SUS-95	Seite 222
für 12-230V AC und 12-220V DC, Front Ø 32 mm und 32x32 mm	SUS-99	Seite 223

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Switch position indicators

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Switch position indicators



Types:
PI 24, PI 25, PI 29, PI 36 (24-230 V DC)
PIR 24, PIR 25, PIR 29, PIR 36 (24-230 V AC)



Application

Switch position indicators are used to signal the switching state in electrical installations. They may be used both in schematic diagrams of switchgear and control gear and in measuring stations and control rooms or also in mosaic systems. The switch position indicators dispose of screw terminal for cable cross sections of up to 1.5 mm².

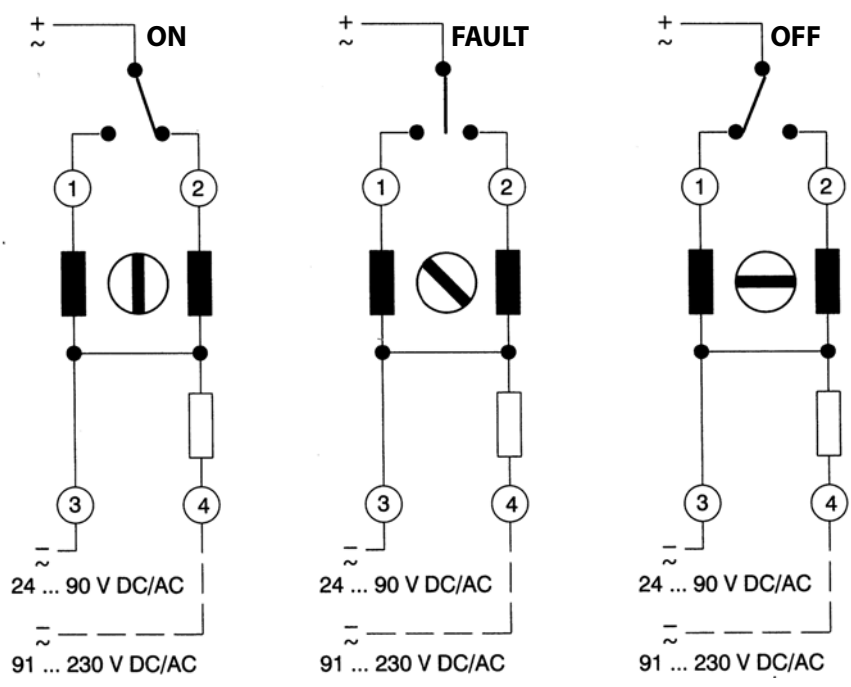


Function

The switch position indicators are equipped with a rotating magnet system. This guarantees a precise symbol position. With a rather low energy consumption, the heat development in the indicator is negligible. The coil of the system generates a magnetic field. The moving magnet is axially linked to the symbol. Pole shoes determine its position. An external reset is not required.



Connection



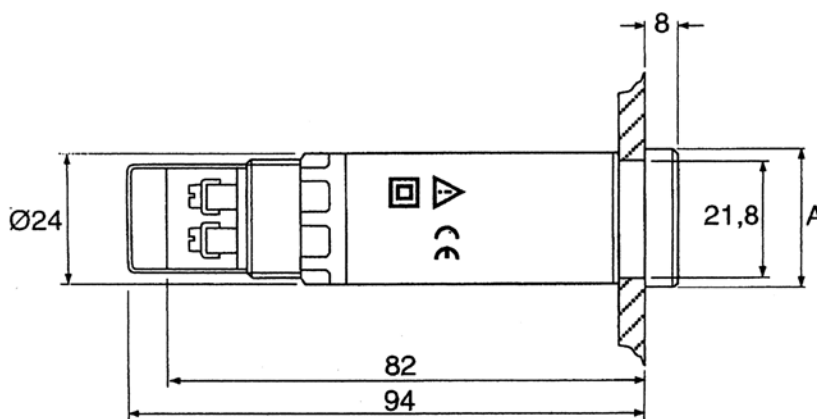


Technical data

Type	Round plastic housing with round or square front panel for cut-out installation in switchboards (PI / PIR 25/29/36) or mosaic panels (PI / PIR 24).
Housing material	Polycarbonat (self extinguishing acc. to UL 94 V-0)
Mounting position	Independent of position
Fastening	Union nut
Connection	Screw terminals up to 1,5 mm ² with accidental-contact protection
IP code	IP 54
Types PI...	Direct voltage 24-230 V
Types PIR...	Alternating voltage 24-230 V
Power input	0,4 W at 110 V, 1,4 W at 230 V
Test voltage	3,7 kV
Frequency range	(for alternating voltage) 40 Hz to 10 kHz
Max. voltage fluctuation	± 20 %
Temperature range	-25 °C to +20 °C to +30 °C to +50 °C

Dimensions

Types	PI 24 / PIR 24	PI 25 / PIR 25	PI 29 / PIR 29	PI 36 / PIR 36
Front frame	□ 24	□ 25	Ø 29	□ 36
Housing	Ø 21,8	Ø 21,8	Ø 21,8	Ø 21,8
Instal. depth	94	94	94	94
Cut-out	Ø 22	Ø 22	Ø 22	Ø 22
Weight (kg)	0,1	0,1	0,12	0,12



Types and variants

PI 24 / PI 25 / PI 29
PI 36
PIR 24 / PIR 25 / PIR 29
PIR 36

Switch position indicators



Type:
PI ..X



Application

Switch position indicators are used to signal the switching state in electrical installations. They may be used both in schematic diagrams of switchgear and control gear and in measuring stations and control rooms or also in mosaic systems. The switch position indicators dispose of screw terminal for cable cross sections of up to 1.5 mm².



Function

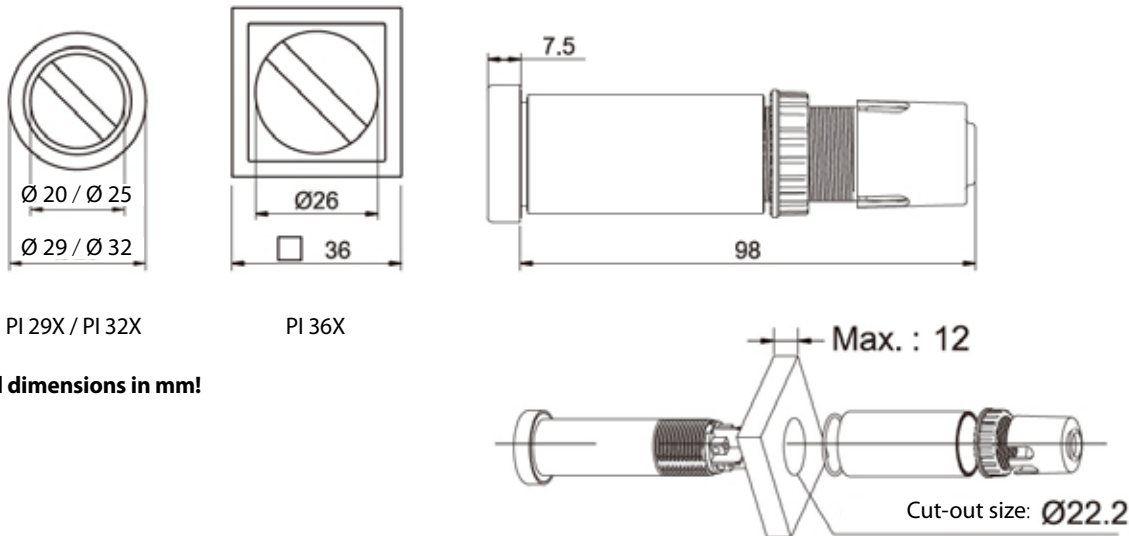
The switch position indicators are equipped with a rotating magnet system. This guarantees a precise symbol position. With a rather low energy consumption, the heat development in the indicator is negligible. The coil of the system generates a magnetic field. The moving magnet is axially linked to the symbol. Pole shoes determine its position. An external reset is not required.

Types and variants / technical data

Types cross symbol	PI 29X	PI 32X	PI 36X
Bezel shape	Ø 29	Ø 32	□ 36
Bezel dimensions	Diameter 29 mm	Diameter 32 mm	36 x 36 mm
Types break contact symbol	PI 29X-TR	PI 32X-TR	PI 36X-TR
Bezel shape	Ø 29	Ø 32	□ 36
Bezel dimensions	Diameter 29 mm	Diameter 32 mm	36 x 36 mm
	X	X	X
Technical data			
Operating voltage	24 - 60 V AC/DC and 90 - 240 V AC/DC		
Angle indication error	+/- 2°		
Overload capacity	1.2 times rated value continuous overload 2 time rated value short time overload for 5 sec		
Power consumption	< 1 VA	< 1,6 VA	< 1,6 VA
Security level	300 V CAT III		
Pollution grade	2		
Temperatur range	-25 °C to +55 °C		
Ambient conditions	5 to 95% RH, no condensation		



Dimensions



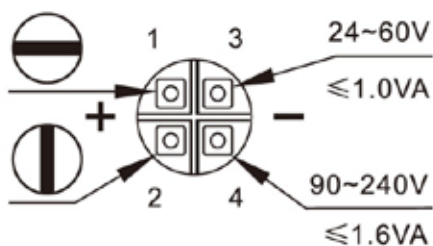
PI 29X / PI 32X

PI 36X

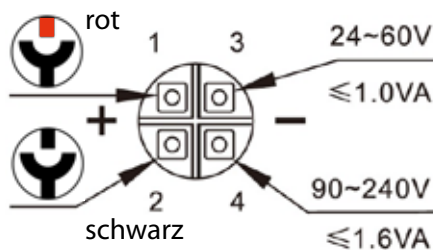
All dimensions in mm!



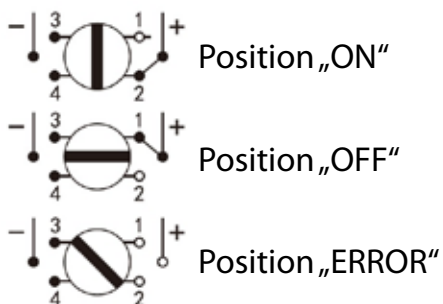
Wiring diagram cross symbol



Wiring diagram break contact symbol



Switch status cross symbol



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Switch position indicators LED version

Type:
PI ..X-LED ..



Application

Switch position indicators in LED version are used to report the switching status in electrical systems. You can both in symbolic circuit diagrams of switchgear as well as in measuring and control rooms as well as in mosaic technology. The switch position indicators have screw connection terminals for cable cross-sections of up to max. 1.5 mm².



Function

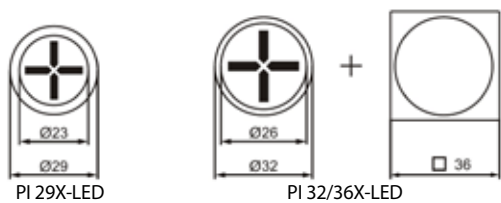
The switch position indicators in LED version are available in the versions cross symbol, break contact symbol and earth symbol with 3 different front dimensions. The LED colors are green (ON) and red (OFF) in all variants. Without applying the operating voltage, no color lights up.

Types and variants, technical data

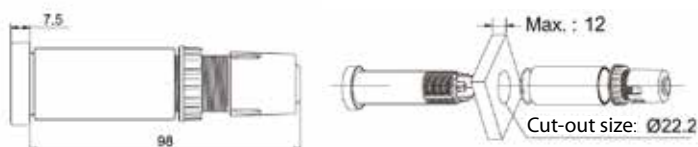
Type	PI 29X-LED		PI 32/36X-LED	
Bezel shape	Ø 29		Ø 32 / □ 36 mm	
Bezel dimensions	Diameter 29 mm		Diameter 32 mm 36 x 36 mm (with separately bezel)	
Operating voltage	24 + 60V or 48 + 125V or 110 + 220/230V AC/DC (please specify with order)		24 + 60V or 48 + 125V or 110 + 220/230V AC/DC (please specify with order)	
Angle indication error	250 V			
Overload capacity	1.2 times rated value continuous overload 2 time rated value short time overload for 5 sec			
Power consumption	< 0,5 VA		< 1,2 VA	
Security level	300 V CAT III			
Pollution grade	2			
Temperature range	-25 °C to +55 °C			
Ambient conditions	5 to 95% RH, no condensation			
Symbol variants	Type		Type	
Cross symbol	PI 29X-LED-KR	X	PI 32/36X-LED-KR	X
Break contact symbol	PI 29X-LED-TR	X	PI 32/36X-LED-TR	X
Earth symbol	PI 29X-LED-ER	X	PI 32/36X-LED-ER	X



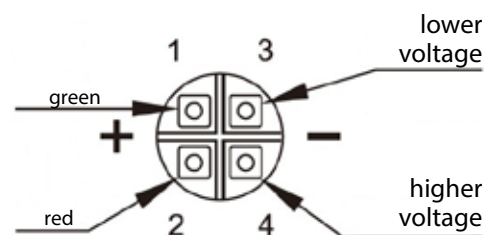
Dimensions



All dimensions in mm!



Wiring diagram



Switch position indicators LED version



Type:
SUS-..



Application

Switch position indicators in LED version are used to report the switching status in electrical systems. You can both in symbolic circuit diagrams of switchgear as well as in measuring and control rooms.



Function

The switch position indicators of the SUS series are equipped with different colored LEDs. The LEDs are controlled via different terminals.

The switch position indicators are available in round and square designs from 25 to 39 mm. They are installed using a union nut.

Technical data

Dimensions	see "types and variants"
Nominal voltage	12 - 230V AC or 12 - 220V DC (see "types and variants")
Rated current	max. 20 mA per input
Temperature range	-25 to +55 °C
max. cabinet thickness	12 mm
Degree of protection	front IP65, connections IP20
Standards	EN 61 010-1, EN 60598-1, EN 60598-2-2



Types and variants

Individual descriptions of the different types from page 219!

Type	Front bezel	Mouting cut-out	nut	Voltage AC	Voltage DC	LED color	connection
SUS-01	Ø 25 mm	Ø 22 mm	M 22 x 1,5	12-230 V	12-220 V	R/G *	screw connect. 2,5 mm ²
SUS-01-Q	25x25 mm	Ø 22 mm	M 22 x 1,5	12-230 V	12-220 V	R/G *	screw connect. 2,5 mm ²
SUS-01-T	Ø 25 mm	Ø 22 mm	M 22 x 1,5	12-230 V	12-220 V	R/G *	Faston term. 2,86x0,8 mm
SUS-01-T-Q	25x25 mm	Ø 22 mm	M 22 x 1,5	12-230 V	12-220 V	R/G *	Faston term. 2,86x0,8 mm
SUS-02	Ø 20 mm	Ø 16 mm	M 16 x 1	12-230 V	12-220 V	R/G *	screw connect. 2,5 mm ²
SUS-02-Q	20x20 mm	Ø 16 mm	M 16 x 1	12-230 V	12-220 V	R/G *	screw connect. 2,5 mm ²
SUS-02-T	Ø 20 mm	Ø 16 mm	M 16 x 1	12-230 V	12-220 V	R/G *	Faston term. 2,86x0,8 mm
SUS-02-T-Q	20x20 mm	Ø 16 mm	M 16 x 1	12-230 V	12-220 V	R/G *	Faston term. 2,86x0,8 mm
SUS-03-T	Ø 25 mm	Ø 22 mm	M 22 x 1,5	12-230 V	12-220 V	R/G *	Faston term. 2,86x0,8 mm
SUS-03-T-Q	25x25 mm	Ø 22 mm	M 22 x 1,5	12-230 V	12-220 V	R/G *	Faston term. 2,86x0,8 mm
SUS-09	Ø 32 mm	Ø 22 mm	M 22 x 1	12-230 V	12-220 V	R/G *	screw connect. 2,5 mm ²
SUS-09-Q	32x32 mm	Ø 22 mm	M 22 x 1	12-230 V	12-220 V	R/G *	screw connect. 2,5 mm ²
SUS-95	Ø 39 mm	Ø 22 mm	M 22 x 1	12-230 V	12-220 V	R/G *	screw connect. 2,5 mm ²
SUS-95-Q	39x39 mm	Ø 22 mm	M 22 x 1	12-230 V	12-220 V	R/G *	screw connect. 2,5 mm ²
SUS-95-L	Ø 39 mm	Ø 22 mm	M 22 x 1	24/48/60 V	24/48/60 V	R/G	screw connect. 2,5 mm ²
SUS-95-L-Q	39x39 mm	Ø 22 mm	M 22 x 1	24/48/60 V	24/48/60 V	R/G	screw connect. 2,5 mm ²
SUS-99	Ø 32 mm	Ø 22 mm	M 22 x 1	12-230 V	12-220 V	R/G *	screw connect. 2,5 mm ²
SUS-99-Q	32x32 mm	Ø 22 mm	M 22 x 1	12-230 V	12-220 V	R/G *	screw connect. 2,5 mm ²
SUS-99-L	Ø 32 mm	Ø 22 mm	M 22 x 1	24/48/60 V	24/48/60 V	R/G	screw connect. 2,5 mm ²
SUS-99-L-Q	32x32 mm	Ø 22 mm	M 22 x 1	24/48/60 V	24/48/60 V	R/G	screw connect. 2,5 mm ²

LED color *: R/G = red / green; with * other colors are possible - see individual description



SUS-01 / SUS-01-Q

Installation depth: 58 mm
 Front dimension: Ø 25 mm / 25x25 mm square

Picture	Dimensions	LED colors	AC voltages	DC voltage												
		<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> <tr><td></td><td>B</td></tr> <tr><td></td><td>Y</td></tr> <tr><td></td><td>W</td></tr> <tr><td></td><td>O</td></tr> </table>		R		G		B		Y		W		O	12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
	R															
	G															
	B															
	Y															
	W															
	O															
		<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> <tr><td></td><td>B</td></tr> <tr><td></td><td>Y</td></tr> <tr><td></td><td>W</td></tr> <tr><td></td><td>O</td></tr> </table>		R		G		B		Y		W		O	12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
	R															
	G															
	B															
	Y															
	W															
	O															

Distance between the mounting holes at least 30 mm!!!

Example for ordering:

SUS-01-Q-R/G-110V-DC SUS-01 = Type / Size
 -Q = Front (square)
 -R/G = Color red/green
 -110V = Voltage
 -DC = Direct voltage

SUS-01-T / SUS-01-T-Q

Installation depth: 48 mm
 Front dimension: Ø 25 mm / 25x25 mm square

Picture	Dimensions	LED colors	AC voltages	DC voltage												
		<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> <tr><td></td><td>B</td></tr> <tr><td></td><td>Y</td></tr> <tr><td></td><td>W</td></tr> <tr><td></td><td>O</td></tr> </table>		R		G		B		Y		W		O	12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
	R															
	G															
	B															
	Y															
	W															
	O															
		<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> <tr><td></td><td>B</td></tr> <tr><td></td><td>Y</td></tr> <tr><td></td><td>W</td></tr> <tr><td></td><td>O</td></tr> </table>		R		G		B		Y		W		O	12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
	R															
	G															
	B															
	Y															
	W															
	O															

Distance between the mounting holes at least 30 mm!!!

Example for ordering::

SUS-01-T-Q-R/G-110V-DC SUS-01 = Type / Size
 -T = Short mounting depth with faston terminals
 -Q = Front (square)
 -R/G = Color red/green
 -110V = Voltage
 -DC = Direct voltage

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SUS-02 / SUS-02-Q

Installation depth: 56 mm
 Front dimension: Ø 20 mm / 20x20 mm quadratisch

Picture	Dimensions	LED colors	AC voltages	DC voltage
			12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
			12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V

Distance between the mounting holes at least 25 mm!!!

Example for ordering:
SUS-02-Q-R/G-110V-DC SUS-02 = Type / Size
 -Q = Front (square)
 -R/G = Color red/green
 -110V = Voltage
 -DC = Direct voltage

SUS-02-T / SUS-02-T-Q

Installation depth: 58 mm
 Front dimension: Ø 20 mm / 20x20 mm square

Picture	Dimensions	LED colors	AC voltages	DC voltage
			12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
			12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V

Distance between the mounting holes at least 25 mm!!!

Example for ordering:
SUS-02-T-Q-R/G/O-110V-DC SUS-02 = Type / Size
 -T = special size with faston terminals, 3-color combination possible
 -Q = Front (square)
 -R/G/O = Color red/green/orange
 -110V = Voltage
 -DC = Direct voltage



SUS-03-T / SUS-03-T-Q

Installation depth: 48 mm
 Front dimension: Ø 25 mm / 25x25 mm quadratisch

Picture	Dimensions	LED colors	AC voltages	DC voltage												
		<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> <tr><td></td><td>B</td></tr> <tr><td></td><td>Y</td></tr> <tr><td></td><td>W</td></tr> <tr><td></td><td>O</td></tr> </table>		R		G		B		Y		W		O	12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
	R															
	G															
	B															
	Y															
	W															
	O															
		<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> <tr><td></td><td>B</td></tr> <tr><td></td><td>Y</td></tr> <tr><td></td><td>W</td></tr> <tr><td></td><td>O</td></tr> </table>		R		G		B		Y		W		O	12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
	R															
	G															
	B															
	Y															
	W															
	O															

Distance between the mounting holes at least 30 mm!!!

Example for ordering::

SUS-03-T-Q-R/G/O-110V-DC SUS-03 = Type / Size
 -T = Short mounting depth with faston terminals, 3-color combination possible
 -Q = Front quadratisch
 -R/G/O = Color red/green/orange
 -110V = Voltage
 -DC = Direct voltage

SUS-09 / SUS-09-Q

Installation depth: 42 mm
 Front dimension: Ø 32 mm / 32x32 mm square

Picture	Dimensions	LED colors	AC voltages	DC voltage												
		<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> <tr><td></td><td>B</td></tr> <tr><td></td><td>Y</td></tr> <tr><td></td><td>W</td></tr> <tr><td></td><td>O</td></tr> </table>		R		G		B		Y		W		O	12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
	R															
	G															
	B															
	Y															
	W															
	O															
		<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> <tr><td></td><td>B</td></tr> <tr><td></td><td>Y</td></tr> <tr><td></td><td>W</td></tr> <tr><td></td><td>O</td></tr> </table>		R		G		B		Y		W		O	12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
	R															
	G															
	B															
	Y															
	W															
	O															

Distance between the mounting holes at least 33 mm!!!

Example for ordering::

SUS-09-Q-R/G-110V-DC SUS-09 = Type / Size
 -Q = Front (square)
 -R/G = Color red/green
 -110V = Voltage
 -DC = Direct voltage

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SUS-95 / SUS-95-Q

Installation depth: 57 mm
 Front dimension: Ø 39 mm / 39x39 mm square

Picture	Dimensions	LED colors	AC voltages	DC voltage
			12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
			12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V

Distance between the mounting holes at least 40 mm!!!

Example for ordering::
SUS-95-Q-R/G-110V-DC SUS-95 = Type / Size
 -Q = Front (square)
 -R/G = Color red/green
 -110V = Voltage
 -DC = Direct voltage

SUS-95-L / SUS-95-L-Q

Installation depth: 57 mm
 Front dimension: Ø 39 mm / 39x39 mm square

Picture	Dimensions	LED colors	AC voltages	DC voltage
			24 V 48 V 60 V	24 V 48 V 60 V
			24 V 48 V 60 V	24 V 48 V 60 V

Distance between the mounting holes at least 40 mm!!!

Example for ordering::
SUS-95-L-Q-R/G-60V-DC SUS-95 = Type / Size
 -L = Special size
 -Q = Front (square)
 -R/G = Color red/green
 -60V = Voltage
 -DC = Direct voltage



SUS-99 / SUS-99-Q

Installation depth: 58 mm
 Front dimension: Ø 32 mm / 32x32 mm square

Picture	Dimensions	LED colors	AC voltages	DC voltage												
		<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> <tr><td></td><td>B</td></tr> <tr><td></td><td>Y</td></tr> <tr><td></td><td>W</td></tr> <tr><td></td><td>O</td></tr> </table>		R		G		B		Y		W		O	12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V
		R														
	G															
	B															
	Y															
	W															
	O															
	<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> <tr><td></td><td>B</td></tr> <tr><td></td><td>Y</td></tr> <tr><td></td><td>W</td></tr> <tr><td></td><td>O</td></tr> </table>		R		G		B		Y		W		O	12 V 24 V 48 V 60 V 110 V 125 V 230 V	12 V 24 V 48 V 60 V 110 V 125 V 220 V	
	R															
	G															
	B															
	Y															
	W															
	O															

Distance between the mounting holes at least 33 mm!!!

Example for ordering::

SUS-99-Q-R/G-110V-DC SUS-99 = Type / Size
 -Q = Front (square)
 -R/G = Color red/green
 -110V = Voltage
 -DC = Direct voltage

SUS-99-L / SUS-99-L-Q

Installation depth: 58 mm
 Front dimension: Ø 32 mm / 32x32 mm square

Picture	Dimensions	LED colors	AC voltages	DC voltage				
		<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> </table>		R		G	24 V 48 V 60 V	24 V 48 V 60 V
		R						
	G							
	<table border="1"> <tr><td></td><td>R</td></tr> <tr><td></td><td>G</td></tr> </table>		R		G	24 V 48 V 60 V	24 V 48 V 60 V	
	R							
	G							

Distance between the mounting holes at least 40 mm!!!

Example for ordering::

SUS-99-L-Q-R/G-60V-DC SUS-99 = Type / Size
 -L = Special size
 -Q = Front (square)
 -R/G = Color red/green
 -60V = Voltage
 -DC = Direct voltage

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Moving-iron measuring instruments
 Alternating current and alternating voltage WAS 45 Page 227

Moving-coil measuring instruments
 Direct current and direct voltage PAS 45 Page 228

Voltmeter selector switch
 7 switching positions SUAS 45/7 Page 227

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WAS 45



PAS 45



SUAS 45/7



General description

Application

Snap-on measuring instruments are mainly used for measuring heavy-current quantities in distribution boards. They allow for snap-on fastening on top hat rails.

Measuring systems

- Moving-iron measuring system
- Moving-coil measuring system

Special features

- standard front dimensions, 45 x 45 mm
- slim design, 2.5 module widths
- quadrant scale, 43 mm scale length
- contact-proof connecting terminals

General specifications

Snap-on measuring instruments are manufactured according to DIN 60 051 as well as according to the other relevant VDE and DIN regulations. The following variables may be measured: Direct current, direct voltage, alternating current, alternating voltage, operating hours. The accuracy amounts to 1.5 % referred to the full scale. Standard-type moving-iron ammeters dispose of a 2-fold overload scale.

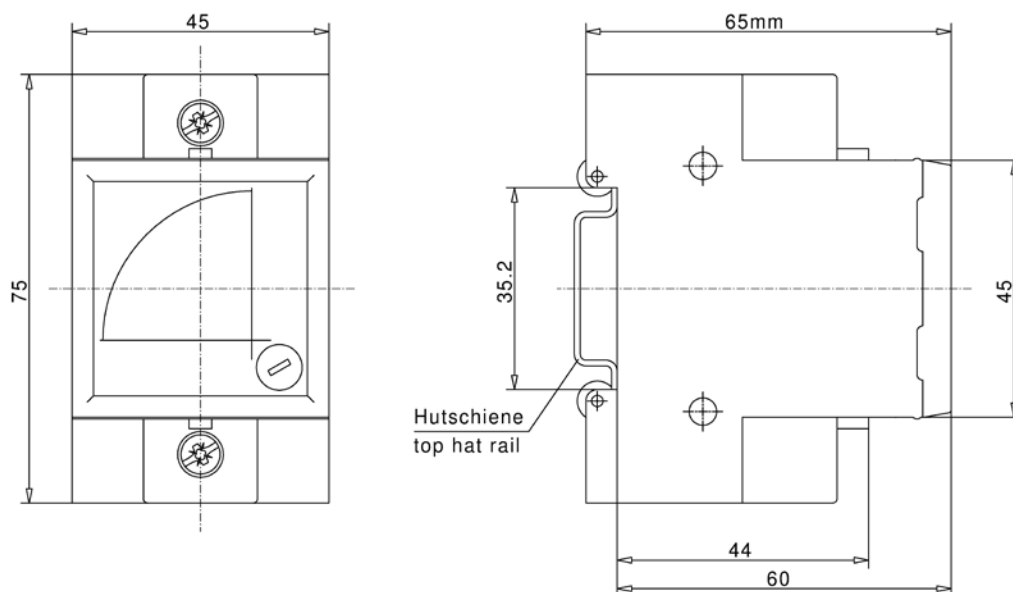
All measuring instruments are resistant to a permanent 1.2-fold overload, ammeters temporarily to a max. 10-fold overload, voltmeters to an up to 2-fold overload. For the rest, DIN EN 60 051 applies. The measuring elements are mounted in a shock-resistant housing from polycarbonate. The housing dimensions comply with DIN 43 880 for built-in equipment for electrical installations. Connection is made to touch-proof captive M5 screws, max. 10 mm².

Special versions

Mounting on vertical top hat rail

- Measuring range without overload range (moving-iron)
 outside of the standard series
- Scales red marking at arbitray position of scale
 colored sector at arbitray position of scale

Dimensional drawing





Moving-iron measuring instruments

for alternating current and alternating voltage

Type:
WAS 45

Snap-on fastening on top hat rail, 40-100 Hz, class 1,5
Please explicitly specify direct current!
Ammeters with 2-fold overload scale
Energy consumption: ammeters 0,6-1,5 VA, voltmeters approx. 2,5 VA

Type	WAS 45	
Installation width (mm)	45	(2.5 module width)
Scale length (mm)	43	
Weight (kg)	0,10	



Types and variants

Measuring ranges		
V	100	
	250	X
	500	
A	1	
	1,5	
	2,5	
	4	X
	6	
	10	
	15	
for use with current transformer		
	sec. 5 A (0,6 VA)	X
	sec. 1 A (0,6 VA)	

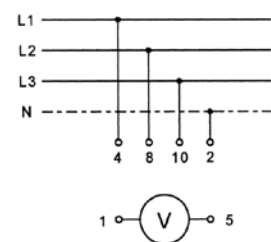
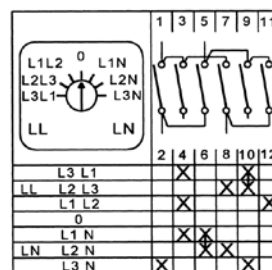


Voltmeter selector switch

Type:
SUAS 45/7

Snap-on fastening on top hat rail
for switchover between three different voltages and three phases against neutral acc. to VDE 0660

Type	SUAS 45/7
Operating voltage	max. 690 V
Operating current	max. 16 A
IP code	IP 54
Screw terminal	max. 4 mm
Installation width	52,5 mm
	(3 module widths)
Installation depth	45 mm
	X





Moving-coil measuring instruments

for direct current and direct voltage

Type:
PAS 45

Snap-on fastening on top hat rail, class 1,5

Type	PAS 45
Installation width (mm)	45 (2.5 module widths)
Scale length (mm)	43
Weight (kg)	0,10



Types and variants

Measuring ranges		$R_e / R_i / \Delta U$	
mV	100	200 Ω / V	
	150	200 Ω / V	
	250	200 Ω / V	X
	400	1000 Ω / V	
	500	1000 Ω / V	
V	1	1000 Ω / V	
	1,5	1000 Ω / V	
	2,5	1000 Ω / V	
	4	1000 Ω / V	
	6	1000 Ω / V	
	10	1000 Ω / V	
	15	1000 Ω / V	
	25	1000 Ω / V	X
	40	1000 Ω / V	
	60	1000 Ω / V	
	100	1000 Ω / V	
	150	1000 Ω / V	
	250	1000 Ω / V	
	400	1000 Ω / V	
500	1000 Ω / V		
600	1000 Ω / V		
mA	1	28,6 Ω	
	1,5	14,2 Ω	
	2,5	7,6 Ω	
	4	3,8 Ω	
	6	1,9 Ω	
	10	1,4 Ω	
	15	1,3 Ω	
	25	60 mV	X
	40	60 mV	
	60	60 mV	
	100	60 mV	
	150	60 mV	
	250	60 mV	
	400	60 mV	
600	60 mV		
A	1	60 mV	
	1,5	60 mV	
	2,5	60 mV	
	4	60 mV	X
	6	60 mV	
	10	60 mV	
	15	60 mV	
	25	60 mV	
for use with shunt			
mV	60	12 Ω	X
for use with measuring transducer			
mA	0-20	1,2 Ω	X
	4-20	50 Ω	X
V	0-10	10 k Ω	X

Universal measuring instruments

Energy and power quality measurement products - schematic overview	Page 230
Panel mouting instruments - overview	Page 231
DIN-rail mounting instruments - overview	Page 231
Selection table UMG 96-series and UMG 5.. series	Page 232

Universal energy measuring instrument	UMG 96-S2	Page 233
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Multifunctional power analyzer	UMG 96RM Serie	Page 234
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Modular energy measuring instrument	UMG 96-PA Serie	Page 235
	UMG 96RM-E	Page 236

Multifunctional power analyzer	UMG 509-PRO	Page 237
	UMG 512-PRO	Page 238

The universal measuring devices of the UMG series as well as the associated attachments, extensions and accessories are subject to ongoing technical improvements and adjustments to market requirements. You can find detailed descriptions and data sheets of the current device version on our homepage

www.mueller-ziegler.de

in the field of universal measuring instruments. Prices and delivery times for this product range on request.



More products from the areas

- Energy management
- Software and IT solutions in the areas of energy and voltage quality as well as energy management
- Reactive power compensation
- Services

please ask us directly. We would be glad to help you!

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

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8 Current transformers

9 Shunts

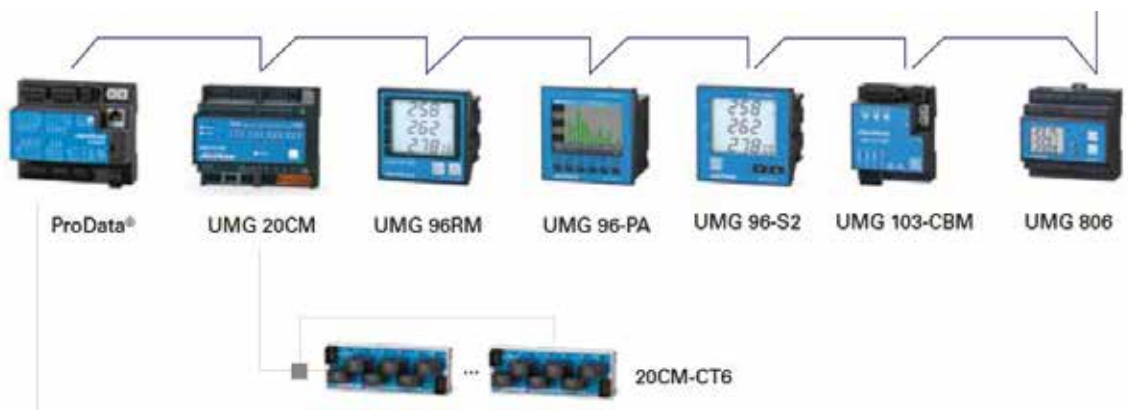
10 Test apparatus

Energy and power quality management

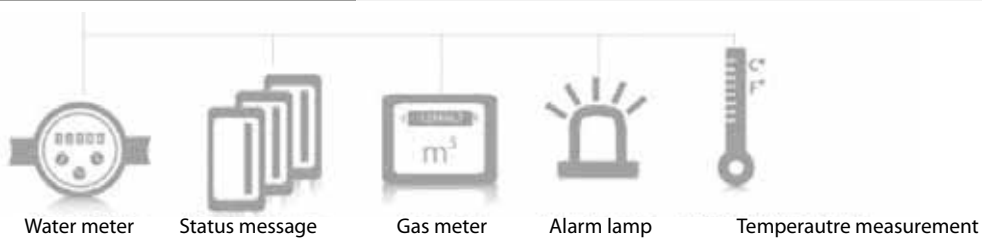
Ethernet level (TCP/IP)



Fieldbus level (e.g. Modbus RTU)



Analog-/status level



Panel mounting universal measuring instruments

Universal energy measurement device



UMG 96-S2

- Harmonics up to 15th
- Low price
- 2-button operation
- Modbus interface
- Class 0,5S

Multifunctional power analyzer



UMG 96RM series

- Harmonics up to 40th
- Various interface options
- 2-button operation
- Measured data memory
- UL application
- up to 6 digital outputs
- Class 0,5S

Modular energy measurement device



UMG 96-PA series

- Harmonics up to 40th
- Modularity expendable
- Residual current measuring
- MID application
- Fulfilment of legal stipulations
- High resolution color display
- 600 V CAT III
- Ethernet interface
- Class 0,2S

UMG 96RM-E

- Harmonics up to 40th
- Residual current measuring
- Homepage for instrument
- Measured data memory
- 300 V CAT III
- Ethernet interface
- Class 0,5S



Multifunctional power analyzer



UMG 509-PRO

- Harmonics up to 63th
- Residual current measuring
- Acquisition of transients
- Programming options (Jasic & Apps)
- Analyses of electrical disturbances

UMG 512-PRO

- Harmonics up to 63th
- Certified accuracy of measurement acc. to class A
- Residual current measuring
- Flicker measurement
- Acquisition of transients
- Programming options (Jasic & Apps)
- Analyses of electrical disturbances
- EN 50160 / 61000-2-4



Universal measuring instrument for mounting on top hat rail

Design, data sheet and prices on request



UMG 806



UMG 103-CBM



UMG 801



UMG 604-PRO



UMG 605-PRO



UMG 20CM

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Overview of UMG 96 types

universal measuring instruments

Auxiliary-voltage		Interfaces													Dimensions in mm (WxHxD)		weight in g	Type				
90-265V AC / 90-250V DC	90-277V AC / 90-250V DC	24-90V AC / 24-90V DC	Digital inputs	Digital and pulse output	Digital inputs / outputs optionally 3 inputs or outputs	Analog inputs temperature / residual current can be combined with failure monitoring	Analog output	4th current transformer input	Measured data memory, size in MB	Clock and battery	RS485 - Modbus	Profibus	Profinet	M-Bus	Ethernet 1000baseT	USB	MID certified	Fulfillment of legal stipulations acc. to PTB-A 50.7	UL certified	Dimensions in mm (WxHxD)	weight in g	Type
•	-	-	-	1	-	-	-	-	-	•	-	-	-	-	-	-	-	-	-	96 x 96 x 48	300	UMG 96-S2
-	•	-	2	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-	-	96 x 96 x 48	300	UMG 96RM
-	-	•	2	-	-	-	-	-	-	•	-	-	-	-	-	-	-	-	-	96 x 96 x 48	300	UMG 96RM
-	-	-	-	2	3	2	-	•	256	•	•	-	-	-	•	-	-	-	-	96 x 96 x 78	400	UMG 96RM-E
-	-	•	-	2	3	2	-	•	256	•	•	-	-	-	•	-	-	-	-	96 x 96 x 78	400	UMG 96RM-E
-	•	-	4	6	-	-	-	•	256	•	•	•	-	-	•	-	-	-	-	96 x 96 x 78	300	UMG 96RM-P
-	-	•	4	6	-	-	-	•	256	•	•	•	-	-	•	-	-	-	-	96 x 96 x 78	300	UMG 96RM-P
-	•	-	4	6	-	-	-	•	256	•	•	-	-	-	•	-	-	-	-	96 x 96 x 78	300	UMG 96RM-CBM
-	-	•	4	6	-	-	-	•	256	•	•	-	-	-	•	-	-	-	-	96 x 96 x 78	300	UMG 96RM-CBM
-	•	-	-	2	-	-	-	-	-	-	-	-	-	•	-	-	-	-	-	96 x 96 x 48	300	UMG 96RM-M
-	-	•	-	2	-	-	-	-	-	-	-	-	-	•	-	-	-	-	-	96 x 96 x 48	300	UMG 96RM-M
-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	•	-	-	-	-	96 x 96 x 48	300	UMG 96EM-EL
-	-	•	-	2	3	2	-	•	-	-	-	-	-	-	•	-	-	-	-	96 x 96 x 48	300	UMG 96EM-EL
-	-	•	-	2	3	2	-	•	-	-	-	-	-	-	•	-	-	-	-	96 x 96 x 78	400	UMG 96RM-PN
-	-	•	-	-	3	-	-	-	-	-	-	-	-	-	•	-	-	-	-	96 x 96 x 78	400	UMG 96RM-PN
-	•	-	-	-	3	-	1	-	4	•	•	-	-	-	-	-	-	-	•	96 x 96 x 86	250	UMG 96-PA
-	-	•	-	-	3	-	1	-	4	•	•	-	-	-	-	-	-	-	•	96 x 96 x 86	250	UMG 96-PA
-	•	-	-	-	3	-	1	-	4	•	•	-	-	-	-	-	-	•	•	96 x 96 x 86	250	UMG 96-PA-MID
-	•	-	-	-	3	-	1	-	4	•	•	-	-	-	-	-	•	•	•	96 x 96 x 86	250	UMG 96-PA-MID+

Overview of UMG 5.. types

multifunctional power analyzers

Auxiliary voltage		Interfaces													Dimensions in mm (WxHxD)		Weight in g	Type
95-240V AC	80-300V DC	48-110V AC	24-150V DC	4 voltage and current inputs	2 residual current inputs (RCM) with failure monitoring	1 temperature measurement input	Measured data memory 256 MB Flash	2 digital inputs & 2 digital outputs	RS485 - (via connection terminals)	Ethernet 100baseT	Profibus DP V0 via Dsub-9-socket	7 freely programmable application programs	UL certified	Dimensions in mm (WxHxD)	Weight in g	Type		
•	-	-	-	•	-	-	•	•	•	•	•	•	•	114 x 114 x 81	1000	UMG 509-PRO		
-	•	-	-	•	-	-	•	•	•	•	•	•	•	114 x 114 x 81	1000	UMG 509-PRO		
•	-	-	-	•	•	•	•	•	•	•	•	•	•	114 x 114 x 81	1000	UMG 512-PRO		
-	•	-	-	•	•	•	•	•	•	•	•	•	•	114 x 114 x 81	1000	UMG 512-PRO		



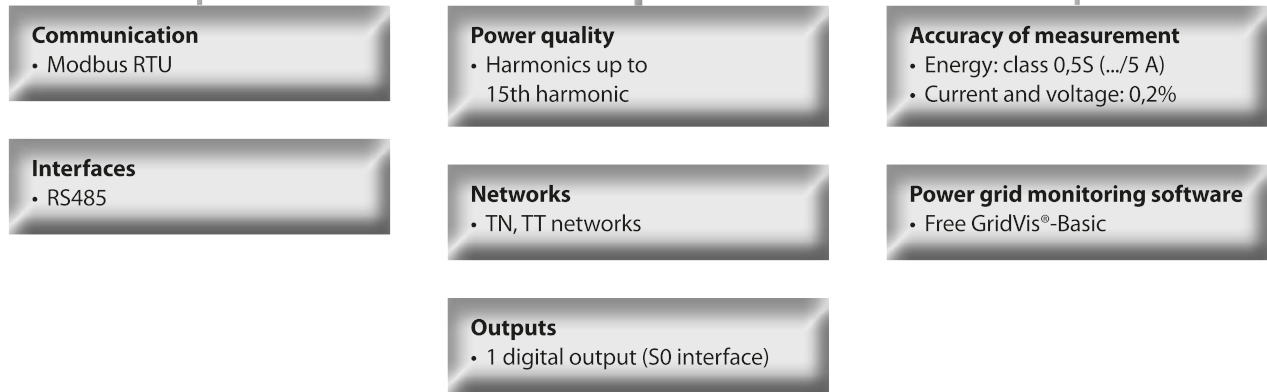
Universal energy measurement device

Panel mounting 96 x 96 mm

Type:
UMG 96-S2



Features



Application

The UMG 96-S2 is suitable for measuring and checking electrical parameters and energy consumption as well as for monitoring the voltage quality parameters, such as harmonics. Applications can be found in energy distribution systems, for example for cost center recording and limit value monitoring. Furthermore, the device can be used as a sensor for building management systems or a PLC.



Technical data (extract)

Auxiliary voltage	Voltage range	AC 90 V - 265 V (50/60 Hz) or DC 90 V - 250 V, 300V CAT III
	Energy consumption	max. 1,5 VA / 0,5 W
Voltage measurement	Rated voltage	230/400 V (+/- 10%), 3-phase 4-wire power systems
	Overvoltage category	300 V CAT III
	Metering range L-N	0 - 300 Vrms (max. overvoltage 400 Vrms)
	Metering range L-L	0 - 425 Vrms (max. overvoltage 425 Vrms)
Current measurement	Rated current	x/1 and x/5 A
	Metering range	0 - 6 Arms
	Overvoltage category	300 V CAT II
Digital output	1 digital output	Solid state relay, not short-circuit proof
	Switching voltage/current	max. 60 V DC / max. 50 mA eff DC
	Pulse output (Energy pulse)	max. 12,5 Hz



Price

Type	UMG 96-S2	Designs and prices on request
-------------	-----------	-------------------------------

You can find designs as well as detailed technical data on our homepage www.mueller-ziegler.de

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Multifunction power analyzer

Panel mounting 96 x 96 mm

Type:
UMG 96RM - Serie



Features

Communication (device-specific)

- Modbus (RTU)
- Profibus DP V0 (option)
- Profinet
- TCP/IP (option)
- M-BUS

Power quality

- Harmonics up to 40th harmonic
- Rotary field components
- Distortion factor THD-U/THD-I
- Wave form display (Option)

Accuracy of measurement

- Energy: class 0,5S (.../5 A)
- Current and voltage: 0,2%

Interfaces (device-specific)

- RS485
- Profibus / Profinet
- M-Bus
- Ethernet / USB

Networks

- TN-, TT-, IT networks
- 3- and 4-phase networks
- up to 4 single-phase networks

Outputs

- up to 6 digital outputs
- Pulse output kWh/kvarh
- Switch output
- Threshold value output
- Logic output
- Remote via Modbus/Profibus



Application

The UMG 96RM multifunction measuring device is primarily designed for use in low-voltage and medium-voltage distribution systems. The device measures harmonics up to the 40th harmonic, has rotating field components and can display data in wave form. The device has up to four digital inputs and 6 digital outputs. The measurement data memory is 256 MB.



Technical data (extract)

Auxiliary voltage	Voltage range	AC 90 V - 277 V (50/60 Hz) or DC 90 V - 250 V, 300 V CAT III or 24 - 90 V AC/DC, 150 V CAT III
	Energy consumption	see detailed technical data
Voltage measurement	Rated voltage	277/480 V (+/- 10%), 3-phase 4-wire power systems
	Overvoltage category	300 V CAT III
	Metering range L-N	0 - 300 Vrms (max. overvoltage 520 Vrms)
	Metering range L-L	0 - 520 Vrms (max. overvoltage 900 Vrms)
Current measurement	Rated current	5 A
	Metering range	0 - 6 Arms
	Overvoltage category	300 V CAT II
Outputs	device-specific	2 or 6 digital output (as switch or pulse outputs)



Price

Type	UMG 96-RM	Designs and prices on request
-------------	-----------	-------------------------------

You can find designs as well as detailed technical data on our homepage www.mueller-ziegler.de



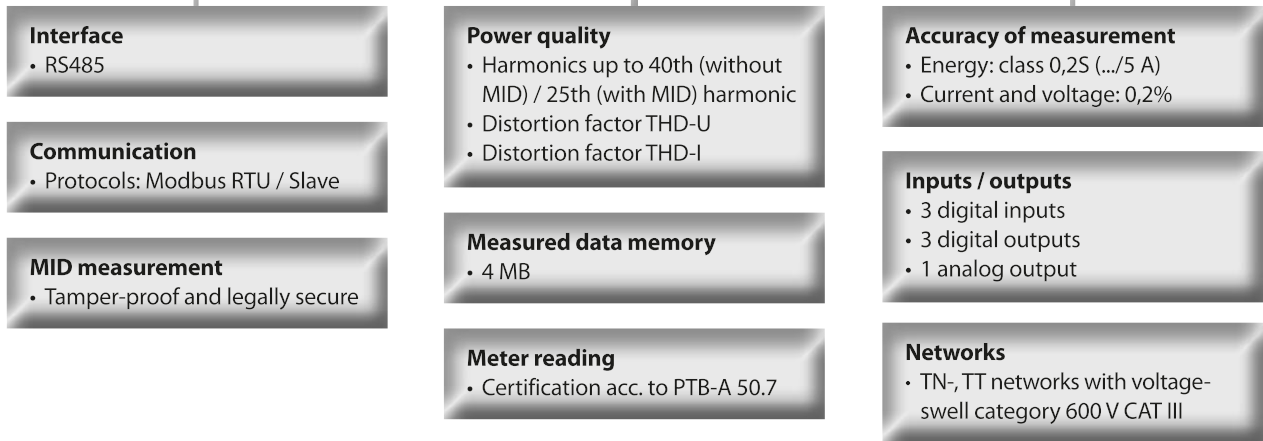
Modular energy measurement device

Panel mounting 96 x 96 mm

Type:
UMG 96-PA - Serie



Features



Application

The modular energy measurement devices of the UMG 96-PA series are used to measure, monitor and control electrical parameters in energy distribution systems. The recording of load profiles (in energy management systems) are just as much a task of the devices as the recording of energy consumption for cost center analysis. The MID variant is suitable for billing-related applications. The devices can be modularly expanded for differential and residual current measurement.



Technical data (extract)

Auxiliary voltage	Voltage range option 230 V	90 V - 277 V AC (50/60 Hz) / 90 V - 250 V DC, 300 V CAT III
	Energy consumption	max. 4,5 VA / 2 W
	Voltage range option 24 V	24 - 90 V AC (50-60 Hz) / 24 - 90 V DC, 150 V CAT III
	Energy consumption	max. 4,5 VA / 2 W
Voltage measurement	Rated voltage	3-phase 4-wire power systems 417/720 V (+/- 10%) acc. to IEC as well as 347/600 V (+/- 10%) acc. to UL Single-phase 2-wire power system 480 V (+/- 10%)
	Overvoltage category	600 V CAT III
	Metering range L-N	0 - 600 Vrms (max. overvoltage 800 Vrms)
	Metering range L-L	0 - 1040 Vrms (max. overvoltage 1350 Vrms)
Current measurement	Rated current	5 A
	Metering range	0,005 - 6 Arms
	Overvoltage category	300 V CAT II
Outputs	3 digital outputs	Solid state relay, not short-circuit proof
	1 analog output	0 - 20 mA



Price

Type	UMG 96-PA - Serie	Designs and prices on request
-------------	-------------------	-------------------------------

You can find designs as well as detailed technical data on our homepage www.mueller-ziegler.de

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers

9 Shunts

10 Test apparatus



Modular energy measurement device

Panel mounting 96 x 96 mm

Type:
UMG 96RM-E



Features

Interfaces

- RS485
- Ethernet

Power quality

- Harmonics up to 40th harmonic
- Rotary field components
- Distortion factor THD-U/THD-I

Accuracy of measurement

- Energy: class 0,5S (.../5 A)
- Current and voltage: 0,2%

Communication

- Modbus (RTU, TCP, Gateway)
- HTTP (configurable homepage)
- FTP (file transfer)
- SNMP, NTP (time synchronisation)
- SMTP (email function)
- DHCP, SNTP, TFTP
- BACnet (optional)

Measured data memory

- 256 MB Flash

Inputs / outputs

- 3 digital inputs or outputs
- 2 analog inputs (temperature)
- 2 digital outputs

Thermistor input

- PT100, PT1000, KTY83, KTY84

Networks

- TN-, TT-, IT networks
- 3- and 4-phase networks
- up to 4 single-phase networks



Anwendung

The multifunctional power analyzer UMG 96RM-E is used to measure, monitor and control electrical parameters in energy distribution systems. The recording of load profiles (in energy management systems) are just as much a task of the device as the recording of energy consumption for cost center analysis. A residual current monitoring is integrated.



Technical data (extract)

Auxiliary voltage	Voltage range option 230 V	90 V - 277 V AC (50/60 Hz) / 90 V - 250 V DC, 300 V CAT III
	Energy consumption	max. 4,5 VA / 2 W
	Voltage range option 24 V	24 - 90 V AC (50-60 Hz) / 24 - 90 V DC, 150 V CAT III
	Energy consumption	max. 4,5 VA / 2 W
Voltage measurement	Rated voltage	3-phase 4-wire power systems 277/480 V (+/- 10%)
	Overvoltage category	300 V CAT III
	Metering range L-N	0 - 300 Vrms (max. overvoltage 520 Vrms)
	Metering range L-L	0 - 520 Vrms (max. overvoltage 900 Vrms)
Current measurement	Rated current	5 A
	Metering range	0 - 6 Arms
	Overvoltage category	300 V CAT II
Outputs	3 digital inputs or outputs	Solid state relay, not short-circuit proof
	2 analog inputs	for temperature measurement
	2 digital outputs	Solid state relay, not short-circuit proof



Price

Type	UMG 96RM-E	Designs and prices on request
-------------	------------	-------------------------------

You can find designs as well as detailed technical data on our homepage www.mueller-ziegler.de



Multifunctional power analyzer

Panel mounting 144 x 144 mm

Type:
UMG 509-PRO



Features

Interfaces

- Ethernet
- Profibus (DSUB-9)
- RS485 Modbus (terminal strip)

Communication

- Protocols: Profibus (DP/V0)
- Modbus (RTU, TCP, Gateway)
- TCP/IP
- BACnet (optional)
- HTTP (homepage)
- FTP (file transfer)
- SNMP, TFTP
- NTP (time synchronisation)
- SMTP (email function)
- DHCP

Power quality

- Harmonics up to 63th harmonic
- shot term interruptions (> 20 ms)
- Transient recorder (> 50 µs)
- Starting currents (> 20 ms)
- Unbalance

Measured data memory

- 256 MB Flash
- 32 MB SDRAM

Thermistor input

- PT100, PT1000, KTY83, KTY84

Accuracy of measurement

- Energy: class 0,2S (.../5 A)
- Current 0,2%, voltage 0,1%

Inputs / outputs

- 2 digital inputs
- 2 digital outputs

Networks

- TN-, TT-, IT networks
- 3- and 4-phase networks
- up to 4 single-phase networks



Application

The multifunctional power analyzer UMG 509PRO is used for the continuous monitoring of the voltage quality in power distribution systems and energy management systems (ISO 50001) as well as in test fields. The visualization of the energy supply in LV main boards, the analysis of electrical disturbances in case of network problems and the cost center analysis are among the tasks of the device.



Technical data (extract)

Auxiliary voltage	Voltage range option 230 V	90 V - 240 V AC (50/60 Hz) / 80 V - 300 V DC, 300 V CAT III
	Energie consumption	max. 7 W / 14 VA
	Voltage range option 24 V	48 - 110 V AC (50-60 Hz) / 24 - 150 V DC, 300 V CAT III
	Energy consumption	max. 9 W / 13 VA
Voltage measurement	Rated voltage	3-phase 4-wire power systems 417/720 V and 347/600 V UL listed 3-phase 3-wire power systems 600 V
	Overvoltage category	600 V CAT III
	Current measurement	Rated current
	Metering range	0,005 - 7 Arms
	Overvoltage category	at option 230 V - 300 V CAT III at option 24 V - 300 V CAT II



Price

Type	UMG 509-PRO	Designs and prices on request
-------------	-------------	-------------------------------

You can find designs as well as detailed technical data on our homepage www.mueller-ziegler.de

Measuring transducers

1

Mains and limit monitoring

2

Energy meters

3

Panel meters digital

4

Panel meters analog

5

Meas. instruments for top hat rail mounting

6

Universal measuring instruments

7

Current transformers

8

Shunts

9

Test apparatus

10



Multifunctional power analyzer - class A

Panel mounting 144 x 144 mm



Type:
UMG 512-PRO



Features

Interfaces

- Ethernet
- Profibus (DSUB-9)
- RS485 Modbus (terminal strip)

Communication

- Protocols: Profibus (DP/V0)
- Modbus (RTU, TCP, Gateway)
- TCP/IP
- BACnet (optional)
- HTTP (homepage)
- FTP (file transfer)
- SNMP, TFTP
- NTP (time synchronisation)
- SMTP (email function)
- DHCP

Power quality

- Harmonics up to 63.th harmonic, odd / even
- Flicker measurement
- Short term interruptions (from 10 ms)
- Transient recorder (> 39 μ s)
- Start-up currents (> 10 ms)
- Imbalance
- Half wave RMS recordings (up to 11 min.)
- Events can be display in waveforms

Measured data memory

- 256 MB Flash
- 32 MB SDRAM

Accuracy of measurement

- Energy: class 0,2S (.../5 A)
- Current and voltage: 0,1%

Inputs / outputs

- 2 digital inputs
- 2 digital outputs

Networks

- TN-, TT-, IT networks
- 3- and 4-phase networks

Thermistor input

- PT100, PT1000, KTY83, KTY84



Application

The class A multifunctional power analyzer UMG 512-PRO is used for continuous monitoring of the voltage quality and for harmonic analysis in energy distribution systems. The documentation of the voltage quality for customers and supervisory authorities is the main task of the device; the current voltage quality standards and standards for measurement methods are observed.



Technical data (extract)

Auxiliary voltage	Voltage range option 230 V	90 V - 240 V AC (50/60 Hz) / 80 V - 300 V DC, 300 V CAT III
	Energy consumption	max. 7 W / 14 VA
Voltage range option 24 V	Voltage range option 24 V	48 - 110 V AC (50-60 Hz) / 24 - 150 V DC, 300 V CAT III
	Energy consumption	max. 9 W / 13 VA
Voltage measurement	Rated voltage	3-phase 4-wire power systems 417/720 V (+10%) and 347/600 V UL listed 3-phase 3-wire power systems 600 V (+10%)
	Overvoltage category	600 V CAT III
	Current measurement	Rated current
	Metering range	0,005 - 7 Arms
	Overvoltage category	at option 230 V - 300 V CAT III at option 24 V - 300 V CAT II



Price

Type	UMG 512-PRO	Designs and prices on request
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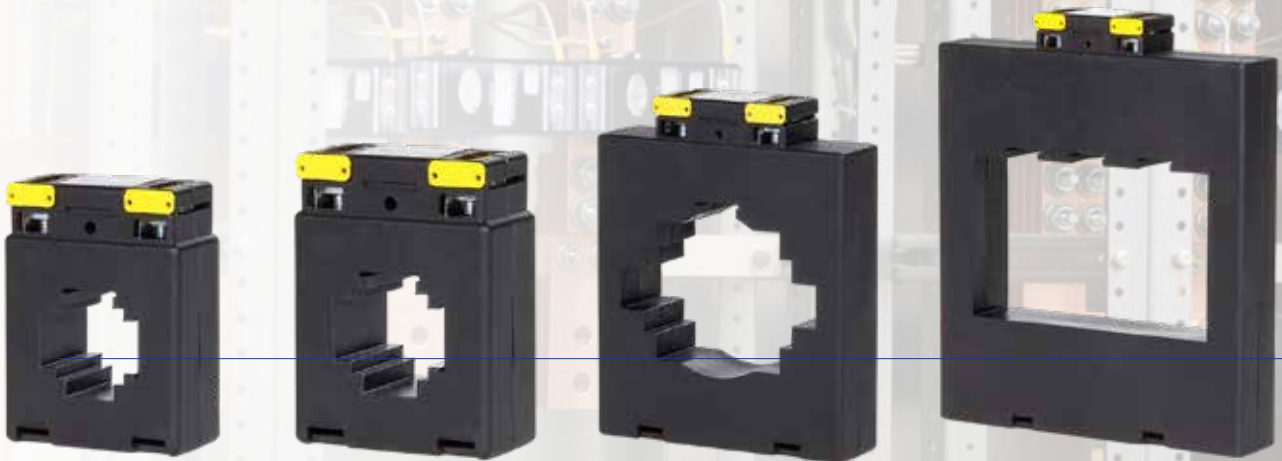
You can find designs as well as detailed technical data on our homepage www.mueller-ziegler.de

Current transformers

- 3-phase current transformer sets
- Tube unit current transformers
- Plug-in current transformers
- Wound primary current transformers
- Summary current transformers
- Split core current transformers
- Plug-in current transformers "Cage Clamp"

are available in two series:

- Series SW"R" from page 240



- Series SW from page 280



Current transformers for low voltage series SW"R"

General description and data Page 241

Tube unit current transformers

for round conductors up to $\varnothing 21,0 / 28,0$ mm 40 - 600 A RSWR / RSWR 28 Page 247

Plug-in current transformers

for busbars 30x10 / 30x15 mm 50 - 750 A SWR 3010 / SWR-L 3010 Page 248

for busbars 30x10 mm 40 - 300 A SWR-S 3010 Page 250

for busbars 40x10 / 40x12 mm 60 - 1000 A SWR 4010 / SWR-L 4010 Page 252

for busbars 40x10 / 40x12 mm 60 - 1000 A SWR-K 4010 / SWR-S 4010 Page 254

for busbars 50x12 / 2x40x10 mm 150 - 1500 A SWR-S 5010 / SWR 5010 Page 256

for busbars 60x15 / 2x50x10 mm 200 - 2500 A SWR-S 6010 / SWR 6010 Page 258

for busbars 60x40 mm 200 - 2000 A SWR 6040 Page 260

for busbars 80x15 / 2x80x10 mm 400 - 2500 A SWR 8010 / SWR 8030 Page 261

for busbars 2x100x10 / 3x100x12 mm 400 - 4000 A SWR 10030 / SWR 10056 Page 262

for busbars 2x120x10 / 4x120x10 mm 400 - 6000 A SWR 12030 / SWR 12070 Page 264

for busbars 3x140x10 mm 1000 - 7000 A SWR 14050 Page 266

Wound primary current transformers

for direct connection, CT width 60 mm 1 - 40 A WSR 60 Page 267

Summary current transformers

Description summary current transformers Page 268

for summation of 2 up to 9 circuits 1 - 5 A SSWR 2 bis 9 Page 269

Split core current transformers

for round conductors up to $\varnothing 18$ mm / $\varnothing 28$ mm 50 - 500 A SWUR 18 / SWUR 28 Page 270

for round conductors up to $\varnothing 42$ mm 400 - 800 A SWUR 42 Page 271

Accessories current transformers

Accessories overview for accessories all types Page 272

Dimensions current transformers

Dimensional drawings all types from Page 274

General description current transformers



Application

Current transformers mainly are used where it is impossible or difficult to measure currents directly. They are special configurations of transformers which transform the primary current into a (mostly) lower secondary current and which separate (galvanically) both currents.

By means of the physical principal of saturation of the core material additional a protection of the secondary circuit from high currents produced in the event of system fault is enable.

The accuracy and safety of the connected devices is directly dependent on the quality of the current transformer used.



Special notes

Rated burden, secondary currents

In the case of current transformers, the rated burden that is made available at the secondary terminals is specified in VA. The selection of the rated burden is determined by the consumption of the connected measuring device and its feed line. In particular with secondary currents of 5 A and a long measuring line, considerable losses occur (see pages 7 and 8). In this case, current transformers with a secondary current of 1 A are preferable.

„Site-winding“ current transformer

With plug-in current transformers, the smaller the CT ratio, the lower the rated burden in VA. By passing through the primary conductor several times, a smaller CT ratio can be achieved with the rated burden (VA) unchanged. Example: CT with a ratio of 50/5 A at 1.5 VA rated burden - after threading the primary conductor 5 times, a CT with a ratio of 10/5 A at 1.5 VA rated burden results. In comparison to wound primary current transformers, this measure enables cost savings to be achieved.

Grounding of secondary terminals

According to VDE 0141, paragraph 5.3.4, current and voltage transformers should be grounded starting from measuring voltages of ≥ 3.6 kV. In case of low voltages (up to a measuring voltage of ≤ 1.2 kV), no grounding is necessary unless the transformer housing has large accessible metal surfaces.

Caution: Current transformers may conduct voltages which are dangerous to touch at the „open“ secondary terminals. Therefore, operating the transformers „open“ should be avoided under all circumstances.



Technical terms

Primary nominal current	Value of the primary current which characterizes the CT and for which it is dimensioned.
Secondary nominal current	Value of the secondary current which characterizes the CT and for which it is dimensioned.
Rated transformation ratio	Ratio of the primary current and secondary current. The ratio of a current transformer is indicated on the label as an unabridged fraction.
Rated burden	The burden is the impedance of the exterior secondary circuit including wires. The rated burden is decisive in determining the error limits of the current transformer. Usual the burden is expressed as its volt-ampere rating.
Load	Impedance of the secondary circuit, expressed in ohms with indication of the power factor.
Nominal burden	Value of the burden on which the accuracy information of the CT is based.
Nominal rated frequency	Value of the frequency on which the rating of the CT is based.
Accuracy class	Information for a current transformer that its measurement deviations under prescribed conditions are within defined limits.
Phase displacement (δ)	Phase displacement is the angle of the phase shift between the secondary and primary current. It is specified in angle minutes and positively calculated if the secondary size goes after the primary one.
Current error	The current error is the deviation of the nominal transmission multiplied by the secondary from that of the primary current. The current error is calculated positively, in the actual value of the secondary current exceeds the nominal value.

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers SW"R"-series

9 Shunts

10 Test apparatus

$$F_i[\%] = \frac{(K_n I_s - I_p) \times 100}{I_p}$$

- F_i = Current error in %
 K_n = Current transformer ratio
 I_s = Actual secondary current, if I_p is under measurement conditions
 I_p = Actual primary current

Total measurement error	The total measurement error is the momentary value of the ratio of the r.m.s. difference from the secondary current multiplied with the transmission to the primary current, referred to the r.m.s. primary current.
Rated limit instrument primary current I_{pl}	is the primary current attached to the excess current limiting factor. In case of CTs for measuring it is defined that the total error is equal to or greater 10% of the secondary current which should appear according to the transmission
Instrument security factor FS	expresses the physical attribute of a CT to go into saturation
Rated continuous thermal current I_{cth}	is the primary continuous current which the CT will operate with, if it is connected to the rated burden without its temperature exceeding specified values.
Rated short time thermal current I_{th}	is the r.m.s. value of the primary current which the CT can withstand for 1 second with short-circuited secondary winding without incurring damage
Rated dynamic current I_{dyn}	is the peak value of the first amplitude of the primary current whose mechanical and electromagnetic impact is resisted by the transformer with short-circuited secondary winding.



Technical data

General data	Standards	DIN EN 60044-1, DIN 42 600, IEC 185, DIN EN 61 010 part 1
	Max. operating voltage	0,72 kV, Types CSW and XCSW 1,2 kV
	Test voltage	3 kV, Types CSW and XCSW 6 kV
	Rated frequency	50 / 60 Hz, 16 2/3 and 400 Hz on request
	Instrument security factor	FS5 up to 1500 A, FS10 from 1600 A and above
	Rated cont. thermal current I_{cth}	1,0 x IN, Types CSW and XCSW 1,2 x IN
	Rated short time thermal current I_{th}	60 x IN (1 s), max. 100 kA
	Rated dynamic current I_{dyn}	40 x IN (1 s), max. 100 kA at wound primary and summary CTs
	Rated dynamic current I_{dyn}	2,5 x I_{th}
	Operating temperature	-5 °C to +50 °C
	Storage temperature	-25 °C to +70 °C
	Insulation class	E
	Housing	Polycarbonate black or grey, acc. to UL 94 V 0, self extinguishing
	Connection	Combi-screws M5 x 10 on the secondary terminals

Marking of terminals for current transformers

The terminals for current transformers have standardized markings. These are in detail:

- For the primary terminals: **K - P1** and **L - P2**, the direction of energy is always from K-P1 to L-P2!
 For the secondary terminals: **k - s1** und **l - s2** (in lower case)

In case of summary CTs with several input circuits, the usual terminal markings „K“ and „L“ are preceded by the capital letters „A“, „B“, „C“ ... This serves to clearly differentiate the input circuits.

In case of input circuits with different main transformers, the main transformer with the highest transformation ratio is connected to the terminals „AK - AL“ and then in descending order to terminal „BK - BL“ etc.

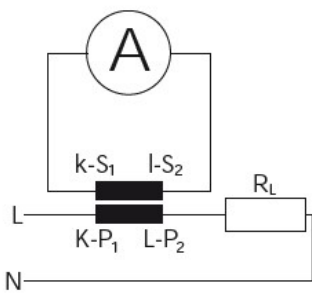
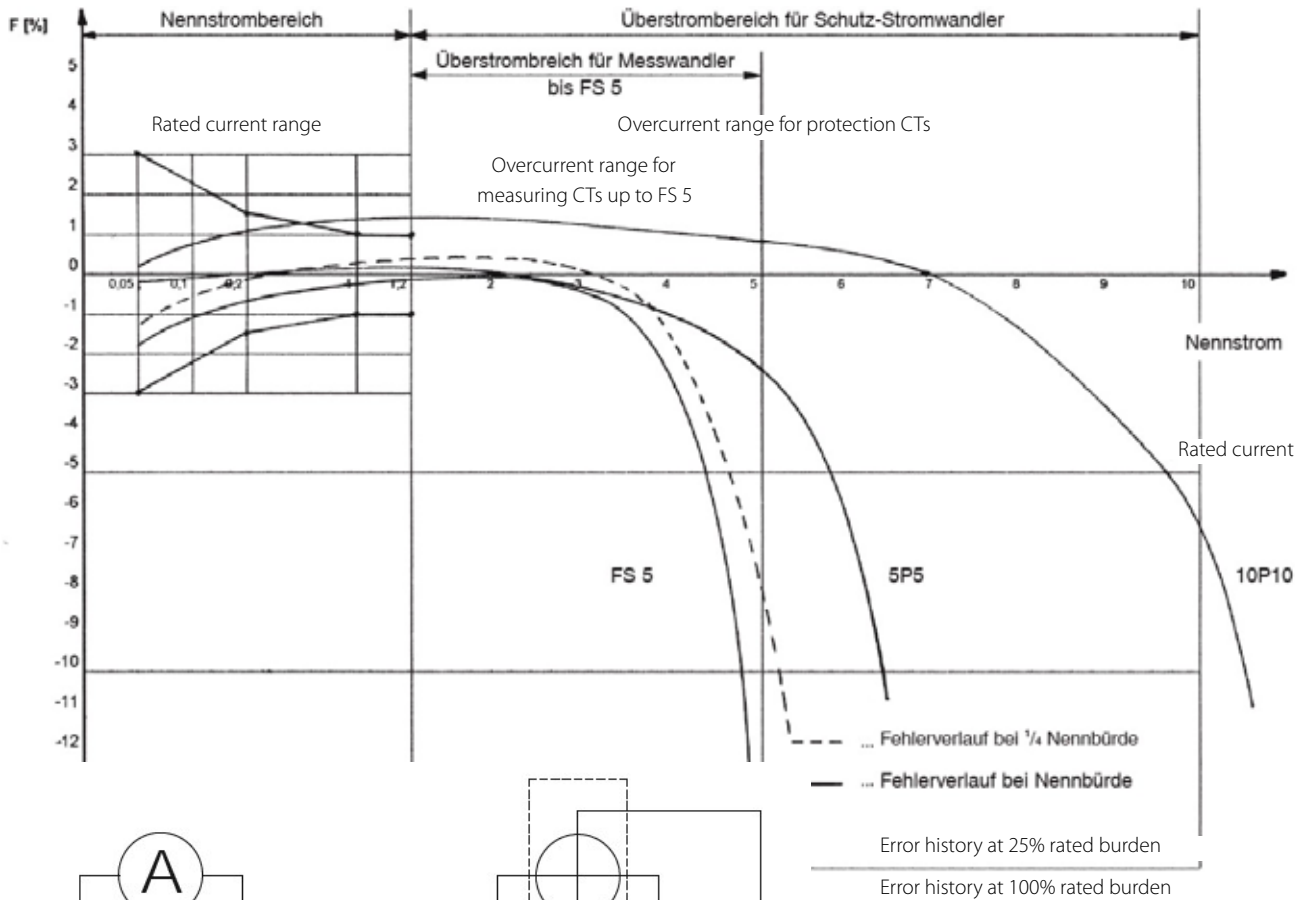
The correct connection assignment can also be found on the rating plate.

Error limits for current transformers

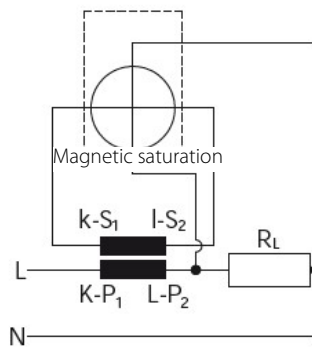
class 0,2 to 3, acc. to IEC 61869/2, version 09/2012

Klassengenauigkeit	Stromfehler $\pm \Delta$, bei					Fehlwinkel $\pm \Delta$, bei				
	$1,2 I_n$	$0,2 I_n$	$0,1 I_n$	$0,05 I_n$	$0,01 I_n$	$1,2 I_n$	$0,2 I_n$	$0,1 I_n$	$0,05 I_n$	$0,01 I_n$
	$1,0 I_n$	%	%	%	%	min	min	min	min	min
0,2	0,2	0,35		0,75		10	15		30	
0,2s	0,2	0,2		0,35	0,75	10	10		15	30
0,5	0,5	0,75		1,5		30	45		90	
0,5s	0,5	0,5		0,75	1,5	30	30		45	90
1	1	1,5		3		60	90		180	
3	3*									

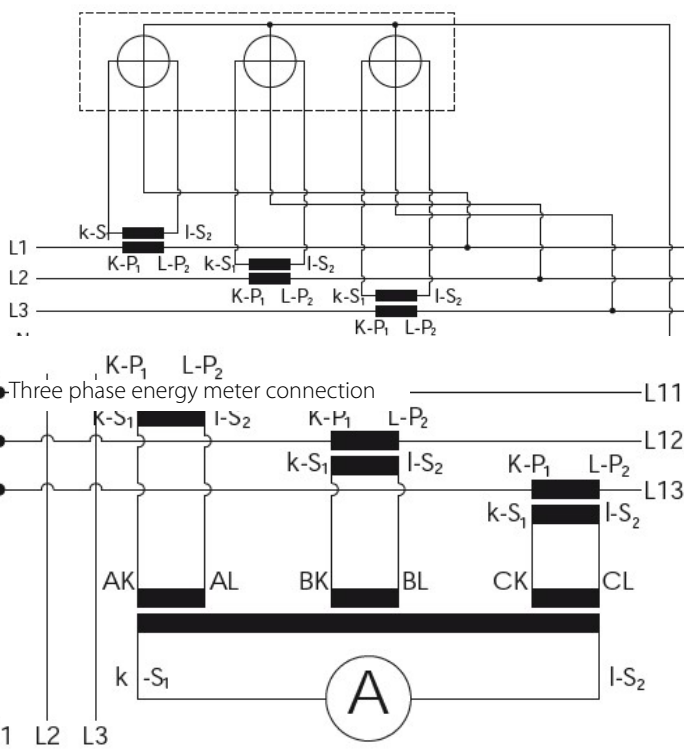
* bei $0,5 I_n$ und thermischem Nenn-Dauerstrom



Measuring connection



Single phase energy meter connection



relays

Summenwandler-Schaltung

- high measurement accuracy in the nominal current range
- protectiv function in the overcurrent range

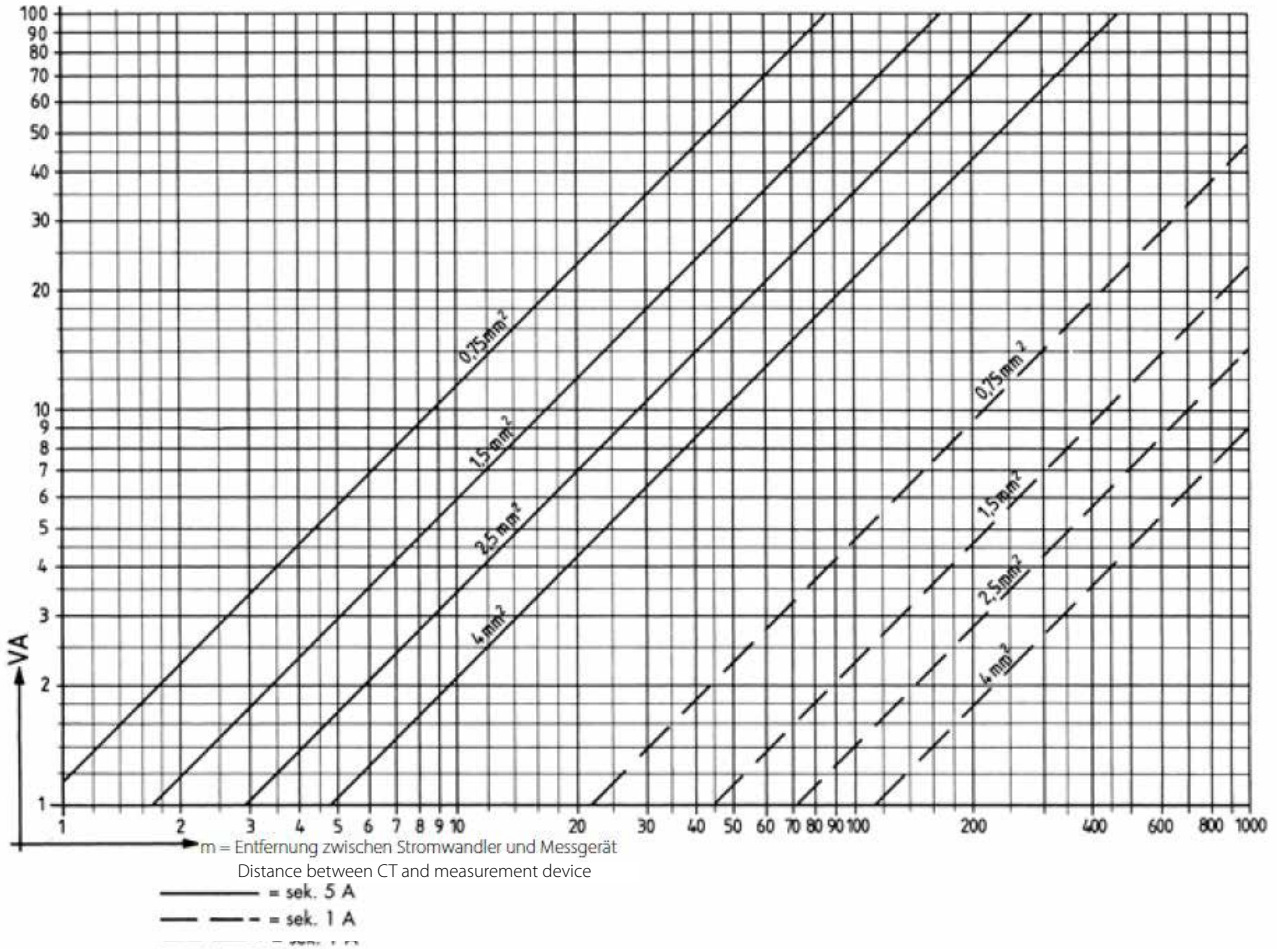
Connection of summary CTs

In order to meet these requirements, it is necessary that the range of services (the nominal apparent power) of the current transformer is adapted as close as possible to the actual power requirement of the measuring arrangement. To determine the actual power requirement, in addition to the internal power requirement of the connected measuring devices, the line losses of the measuring lines connected to the secondary circuit of the converter must also be taken into account.

Internal power requirement of typical measuring devices

Moving iron current meter 100 mm	0,700	-	1,50 VA
Moving coil current meter with rectifier	0,001	-	0,25 VA
Multiple current meter	0,005	-	5,00 VA
Current recorder	0,300	-	9,00 VA
Bimetall current meter	2,500	-	3,00 VA
Power meter	0,200	-	5,00 VA
Power recorder	3,000	-	12,00 VA
Power factor meter	2,000	-	6,00 VA
Power facotr recorder	9,000	-	16,00 VA
Energy meter	0,400	-	1,00 VA
N-Relay			14,00 VA
Overcurrent relay	0,200	-	6,00 VA
Overcurrent time relay	3,000	-	6,00 VA
Directional relay			10,00 VA
Bimetall relay	7,000	-	11,00 VA
Distance relay	1,000	-	30,00 VA
Differential relay	0,200	-	2,00 VA
Current transformer trip switch	5,000	-	150,00 VA
Regulator	5,000	-	180,00 VA

Auxiliary diagram for determining the power loss (secondary line)



Outside dimensions of cables and wires

Depending on the manufacturer, the diameters can differ from the information!

Cross section	Type NYM..	Type NY..	Type H07V-K
1 x 1,5 mm ²	5,2 mm	-	3,4 mm
1 x 2,5 mm ²	6,0 mm	-	4,1 mm
1 x 4 mm ²	6,7 mm	-	4,8 mm
1 x 6 mm ²	7,2 mm	-	5,3 mm
1 x 10 mm ²	8,6 mm	-	6,8 mm
1 x 16 mm ²	9,6 mm	-	8,1 mm
1 x 25 mm ²	12,5 mm	13,0 mm	10,2 mm
1 x 35 mm ²	-	14,0 mm	11,7 mm
1 x 50 mm ²	-	15,0 mm	13,9 mm
1 x 70 mm ²	-	17,0 mm	16,0 mm
1 x 95 mm ²	-	-	18,2 mm
1 x 120 mm ²	-	21,0 mm	20,2 mm
1 x 150 mm ²	-	-	22,5 mm
1 x 185 mm ²	-	25,0 mm	24,9 mm
1 x 240 mm ²	-	-	28,4 mm

1 Measuring transducers

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3 Energy meters

4 Panel meters digital

5 Panel meters analog

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7 Universal measurement ring instruments

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Tube unit current transformer

for round conductors up to 21 / 28 mm

RSWR 21 / RSWR 28

Primary current 40 - 600 A



Dimensions
Page 274

Type RSWR 21

Width	44 mm
Depth	30 mm
Busbar size	--
Round cond.	Ø 21 mm

Accessories incl. Foot fastening brackets
secondary terminal cover

Weight approx. 200 g
also possible in class 0,2; 0,2S und 0,5S

Type RSWR 28

Width	60 mm
Depth	35 mm
Busbar size	30 x 10 mm
Round cond.	Ø 28 mm

Accessories incl. Foot fastening brackets
secondary terminal cover

Weight approx. 300 g



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
40	1	X*	X*	-	-	-	-	-	-
50	1	X	X	-	-	-	-	-	-
60	1,25	X	X	-	-	X	X	-	-
75	1,25	X	-	-	-	X	X	-	-
	2,5	X	X	-	-	-	-	-	-
80	1,25	-	-	-	-	X	X	-	-
	2,5	X	X	-	-	-	-	-	-
100	1	-	-	X	X	-	-	-	-
	1,25	-	-	-	-	X	X	X	X
	1,5	-	-	X	-	-	-	-	-
	2,5	X	X	-	-	X	X	-	-
125	1	-	-	X	X	-	-	-	-
	1,25	-	-	-	-	-	-	X	X
	2,5	X	X	-	X	X	X	-	-
	3,75	X	X	-	-	X	X	-	-
150	2,5	X	X	X	X	X	X	X	X
	5	X	X	-	-	X	X	-	-
200	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	7,5	X	-	-	-	X	X	-	-
250	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	7,5	X	X	X	X	-	-	X	X
	10	-	-	-	-	X	X	-	-
300	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	-	-	-	X	X	X	X
400	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	7,5	X	X	X	X	-	-	-	-
	10	-	-	-	-	X	X	X	X
500	2,5	X	-	X	-	-	-	-	-
	5	X	-	X	-	X	X	X	X
	10	X	-	X	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
600	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X

* class 3 only!!!

Accessories: see page 272

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Plug-in current transformers

for busbars 30 x 10 (15) mm

SWR 3010 / SWR-L 3010

Primary current 50 - 250 A



Dimensions page 274

Type SWR 3010

Width	60 mm
Depth	30 mm
Busbar size	30 x 10 (15) mm
Round cond.	Ø 28 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 300 g
also possible in class 0,2; 0,2S und 0,5S

Type SWR-L 3010

Width	70 mm
Depth	35 mm
Busbar size	30 x 10 mm
Round cond.	Ø 23 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 400 g
also possible in class 0,2; 0,2S und 0,5S



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
50	1	X*	X*	-	-	-	-	-	-
60	1	X*	X*	-	-	-	-	-	-
	1,25	-	-	-	-	X	X	-	-
75	1	X	-	-	-	-	-	-	-
	1,25	-	X	-	-	-	-	-	-
	2,5	-	-	-	-	X	X	-	-
80	1,25	X	-	-	-	-	-	-	-
	1,5	-	X	-	-	-	-	-	-
	2,5	-	-	-	-	X	X	-	-
100	1,25	-	-	-	X	-	-	X	-
	2,5	X	X	-	-	-	-	-	-
	3,75	-	-	-	-	X	X	-	-
125	1,25	-	-	-	X	-	-	-	-
	2,5	X	X	-	-	-	-	X	X
	3,75	X	X	-	-	-	-	-	-
	5	-	-	-	-	X	X	-	-
150	2,5	X	X	X	X	-	-	X	X
	3,75	X	X	-	-	-	-	X	X
	5	X	-	-	-	X	X	-	-
	10	-	-	-	-	X	X	-	-
200	2,5	X	X	X	X	-	-	-	-
	3,75	-	-	-	X	-	-	-	-
	5	X	X	-	-	-	-	X	X
	7,5	-	-	-	-	-	-	X	X
	10	-	-	-	-	X	X	-	-
	15	-	-	-	-	X	X	-	-
250	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	-	-	X	X
	7,5	X	X	X	-	-	-	-	-
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	-	-

* class 3 only!!!

Accessories: see page 272



Plug-in current transformers

for busbars 30 x 10 (15) mm

SWR 3010 / SWR-L 3010

Primary current 300 - 750 A



Dimensions
page 274

Type SWR 3010

Width	60 mm
Depth	30 mm
Busbar size	30 x 10 (15) mm
Round cond.	Ø 28 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 300 g
also possible in class 0,2; 0,2S und 0,5S

Type SWR-L 3010

Width	70 mm
Depth	35 mm
Busbar size	30 x 10 mm
Round cond.	Ø 23 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 400 g
also possible in class 0,2; 0,2S und 0,5S



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
300	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	-	-	-	-
	7,5	X	X	X	X	-	-	-	-
	10	X	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
400	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
	15	X	-	-	-	X	X	X	X
500	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
	15	-	-	-	-	X	X	X	X
	20	-	-	-	-	X	X	X	X
600	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
	15	-	-	-	-	X	X	X	X
	20	-	-	-	-	X	X	X	X
	25	-	-	-	-	X	X	X	X
750	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
	15	X	-	X	-	-	-	-	-

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Plug-in current transformers

for busbars 30 x 10 (15) mm

SWR-S 3010

Primary current 40 - 300 A

Type SWR-S 3010

Width	70 mm
Depth	49 mm
Busbar size	30 x 10 mm
Round cond.	Ø 23 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 650 g
also possible in class 0,2; 0,25 und 0,5S

Dimensions
page 274

Types and variants

Primary current in A	VA	class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
40	1,25	X	X	-	-
	2,5	-	-	-	-
50	1	-	-	X	X
	1,25	X	X	-	-
60	2,5	X	X	-	X
	1	-	-	X	X
75	1,25	X	-	-	-
	2,5	X	X	X	X
	3,75	X	X	-	-
80	1	-	-	X	X
	2,5	X	X	X	X
	5	X	X	-	-
100	1	-	-	X	X
	2,5	X	X	X	X
	5	X	X	X	X
125	7,5	X	X	-	-
	2,5	-	X	X	-
	5	X	X	X	X
	7,5	-	-	X	X
150	10	X	X	-	-
	2,5	-	-	X	-
	5	X	X	X	X
	10	X	X	X	X
200	15	X	X	-	-
	5	-	X	X	X
	10	X	X	X	X
	15	X	-	X	X
250	20	X	X	-	-
	5	-	X	-	X
	10	X	X	X	-
	15	X	-	X	X
300	20	X	X	X	X
	10	X	-	X	-
	15	-	-	X	-
	20	X	-	-	-
	30	X	-	-	-

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Plug-in current transformers

for busbars 40 x 10 (12) mm

SWR 4010 / SWR-L 4010

Primary current 60 - 500 A



Dimensions page 275

Type SWR 4010

Width	60 mm
Depth	30 mm
Busbar size	40 x 12 / 30 x 30 mm
Round cond.	Ø 33 mm
Accessories incl.	foot fastening brackets busbar fixing material secondary terminal cover
Weight	approx. 200 g

Type SWR-L 4010

Width	70 mm
Depth	30 mm
Busbar size	40 x 12 / 30 x 30 mm
Round cond.	Ø 33 mm
Accessories incl.	foot fastening brackets busbar fixing material secondary terminal cover
Weight	approx. 300 g also possible in class 0,2; 0,25 und 0,55



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
60	1,25	-	-	-	-	X*	X*	-	-
75	1,25	-	-	-	-	X*	X*	-	-
80	1,25	-	-	-	-	X	X	-	-
100	2,5	-	-	-	-	X	X	-	-
125	1,25	-	-	-	-	-	-	X	X
	2,5	-	-	-	-	X	X	-	-
150	3,75	-	-	-	-	X	X	-	-
	1	-	-	-	-	-	-	-	X
200	2,5	-	X	-	-	X	X	X	X
	5	-	-	-	-	X	X	-	-
	1,25	X	-	-	X	-	-	-	-
250	2,5	-	X	-	-	X	X	X	X
	3,75	-	-	-	-	-	-	-	X
	5	-	-	-	-	X	X	-	-
	1,25	-	-	-	X	-	-	-	-
300	2	X	X	X	-	-	-	-	-
	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	X	X
	7,5	-	-	-	-	X	X	-	-
	2,5	X	X	X	X	X	X	X	X
400	5	-	-	-	-	X	X	X	X
	7,5	-	-	-	-	X	X	-	X
	2,5	X	X	X	X	X	X	X	X
	3,75	X	X	X	X	-	-	-	-
	5	-	-	-	-	X	X	X	X
500	7,5	-	-	-	-	-	X	-	X
	10	-	-	-	-	X	-	X	-
	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	-	-	-	-	X	X	X	X

* nur in Klasse 3!!!

Accessories: see page 272



Plug-in current transformers

for busbars 40 x 10 (12) mm

SWR 4010 / SWR-L 4010

Primary current 600 - 1000 A



Dimensions
page 275

Type SWR 4010

Width	60 mm
Depth	30 mm
Busbar size	40 x 12 / 30 x 30 mm
Round cond.	Ø 33 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 200 g

Type SWR-L 4010

Width	70 mm
Depth	30 mm
Busbar size	40 x 12 / 30 x 30 mm
Round cond.	Ø 33 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 300 g
also possible in class 0,2; 0,2S und 0,5S



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
600	1,25	X	-	X	-	-	-	-	-
	2,5	-	X	-	X	X	X	X	X
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
750	2,5	X	X	X	X	X	X	X	X
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	-	-
800	2,5	X	-	X	-	X	X	X	X
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
1000	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	-	X	-	X
	20	-	-	-	-	X	-	X	-

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Plug-in current transformers

for busbars 40 x 10 (12) mm

SWR-K 4010 / SWR-S 4010

Primary current 60 - 400 A



Dimensions page 275

Type SWR-K 4010

Width	70 mm
Depth	35 mm
Busbar size	40 x 10 / 30 x 15 mm
Round cond.	Ø 30 mm
Accessories incl.	foot fastening brackets busbar fixing material secondary terminal cover

Weight approx. 350 g
also possible in class 0,2; 0,25 und 0,5S

Type SWR-S 4010

Width	70 mm
Depth	49 mm
Busbar size	40 x 10 / 30 x 15 mm
Round cond.	Ø 30 mm
Accessories incl.	foot fastening brackets busbar fixing material secondary terminal cover

Weight approx. 550 g
also possible in class 0,2; 0,25 und 0,5S



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
60	1,25	-	-	-	-	X	X	-	-
75	1,25	X	X	-	-	X	X	-	-
80	1,25	X	X	-	-	-	-	-	-
	2	-	-	-	-	X	X	-	-
100	1,25	X	X	-	-	-	-	-	-
	2,5	X	X	-	-	X	X	-	-
	3,75	-	-	-	-	X	X	-	-
125	1,25	-	-	X	X	-	-	-	-
	2,5	X	X	-	-	X	X	X	X
	3,75	X	X	-	-	-	-	X	X
	5	-	-	-	-	X	X	-	-
150	1,25	-	-	X	X	-	-	-	-
	2,5	X	X	X	X	X	X	X	X
	3,75	-	-	-	-	-	-	X	X
	5	X	X	-	-	X	X	-	-
200	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	7,5	X	X	-	-	-	-	X	X
	10	-	-	-	-	X	X	-	-
250	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	-	X	X	X	X
	10	X	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	-	-
300	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	7,5	-	X	-	-	-	-	-	-
	10	X	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
400	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	7,5	-	X	-	X	-	-	-	-
	10	X	-	X	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
	20	-	-	-	-	X	-	-	-
	30	-	-	-	-	-	X	-	-

Accessories: see page 272



Plug-in current transformers

for busbars 40 x 10 (12) mm

SWR-K 4010 / SWR-S 4010

Primary current 500 - 1000 A



Dimensions
page 275

Type SWR-K 4010

Width	70 mm
Depth	35 mm
Busbar size	40 x 10 / 30 x 15 mm
Round cond.	Ø 30 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 350 g
also possible in class 0,2; 0,25 und 0,55

Type SWR-S 4010

Width	70 mm
Depth	49 mm
Busbar size	40 x 10 / 30 x 15 mm
Round cond.	Ø 30 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 550 g
also possible in class 0,2; 0,25 und 0,55



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net €	net €	net €	net €	net €	net €	net €	net €
		sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A
500	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	-	-	-	-	X	X	X	X
	20	-	-	-	-	-	-	X	X
	30	-	-	-	-	X	X	-	-
600	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	20	-	-	-	-	-	-	X	X
	30	-	-	-	-	X	X	-	-
750	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	-	-	-	-	X	X	X	X
800	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	-	-	-	-	X	X	X	X
1000	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	-	-	-	-	X	X	X	X

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7 Universal measuring instruments

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Plug-in current transformers

for busbars 50 x 12 / 2 x 40 x 10 mm

SWR-S 5010 / SWR 5010

Primary current 150 - 600 A

Type SWR-S 5010

Width	70 mm
Depth	30 mm
Busbar size	50x12 / 2x40x10 mm
Round cond.	Ø 42 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 200 g

Type SWR 5010

Width	85 mm
Depth	30 mm
Busbar size	50x10 / 2x40x10 mm
Round cond.	Ø 42 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 400 g
also possible in class 0,2; 0,25 und 0,55

Dimensions
page 275

Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
150	1	-	-	-	-	-	-	X	X
	1,25	X	X	-	-	-	-	-	-
	2,5	-	-	-	-	X	X	-	-
	3,75	-	-	-	-	X	-	-	-
200	1,25	X	X	-	X	-	-	-	-
	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	-	-
	7,5	-	-	-	-	X	-	-	-
250	1,25	-	-	X	X	-	-	-	-
	2,5	X	X	-	-	X	X	X	X
	3,75	-	-	-	-	-	-	-	X
	5	-	-	-	-	X	X	X	-
	7,5	-	-	-	-	X	X	-	-
300	10	-	-	-	-	X	-	-	-
	1,25	-	-	X	-	-	-	-	-
	2,5	X	X	X	X	X	X	X	X
	5	-	-	-	-	X	X	X	X
	7,5	-	-	-	-	-	-	X	X
400	10	-	-	-	-	X	X	-	-
	1,25	X	X	X	X	-	-	-	-
	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
500	15	-	-	-	-	X	X	X	X
	1,25	-	-	X	-	-	-	-	-
	2,5	X	X	X	X	-	X	X	X
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
600	15	-	-	-	-	X	-	X	X
	20	-	-	-	-	X	X	-	-
	2,5	X	X	X	X	-	X	-	X
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X

Accessories: see page 272



Plug-in current transformers

for busbars 50 x 12 / 2 x 40 x 10 mm

SWR-S 5010 / SWR 5010

Primary current 750 - 1500 A



Dimensions
page 275

Type SWR 5010

Width	85 mm
Depth	30 mm
Busbar size	50x10 / 2x40x10 mm
Round cond.	Ø 42 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 400 g
also possible in class 0,2; 0,25 und 0,5S

Type SWR 5010

Wandlerbreite	85 mm
Wandlertiefe	30 mm
Primärleiter	50x10 / 2x40x10 mm
Rundleiter	Ø 42 mm

Zubehör inkl. Fußbefestigungswinkel
Primärleiterbefestigung
Sekundärklemmen-
abdeckung (Schieber)

Gewicht ca. 400 g
auch in Klasse 0,2; 0,25 und 0,5S möglich.
Geeichte Wandler auf Anfrage.



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
750	2,5	X	X	X	X	-	-	-	-
	3,75	X	X	X	X	-	-	-	-
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	-
800	2,5	X	X	X	X	-	-	-	-
	3,75	X	X	X	X	-	-	-	-
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	-	-
1000	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
	30	-	-	-	-	X	X	X	X
1250	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
	20	-	-	-	-	-	-	X	X
	30	-	-	-	-	X	X	-	-
1500	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
	20	-	-	-	-	-	-	X	X
	30	-	-	-	-	X	X	-	-

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Plug-in current transformers

for busbars 60 x 15 / 2 x 50 x 10 mm

SWR-S 6010 / SWR 6010

Primary current 200 - 750 A

Dimensions page 276

Type SWR-S 6010

Width	85 mm
Depth	30 mm
Busbar size	60x15/2x50x10 mm
Round cond.	Ø 52 mm
Accessories incl.	busbar fixing material secondary terminal cover

Weight approx. 350 g
also possible in class 0,2; 0,2S und 0,5S

Type SWR 6010

Width	95 mm
Depth	30 mm
Busbar size	60x15/2x50x10 mm
Round cond.	Ø 53 mm
Accessories incl.	busbar fixing material secondary terminal cover

Weight approx. 500 g
also possible in class 0,2; 0,2S und 0,5S



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
200	2,5	X	X	-	-	X	X	X	X
	3,75	-	-	-	-	X	X	-	-
250	1	-	-	X	X	-	-	-	-
	2,5	X	X	-	-	X	X	X	X
	3,75	X	-	-	-	-	-	-	-
	5	-	-	-	-	X	X	X	-
300	7,5	-	-	-	-	X	X	-	-
	1	-	-	X	X	-	-	-	-
	2,5	X	X	X	X	X	X	X	X
	3,75	X	X	-	-	-	-	-	-
	5	X	-	-	-	X	X	X	X
400	10	-	-	-	-	X	X	-	-
	1	-	-	-	X	-	-	-	-
	2,5	X	X	X	X	X	X	X	X
	3,75	X	X	-	-	-	-	-	-
	5	X	-	X	-	X	X	X	X
	7,5	-	-	-	-	-	-	-	X
	10	-	-	-	-	X	X	X	-
	15	-	-	-	-	X	-	-	-
500	2,5	X	X	X	X	-	X	X	X
	3,75	-	-	-	X	-	-	-	-
	5	X	X	X	-	X	X	X	X
	7,5	X	-	X	-	-	-	-	-
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	-
	20	-	-	-	-	X	-	-	-
	600	2,5	X	X	X	X	-	X	X
5		X	X	X	X	X	X	X	X
10		X	-	X	-	X	X	X	X
15		-	-	-	-	X	-	X	-
20		-	-	-	-	X	-	-	-
750	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	7,5	-	X	-	X	-	-	-	-
	10	X	-	X	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
	20	-	-	-	-	X	X	X	-

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Plug-in current transformers

for busbars 60 x 15 / 2 x 50 x 10 mm

SWR-S 6010 / SWR 6010

Primary current 800 - 2500 A



Dimensions
page 276

Type SWR-S 6010

Width	85 mm
Depth	30 mm
Busbar size	60x15/2x50x10 mm
Round cond.	Ø 52 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 350 g
also possible in class 0,2; 0,2S und 0,5S

Type SWR 6010

Width	95 mm
Depth	30 mm
Busbar size	60x15/2x50x10 mm
Round cond.	Ø 53 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 500 g
also possible in class 0,2; 0,2S und 0,5S



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
800	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	10	X	-	X	-	X	X	X	X
	15	X	-	X	-	X	X	X	X
	20	-	-	-	-	X	X	X	-
1000	2,5	-	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	10	X	-	X	-	X	X	X	X
	15	X	-	X	-	X	X	X	X
	20	-	-	-	-	X	X	X	X
1250	2,5	-	X	-	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	7,5	-	X	-	X	-	-	-	-
	10	X	-	X	-	X	X	X	X
	15	X	-	X	-	X	X	X	X
1500	20	X	-	X	-	X	X	X	X
	5	X	-	X	-	X	X	X	X
	10	X	-	X	-	X	X	X	X
	15	X	-	X	-	X	X	X	X
	20	X	-	X	-	-	-	-	-
1600	30	-	-	-	-	X	-	X	-
	5	X	-	X	-	X	X	X	X
	10	X	-	X	-	X	X	X	X
	15	X	-	X	-	X	X	X	X
	20	X	-	X	-	-	-	-	-
2000	30	-	-	-	-	X	-	X	-
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
	20	-	-	-	-	X	X	X	X
2500	5	-	-	-	-	X	-	X	-
	10	-	-	-	-	X	-	X	-
	15	-	-	-	-	X	-	X	-
	20	-	-	-	-	X	-	X	-

Accessories: see page 272

1 Measuring transducers

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3 Energy meters

4 Panel meters digital

5 Panel meters analog

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7 Universal measuring instruments

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10 Test apparatus



Plug-in current transformers

for busbars 60 x 40 mm

SWR 6040

Primary current 200 - 2000 A

Type SWR 6040

Width	96 mm
Depth	30 mm
Busbar size	60 x 40 / 50 x 50 mm
Round cond.	Ø 61 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 350 g
also possible in class 0,2; 0,2S und 0,5S

Dimensions
page 276

Types and variants

Primary current in A	VA	class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
200	2,5	X	X	-	-
	250	X	X	-	-
300	3,75	X	-	-	-
	2,5	X	X	X	X
	3,75	-	X	-	-
400	5	X	-	-	-
	2,5	X	X	X	X
	3,75	-	-	-	X
500	5	X	X	X	-
	2,5	X	X	X	X
	5	X	X	X	X
600	7,5	X	X	-	X
	2,5	X	X	X	X
	5	X	X	X	X
750	7,5	-	-	X	X
	10	X	X	-	-
	2,5	X	X	X	X
800	5	X	X	X	X
	10	X	X	X	X
	2,5	X	X	X	X
1000	5	X	X	X	X
	10	X	X	X	X
	2,5	X	X	X	X
1250	5	X	X	X	X
	10	X	X	X	X
	2,5	X	X	X	X
1500	5	-	X	-	X
	10	X	X	X	-
	15	X	X	-	-
	5	X	-	-	-
1600	10	X	-	-	-
	15	X	-	-	-
	5	X	-	-	-
2000	10	X	-	-	-
	15	X	-	-	-
	5	X	-	-	-

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2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers SWR[®]-series

9 Shunts

10 Test apparatus

Plug-in current transformers

for busbars 80 x 15 / 2 x 80 x 10 mm

SWR 8010 / SWR 8030

Primary current 400 - 2500 A



Dimensions
page 276

Type SWR 8010

Width	105 mm
Depth	30 mm
Busbar size	80x15/2x60x10 mm
Round cond.	Ø 61 mm
Accessories incl.	busbar fixing material secondary terminal cover

Weight approx. 450 g
also possible in class 0,2; 0,2S und 0,5S

Type SWR 8030

Width	105 mm
Depth	30 mm
Busbar size	2x80x10 / 60x60 mm
Round cond.	Ø 70 mm
Accessories incl.	busbar fixing material secondary terminal cover

Weight approx. 400 g
also possible in class 0,2; 0,2S und 0,5S



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net €	net €	net €	net €	net €	net €	net €	net €
		sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A
400	2,5	X	X	X	X	X	-	X	-
	5	X	X	-	X	X	-	X	-
	7,5	X	X	-	-	-	-	-	-
500	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	-	X	-
	10	X	X	-	-	-	-	-	-
600	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	-	-	-	-
750	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	-	-	-
	15	X	-	X	-	-	-	-	-
800	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	-	X	-
	15	X	-	X	-	-	-	-	-
1000	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
1250	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	-	-	-	-
1500	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	-	-	-	-
1600	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	-	-	-	-
2000	5	X	X	X	X	X	-	X	-
	10	X	X	X	X	X	-	X	-
	15	X	X	X	X	X	-	X	-
2500 *	10	X	-	X	-	X	-	X	-
	15	X	-	X	-	X	-	X	-
	20	X	-	X	-	-	-	-	-
	30	X	-	-	-	-	-	-	-
			X	-	-	-	-	-	-

* I_{cth}: 1,0 x I_{pr}

Accessories: see page 272

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring ring instruments

8 Current transformers SW"R"-series

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10 Test apparatus



Plug-in current transformers

for busbars 2 x 100 x 10 / 3 x 100 x 12 mm

SWR 10030 / SWR 10056

Primary current 400 - 4000 A



Dimensions page 277

Type SWR 10030

Width	129 mm
Depth	30 mm
Busbar size	2x100x10 / 80x60 mm
Round cond.	Ø 85 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 650 g
also possible in class 0,2; 0,25 und 0,5S

Type SWR 10056

Width	129 mm
Depth	30 mm
Busbar size	3x100x12 mm
Round cond.	Ø 56 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 600 g
also possible in class 0,2; 0,25 und 0,5S



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
400	2,5	X	X	X	X	X	X	-	-
	5	X	X	-	-	X	X	-	-
500	2,5	X	X	X	X	X	X	-	-
	5	X	X	X	X	X	X	-	-
600	5	X	X	X	X	X	X	X	X
	10	X	X	-	X	X	X	-	-
750	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
800	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
1000	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	-	X	X	X	X
1200	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
1250	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
1500	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
1600	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
2000	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
2500	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
3000*	5	X	X	X	X	X	-	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
4000*	5	X	-	X	-	X	-	X	-
	10	X	-	X	-	X	-	X	-
	15	X	-	X	-	X	-	X	-

* I_{cth}: 1,0 x I_{pr}

Accessories: see page 272



Dimensions page 277

Plug-in current transformers

for busbars 2 x 120 x 10 / 4 x 120 x 10 mm

SWR 12030 / SWR 12070

Primary current 400 - 1600 A

Type SWR 12030

Width	159 mm
Depth	30 mm
Busbar size	2x120x10 / 3x100x10 mm
Round cond.	Ø 96 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 900 g
also possible in class 0,2; 0,25 und 0,5S

Type SWR 12070

Width	159 mm
Depth	30 mm
Busbar size	4x120x10 mm
Round cond.	Ø 72 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 950 g
also possible in class 0,2; 0,25 und 0,5S



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
400	2,5	X	-	X	X	X	X	-	-
	5	X	X	-	X	X	X	-	-
	10	-	X	-	-	-	-	-	-
500	2,5	-	-	X	X	X	X	-	-
	5	X	X	X	X	X	X	-	-
	10	X	X	-	-	-	-	-	-
600	15	-	X	-	-	-	-	-	-
	2,5	-	-	X	X	-	-	X	X
	5	X	X	X	X	X	X	X	X
750	10	X	X	-	X	X	X	-	-
	15	X	X	X	X	-	-	-	-
	20	X	X	-	-	-	-	-	-
800	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	-	-
	15	X	X	X	X	-	-	-	-
	20	X	X	-	-	-	-	-	-
1000	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
	30	X	X	X	X	-	-	-	-
1250	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
	20	X	X	X	X	-	-	-	-
1500	5	-	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
	20	X	X	X	X	-	-	-	-
1600	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
	20	-	-	X	X	-	-	-	-
	30	X	X	-	-	-	-	-	-

Accessories: see page 272



Plug-in current transformers

for busbars 2 x 120 x 10 / 4 x 120 x 10 mm

SWR 12030 / SWR 12070 Primary current 2000 - 6000 A



Dimensions page 277

Type SWR 12030

Width	159 mm
Depth	30 mm
Busbar size	2x120x10 / 3x100x10 mm
Round cond.	Ø 96 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 900 g
also possible in class 0,2; 0,25 und 0,55

Type SWR 12070

Width	159 mm
Depth	30 mm
Busbar size	4x120x10 mm
Round cond.	Ø 72 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 950 g
also possible in class 0,2; 0,25 und 0,55



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net €	net €	net €	net €	net €	net €	net €	net €
		sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A
2000	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	-	-	-	-
2500	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	X	X	-	-
3000	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	X	X	-	-
	45	X	X	X	X	-	-	-	-
4000	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	X	X	-	-
	45	X	X	X	X	-	-	-	-
5000*	10	-	-	-	-	X	-	X	-
	20	-	-	-	-	X	-	X	-
	30	-	-	-	-	X	-	X	-
6000*	10	-	-	-	-	X	-	X	-
	20	-	-	-	-	X	-	X	-
	30	-	-	-	-	X	-	X	-

* I_{cth}: 1,0 x I_{pr}

Accessories: see page 272

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers SW"R"-series

9 Shunts

10 Test apparatus



Plug-in current transformers

for busbars 3 x 140 x 10 mm

SWR 14050

Primary current 1000 - 7000 A

Type SWR 14050

Width	200 mm
Depth	50 mm
Busbar size	3x140x10 mm
Round cond.	Ø 56 mm

Accessories incl. busbar fixing material
secondary terminal cover

Weight approx. 900 g
also possible in class 0,2; 0,25 und 0,5S

Dimensions
page 278

Types and variants

Primary current in A	VA	class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
1000	5	X	-	X	-
	10	X	-	X	-
2000	10	X	-	X	-
	15	-	-	X	-
3000	20	X	-	-	-
	10	X	-	X	-
4000	15	-	-	X	-
	20	X	-	-	-
5000	10	X	-	X	-
	15	-	-	X	-
7000*	20	X	-	-	-
	10	X	-	X	-
	20	X	-	X	-
	30	X	-	X	-

* I_{cth}: 1,0 x I_{pr}

Accessories: see page 272

1 Measuring transducers
2 Mains and limit monitoring
3 Energy meters
4 Panel meters digital
5 Panel meters analog
6 Meas. instruments for top hat rail mounting
7 Universal measuring instruments
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9 Shunts
10 Test apparatus



Wound primary CT's

for direct connection

WSR 60

Primary current 1 - 40 A



Dimensions
page 278

Type WSR 60

Width	60 mm
Depth	30 mm
Busbar size	-- mm
Round cond.	-- mm
Accessories incl.	foot fastening brackets secondary terminal cover
Weight	approx. 250 g



Types and variants

Primary current in A	VA	class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
1	2,5	X	X	X	X
	5	X	X	X	X
2	2,5	X	X	X	X
	5	X	X	X	X
2,5	2,5	X	X	X	X
	5	X	X	X	X
4	2,5	X	X	X	X
	5	X	X	X	X
5	2,5	X	X	X	X
	5	X	X	X	X
6	2,5	X	X	X	X
	5	X	X	X	X
7,5	2,5	X	X	X	X
	5	X	X	X	X
10	2,5	X	X	X	X
	5	X	X	X	X
12,5	2,5	X	X	X	X
	5	X	X	X	X
15	2,5	X	X	X	X
	5	X	X	X	X
20	2,5	X	X	X	X
	5	X	X	X	X
25	2,5	X	X	X	X
	5	X	X	X	X
30	2,5	X	X	X	X
	5	X	X	X	X
40	2,5	X	X	X	X
	5	X	X	X	X

Accessories: see page 272

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measurement ring instruments

8 Current transformers SW"R"-series

9 Shunts

10 Test apparatus

General description summary current transformers



Application

Summary current transformers are suitable for the summation of several synchronized alternating currents with similar phases but with differing load phase shifts. It is also possible to have the summation of currents with varied nominal voltages of similar phase positions. These measurements cannot be used for tariff applications, as the existing voltage differences are recorded as errors.

With the counter connection of the main transformer to the summation current transformer, it is possible to receive secondary currents which are proportional to the differences of the primary input currents. The built-in technical know-how enables the summary current transformers to add secondary currents of varying nominal transmissions from the main transformer.

Connection of main transformers with similar transmission ratios

It is irrelevant for the main transformers with similar nominal transmission ratios, to which primary circuit of the summary current transformer the connection is made.

Connection of main transformers with different transmission ratios

With main transformers of different nominal transmission ratios, care must be taken to adhere to the assigned connection to the terminals of the summary current transformers. Is the current flow in the main transformer interrupted, the secondary circuit of the main transformer must neither be short-circuited nor be connected to the summary current transformer, or to the main transformer.

Summary current transformers with unallocated primary circuits must remain open for a later connection to an additional main transformer. The secondary output current of the summary current transformer is in this instance lower than the secondary nominal current of the summary current transformer by a quantity equal to the ratio of the primary nominal current of this "missing" main transformer and the sum of all the primary nominal currents of the main transformer.

A measuring device with a measuring range equal to the secondary nominal current of the total current transformer can be used to display the „total current“.

The ratio of the primary current of a main transformer to the sum of the primary currents of all main current transformers the ratio must not exceed 1:8.



Calculation and interpretation of summary current transformers

Example:

Actual situation:	3 transmission ratios	1000/5 A 800/5 A <u>600/5 A</u> 2400/5 A
Burden:	1 current meter 1 power recorder	
Locking for:	Summary CT and the VA power of the individual main transformers	
Required active performance of the summary current transformer:	Current meter Power recorder Measurement line loss Consumption summary CT Interim result	1,5 VA 7,0 VA 1,5 VA <u>4,0 VA</u> 14,00 VA

The individual transformer must provide its VA share from this 14.0 VA corresponding to its ratio to the "total transmission". Consideration must also be given to the respective power loss between the main transformer and the summary transformer plus other possible losses.

1. Main transformer 1000/5 A	<u>1000</u> 2400 x 14,0 = 5,83 VA + additional possible losses
2. Main transformer 800/5 A	<u>800</u> 2400 x 14,0 = 4,67 VA + additional possible losses
3. Main transformer 600/5 A	<u>600</u> 2400 x 14,0 = 3,50 VA + additional possible losses

The VA values of the main transformers are to be rounded up to the corresponding VA values in our charts.

Summary current transformers

for 2 to 9 primary circuits

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measurement instruments

8 Current transformers SW"R"-series

9 Shunts

10 Test apparatus



SSWR 2 to SSWR 9

Type SSWR 2 bis 9

- Width** 45 (size 1)/100 (size 2) mm
- Depth** 73 mm
- Primary circuits** 2 to 9
- Accessories incl.** integrated DIN top hat rail mounting

Weight approx.. 350 - 600 g

If different main circuit inputs are use, these must be specified when ordering!



Maßzeichnungen
Seite 278



Types and variants Primary current 5 A

Primary circuits (no. of)	VA/housing size	Class 1		Class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
2	2,5/1	X	X	X	X
	5/1	X	X	X	X
	10/1	X	X	X	X
	15/1	X	X	X	X
	30/2	X	X	X	X
3	2,5/1	X	X	X	X
	5/1	X	X	X	X
	10/1	X	X	X	X
	15/1	X	X	X	X
	30/2	X	X	X	X
4	2,5/1	X	X	X	X
	5/1	X	X	X	X
	10/1	X	X	X	X
	15/1	X	X	X	X
	30/2	X	X	X	X
5	2,5/2	X	X	X	X
	5/2	X	X	X	X
	10/2	X	X	X	X
	15/2	X	X	X	X
	30/2	X	X	X	X
6	2,5/2	X	X	X	X
	5/2	X	X	X	X
	10/2	X	X	X	X
	15/2	X	X	X	X
	30/2	X	X	X	X
7	2,5/2				
	5/2	on request		on request	
	10/2				
	15/2				
8	2,5/2				
	5/2	on request		on request	
	10/2				
	15/2				
	30/2				
9	2,5/2				
	5/2	on request		on request	
	10/2				
	15/2				
	30/2				

Types and variants Primary current 1 A

Primary circuits (no. of)	VA/housing size	Class 1		Class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
2	2,5/1	X	X	X	X
	5/1	X	X	X	X
	10/1	X	X	X	X
	15/1	X	X	X	X
	30/2	X	X	X	X
3	2,5/1	X	X	X	X
	5/1	X	X	X	X
	10/1	X	X	X	X
	15/1	X	X	X	X
	30/2	X	X	X	X
4	2,5/1	X	X	X	X
	5/1	X	X	X	X
	10/1	X	X	X	X
	15/1	X	X	X	X
	30/2	X	X	X	X
5	2,5/2	X	X	X	X
	5/2	X	X	X	X
	10/2	X	X	X	X
	15/2	X	X	X	X
	30/2	X	X	X	X
6	2,5/2	X	X	X	X
	5/2	X	X	X	X
	10/2	X	X	X	X
	15/2	X	X	X	X
	30/2	X	X	X	X
7	2,5/2				
	5/2	on request		on request	
	10/2				
	15/2				
8	2,5/2				
	5/2	on request		on request	
	10/2				
	15/2				
	30/2				
9	2,5/2				
	5/2	on request		on request	
	10/2				
	15/2				
	30/2				

Accessories: see page 272



Split-core current transformers

for round conductors up to 18,5 / 28 mm

SWUR 18 / SWUR 28

Primary current 50 - 500 A



Maßzeichnungen Seite 279

Type SWUR 18

With	44,4 mm
Depth	44,6 mm
Busbar size	--
Round cond.	Ø 18,5 mm
Accessories incl.	foot fastening brackets click-off hinge connection cable length = 1,5 m 2x0,75 mm ² at 1 A sec. 2x2,5 mm ² at 5 A sec.
Weight	approx. 150 g

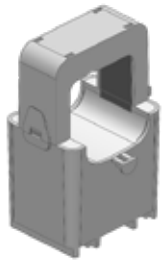
Type SWUR 28

Width	43,9 mm
Depth	43,7 mm
Busbar size	--
Round cond.	Ø 28 mm
Accessories incl.	foot fastening brackets click-off hinge connection cable length = 1,5 m 2x0,75 mm ² at 1 A sec. 2x2,5 mm ² at 5 A sec.
Weight	approx. 220 g



Types and variants

Primary current in A	VA	class 3		class 1		class 3		class 1	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
50	1	-	X	-	-	-	-	-	-
60	0,6	X	-	-	-	-	-	-	-
	1,25	-	X	-	-	-	-	-	-
63	0,6	X	-	-	-	-	-	-	-
	1,25	-	X	-	-	-	-	-	-
75	0,6	X	-	-	-	-	-	-	-
	1,25	-	X	-	-	-	-	-	-
80	0,6	X	-	-	-	-	-	-	-
	1,25	-	X	-	-	-	-	-	-
100	0,2	-	-	X	X	-	-	-	-
	0,6	X	-	-	-	-	-	-	-
	1,5	-	X	-	-	-	-	-	-
125	0,2	-	-	X	-	-	-	-	-
	0,4	-	-	-	X	-	-	-	-
	0,6	X	-	-	-	-	-	-	-
	1,5	-	X	-	-	-	-	-	-
150	0,4	-	-	X	-	-	-	-	-
	0,5	-	-	-	-	X	X	-	-
	0,6	X	-	-	X	-	-	-	-
	2	-	X	-	-	-	-	-	-
200	0,5	-	-	-	-	X	X	-	-
	0,6	-	-	X	-	-	-	-	-
	1,25	-	-	-	X	-	-	-	-
	1,5	X	-	-	-	-	-	-	-
	2,5	-	X	-	-	-	-	-	-
250	0,5	-	-	-	-	X	X	X	X
	0,6	-	-	X	-	-	-	-	-
	2,5	X	-	-	X	-	-	-	-
	3,75	-	X	-	-	-	-	-	-
300	0,5	-	-	-	-	-	-	X	X
	1	-	-	-	-	X	X	-	-
400	0,5	-	-	-	-	-	-	X	X
	1,5	-	-	-	-	X	X	-	-
500	1	-	-	-	-	-	-	X	X
	2	-	-	-	-	X	X	-	-



Split-core current transformers

for round conductors up to 42 mm

SWUR 42

Primary current 400 - 800 A



Dimensions
page 279

Type SWUR 42

Width	60,5 mm
Depth	45,8 mm
busbar size	--
Round cond.	Ø 42 mm
Accessories incl.	foot fastening brackets click-off hinge connection cable length = 3 m, 2x0,5 mm ² at 1 A sec or 1,5m, 2x2,5 mm ² at 5 A sec.
Weight	approx. 150 g



Types and variants

Primary current in A	VA	class 3		class 1	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
400	2,5	-	-	X	-
	3,75	X	-	-	X
	5	-	X	-	-
500	2,5	-	-	X	-
	3,75	X	-	-	X
	5	-	X	-	-
600	3,75	-	-	X	-
	5	X	X	-	X
	7,5	-	X	-	-
750 *	5	X	-	X	X
	7,5	-	X	-	-
	5	X	-	X	X
800 *	5	-	X	-	-
	7,5	-	X	-	-

* I_{cth}: 1,0 x I_{pr}

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers SW"R"-series

9 Shunts

10 Test apparatus

Accessories for current transformers

Snap-on brackets, plastic version (rigid)

for mounting the current transformer on standard top hat rail TH 35 mm (DIN EN 60715)



Variants

Form	for CT type	
A (30 mm)	RSWR 21, SWR3010, SWR 4010, SWR-L 4010, SWR-S 5010, SWR 5010 SWR-S 6010, SWR 6010, SWR 6040, SWR 8010, SWR 8030	X
B (35 mm)	RSWR 28, SWR-L 3010, SWR-K 4010	X
C (49 mm)	SWR-S 3010, SWR-S 4010	X
E (SWUR)	SWUR 18, SWUR 28, SWUR 42	X

Snap-on mounting base, metal version (rotatable)

for mounting the current transformer on standard top hat rail TH 35 mm (DIN EN 60715)



Variants

Form	for CT type	
D1 (35 mm)	SWR-L 3010, SWR-K 4010	X
D2 (49 mm)	SWR-S 3010, SWR-S 4010	X

Isolating caps

for protection of primary busbar mounting screws



Variants

Form	for all types	
P	alle Typen	X

More accessories

More accessories available on request e.g.:

- Copper tubes for use with Tube-unit CT's
- Copper busbars for use with Plug-in CT's

Spare parts

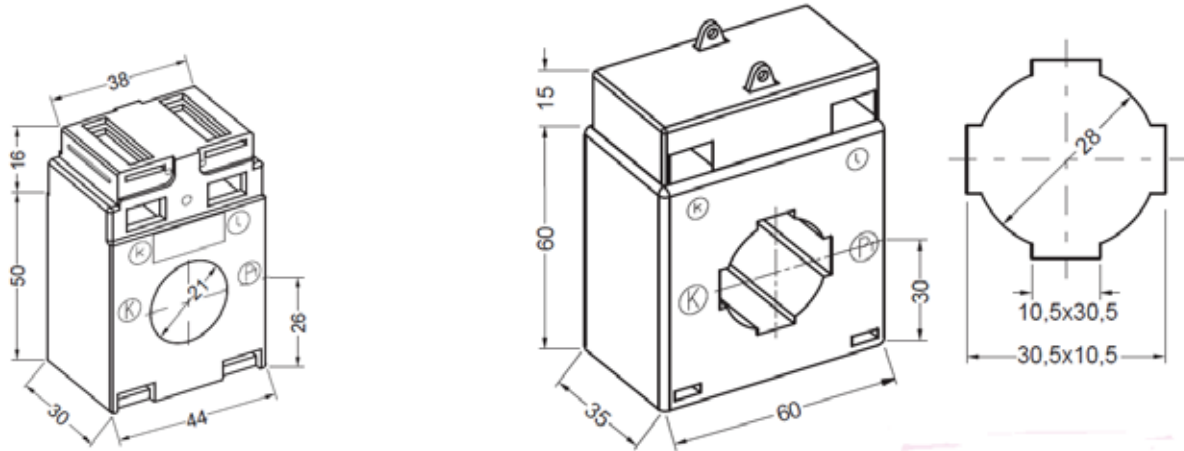
Spare parts on request:

- Busbar fixing brackets
- Busbar mounting screws
- Foot fastening brackets
- Secondary terminal covers
- Click-off hinges for split-core CT's



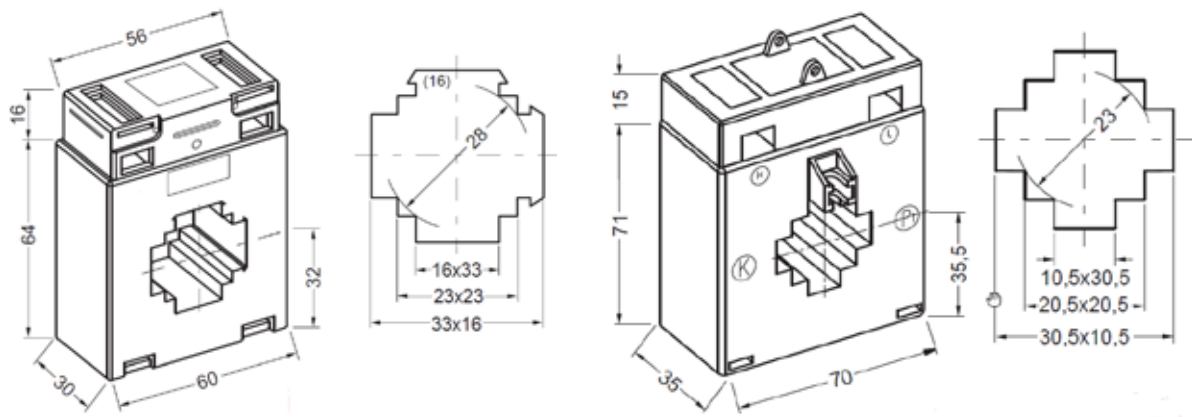
Dimensional drawings tube-unit current transformers

RSWR 21 **RSWR 28**

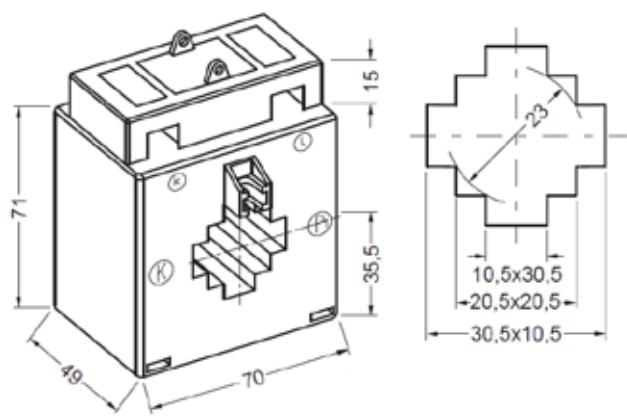


Dimensional drawings plug-in current transformers

SWR 3010 **SWR-L 3010**

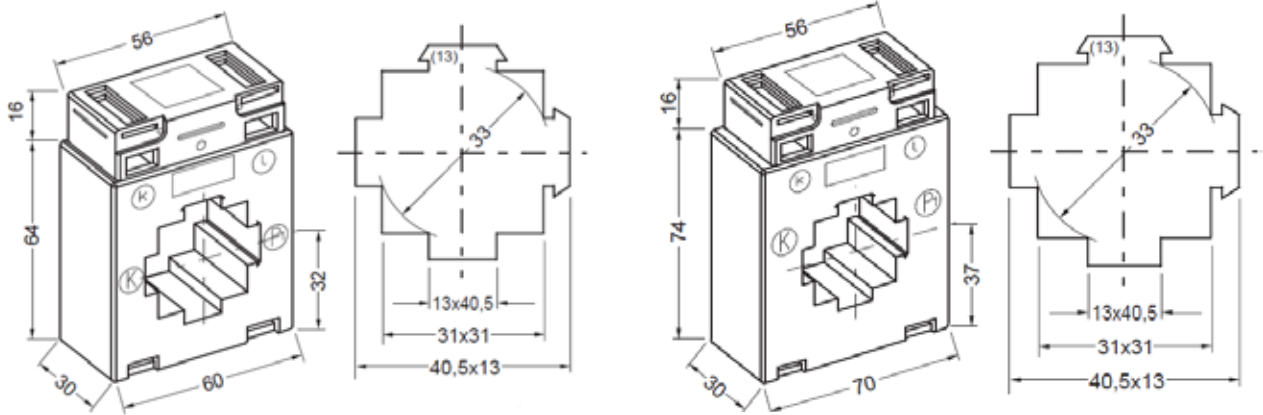


SWR-S 3010

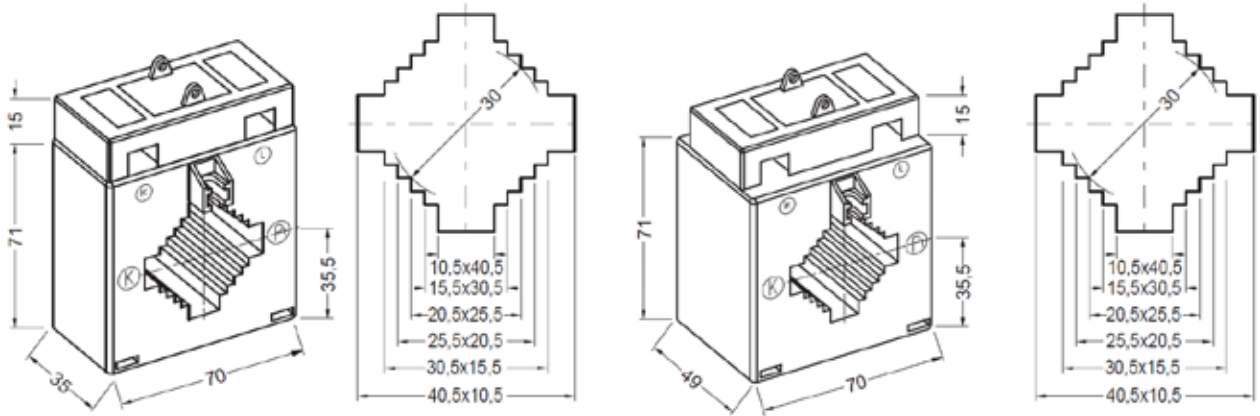


Dimensional drawings plug-in current transformers

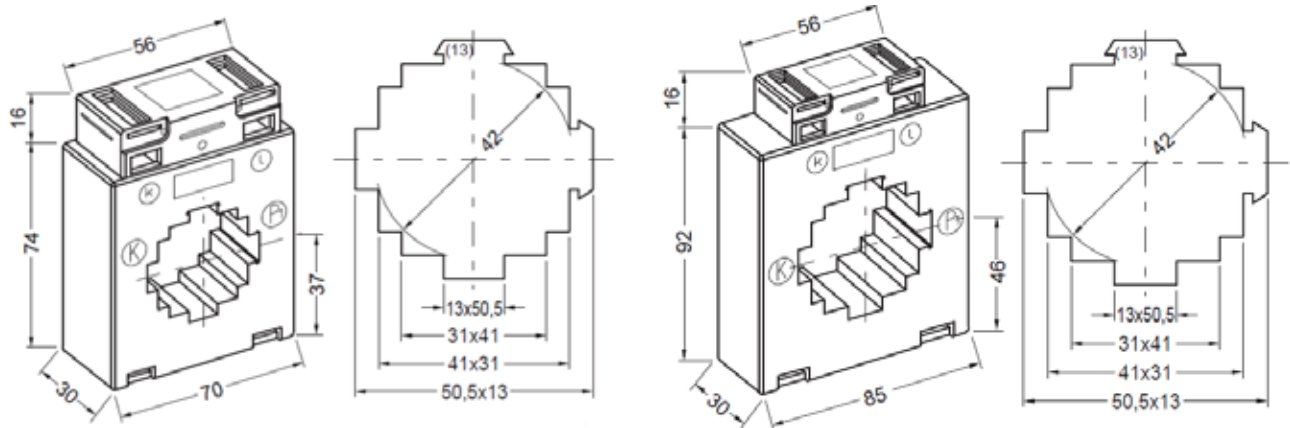
SWR 4010 **SWR-L 4010**



SWR-K 4010 **SWR-S 4010**



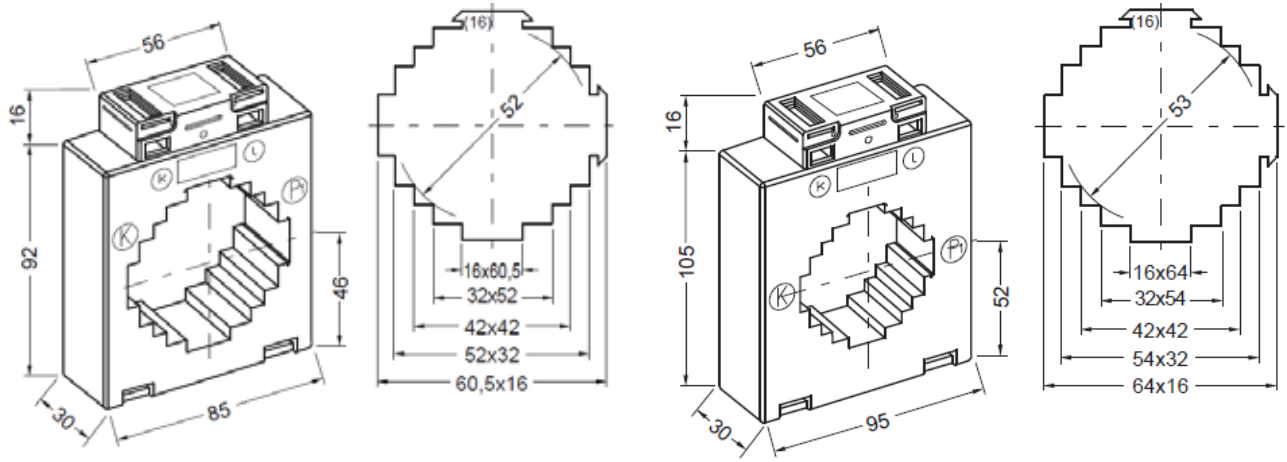
SWR-S 5010 **SWR 5010**



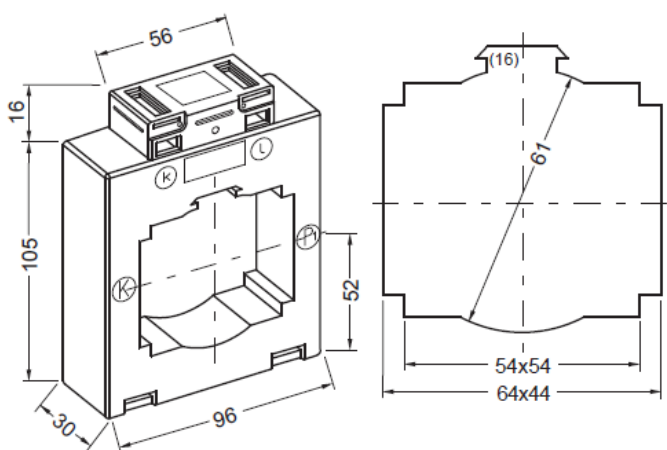


Dimensional drawings plug-in current transformers

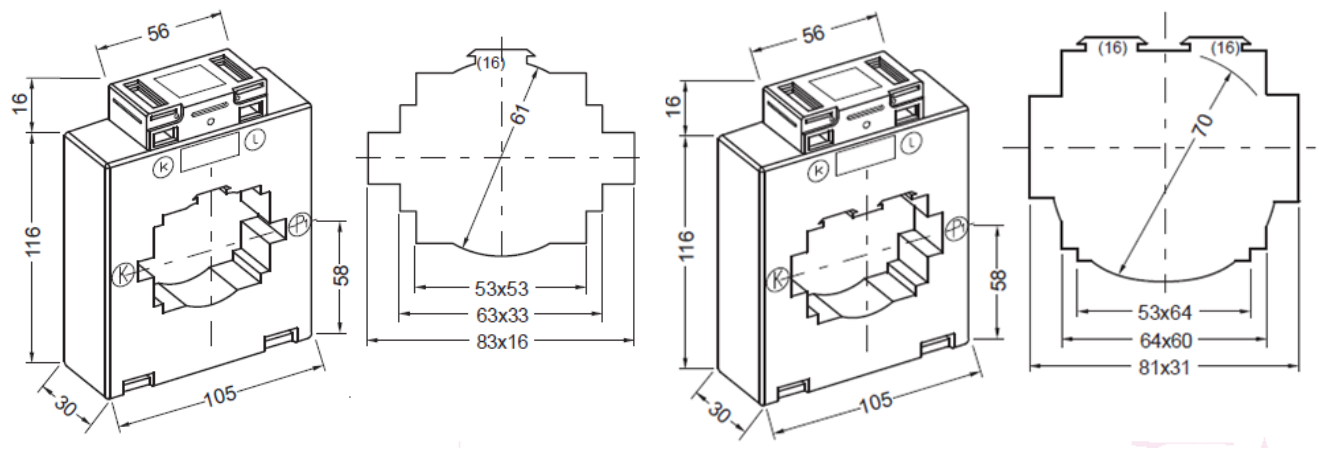
SWR-S 6010 SWR 6010



SWR 6040



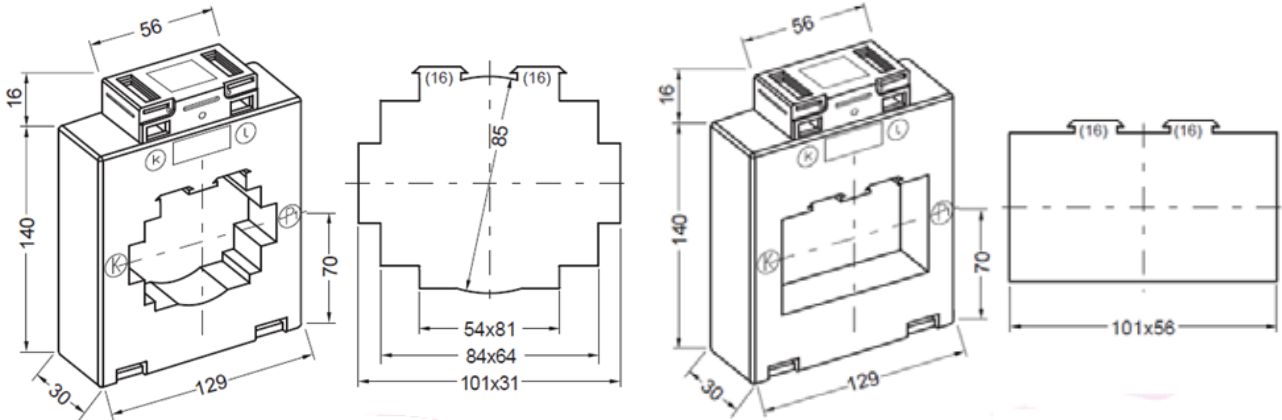
SWR 8010 SWR 8030



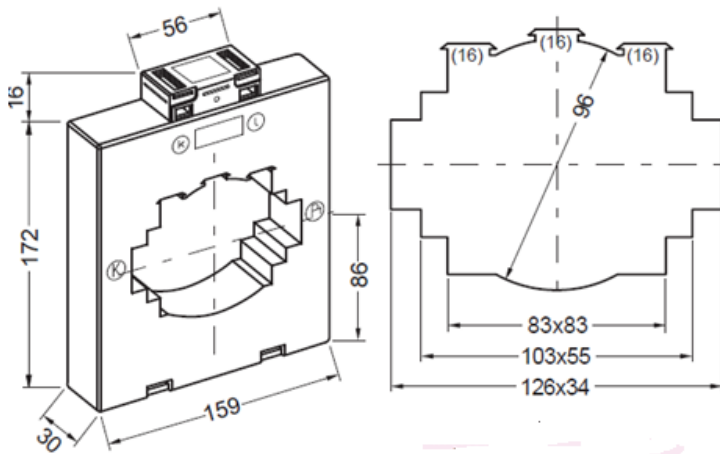


Dimensional drawings plug-in current transformers

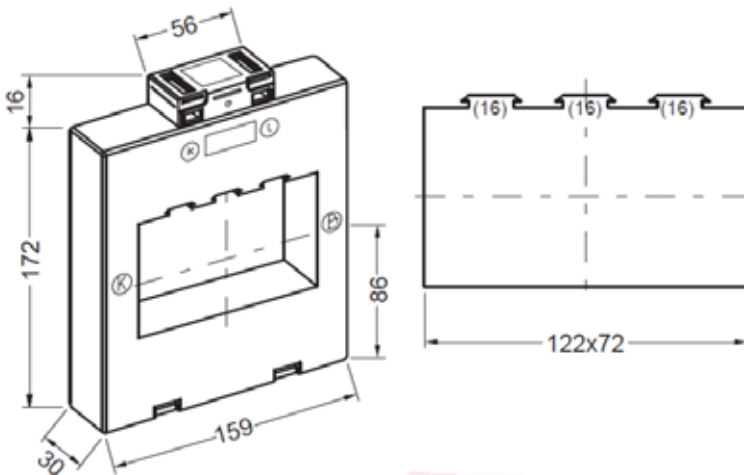
SWR 10030 SWR 10056



SWR 12030



SWR 12070



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

Panel meters digital

4

Panel meters analog

5

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers SW"R"-series

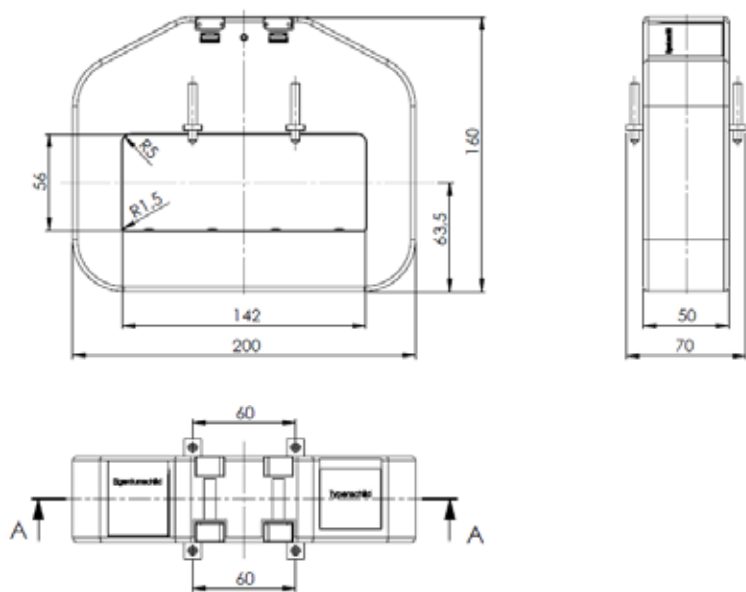
9 Shunts

10 Test apparatus

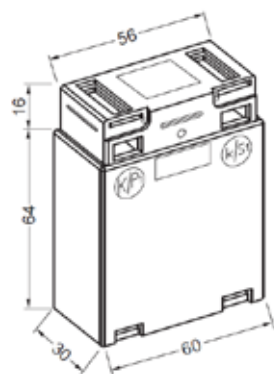


Dimensional drawings plug-in CT's, wound primary CT's, summary CT's

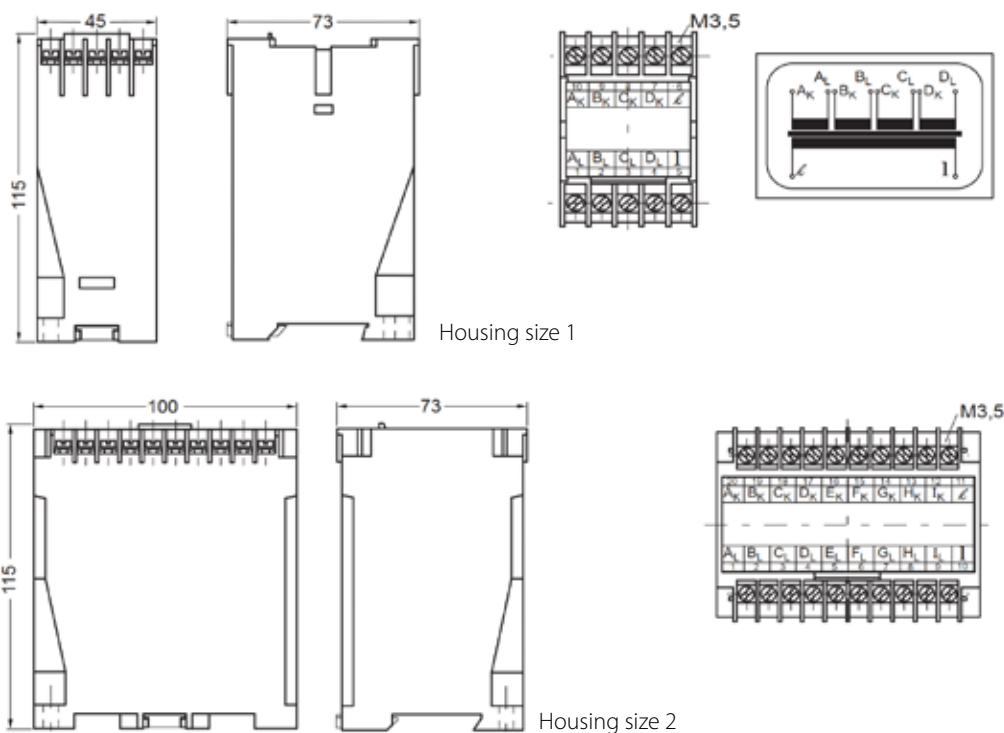
SWR 14050



WSR 60



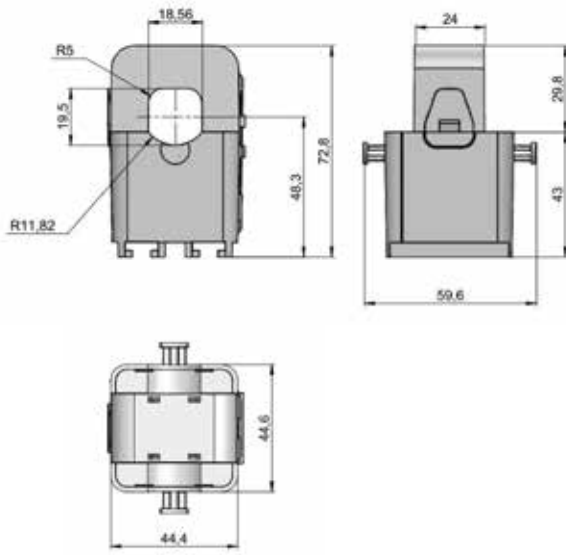
SSWR 2 bis 9



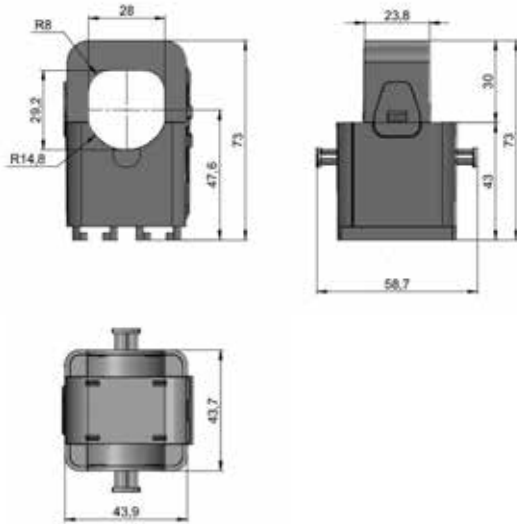


Dimensional drawings split core current transformers

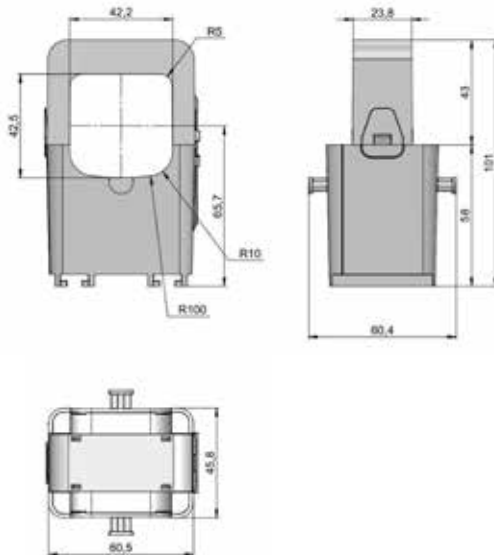
SWUR 18



SWUR 28



SWUR 42



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8 Current transformers SW"R"-series

9 Shunts

10 Test apparatus

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

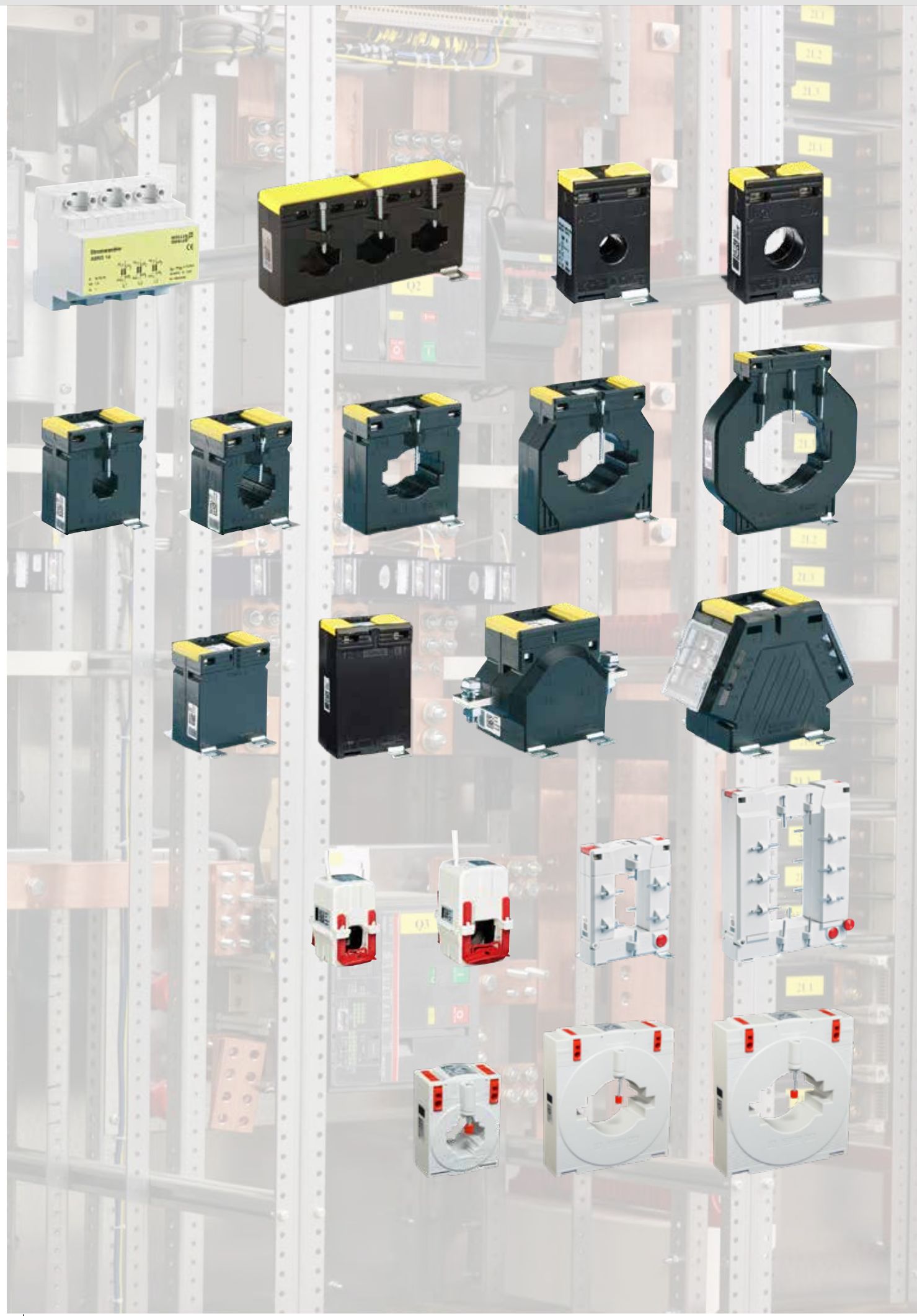
6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8.1 Current transformers

9 Shunts

10 Test apparatus



Current transformers

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1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

Panel meters analog

5 Meas. instruments for top hat rail mounting

6 Meas. instruments for universal measuring ring instruments

8.1 Current transformers SW-series

9 Shunts

10 Test apparatus



Three-phase CT sets

for round conductors Ø 13,5 mm / busbars 20 x 5 / 30 x 10 mm

ASRD 14 ASRD 205.37 / ARSD 310.37



Type ASRD 14

Width	105 mm
Depth	54 mm
Busbar size	-- mm
Round cond.	Ø 13,5 mm

Accessories incl. --

Weight approx. 300 g

Type ASRD 205.37

Width	115 mm
Depth	37 mm
Busbar size	20 x 5 mm
Round cond.	Ø 18 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 600 g

Dimensions page 310



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
3 x 50	1	X	X	-	-	-	-	-	-
3 x 60	1,25	X	X	-	-	-	-	-	-
3 x 75	1,5	X	X	-	-	-	-	-	-
3 x 80	1,5	X	X	-	-	-	-	-	-
3 x 100	1	-	-	-	-	X	X	-	-
	2,5	X	X	-	-	-	-	-	-
3 x 125	2,5	X	X	X	X	-	-	-	-
3 x 150	1,25	-	-	-	-	X	X	-	-
	2,5	X	X	X	X	-	-	-	-
	3,75	X	X	-	-	-	-	-	-
3 x 160	1,5	-	-	-	-	X	X	-	-
3 x 200	1,5	-	-	-	-	X	X	-	-
3 x 250	2,5	-	-	-	-	X	X	-	-

Accessories: see page 309



Dimensions page 310

Type ASRD 310.37

Width	150 mm
Depth	37 mm
Busbar size	30 x 10 mm
Round cond.	Ø 22 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 600 g



Types and variants

Primary current in A	VA	class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
3 x 250	2,5	X	X	-	-
3 x 300	3,75	X	X	-	-
3 x 400	5	X	X	-	-
3 x 500	5	X	X	-	-
3 x 600	5	X	X	-	-

Accessories: see page 309

- 1 Measuring transducers
- 2 Mains and limit monitoring
- 3 Energy meters
- 4 Panel meters digital
- 5 Panel meters analog
- 6 Meas. instruments for top hat rail mounting
- 7 Universal measuring instruments
- 8.1 Current transformers SW-series
- 9 Shunts
- 10 Test apparatus



Tube unit current transformers

for round conductors up to 14 / 21 mm

RSW 14 / RSW 21



Dimensions
page 311



Types and variants

Type RSW 14

Width	45 mm
Depth	30 mm
Busbar size	--
Round cond.	Ø 14 mm
Accessories incl.	foot fastening brackets busbar fixing material secondary terminal cover
Weight	approx. 200 g

suitable for integrated installation in Slimline switchable fuse rails size XR00

Type RSW 21

Width	45 mm
Depth	30 mm
Busbar size	-- mm
Round cond.	Ø 21 mm
Accessories incl.	foot fastening brackets busbar fixing material secondary terminal cover
Weight	approx. 200 g

suitable for integrated installation in Slimline switchable fuse rails size XR00/1

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
40	1	X	X	-	-	-	-	-	-
50	1	X	X	-	-	X	X	-	-
	1,5	X	X	-	-	-	-	-	-
60	1	-	-	-	-	X	X	-	-
	1,25	-	-	-	-	X	X	-	-
	1,5	X	X	-	-	-	-	-	-
75	1,25	-	-	-	-	X	X	-	-
	1,5	X	X	-	-	X	X	-	-
80	1,25	-	-	-	-	X	X	-	-
	1,5	-	-	-	-	X	X	-	-
100	1,5	-	-	-	-	X	X	X	X
	2,5	X	X	-	-	X	X	-	-
125	1,5	-	-	-	-	X	X	X	X
	2,5	X	X	-	-	X	X	-	-
150	1,5	-	-	-	-	X	X	X	X
	2,5	X	X	-	-	X	X	X	X
	3,75	-	-	-	-	X	X	-	-
200	1,5	-	-	-	-	X	X	X	X
	2,5	-	-	-	-	X	X	X	X
	3,75	-	-	-	-	X	X	-	-
250	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	-	-
300	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	-	-

Accessories: see page 309



Plug-in current transformers

for busbars 20 x 10 mm

SW-S 2010 / SW 2010

Type SW-S 2010

Width	60 mm
Depth	30 / 48 mm
Busbar size	20 x 10 mm
Round cond.	Ø 19,2 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 450 g
Special design in class 0,25 and calibrated CTs on request.

Type SW 2010

Width	70 mm
Depth	40 / 58 mm
Busbar size	20 x 10 mm
Round cond.	Ø 20 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 500 g



Dimensions
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Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
40	1,5	-	-	-	-	X	X	-	-
50	1	X	X	-	-	-	-	-	-
	1,5	-	-	-	-	X	X	X	X
	2,5	-	-	-	-	-	X	-	-
60	1	X	X	-	-	-	-	-	-
	1,5	X	X	-	-	X	X	X	X
	2,5	-	-	-	-	X	X	-	-
75	1,5	X	X	-	-	-	-	-	-
	2,5	X	X	-	-	X	X	X	X
	3,75	-	-	-	-	X	X	-	-
80	1,5	X	X	-	-	-	-	-	-
	2,5	X	X	-	-	X	X	X	X
	3,75	-	-	-	-	X	X	-	-
100	1,5	X	X	X	X	-	-	-	-
	2,5	X	X	X	X	X	X	X	X
	5	-	-	-	-	X	X	-	-
125	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	X	X
150	2,5	X	X	X	X	X	X	X	X
	5	X	X	-	-	X	X	X	X
200	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	10	X	X	-	-	X	X	-	-
250	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
300	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
400	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
500	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X

Accessories: see page 309

- 1 Measuring transducers
- 2 Mains and limit monitoring
- 3 Energy meters
- 4 Panel meters digital
- 5 Panel meters analog
- 6 Meas. instruments for top hat rail mounting
- 7 Universal measurement instruments
- 8.1 Current transformers SW-series
- 9 Shunts
- 10 Test apparatus



Plug-in current transformers

for busbars PL 30 x 10 mm

SW-S 3010 / SW 3010

Type SW-S 3010

Width	60 mm
Depth	30 / 48 mm
Busbar size	30 x 10 mm
Round cond.	Ø 26 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 300 g
Special design in class 0,25 and calibrated CTs on request.

Type SW 3010

Width	60 mm
Depth	40 / 58 mm
Busbar size	30 x 10 mm
Round cond.	Ø 28 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 350 g
Special design in class 0,25 and calibrated CTs on request.

Dimensions
page 312/313



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
50	1	X	X	-	-	-	-	-	-
	1,25	-	-	-	-	X	X	-	-
	1,5	-	-	-	-	X	-	-	-
60	1	X	X	-	-	-	-	-	-
	1,25	-	-	-	-	X	X	-	-
	1,5	-	-	-	-	X	X	-	-
75	1	X	X	-	-	-	-	-	-
	1,5	X	X	-	-	X	X	-	-
	2,5	X	X	-	-	X	X	-	-
80	1,5	X	X	-	-	X	X	-	-
	2,5	X	X	-	-	X	X	-	-
	3,75	-	-	-	-	X	X	-	-
100	1,5	X	X	X	X	-	-	X	X
	2,5	X	X	X	X	X	X	X	X
	3,75	-	-	-	-	X	X	-	-
150	1,5	X	X	X	X	-	-	-	-
	2,5	X	X	X	X	X	X	X	X
	5	-	-	-	-	X	X	X	-
200	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	-	X	X	-	X
	7,5	-	-	-	-	X	X	-	-
250	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	-	-	-	-	X	X	-	-
300	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	-	-	-	-	X	X	X	X
400	2,5	X	X	X	X	X	X	X	X
	5	X	X	-	X	X	X	X	X
	10	X	X	-	-	X	X	X	X
500	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
600	5	X	X	X	X	X	X	X	X
	10	X	X	-	X	X	X	X	X
	15	X	X	-	-	X	X	X	X
750	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	-	-	X	X	X	X

Accessories: see page 309



Plug-in current transformers

for busbars 30 x 10 mm

SW-L 3010 / SW-K 3010



Dimensions
page 313

Type SW-L 3010

Width	60 mm
Depth	50 / 68 mm
Busbar size	30 x 10 mm
Round cond.	Ø 28 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 400 g
Special design as calibrated CTs on request.

Type SW-K 3010

Width	50 mm
Depth	50 / 68 mm
Busbar size	30 x 10 mm
Round cond.	Ø 28 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 400 g



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
40	1	X	X	-	-	-	-	-	-
50	1,5	X	X	-	-	-	-	-	-
60	1	-	-	-	-	X	X	-	-
	1,5	X	X	-	-	-	-	-	-
	2,5	X	X	-	-	-	-	-	-
75	1,25	-	-	-	-	X	X	-	-
	1,5	X	X	X	X	-	-	-	-
	2,5	X	X	X	X	-	-	-	-
80	1,25	-	-	-	-	X	X	-	-
	1,5	X	X	X	X	-	-	-	-
	2,5	X	X	X	X	-	-	-	-
100	1,5	-	-	X	X	X	X	-	-
	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	-	-	-	-
125	1,5	-	-	-	-	X	X	-	X
	2,5	-	-	-	-	X	X	-	-
150	2,5	-	-	X	X	X	X	-	-
	5	X	X	X	X	-	-	-	-
200	2,5	-	-	X	X	X	X	X	X
	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
250	2,5	-	-	-	-	X	X	X	X
	5	X	X	X	X	-	X	-	-
	10	X	X	X	X	-	-	-	-
300	2,5	-	-	-	-	X	X	X	X
	5	X	X	X	X	X	X	-	-
	10	X	X	X	X	-	-	-	-
	15	X	X	X	X	-	-	-	-
400	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	-	-	-	-
	15	X	X	-	X	-	-	-	-
500	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	-	-	-	-
	15	X	X	X	X	-	-	-	-
600	10	X	X	X	X	-	-	-	-
	15	X	X	X	X	-	-	-	-
750	10	X	X	X	X	-	-	-	-
	15	X	X	X	X	-	-	-	-

Accessories: see page 309

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measurement instruments

8.1 Current transformers SW-series

9 Shunts

10 Test apparatus



Plug-in current transformers

for busbars PL 40 x 10 / 40 x 12 mm

SW-S 4010 / SW 4010

Type SW-S 4010

Width	60 mm
Depth	30 / 48 mm
Busbar size	40 x 12 / 32 x 18 mm
Round cond.	Ø 26 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 300 g

Type SW 4010

Width	70 mm
Depth	40 / 58 mm
Busbar size	40x10 / 2x30x5 mm
Round cond.	Ø 32 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 370 g
Special design in class 0,25 and calibrated CTs on request.

Dimensions
page 314

Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
50	1,5	-	-	-	-	X	X	-	-
60	1,5	-	-	-	-	X	X	-	-
75	1,5	-	-	-	-	X	X	-	-
80	2,5	-	-	-	-	X	X	-	-
100	1,5	X	X	-	-	X	X	X	X
	2,5	-	-	-	-	X	X	X	X
150	1,5	X	X	-	-	X	X	X	X
	2,5	X	X	-	-	X	X	X	X
	5	-	-	-	-	X	X	X	X
200	2,5	X	X	-	-	X	X	X	X
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	-	-
250	2,5	X	X	-	-	X	X	X	X
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	-	-
300	2,5	X	X	-	-	X	X	X	X
	5	X	X	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
400	2,5	X	-	-	-	X	X	X	X
	5	X	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
500	5	X	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
600	5	X	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	-	-
750	5	X	-	-	-	X	X	X	X
	10	X	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	-	X
800	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	-	-
1000	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X

Accessories: see page 309



Plug-in current transformers

for busbars PL 40 x 10 mm

SW-L 4010

Type SW-L 4010

Width	70 mm
Depth	50 / 68 mm
Busbar size	40x10 / 2x30x5 mm
Round cond.	Ø 32 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 450 g
Special design as calibrated CTs on request.



Dimensions
page 314



Types and variants

Primary current in A	VA	class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
60	1,5	X	X	-	-
75	1,5	X	X	-	-
	2,5	X	X	-	-
80	1,5	X	X	-	-
	2,5	X	X	-	-
100	2,5	X	X	-	-
	3,75	X	X	-	-
150	5	X	X	-	-
	7,5	X	X	-	-
200	5	X	X	X	X
	10	X	X	-	-
250	10	X	X	X	X
	15	X	X	-	-
300	10	X	X	X	X
	15	X	X	-	-
400	10	X	X	X	X
	15	X	X	X	X
500	10	X	X	X	X
	15	X	X	X	X
600	10	X	X	X	X
	15	X	X	X	X
750	10	X	X	X	X
	15	X	X	X	X
800	10	X	X	X	X
	15	X	X	-	-
1000	10	X	X	X	X
	15	X	X	-	-

Accessories: see page 309

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8.1 Current transformers SW-series

9 Shunts

10 Test apparatus



Plug-in current transformers

for busbars 50 x 12 / 2 x 50 x 10 / 60 x 10 mm

SW-S 5010 / SW 5010



Dimensions page 315

Type SW-S 5010

Width	85 mm
Depth	40 / 58 mm
Busbar size	50x12 / 2x40x10 mm
Round cond.	Ø 44 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 450 g
Special design in class 0,25 and calibrated CTs on request.

Type SW 5010

Width	85 mm
Depth	40 / 58 mm
Busbar size	60x10/30x40/2x50x10 mm
Round cond.	Ø 44 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 450 g



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
100	1,5	X	X	-	-	-	-	-	-
150	1,5	X	X	X	X	-	-	-	-
	2,5	X	X	X	X	-	-	-	-
200	2,5	X	X	X	X	X	X	-	-
	5	X	X	X	X	-	-	-	-
250	2,5	-	-	-	-	X	X	-	-
	5	X	X	X	X	X	X	-	-
	10	X	X	-	-	-	-	-	-
300	2,5	-	-	X	X	X	X	X	X
	5	X	X	X	X	X	X	-	-
	10	X	X	-	-	-	-	-	-
400	2,5	-	-	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	-	-
500	5	-	-	X	X	X	X	X	X
	10	X	X	X	X	X	X	-	-
	15	X	X	X	-	X	X	-	-
600	5	-	-	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
750	5	-	-	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
800	5	-	-	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
1000	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	-	-	-	-	X	X	-	-
1200	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	-	-	X	X	-	-
1250	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	-	-	-	-	-	-

Accessories: see page 309



Plug-in current transformers

for busbars PL 60 x 13 / 60 x 30 mm

SW 6010 / SW 6030



Dimensions
page 315/316

Type SW 6010

Width	95 mm
Depth	40 / 58 mm
Busbar size	63x10 / 2x50x10 mm
Round cond.	Ø 44 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 450 g
Special design in class 0,25 and calibrated CTs on request.

Type SW 6030

Width	95 mm
Depth	40 / 58 mm
Busbar size	60x30 / 50x40 mm
Round cond.	Ø 44 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 450 g



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
200	1,5	X	X	X	X	-	-	-	-
	2,5	X	X	X	X	-	-	-	-
250	2,5	X	X	X	X	-	-	-	-
	5	X	X	-	-	-	-	-	-
300	1,5	-	-	-	-	X	X	X	X
	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	-	-	-	-
400	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	-	-	-	-
500	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	-	-
	15	X	X	-	-	-	-	-	-
600	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
750	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
800	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
1000	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
1200	5	-	-	-	-	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	-	-	-	-
1250	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	-	-	-	-
1500	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	-	-	-	-
1600	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	-	-	-	-

Accessories: see page 309

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8.1 Current transformers SW-series

9 Shunts

10 Test apparatus



Plug-in current transformers

for busbars PL 80 x 10 / 100 x 10 mm

SW 8010 / SW 10010



Dimensions
page 316/317

Type SW 8010

Width	120 mm
Depth	40 / 58 mm
Busbar size	80x10/60x30/2x60x10 mm
Round cond.	Ø 55 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 500 g
Special design in class 0,25 and calibrated CTs on request.

Type SW 10010

Width	130 mm
Depth	40 / 58 mm
Busbar size	100x10/2x80x10 mm
Round cond.	Ø 70 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 500 g



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
400	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	-	-	-	-
	10	X	X	-	-	-	-	-	-
500	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	-	-
600	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	-	-
750	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	-	-	-	-
800	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
1000	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
1200	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
	30	-	-	-	-	X	X	-	-
1250	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
	30	-	-	-	-	X	X	-	-
1500	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	-	-	X	X	-	-
1600	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	-	-	X	X	-	-
2000	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	-	-	X	X	X	X

Accessories: see page 309



Plug-in current transformers

for busbars PL 100 x 55 / 2 x 100 x 10 mm

SW 10055 / SW 20010



Dimensions
page 317/318

Type SW 10055

Width	129 mm
Depth	60 / 78 mm
Busbar size	100 x 55 mm
Round cond.	Ø 55 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 1000 g
Special design in class 0,25 and calibrated CTs on request.

Type SW 20010

Width	172 mm
Depth	30 / 48 mm
Busbar size	2x100x10 / 3x80x10 mm
Round cond.	Ø 85 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 750 g



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
600	5	X	X	X	X	-	-	-	-
	10	X	X	-	-	-	-	-	-
750	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	-	-
800	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	X	X	X	X
	15	-	-	-	-	X	X	-	-
1000	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
1200	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
1250	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
1500	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	X	X	-	-
1600	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	X	X	-	-
2000	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	X	X	X	X
2500	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	X	X	X	X
3000	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	X	X	X	X

Accessories: see page 309

- 1 Measuring transducers
- 2 Mains and limit monitoring
- 3 Energy meters
- 4 Panel meters digital
- 5 Panel meters analog
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Plug-in current transformers

for busbars PL 123 x 30 / 128 x 38 mm

SW 12330 / SW 12838

Dimensions
page 318/319

Type SW 12330

Width	172 mm
Depth	30 / 48 mm
Busbar size	123x30 / 3x100x10 mm
Round cond.	Ø 100 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 800 g
Special design in class 0,2S and calibrated CTs on request.

Type SW 12838

Width	100 mm
Depth	40 / 58 mm
Busbar size	128 x 38 mm
Round cond.	-- mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 900 g

Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
400	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	-	-
500	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	-	-
600	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	-	-
750	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	-	-
800	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	-	-
1000	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
1200	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
1250	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	-	-
1500	10	X	X	X	X	-	-	-	-
	15	X	X	X	X	X	X	X	X
	30	-	-	-	-	X	X	-	-
1600	10	X	-	-	-	-	-	-	-
	15	X	-	-	-	-	-	-	-
1800	10	X	X	X	X	-	-	-	-
	15	X	X	X	X	-	-	-	-
2000	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	-	-	-	-
2500	15	X	X	X	X	X	X	X	X
	30	X	X	X	X	-	-	-	-
3000	15	X	X	X	X	-	-	-	-
	30	X	X	X	X	-	-	-	-

Accessories: see page 309



Wound primary CT

for direct connection

WSWK / WSWK-N



Dimensions
page 320



Types and variants

Type WSKW

Width	70 mm
Depth	40 / 45 mm
Busbar size	-- mm
Round cond.	-- mm
Accessories incl.	foot fastening brackets secondary terminal cover
Weight	approx. 440 g

Type WSKW-N

Width	70 mm
Depth	50 / 55 mm
Busbar size	-- mm
Round cond.	-- mm
Accessories incl.	foot fastening brackets secondary terminal cover
Weight	approx. 500 g

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
1	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
2,5	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
5	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
10	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
15	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
20	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
25	2,5	X	X	X	X	-	-	-	-
	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
30	2,5	X	X	X	X	X	X	X	X
	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
40	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
50	2,5	-	-	-	-	X	X	X	X
	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X

Accessories: see page 309



Wound primary CTs

for direct connection

WSWS



Dimensions
page 320

Type WSWS

Width	70 mm (with busbar 136 mm)
Depth	60 mm
Busbar size	-- mm
Round cond.	-- mm

Accessories incl. foot fastening brackets
secondary terminal cover
terminal screws busbar

Weight approx. 580 g



Types and variants

Primary current in A	VA	class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
25	5	X	X	X	X
	10	X	X	X	X
	15	-	X	-	-
30	5	X	X	X	X
	10	X	X	X	X
	15	X	X	-	-
40	5	X	X	X	X
	10	X	X	X	X
	15	X	X	-	-
50	5	X	X	X	X
	10	X	X	X	X
	15	X	X	-	-
60	5	X	X	X	X
	10	X	X	X	X
	15	X	X	-	-
75	5	X	X	X	X
	10	X	X	X	X
	15	X	X	-	-
80	5	X	X	X	X
	10	X	X	X	X
	15	X	X	-	-
100	5	X	X	X	X
	10	X	X	X	X
	15	X	X	-	-

Accessories: see page 309

1 Measuring transducers

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General description summary current transformers



Application

Summary current transformers are suitable for the summation of several synchronized alternating currents with similar phases but with differing load phase shifts. It is also possible to have the summation of currents with varied nominal voltages of similar phase positions. These measurements cannot be used for tariff applications, as the existing voltage differences are recorded as errors.

With the counter connection of the main transformer to the summation current transformer, it is possible to receive secondary currents which are proportional to the differences of the primary input currents. The built-in technical know-how enables the summary current transformers to add secondary currents of varying nominal transmissions from the main transformer.

Connection of main transformers with similar transmission ratios

It is irrelevant for the main transformers with similar nominal transmission ratios, to which primary circuit of the summary current transformer the connection is made.

Connection of main transformers with different transmission ratios

With main transformers of different nominal transmission ratios, care must be taken to adhere to the assigned connection to the terminals of the summary current transformers. Is the current flow in the main transformer interrupted, the secondary circuit of the main transformer must neither be short-circuited nor be connected to the summary current transformer, or to the main transformer.

Summary current transformers with unallocated primary circuits must remain open for a later connection to an additional main transformer. The secondary output current of the summary current transformer is in this instance lower than the secondary nominal current of the summary current transformer by a quantity equal to the ratio of the primary nominal current of this "missing" main transformer and the sum of all the primary nominal currents of the main transformer.

A measuring device with a measuring range equal to the secondary nominal current of the total current transformer can be used to display the „total current“.

The ratio of the primary current of a main transformer to the sum of the primary currents of all main current transformers the ratio must not exceed 1:8.



Calculation and interpretation of summary current transformers

Example:

Actual situation:	3 transmission ratios	1000/5 A 800/5 A <u>600/5 A</u> 2400/5 A
Burden:	1 current meter 1 power recorder	
Locking for:	Summary CT and the VA power of the individual main transformers	
Required active performance of the summary current transformer:	Current meter	1,5 VA
	Power recorder	7,0 VA
	Measurement line loss	1,5 VA
	Consumption summary CT	<u>4,0 VA</u>
	Interim result	14,00 VA

The individual transformer must provide its VA share from this 14.0 VA corresponding to its ratio to the "total transmission". Consideration must also be given to the respective power loss between the main transformer and the summary transformer plus other possible losses.

1. Main transformer 1000/5 A	<u>1000</u> 2400 x 14,0 = 5,83 VA + additional possible losses
2. Main transformer 800/5 A	<u>800</u> 2400 x 14,0 = 4,67 VA + additional possible losses
3. Main transformer 600/5 A	<u>600</u> 2400 x 14,0 = 3,50 VA + additional possible losses

The VA values of the main transformers are to be rounded up to the corresponding VA values in our charts.



Summary current transformers

for 2 to 8 primary circuits

SSW 2 to SSW 8

Type SSW 2 to 3

Width	127 mm
Depth	57 mm
No. of inputs	2 or 3

Accessories incl. foot fastening brackets
secondary terminal cover
primary terminal cover

Weight approx. 550 g

If different main circuit inputs are use, these must be specified when ordering!

Type SSW 4 bis 8

Wandlerbreite	156 mm
Wandlertiefe	65 mm
Primärkreise	4; 5; 6; 7; 8

Zubehör inkl. Fußbefestigungswinkel
Sekundärklemmen-abdeckung
Primärklemmen-abdeckung

Gewicht ca. 750 g

Bei unterschiedlichen Hauptwandler-Übersetzungen müssen diese bei Bestellung unbedingt angegeben werden!

Dimensions page 321

Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
2 x 1	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
	15	X	X	X	X	-	-	-	-
2 x 5	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
	15	X	X	X	X	-	-	-	-
3 x 1	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
	15	X	X	X	X	-	-	-	-
3 x 5	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	-	-	-	-
	15	X	X	X	X	-	-	-	-
4 x 1	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
4 x 5	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
5 x 1	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
5 x 5	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
6 x 1	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
	30	-	-	-	-	X	X	-	-
6 x 5	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
	30	-	-	-	-	X	X	-	-
7 x 1	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
	30	-	-	-	-	X	X	-	-
7 x 5	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
	30	-	-	-	-	X	X	-	-
8 x 1	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	-
	30	-	-	-	-	X	X	-	-
8 x 5	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
	30	-	-	-	-	X	X	-	-

Accessories: see page 309

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8.1 Current transformers SW-series

9 Shunts

10 Test apparatus



Split core current transformers

for round conductors up to 18,5 / 32,5 mm

SWU 18 / SWU 32



Dimensions
page 322

Type SWU 18

Width	41,6 mm
Depth	55 / 68 mm
Busbar size	--
Round cond.	Ø 18,5 mm

Accessories incl. fixing brackets
connection cable 2x0,75²,
length 2,5 m

Weight approx. 150 g

Type SWU 32

Width	59,2 mm
Depth	75 / 90 mm
Busbar size	--
Round cond.	Ø 32,5 mm

Accessories incl. fixing brackets
connection cable 2x0,75²,
length 2,5 m

Weight approx. 220 g



Types and variants

Primary current in A	VA	class 3		class 1		class 3		class 1	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
50	1	-	X	-	-	-	-	-	-
75	1	-	X	-	-	-	-	-	-
100	1,25	-	X	-	-	-	-	-	-
	1,5	-	-	-	-	X	-	-	-
	2,5	-	-	-	-	-	X	-	-
125	1,5	-	X	-	-	-	-	-	-
	2,5	-	-	-	-	X	-	-	-
	3	-	-	-	-	-	X	-	-
150	2	-	X	-	-	-	-	-	-
	3	-	-	-	-	X	X	-	-
200	1	-	-	-	X	-	-	-	-
	3	-	X	-	-	X	-	-	-
	5	-	-	-	-	-	X	-	-
250	1,5	-	-	-	X	-	-	-	-
	3	-	-	-	-	X	-	-	-
	4	-	X	-	-	-	-	-	-
	5	-	-	-	-	-	X	-	-
300	2,5	-	-	-	-	-	-	X	-
	5	-	-	-	-	-	-	-	X
400	5	-	-	-	-	-	-	X	X
500	5	-	-	-	-	-	-	X	X
600	5	-	-	-	-	-	-	X	X



Split core current transformers

for busbars 20 x 30 / 50 x 80 mm

SWU 2030 / SWU 5080



Dimensions
page 323

Type SWU 2030

Width	93 mm
Depth	34 / 58 mm
Busbar size	20 x 30 mm
Round cond.	Ø 20 mm
Accessories incl.	foot fastening brackets busbar fixing material secondary terminal cover
Weight	approx. 850 g

Type SWU 5080

Width	125 mm
Depth	34 / 58 mm
Busbar size	50 x 80 mm
Round cond.	Ø 50 mm
Accessories incl.	foot fastening brackets busbar fixing material secondary terminal cover
Weight	approx. 1080 g



Types and variants

Primary current in A	VA	class 3		class 1		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
100	1,25	X	X	-	-	-	-	-	-
150	1,5	X	X	-	-	-	-	-	-
200	2,5	X	X	-	-	-	-	-	-
250	1,5	-	-	X	X	X	X	-	-
300	2,5	-	-	-	-	X	X	-	-
400	3,75	-	-	X	X	-	-	-	-
	1	-	-	-	-	-	-	X	X
	2,5	-	-	-	-	X	X	-	-
500	5	X	X	-	-	-	-	-	-
	2,5	-	-	-	-	-	-	X	X
600	5	-	-	-	-	X	X	-	-
	2,5	-	-	-	-	-	-	X	X
750	5	-	-	-	-	X	X	-	-
	2,5	-	-	-	-	-	-	X	X
800	5	-	-	-	-	X	X	-	-
	2,5	-	-	-	-	-	-	X	X
1000	7,5	-	-	-	-	X	X	-	-
	5	-	-	-	-	-	-	X	X
	10	-	-	-	-	X	X	-	-

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8.1 Current transformers SW-series

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Split core current transformers

for busbars PL 80 x 120 / 80 x 160 mm

SWU 80120 / SWU 80160

Type SWU 80120

Width	155 mm
Depth	34 / 58 mm
Busbar size	80 x 120 mm
Round cond.	Ø 80 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 1320 g

Type SWU 80160

Width	195 mm
Depth	34 / 58 mm
Busbar size	80 x 160 mm
Round cond.	Ø 80 mm

Accessories incl. foot fastening brackets
busbar fixing material
secondary terminal cover

Weight approx. 1350 g

Dimensions
page 324



Types and variants

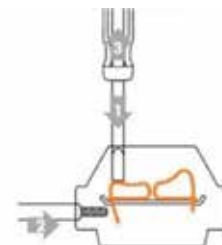
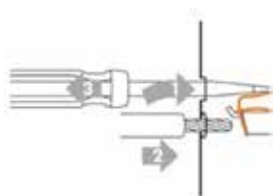
Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
250	1,5	X	X	-	-	-	-	-	-
300	2,5	X	X	-	-	-	-	-	-
400	2,5	X	X	-	-	-	-	-	-
500	2,5	-	-	X	X	-	-	-	-
	5	X	X	-	-	-	-	-	-
600	2,5	-	-	X	X	-	-	-	-
	5	X	X	-	-	-	-	-	-
750	2,5	-	-	X	X	-	-	-	-
	5	X	X	-	-	-	-	-	-
800	2,5	-	-	X	X	-	-	-	-
	7,5	X	X	-	-	-	-	-	-
1000	5	-	-	X	X	-	-	-	-
	10	X	X	-	-	X	X	X	X
	15	-	-	-	-	X	X	-	-
1200	5	-	-	X	X	-	-	-	-
	10	X	X	-	-	X	X	X	X
	15	-	-	-	-	X	X	-	-
1250	7,5	-	-	X	X	-	-	-	-
	15	X	X	-	-	-	-	-	-
1500	7,5	-	-	X	X	-	-	-	-
	10	-	-	-	-	X	X	X	X
	15	X	X	-	-	X	X	X	X
1600	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
2000	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
2500	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X
3000	15	-	-	-	-	X	X	X	X
	30	-	-	-	-	X	X	-	-
4000	15	-	-	-	-	X	X	X	X
	30	-	-	-	-	X	X	X	X
5000	15	-	-	-	-	X	X	X	X
	30	-	-	-	-	X	X	X	X

Current transformers for industrial use with screwless connection technology „Cage Clamp“



Application

The current transformer series are characterized by their screwless connection technology with spring-loaded terminals „Cage Clamp“. This innovative connection technology enables the secondary lines to be connected directly to the secondary terminals both from the front and from above. Both solid and flexible cables up to a cross-section of 4 mm² can be connected directly without wire end sleeves. **The current transformers of the CSW type are UL-certified.**



With the „Quick-Fix“ quick fastenings, the current transformers can also be fixed to the primary cables or rails using screwless clamping technology.



Available series

The current transformers with screwless connection technology are available in the following series:

Type CSW	Standard plug-in current transformers For busbars 30 x 10 up to 100 x 10 mm Accuracy class 0,5 - 1 - (3)
Type ECTB	Standard plug-in current transformers with MID approval Extension of the type CSW For busbars 30 x 10 up to 100 x 10 mm Accuracy class 0,2S - 0,2 - 0,5S - 0,5 You can find detailed technical documents at www.mueller-ziegler.de
Type XCSW	Current transformers for power quality applications up to 20 kHz (description see page 31) High precision harmonic measurement up to 20 kHz For busbars 30 x 10 up to 100 x 10 mm Accuracy class 0,2S - 0,2 - 0,5S - 0,5 - 1 You can find detailed technical documents at www.mueller-ziegler.de

Technical data

General data	Standards	DIN EN 60044-1, DIN 42 600, IEC 185, DIN EN 61 010 part 1
	Max. operating voltage	1,2 kV, use in 690 V networks possible
	Test voltage	6 kV
	Rated frequency	50 / 60 Hz, XCSW up to 20 kHz
	Rated cont. thermal current I _{cth}	1,2 x I _N
	Rated dynamic current I _{dyn}	2,5 x I _{th}
	Connection	spring loaded terminals up to 4 mm ²
	UL-certified	Certification no. 20100426-E336996

Current transformers for power quality applications *up to 20 kHz* with screwless connection technology „Cage Clamp“ Type XCSW



Application / Description

New measuring requirements for inductive current transformers in the area of low voltage and changes in the generation and consumer structure require new ways of current measurement and transmission through current transformers. The current transformers of the XCSW series for power quality applications up to 20 kHz meet these requirements.

Over the last few years, the proportion of renewable energy has grown massively. Wind, biomass, photovoltaic and hydroelectric plants now make up approximately 30% of the energy mix. Unlike in conventional nuclear or coal-fired power stations, where all synchronous generators are used to produce electricity, here inverters or frequency converters are used. As such, it is not always possible to achieve a clean sine wave.

The distortions are caused by the switching semiconductor elements in the inverter. Harmonics generated in this way are whole multiples of the first harmonic and can extend far into the single-digit kilohertz range. The total harmonic distortion (THD) factor¹ specifies the undesirable distortion ratio of the 50 Hz sinusoidal oscillation and regularly reaches between 10 and 30%.

In addition to the harmonics produced by inverters on the generator side, there have also been changes on the consumer side in recent years. Non-linear consumers such as LED or energy-saving lamps are pushing linear ones, like traditional incandescent bulbs, out of our daily lives almost completely. Plug-in power supply units for mobile phones and laptops are no longer made from small transformers either, but from semiconductor circuits known as switched-mode power supplies. It would not be possible to create such small, light power supply units any other way. But these benefits are set against one big disadvantage: the current is drawn from the public grid not as a sinusoidal waveform, but in pulses. The figure below illustrates this:

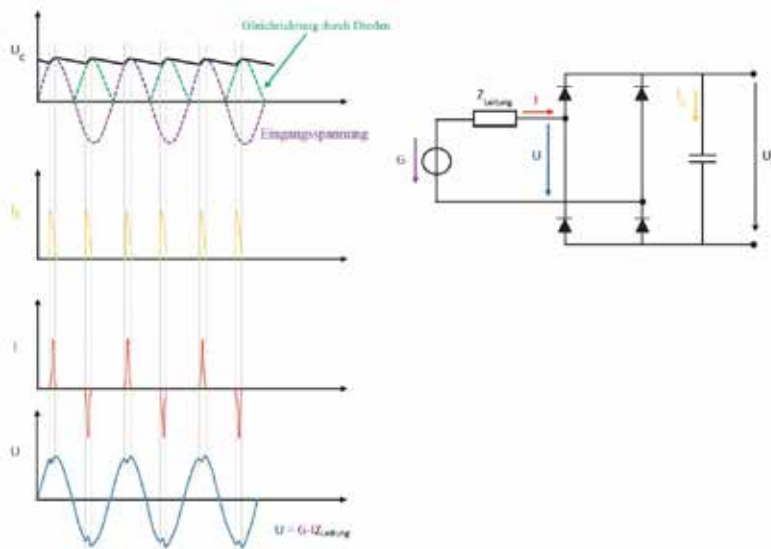


Figure: Bridge rectifier with pulsed current draw

The filter capacitor shown in the diagram not only smooths the required output voltage, it is also recharged in pulses by the rectifier diodes. These steep current peaks generate reactive power on the one hand, and harmonics on the other.

Grid operators are primarily interested in the economic effects of harmonics. When it comes to harmonic currents, the most important phenomena are as follows:

- Overloading of neutral conductors
- Overheating of transformers
- False tripping of circuit breakers / miniature circuit breakers
- Overstressing of power-factor correction capacitors
- Skin effects

The versions and dimensions of type XCSW are identical to type CSW. Detailed technical information, functional description and selection tables for the type XCSW current transformers can be found as PDF files for download on our website



Plug-in current transformers

for busbars 30 x 10 / 40 x 10 mm

CSW 31 / CSW 41

Type CSW 31

Width	60 mm
Depth	35 / 52 mm
Busbar size	30x10 / 25x12 mm
Round cond.	Ø 25,7 mm

Accessories incl. foot fastening brackets
busbar fixing material

Weight approx. 250 g
Special design as calibrated CTs on request.

Type CSW 41

Width	70 mm
Depth	35 / 52 mm
Busbar size	40x10 / 30x15 mm
Round cond.	Ø 31,8 mm

Accessories incl. foot fastening brackets
busbar fixing material

Weight approx. 280 g
Special design as calibrated CTs on request.

Dimensions
page 325



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
60	1,25	X	X	-	-	-	-	-	-
75	2,5	X	X	-	-	-	-	-	-
80	2,5	X	X	-	-	-	-	-	-
100	2,5	X	X	-	-	-	-	-	-
125	1,5	-	-	X	X	-	-	-	-
	2,5	X	X	-	-	X	X	-	-
150	2,5	-	-	X	X	X	X	-	-
	5	X	X	-	-	-	-	-	-
200	1,5	-	-	-	-	-	-	X	X
	2,5	-	-	X	X	-	-	-	-
	5	X	X	-	-	X	X	-	-
250	2,5	-	-	-	-	-	-	X	X
	5	X	X	X	X	X	X	-	-
300	2,5	-	-	-	-	-	-	X	X
	5	X	X	X	X	X	X	-	-
	10	X	X	-	-	-	-	-	-
400	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	-	-	-	-
500	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	-	-
600	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
750	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	-
800	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
1000	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X

Accessories: see page 309



Plug-in current transformers

for busbars 50 x 12 / 63 x 10 mm

CSW 51 / CSW 61

Type CSW 51

Width	85 mm
Depth	35 / 52 mm
Busbar size	50x12 / 40x30 mm
Round cond.	Ø 43,7 mm

Accessories incl. foot fastening brackets
busbar fixing material

Weight approx. 380 g
Special design as calibrated CTs on request.

Type CSW 61

Width	95 mm
Depth	35 / 52 mm
Busbar size	63x10 / 50x30 mm
Round cond.	Ø 43,7 mm

Accessories incl. foot fastening brackets
busbar fixing material

Weight approx. 420 g
Special design as calibrated CTs on request.

Dimensions
page 326



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A	net € sec. 5 A	net € sec. 1 A
100	1,25	X	X	-	-	-	-	-	-
125	2,5	X	X	-	-	-	-	-	-
150	2,5	X	X	-	-	-	-	-	-
200	1,5	-	-	X	X	-	-	-	-
	2,5	-	-	-	-	X	X	X	X
	5	X	X	-	-	-	-	-	-
250	2,5	-	-	X	X	-	-	X	X
	5	X	X	-	-	X	X	-	-
300	2,5	-	-	X	X	-	-	-	-
	5	X	X	-	-	X	X	X	X
400	5	X	X	X	X	X	X	X	X
	10	X	X	-	-	-	-	-	-
500	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	-	-	-	-
600	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	-	-	-	-
750	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
800	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
1000	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
1200	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
1250	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
1500	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X
1600	5	-	-	-	-	X	X	X	X
	10	-	-	-	-	X	X	X	X

Accessories: see page 309

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8.1 Current transformers SW-series

9 Shunts

10 Test apparatus



Plug-in current transformers

for busbars 80 x 10 / 100 x 10 mm

CSW 81 / CSW 101

Type CSW 81

Width	120 mm
Depth	35 / 52 mm
Busbar size	80x10 / 60x30 mm
Round cond.	Ø 54,7 mm

Accessories incl. foot fastening brackets
busbar fixing material

Weight approx. 480 g
Special design as calibrated CTs on request.

Type CSW 101

Width	130 mm
Depth	35 / 52 mm
Busbar size	100x10 / 80x30 mm
Round cond.	Ø 70 mm

Accessories incl. foot fastening brackets
busbar fixing material

Weight approx. 550 g
Special design as calibrated CTs on request.

Dimensions
page 327



Types and variants

Primary current in A	VA	class 1		class 0,5		class 1		class 0,5	
		net €	net €	net €	net €	net €	net €	net €	net €
		sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A	sec. 5 A	sec. 1 A
400	2,5	-	-	X	X	-	-	X	X
	5	X	X	-	-	X	X	-	-
500	2,5	-	-	X	X	-	-	-	-
	5	X	X	-	-	X	X	X	X
600	5	X	X	X	X	-	-	X	X
	10	-	-	-	-	X	X	-	-
750	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
800	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
1000	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
1200	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
1250	5	X	X	X	X	X	X	X	X
	10	X	X	X	X	X	X	X	X
1500	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	X	X	X	X
	15	-	-	-	-	X	X	X	X
1600	5	X	X	X	X	-	-	-	-
	10	X	X	X	X	X	X	X	X
	15	-	-	-	-	X	X	X	X
2000	10	X	X	X	X	X	X	X	X
	15	X	X	X	X	X	X	X	X
2500	10	-	-	-	-	X	X	X	X
	15	-	-	-	-	X	X	X	X

Accessories: see page 309

Accessories for current transformers

1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8.1 Current transformers SW-series

9 Shunts

10 Test apparatus

Snap-on mounting base

for mounting on top hat rail 35 mm (DIN EN 60715)



Variants

Version	for CT type	
A	SW 2010, SW-S 3010, SW-S 4010	X
B	SW 3010	X
C	SW-L 3010, SW-L 4010, WSWK-N	X
D	SW-S 2010, SW 4010, WSWK	X
E	RSW 14, RSW 21	X
L	ASRD 205.37, ASRD 310.37	X

Sealed shutters

for sealing the secondary terminals after connection



Variants

Version	for CT type	
A	SW 2010, SW-S 3010, SW-S 4010, SW 20010, SW 12330	X
B	SW-S 2010, SW 3010, SW-L 3010, SW 4010, SW-L 4010, WSWK, WSWK-N, WSWs, SSW	X
C	SW-S 5010, SW 5010, SW 6010, SW 6030, SW 8010, SW 10010, SW 10055, SW 12838	X
G	CSW 31, CSW 41	X
H	CSW 51	X
J	CSW 61, CSW 81, CSW 101	X

Quick fix fastenings

for mounting CT type CSW on the busbars



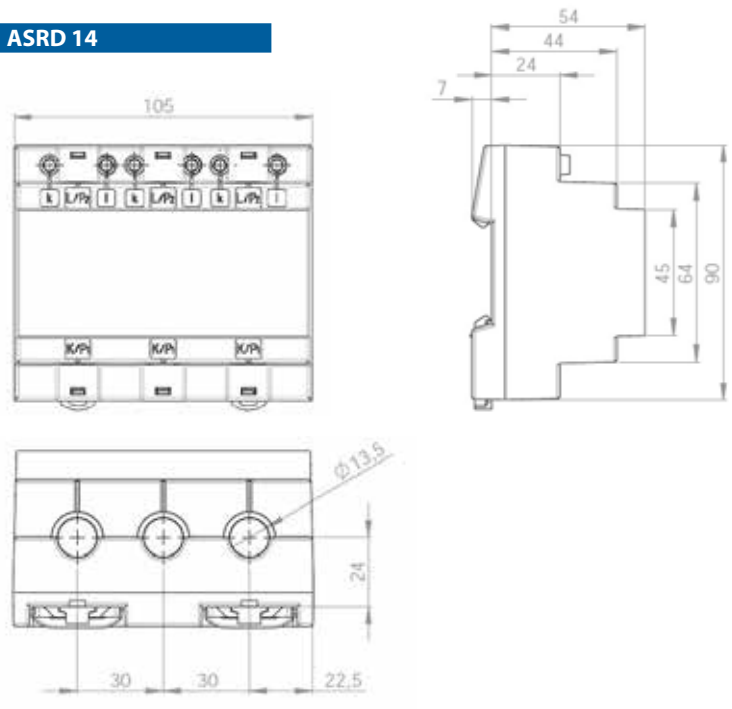
Variants

Version	Application	
A	Standard for 85°C continuous temperature	X
B	Heat stabilized for up to 130°C	X

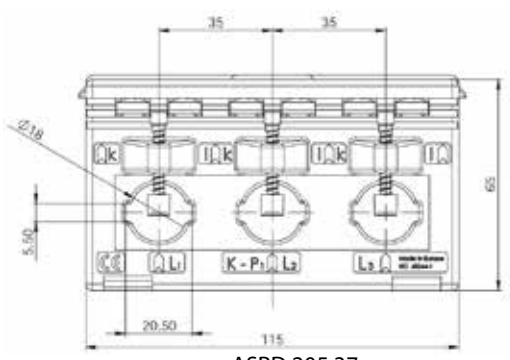


Dimensional drawings three-phase current transformer sets

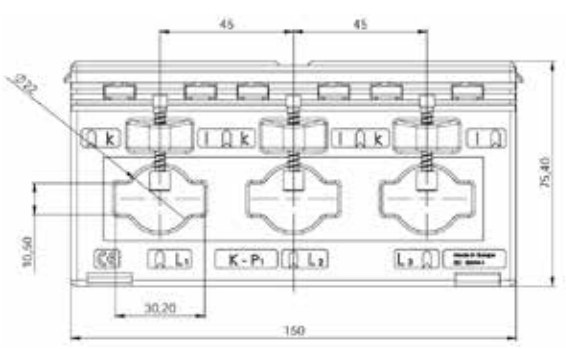
ASRD 14



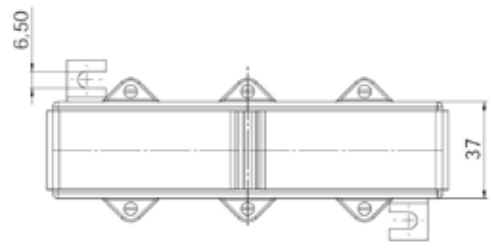
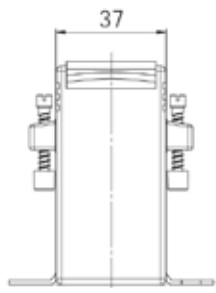
ASRD 205.37 / 310.37



ASRD 205.37



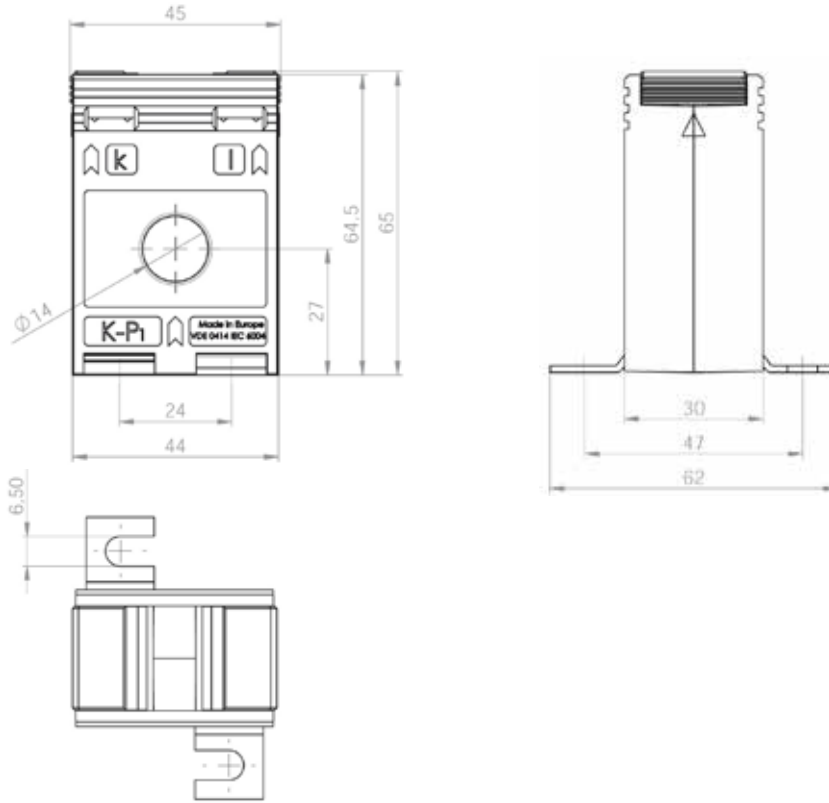
ASRD 310.37



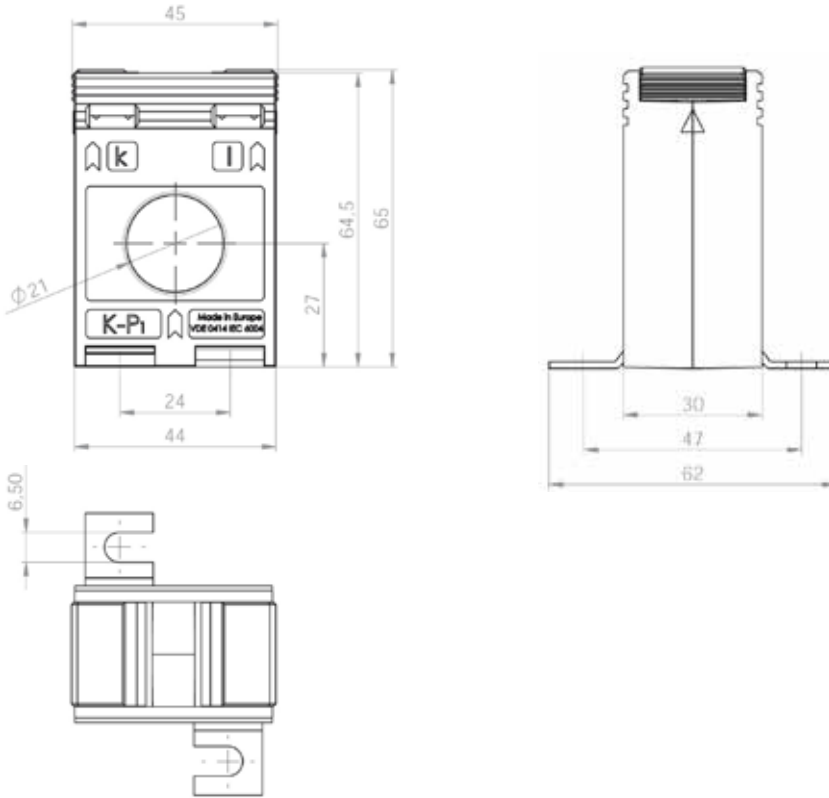


Dimensional drawings tube unit current transformers

RSW 14



RSW 21



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8.1 Current transformers SW-series

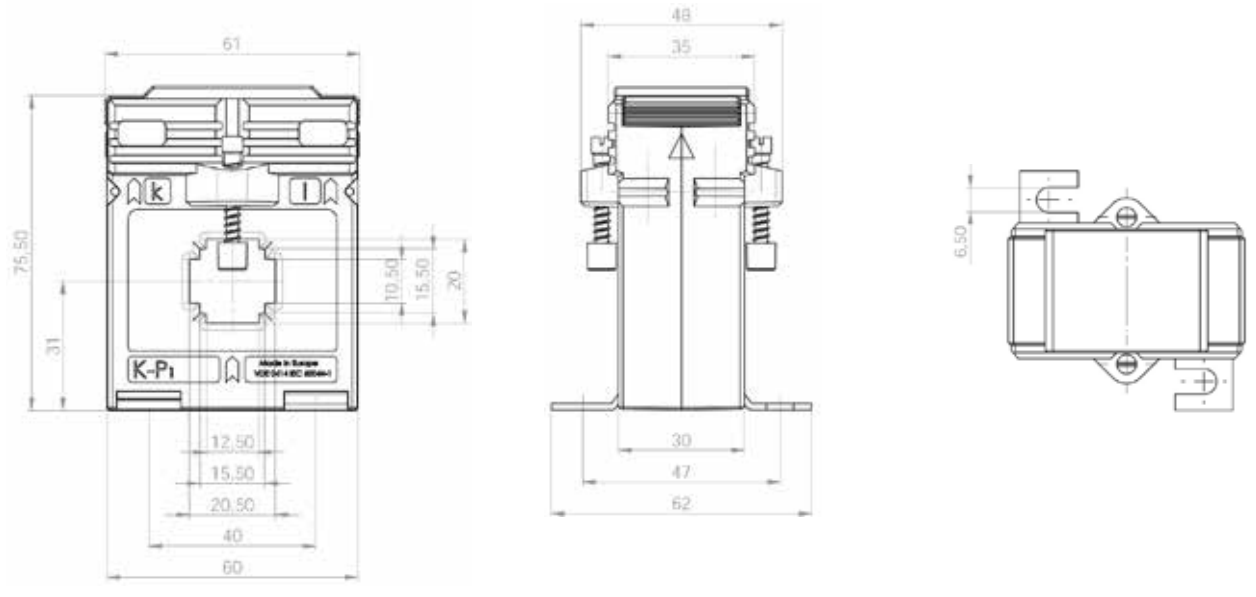
9 Shunts

10 Test apparatus

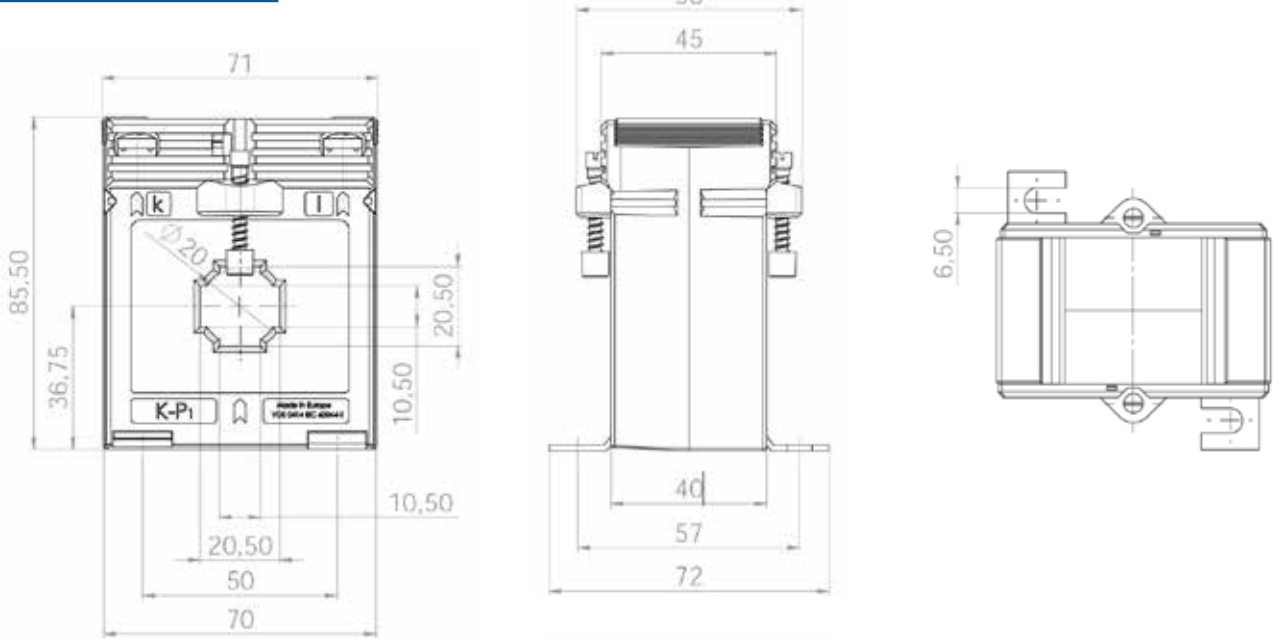


Dimensional drawings plug-in current transformers

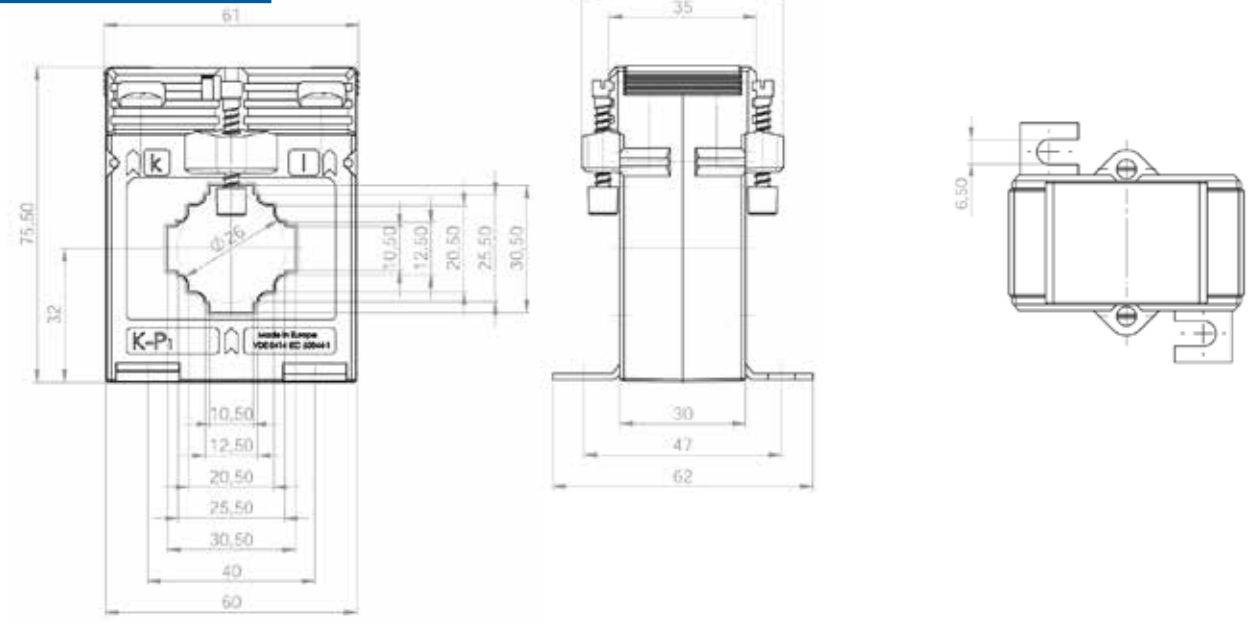
SW-S 2010



SW 2010



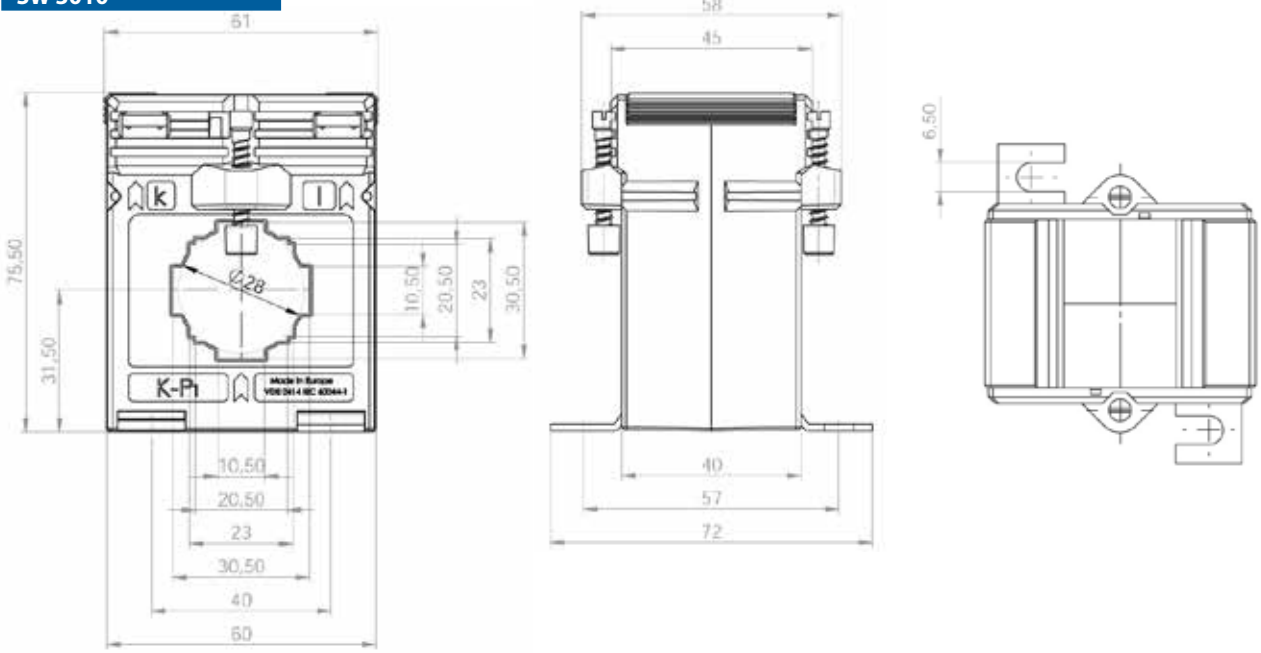
SW-S 3010



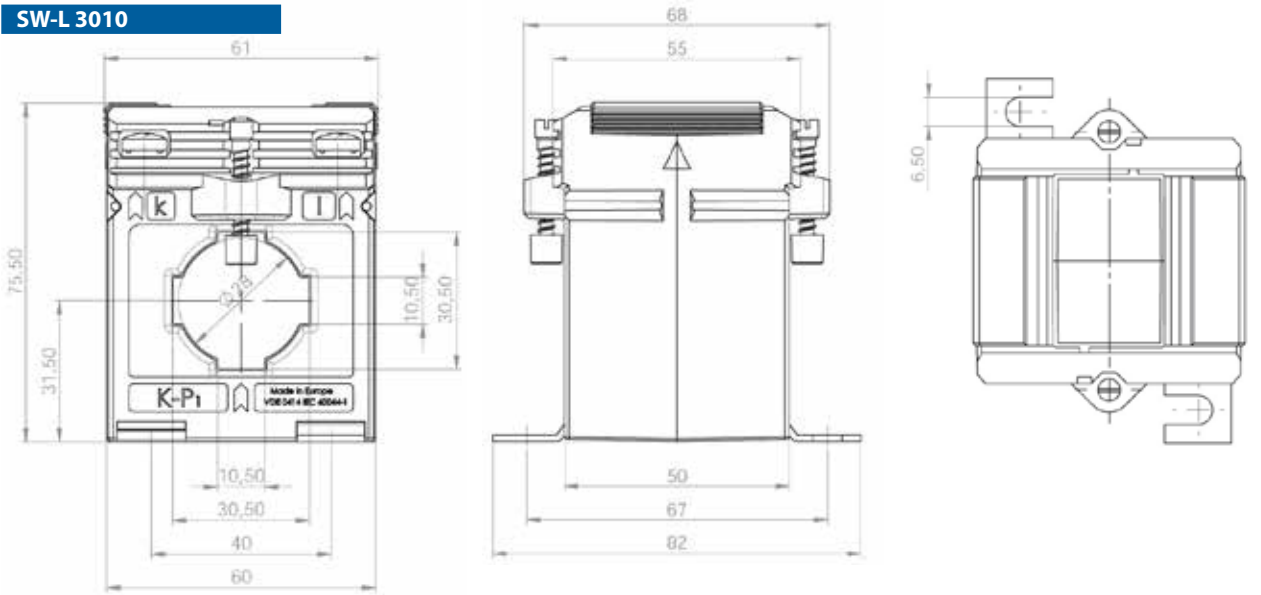


Dimensional drawings plug-in current transformers

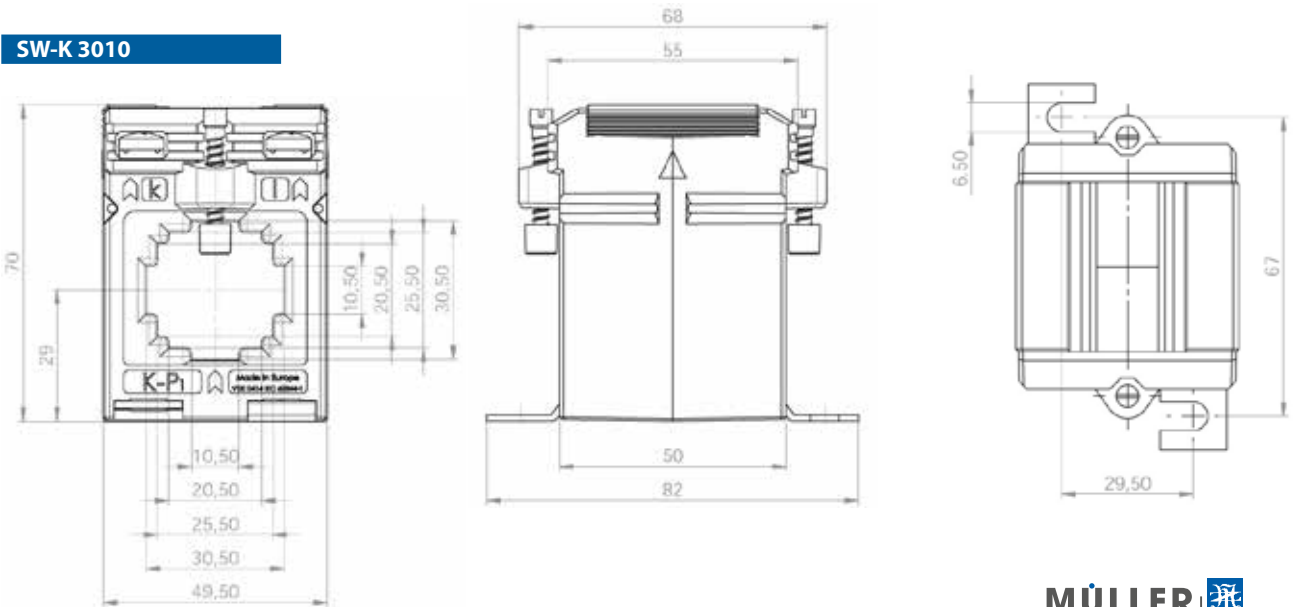
SW 3010



SW-L 3010



SW-K 3010



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

Panel meters digital

4

Panel meters analog

5

6 Meas. instruments for top hat rail mounting

7 Universal measuring-ring instruments

8.1 Current transformers SW-series

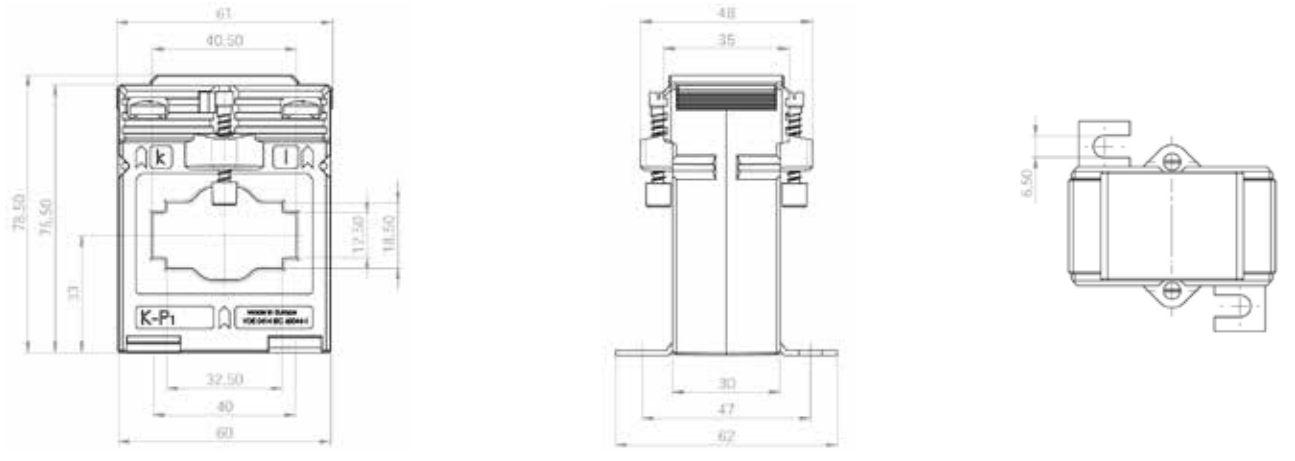
9 Shunts

10 Test apparatus

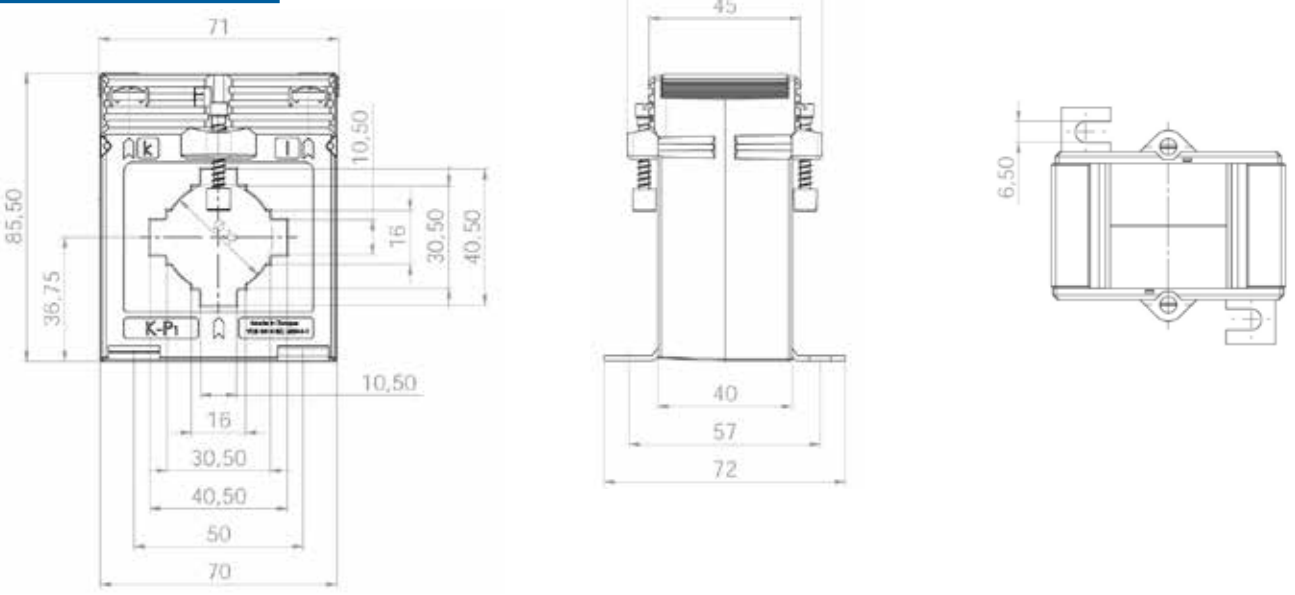


Dimensional drawings plug-in current transformers

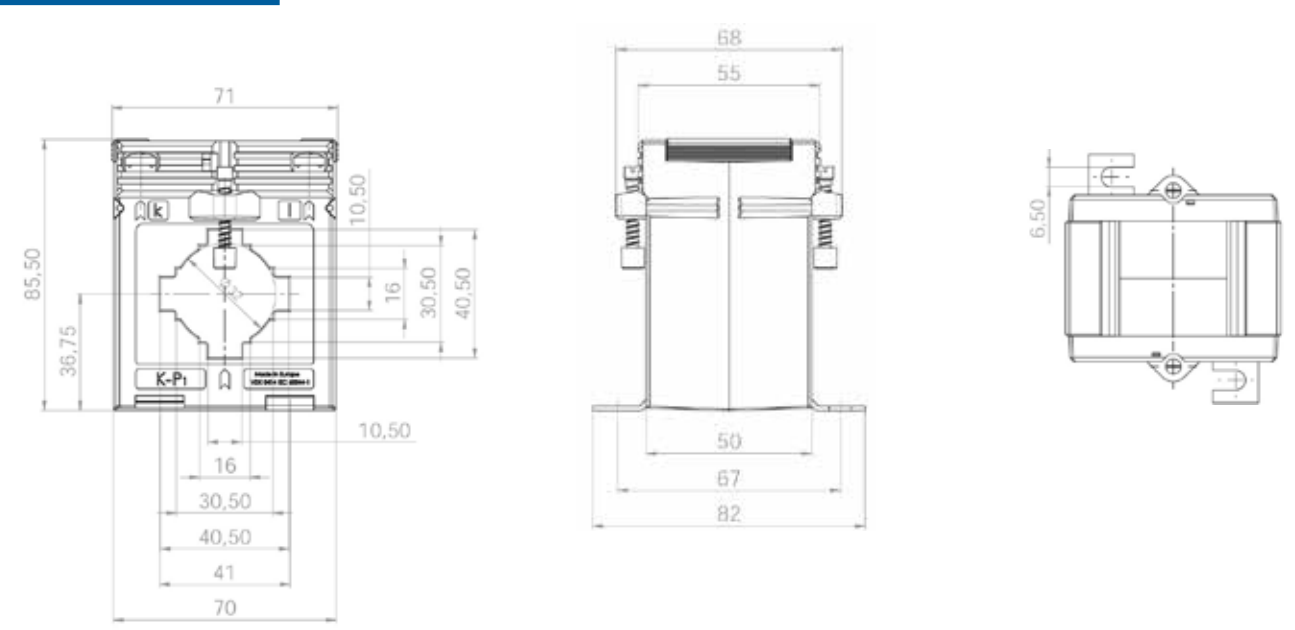
SW-S 4010



SW 4010



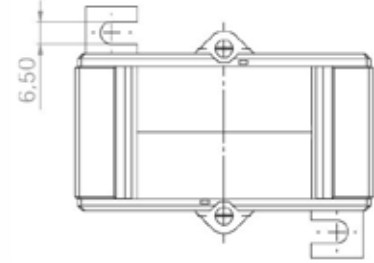
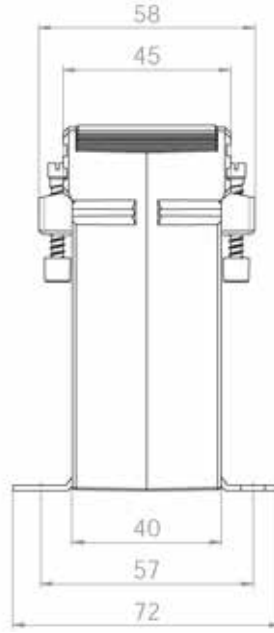
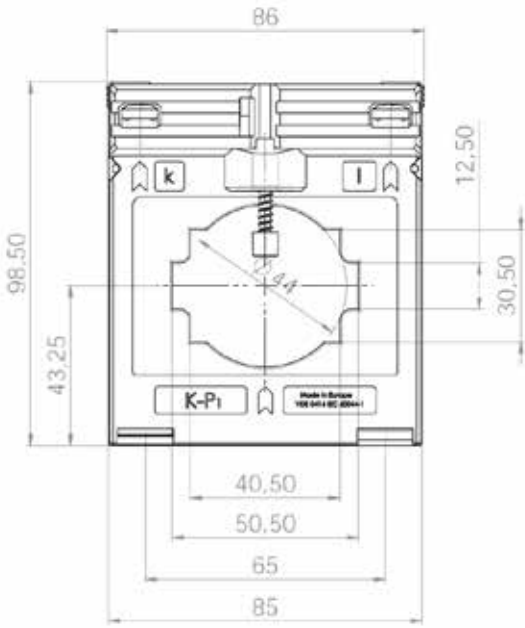
SW-L 4010



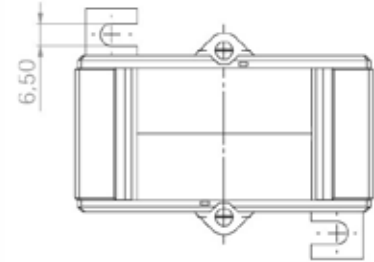
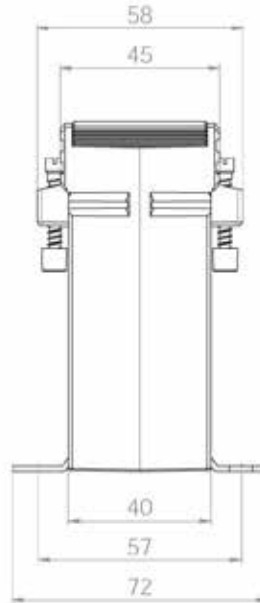
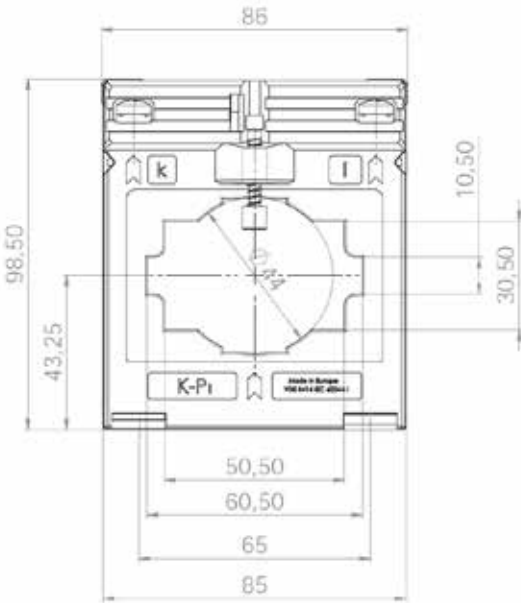


Dimensional drawings plug-in current transformers

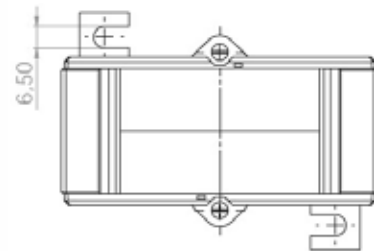
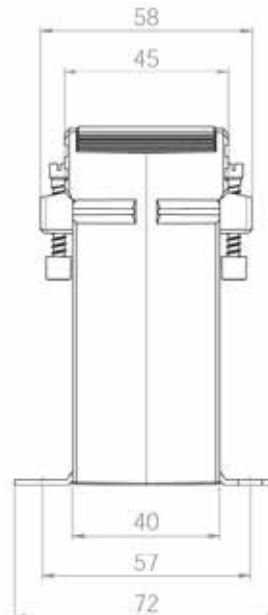
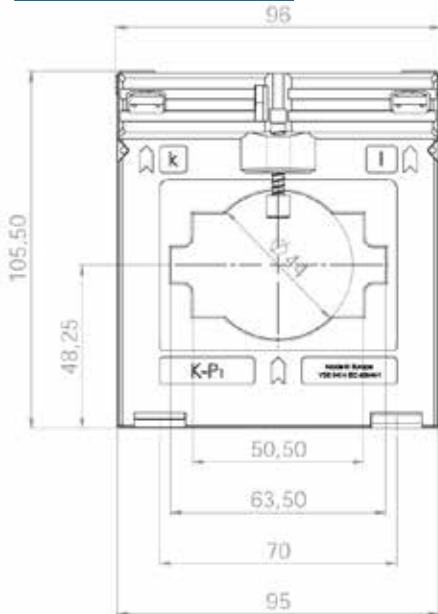
SW-S 5010



SW 5010



SW 6010

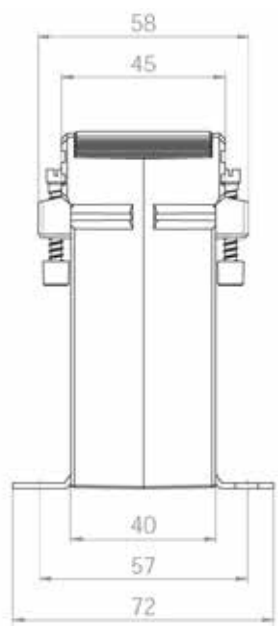
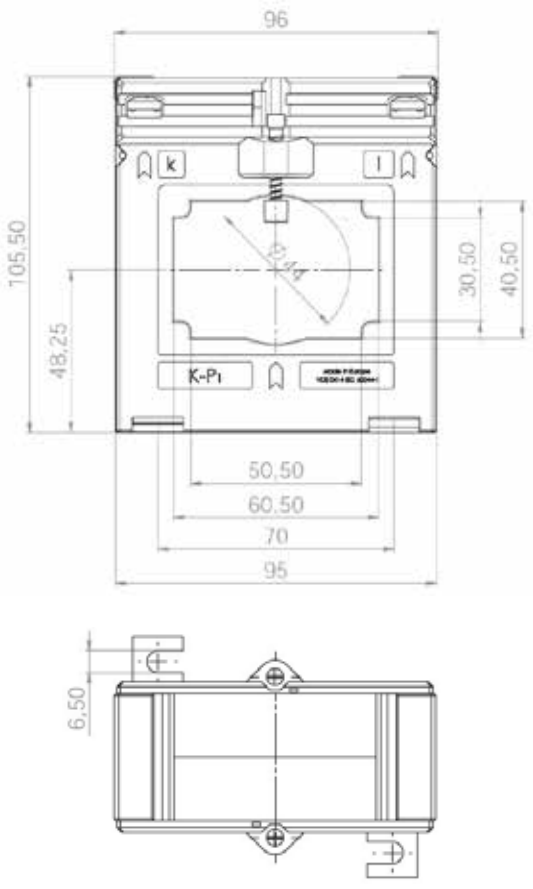


- 1 Measuring transducers
- 2 Mains and limit monitoring
- 3 Energy meters
- 4 Panel meters digital
- 5 Panel meters analog
- 6 Meas. instruments for top hat rail mounting
- 7 Universal measuring instruments
- 8.1 Current transformers SW-series
- 9 Shunts
- 10 Test apparatus

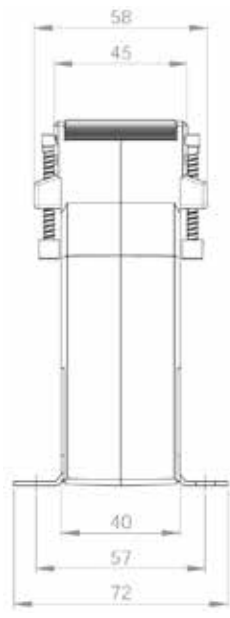
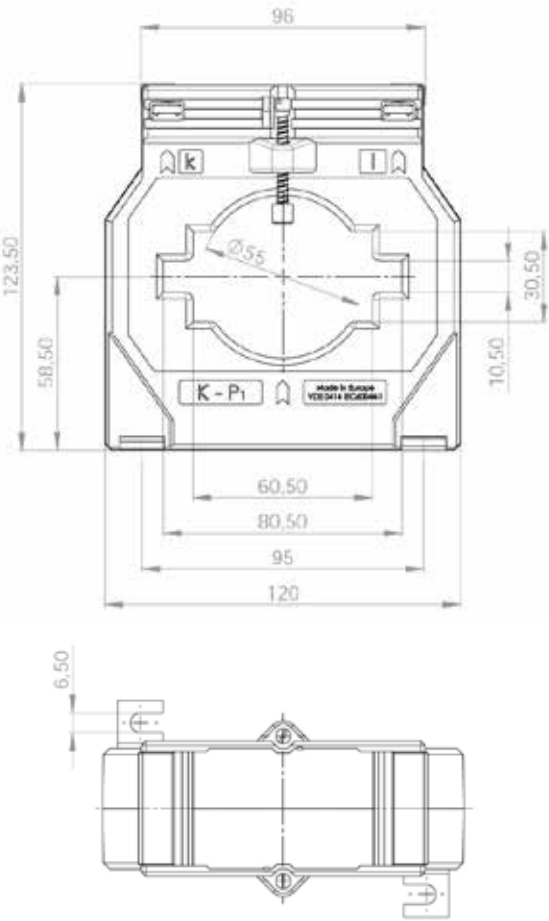


Dimensional drawings plug-in current transformers

SW 6030



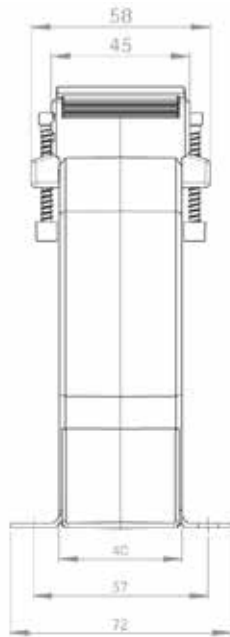
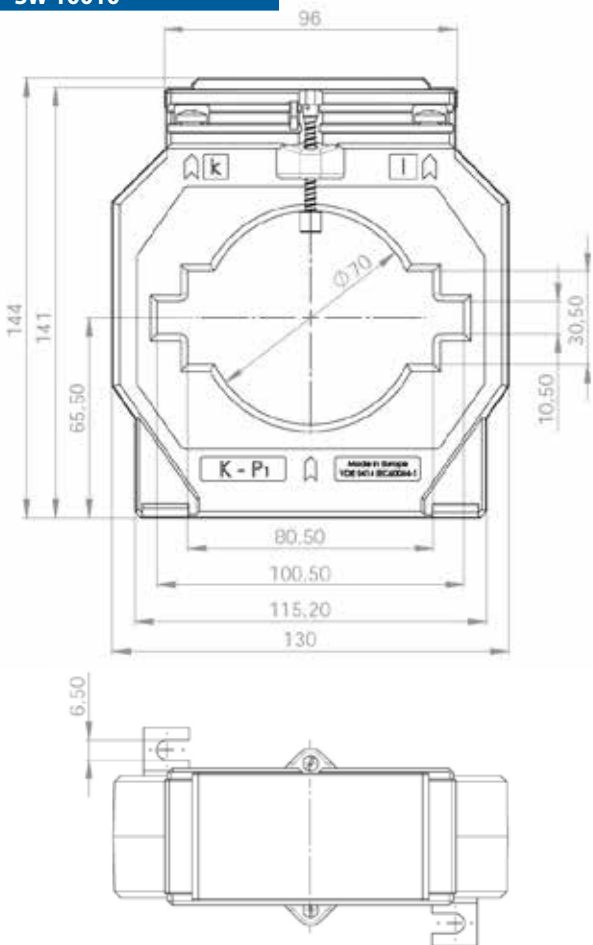
SW 8010



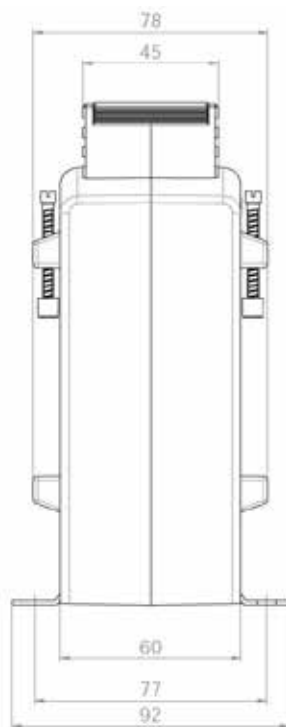
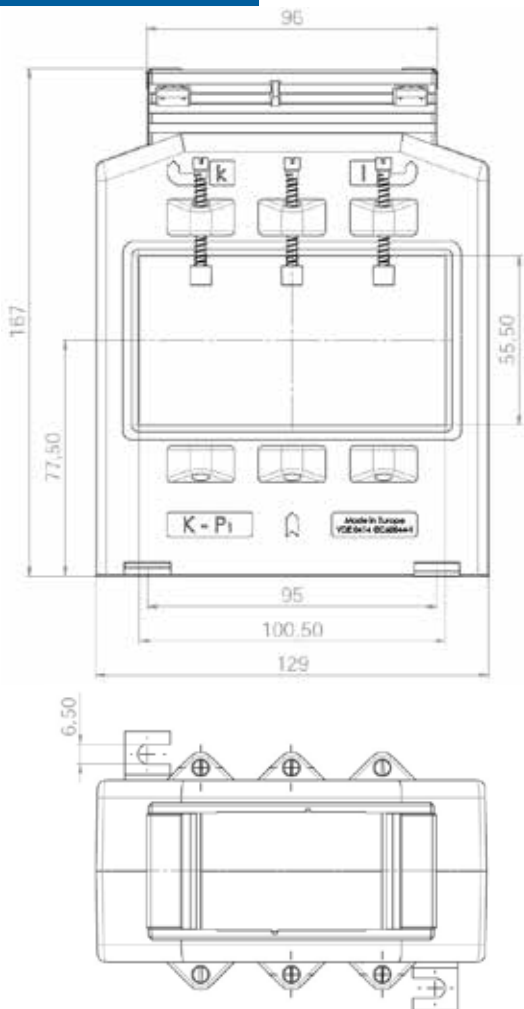


Dimensional drawings plug-in current transformers

SW 10010



SW 10055



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8.1 Current transformers SW-series

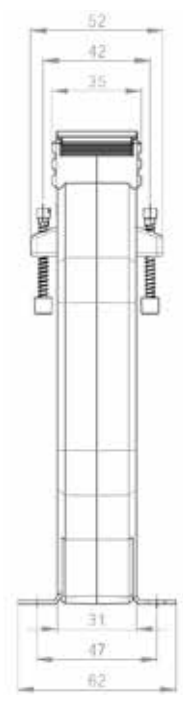
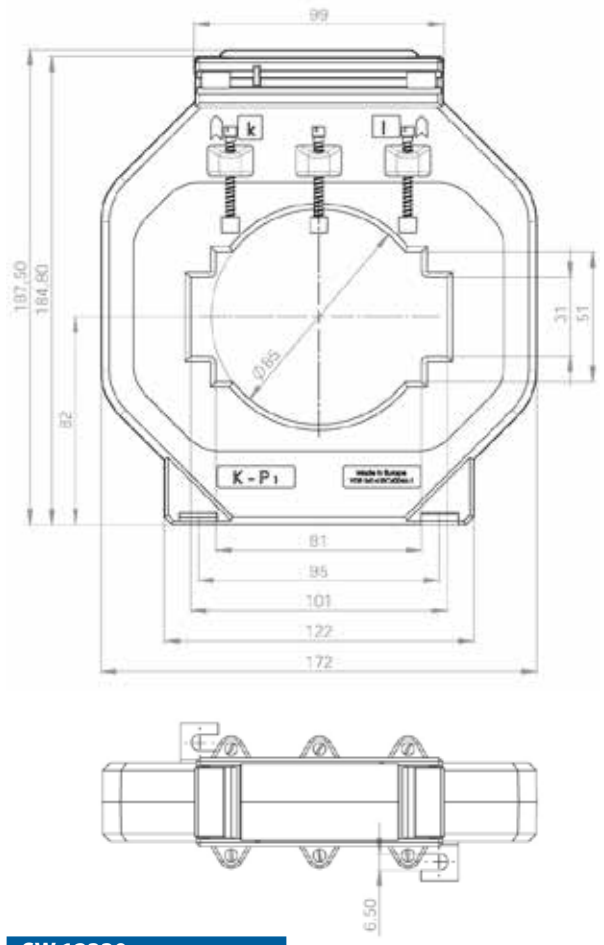
9 Shunts

10 Test apparatus

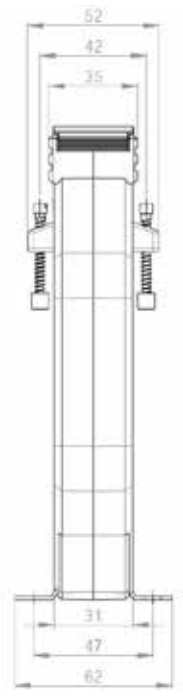
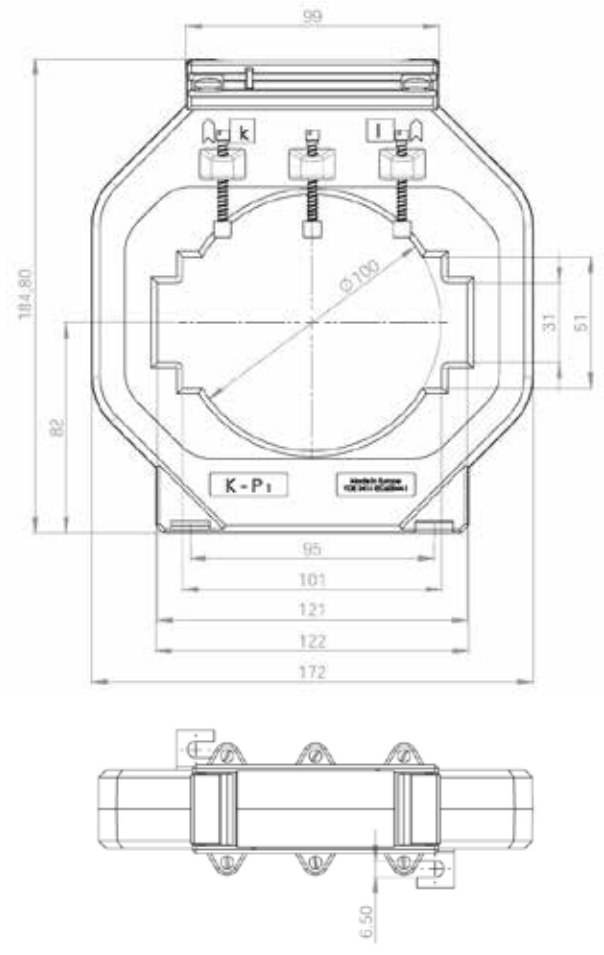


Dimensional drawings plug-in current transformers

SWU 20010



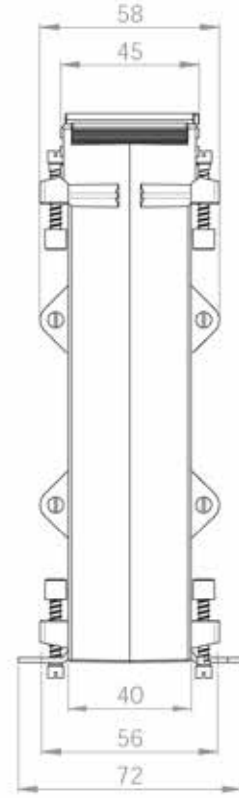
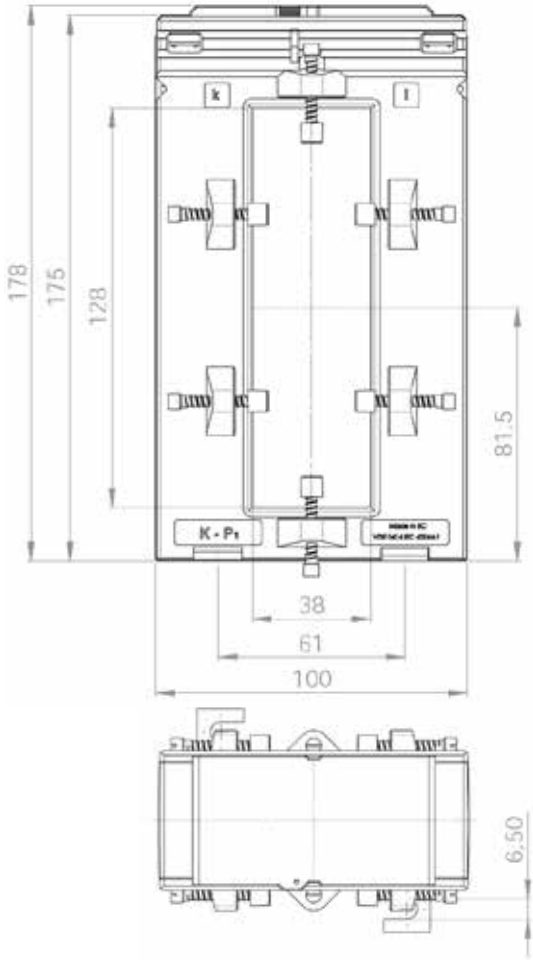
SW 12330





Dimensional drawings plug-in current transformers

SW 12838



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8.1 Current transformers SW-series

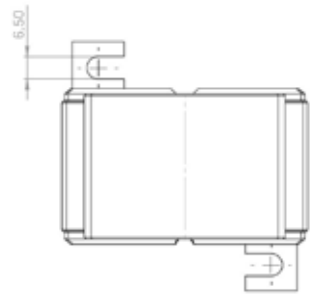
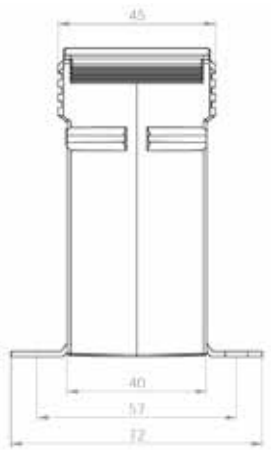
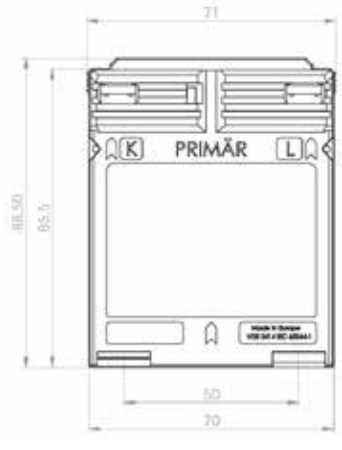
9 Shunts

10 Test apparatus

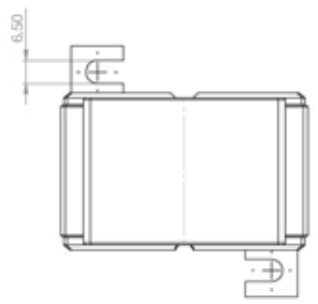
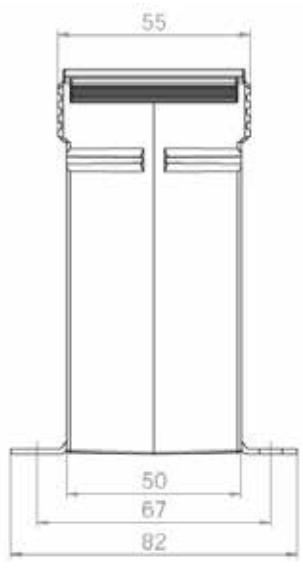
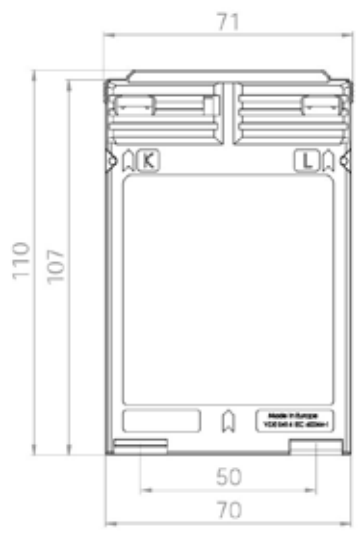


Dimensional drawings wound primary current transformers

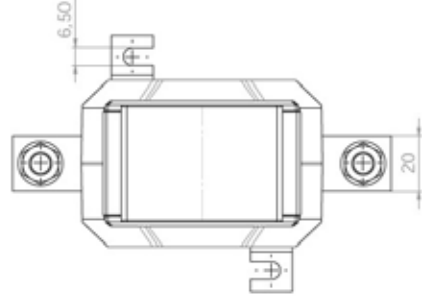
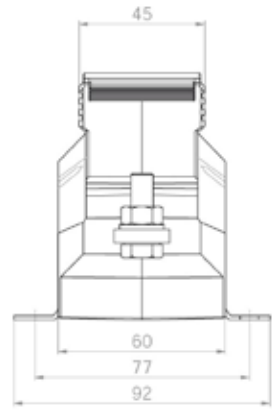
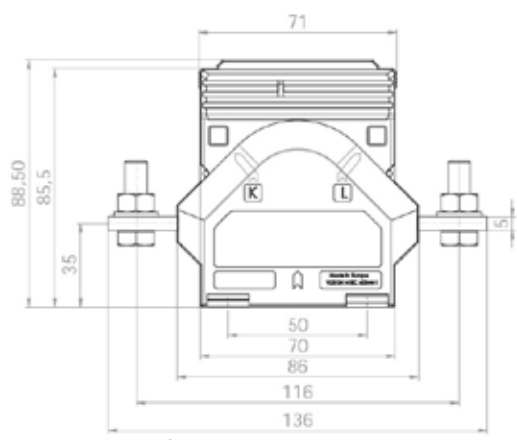
WSWK



WSWK-N



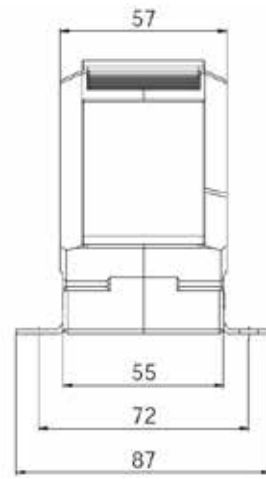
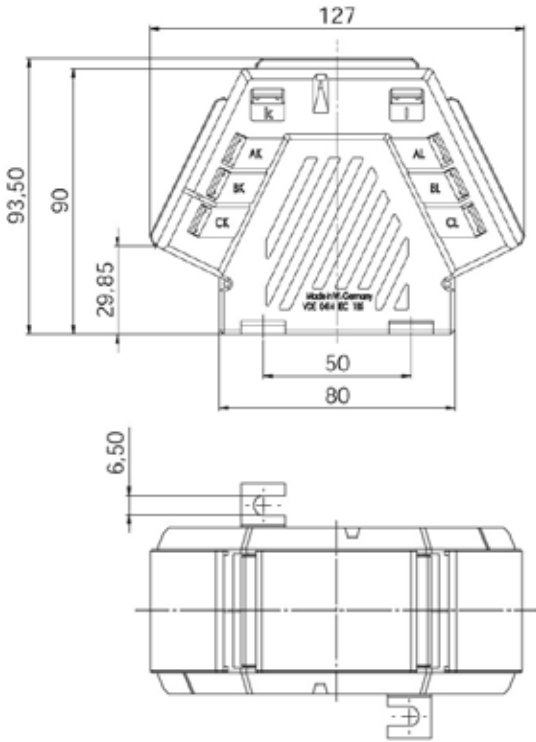
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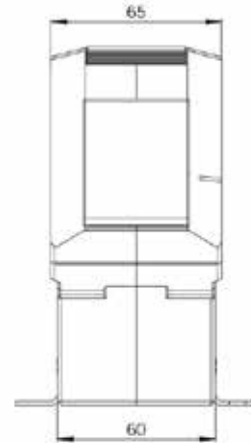
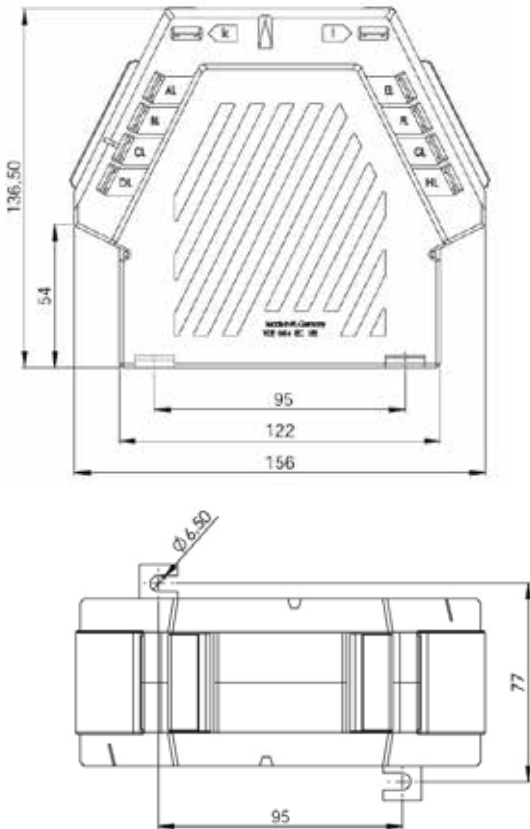


Dimensional drawings summary current transformers

SWS 2-3



SWS 4-8



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

5 Panel meters analog

6 Meas. instruments for top hat rail mounting

7 Universal measuring instruments

8.1 Current transformers SW-series

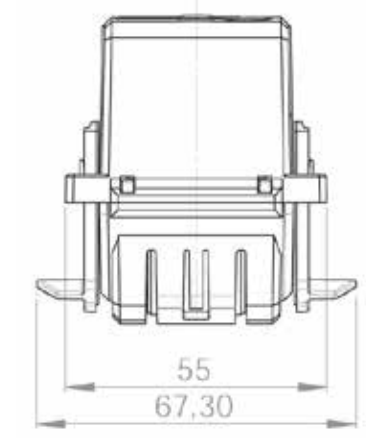
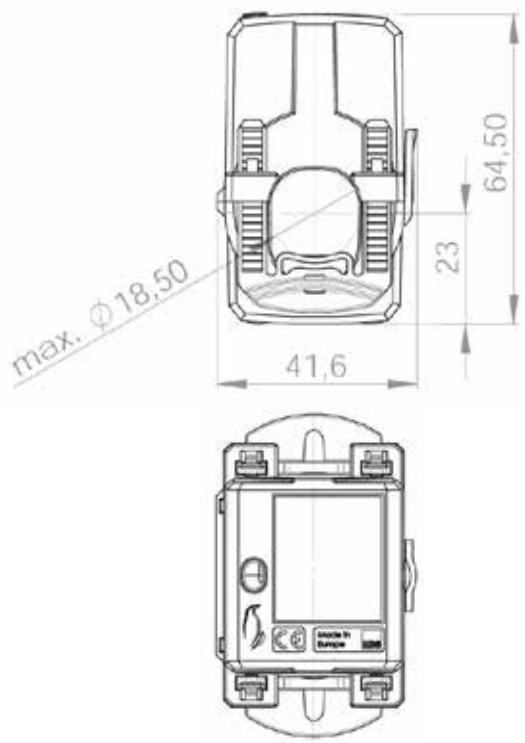
9 Shunts

10 Test apparatus

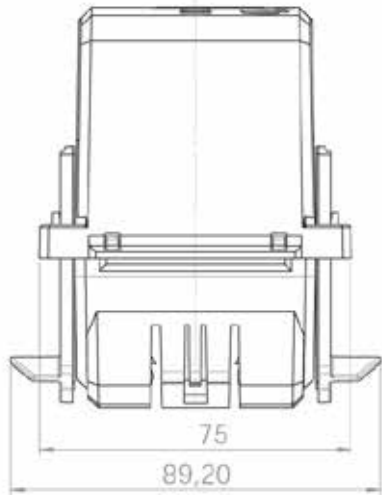
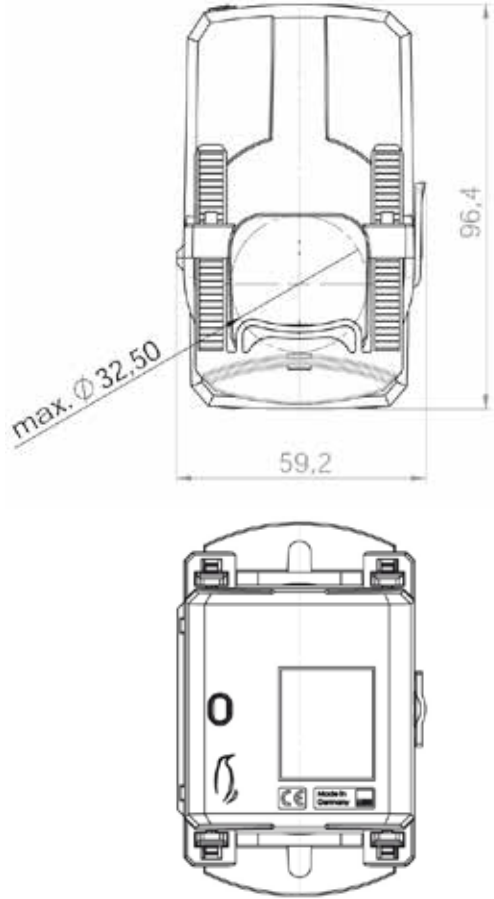


Dimensional drawings split core current transformers

SWU 18



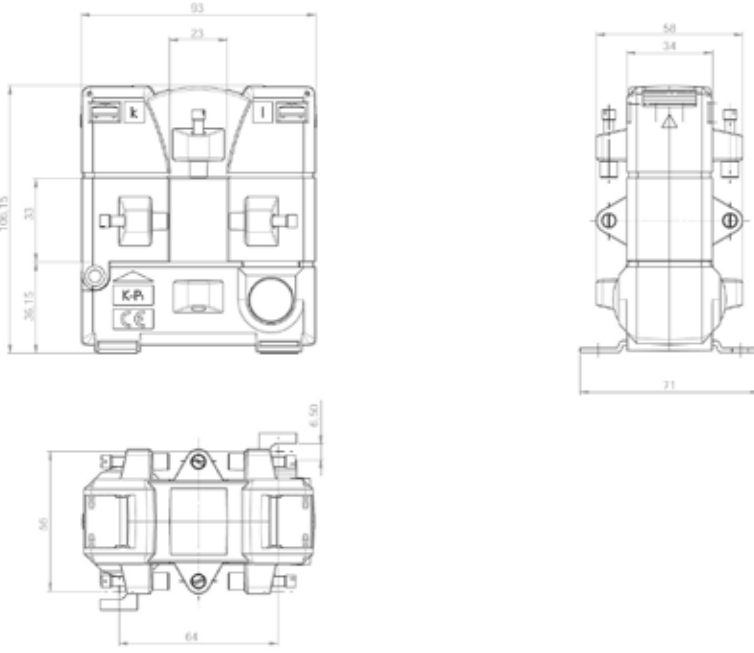
SWU 32



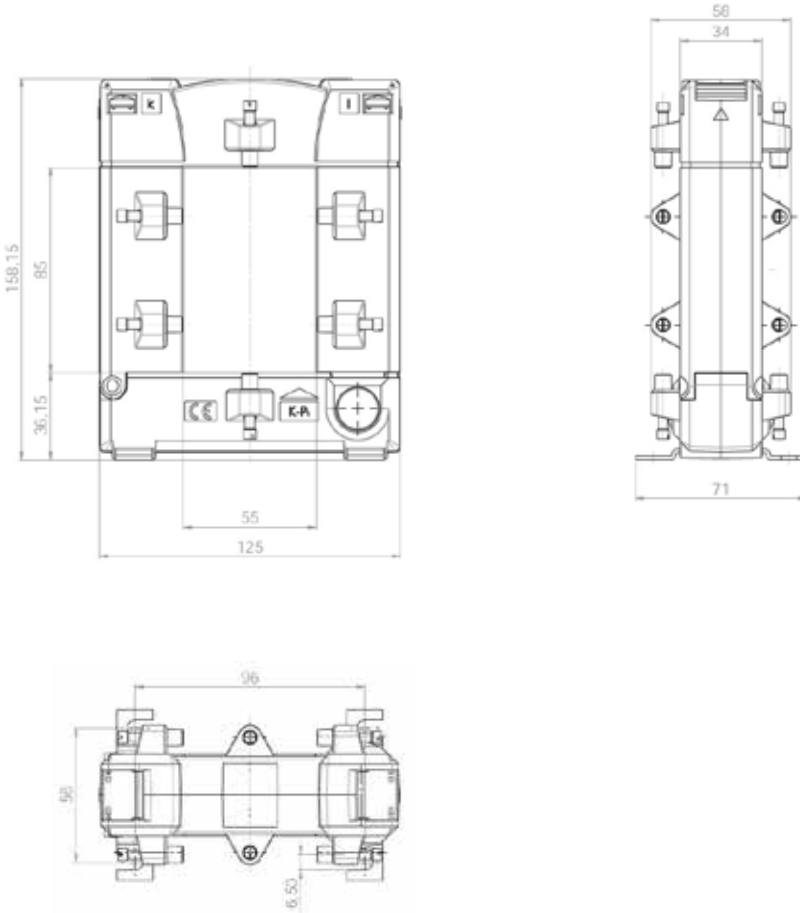


Dimensional drawings split core current transformers

SWU 2030



SWU 5080



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

Panel meters analog

5 Meas. instruments for top hat rail mounting

6 Universal measuring instruments

7 Current transformers SW-series

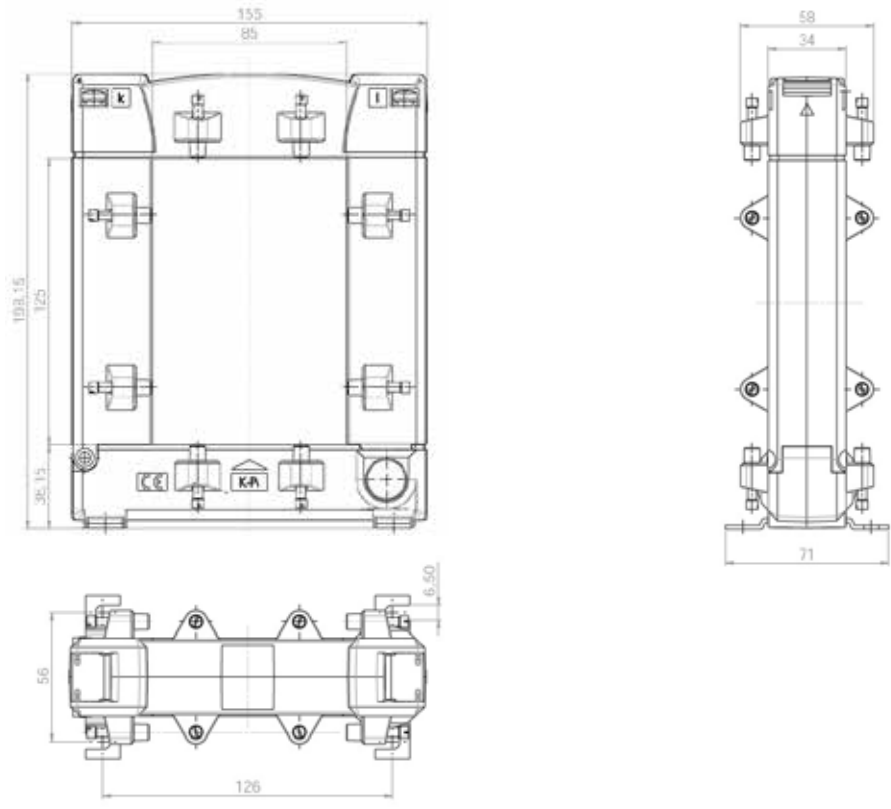
8 Shunts

9 Test apparatus

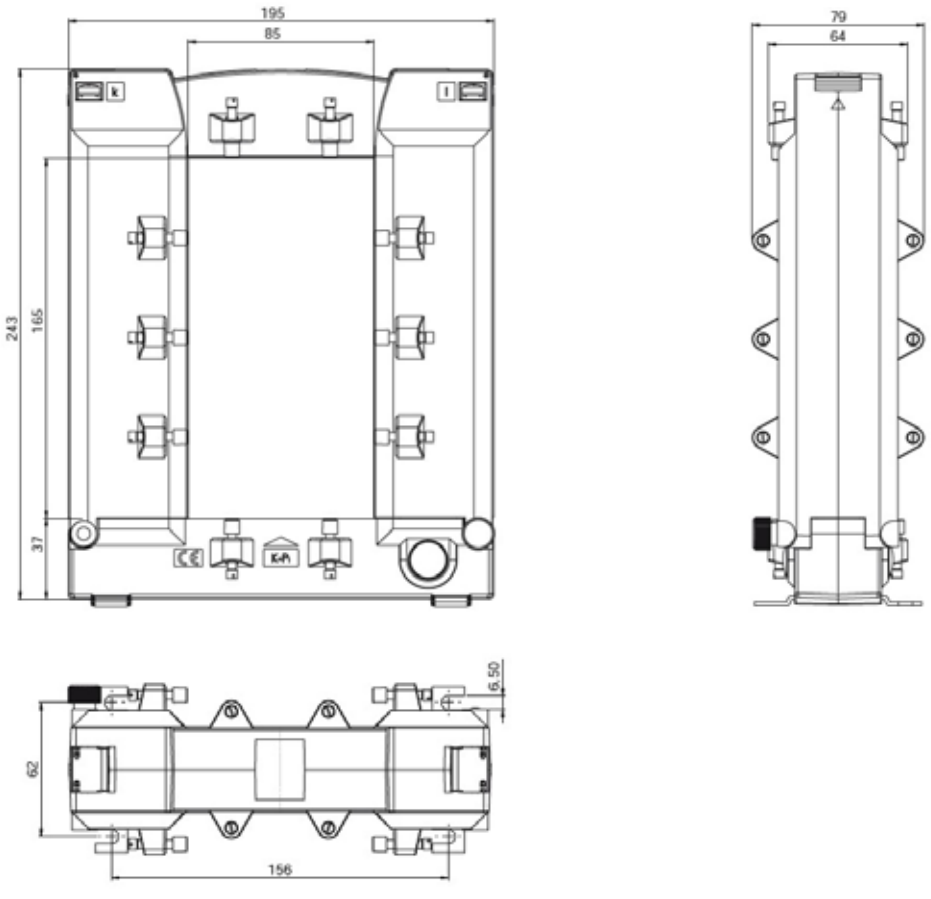


Dimensional drawings split core current transformers

SWU 80120



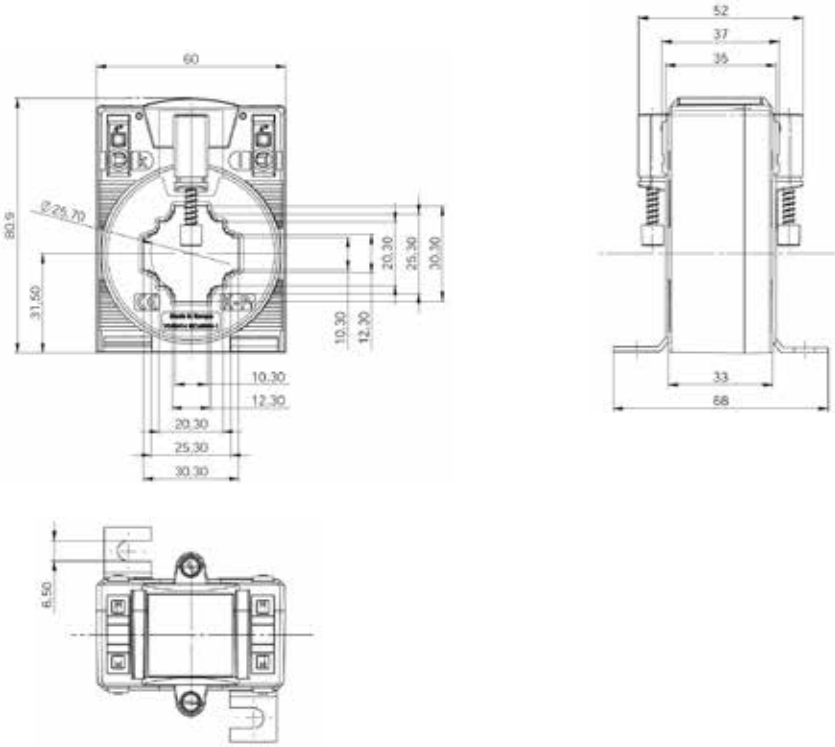
SWU 80160



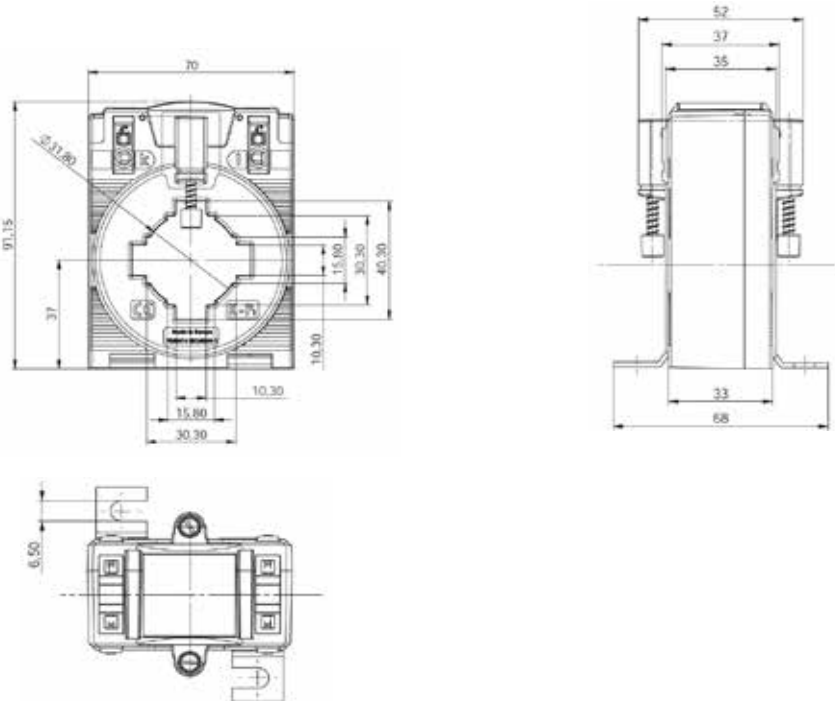


Dimensional drawings plug-in current transformers „Cage Clamp“ CSW

CSW 31



CSW 41



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

Panel meters analog

5 Meas. instruments for top hat rail mounting

6 Universal measuring instruments

7 Current transformers SW-series

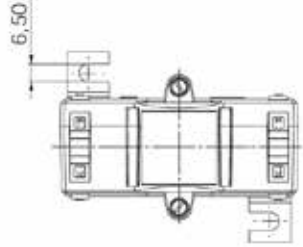
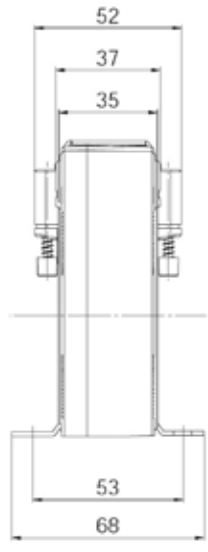
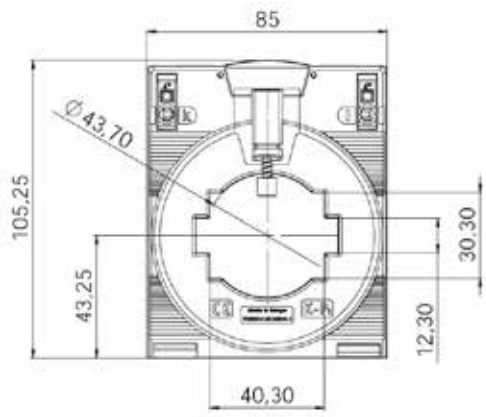
8 Shunts

9 Test apparatus

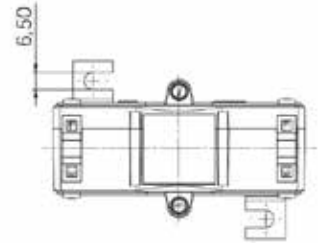
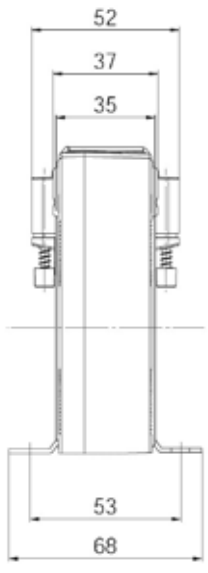
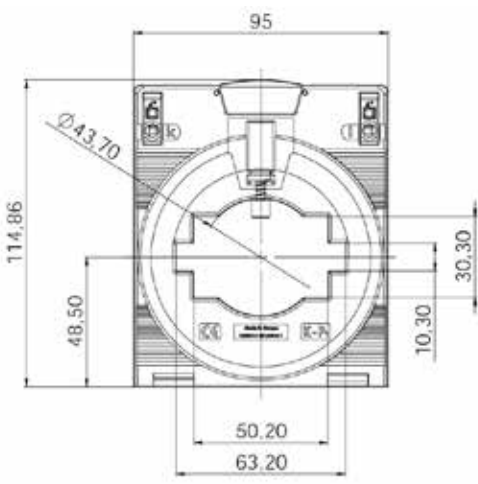


Dimensional drawings plug-in current transformers „Cage Clamp“ CSW

CSW 51



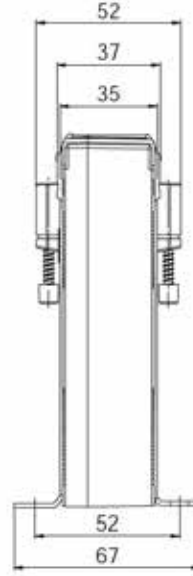
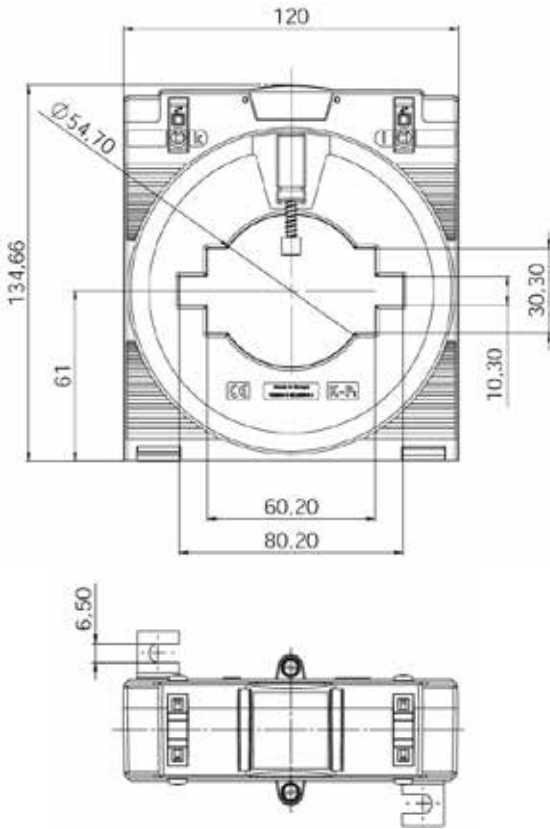
CSW 61



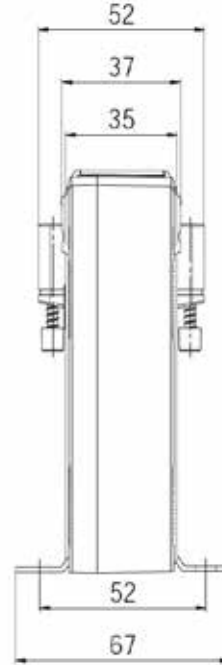
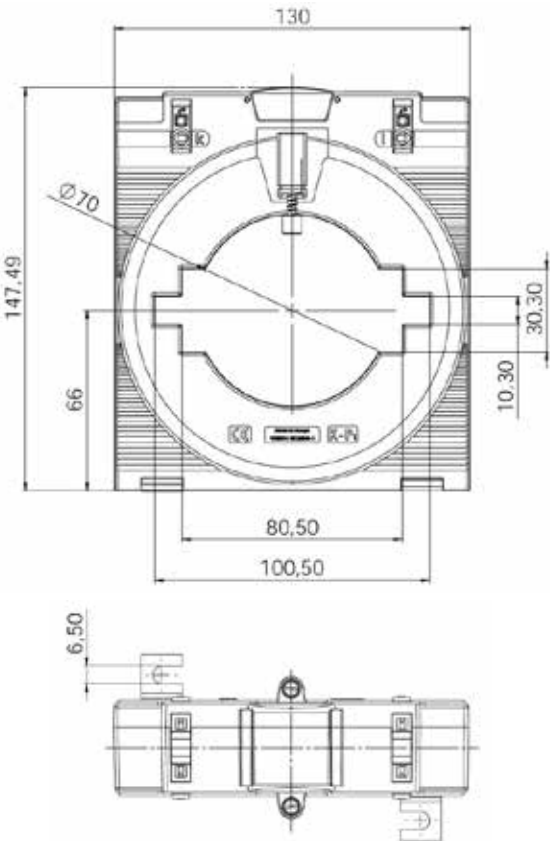


Dimensional drawings plug-in current transformers „Cage Clamp“ CSW

CSW 81



CSW 101



1 Measuring transducers

2 Mains and limit monitoring

3 Energy meters

4 Panel meters digital

Panel meters analog

5 Meas. instruments for top hat rail mounting

6 Universal measuring instruments

7 Universal measuring instruments

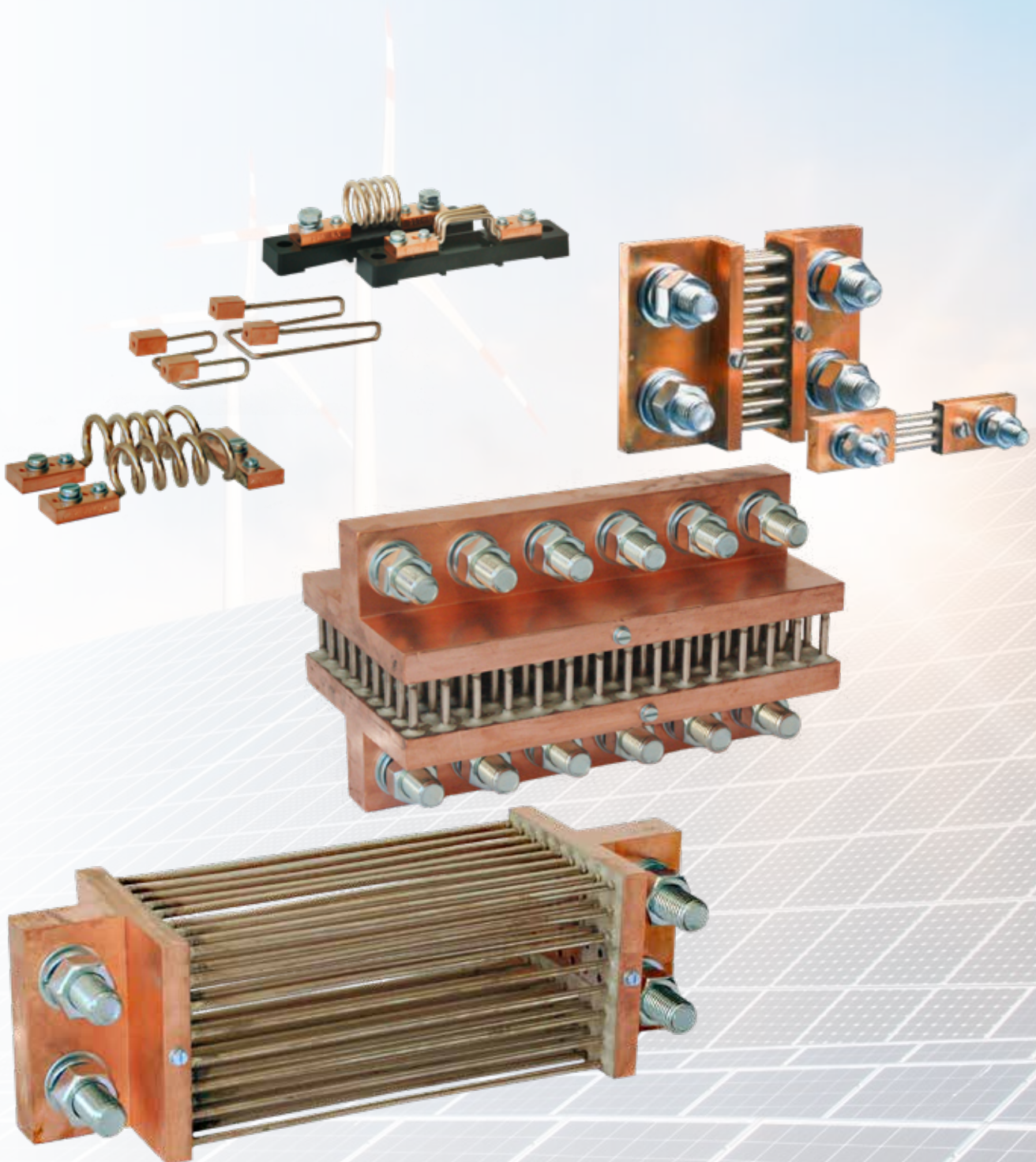
8.1 Current transformers SW-series

9 Shunts

10 Test apparatus

Shunts

General description	Page 330
60 mV, 100 mV, 150 mV / up to 20.000 A	Page 331
Dimensional drawing	Page 332



General description shunts



Application

Shunts are used for expanding the measuring range of moving-coil measuring devices as well as for generating a current-dependent voltage drop, e.g. for electronic further processing.

Function

Shunts are manufactured according to DIN 43 703 and DIN EN 60 051. The accuracy amounts to 0.5 % referred to the nominal value.

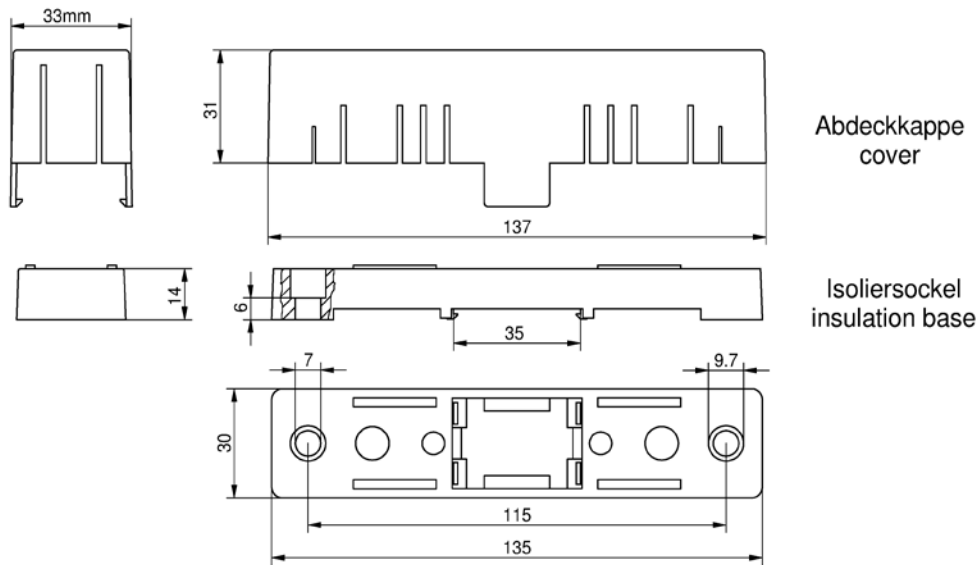
Special options may achieve an even higher accuracy of 0.2 % or 0.1 %.

Shunts up to 25 A are mounted on insulation bases. Such bases are suited for top hat rail mounting or screw fastening. The potential screws have an M5 thread. Connector copper and resistor material (Manganin) are hard-soldered with silver solder.

Special models

Adjustment of lead resistances at shunt	X
Differing rated current and/or voltage drop	on request
Extended accuracy 0,2% or 0,1%	on request
Shunt cover cap with insulating base for top hat rail mounting or screw fixing up to 25 A for 60 mV, 100 mV and 150 mV	X
from 25 A up to 150 A for 60 mV	X

Dimensions shunt cover cap

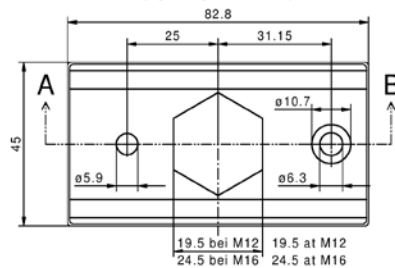


Isoliersockel für 200A - 600A

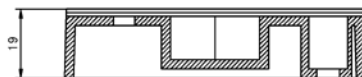
(2St. pro Shunt)

insulation base for 200A - 600A

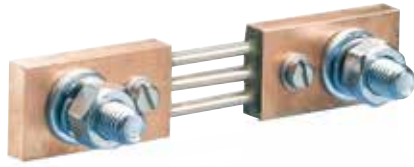
(2pcs. per Shunt)



Schnitt A - B
sectional view A - B



Befestigungsbohrungen: Maß "e" + 62,3mm
fixing holes: dimension "e" + 62,3mm



Shunts

Class 0,5 acc. to DIN EN 60 051
Dimensions acc. to DIN 43 703

Type:
Shunt



Types and variants

Rated current A up to		Voltage drop					
		60 mV	weight kg	100 mV	weight kg	150 mV	weight kg
10 (with isolation base)	X	0,13	X	0,13	X	0,15	
15 (with isolation base)	X	0,13	X	0,13	X	0,15	
25 (with isolation base)	X	0,13	X	0,13	X	0,15	
40	X	0,12	X	0,14	X	0,16	
60	X	0,13	X	0,14	X	0,16	
100	X	0,13	X	0,15	X	0,17	
150	X	0,13	X	0,15	X	0,23	
200	X	0,43	X	0,55	X	0,65	
250	X	0,43	X	0,57	X	0,68	
300	X	0,54	X	0,60	X	0,70	
400	X	0,81	X	0,90	X	1,00	
500	X	0,81	X	0,92	X	1,10	
600	X	0,81	X	0,95	X	1,20	
800	X	1,45	X	1,85	X	2,00	
1000	X	1,47	X	1,90	X	2,10	
1200	X	1,47	X	2,00	X	2,20	
1500	X	2,00	X	2,76	X	3,80	
2000	X	2,90	X	3,40	X	4,10	
2500	X	3,00	X	4,70	X	5,60	
3000	X	3,50	X	4,80	X	5,90	
4000	X	4,20	X	5,60	X	11,70	
5000	X	4,40	X	5,90	X	12,30	
6000	X	11,30	X	12,50	X	14,60	
7000	X	11,30	X	12,80	X	15,30	
8000	X	15,40	X	22,40	X	25,30	
10000	X	21,00	X	22,90	X	26,60	
12000	X	26,40		on request		on request	
15000	X	32,00		on request		on request	
20000	X	44,00		on request		on request	

Surcharge for insulation base above 25 A (up to 25 A principally on insulation base)

A	60 mV	100 mV	150 mV
40	X	X	X
60	X	X	X
100	X	X	X
150	X	X	X
200	X	X	X
250	X	X	X
300	X	X	X
400	X	X	X
500	X	X	X

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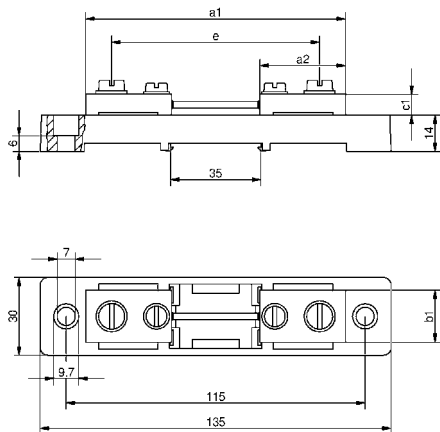
7 Current transformers

8 Shunts

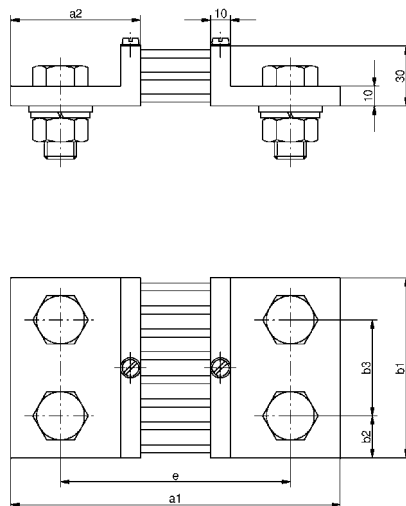
9 Test apparatus

10

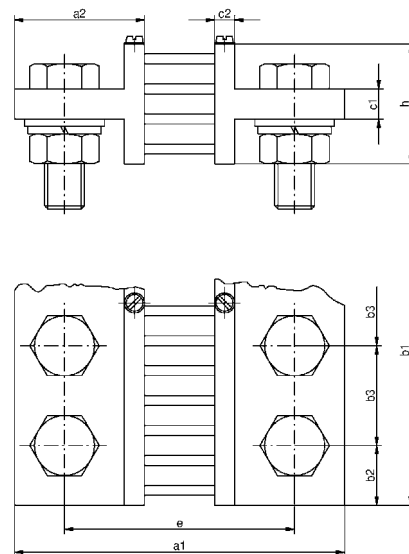
Form A (flat copper)



Form B (L-form copper)



Form C (T-form copper)



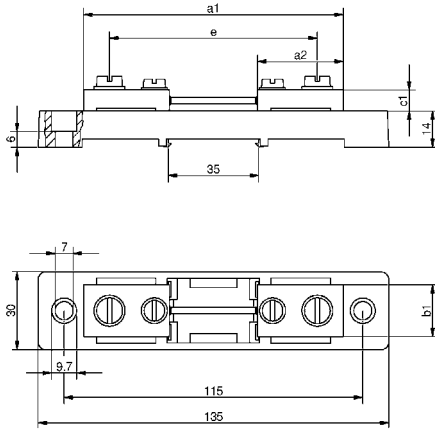
Insulation base up to 25 A

Dimensions 60 mV

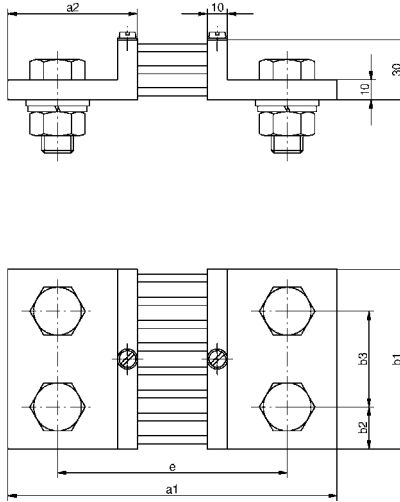
rated current	Form	a1	a2	b1	b2	b3	c1	c2	h	e	n ¹	s ²
A up to 25	A	100	33	20			8			78	2	M 6
40-150	A	100	33	20			8			80	2	M 8
200 / 250	A	145	55	30			10			105	2	M 12
300	B	145	55	30	15					105	2	M 12
400 / 500 / 600	B	145	55	40	20					105	2	M 16
800 / 1000 / 1200	B	165	65	60	30					115	2	M 20
1500	B	165	65	90	21	48				115	4	M 16
2000 / 2500	B	165	65	120	30	60				115	4	M 20
3000	B	165	65	150	45	60				115	4	M 20
4000 / 5000	C	165	65	120	30	60	15	10	60	115	4	M 20
6000 / 7000	C	175	70	154	25	52	25	15	130	125	6	M 20
8000	C	175	70	206	25	52	25	15	130	125	8	M 20
10000	C	185	75	206	25	52	30	20	170	135	8	M 20
12000	C	185	75	258	25	52	30	20	170	135	10	M 20
15000	C	185	75	310	25	52	30	20	170	135	12	M 20
20000	C	185	75	414	25	52	30	20	170	135	16	M 20

1 = n: number of screws
 2 = s: screws acc. to ISO 4017

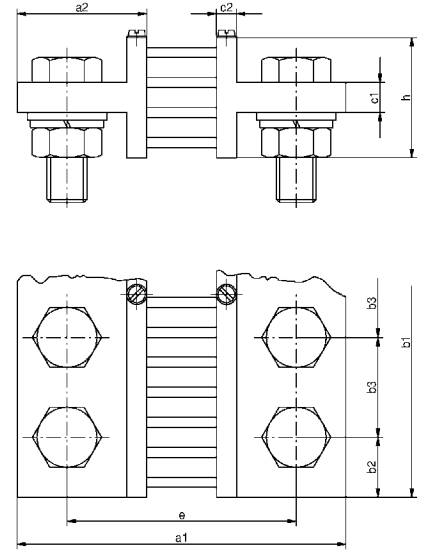
Form A (flat copper)



Form B (L-form copper)



Form C (T-form copper)



Insulation base up to 25 A

rated current		Form	a1	a2	b1	b2	b3	c1	c2	h	e	n ¹	s ²
A	up to 25	A	100	33	20			8			78	2	M 6
	40-150	A	150	33	25			8			131	2	M 8
	200 / 250 / 300	B	195	55	30	15					155	2	M 12
	400 / 500 / 600	B	195	55	40	20					155	2	M 16
	800 / 1000 / 1200	B	215	65	60	30					165	2	M 20
	1500	B	215	65	90	21	48				165	4	M 16
	2000	B	215	65	120	30	60				165	4	M 20
	2500 / 3000	C	215	65	120	30	60	15	10	60	165	4	M 20
	4000 / 5000	C	215	65	135	37,5	60	15	10	60	165	4	M 20
	6000 / 7000	C	225	70	154	25	52	25	15	130	175	6	M 20
	8000 / 10000	C	235	75	206	25	52	30	20	170	185	8	M 20

Dimensions 150 mV

rated current		Form	a1	a2	b1	b2	b3	c1	c2	h	e	n ¹	s ²
A	up to 25	A	100	33	20			8			78	2	M 6
	40-150	A	225	33	25			8			205	2	M 8
	200 / 250	B	270	55	30	15					230	2	M 12
	300 / 400 / 500 / 600	B	270	55	40	20					230	2	M 16
	800 / 1000 / 1200	B	290	65	70	35					240	2	M 20
	1500 / 2000	C	290	65	90	21	48	15	10	60	240	4	M 16
	2500 / 3000	C	290	65	120	30	60	15	10	60	240	4	M 20
	4000 / 5000	C	300	70	120	30	60	25	15	130	250	4	M 20
	6000 / 7000	C	300	70	154	25	52	25	15	130	250	6	M 20
	8000 / 10000	C	310	75	206	25	52	30	20	170	260	8	M 20

1 = n: number of screws
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Test apparatus

Insulation tester DIN VDE 0413 / EN 61557		
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 **Test equipment**

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Müzitester

Test apparatus for test according to DIN VDE 0413 / EN 61 557



Application

The Müzitester is a testing device for testing the protective measures in electrical installations according to DIN VDE 0413 / EN 61557. It may be used for the insulation measurement with rated voltages of 250 V / 500 V and 1000 V as well as for the testing of protective conductor connections by low-impedance measurements.

Type and function

The electronics of the Müzitester is mounted in an impact-proof plastic housing from ABS. The operation is highly rational and safe due to the largely automatic measuring sequence. The display of the measured values is done through a moving coil measuring system. The insulation value, measured with test voltages 1000 V, 500 V or 250 V, may be indicated on a common scale. The test handle with power ON switch as well as the shoulder strap with wide neck part is especially suited for series measurements. The rechargeable battery used is environmentally friendly and completely free from mercury and cadmium. The high capacity of the battery as well as a sequence control allow for a large number of measurements per battery charge. Thanks to the mounted charging unit, the battery may be recharged at any time.



Types and variants

Müzitester

Accessory Shoulder bag from nylon
 Test report

Scope of delivery Müzitester with test handle, shoulder strap, clip terminal,
 loading cable, screwdriver for changing the probe, spare probe

Functional description

Insulation and low-impedance measurement with automatic measuring range switchover

The measuring function selector switch is set to „M Ω / Ω 1000 V Iso“, „500 V Iso“ or „250 V Iso“. By pressing the button on the test handle, the automatic test sequence is started. Testing for zero potential: If the input voltage lies below 50 V, the insulation measurement is started. A DC/AC converter converts a stabilized direct voltage into a test voltage of 250 V, 500 V or 1000 V DC. The current resulting from the test voltage and insulation resistance is recorded as voltage via a resistor and displayed as ohmic value on the insulation scale. If the measured resistance is smaller than approx. 200 Ω and if the input voltage (separate source voltage) lies below 5 V, the switchover to the low-impedance measurement is started which changes into a stable state at approx. 20 Ω . The DC/AC converter is separated from the direct voltage and a constant current of >200 mA flows through the measuring resistance. The voltage dropping via the measuring resistance is registered and displayed as resistance (ohmic value) on the low-ohm scale.

Returning to the insulation range starts at resistance values of above 20 Ω and changes over to a stable state at approx. 200 Ω . An acoustic signal is output during the measurement in case of resistance values >1 M Ω in the insulation range and of <1 Ω in the low-impedance range.

Low-impedance measurement

The measuring function selector switch is set to „+ Ω “ or „- Ω “. By pressing the button on the test handle, the automatic test sequence is started. Testing for zero potential: If the input voltage (separate source voltage) lies below 5 V, the low-impedance measurement is started. A constant current of >200 mA flows through the measuring resistance. The voltage dropping via the measuring resistance is registered and displayed as resistance (ohmic value) on the low-ohm scale. An acoustic signal is output during the measurement in case of resistance values of <1 Ω . Using the measuring function selector switch, switch position „+ Ω “ and „- Ω “, the measuring voltage may be reversed. The connecting socket for the test cable is positive for switch position „+ Ω “ and negative for switch position „- Ω “.

Voltage measurement

The measuring function selector switch is set to an arbitrary position. By pressing the button at the test handle, the measurement voltage is applied. The measuring voltage is registered via a resistor by an rms value rectifier. This rectifier is able to measure direct and alternating voltage of arbitrary waveform and frequency. The voltage value may be read from the voltage scale.

Phase testing

This test only functions in combination with the rechargeable battery installed in the device. By bringing the probe into contact with a phase conductor and simultaneously touching the contact face at the test handle, current flows. This current activates the LED via a transistor which signals the present voltage to ground.

Rechargeable battery capacity

The measuring function selector switch is set to „battery capacity“. By pressing the button on the test handle, the actual state of a counter is converted into a voltage and indicated as percentage value on the rechargeable battery scale. For determining the energy content of the rechargeable battery, the charging/discharge current as well as the self discharge are taken into account. After the energy content has dropped to <10 %, the battery status indicator signals "empty".

Charging the battery

The integrated charger allows for charging the battery at a voltage of 230 V, 50 Hz. Only the missing energy amount is recharged. After the energy content has been recharged to 100%, the charging current drops to the conservation charging current.

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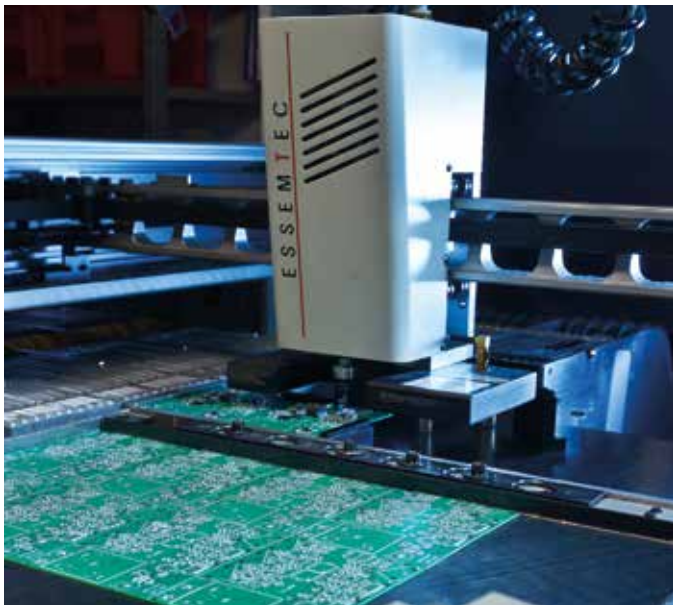
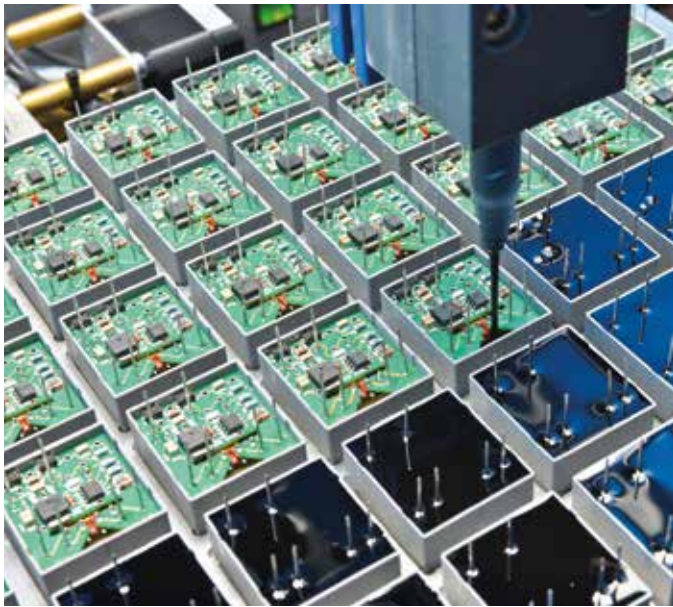
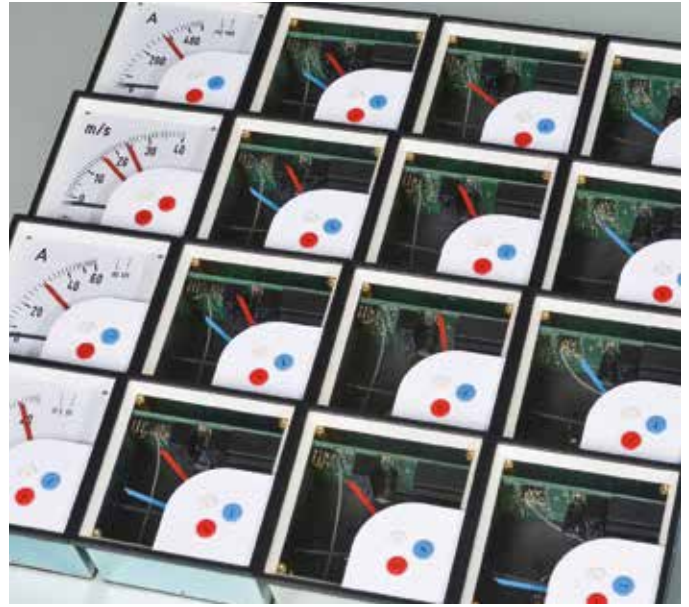
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Technical data

General data	Test apparatus acc. to DIN VDE 0413 / EN 61557 with largely automatic measuring sequence	
Functions	Insulation measurement with 250 V, 500 V oder 1000 V, low-impedance measurement, voltage measurement and phase testing	
Display	Moving-coil measuring system with four scale graduations	
Scale length	max. 95 mm	
Error in actual measurement	DIN VDE 0413 part 2+4, DIN EN 60 051	
Temperature range	0 °C to 40 °C	
EMC	DIN EN 61 326	
Test voltage	DIN EN 61 010 – 1, 3,7 kV 50 Hz 10 s	
Air and creep distances	DIN EN 61 010 – 1	
IP code	DIN EN 60 529, IP 50	
Electrical safety	DIN EN 61 010 – 1, housing insulated, protection class II, pollution degree 2, Measuring category CAT III for working voltages up to 300 V (phase to neutral), Measuring category CAT II for working voltages from 300 – 600 V (phase to neutral)	
External magnetic field influence	no (bis 4 kA/m)	
Power supply	NiMH rechargeable battery pack (6 x AA), 7,2 V, 1500 mAh	
Battery charge	230 V, 50 Hz, approx. 18 mA, 14 hrs.	
Dimensions	190 mm (L) x 180 mm (W) x 60 mm (H)	
Weight	900 g (incl. battery kit)	
Insulation measurement	with 1000 V	
DIN VDE 0413–2 / EN 61557–2	Display range	0-50 MΩ
	Measuring range	10 kΩ-5 MΩ
	Rated voltage	1000 V
	Open circuit voltage	max. 1200 V
	Short circuit current	3 mA
	Measuring time	arbitrary
Insulation measurement	with 500 V	
	Display range	0-50 MΩ
	Measuring range	10 kΩ-5 MΩ
	Rated voltage	500 V
	Open circuit voltage	max. 600 V
	Short circuit current	3 mA
	Measuring time	arbitrary
Insulation measurement	with 250 V	
	Display range	0-50 MΩ
	Measuring range	10 kΩ-5 MΩ
	Rated voltage	250 V
	Open circuit voltage	max. 300 V
	Short circuit current	3 mA
	Measuring time	arbitrary
Low-impedance measurement	DIN VDE 0413–4 / EN 61557–4	
	Display range	0-10 MΩ
	Measuring range	0,1 Ω-10 Ω
	Rated current	> 200 mA
	Open circuit voltage	ca. 5 V
	Pole reversal	manual
	Measuring line compensation	0 - 1 Ω, manual
	Measuring time	arbitrary
Voltage measurement	Measuring range	0-600 V
	Frequency range	DC/40-1000 Hz
	Internal resistance	approx. 250 kΩ
	Crest factor	4
	Accuracy	1,5 % from final value
	Measuring time	arbitrary
Phase testing	DIN VDE 0680 - 6	
	Voltage range	30-250 V
	Frequency range	50-500 Hz
	Internal resistance	6 MΩ
	Temperature range	-10 °C to +50 °C
Rechargeable battery capacity	per battery charge	30-250 V
DIN VDE 0413 / EN 61 557	approx. 2000 measurements	

Precision and service are the measure of all things





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