2010

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TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

K Series
421.D.101.01

Switchable Analog Meters with Moving-Iron Movement

EQ 72 SWT
EQ 96 SWT

with Slide-In-Dial

WEIGEL

Application

The moving-iron panel meters **EQ 72/96 SWT** (K series) housed in moulded thermoplastic cases are used for the measurement of AC voltages in the usual 3-phase system.

Moving−iron meters indicate rms−values practically independent of wave form even of high harmonics. Error of indication may occur for extreme wave forms (e.g. phase gating controls) and / or frequencies above 100 Hz.

With the built-in 6 position switch, all voltages in a 4-wire 3-phase system can be measured.

Movements

Moving−iron movement with pivot suspension, spring loaded shock absorbing jewel bearings and silicon oil damping.

Mechanical Data

case details	moulded square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable
material of case	polycarbonate thermoplastics, flame retardant with UL rating of 94 V − 0
material of window	glass ⧫
colour of bezel	black (similar to RAL 9005) ⧫
position of use	vertical ±5° ⧫
panel fixing	screw clamps or spring clamps
mounting	stackable next to each other
panel thickness	≤ 40 mm
terminals	hexagon studs, M4 screws and wire clamps E3

dimensions (in mm)	**EQ 72 SWT**	**EQ 96 SWT**
bezel	□ 72	□ 96
case	□ 66	□ 90
depth	53	53
panel cutout	□ $68^{+0.7}$	□ $92^{+0.8}$
weight approx.	0.19 kg	0.23 kg

Electrical Data

measuring unit	AC voltage / current
frequency range	$16^2/_3$ ... 100 Hz
power consumption	<4.5 VA
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage
5 s max.	2 times rated voltage, 1000 V max.
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact ⧫

⧫ also refer to "Options"

Measuring Ranges

AC voltage	**500 V**
operating voltage	600 V
for use on VT	**N/100 V** *)
operating voltage	150 V

Please state transformer ratio when ordering.
*) full scale value = 1.2 times rated value (overload scaling)

switch positions in a 4-wire 3-phase system

6 switch positions	L1L3; L2L3; L1L2; L1N; L2N; L3N

Scaling

pointer	bar / knife−edge pointer	
pointer deflection	0 ... 90°	
scale characteristics	practically linear above 10% of rated full−scale value	
scale division	coarse−fine	
scale length	EQ 72 SWT 61 mm	EQ 96 SWT 97 mm
overload scaling	1.2 times rated voltage (voltmeters for use on voltage transformers)	

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23°C±1K
position of use	nominal position ±1° ⧫
input	rated measuring value
wave form	sinusoidal, distortion factor ≤ 5%
frequency	45 ... 65 Hz
others	DIN EN 60 051
influences	
ambient temperature	−10°C ... +23°C ... +55°C
position of use	nominal position ±5°
frequency	15 ... 100 Hz
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 3 acc. to VDE/VDI 3540 sheet 2
operating temperature range	−10 ... +55°C
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

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Switchable Analog Meters with Moving-Iron Movement

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 43 802	scales and pointers for electrical measuring instruments
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

case

window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	on request 15˚...165˚

terminal safety protection

full-sized rear cover or protective sleeves to go on hexagon studs and M4 screws with wire clamps E3

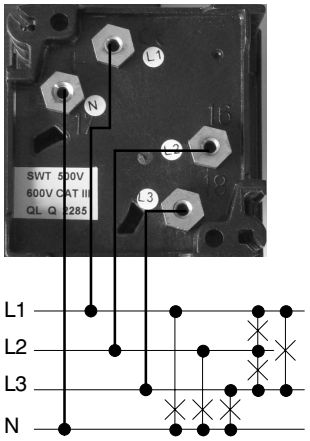
protection against accidental contact (hand and fingers) acc. to VBG 4 / DIN 57 106, sec. 100

dial

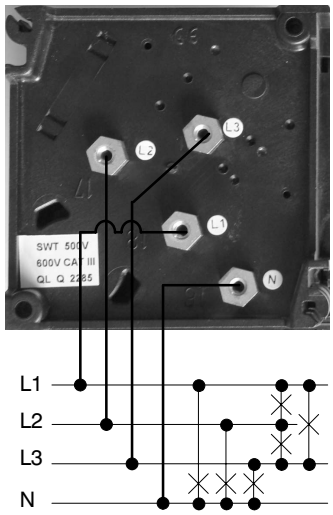
non−calibrated	with dial symbols
blank dial	pencil−marked on initial and end values
scale division and figuring	0 ... 100%
linear scale division	non−standard captions on request
additional lettering	on request e.g. ”generator”
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request

Connections

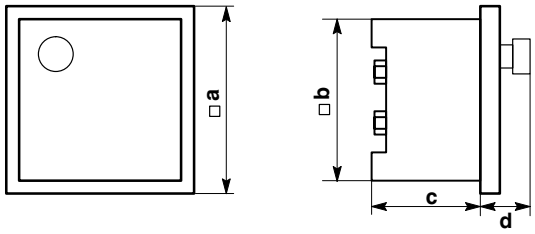
EQ 72 SWT



EQ 96 SWT



Dimensions



dimensions (in mm)	**EQ 72 SWT**	**EQ 96 SWT**
a	72	96
b	66	90
c	53	53
d	13	13

Ordering Information

type **EQ**	 moving-iron panel meter, switchable
front dimensions **72 SWT** **96 SWT**	 72 mm x 72 mm 96 mm x 96 mm
measuring ranges	refer to preceding table
window	glass *) non–glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) on request 15 ... 165° **)
panel fixing	screw clamps *) spring clamps
terminal safety protection	none *) full–sized rear cover protective sleeves
dial	according to measuring range resp. standard series for use on transformers *) non–calibrated, with dial symbols blank dial scale division and figuring 0 ... 100% according to standard series additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.

ordering example

EQ 72 SWT, measuring range 0 ... 500 V, window non–glaring glass, WEIGEL logo

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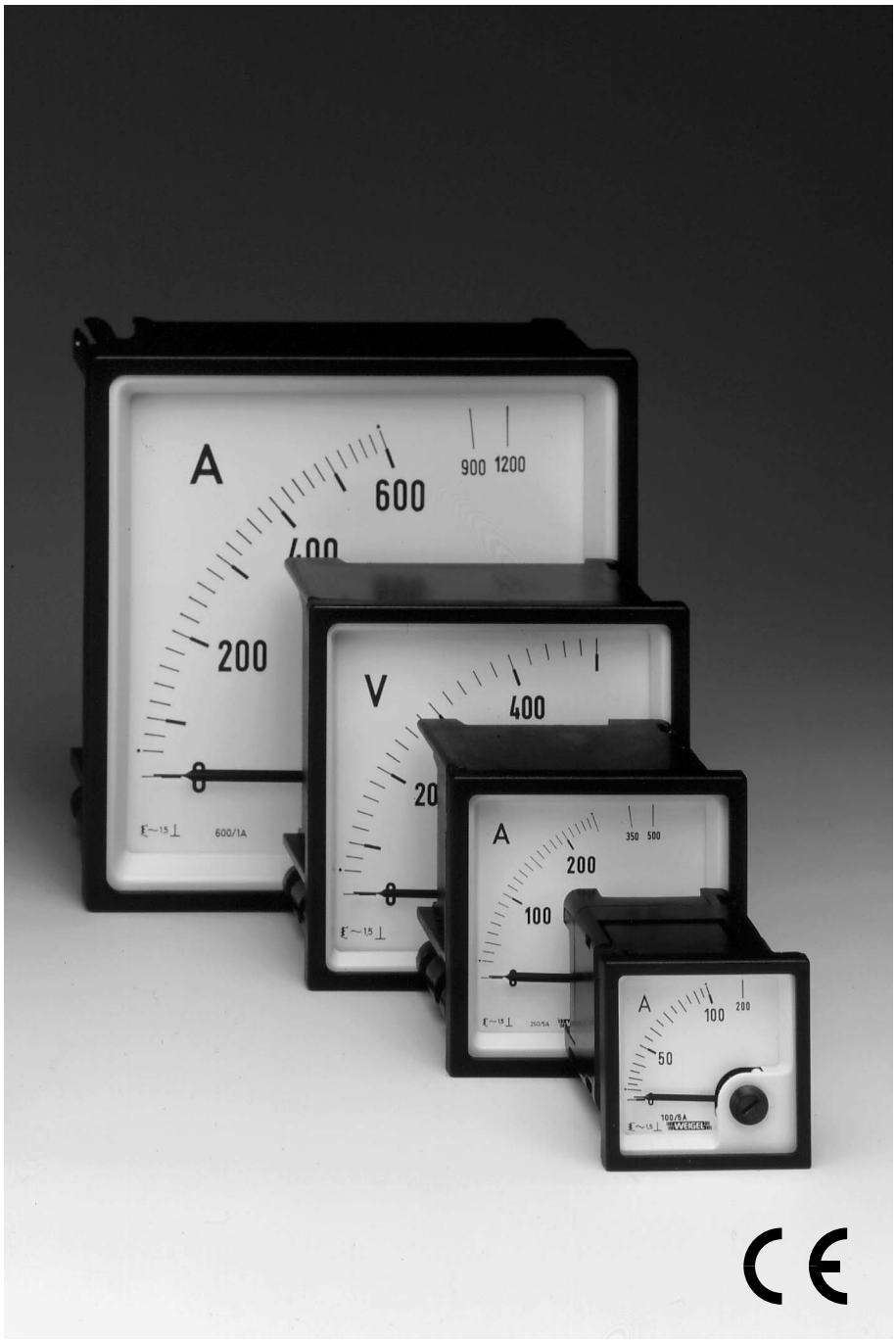
Data Sheet

K Series
420.D.101.07

Analog Meters with Moving-Iron Movement 90° – Dial

EQ 48 K
EQ 72 K
EQ 96 K
EQ 144 K

with Slide-In-Dial



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Application

The moving−iron panel meters **EQ 48**/**72**/**96**/**144 K** (K series) housed in moulded thermoplastic cases are mainly used for the measurement of AC currents and voltages in the usual technical frequency range of $16^2/_3$ ... 100 Hz.

Moving−iron meters indicate rms−values practically independent of wave form even of high harmonics. Error of indication may occur for extreme wave forms (e.g. phase gating controls) and / or frequencies above 100 Hz.

These meters are **not** suitable for use with shunts or tachogenerators due to their high power consumption.

The K−series meters offer application−oriented advantages in switchboard and generating set production, also suitable for mosaic panel mounting. The bezel, the glass window and the dial can be easily exchanged on site.

Movements

Moving−iron movement with pivot suspension, spring loaded shock absorbing jewel bearings and silicon oil damping.

Mechanical Data

case details	moulded square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable
material of case	polycarbonate thermoplastics, flame retardant with UL rating of 94 V − 0
material of window	glass ◗
colour of bezel	black (similar to RAL 9005) ◗
position of use	vertical ±5° ◗
panel fixing	screw clamps or spring clamps (except EQ 144 K)
mounting	stackable next to each other
panel thickness	≤ 40 mm
terminals	
voltmeters and ammeters up to 30 A	hexagon studs, M4 screws and wire clamps E3
ammeters ≥ 40 A	threaded studs M6 with nuts
ammeters >60 A	threaded studs M8 with nuts

dimensions (in mm)	**EQ 48 K**	**EQ 72 K**	**EQ 96 K**	**EQ 144 K**
bezel	□ 48	□ 72	□ 96	□ 144
case	□ 42.5	□ 66	□ 90	□ 136
depth	53	53	53	53
panel cutout	□ $45^{+0.6}$	□ $68^{+0.7}$	□ $92^{+0.8}$	□ 138^{+1}
weight approx.	0.1 kg	0.15 kg	0.2 kg	0.25 kg

◗ also refer to "Options"

Electrical Data

measuring unit	AC voltage / current
frequency range	$16^2/_3$ ... 100 Hz
power consumption	
voltmeters	<4.5 VA
ammeters ≤ 15 A	<0.5 VA
ammeters >15 A	<0.8 VA
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
voltmeters	
5 s max.	2 times, 1000 V max.

ammeters	EQ 48 K	EQ 72/96/144 K
5 s max.	10 times, 200 A max.	10 times
1 s max.	–	40 times, up to 250 A

measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact ◗

Measuring Ranges

measuring ranges	operating voltage			
AC current	EQ 48 K	EQ 72 K	EQ 96 K	EQ 144 K
1; 1,5; 2,5; 4; 5; 6; 10; 15; 25 A [1])	300 V	300 V	300 V	600 V
40; 60; 100 A [1]) *)	–	300 V	300 V	600 V
AC voltage	EQ 48 K	EQ 72 K	EQ 96 K	EQ 144 K
60 V, 100 V	150 V	150 V	150 V	150 V
150 V	150 V	150 V	150 V	150 V
250 V	300 V	600 V	600 V	600 V
400 V, 500 V	300 V	600 V	600 V	600 V
600 V *)	–	600 V	600 V	600 V
for use on VT/**CT**	EQ 48 K	EQ 72 K	EQ 96 K	EQ 144 K
N/1 A, N/5 A [1])	150 V	150 V	150 V	150 V
N/100 V, N/110 V [2])	150 V	150 V	150 V	150 V

Please state transformer ratio when ordering.

*) not for EQ 48 K

[1]) full scale value = 2 times rated value (overload scaling) ◗

[2]) full scale value = 1.2 times rated value (− " −)

Scaling

pointer	bar / knife−edge pointer
pointer deflection	0 ... 90°
scale characteristics	practically linear above 10% of rated full−scale value
scale division	coarse−fine

scale length	EQ 48 K	EQ 72 K	EQ 96 K	EQ 144 K
	41 mm	61 mm	97 mm	146 mm

overload scaling	
ammeters	2 times rated current ◗
voltmeters for use on voltage transformers	1.2 times rated voltage

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Data Sheet

K Series
420.D.101.07

Analog Meters with Moving-Iron Movement 90° – Dial

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23°C±1K
position of use	nominal position ±1°
input	rated measuring value
wave form	sinusoidal, distortion factor ≤ 5%
frequency	45 ... 65 Hz
others	DIN EN 60 051
influences	
ambient temperature	−10°C ... +23°C ... +55°C
position of use	nominal position ±5°
frequency	15 ... 100 Hz (voltage) 15 ... 400 Hz (current)
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 3 acc. to VDE/VDI 3540 sheet 2
operating temperature range	−10 ... +55°C
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 43 802	scales and pointers for electrical measuring instruments
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

case

window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
index marking pointer	red, front adjustable
position of use	on request 15°...165°
marine application	non−certified or with approbation by "Germanischer Lloyd" (except EQ 48 K)

terminal safety protection

full−sized rear cover (except direct−connected ammeters > 25 A),

protective sleeves to go on hexagon studs and M4 screws with wire clamps E3

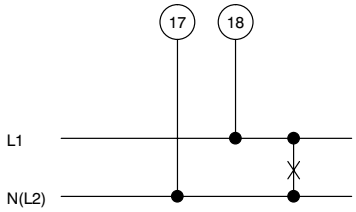
protection against accidental contact (hand and fingers) acc. to VBG 4 / DIN 57 106, sec. 100

dial

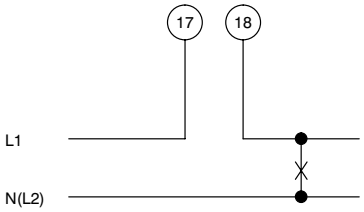
non−calibrated	with dial symbols
blank dial	pencil−marked on initial and end values
scale division and figuring	0 ... 100%
linear scale division	non−standard captions on request
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request
overload scaling (ammeters)	no overload range or overload range 5 times rated current

Connections

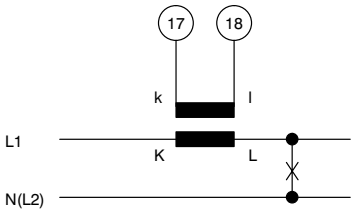
AC voltage (direct−connected)



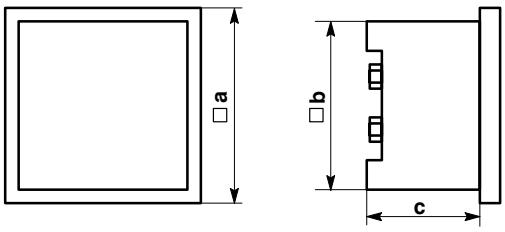
AC current (direct−connected)



AC current (for use on current transformer)



Dimensions



dimensions (in mm)	**EQ 48 K**	**EQ 72 K**	**EQ 96 K**	**EQ 144 K**
a	48	72	96	144
b	42.5	66	90	136
c	53	53	53	53

Ordering Information

type	
EQ	moving−iron panel meter
front dimensions	
48 K	48 mm x 48 mm
72 K	72 mm x 72 mm
96 K	96 mm x 96 mm
144 K	144 mm x 144 mm
measuring ranges	refer to preceding table
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
index marking pointer	none *) red, front adjustable
position of use	vertical *) on request 15 ... 165° **)
marine application	none *) non−certified with approbation by "Germanischer Lloyd" (except EQ 48 K)
panel fixing	screw clamps *) spring clamps (except EQ 144 K)
terminal safety protection	none *) full−sized rear cover protective sleeves
dial	according to measuring range resp. standard series for use on transformers *) non−calibrated, with dial symbols blank dial scale division and figuring 0 ... 100% according to standard series additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
overload scaling (ammeters)	no overload range 2 times rated current *) 5 times rated current
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.

ordering example

EQ 72 K, measuring range 0 ... 150 V, window non−glaring glass, dial 0 ... 100%, no logo

− specifications subject to change without notice; date of issue 06/06 −

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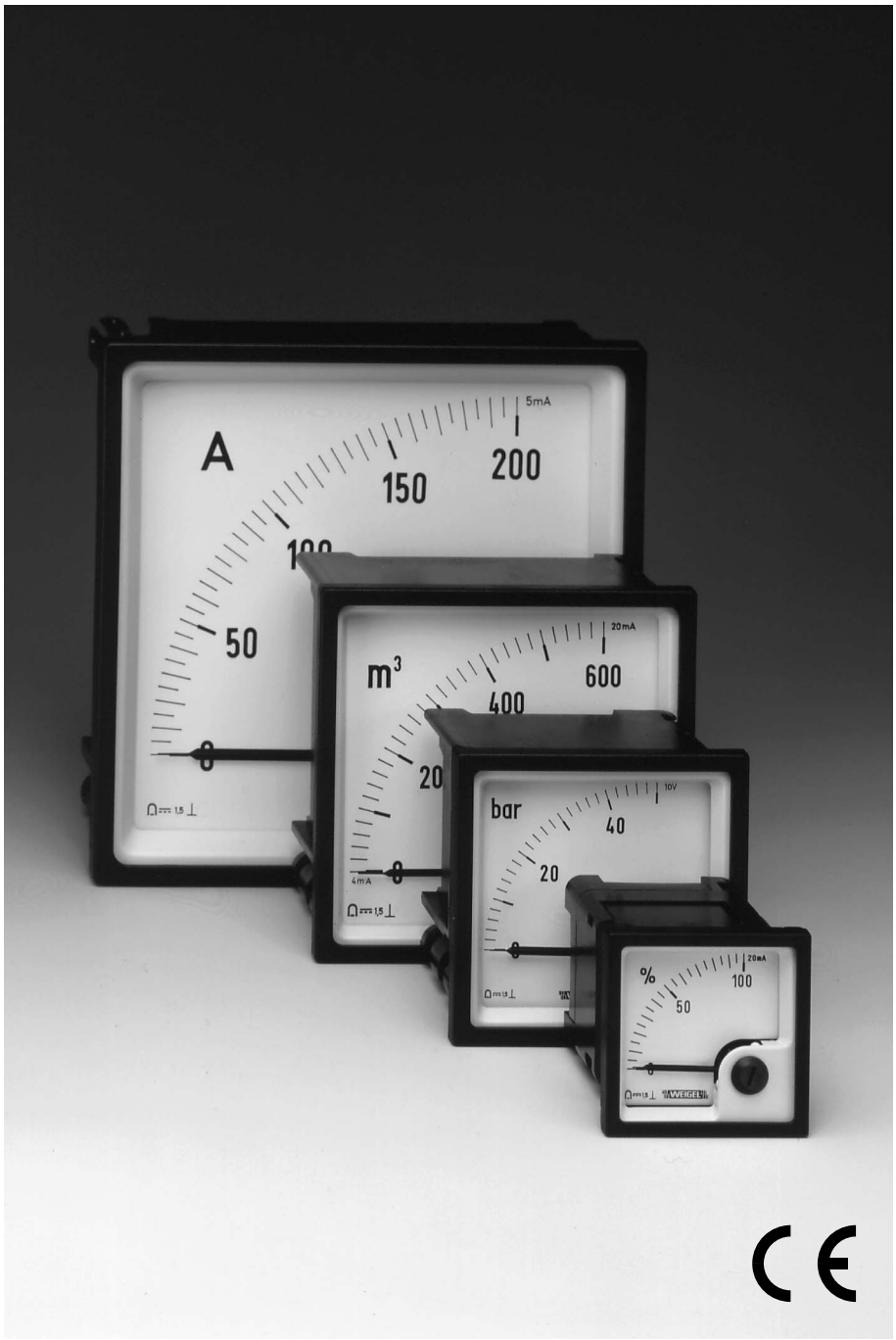
Data Sheet

K Series
410.D.101.10

Analog Meters with Moving-Coil Movement 90° – Dial

PQ 48 K
PQ 72 K
PQ 96 K
PQ 144 K

with Slide-In-Dial



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Application

The moving-coil panel meters **PQ 48/72/96/144 K** (K series) housed in moulded thermoplastic cases are suitable for the measurement of DC currents and voltages.

The instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels. The bezel, the glass window and the dial can be easily exchanged on-site.

Movements

Self-shielding moving-coil movements with core-type magnet and pivot suspension. Spring loaded jewel bearings for vibration and shock resistance.

Mechanical Data

case details	moulded square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable
material of case	polycarbonate thermoplastics, flame retardant with UL rating of 94 V – 0
material of window	glass ➧
colour of bezel	black (similar to RAL 9005) ➧
position of use	vertical ±5° ➧
panel fixing	screw clamps or spring clamps (except PQ 144 K)
mounting	stackable next to each other
panel thickness	≤ 40 mm
terminals	
voltmeters and ammeters ≤ 4 A	hexagon studs, M4 screws and wire clamps E3
ammeters ≤ 60 A	threaded studs M6 with nuts
ammeters 100 A	threaded studs M8 with nuts

dimensions (in mm)	**PQ 48 K**	**PQ 72 K**	**PQ 96 K**	**PQ 144 K**
bezel	□ 48	□ 72	□ 96	□ 144
case	□ 42.5	□ 66	□ 90	□ 136
depth	53	53	53	53
panel cutout	□ $45^{+0.6}$	□ $68^{+0.7}$	□ $92^{+0.8}$	□ 138^{+1}
weight approx.	0.11 kg	0.15 kg	0.2 kg	0.25 kg

Electrical Data

measuring unit	DC voltage or current
overload capacity acc. to DIN EN 60 051-1	
continuously	1.2 times rated voltage / current
5 s max.	2 times rated voltage, 10 times rated current
overvoltage category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case (front side) IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact ➧

➧ also refer to "Options"

Measuring Ranges

For mains use

DC current	voltage drop approx. PQ 48 K	PQ 72/96/144 K	**DC voltage >5V**	sensitivity[1] ➧
100 µA	270 mV	400 mV	6 V	1 kΩ/V
1 mA	30 mV	40 mV	10 V	1 kΩ/V
1.5 mA	90 mV	200 mV	15 V	1 kΩ/V
2.5 mA	90 mV	200 mV	25 V	1 kΩ/V
4 mA	90 mV	200 mV	40 V	1 kΩ/V
5 mA	100 mV	200 mV	60 V	1 kΩ/V
6 mA	100 mV	200 mV	100 V	1 kΩ/V
10 mA	100 mV	200 mV	150 V	1 kΩ/V
15 mA	15 mV	15 mV	250 V	1 kΩ/V
20 mA	60 mV	60 mV	400 V [2)3)]	1 kΩ/V
25 mA	60 mV	60 mV	500 V [2)3)]	1 kΩ/V
40 mA	60 mV	60 mV	600 V [2)3)]	1 kΩ/V
60 mA	60 mV	60 mV		
1 A	60 mV	60 mV		
1.5 A	60 mV	60 mV		
2.5 A	60 mV	60 mV		
4 A	60 mV	60 mV		
6 A	60 mV	60 mV		
10 A	60 mV	60 mV		
15 A	60 mV	60 mV		
25 A	60 mV	60 mV		
40 A [2)]	–	60 mV		
60 A [2)]	–	60 mV		
100 A [2)]	–	60 mV		

for use with external shunt

60 mV / 150 mV: current consumption 15 mA approximately, a total lead resistance of 0.035 Ω is considered in the calibration of the indicator for interconnecting leads 1 m, 2x 1 mm^2

Not for mains use

DC voltage ≤5V	sensitivity[1] ➧
60 mV; 100 mV; 150 mV; 250 mV; 400 mV; 600 mV	1 kΩ/V
1 V; 1.5 V; 2.5 V; 4 V; 5 V	1 kΩ/V

for use on transducer

4 ... 20 mA: mechanically suppressed zero, without zero adjustment, voltage drop approx. 60 mV

Operating Voltages

measuring ranges	operating voltage ➧			
DC current	PQ 48 K	PQ 72 K	PQ 96 K	PQ 144 K
100 µA 1; 1.5; 2.5; 4; 5; 6; 10; 15; 20; 25; 40; 60 mA	150 V	150 V	150 V	150 V
1; 1.5; 2.5; 4; 6; 10; 15; 25 A	150 V	150 V	150 V	150 V
40; 60; 100 A [2)]	–	150 V	150 V	150 V
DC voltage	PQ 48 K	PQ 72 K	PQ 96 K	PQ 144 K
60; 100; 150; 250; 400; 600 mV	150 V	150 V	150 V	150 V
1; 1.5; 2.5; 4; 6; 10; 15; 25; 40; 60; 100 V	150 V	150 V	150 V	150 V
150 V	150 V	150 V	150 V	150 V
250 V	300 V	300 V	300 V	600 V
400; 500; 600 V [2)3)]	–	–	600 V	600 V

[1)] the resistance values are limited to a tolerance of ±20%
[2)] except PQ 48 K
[3)] except PQ 72 K

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

K Series
410.D.101.10

Analog Meters with Moving-Coil Movement 90˚ – Dial

Scaling

pointer	bar / knife–edge pointer			
pointer deflection	0 ... 90˚			
scale characteristics	linear			
scale division	coarse–fine			
scale length	PQ 48 K 41 mm	PQ 72 K 61 mm	PQ 96 K 97 mm	PQ 144 K 146 mm

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051-1
reference conditions	
ambient temperature	23˚C
position of use	nominal position ±1˚
input	rated measuring value
others	DIN EN 60 051-1
influences	
ambient temperature	23˚C±2K
position of use	nominal position ±5˚
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 3 acc. to VDE/VDI 3540 sheet 2
operating temperature range	–10 ... +55˚C
storage temperature range	–25 ... +65˚C
relative humidity	≤ 75% annual average, non–condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

Rules and Standards

DIN 43 718	Measurement and control; front-frames and frontpanels of measurement and control equipment; principal dimensions
DIN 43 802	Line scales and pointers for indicating electrical measuring instruments; general requirements
DIN 16 257	Nominal positions and position symbols used for measuring instruments
DIN EN 60 051	Direct acting indicating analogue electrical measuring instruments and their accessories
–1	Part 1: Definitions and general requirements common to all parts
–2	Part 2: special requirements for ammeters and voltmeters
–9	Part 9: recommended test methods
DIN EN 60 529	Enclosure codes by housings (IP-code)
DIN EN 61 010-1	Safety requirements for electrical measuring, control and laboratory equipment Part 1: General requirements
DIN EN 61 326-1	Electrical equipment for measurement, control and laboratory use – EMC requirements Part 1: General requirements
DIN IEC 61 554	Panel mounted equipment – Electrical measuring instruments – Dimensions for panel mounting
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

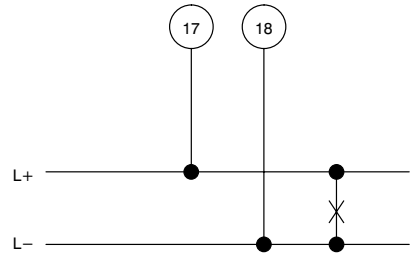
case	
window	non-glaring glass
colour of bezel	gray (similar to RAL 7037)
index marking pointer	red, front adjustable
position of use	on request 15˚...165˚
marine application	non-certified or with approbation by "Germanischer Lloyd" (except EQ 48 K)
dial	
non-calibrated	with dial symbols
blank dial	pencil-marked on initial and end values
scale division and figuring	0 ... 100%
linear scale division	non-standard captions on request
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request
dial illumination	on request
others	
zero position	centre zero or off-set zero
increased sensitivity	4 kΩ/V for voltmeters 1 ... 600 V 10 kΩ/V for voltmeters 1.5 ... 150 V
adjustment of resistance	to ±1% at 23˚C
operating voltage	higher operating voltage on request

terminal protection against accidental contact

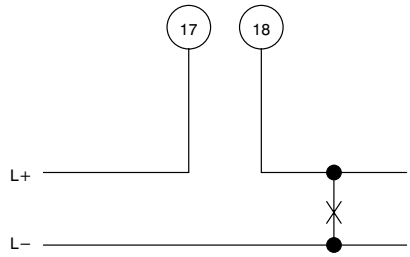
full-sized rear cover (not for directly connected ammeters >5 A),
protective sleeves (for meters with hexagon studs and M4 screws with wire clamps)

Connections

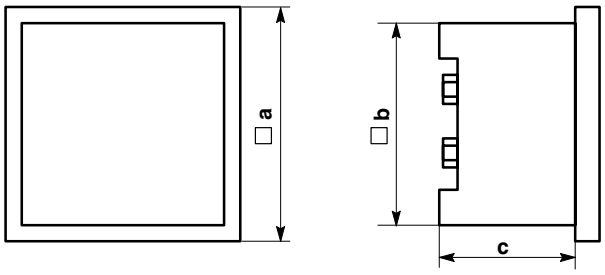
DC voltage



DC current



Dimensions



dimensions (in mm)	**PQ 48 K**	**PQ 72 K**	**PQ 96 K**	**PQ 144 K**
a	48	72	96	144
b	42.5	66	90	136
c	53	53	53	53

Ordering Information

type **PQ**	 moving–coil panel meter
front dimensions **48 K** **72 K** **96 K** **144 K**	 48 mm x 48 mm 72 mm x 72 mm 96 mm x 96 mm 144 mm x 144 mm
measuring ranges	refer to preceding table
window	glass *) non-glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) on request 15 ... 165° **)
panel fixing	screw clamps *) spring clamps (except PQ 144 K)
marine application	none *) non-certified with approbation by "Germanischer Lloyd" (except PQ 48 K)
terminal protection	none *) full-sized rear cover protective sleeves
index marking pointer	none *) red, front adjustable
zero position	left hand zero *) centre or off-set zero **)
increased sensitivity	1 kΩ/V *) 4 kΩ/V for voltmeters 1 ... 600 V 10 kΩ/V for voltmeters 1.5 ... 150 V
adjustment of resistance	±20% *) to ±1% at 23°C
dial	scale division & measuring range alike *) no dial non-calibrated, with dial symbols blank dial scale division and figuring 0 ... 100% linear scale division **) additional lettering on request **) additional figuring on request **) coloured mark red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.

ordering example

PQ 72 K, measuring range 0 ... 20 mA, window non-glaring glass, dial with linear scale division 0 ... 100°C, red mark at 37°C, no logo

– specifications subject to change without notice; date of issue 04/10 –

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DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

K Series
411.D.101.07

Analog Meters with Moving-Coil Movement 240° – Dial

LSP 72 K
LSP 96 K
LSG 72 K
LSG 96 K

with Slide-In-Dial

WEIGEL

Application

The 240° moving–coil panel meters **LSP 72/96 K** (K series) are used for the measurement of DC currents or DC voltages; the moving–coil rectifier meters **LSG 72/96 K** measure sinusoidal AC currents or AC voltages.

The instruments cases are injection moulded in flame retardant thermoplastic. The meters are suitable to be mounted in switchboards, control panels, machinery and/or mosaic grid panels.

The bezel, the glass window and the dial can easily be exchanged on–site.

Movements

Moving–coil movement with a swivel coil system; dual spring loaded jewel bearings for vibration and shock resistance.

The models LSG 72/96 K are AC rectified.

Mechanical Data

case details	square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic grid panels, stackable
material of case	polycarbonate thermoplastics, self–extinguishing, non–dripping with UL rating of 94 V – 0
material of window	glass ➧
colour of bezel	black (similar to RAL 9005) ➧
position of use	vertical ±5° ➧
panel fixing	screw clamps
mounting	stackable next to each other
panel thickness	≤ 40 mm
terminals	hexagon studs with M3 (LSP/G 72 K) or M4 (LSP/G 96 K) screws and wire clamps E3 ➧

dimensions	**LSP/G 72 K**	**LSP/G 96 K**
bezel	□ 72 mm	□ 96 mm
case	□ 66 mm	□ 90 mm
depth	53 mm	53 mm / 104 mm *)
panel cutout	□ $68^{+0.7}$ mm	□ $92^{+0.8}$ mm
weight approx.	0.25 kg	0.3 kg

*) LSG 96 K including built-in miniature current transformer

Electrical Data

measuring unit	LSP	DC current or DC voltage
	LSG	AC current or AC voltage
frequency range	LSG	voltage 40 Hz ... 50 Hz ... 10 kHz current 50 Hz (others on request)
overload capacity (acc. to DIN EN 60 051)		
continuously		1.2 times rated voltage / current
5 s max.		
voltmeters		2 times rated voltage
ammeters		10 times rated current
measurement category		CAT III
operating voltage		refer to Measuring Ranges
pollution level		2
enclosure code		IP 52 case IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact ➧

➧ also refer to "Options"

Measuring Ranges

current	internal resistance[1]) / voltage drop approx. **LSP**	**LSG**	**voltage**	sensitivity[1]) **LSP**	**LSG**
100 µA	6500 Ω	1.5 V	60 mV	200 Ω/V	–
150 µA	4900 Ω	1.5 V	100 mV	200 Ω/V	–
250 µA	2500 Ω	1.5 V	150 mV	200 Ω/V	–
400 µA	2500 Ω	1.5 V	250 mV	200 Ω/V	–
600 µA	1700 Ω	1.5 V	400 mV	1 kΩ/V	–
1 mA	270 Ω	1.5 V	600 mV	1 kΩ/V	–
1.5 mA	225 Ω	1.5 V	1 V	1 kΩ/V	–
2.5 mA	135 Ω	1.5 V	1.5 V	1 kΩ/V	900 Ω/V
4 mA	85 Ω	1.5 V	2.5 V	1 kΩ/V	900 Ω/V
5 mA	12 Ω	1.5 V	4 V	1 kΩ/V	900 Ω/V
6 mA	60 mV	1.5 V	6 V	1 kΩ/V	900 Ω/V
10 mA	60 mV	1.5 V	10 V	1 kΩ/V	900 Ω/V
15 mA	60 mV	1.5 V	15 V	1 kΩ/V	900 Ω/V
20 mA	60 mV	1.5 V	25 V	1 kΩ/V	900 Ω/V
25 mA	60 mV	1.5 V	40 V	1 kΩ/V	900 Ω/V
40 mA	60 mV	1.5 V	60 V	1 kΩ/V	900 Ω/V
60 mA	60 mV	1.5 V	100 V	1 kΩ/V	900 Ω/V
100 mA	60 mV	1.5 V	150 V	1 kΩ/V	900 Ω/V
150 mA	60 mV	1.5 V	250 V	1 kΩ/V	900 Ω/V
250 mA	60 mV	1.5 V	400 V *)	1 kΩ/V	900 Ω/V
400 mA	60 mV	1.5 V	500 V *)	1 kΩ/V	900 Ω/V
600 mA	60 mV	1.5 V	600 V *)***)	1 kΩ/V	900 Ω/V
1 A **)	60 mV	0.2 V	➧	➧	
1.5 A **)	60 mV	0.2 V			
2.5 A **)	60 mV	0.2 V			
4 A **)	60 mV	0.3 V			
➧					
LSG for use on transformer					
N/1 A **)	–	0.2 V	sec. 100 V	–	900 Ω/V
N/5 A **)	–	0.3 V	sec. 110 V	–	900 Ω/V

(scaling without overload range) ➧

LSP for use on transducer ("live zero")

0/4 ... 20 mA	electrically suppressed zero with zero adjustment, voltage drop approx. 900 mV

LSP for use with external shunt

60 mV	sensitivity 200 Ω/V [1])
150 mV	sensitivity 200 Ω/V [1])

a total lead resistance of 0.050 Ω is considered in the calibration of the indicator for interconnecting leads 1 m, 2x 0.75 mm^2 ➧

measuring ranges	operating voltage			
current	150 V (LSP/LSG 72/96 K)			
voltage	LSP 72 K	LSP 96 K	LSG 72 K	LSG 96 K
60; 100; 150; 250; 400; 600 mV; 1 V	150 V	150 V	–	–
1.5; 2.5; 4; 6; 10; 15; 25; 40; 60; 100 V	150 V	150 V	150 V	150 V
150 V	150 V	150 V	150 V	150 V
250 V	300 V	600 V	300 V	600 V
400; 500 V *)	–	600 V	300 V	600 V
600 V *)***)	–	600 V	–	600 V

[1]) the resistance values are limited to a tolerance of ±20% ➧
*) not for LSP 72 K
**) separate (LSG 72 K) resp. built-on (LSG 96 K) miniature current transformer 50 Hz, 10 mA sec. included
***) not for LSG 72 K

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

K Series
411.D.101.07

Analog Meters with Moving-Coil Movement 240˚ – Dial

Scaling

scale	flat dial	
pointer	bar / knife–edge pointer	
colour of pointer	black ◗	
pointer deflection	0 ... 240˚	
colour of dial	white ◗	
scale characteristics	linear	
scale division	coarse–fine	
scale length	LSP/G 72 K 106 mm	LSP/G 96 K 142 mm

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051 ◗	
reference conditions		
ambient temperature	23˚C±1K	
position of use	nominal position ±1˚ ◗	
input	rated measuring value	
frequency	LSG	50±2 Hz
wave form	LSG	sinusoidal, distortion factor <5%
others	DIN EN 60 051	
influences		
ambient temperature	−25˚C ... +23˚C ... +40˚C	
position of use	nominal position ±5˚	
frequency	LSG	40 Hz ... 50 Hz ... 10 kHz
stray magnetic field	0.5 mT	

Environmental

climatic suitability	climatic class 2 ◗ according to VDE/VDI 3540 sheet 2 ◗
operating temperature range	−25 ... +40˚C ◗
storage temperature range	−25 ... +65˚C
relative humidity	≤ 75% annual average, non–condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 43 802	scales and pointers for electrical measuring instruments
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

measuring range	
special measuring range	deviating from standard
measuring range adjustment	adjustment potentiometer installed in voltmeters LSP/LSG 96 K, adjustment range approx. ±10% or ±20 ... 50%; ammeters and LSP/G 72 K on request
accuracy class	1.0 with fine scale division (as far as practicable)
adjustment	of internal resistance to ±1% at 23˚C
lead resistance	calibration to >0.05Ω
increased sensitivity	to 2 kΩ/V, 5 kΩ/V or 10 kΩ/V for voltmeters 1 ... 600 V (as far as practicable)
case	
window	non–glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or to be specified 15˚...165˚
terminals	connector blades 6.3 x 0.8
performance	
climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540
with operating temperature range	−25 ... +55˚C
marine application	non–certified
enclosure code	at least IP 53 (front of case with meter mounted)

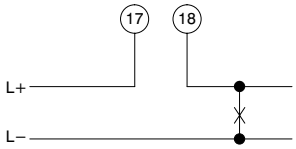
terminal protection

full–sized rear cover or protective sleeves
safe against accidental backhanded and fingertip contact
complying with VBG 4 / DIN 57 106, section 100

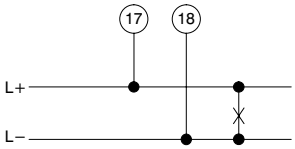
dial	
blank dial	pencil marked initial and end values
scale division and figuring	0 ... 100%, linear, full–scale values acc. to DIN series (1-1.2-1.5-2-2.5-3-4-5-6-7.5 and any decimal multiple of these numbers e.g. 150 m^3/h) or deviating from DIN series; special calibration from customer's non–linear graph or chart; scaling of voltmeters in ohms; captions optional
2nd scale division	including figuring
coloured dial	dial plate black; pointer, DIN scale division and figuring yellow or white non–glaring glass window included
additional lettering	to be specified e.g. "generator"
additional figuring	to be specified
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or to be specified
zero position	centre zero or off–set zero
overload scaling LSG ammeters for use on CT	2 to 5 times rated current
expanded scale	expanded initial scale division (electronically) up to approx. 5% of full–scale value in centre scale
dial illumination	by two lamps 6 V, 12 V or 24 V, dial translucent (LSP/LSG 96 K only; LSP/LSG 72 K on request)

Connections

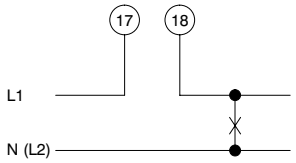
DC current

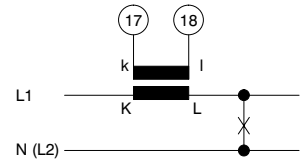


DC voltage

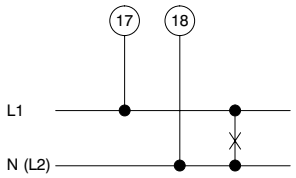


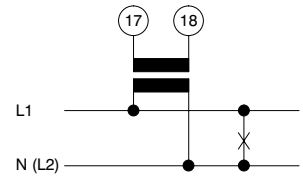
AC current



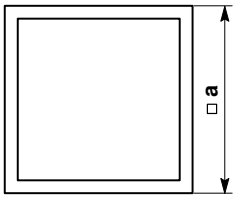


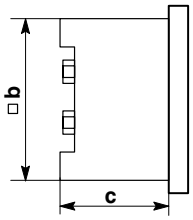
AC voltage





Dimensions





dimensions (in mm)	**LSP/G 72 K**	**LSP/G 96 K**
a	72	96
b	66	90
c	53	53 / 104 *)

*) LSG 96 K including built-in miniature current transformer

Ordering Information

type **LSP** **LSG**	240° moving–coil panel meter measuring DC current or DC voltage measuring AC current or AC voltage
front dimensions **72 K** **96 K**	 72 mm x 72 mm 96 mm x 96 mm
measuring ranges	refer to preceding table
special measuring range	to be specified **)
measuring range adjustment (voltmeters)	none *) adjustment range ±10% approx. ***) adjustment range ±20 ... 50% approx. ***)

accuracy class	1.5 *) 1.0 with fine scale division
adjustments	internal resistance to ±20% *) internal resistance to ±1% at 23°C lead resistance >0.05 Ω
sensitivity (voltmeters)	1 kΩ/V *) increased to 2 kΩ/V increased to 5 kΩ/V increased to 10 kΩ/V
window	glass *) non–glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) to special order 15 ... 165°
climatic suitability	class 2, –25 ... +40°C *) class 3, –25 ... +55°C
marine application	none *) non–certified
enclosure code	IP 52 *) IP 53 at least
terminal safety protection	none *) full–sized rear cover ***) protective sleeves
terminals	screws and wire clamps *) connector blades 6.3 x 0.8
dial	scale division and measuring range alike resp. full–scale values to DIN series blank dial scale division and figuring 0 ... 100% deviating from DIN series **) calibration fr. non–linear graph or chart **) scaling in ohms for voltmeters **) 2nd scale division **) black dial, yellow scale division black dial, white scale division additional lettering to be specified **) additional figuring to be specified **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo on dial	WEIGEL *) none OEM logo **)
zero position	left–hand zero *) centre zero or off–set zero **)
expanded initial scale	none *) up to approx. 5%, electronically
overload scaling LSG ammeters for CT use	without overload range *) 2 to 5 times rated current
dial illumination	none *) by 2 lamps 6 V, 12 V or 24 V ***)

*) standard
**) Please clearly add the desired specifications.
***) LSP/G 96 K only

ordering example

LSP 72 K, measuring range 0 ... 20 mA, scale 0 ... 100 A, window non–glaring glass, WEIGEL logo

– specifications subject to change without notice; date of issue 02/07 –

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TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

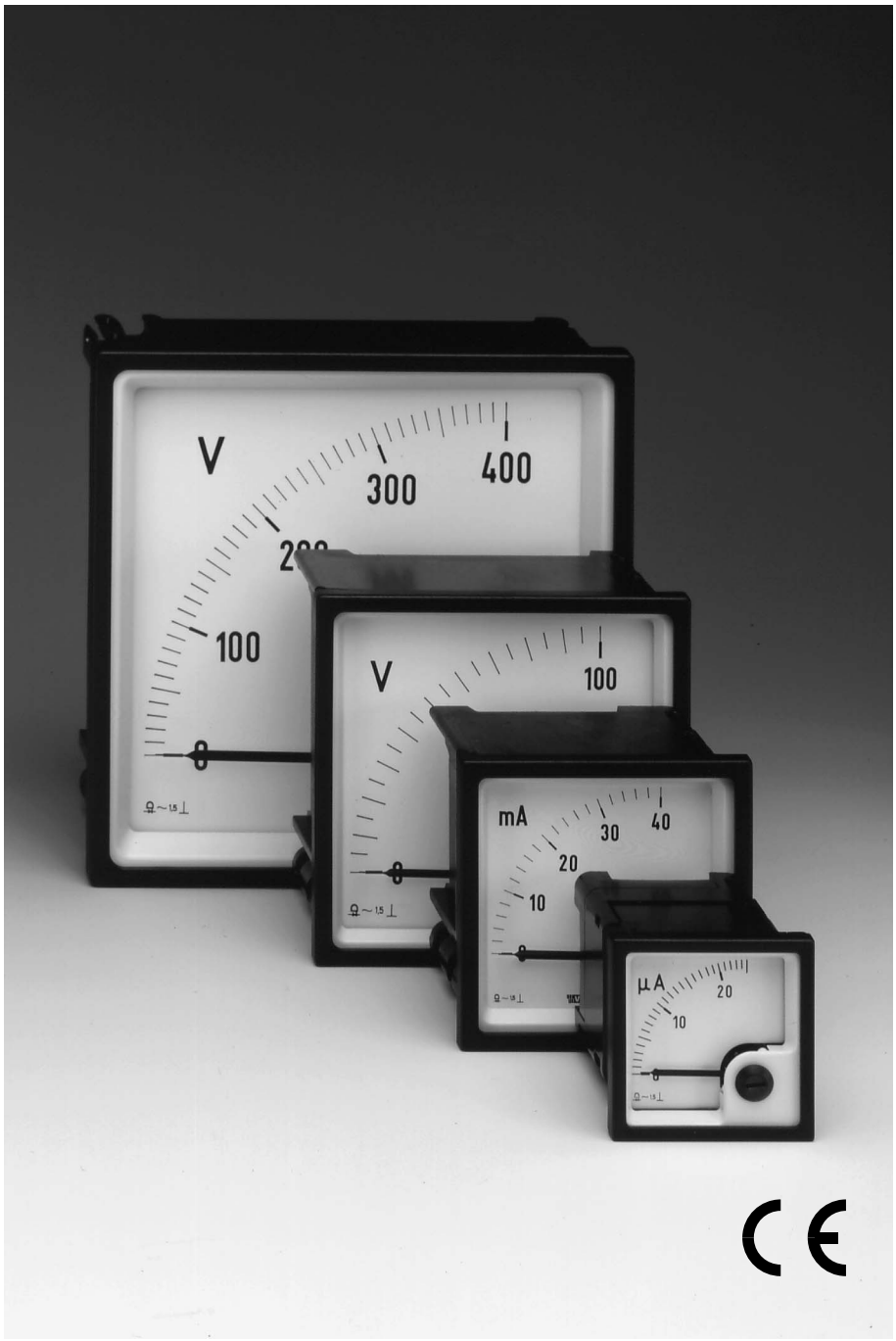
Data Sheet

K Series
415.D.101.08

Analog Meters with Moving-Coil Movement and Rectifier 90° – Dial

VQ 48 K
VQ 72 K
VQ 96 K
VQ 144 K

with Slide-In-Dial



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Application

The moving–coil rectifier meters **VQ 48/72/96/144 K** (K series) housed in moulded thermoplastic cases are used for the measurement of sinusoidal AC currents and voltages.

Moving–coil rectifier instruments measure average values and are scaled to indicate r.m.s., assuming a sinusoidal wave form.

The instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels. The bezel, the glass window and the dial can be easily exchanged on–site.

Movements

Self–shielding moving–coil movements with core–type magnet and pivot suspension. Spring loaded jewel bearings for vibration and shock resistance.

Mechanical Data

case details	moulded square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable
material of case	polycarbonate thermoplastics, flame retardant with UL rating of 94 V – 0
material of window	glass ◗
colour of bezel	black (similar to RAL 9005) ◗
position of use	vertical ±5° ◗
panel fixing	screw clamps or spring clamps (except VQ 144 K)
mounting	stackable next to each other
panel thickness	≤ 40 mm
terminals	hexagon studs, M4 screws and wire clamps E3

dimensions (in mm)	**VQ 48 K**	**VQ 72 K**	**VQ 96 K**	**VQ 144 K**
bezel	□ 48	□ 72	□ 96	□ 144
case	□ 42.5	□ 66	□ 90	□ 136
depth	53	53	53	53
panel cutout	□ $45^{+0.6}$	□ $68^{+0.7}$	□ $92^{+0.8}$	□ 138^{+1}
weight approx.	0.11 kg	0.15 kg	0.2 kg	0.25 kg

Electrical Data

measuring unit	AC voltage or current
frequency range	voltage 40 Hz ... 50 Hz ... 10 kHz current 50 Hz (others on request)
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
5 s max.	2 times rated voltage, 10 times rated current
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact ◗

Measuring Ranges

AC current	voltage drop approx.	**AC voltage**	sensitivity[1])
10 mA	1.7 V	6 V	900 Ω/V
15 mA	1.7 V	10 V	900 Ω/V
25 mA	1.7 V	15 V	900 Ω/V
40 mA	1.9 V	25 V	900 Ω/V
60 mA	1.9 V	40 V	900 Ω/V
100 mA	2.0 V	60 V	900 Ω/V
		100 V	900 Ω/V
		150 V	900 Ω/V
		250 V	900 Ω/V
		400 V	900 Ω/V
		500 V	900 Ω/V
		600 V *)	900 Ω/V

measuring ranges	operating voltage			
AC current	VQ 48 K	VQ 72 K	VQ 96 K	VQ 144 K
10; 15; 20; 25; 40; 60; 100 mA	150 V	150 V	150 V	150 V
AC voltage	VQ 48 K	VQ 72 K	VQ 96 K	VQ 144 K
6; 10; 15; 25; 40; 60; 100; 150 V	150 V	150 V	150 V	150 V
250 V	300 V	300 V	300 V	600 V
400; 500 V	300 V	300 V	300 V	600 V
600 V *)	–	–	600 V	600 V

*) not for VQ 48/72 K
1) the resistance values are limited to a tolerance of ±20%

Scaling

pointer	bar / knife–edge pointer			
pointer deflection	0 ... 90°			
scale characteristics	linear			
scale division	coarse–fine			
scale length	VQ 48 K	VQ 72 K	VQ 96 K	VQ 144 K
	41 mm	61 mm	97 mm	146 mm

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051 ◗
reference conditions	
ambient temperature	23°C±1K
position of use	nominal position ±1° ◗
input	rated measuring value
frequency	45 ... 50 ... 65 Hz
wave form	sinusoidal, distortion factor <5%
others	DIN EN 60 051
influences	
ambient temperature	–10°C ... +23°C ... +55°C
position of use	nominal position ±5°
frequency	40 ... 50 ... 100 Hz
stray magnetic field	0.5 mT

◗ also refer to "Options"

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

K Series
415.D.101.08

Analog Meters with Moving-Coil Movement and Rectifier 90° – Dial

Environmental

climatic suitability	climatic class 3 acc. to VDE/VDI 3540 sheet 2
operating temperature range	−10 ... +55°C
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 43 802	scales and pointers for electrical measuring instruments
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

case

window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
index marking pointer	red, front adjustable
position of use	on request 15°...165°
marine application	non−certified or with approbation by "Germanischer Lloyd" (except VQ 48 K)

dial

non−calibrated	with dial symbols
blank dial	pencil−marked on initial and end values
scale division and figuring	0 ... 100%
linear scale division	non−standard captions on request
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request

others

increased sensitivity	4 kΩ/V for voltmeters 6 ... 600 V 10 kΩ/V for voltmeters 6 ... 150 V
adjustment of resistance	to ±1% at 23°C

terminal protection against accidental contact

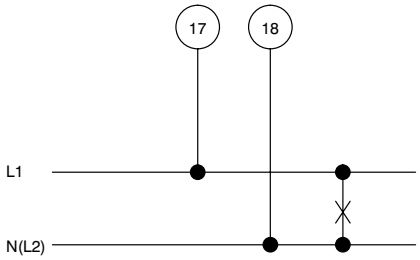
full−sized rear cover (except direct−connected ammeters > 25 A),

protective sleeves to go on hexagon studs and M4 screws with wire clamps E3

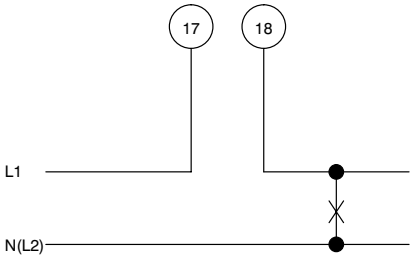
protection against accidental contact (hand and fingers) acc. to VBG 4 / DIN 57 106, sec. 100

Connections

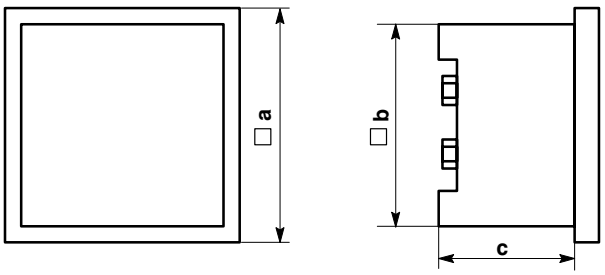
AC voltage



AC current



Dimensions



dimensions (in mm)	**VQ 48 K**	**VQ 72 K**	**VQ 96 K**	**VQ 144 K**
a	48	72	96	144
b	42.5	66	90	136
c	53	53	53	53

Ordering Information

type **VQ**	 moving−coil rectifier panel meter
front dimensions **48 K** **72 K** **96 K** **144 K**	 48 mm x 48 mm 72 mm x 72 mm 96 mm x 96 mm 144 mm x 144 mm
measuring ranges	refer to preceding table
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) on request 15 ... 165° **)
panel fixing	screw clamps *) spring clamps (except VQ 144 K)
marine application	none *) non−certified with approbation by "Germanischer Lloyd" (except VQ 48 K)
terminal protection	none *) full−sized rear cover protective sleeves
index marking pointer	none *) red, front adjustable
increased sensitivity	4 kΩ/V for voltmeters 6 ... 600 V 10 kΩ/V for voltmeters 6 ... 150 V
adjustment of resistance	none *) to ±1% at 23°C
dial	scale division & measuring range alike *) no dial non−calibrated, with dial symbols blank dial scale division and figuring 0 ... 100% linear scale division **) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.

ordering example

VQ 72 K, measuring range 0 ... 100 mA, window non−glaring glass, dial 0 ... 100%, red mark at 90%, no logo

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DIN EN ISO 9001
Certificate: 01 100 80407

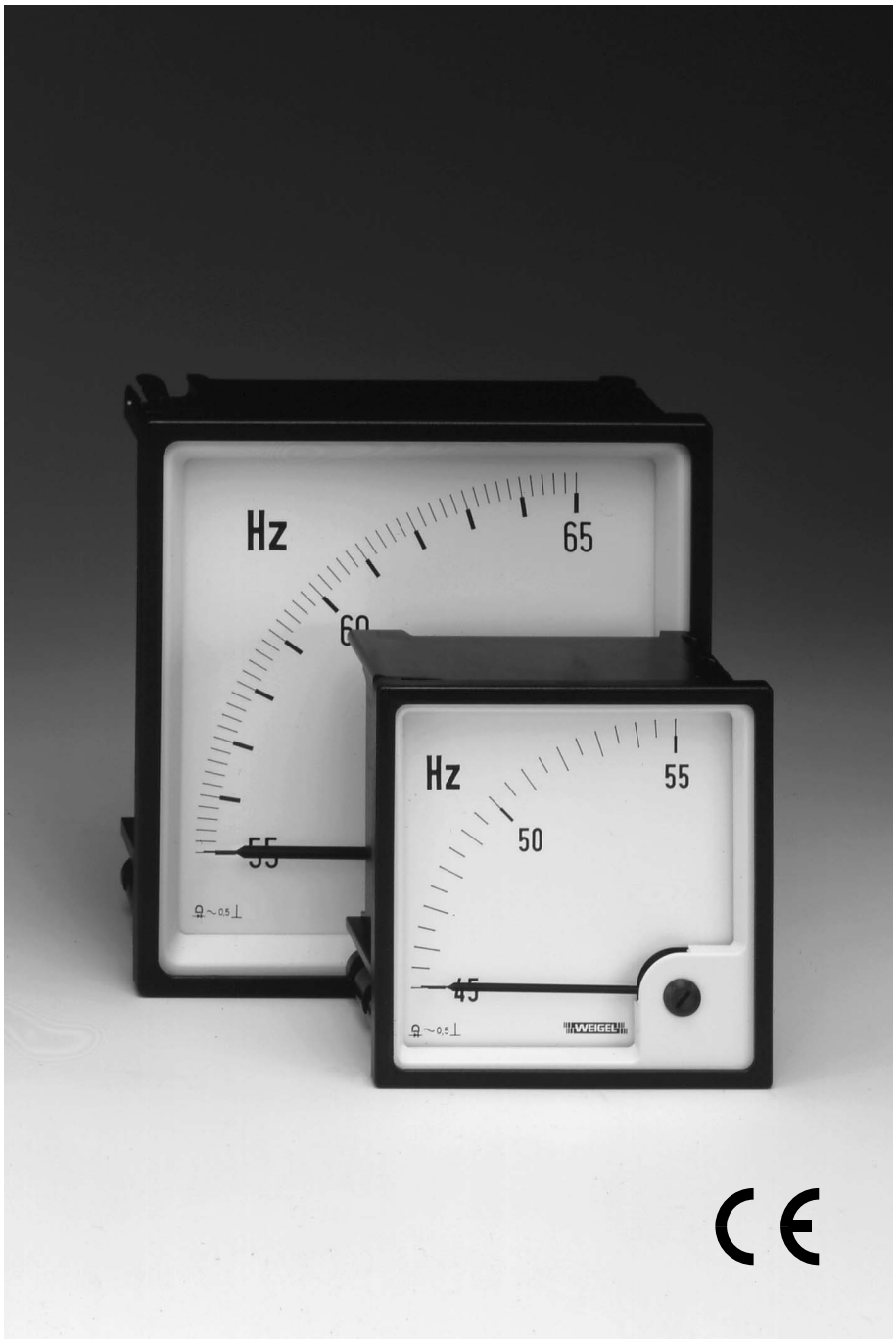
Data Sheet

K Series
432.D.101.07

Analog Pointer-Type Frequency Meters 90° or 240° Dial

ZQ 72 K
ZQ 96 K
ZQ 144 K
LSZ 96 K

with Slide-In-Dial



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Application

The pointer−type frequency meters **ZQ 72**/**96**/**144 K** with 90˚ dial and **LSZ 96 K** with 240˚ dial (K series) housed in moulded thermoplastic cases are used for measurement of frequencies in the range of 50, 60, 200 or 400 Hz.

For maximum accuracy, the meteers show only a small range around the selected nominal frequency. The non - interesting measuring range is suppressed electronically.

The bezel, the front window and the dial can be exchanged easily.

Functional Principle

Self - shielding moving - coil movements with core - type magnet and pivot suspension (ZQ) or with swivel coil (LSZ). Spring loaded jewel bearings for vibration and shock resistance.

Electronic measuring unit based on condensor reloading.

Mechanical Data

case details	moulded square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable
material of case	polycarbonate thermoplastics, flame retardant with UL rating of 94 V − 0
material of window	glass ➧
colour of bezel	black (similar to RAL 9005) ➧
position of use	vertical ±5˚ ➧
panel fixing	screw clamps
mounting	stackable next to each other
panel thickness	≤ 40 mm
terminals	hexagon studs, M4 screws and wire clamps E3

dimensions	**ZQ 72 K**	**ZQ/LSZ 96 K**	**ZQ 144 K**
bezel	□ 72 mm	□ 96 mm	□ 144 mm
case	□ 66 mm	□ 90 mm	□ 136 mm
depth	53 mm	53 mm	53 mm
panel cutout	□ $68^{+0.7}$ mm	□ $92^{+0.8}$ mm	□ 138^{+1} mm
weight approx.	0,3 kg	0,3 kg	0,3 kg

Electrical Data

measuring unit	frequency
admissible voltage variation	−15% ... +10% of rated voltage
power consumption	≤ 3 VA
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact ➧

➧ also refer to "Options"

Measuring Ranges

frequency range

45 ... 50 ... 55 Hz
48 ... 50 ... 52 Hz
55 ... 60 ... 65 Hz
58 ... 60 ... 62 Hz
180 ... 200 ... 220 Hz
360 ... 400 ... 440 Hz
380 ... 400 ... 420 Hz

rated voltage	operating voltage ZQ 72 K	ZQ 96 K	ZQ 144 K	LSZ 96 K
57.7 V	150 V	150 V	150 V	150 V
63.5 V	150 V	150 V	150 V	150 V
100 V	150 V	150 V	150 V	150 V
110 V	150 V	150 V	150 V	150 V
115 V	150 V	150 V	150 V	150 V
120 V	150 V	150 V	150 V	150 V
127 V	150 V	150 V	150 V	150 V
208 V	300 V	300 V	600 V	600 V
230 V	300 V	300 V	600 V	600 V
289 V	300 V	300 V	600 V	600 V
400 V	300 V	300 V	600 V	600 V
415 V	300 V	300 V	600 V	600 V
440 V	300 V	300 V	600 V	600 V
500 V	300 V	300 V	600 V	600 V

Scaling

dial	flat dial
pointer	bar / knife−edge pointer
pointer deflection	0 ... 90˚ (ZQ) 0 ... 240˚ (LSZ)
scale characteristics	linear
scale division	coarse−fine

scale length	ZQ 72 K	ZQ 96 K	ZQ 144 K	LSZ 96 K
	61 mm	97 mm	146 mm	142 mm

Accuracy at Reference Conditions

accuracy class	0.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23˚C±1K
position of use	nominal position ±1˚ ➧
input	rated measuring value
voltage	nominal voltage
others	DIN EN 60 051
influences	
ambient temperature	−10˚C ... +23˚C ... +55˚C
position of use	nominal position ±5˚
stray magnetic field	0.5 mT

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

K Series
432.D.101.07

Analog Pointer-Type Frequency Meters 90° or 240° Dial

Environmental

climatic suitability	climatic class 3 acc. to VDE/VDI 3540 sheet 2
operating temperature range	−10 ... +55°C
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 43 802	scales and pointers for electrical measuring instruments
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

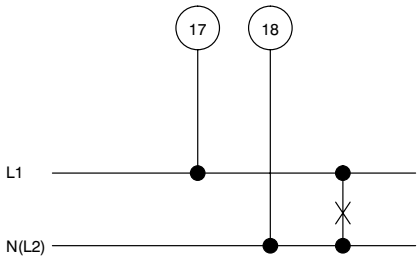
case

window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
index marking pointer	red, front adjustable (ZQ 72/96/144 K only)
position of use	on request 15°...165°
marine application	non−certified or with approbation by "Germanischer Lloyd" (ZQ 96/144 K only)

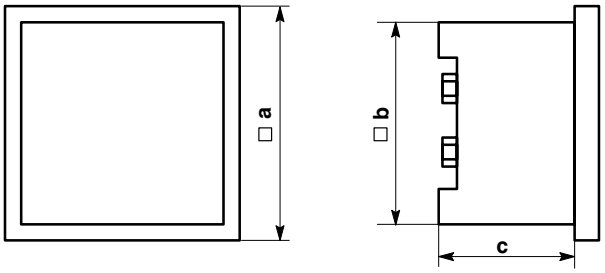
dial

non−calibrated	with dial symbols
blank dial	pencil−marked on initial and end values
scale division and figuring	0 ... 100%
linear scale division	non−standard captions on request
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request

Connections



Dimensions



dimensions (in mm)	**ZQ 72 K**	**ZQ/LSZ 96 K**	**ZQ 144 K**
a	72	96	144
b	66	90	136
c	53	53	53

Ordering Information

type	
ZQ	pointer−type frequency meter, 90° dial
LSZ (96 K only)	pointer−type frequency meter, 240° dial
front dimensions	
72 K	72 mm x 72 mm
96 K	96 mm x 96 mm
144 K	144 mm x 144 mm
measuring ranges	refer to preceding table
rated voltages	refer to preceding table
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
index marking pointer	none *) red, front adjustable ****)
position of use	vertical *) on request 15 ... 165° **)
marine application	none *) non−certified with approbation by "Germanischer Lloyd" ***)
terminal protection	none *) full−sized rear cover protective sleeves
dial	scale division & measuring range alike *) no dial non−calibrated, with dial symbols blank dial scale division and figuring 0 ... 100% linear scale division **) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.
***) ZQ 96/144 K only
****) ZQ 72/96/144 K only

ordering example

ZQ 96 K, measuring range 45 ... 50 ... 55 Hz, rated voltage AC 230 V, window non−glaring glass, WEIGEL logo

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Certificate: 01 100 80407

Data Sheet

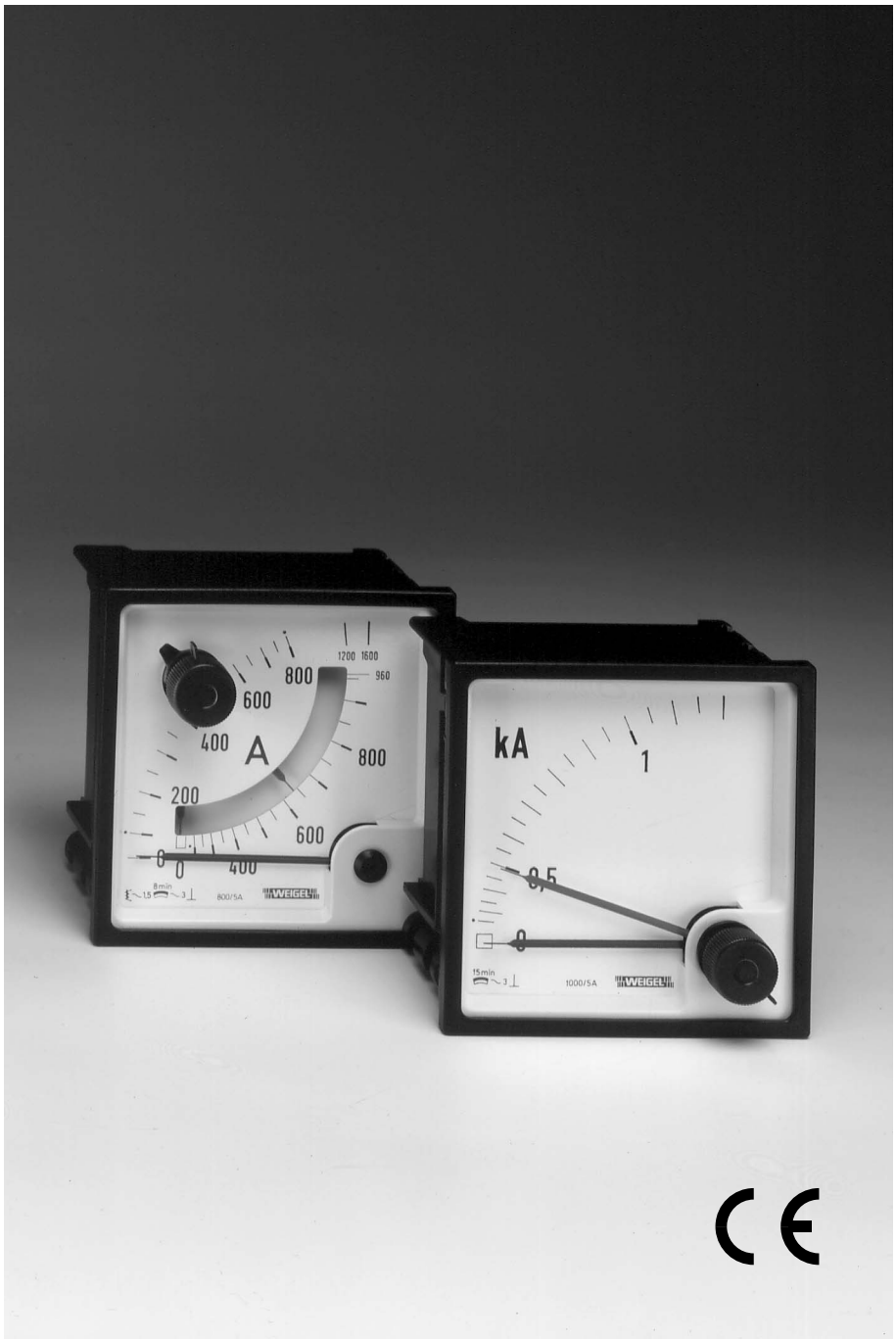
K Series
450.D.101.08

Analog Meters

Maximum Demand Indicators with Bimetallic Movement, Combined M.D.I. and Moving – Iron Ammeter

BIQ 48 K
BIEQ 72 K
BIQ 72 K
BIEQ 96 K
BIQ 96 K

with Slide – In – Dial



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Application

Bimetallic maximum demand indicators monitor the most economic use of transformer stations and L.T. distribution feeders by indicating the thermal/time characteristics of the load.

The bimetallic movements are thermally inert. They indicate the mean rms−value over 15 or 8 minute periods enabling to evaluate continuous loads rather than short−time current peaks.

The high torque of the thermal movement offers the possibility to drive a red slave pointer linked to the instrument pointer. Thereby, the highest current reached in the circuit can be read off at any time. The slave pointer is reset to the position of the indicator pointer by means of a sealable reset knob.

Where the instantaneous and maximum demand currents are required, the **BIEQ 72/96 K** instruments combine a thermal bimetallic and a moving−iron movement installed diametrically in one case.

The maximum demand indicators are suitable to be installed in switchboards, mosaic grid panels (except model BIQ 48 K) or machine tool consoles. The bezel, the glass window and the dial can easily be exchanged on−site.

Functional Principle

Bimetallic movement with resetable red slave pointer and a thermally delayed indication enabling to measure the mean rms−value within a time lag of 8 min or 15 min.

Moving iron movement with shell−type system, silicon oil damping, pivot and spring−loaded jewel bearings (response time approx. 1 s).

Mechanical Data

case details	square case suitable to be mounted in control / switchgear panels or mosaic grid panels (except model BIQ 48 K), stackable
material of case	polycarbonate thermoplastics, self−extinguishing with UL rating of 94 V − 0
material of window	glass ◗
colour of bezel	black (similar to RAL 9005) ◗
position of use	vertical ±5° ◗
panel fixing	swivel screw clamps or plate springs on top and bottom (except BIEQ 72 K ◗)
mounting	stackable next to each other
terminals	hexagon studs, M4 screws and wire clamps E3 terminal safety protection ◗

dimensions (in mm)	**BIQ 48 K**	**BIQ 72 K**	**BIEQ 72 K**
bezel	□ 48 mm	□ 72	□ 72
case	□ 45	□ 66	□ 66
mounting depth	48	53	53
panel cutout	□ $45.2^{+0.3}$	□ $68^{+0.7}$	□ $68^{+0.7}$
panel thickness	1 ... 15	≤ 40	≤ 40
weight approx.	0.1 kg	0.2 kg	0.2 kg

dimensions (in mm)	**BIQ 96 K**	**BIEQ 96 K**
bezel	□ 96	□ 96
case	□ 90	□ 90
mounting depth	60	60
panel cutout	□ $92^{+0.8}$	□ $92^{+0.8}$
panel thickness	≤ 40	≤ 40
weight approx.	0.26 kg	0.3 kg

Electrical Data

measuring unit	AC current				
frequency range	50 ... 100 Hz				
power consumption	BIQ			BIEQ	
VA ratings	48 K	72 K	96 K	72 K	96 K
at 1 A rated current	<0.5	<1	<1	<1.6	<1.6
at 5 A rated current	<2.2	<2.5	<2.5	<2.7	<3.4

overload capacity (acc. to DIN EN 60 051)
continuously 1.2 times rated current
1 s max. 10 times rated current

Saturating current transformers shall be used to protect the movements against overloads exceeding specified overload ratings.

measurement category CAT III

operating voltage	BIQ			BIEQ	
	48 K	72 K	96 K	72 K	96 K
	600 V	600 V	150 V	150 V	150 V

pollution level 2

enclosure code
IP 52 case
IP 00 for terminals without protection against accidental contact
IP 20 for terminals protected against accidental contact ◗

Measuring Ranges

measuring ranges AC current

bimetallic	0 ... **1** / 1.2 **A**	or	0 ... **5** / 6 **A**
moving iron	0 ... **1** / 2 **A**		0 ... **5** / 10 **A**

for use on **current transformer** (scaling to DIN series)

bimetallic	0 ... **N/1** / 1.2 **A**	or	0 ... **N/5** / 6 **A**
moving iron (with overload scaling)	0 ... **N/1** / 2 **A**		0 ... **N/5** / 10 **A**

movements available	BIQ			BIEQ	
	48 K	72 K	96 K	72 K	96 K
bimetallic 1 A	●	●	●	●	●
moving iron 1 A	–	–	–	●	●
bimetallic 5 A	●	●	●	●	●
moving iron 5 A	–	–	–	●	●

Scaling

pointer	bar / knife−edge pointer	
pointer deflection	0 ... 90°	
scale characteristics	bimetallic quadratic;	moving−iron practically linear;
	scales are calibrated down to $^1/_5$ th rated current.	
overload scaling	bimetallic ◗ 1.2 times rated current	moving−iron 2 times rated current
scale division	coarse−fine	

scale length	BIQ			BIEQ	
	48 K	72 K	96 K	72 K	96 K
bimetallic	44 mm	62 mm	98 mm	44 mm	71 mm
moving−iron	–	–	–	62 mm	98 mm

	BIQ			BIEQ	
thermal time delay ◗	48 K	72 K	96 K	72 K	96 K
bimetallic movem.	15 min	15 min	15 min	15 min	15 min
response time moving iron movem.	–	–	–	approx. 1 s	

◗ also refer to "Options"

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

K Series
450.D.101.08

Analog Meters

Maximum Demand Indicators with Bimetallic Movement, Combined M.D.I. and Moving−Iron Ammeter

Accuracy at Reference Conditions

accuracy class acc. to DIN EN 60 051	3 (bimetallic movement referred to slave pointer) 1.5 (moving−iron movement)

reference conditions

ambient temperature	23°C±1K
position of use	nominal position ±1°
input	rated measuring value
others	DIN EN 60 051

influences

ambient temperature	−10°C ... +23°C ... +55°C
position of use	nominal position ±5°
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 3 acc. to VDE/VDI 3540 sheet 2
operating temperature range	−10 ... +55°C
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 43 802	scales and pointers for electrical measuring instruments
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

case

window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	to be specified 15°...165°
marine application	non−certified
panel fixing	plate springs for BIEQ 72 K on request

dial

blank dial	pencil−marked initial and end values
scale division and figuring	0 ... 100%
additional lettering	to be specified e.g. "generator"
additional figuring	to be specified
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
overload scaling bimetallic	no overload range or overload range 1.5 times rated current
logo on the dial	none or to be specified

others

calibration	for a definite frequency 100 ... 1000 Hz
thermal time delay	8 min or 15 min

terminal protection against accidental contact

full−sized rear cover (except model BIQ 48 K) or protective sleeves

safe against back−handed and fingertip contact acc. to VBG 4 / DIN 57 106, sec. 100

saturating current transformer

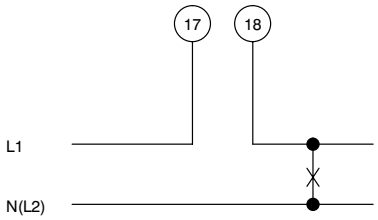
saturating transformer accuracy class 3, 50 Hz to protect the movements against overloads up to 100 times rated current (1 s max).

with base fixing attachment for panel projection mounting

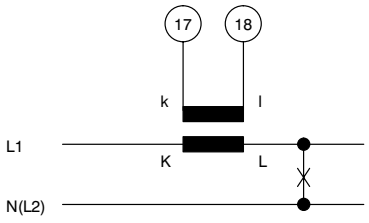
ESW 1/5 A, 4.25 VA
ESW 5/5 A, 4.25 VA

Connections

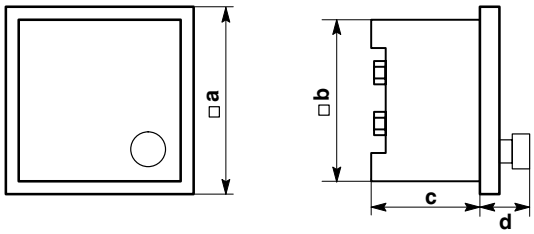
direct – connected



for use on current transformer



Dimensions



dimensions (in mm)	**BIQ 48 K**	**BIQ/BIEQ 72 K**	**BIQ/BIEQ 96 K**
a	48	72	96
b	45	66	90
c	48	53	60
d	11	11 (BIQ 72 K) 20 (BIEQ 72 K)	20

Ordering Information

type	
BIQ	maximum demand indicator with bimetallic movement
BIEQ	combined M.D.I. & moving – iron ammeter
front dimensions	
48 K	48 mm x 48 mm
72 K	72 mm x 72 mm
96 K	96 mm x 96 mm
measuring ranges	refer to table inside
window	glass *) non – glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) to be specified 15 ... 165° **)
marine application	none *) non – certified
dial	scale division & measuring range alike resp. acc. to DIN series if used on C.T. *) no dial blank dial scale division and figuring 0 ... 100% additional lettering to be specified **) additional figuring to be specified **) coloured marks red, green or blue **) coloured sector red, green or blue **)
overload scaling bimetallic	no overload range 1.2 times rated current *) 1.5 times rated current
calibration	50 Hz *) for a definite frequency 100 ... 1000 Hz
thermal time delay	8 min [1]) 15 min [2])
logo	WEIGEL *) none to be specified **)
terminal safety protection	none *) full – sized rear cover protective sleeves
saturating current transformer	none *) ESW 1/5 A, 4.25 VA ESW 5/5 A, 4.25 VA

*) standard
**) Please clearly add the desired specifications.
[1]) standard for models BIQ 48 K, BIEQ 72 K
[2]) standard for models BIQ 72/96 K, BIEQ 96 K

ordering example

BIEQ 96 K for use on current transformer 300/5 A, thermal time delay 15 min, WEIGEL logo

– specifications subject to change without notice; date of issue 10/06 –

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TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

019.D.001.03

Analog Meters with Moving-Coil Movement for use with Thermocouples

PQ 72 RS
PQ 96 RS
PQ 144 RS
P 72 PrS
P 96 PrS
P 144 PrS

CE

WEIGEL

Application

The moving–coil panel meters **PQ 72/96/144 RS** (M series) and the profile models **P 72/96/144 PrS** are used with thermocouples to measure and indicate temperature.

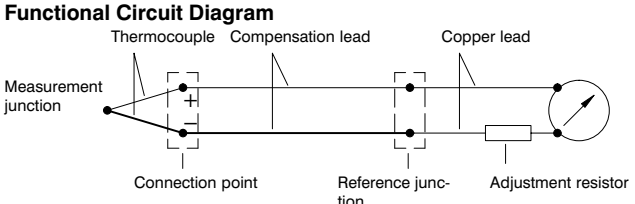
The moving–coil movements, manufactured to advanced engineering standards, are characterized by a low power consumption, high precision and excellent damping.

The square and profile meter–models are housed in pressed steel cases (except P 144 PrS with a thermoplastic case). They are suitable to be mounted in switchboards, control panels, machine tool consoles or mosaic grid panels.

Functional Principle

Moving–coil movement comprising a core–type magnetic system, pivot suspension. Dual spring loaded, shock absorbing jewel bearings.

Functional Circuit Diagram



The resistance of the connecting lead may substantially influence the temperature indication.
Consequently, the lead resistance R_a (=connecting lead resistance+compensation lead resistance+thermocouple resistance) will have to be considered in the calibration of the meter.
It shall be stated when ordering.

The internal resistance R_i of the meter plus the calibrated lead resistance R_a is printed on the dial. The actual lead resistance will have to be adjusted to the calibrated R_a–value.

Thermoelectric voltages up to 30 mV

External (PQ 72 RS, P 72/96 PrS) resp.
built–in (PQ 96/144 RS, P 144 PrS) amplifier.

The amplifier output current is not linearized, it rather follows the thermoelectric voltage. Input and output are electrically **not** insulated.

input impedance approx. 1 kΩ/mV

temperature influence <0,1%/˚C

maximum lead resistance R_a=50 Ω requires no calibration,
over 50 Ω up to max. 200 Ω requires calibration of the meter.

Thermoelectric voltages higher than 30 mV

direct–connected, requires no amplifier.
A total lead resistance value R_a=2 Ω for the thermocouple, copper lead and compensation lead is considered in the calibration of the indicator.
If possible, non–standard resistance values may be considered (up to 10 Ω maximum).

Mechanical Data

case details	square (PQ 72/96/144 RS) resp. edgewise (P 72/96/144 PrS) case suitable to be mounted in switchboards or mosaic grid panels
material of case	pressed steel (PQ 72/96/144 RS, P 72/96 PrS) self–extinguishing thermoplastics (P 144 PrS)
material of window	glass ➧
colour of bezel	black (similar to RAL 9005) ➧
position of use	vertical ±5˚ ➧
panel fixing	screw clamps
mounting	stackable next to each other (except P 144 PrS)
terminals	hexagon studs, M3 screws and wire clamps (PQ 72/96/144 RS, P 72/96 PrS), ➧ connector blades 6.3 x 0.8 (P 144 PrS)

dimensions	PQ 72 RS	PQ 96 RS	PQ 144 RS
bezel	□ 72 mm	□ 96 mm	□ 144 mm
case	□ 66 mm	□ 90 mm	□ 137 mm
depth	60 mm	62 mm	60 mm
panel cutout	□$68.3^{+0.4}$ mm	□$92^{+0.8}$ mm	□138^{+1} mm
panel thickness	1 ... 15 mm	1 ... 15 mm	1 ... 15 mm
weight approx.	0.5 kg	0.6 kg	0.9 kg

dimensions (in mm)	P 72 PrS	P 96 PrS	P 144 PrS
bezel	72 x 36	96 x 48	144 x 72
case	67.5 x 32	90.5 x 42.5	137 x 67
depth	94 mm	107 mm	192 mm
panel cutout	$68^{+0.7}$ mm x $33^{+0.6}$ mm	$92^{+0.8}$ mm x $45^{+0.6}$ mm	$138^{+1.0}$ mm x $68^{+0.7}$ mm
panel thickness	1 ... 25 mm	1 ... 12 mm	≤ 40 mm
weight approx.	0.5 kg	0.7 kg	1.3 kg

Electrical Data

measuring unit	thermoelectric voltage (DC voltage)		
measurement category	CAT III		
operating voltage	PQ 72/96/144 RS 150 V	P 72/96 PrS 50 V	P 144 PrS 150 V
pollution level	2		
enclosure code	IP 52 case ➧ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact		

Measuring Ranges

Thermoelectric voltages

from 11.5 mV upwards

for thermocouples acc. to IEC 584 resp. DIN 43 710

measuring range	sensor	type	thermoelectric voltage
0 ... 250˚C	Fe – CuNi	L	13.75 mV
0 ... 400˚C	Fe – CuNi	L	22.16 mV
0 ... 600˚C	Fe – CuNi	L	33.67 mV
0 ... 800˚C	Fe – CuNi	L	46.22 mV
0 ... 900˚C	Fe – CuNi	L	53.14 mV
0 ... 250˚C	Fe – CuNi	J	13.55 mV
0 ... 400˚C	Fe – CuNi	J	21.85 mV
0 ... 600˚C	Fe – CuNi	J	33.10 mV
0 ... 800˚C	Fe – CuNi	J	45.50 mV
0 ... 900˚C	Fe – CuNi	J	51.88 mV
0 ... 600˚C	NiCr – Ni	K	24.90 mV
0 ... 900˚C	NiCr – Ni	K	37.33 mV
0 ... 1000˚C	NiCr – Ni	K	41.27 mV
0 ... 1200˚C	NiCr – Ni	K	48.83 mV
0 ... 1300˚C	NiCr – Ni	K	52.40 mV
0 ... 1200˚C	Pt10Rh – Pt	S	11.95 mV
0 ... 1400˚C	Pt10Rh – Pt	S	14.37 mV
0 ... 1600˚C	Pt10Rh – Pt	S	16.77 mV

reference temperature 0˚C

In case of external reference junction,
state reference temperature 0˚C, 20˚C or 50˚C.

➧ also refer to "Options"

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet 019.D.001.03

Analog Meters with Moving-Coil Movement for use with Thermocouples

Scaling

pointer	bar / knife–edge pointer		
scale arrangement	horizontal, left–hand zero (P 72/96/144 PrS) ➧		
scale characteristics	practically linear		
scale division	coarse–fine		
scale length	PQ 72 RS 69 mm	PQ 96 RS 94 mm	PQ 144 RS 146 mm
	P 72 PrS 46 mm	P 96 PrS 67 mm	P 144 PrS 92 mm

Auxiliary Supply

for thermoelectric voltages up to 30 mV

auxiliary voltage	AC 230 V –20 ... +5%, 48 ... 62 Hz
power consumption	approx. 3 VA

Electrical insulation between measuring circuit and auxiliary supply circuit.

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051

reference conditions

ambient temperature	23˚C±1K
position of use	nominal position ±1˚ ➧
input	rated measuring value
auxiliary voltage	within specified limits
others	DIN EN 60 051

influences

ambient temperature	–25˚C ... +23˚C ... +40˚C
position of use	nominal position ±5˚
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 ➧ according to VDE/VDI 3540, sheet 2
operating temperature range	–25 ... +40˚C ➧
storage temperature range	–25 ... +65˚C
relative humidity	≤ 75% annual average, non–condensing
shock resistance	15 g, 11 ms ➧
vibration resistance	2.5 g, 5 ... 55 Hz ➧

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN 43 710	Electrical Temperature Sensors
DIN IEC 584–1	Thermocouples; deviation limits of thermoelectric voltages
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

case

window	non–glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or to be specified 15˚...165˚

performance

increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	limited use in the tropics, climatic class 3 according to VDE/VDI 3540, sheet 2
with operating temperature range	–10 ... +55˚C
marine application	non–certified
enclosure code	IP 54 splash–water protected front

accessories

terminal protection against accidental contact
full–sized rear cover (PQ 72/96/144 RS only) or protective sleeves SW6

terminals	connector blades 6.3 x 0.8

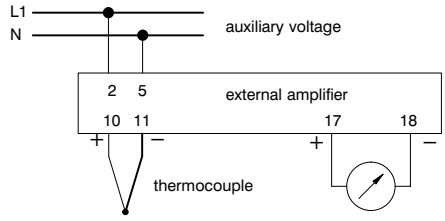
dial

scale arrangement	vertical, bottom zero (P 72/96/144 PrS)
blank dial	pencil marked initial and end values
scale division and figuring	0 ... 100%
additional lettering	to be specified e.g. ”generator”
additional figuring	to be specified
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or to be specified

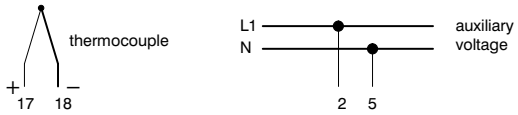
dial illumination by one (PQ 72/96 RS) resp. two (PQ 144 RS) lamps 6 V, 12 V or 24 V to be installed from the rear, dial translucent

Connections

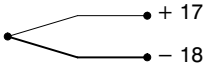
up to 30 mV, external amplifier (PQ 72 RS, P 72/96 PrS)



up to 30 mV, built–in amplifier (PQ 96/144 RS, P 144 PrS)

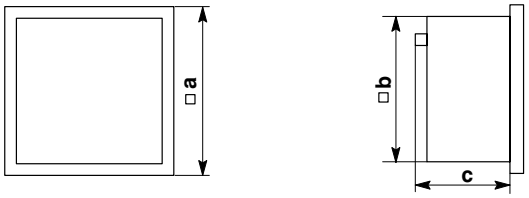


higher than 30 mV, direct–connected, no amplifier required



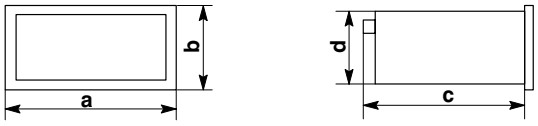
Dimensions

PQ72/96/144RS

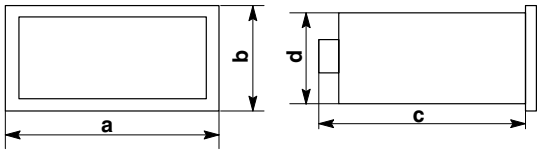


dimensions (in mm)	**PQ72RS**	**PQ96RS**	**PQ144RS**
a	72	96	144
b	66	90	137
c	60	62	60

P 72/96 PrS



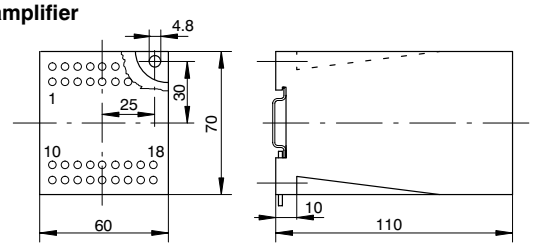
P 144 PrS



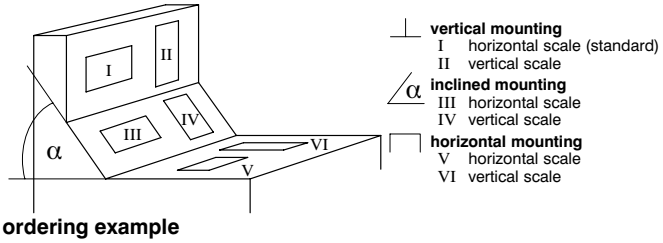
dimensions (in mm)	**P 72 PrS**	**P 96 PrS**	**P 144 PrS**
a	72	96	144
b	36	48	72
c	94	107	192
d	32	43	67

external amplifier

case for clamping to DIN rail



scales and position of use (P 72/96/144 PrS)



vertical mounting
I horizontal scale (standard)
II vertical scale

inclined mounting
III horizontal scale
IV vertical scale

horizontal mounting
V horizontal scale
VI vertical scale

ordering example

P 72 PrS, measuring range 0 ... 600°C for use with thermocouple Fe−CuNi, type L, 33.67 mV, reference temperature 0°C, lead resistance R_a=2 Ω, horizontal scale 0 ... 600°C, vertical position of use

Ordering Information

type **PQ**	moving−coil panel meter to measure thermoelectric voltages
front dimensions **72 RS** **96 RS** **144 RS**	 72 mm x 72 mm 96 mm x 96 mm 144 mm x 144 mm
type **P**	profile moving−coil panel meter to measure thermoelectric voltages
front dimensions **72 PrS** **96 PrS** **144 PrS**	 72 mm x 36 mm 96 mm x 48 mm 144 mm x 72 mm
measuring ranges	refer to preceding table
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) horizontal to be specified 15 ... 165° **)
performance loads	shock 15 g, vibration 2.5 g *) shock 30 g, vibration 5 g
climatic suitability	class 2, −25 ... +40°C *) class 3, −10 ... +55°C
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal safety protection	none *) full−sized rear cover ***) protective sleeves
terminals	screws and wire clamps *) connector blades 6.3 x 0.8 (P 144 PrS *))
scale arrangement (P 72/96/144 PrS)	horizontal, left−hand zero *) vertical, bottom zero
dial	°C (DIN range) *) blank dial scale division and figuring 0 ... 100% additional lettering to be specified **) additional figuring to be specified **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)
dial illumination	none with 1 lamp 6, 12 or 24 V (models PQ 72/96 RS only) with 2 lamps 6, 12 or 24 V (model PQ 144 RS only)

*) standard
**) Please clearly add the desired specifications.
***) PQ 72/96/144 only

− specifications subject to change without notice; date of issue 04/07 −

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TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

018.D.001.03

Analog Meters with Moving-Coil Movement arranged in a Bridge Circuit

PBQ 72
PBQ 96
PBQ 144
PB 72 PrS
PB 96 PrS
PB 144 PrS

WEIGEL

Application

The moving–coil panel meters **PBQ 72/96/144** (M series) in pressed steel cases as well as **PB 72/96/144 PrS** (edgewise series) have two main fields of application. They are used with RTD (resistance thermometers) Pt or Ni according to DIN 43 760 to measure and indicate temperature.

If used with resistance sensors they indicate position, e.g. transformer tap position, hoist or valve position, transformer winding temperature and any similar function where the position can be related to the movement of a potentiometer.

The indicators are suitable to be mounted in switchboards, control panels or mosaic grid panels.

Functional Principle

Self–shielding moving–coil movement with a core–type magnet, pivot suspended. Spring loaded jewel bearings for vibration and shock resistance.

The measuring system comprises a stabilized power source, a moving–coil indicator arranged in a bridge circuit and a remotely mounted potentiometer resp. a RTD (resistance thermometer) both to be supplied by customer. (Separate bridge circuit for PB 72 PrS model.)

Mechanical Data

case details	square (PBQ 72/96/144) resp. edgewise (PB 72/96/144 PrS) case suitable to be mounted in switchboards or mosaic grid panels
material of case	pressed steel (PBQ 72/96/144, PB 72/96 PrS) self–extinguishing thermoplastics (PB 144 PrS)
material of window	glass ◗
colour of bezel	black (similar to RAL 9005) ◗
position of use	vertical ±5° ◗
panel fixing	screw clamps
mounting	stackable next to each other (except PB 144 PrS)
terminals	hexagon studs, M3 screws and wire clamps C6 (PBQ 72/96/144, PB 72/96 PrS), ◗ connector blades 6.3 x 0.8 (PB 144 PrS)

dimensions	PBQ 72	PBQ 96	PBQ 144
bezel	□ 72 mm	□ 96 mm	□ 144 mm
case	□ 66 mm	□ 90 mm	□ 137 mm
depth	60 mm	62 mm	60 mm
panel cutout	□$68.3^{+0.4}$ mm	□$92^{+0.8}$ mm	□138^{+1} mm
panel thickness	1 ... 15 mm	1 ... 15 mm	1 ... 15 mm
weight approx.	0.3 kg	0.4 kg	0.7 kg

dimensions (in mm)	PB 72 PrS	PB 96 PrS	PB 144 PrS
bezel	72 x 36	96 x 48	144 x 72
case	67.5 x 32	90.5 x 42.5	137 x 67
depth	91 mm	100 mm	180 mm
panel cutout	$68^{+0.7}$ mm x $33^{+0.6}$ mm	$92^{+0.8}$ mm x $45^{+0.6}$ mm	$138^{+1.0}$ mm x $68^{+0.7}$ mm
panel thickness	1 ... 25 mm	1 ... 12 mm	≤ 40 mm
weight approx.	0.2 kg	0.45 kg	0.7 kg

Electrical Data

measuring unit	resistance (DC)		
measurement category	CAT III		
operating voltage	PBQ 72/96/144 150 V	PB72/96 PrS 50 V	PB 144 PrS 100 V
pollution level	2		
enclosure code	IP 52 case ◗ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact		

Measuring Ranges

for RTD (resistance thermometer) acc. to DIN 43 760

measuring range	sensor	
−220 ... +50°C	Pt 100	–
−100 ... +50°C	Pt 100	–
−20 ... +20°C	Pt 100,	Ni 100
0 ... +40°C	Pt 100,	Ni 100
−30 ... +60°C	Pt 100,	Ni 100
0 ... +60°C	Pt 100,	Ni 100
0 ... +100°C	Pt 100,	Ni 100
0 ... +150°C	Pt 100,	Ni 100
+50 ... +150°C	Pt 100,	Ni 100
0 ... +200°C	Pt 100,	Ni 100
0 ... +300°C	Pt 100	–
0 ... +400°C	Pt 100	–
0 ... +550°C	Pt 100	–
+200 ... +400°C	Pt 100	–
+300 ... +550°C	Pt 100	–

for resistance sensors

please state when ordering:	– measuring range and scaling – auxiliary voltage – total resistance of sensor – variation range of sensor – maximum lead resistance (standard 2x 10 Ω)

Note

Indication of the meter is influenced by the lead resistance. Consequently, the lead resistance will have to be considered in the calibration of the meter. It should be stated when ordering.

The lead resistance will be calibrated to 10 Ω for RTD (resistance thermometer) in a 2 wire system, to 2x 10 Ω for RTD in a 3 wire system and to 2x 10 Ω for resistance sensors. If possible, varying resistance values may be considered.

The lead resistance calibrated is printed on the dial. The actual resistance will have to be adjusted to this value.

Scaling

pointer	bar / knife–edge pointer		
dial position	horizontal dial (PB 72/96/144 PrS) ◗		
scale characteristics	linear		
scale division	coarse–fine		
scale length	PBQ 72 69 mm	PBQ 96 94 mm	PBQ 144 146 mm
	PB 72 PrS 46 mm	PB 96 PrS 67 mm	PB 144 PrS 92 mm

Auxiliary Supply

auxiliary voltage	DC 24 V ±10% ◗
current consumption	approx. 40 mA
residual ripple	<3%

Measuring input and auxiliary supply are **not** electrically insulated.

◗ also refer to "Options"

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

018.D.001.03

Analog Meters with Moving-Coil Movement arranged in a Bridge Circuit

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23˚C±1K
position of use	nominal position ±1˚ ⧫
input	rated measuring value
auxiliary voltage	within the limits specified
others	DIN EN 60 051
influences	
ambient temperature	−25˚C ... +23˚C ... +40˚C
position of use	nominal position ±5˚
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 ⧫ according to VDE/VDI 3540, sheet 2
operating temperature range	−25 ... +40˚C ⧫
storage temperature range	−25 ... +65˚C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms ⧫
vibration resistance	2.5 g, 5 ... 55 Hz ⧫

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540, sheet 2	reliability of measuring and control equipment (classification of climates)

Options

auxiliary voltage	AC 230 V −20% ... +5%, 48 ... 62 Hz electrically insulated applying to PBQ 96/144, PB 144 PrS only
case	
window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or to be specified 15˚...165˚
performance	
increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	limited use in the tropics, climatic class 3 according to VDE/VDI 3540, sheet 2
with operating temperature range	−10 ... +55˚C

⧫ also refer to "Options"

marine application	non−certified
enclosure code	IP 54 splash−water protected front
accessories	
terminal protection against accidental contact full−sized rear cover (PBQ 72/96/144 only) or protective sleeves	
terminals	connector blades 6.3 x 0.8
dial	
dial position	vertical dial (PB 72/96/144 PrS)
blank dial	pencil marked initial and end values
scale division and figuring	0 ... 100%, linear, full−scale values acc. to standardized series (1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 and their decimal multiples e.g. 150 m^3/h) or deviating from standard; captions optional
additional lettering	to be specified e.g. "generator"
additional figuring	to be specified
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or to be specified

Attachment

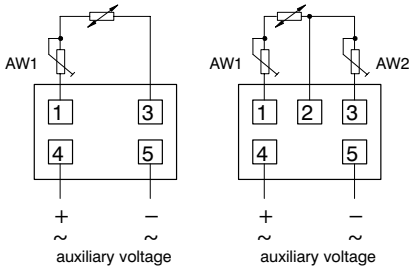
Power Supply please refer to accessories data sheets

Lead Adjustment Resistor 10 Ω coil−type with soldering tags

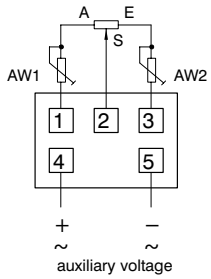
Test Resistor for RTD (resistance thermometer) to adjust the measuring circuit.

Connections

RTD (resistance thermometer)
in a 2 wire system in a 3 wire system

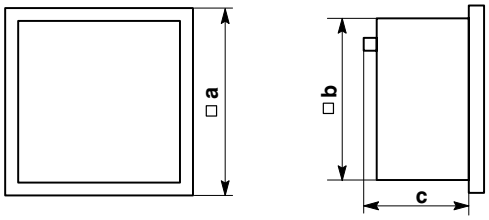


Resistance Sensor



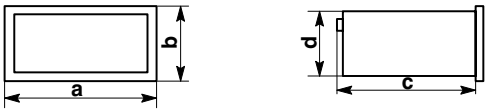
Dimensions

PBQ72/96/144RS

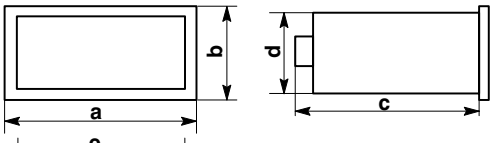


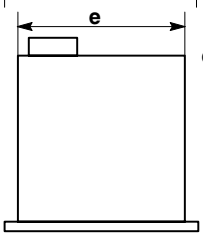
dimensions (in mm)	**PBQ72**	**PBQ96**	**PBQ144**
a	72	96	144
b	66	90	137
c	60	62	60

PB 72/96 PrS



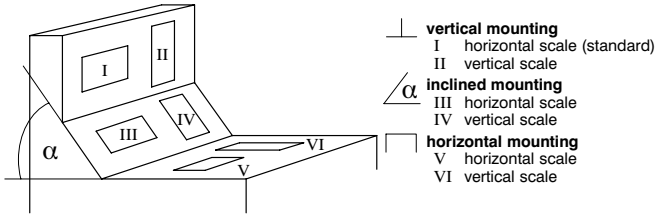
PB 144 PrS





dimensions (in mm)	**PB 72 PrS**	**PB 96 PrS**	**PB 144 PrS**
a	72	96	144
b	36	48	72
c	91	100	180
d	32	43	67
e	67.5	90.5	137

scales and position of use (PB 72/96/144 PrS)



vertical mounting
I horizontal scale (standard)
II vertical scale

inclined mounting
III horizontal scale
IV vertical scale

horizontal mounting
V horizontal scale
VI vertical scale

Ordering Information

type **PBQ**	square moving−coil panel meter arranged in a bridge circuit
front dimensions **72** **96** **144**	 72 mm x 72 mm 96 mm x 96 mm 144 mm x 144 mm

type **PB**	profile moving−coil panel meter arranged in a bridge circuit
front dimensions **72 PrS** **96 PrS** **144 PrS**	 72 mm x 36 mm 96 mm x 48 mm 144 mm x 72 mm
measuring ranges	refer to preceding table
wiring	RTD in 2 wire system RTD in 3 wire system resistance sensor
auxiliary voltage	DC 24 V *) AC 230 V
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) horizontal to special order 15 ... 165° **)
performance loads	shock 15 g, vibration 2.5 g *) shock 30 g, vibration 5 g
climatic suitability	class 2, −25 ... +40°C *) class 3, −10 ... +55°C
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal safety protection	none *) full−sized rear cover ***) protective sleeves
terminals	screws and wire clamps *) connector blades 6.3 x 0.8 (PB 144 PrS *))
dial position (PB 72/96/144 PrS)	horizontal dial *) vertical dial
dial	scale division and measuring range alike *) blank dial scale division and figuring 0 ... 100% linear to standardized series **) linear deviating from standard **) additional lettering to be specified **) additional figuring to be specified **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.
***) PBQ 72/96/144 only

ordering example

PB 72 PrS, measuring range −30 ... 60°C on Pt 100, 3 wire system, auxiliary voltage DC 24 V, horizontal scale −30 ... 60°C, vertical mounting, window non−glaring glass, WEIGEL logo

− specifications subject to change without notice; date of issue 04/07 −

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DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
017.D.101.03

Analog Meters with Dual Moving-Coil Movement

PQ 48 /2

CE

WEIGEL

Application

The square moving–coil instruments **PQ 48 /2** (M series) having two meter movements are used for process control measurement of DC currents and/or DC voltages. They are scaled to determine control deviations and regulating link positions in control systems.

The instruments are suitable to be mounted in switchboards, control panels, machine tool consoles or mosaic grid panels.

Movements

Self–shielding moving–coil movements with core–type magnetic systems, pivot suspended. Twin spring loaded jewel bearings for vibration and shock resistance.

Mechanical Data

case details	square case suitable to be mounted in control / switchgear panels or mosaic grid panels, stackable
material of case	thermoplastics, flame retardant
material of window	glass ◗
colour of bezel	black (similar to RAL 9005) ◗
position of use	any position permissible
panel fixing	screw clamps ◗
panel thickness	1 ... 40 mm
mounting	stackable next to each other
terminals	connector blades 6.3 x 0.8

dimensions

bezel	□ 48 mm
case	□ 41 mm
depth	72 mm
panel cutout	□ $45.0^{+0.6}$ mm
weight approx.	0.09 kg

Electrical Data

measuring unit	DC voltages or DC currents
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
5 s max.	
voltmeters	2 times rated voltage
ammeters	10 times rated current
measurement category	CAT III
operating voltage	100 V
pollution level	2
enclosure code	IP 52 case ◗ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact

◗ also refer to "Options"

Measuring Ranges

Movement I (outer)

control deviation	internal resistance*)	pointer deflection	scale ◗
−20 ... 0 ... +20 μA	6 kΩ	±22.5°	−10 ... 0 ... +10
−20 ... 0 ... +20 μA	6 kΩ	±22.5°	−20 ... 0 ... +20
−20 ... 0 ... +20 μA	13 kΩ	±22.5°	−10 ... 0 ... +10
−20 ... 0 ... +20 μA	13 kΩ	±22.5°	−20 ... 0 ... +20
−20 ... 0 ... +20 μA	50 kΩ	±22.5°	−10 ... 0 ... +10
−20 ... 0 ... +20 μA	50 kΩ	±22.5°	−20 ... 0 ... +20
−50 ... 0 ... +50 μA	2 kΩ	±22.5°	−10 ... 0 ... +10
−50 ... 0 ... +50 μA	2 kΩ	±22.5°	−20 ... 0 ... +20
−300 ... 0 ... +300 μA	325 Ω	±22.5°	−10 ... 0 ... +10
−300 ... 0 ... +300 μA	325 Ω	±22.5°	−20 ... 0 ... +20

regulating link position	internal resistance*)	pointer deflection	scale ◗
0 ... 600 μA	325 Ω	90°	0 ... 100%
0 ... 20 mA ◗	3 Ω	90°	0 ... 100%
0 ... 3 V	30 kΩ	90°	0 ... 100%
0 ... 10 V	100 kΩ	90°	0 ... 100%

Movement II (inner)

regulating link position	internal resistance*)	pointer deflection	scale ◗
0 ... 600 μA	325 Ω	90°	0 ... 100%
0 ... 20 mA ◗	3 Ω	90°	0 ... 100%
0 ... 3 V	30 kΩ	90°	0 ... 100%
0 ... 10 V	100 kΩ	90°	0 ... 100%

*) the resistance values are limited to a tolerance of ±20%

Scaling

pointers	bar / knife–edge pointers		
pointer deflection	control deviation ±22.5°	regulating link position 0 ... 90°	
scale characteristics	linear		
scale division	coarse–fine		
scale length	control deviation movement I	regulating link position movement I	movement II
	15.5 mm	31 mm	28 mm

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23°C±1K
input	rated measuring value
others	DIN EN 60 051
influences	
ambient temperature	−25°C ... +23°C ... +40°C

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
017.D.101.03

Analog Meters with Dual Moving-Coil Movement

Environmental

climatic suitability	climatic class 2 ➧ according to VDE/VDI 3540 sheet 2
operating temperature range	−25 ... +40˚C ➧
storage temperature range	−25 ... +65˚C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms ➧
vibration resistance	2.5 g, 5 ... 55 Hz ➧

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

measuring range

special measuring range	deviating from ranges as specified in table
zero position	suppressed for range 4 ... 20 mA mechanically suppressed zero

case

window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
panel fixing	plate springs

performance

increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540 sheet 2
with operating temperature range	−10 ... +55˚C
marine application	non−certified
enclosure code	IP 54 splash−water protected front

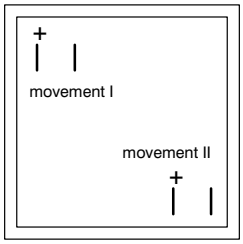
accessories

terminal protection against accidental contact
protective sleeves

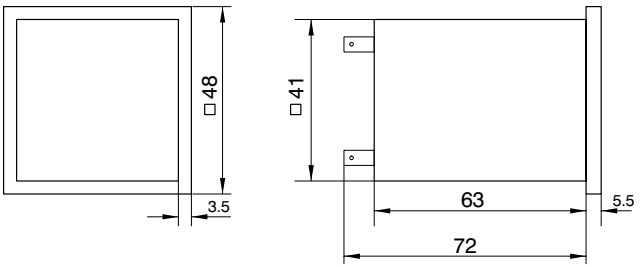
dial

blank dial	pencil marked initial and end values
scale division and figuring	0 ... 100%, linear, full−scale values acc. to standardized series (1 − 1.5 − 2.5 − 4 − 6 and any decimal multiple of these numbers e.g. 150 m^3/h) or deviating from standard series, captions optional
additional lettering	to be specified e.g. ”generator”
additional figuring	to be specified
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or to be specified

Connections



Dimensions



(scaled in mm)

Ordering Information

type **PQ**	moving−coil instrument for DC voltage and/or DC current
front dimension **48**	 48 mm x 48 mm
type identification **/2**	 2 movements
measuring ranges	refer to preceding table
special measuring range	on special order **)
zero position	electrical zero = mechanical zero *) mechanically suppressed zero for range 4 ... 20 mA
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
panel fixing	screw clamps *) plate springs
mechanical loads	shock 15 g, vibration 2.5 g *) shock 30 g, vibration 5 g
climatic suitability	class 2, −25 ... +40°C *) class 3, −10 ... +55°C
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal safety protection	none *) protective sleeves
dial	refer to table inside *) blank dial scale division and figuring 0 ... 100% linear acc. to standardized series linear deviating from standard **) additional lettering to be specified **) additional figuring to be specified **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.

ordering example

PQ 48 /2, measuring range movement I: −20 ... 0 ...+20 µA,
internal resistance 13 kΩ, scale −20 ... 0 ...+20,
movement II: 4 ... 20 mA, scale 0 ... 100 %,
panel fixing by plate springs, no logo on the dial

− specifications subject to change without notice; date of issue 12/06 −

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DIN EN ISO 9001
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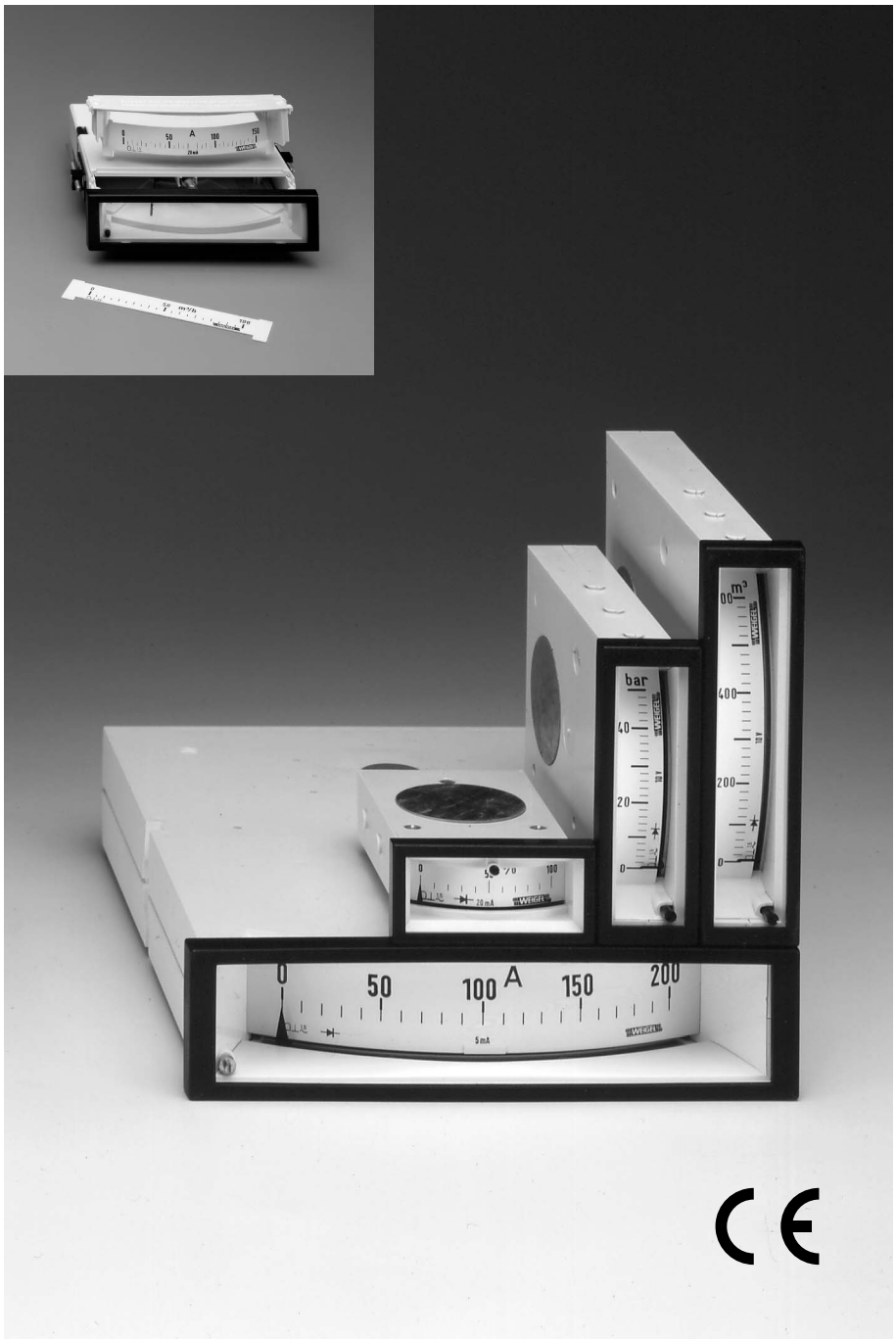
Data Sheet

Edgewise Series
015.D.301.06

Analog Meters
Slim Edgewise with Moving-Coil Movement and Rectifier

MG 48x24
MG 72x24
MG 96x24 K
G 144x36



MG 96x24 K

with Slide-In-Dial

WEIGEL

Application

The edgewise moving-coil panel meters **MG 48x24**, **MG 72x24**, **MG 96x24 K** and **G 144x36** with a slim-line dial are used for measurement of **sinusoidal AC currents or voltages**.

Moving-coil rectifier instruments measure average values and are scaled to indicate r.m.s., assuming a sinusoidal wave form.

The moving-coil movement is manufactured to newest findings and distinguishes in a small power consumption, a high accuracy and a very good damping.

The instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels (except G 144x36).

With MG 96x24 K **the front panel, the front window and the dial** as well as the **dial illumination** (optional) can be exchanged easily. On the rear side a cable grip for the connecting leads is integrated.

Movements

Self-shielding moving-coil movements with swivel coil, pivot suspended. Series-connected rectifier incorporated. Spring loaded jewel bearings for vibration and shock resistance.

Mechanical Data

case details	edgewise case suitable to be mounted in control panels, machine tool consoles or mosaic panels (except G144x36), stackable			
material of case	thermoplastics			
material of window	glass ◗			
colour of bezel	black (similar to RAL 9005) ◗			
position of use	vertical ±5° ◗			
panel fixing	screw clamps ◗			
mounting	stackable next to each other			
panel thickness	1 ... 25 mm			
terminals	connector blades 6.3 x 0.8 or connector blades 2.8 x 0.8 (MG 96x24 K)			
dimensions (in mm)	MG 48x24	MG 72x24	MG 96x24K	G 144x36
bezel	48 x 24	72 x 24	96 x 24	144 x 36
case	43 x 17	66 x 17	92 x 18	137 x 32
depth	75	98	108	173
panel cutout	$45^{+0.6}$ x $22.2^{+0.3}$	$68^{+0.7}$ x $22.2^{+0.3}$	$92^{+0.8}$ x $22.2^{+0.3}$	$138^{+1.0}$ x $33^{+0.6}$
weight approx.	0.08 kg	0.1 kg	0.12 kg	0.5 kg

Electrical Data

measuring unit	AC voltage or AC current
frequency range	40 Hz ... 50 Hz ... 10 kHz
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
5 s max. voltmeters	2 times rated voltage
ammeters	10 times rated current
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case ◗ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact

◗ for other ratings refer to "Options"

Measuring Ranges

AC current

100 µA, 150 µA, 250 µA, 400 µA, 600 µA, 1 mA, 1.5 mA, 2.5 mA, 4 mA, 6 mA, 10 mA, 15 mA, 25 mA, 40 mA, 60 mA, 100 mA, 150 mA, 250 mA, 400 mA, 600 mA (voltage drop approx. 1.5 V)

with separate miniature current transformer 50 Hz, 10 mA sec.
1 A, 1.5 A, 2.5 A (voltage drop approx. 0.2 V)
4 A, 5 A, 6 A, 10 A, 15 A, 25 A (voltage drop approx. 0.3 V)

for use on current transformer (scale without overload range)
separate miniature current transformer 50 Hz, 10 mA sec. inclusive
N/1 A (voltage drop approx. 0.2 V)
N/5 A (voltage drop approx. 0.3 V)

operating voltage	MG 48x24	MG 72x24	MG 96x24 K	G 144x36
	300 V	600 V	300 V	300 V

AC voltage

	operating voltage MG 48x24	MG 72x24	MG 96x24 K	G 144x36
2.5 V	50 V	100 V	300 V	100 V
4 V	50 V	100 V	300 V	100 V
6 V	50 V	100 V	300 V	100 V
10 V	50 V	100 V	300 V	100 V
15 V	50 V	100 V	300 V	100 V
25 V	50 V	100 V	300 V	100 V
40 V	50 V	100 V	300 V	100 V
60 V	300 V	100 V	300 V	100 V
100 V	300 V	100 V	300 V	100 V
150 V	300 V	600 V	300 V	300 V
250 V	300 V	600 V	300 V	300 V
400 V	300 V	600 V	300 V	300 V
500 V	300 V	600 V	300 V	300 V
600 V	–	600 V	600 V	600 V

(600 V in MG 48x24 on request)

sensitivity 900 Ω/V ◗
the resistance values are limited to a tolerance of ±20% ◗

Scaling

pointer	bar pointer			
zero adjustment	front accessible ◗			
response time	1 s for full–scale deflection			
scale arrangement	horizontal (left–hand zero) ◗			
scale characteristics	linear			
scale division	coarse–fine			
scale length	MG 48x24 30 mm	MG 72x24 52 mm	MG 96x24 K 60 mm	G 144x36 95 mm

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

Edgewise Series
015.D.301.06

Analog Meters Slim Edgewise with Moving-Coil Movement and Rectifier

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23˚C±1K
position of use	nominal position ±1˚
input	rated measuring value
frequency	50±2 Hz
wave form	sinusoidal, distortion factor <5%
others	DIN EN 60 051
influences	
ambient temperature	−25˚C ... +23˚C ... +40˚C
position of use	nominal position ±5˚
frequency	40 Hz ... 45 ... 60 Hz ... 10 kHz
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 ➧ according to VDE/VDI 3540 sheet 2
operating temperature range	−25 ... +40˚C ➧
storage temperature range	−25 ... +65˚C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms ➧
vibration resistance	2.5 g, 5 ... 55 Hz ➧

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

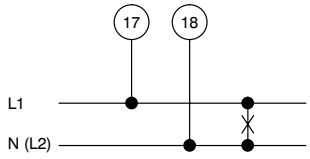
measuring range	
special measuring range	deviating from standard
internal resistance	adjustment to ±1% at 23˚C
increased sensitivity	for voltmeters to 2 kΩ/V, 5 kΩ/V, 10 kΩ/V or 20 kΩ/V (as far as possible)
case	
window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or on request 15˚...165˚
mounting (MG 96 x24 K)	blade springs on the narrow sides
performance	
climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540 sheet 2
with operating temperature range	−10 ... +55˚C
increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
marine application	non−certified
enclosure code	IP 54 splash−water protected front (without zero adjustment or with zero adjustment rear accessible for MG 96x24 K)

terminal protection against accidental contact
protective sleeves B6 for connector blades 6.3 x 0.8
protective sleeves 110 for connector blades 2.8 x 0.8

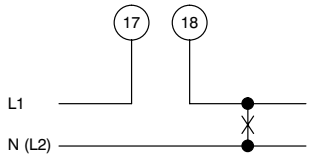
dial	
scale arrangement	vertical (bottom zero)
blank dial	pencil−marked on initial and end values
scale division and figuring	0 ... 100%, linear, full−scale values acc. to standardized series (1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 and their decimal multiples e.g. 150 m^3/h) or deviating from standard; captions on request
2nd scale division	including figuring (on request)
coloured scale (MG 96x24 K only)	scale in black; pointer, scale division and lettering yellow or white
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured segment	red, green or blue within scale division
logo on the dial	none or on request
zero position	mechanically suppressed zero, no zero adjustment, max. 40% of full−scale value for ammeters ≥ 100 µA, voltmeters ≥ 1,5 V
zero adjustment (MG 96x24 K only)	rear accessible
expanded scale	expanded initial scale division by means of electronic circuits up to approx. 5% of full−scale value in centre of scale for MG 72x24 / 96x24 K, P 144x36
dial illumination (MG 96x24 K only)	by 2 lamps 6 V, 12 V or 24 V dial translucent

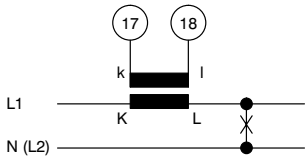
Connections

AC voltage

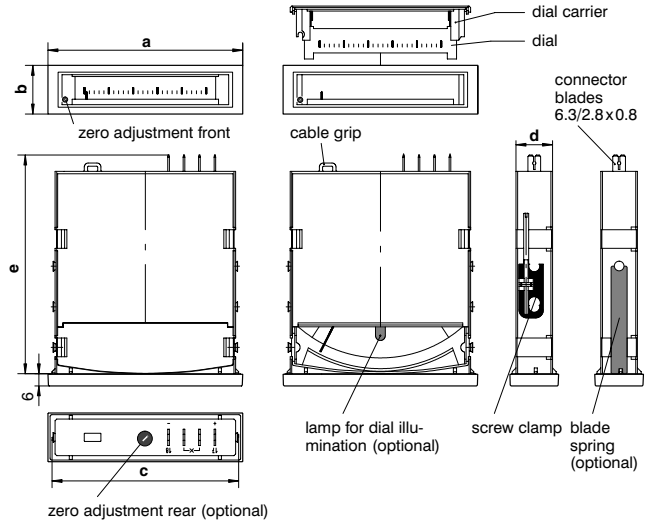


AC current



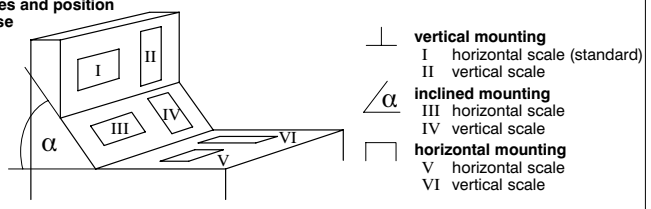


Dimensions



dimensions (in mm)	MG 48x24	MG 72x24	MG 96x24 K	G 144x36
a	48	72	96	144
b	24	24	24	36
c	43	66	92	137
d	17	17	18	32
e	75	98	108	173

scales and position of use



vertical mounting
I horizontal scale (standard)
II vertical scale

inclined mounting
III horizontal scale
IV vertical scale

horizontal mounting
V horizontal scale
VI vertical scale

Ordering Information

type (M)G	slim edgewise moving−coil panel meter for AC voltage or current
front dimensions	
48x24	48 mm x 24 mm
72x24	72 mm x 24 mm
96x24 K	96 mm x 24 mm
144x36	144 mm x 36 mm
measuring ranges	refer to preceding table
sp. measuring range	on request **)
adjustment	internal resistance ±20% *) internal resistance ±1% at 23°C
sensitivity voltmeters	900 Ω/V *) 2 kΩ/V 5 kΩ/V 10 kΩ/V 20 kΩ/V as far as possible
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) horizontal on request 15 ... 165° **)
mounting	screw clamps *) spring blades
climatic suitability	class 2, −25 ... +40°C *) class 3, −10 ... +55°C
mechanical loads	shock 15 g, vibration 2.5 g *) shock 30 g, vibration 5 g
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal protection	none *) protective sleeves B6 (for 6.3 x 0.8) protective sleeves 110 (for 2.8 x 0.8)
scale arrangement	horizontal *) vertical
dial	scale division & measuring range alike *) blank dial scale division and figuring 0 ... 100% deviating from standard **) 2 scale divisions on request **) yellow on black dial **) white on black dial **) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)
zero position	left-hand or bottom zero *) mechanically suppressed zero **)
zero adjustment	front accessible *) rear accessible ***)
expanded scale (not for MG 48x24)	none *) up to approx. 5% of full-scale value in center scale electronically **)
dial illumination	none *) with 1 lamp 6, 12 or 24 V ***)

*) standard
**) Please clearly add the desired specifications.
***) MG 96x24 K only

ordering example

MG 72x24, measuring range 0 ... 250 V, horizontal scale, vertical mounting, window non−glaring glass, WEIGEL logo

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TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

Edgewise Series
015.D.201.05

Analog Meters Edgewise with Moving-Coil Movement and Rectifier

G 48 PrS
G 72 PrS
G 96 PrS
G144 PrS

CE

WEIGEL

Application

The edgewise moving−coil rectifier instruments **G 48**/**72**/**96**/**144 PrS** with a curved dial are used for the measurement of sinusoidal AC currents and voltages.

Moving−coil rectifier instruments measure average values and are scaled to indicate r.m.s., assuming a sinusoidal wave form.

The moving-coil movement is manufactured to newest findings and distinguishes in a small power consumption, a high accuracy and a very good damping.

These instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels.

Movements

Self−shielding moving−coil movements with core−type magnet (P 72/96/144 PrS) resp. swivel coil (P 48 PrS), pivot suspended. Series−connected rectifier incorporated. Spring loaded jewel bearings for vibration and shock resistance.

Mechanical Data

case details	edgewise case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable
material of case	pressed steel (G 72/96 PrS) thermoplastics (G 48/144 PrS)
material of window	glass ➧
colour of bezel	black (similar to RAL 9005) ➧
position of use	vertical ±5° ➧
panel fixing	screw clamps
mounting	stackable next to each other (except G144 PrS)
terminals	
voltmeters and ammeters ≤ 3 A	hexagon studs, M3 screws and wire clamps C6 (G 72/96 PrS), connector blades 6.3 x 0.8 (G 48/144 PrS)
ammeters >3 A	hexagon studs, M5 screws and wire clamps C10
voltmeters 60 ... 150, 600 V (G 72/96 PrS)	connector blades 6.3 x 0.8 for protective wire

dimensions (in mm)	G 48 PrS	G 72 PrS	G 96 PrS	G 144 PrS
bezel	48 x 24	72 x 36	96 x 48	144 x 72
case	43 x 17	66 x 32	91 x 43	137 x 67
depth	75	94	107	192
panel cutout	$45^{+0.6}$ x $22.2^{+0.3}$	$68^{+0.7}$ x $33^{+0.6}$	$92^{+0.8}$ x $45^{+0.6}$	$138^{+1.0}$ x $68^{+0.7}$
panel thickness	1 ... 25	1 ... 25	1 ... 12	≤ 40
weight approx.	0.08 kg	0.2 kg	0.45 kg	0.6 kg

Electrical Data

measuring unit	AC voltage or AC current
frequency range	40 Hz ... 50 Hz ... 10 kHz
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
5 s max.	2 times rated voltage, 10 times rated current
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case ➧ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact

Measuring Ranges

AC current

100 µA, 150 µA, 250 µA, 400 µA, 600 µA, 1 mA, 1.5 mA, 2.5 mA, 4 mA, 6 mA, 10 mA, 15 mA, 25 mA, 40 mA, 60 mA, 100 mA, 150 mA, 250 mA, 400 mA, 600 mA	(voltage drop approx. 1.5 V)
1 A, 1.5 A, 2.5 A *)	(voltage drop approx. 0.2 V)
4 A, 5 A, 6 A, 10 A, 15 A, 25 A *)	(voltage drop approx. 0.3 V)

➧

for use on current transformer (scale without overload range)

N/**1 A** *)	(voltage drop approx. 0.2 V)
N/**5 A** *)	(voltage drop approx. 0.3 V)

*) separate (G 48/72/96 PrS) resp. buit-in (G 144 PrS) miniature current transformer 50 Hz, 10 mA sec. inclusive

operating voltage	G 48 PrS	G 72 PrS	G 96 PrS	G 144 PrS
	300 V	300 V	300 V	600 V

AC voltage	operating voltage G 48 PrS	G 72 PrS	G 96 PrS	G 144 PrS
1.5 V	50 V	50 V	50 V	100 V
2.5 V	50 V	50 V	50 V	100 V
4 V	50 V	50 V	50 V	100 V
6 V	50 V	50 V	50 V	100 V
10 V	50 V	50 V	50 V	100 V
15 V	50 V	50 V	50 V	100 V
25 V	50 V	50 V	50 V	100 V
40 V	50 V	50 V	50 V	100 V
60 V	300 V	100 V	100 V	100 V
100 V	300 V	100 V	100 V	100 V
150 V	300 V	100 V	100 V	100 V
250 V	300 V	300 V	300 V	600 V
400 V	300 V	300 V	300 V	600 V
500 V	300 V	300 V	300 V	600 V
600 V	600 V	600 V	600 V	600 V

➧

for use on voltage transformer (scale without overload range)

N/**100 V**	300 V	100 V	100 V	100 V
N/**110 V**	300 V	100 V	100 V	100 V

sensitivity 900 Ω/V ➧
the resistance values are limited to a tolerance of ±20% ➧

Scaling

pointer	bar / knife−edge pointer
response time	1 s for full−scale deflection
scale arrangement	horizontal (left−hand zero) ➧
scale characteristics	practically linear for voltages >20 V initial scale compressed for voltages ≤ 20 V
scale division	coarse−fine

scale length	G 48 PrS	G 72 PrS	G 96 PrS	G 144 PrS
	30 mm	45 mm	67 mm	92 mm

➧ also refer to "Options"

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

Edgewise Series
015.D.201.05

Analog Meters Edgewise with Moving-Coil Movement and Rectifier

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23˚C±1K
position of use	nominal position ±1˚
input	rated measuring value
frequency	50±2 Hz
wave form	sinusoidal, distortion factor <5%
others	DIN EN 60 051
influences	
ambient temperature	−25˚C ... +23˚C ... +40˚C
position of use	nominal position ±5˚
frequency	40 Hz ... 50 Hz ... 10 kHz
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 according to VDE/VDI 3540 sheet 2
operating temperature range	−25 ... +40˚C
storage temperature range	−25 ... +65˚C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

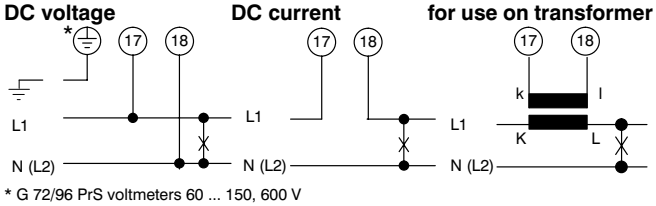
Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

measuring range	
special measuring range	deviating from standard
measuring range adjustment	adjustment potentiometer installed in voltmeters, adjustment range approx. ±10% or ±20 ... 50% (except G 48/72 PrS)
2nd measuring range	with 3rd terminal for voltmeters, 2nd figuring and 1 or 2 scale divisions (except G 48/72 PrS)
additional measuring ranges	on request
accuracy class	1.0 with fine scale division (as far as possible)
adjustment of resistance	to ±1% at 23˚C
increased sensitivity	to 2 kΩ/V, 5 kΩ/V, 10 kΩ/V or 20 kΩ/V for voltmeters ≥ 1 V (as far as possible)
case	
window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or on request 15˚...165˚
performance	
climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540 sheet 2
with operating temperature range	−10 ... +55˚C
marine application	non−certified
enclosure code	IP 54 splash−water protected front (without zero adjustment)
accessories	
terminal protection against accidental contact	protective sleeves B6 for G 48 PrS SW6, SW10 (ammeters >3A) for G 72/96 PrS
dial	
scale arrangement	vertical (bottom zero)
blank dial	pencil−marked on initial and end values
scale division and figuring	0 ... 100%, linear, full−scale values acc. to standardized series (1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 and their decimal multiples e.g. 150 m^3/h) or deviating from standard; special calibration from customer's non−linear graph or chart; scaling of voltmeters in ohms; captions on request
2nd scale division	linear including figuring, non−linear including figuring
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured segment	red, green or blue within scale division
logo on the dial	none or on request
zero position	mechanically suppressed zero, no zero adjustment, max. 40% of full−scale value for ammeters ≥ 100 µA, voltmeters ≥ 1.5 V electrically suppressed zero for voltmeters ≥ 6 V
expanded scale for G 72/96/144 PrS	expanded initial scale division by means of electronic circuits up to approx. 5% of full−scale value in centre of scale

Connections



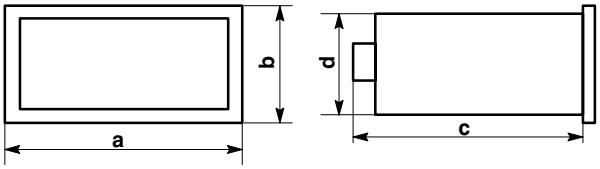
* G 72/96 PrS voltmeters 60 ... 150, 600 V

Dimensions

G 48 PrS

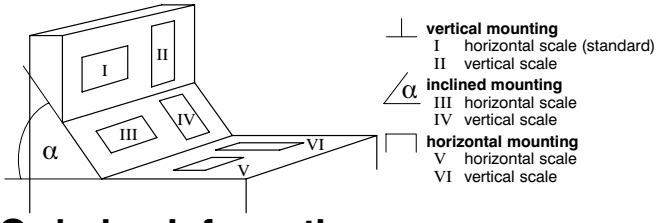
G 72/96 PrS

G 144 PrS



dimensions (in mm)	**G 48 PrS**	**G 72 PrS**	**G 96 PrS**	**G 144 PrS**
a	48	72	96	144
b	24	36	48	72
c	75	94	107	192
d	17	32	43	67

scales and position of use



vertical mounting
I horizontal scale (standard)
II vertical scale

inclined mounting
III horizontal scale
IV vertical scale

horizontal mounting
V horizontal scale
VI vertical scale

Ordering Information

type **G**	edgewise−type moving−coil rectifier instrument
front dimensions **48 PrS** **72 PrS** **96 PrS** **144 PrS**	 48 mm x 24 mm 72 mm x 36 mm 96 mm x 48 mm 144 mm x 72 mm
measuring ranges	refer to preceding table
special measuring range	on request **)
measuring range adjustment	none *) voltage ±10% voltage ±20 ... 50%
2nd measuring range	none *) 1 scale division, 2nd figuring 2 scale divisions, 2 figurings

accuracy class	1.5 *) 1.0 with fine scale division ***)
adjustments	none *) internal resistance ±1% at 23˚C
sensitivity, voltmeters	900 Ω/V *) increased to approx. 2 kΩ/V increased to approx. 5 kΩ/V increased to approx.10 kΩ/V increased to approx.20 kΩ/V ***)
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) horizontal on request 15 ... 165° **)
climatic suitability	class 2, −25 ... +40˚C *) class 3, −10 ... +55˚C
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal protection	none *) protective sleeves B6, SW6 resp. SW10
scale arrangement	horizontal *) vertical
dial	scale division & measuring range alike *) blank dial scale division and figuring 0 ... 100% acc. to standardized series **) deviating from standard **) calibration fr. non−linear graph or chart **) scaling in ohms for voltmeters **) 2 scale divisions **) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)
zero position	electrically suppressed zero **) mechanically suppressed zero **)
expanded scale	none *) electrically up to approx. 5% full−scale value*****)

*) standard
**) Please clearly add the desired specifications.
***) as far as possible
*****) G 72/96/144 PrS only

ordering example

G 72 PrS, measuring range 0 ... 25 mA, horizontal scale 0 ... 100%, vertical mounting, window non−glaring glass, WEIGEL logo

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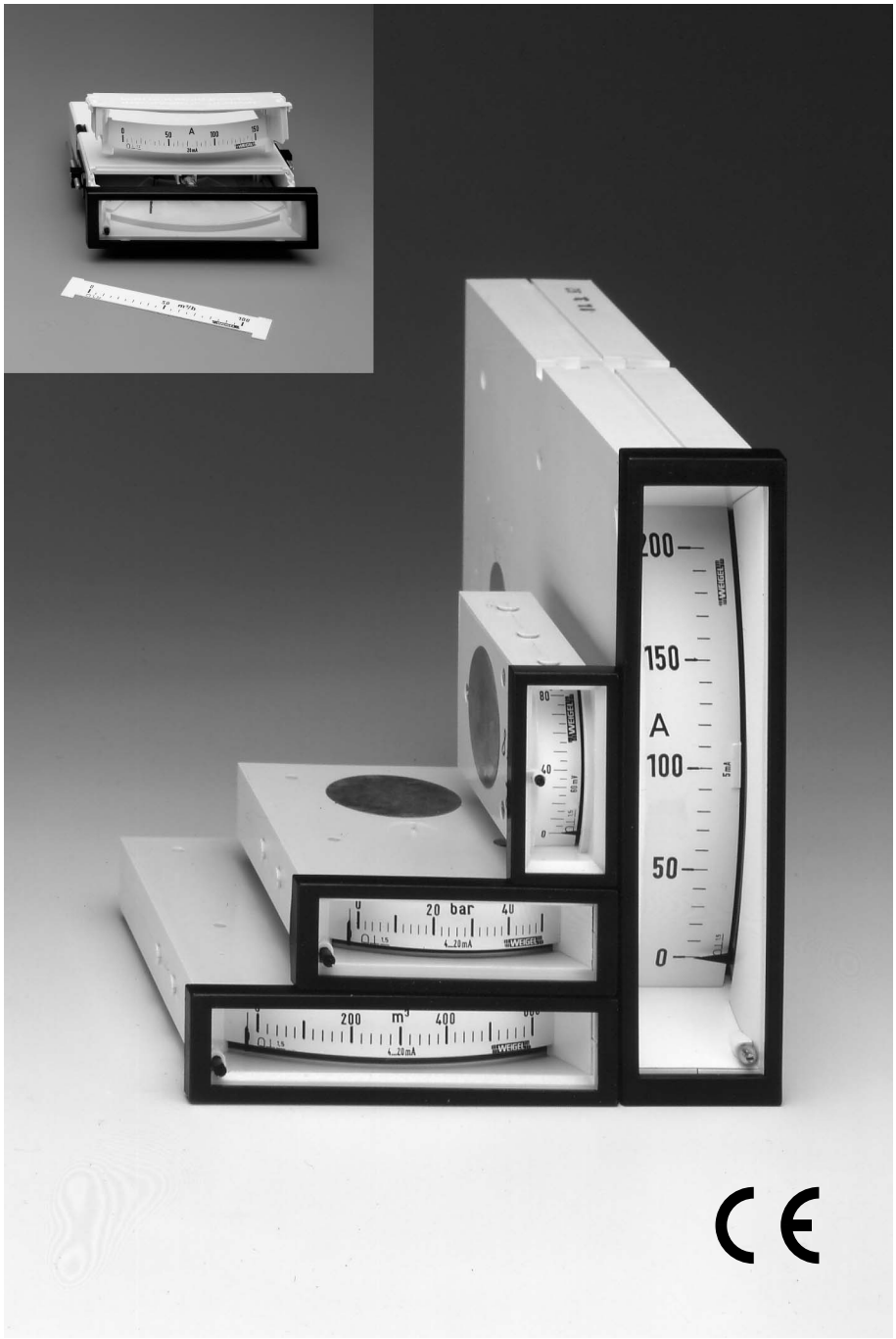
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

Edgewise Series
010.D.301.06

Analog Meters
Slim Edgewise with Moving-Coil Movement

MP 48x24
MP 72x24
MP 96x24 K
P 144x36



MP 96x24 K

with Slide-In-Dial

WEIGEL

Application

The edgewise moving-coil panel meters **MP 48x24**, **MP 72x24**, **MP 96x24 K** and **P 144x36** with a slim-line dial are used for measurement of **DC currents and voltages**.

The moving-coil movement is manufactured to newest findings and distinguishes in a small power consumption, a high accuracy and a very good damping.

The instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels (except P 144x36).

With MP 96x24 K **the front panel, the front window and the dial** as well as the **dial illumination** (optional) can be exchanged easily. On the rear side a cable grip for the connecting leads is integrated.

Movements

Self-shielding moving-coil movements with swivel coil, pivot suspended. Spring loaded jewel bearings for vibration and shock resistance.

Mechanical Data

case details	edgewise case suitable to be mounted in control panels, machine tool consoles or mosaic panels (except P144x36), stackable
material of case	thermoplastics
material of window	glass ⏵
colour of bezel	black (similar to RAL 9005) ⏵
position of use	vertical ±5° ⏵
panel fixing	screw clamps ⏵
mounting	stackable next to each other
panel thickness	1 ... 25 mm
terminals	connector blades 6.3 x 0.8 or connector blades 2.8 x 0.8 (MP 96x24 K)

dimensions (in mm)	MP 48x24	MP 72x24	MP 96x24 K	P 144x36
bezel	48 x 24	72 x 24	96 x 24	144 x 36
case	43 x 17	66 x 17	92 x 18	137 x 32
depth	75	98	108	173
panel cutout	$45^{+0.6}$ x $22.2^{+0.3}$	$68^{+0.7}$ x $22.2^{+0.3}$	$92^{+0.8}$ x $22.2^{+0.3}$	$138^{+1.0}$ x $33^{+0.6}$
weight approx.	0.08 kg	0.1 kg	0.12 kg	0.5 kg

Electrical Data

measuring unit	DC voltage or DC current
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
5 s max. voltmeters	2 times rated voltage
ammeters	10 times rated current
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case ⏵ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact

⏵ for other ratings refer to "Options"

Measuring Ranges

DC current	internal resistance*) / voltage drop approx. MP 48x24	MP 72x24	MP 96x24 K	P 144x36
100 µA	1000 Ω	680 Ω	2000 Ω	550 Ω
150 µA	835 Ω	480 Ω	1500 Ω	420 Ω
250 µA	500 Ω	300 Ω	900 Ω	250 Ω
400 µA	310 Ω	205 Ω	560 Ω	155 Ω
600 µA	210 Ω	110 Ω	390 Ω	105 Ω
1 mA	32 mV	31 Ω	47 Ω	52 Ω
1.5 mA	46 mV	24 Ω	40 Ω	45 Ω
2.5 mA	46 mV	20 Ω	25 Ω	27 Ω
4 mA	46 mV	17 Ω	15 Ω	17 Ω
5 mA	46 mV	16 Ω	11 Ω	14 Ω
6 mA	46 mV	60 mV	60 mV	60 mV
10 mA	46 mV	60 mV	60 mV	60 mV
15 mA	46 mV	60 mV	60 mV	60 mV
20 mA	46 mV	60 mV	60 mV	60 mV
25 mA	46 mV	60 mV	60 mV	60 mV
40 mA	46 mV	60 mV	60 mV	60 mV
60 mA	46 mV	60 mV	60 mV	60 mV
100 mA	46 mV	60 mV	60 mV	60 mV
150 mA	46 mV	60 mV	60 mV	60 mV
250 mA	46 mV	60 mV	60 mV	60 mV
400 mA	46 mV	60 mV	60 mV	60 mV
600 mA	46 mV	60 mV	60 mV	60 mV
1 A	46 mV	60 mV	60 mV	60 mV ⏵

DC current with separate amplifier 10 µA, 15 µA, 25 µA, 50 µA, 60 µA
(power supply AC 230 V 48 ... 62 Hz)

for use with external shunt 60 mV, 150 mV **)
a total lead resistance of 0.05 Ω is considered in the calibration of the indicator for interconnecting leads 1 m, 2 x 0.75 mm^2 ⏵

for use on transducer ("live zero") 4 ... 20 mA
mechanically suppressed zero, no zero adjustment,
voltage drop approx. 46 mV ⏵

operating voltage	MP 48x24	MP 72x24	MP 96x24 K	P 144x36
	300 V	600 V	300 V	300 V

DC voltage **)

60 mV, 100 mV, 150 mV, 250 mV, 400 mV, 600 mV, 1 V, 1.5 V, 2.5 V, 4 V, 6 V, 10 V, 15 V, 25 V 40 V				
operating voltage	MP 48x24	MP 72x24	MP 96x24 K	P 144x36
	50 V	100 V	300 V	100 V
60 V, 100 V				
operating voltage	MP 48x24	MP 72x24	MP 96x24 K	P 144x36
	300 V	100 V	300 V	100 V
150 V, 250 V				
operating voltage	MP 48x24	MP 72x24	MP 96x24 K	P 144x36
	300 V	600 V	300 V	300 V

400 V, 500 V, 600 V (MP 48x24 on request)
operating voltage 600 V

*) the resistance values are limited to a tolerance of ±20%
**) sensitivity*) 1000 Ω/V ⏵

Scaling

pointer	bar pointer
zero adjustment	front accessible ⏵
response time	1 s for full–scale deflection
scale arrangement	horizontal (left–hand zero) ⏵
scale characteristics	linear
scale division	coarse–fine

scale length	MP 48x24	MP 72x24	MP 96x24 K	P 144x36
	30 mm	52 mm	60 mm	95 mm

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

Edgewise Series
010.D.301.06

Analog Meters Slim Edgewise with Moving-Coil Movement

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23˚C±1K
position of use	nominal position ±1˚
input	rated measuring value
others	DIN EN 60 051
influences	
ambient temperature	−25˚C ... +23˚C ... +40˚C
position of use	nominal position ±5˚
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 ◗ according to VDE/VDI 3540 sheet 2
operating temperature range	−25 ... +40˚C ◗
storage temperature range	−25 ... +65˚C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms ◗
vibration resistance	2.5 g, 5 ... 55 Hz ◗

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

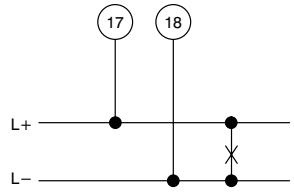
measuring range	
"live zero" (MP 96x24 K)	measuring range 0/4 ... 20 mA electrically suppressed zero with zero adjustment, voltage drop 900 mV approx.
special measuring range	deviating from standard
internal resistance	adjustment to ±1% at 23˚C
increased sensitivity	for voltmeters 1 V and higher to 2 kΩ/V, 5 kΩ/V, 10 kΩ/V or 20 kΩ/V (as far as possible)
lead resistance	calibration of total value >0.05Ω
case	
window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or on request 15˚...165˚
mounting (MP 96 x24 K)	blade springs on the narrow sides
performance	
climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540 sheet 2
with operating temperature range	−10 ... +55˚C
increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
marine application	non−certified
enclosure code	IP 54 splash−water protected front (without zero adjustment or with zero adjustment rear accessible for MP 96x24 K)

terminal protection against accidental contact
protective sleeves B6 for connector blades 6.3 x 0.8
protective sleeves 110 for connector blades 2.8 x 0.8

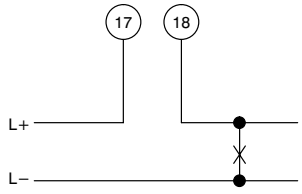
dial	
scale arrangement	vertical (bottom zero)
blank dial	pencil−marked on initial and end values
scale division and figuring	0 ... 100%, linear, full−scale values acc. to standardized series (1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 and their decimal multiples e.g. 150 m^3/h) or deviating from standard; special calibration from customer's non−linear graph or chart; scaling of voltmeters in ohms; captions on request
2nd scale division	including figuring (on request)
coloured scale (MP 96x24 K only)	scale in black; pointer, scale division and lettering yellow or white
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured segment	red, green or blue within scale division
logo on the dial	none or on request
zero position	centre zero or off−set zero, mechanically suppressed zero, no zero adjustment, max. 40% of full−scale value for ammeters ≥ 100 µA, voltmeters ≥ 60 mV
zero adjustment (MP 96x24 K only)	rear accessible
expanded scale	expanded initial scale division by means of electronic circuits up to approx. 5% of full−scale value in centre of scale for MP 72x24 / 96x24 K, P 144x36
dial illumination (MP 96x24 K only)	by 2 lamps 6 V, 12 V or 24 V dial translucent

Connections

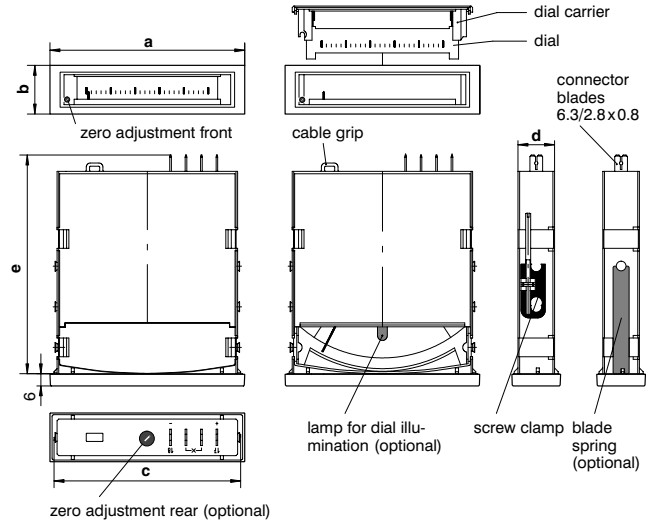
DC voltage



DC current

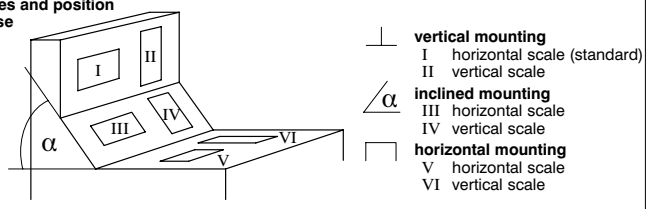


Dimensions



dimensions (in mm)	MP 48x24	MP 72x24	MP 96x24 K	P 144x36
a	48	72	96	144
b	24	24	24	36
c	43	66	92	137
d	17	17	18	32
e	75	98	108	173

scales and position of use



vertical mounting
I horizontal scale (standard)
II vertical scale

inclined mounting
III horizontal scale
IV vertical scale

horizontal mounting
V horizontal scale
VI vertical scale

Ordering Information

type (M)P	slim edgewise moving−coil panel meter for DC voltage or current
front dimensions	
48x24	48 mm x 24 mm
72x24	72 mm x 24 mm
96x24 K	96 mm x 24 mm
144x36	144 mm x 36 mm
measuring ranges	refer to preceding table
sp. measuring range	on request **)
"live zero" MP 96x24 K	mechanically suppressed zero *) electrically suppressed zero
adjustment	internal resistance ±20% *) internal resistance ±1% at 23°C lead resistance >0,05 Ω
sensitivity voltmeters	1 kΩ/V *) 2 kΩ/V 5 kΩ/V 10 kΩ/V 20 kΩ/V as far as possible
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) horizontal on request 15 ... 165° **)
mounting	screw clamps *) spring blades
climatic suitability	class 2, −25 ... +40°C *) class 3, −10 ... +55°C
mechanical loads	shock 15 g, vibration 2.5 g *) shock 30 g, vibration 5 g
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal protection	none *) protective sleeves B6 (for 6.3 x 0.8) protective sleeves 110 (for 2.8 x 0.8)
scale arrangement	horizontal *) vertical
dial	scale division & measuring range alike *) blank dial scale division and figuring 0 ... 100% linear acc. to standardized series **) linear deviating from standard **) calibration f. non-linear graph or chart**) scaling in ohms for voltmeters **) 2 scale divisions on request **) yellow on black dial **) white on black dial **) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)
zero position	left-hand or bottom zero *) centre zero or off-set zero **) mechanically suppressed zero **)
zero adjustment	front accessible *) rear accessible ***)
expanded scale (not for MP 48x24)	none *) up to approx. 5% of full-scale value in center scale electronically **)
dial illumination	none *) with 1 lamp 6, 12 or 24 V ***)

*) standard
**) Please clearly add the desired specifications.
***) MP 96x24 K only

ordering example

MP 72x24, measuring range 0 ... 20 mA, horizontal scale 0 ... 100%, vertical mounting, window non−glaring glass, WEIGEL logo

− specifications subject to change without notice; date of issue 09/06 −

WEIGEL − MESSGERÄTE GmbH

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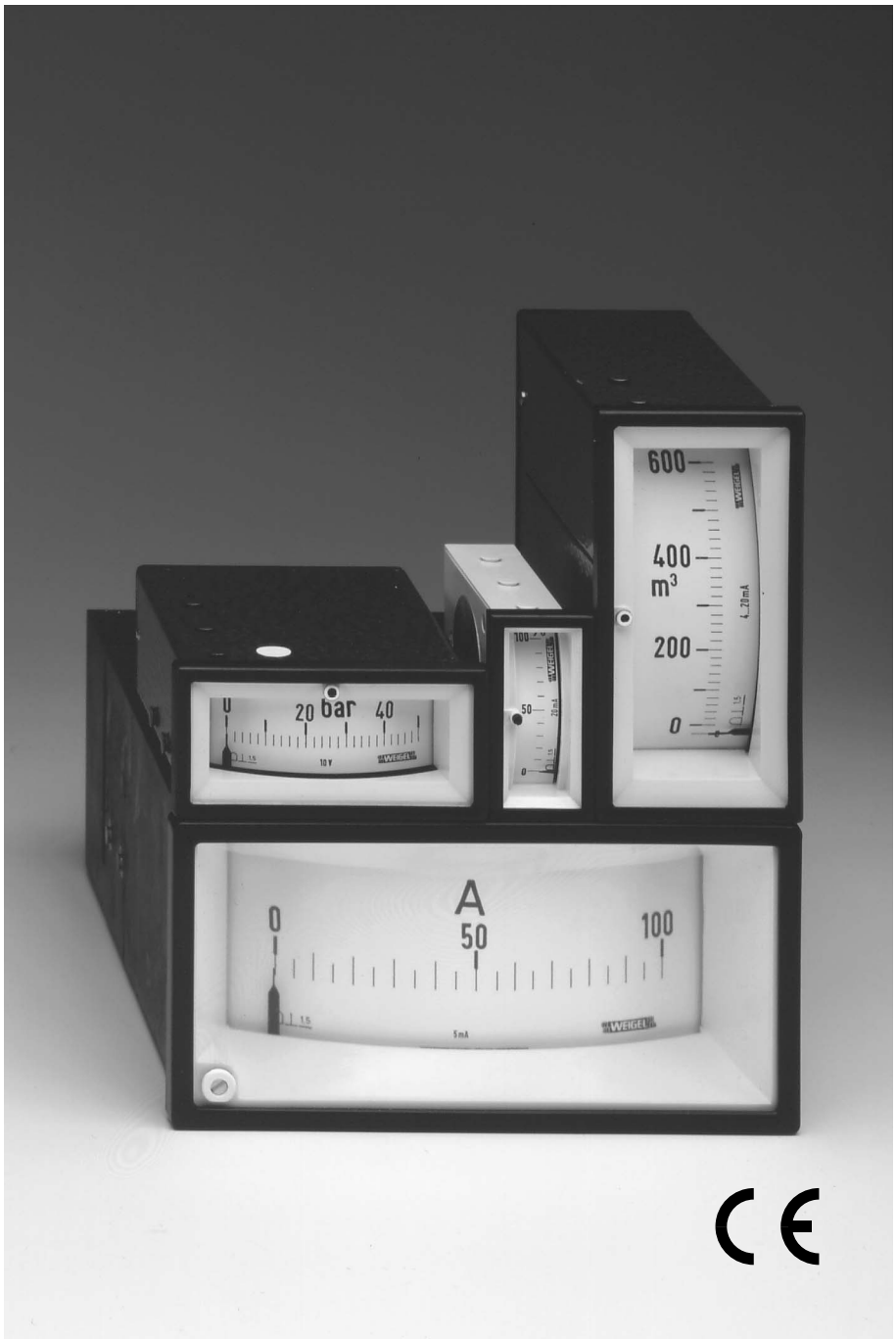
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

Edgewise Series
010.D.201.05

Analog Meters Edgewise with Moving-Coil Movement

P 48 PrS
P 72 PrS
P 96 PrS
P 144 PrS



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Application

The edgewise moving–coil panel meters **P 48**/**72**/**96**/**144 PrS** with a curved dial are used for measurement of DC currents and voltages. The edgewise case styles provide a high ratio of scale length to panel area.

These instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels.

Movements

Self–shielding moving–coil movements with core–type magnet (P 72/96/144 PrS) resp. swivel coil (P 48 PrS), pivot suspended. Spring loaded jewel bearings for vibration and shock resistance.

Mechanical Data

case details	edgewise case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable			
material of case	pressed steel (P 72/96 PrS) thermoplastics (P 48/144 PrS)			
material of window	glass ⧫			
colour of bezel	black (similar to RAL 9005) ⧫			
position of use	vertical ±5° ⧫			
panel fixing	screw clamps			
mounting	stackable next to each other (except P 144 PrS)			
terminals				
voltmeters and ammeters ≤ 3 A	hexagon studs, M3 screws and wire clamps C6 (P 72/96 PrS), connector blades 6.3 x 0.8 (P 48/144 PrS)			
ammeters >3 A	hexagon studs, M5 screws and wire clamps C10			
voltmeters ≥300 V	(P 72/96 PrS) connector blades 6.3 x 0.8 for protective wire			
dimensions (in mm)	P 48 PrS	P 72 PrS	P 96 PrS	P 144 PrS
bezel	48 x 24	72 x 36	96 x 48	144 x 72
case	43 x 17	66 x 32	91 x 43	137 x 67
depth	75	94	107	192
panel cutout	$45^{+0.6}$ x $22.2^{+0.3}$	$68^{+0.7}$ x $33^{+0.6}$	$92^{+0.8}$ x $45^{+0.6}$	$138^{+1.0}$ x $68^{+0.7}$
panel thickness	1 ... 25	1 ... 25	1 ... 12	≤ 40
weight approx.	0.08 kg	0.2 kg	0.45 kg	0.6 kg

Electrical Data

measuring unit	DC voltages or DC currents
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
5 s max.	
voltmeters	2 times rated voltage
ammeters	10 times rated current
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case ⧫ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact

⧫ also refer to ”Options”

Measuring Ranges

DC current	internal resistance *) / voltage drop approx. P 48 PrS	P 72 PrS	P 96 PrS	P 144 PrS
50 µA	1000 Ω	6500 Ω	6500 Ω	4600 Ω
60 µA	1040 Ω	5500 Ω	5500 Ω	4400 Ω
100 µA	1000 Ω	4900 Ω	4900 Ω	2800 Ω
150 µA	835 Ω	3600 Ω	3600 Ω	2200 Ω
250 µA	500 Ω	2200 Ω	2200 Ω	740 Ω
400 µA	310 Ω	1300 Ω	1300 Ω	630 Ω
600 µA	210 Ω	250 Ω	250 Ω	260 Ω
1 mA	32 mV	48 Ω	48 Ω	48 Ω
1.5 mA	46 mV	60 mV	60 mV	60 mV
2.5 mA	46 mV	60 mV	60 mV	60 mV
4 mA	46 mV	60 mV	60 mV	60 mV
5 mA	46 mV	60 mV	60 mV	60 mV
6 mA	46 mV	60 mV	60 mV	60 mV
10 mA	46 mV	60 mV	60 mV	60 mV
15 mA	46 mV	60 mV	60 mV	60 mV
20 mA	46 mV	60 mV	60 mV	60 mV
25 mA	46 mV	60 mV	60 mV	60 mV
40 mA	46 mV	60 mV	60 mV	60 mV
60 mA	46 mV	60 mV	60 mV	60 mV
100 mA	46 mV	60 mV	60 mV	60 mV
150 mA	46 mV	60 mV	60 mV	60 mV
250 mA	46 mV	60 mV	60 mV	60 mV
400 mA	46 mV	60 mV	60 mV	60 mV
600 mA	46 mV	60 mV	60 mV	60 mV
1 A	46 mV	60 mV	60 mV	60 mV
1.5 A	–	60 mV	60 mV	60 mV
2.5 A	–	60 mV	60 mV	60 mV
4 A	–	60 mV	60 mV	60 mV
6 A	–	60 mV	60 mV	60 mV
10 A	–	60 mV	60 mV	60 mV
15 A	–	60 mV	60 mV	60 mV
25 A	–	60 mV	60 mV	60 mV
40 A	–	–	60 mV	60 mV
60 A	–	–	–	60 mV

⧫

DC current with separate amplifier 10 µA, 15 µA, 25 µA
(power supply AC 230 V 48 ... 62 Hz)

for use with external shunt 60 mV, 150 mV **)
a total lead resistance of 0.05 Ω is considered in the calibration of the indicator for interconnecting leads 1 m, 2 x 0.75 mm^2 ⧫

for use on transducer (”live zero”)
0/4 ... 20 mA electrically suppressed zero, with zero adjustment (P 72/96/144 PrS), voltage drop approx. 900 mV
4 ... 20 mA mechanically suppressed zero, no zero adjustment (P 48 PrS), voltage drop approx. 46 mV

operating voltage	P 48 PrS	P 72 PrS	P 96 PrS	P 144 PrS
	300 V	300 V	300 V	600 V

DC voltage	P 48 PrS	P 72/96 PrS	P 144 PrS
40 mV			
sensitivity*)	–	3300 Ω/V	2000 Ω/V
operating voltage	–	300 V	600 V
60 mV, 100 mV, 150 mV, 250 mV, 400 mV, 600 mV, **)			
1 V, 1,5 V, 2,5 V, 4 V, 6 V, 10 V, 15 V, 25 V, 40 V, **)			
operating voltage	50 V	50 V	100 V
60 V, 100 V, **)			
operating voltage	300 V	100 V	100 V
150 V, 250 V, **)			
operating voltage	300 V	300 V	600 V
400 V, 500 V, 600 V **)			
operating voltage	600 V	600 V	600 V

⧫

*) the resistance values are limited to a tolerance of ±20%
**) sensitivity*) 1000 Ω/V ⧫

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

Edgewise Series
010.D.201.05

Analog Meters Edgewise with Moving-Coil Movement

Scaling

pointer	bar / knife−edge pointer			
response time	1 s for full−scale deflection			
scale arrangement	horizontal (left−hand zero)			
scale characteristics	linear			
scale division	coarse−fine			
scale length	P 48 PrS 30 mm	P 72 PrS 45 mm	P 96 PrS 67 mm	P 144 PrS 92 mm

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23˚C±1K
position of use	nominal position ±1˚
input	rated measuring value
others	DIN EN 60 051
influences	
ambient temperature	−25˚C ... +23˚C ... +40˚C
position of use	nominal position ±5˚
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 according to VDE/VDI 3540 sheet 2
operating temperature range	−25 ... +40˚C
storage temperature range	−25 ... +65˚C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

Rules and Standards

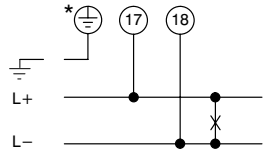
DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

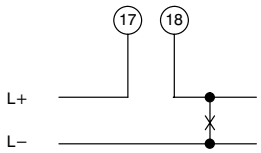
measuring range	
special measuring range	deviating from standard
measuring range adjustment	adjustment potentiometer installed in voltmeters, adjustment range approx. ±10% or ±20 ... 50% (except P 48/72 PrS), ammeters on request
2nd measuring range	with 3rd terminal for voltmeters, 2nd figuring and 1 or 2 scale divisions (except P 48/72 PrS)
additional measuring ranges	on request
accuracy class	1.0 with fine scale division (as far as possible)
adjustment of internal resistance	to ±1% at 23˚C
increased sensitivity	to 2 kΩ/V, 5 kΩ/V, 10 kΩ/V or 20 kΩ/V for voltmeters ≥ 1 V (as far as possible)
lead resistance	calibration of a total value >0.05Ω
case	
window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or on request 15˚...165˚
performance	
climatic suitability	limited use in the tropics, climatic class 3 according to VDE/VDI 3540 sheet 2
with operating temperature range	−10 ... +55˚C
marine application	non−certified
enclosure code	IP 54 splash−water protected front (without zero adjustment)
terminal protection against accidental contact	protective sleeves B6 for P 48 PrS SW6, SW10 (ammeters >3A) for P 72/96 PrS
dial	
scale arrangement	vertical (bottom zero)
blank dial	pencil−marked on initial and end values
scale division and figuring	0 ... 100%, linear, full−scale values acc. to standardized series (1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 and their decimal multiples e.g. 150 m^3/h) or deviating from standard; special calibration from customer's non−linear graph or chart; scaling of voltmeters in ohms; captions on request
2nd scale division	linear including figuring, non−linear including figuring
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request
zero position	centre zero or off−set zero, mechanically suppressed zero, no zero adjustment, max. 40% of full−scale value for ammeters ≥ 100 µA, voltmeters ≥ 60 mV electrically suppressed zero for voltmeters ≥ 6 V
expanded scale for P 72/96/144 PrS	expanded initial scale division by means of electronic circuits up to approx. 5% of full−scale value in centre of scale

Connections

DC voltage



DC current



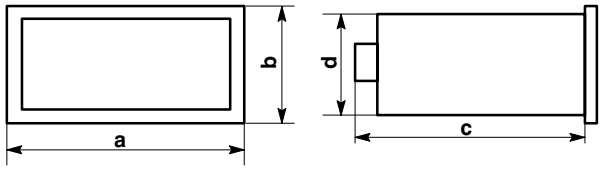
* P 72/96 PrS voltmeters ≥300 V

Dimensions

P 48 PrS

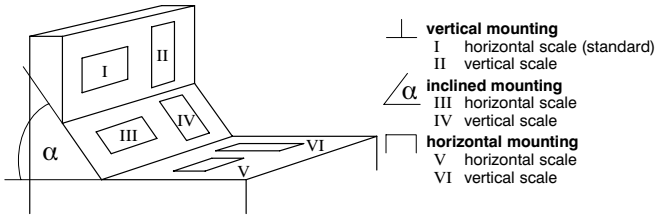
P 72/96 PrS

P 144 PrS



dimensions (in mm)	**P 48 PrS**	**P 72 PrS**	**P 96 PrS**	**P 144 PrS**
a	48	72	96	144
b	24	36	48	72
c	75	94	107	192
d	17	32	43	67

scales and position of use



vertical mounting
I horizontal scale (standard)
II vertical scale

inclined mounting
III horizontal scale
IV vertical scale

horizontal mounting
V horizontal scale
VI vertical scale

Ordering Information

type **P**	edgewise–type moving–coil panel meter
front dimensions	
48 PrS	48 mm x 24 mm
72 PrS	72 mm x 36 mm
96 PrS	96 mm x 48 mm
144 PrS	144 mm x 72 mm

measuring ranges	refer to preceding table
sp. measuring range	on request **)
measuring range adjustment	none *) voltage ±10% voltage ±20 ... 50%
2nd measuring range	none *) 1 scale division, 2nd figuring 2 scale divisions, 2 figurings
accuracy class	1.5 *) 1.0 with fine scale division as far as possible
adjustment	internal resistance to ±20% *) internal resistance to ±1% at 23°C lead resistance >0.05 Ω
sensitivity, voltmeters	1 kΩ/V *) to approx. 2 kΩ/V to approx. 5 kΩ/V to approx. 10 kΩ/V to approx. 20 kΩ/V as far as possible
window	glass *) non–glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) horizontal on request 15 ... 165° **)
climatic suitability	class 2, –25 ... +40°C *) class 3, –10 ... +55°C
marine application	none *) non–certified
enclosure code	IP 52 *) IP 54 splash–water protected front
terminal protection	none *) protective sleeves B6, SW6 resp. SW10
scale arrangement	horizontal *) vertical
dial	scale division & measuring range alike *) blank dial scale division and figuring 0 ... 100% linear acc. to standardized series **) linear deviating from standard **) calibration fr. non–linear graph or chart **) scaling in ohms for voltmeters **) 2 scale divisions **) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)
zero position	centre zero or off–set zero **) electrically suppressed zero **) mechanically suppressed zero **)

*) standard
**) Please clearly add the desired specifications.

ordering example

P 72 PrS, measuring range 0 ... 20 mA, horizontal scale 0 ... 100%, vertical mounting, window non–glaring glass, WEIGEL logo

– specifications subject to change without notice; date of issue 02/07 –

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TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M – Series
100.D.101.03

Wall Brackets, empty
Synchronizing Wall Brackets

WA 96
WA 144

CE

WEIGEL

Application

The wall brackets WA 96/144 are being supplied either empty or equipped as synchronizing wall bracket.

The wall brackets can hold three each panel meters of the standard square form 96 mm x 96 mm resp. 144 mm x 144 mm with a mounting depth up to 150 mm resp. 190 mm.

Synchronizing Wall Brackets

Voltage, frequency and phase balance have to coincide when connecting an alternator to the supply system or to a second alternator, when they are to be operated in parallel.

Four types of indicating meters are available for synchronizing application: (see data sheet No.)

– Synchronoscope	SY	96/144 S	(080.D.101.##) or
– Null Voltmeter	WQ	96/144 /0S	(022.D.101.##)
– Dual Voltmeter	WQ	96/144 /2S	(023.D.101.##) and
– Dual Frequency Meter	FQ	96/144 /2	(031.D.101.##)

Three each indicating meters can be combined to a synchronizing group in a wall bracket WA 96/144:

Synchronoscope	or	Null Voltmeter
Dual Voltmeter		Dual Voltmeter
Dual Frequency Meter		Dual Frequency Meter

Mechanical Data

form A	wall bracket upright, bottom support		
form B	wall bracket suspended, support on top		
form C	wall bracket upright, support on top and bottom (WA 144 only)		
form D	bench–type bracket, support on bottom		
All bracket forms have a swivel range of 180°.			
material			
case	pressed steel		
support	AL–die casting		
colour	gray (similar to RAL 7037)		
fixing	by 4 each screws ø10 mm		
dimensions	see dimensional drawings		
weight approx. (wall bracket empty)	WA 96–A/B/D 4.5 kg	WA 144–A/B/D 6.5 kg	WA 144–C 7.5 kg

Synchronizing Wall Brackets

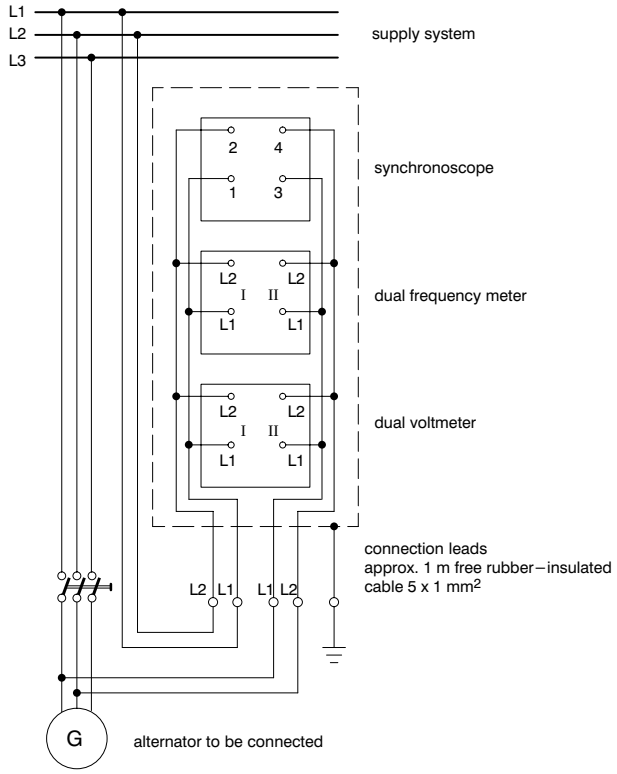
weight approx. (wall bracket equipped)	WA 96–A/B/D 7 kg	WA 144–A/B/D 10 kg	WA 144–C 11 kg
connection	rubber–insulated cable approx. 1 m, 5 x 1 mm^2		
enclosure code	IP 52		
additional data	refer to data sheets relating to sole instruments		

Rules and Standards

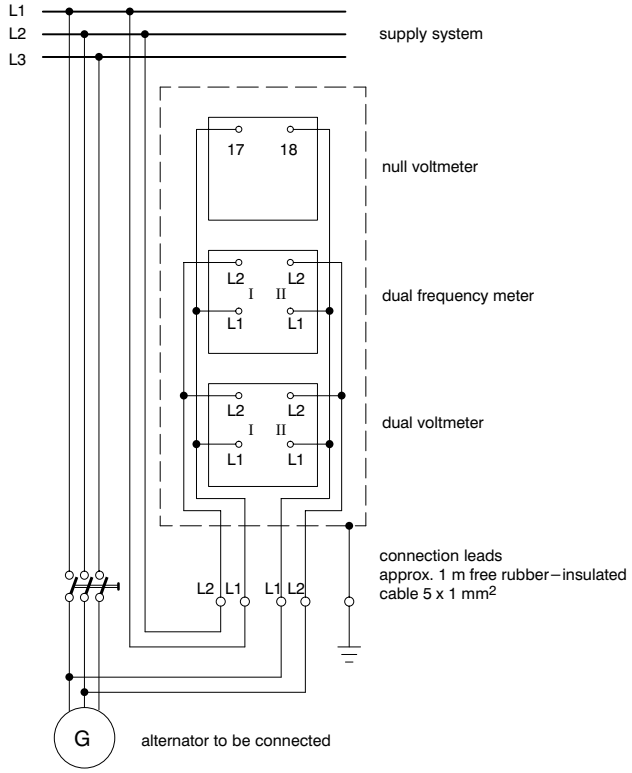
DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 57 410 / VDE 0410	safety requirements for electrically operated measuring, control and laboratory equipment
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water

Connections

Synchronizing Wall Bracket including Synchronoscope



Synchronizing Wall Bracket including Null Voltmeter



DIN EN ISO 9001
Certificate: 01 100 80407

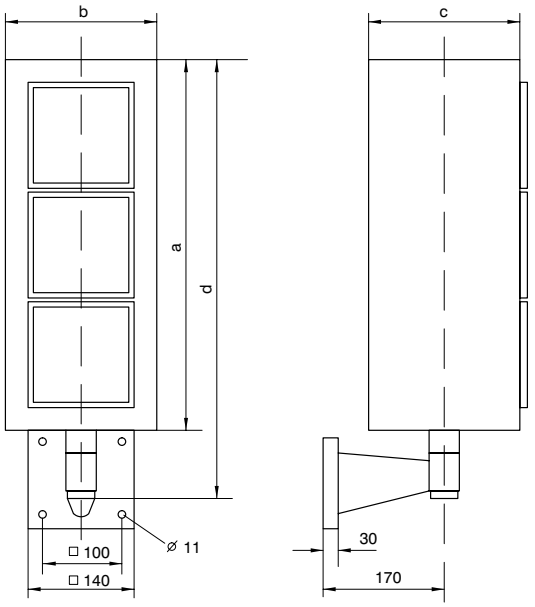
Data Sheet

M – Series
100.D.101.03

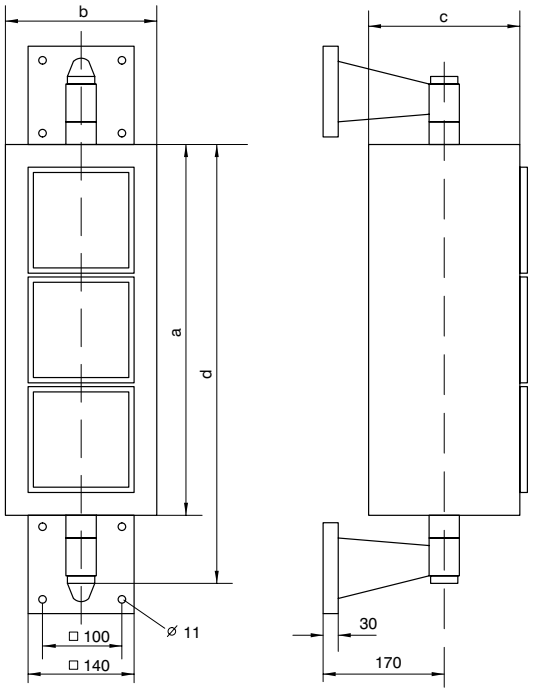
Wall Brackets, empty
Synchronizing
Wall Brackets

Dimensions

form A, B
(form B: support will be mounted on upper side of wall bracket)

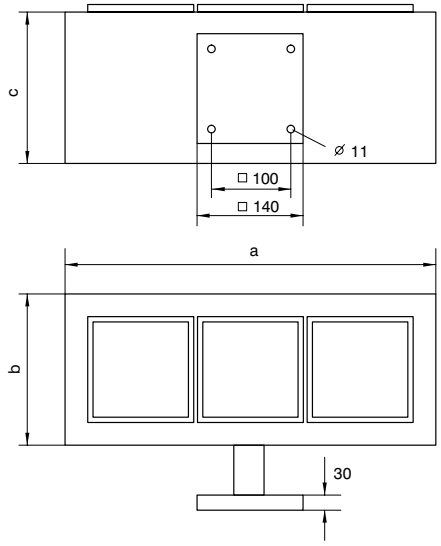


form C (WA 144 only)



dimensions (in mm)	**WA 96 – A/ B**	**WA 144 – A/ B/ C**
a	345	487
b	150	200
c	160	200
d	414	556

form D



dimensions (in mm)	**WA 96 – D**	**WA 144 – D**
a	345	487
b	150	200
c	160	200

Ordering Information

type	
WA	Wall Bracket empty
dimensions	
96	accommodating instruments 96 mm x 96 mm
144	accommodating instruments 144 mm x 144 mm
form	
A	bracket upright, bottom support *)
B	bracket suspended, support on top
C	bracket upright, support on top and bottom **)
D	bench−type bracket, bottom support

*) standard
**) WA 144 only

ordering example 1

Wall Bracket WA 144−B, empty

type		
WA	Synchronizing Wall Bracket	
dimensions		
96	accommodating instruments 96 mm x 96 mm	
144	accommodating instruments 144 mm x 144 mm	
form		
A	bracket upright, bottom support *)	
B	bracket suspended, support on top	
C	bracket upright, support on top and bottom **)	
D	bench−type bracket, bottom support	
combination	meter	refer to data sheet No.
SY 96/144 S	synchronoscope	080.D.101.##
WQ 96/144 /2S	dual voltmeter	023.D.101.##
FQ 96/144 /2	dual frequency meter	031.D.101.##
or		
WQ 96/144 /0S	null voltmeter	022.D.101.##
WQ 96/144 /2S	dual voltmeter	023.D.101.##
FQ 96/144 /2	dual frequency meter	031.D.101.##
assembly	mount and connect instruments, install connection leads	

*) standard
**) WA 144 only

ordering example 2

Synchronizing Wall Bracket WA 96−A
comprising instrument combination:

Synchronoscope SY 96 S,
Dual Voltmeter WQ 96 /2S and
Dual Frequency Meter FQ 96 /2, 2x 21 reeds

rated voltage 400 V, rated frequency 50 Hz,
installed and wired

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DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
090.D.101.04

Phase Sequence Indicator

DFQ 96

CE

WEIGEL

Application

The phase sequence indicator **DFQ 96** (M series) is used to determine the phase sequence in three−phase systems up to 500 V by a direct connection.

A disc marked with two arrows rotates clockwise (in arrow direction) when pressing a button accessible on indicator front, provided the three phases are logically connected in accordance with the indicator terminal markings, otherwise the disc will rotate anticlockwise.

In case of an incorrect phase sequence, the correct direction of rotation is obtained by interchanging any of two phases.

Phase sequence indicators are housed in pressed steel cases suitable to be mounted in switchboards, control panels, machinery and/or mosaic grid panels.

Functional Principle

Induction−movement with a freely rotating disc.

Mechanical Data

case details	square case suitable to be mounted in switchboards or mosaic grid panels, stackable ⧫
material of case	pressed steel
material of window	glass ⧫
colour of bezel	black (similar to RAL 9005) ⧫
position of use	vertical ±5° ⧫
panel fixing	screw clamps
panel thickness	1 ... 15 mm
mounting	stackable next to each other
terminals	hexagon studs, M3 screws and wire clamps C6

dimensions	**DFQ 96**
bezel	□ 96 mm
case	□ 90.5 mm
depth	62 mm
panel cutout	□ $92^{+0.8}$ mm
weight approx.	0.4 kg

Electrical Data

measuring unit	phase sequence in three−phase systems
frequency range	40 ... 100 Hz ⧫
voltage range	100 ... 500 V
power consumption	at 100 V approx. 0.5 VA per phase at 500 V approx. 2 VA per phase
safe operational period	5 min max.
measurement category	CAT III
operating voltage	300 V
pollution level	2
enclosure code	IP 52 case ⧫ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact

Indication

Disc marked with two arrows rotates behind dial plate with an arrow indicating the correct phase sequence.

disc diameter	36 mm

Environmental

climatic suitability	climatic class 2 according to VDE/VDI 3540, sheet 2 ⧫
operating temperature range	−25 ... +40°C ⧫
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms ⧫
vibration resistance	2.5 g, 5 ... 55 Hz ⧫

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

⧫ also refer to "Options"

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

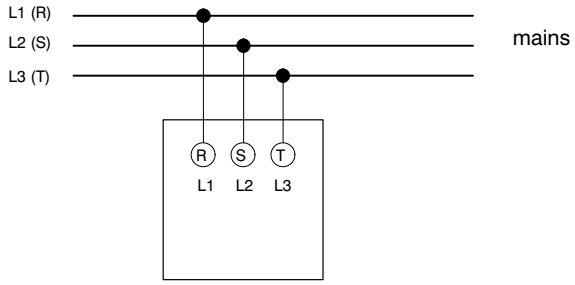
M Series
090.D.101.04

Phase Sequence Indicator

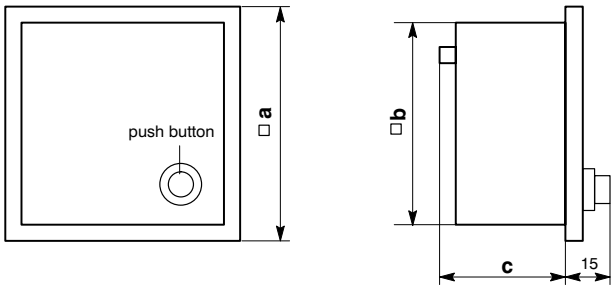
Options

frequency	400 Hz on request
case	
portable type	on request
window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or to be specified 15˚...165˚
performance	
increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540, sheet 2
with operating temperature range	−10 ... +55˚C
marine application	non−certified
enclosure code	IP 54 splash−water protected front
accessories	
terminal protection against accidental contact full−sized rear cover or protective sleeves	
terminals	connector blades 6.3 x 0.8
dial	
custom logo	none or as specified

Connections



Dimensions



dimensions (in mm)	**DFQ 96**
a	96
b	90
c	62

Ordering Information

type **DFQ**	Phase Sequence Indicator
front dimensions **96**	96 mm x 96 mm
frequency	40 ... 100 Hz *) 400 Hz ***)
version	panel type *) portable type ***)
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) to be specified 15 ... 165° **)
mechanical loads	shock 15 g, vibration 2.5 g *) shock 30 g, vibration 5 g
climatic suitability	class 2, −25 ... +40°C *) class 3, −10 ... +55°C
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal protection	none *) full−sized rear cover ***) protective sleeves
terminals	screws M3 x 6 *) connector blades 6.3 x 0.8
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.
***) on request

ordering example

DFQ 96 50 Hz, panel type indicator,
window non−glaring glass, WEIGEL logo

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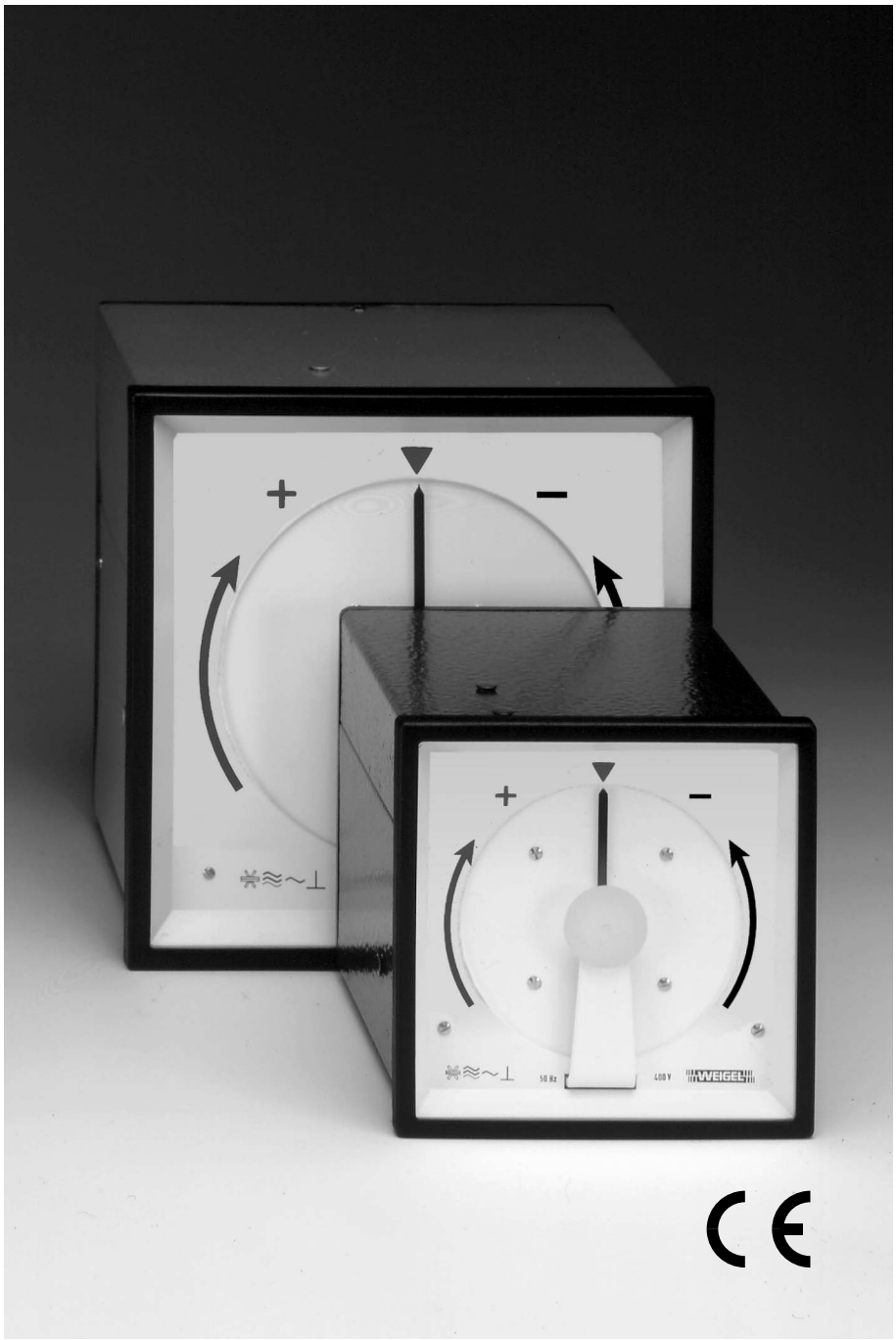
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
080.D.101.05

Analog Meters for Phase Comparison Synchronoscopes

SY 96 S
SY 144 S



WEIGEL

Application

The synchronoscopes **SY 96**/**144 S** (M series) are used to measure phase difference of two AC voltages, e.g. those of a generator and the mains.

The dial carries a zero marker, a red arrow marked with "+" and a black arrow marked with "−"

When the frequencies of the two voltages differ less than approx. 2 Hz, they can be compared approximately:

The pointer rotates according to frequency ratio (and to meter connection) clockwise or anticlockwise. The pointer stands still when the frequencies get equal. The pointer rests at the zero marker when the phases coincide also; the AC voltages can be connected to each other.

The connection of the meter can be chosen so that the pointer rotates clockwise or counterclockwise when the frequency f_1 (e.g. generator) is higher.

When the meter is not in work, the pointer cannot be seen.

The instruments are suitable to be mounted in generating sets, power supply control panels, switchboards or mosaic panels.

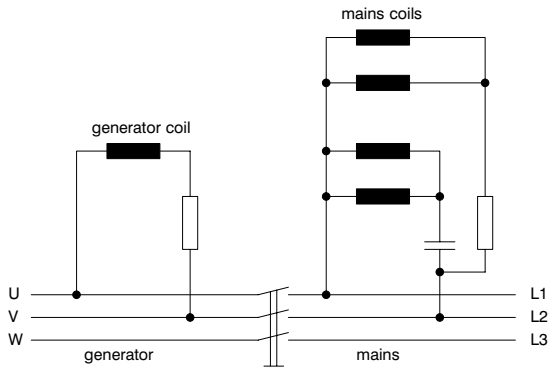
Movements

The synchronoscopes SY 96 S and SY 144 S are supplied with an ironless electrodynamical quotient movement.

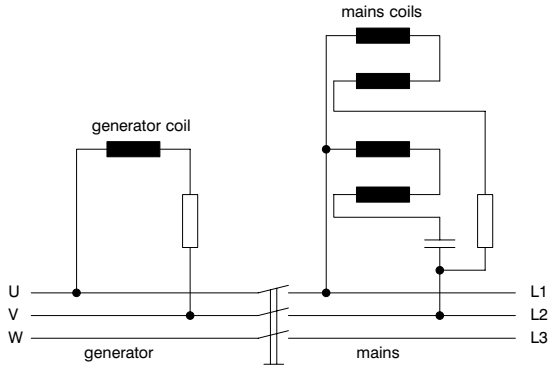
The pointer is able to rotate over 360° in both directions.

Principle Circuit Diagrams

for voltages 100/110 V



for voltages 230/400/500 V



Mechanical Data

case details	square case suitable to be mounted in switchboards or mosaic grid panels, stackable ➧	
material of case	pressed steel	
material of window	glass ➧	
colour of bezel	black (similar to RAL 9005) ➧	
terminals	hexagon studs, M3 screws and wire clamps C6 ➧ connector blades 6.3 x 0.8 for protective wire	
terminal protection against accidental contact	full−sized terminal cover (SY 96 S) / protective sleeves SW6 (SY 144 S) included	
position of use	vertical ±5° ➧	
dimensions	**SY 96 S**	**SY 144 S**
bezel	□ 96 mm	□ 144 mm
case	□ 90 mm	□ 137 mm
depth	119 mm	117 mm
panel cutout	□ $92^{+0.8}$ mm	□ 138^{+1} mm
panel thickness	1...15 mm	1...40 mm
panel fixing	4 pieces WEIGEL screw clamps	2 pieces type B screw clamps acc. to DIN 43 835
weight approx.	1.0 kg	1.1 kg

Electrical Data

measuring unit	phase angle of two sinusoidal AC voltages	
Measuring Ranges		
frequency	rated frequency 50 Hz ➧	frequency range 48.5 ... 51.5 Hz
voltage	**rated voltage** U_N	**operating voltage**
	60; 100; 110 V	300 V
	230; 400; 415 V	300 V
	400 V	300 V
	440; 500 V ➧	300 V
power consumption approx.		
at rated voltage	generator side	mains side
110 V	0.7 VA	4.0 VA
230 V	1.5 VA	5.3 VA
400 V	3.2 VA	4.8 VA
500 V	3.5 VA	6.7 VA
operating range	U_N ±10%	
overload capacity	U_N +20%	
measurement category	CAT III	
operating voltage	refer to Measuring Ranges	
pollution level	2	
enclosure code	IP 52 case ➧ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact	

Scaling

pointer	bar pointer
pointer deflection	360°
zero	triangle on dial top
accuracy class	1 according to DIN EN 60 051

➧ also refer to "Options"

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
080.D.101.05

Analog Meters for Phase Comparison Synchronoscopes

Environmental

climatic suitability	climatic class 2 according to VDE/VDI 3540
operating temperature range	−10 ... +40°C
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz
stray magnetic field	<0.5 mT according to DIN EN 60 051

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

electrical data

frequency	rated frequency	frequency range
	$16\,^2/_3$ Hz	$16\,^1/_3$ ... 17 Hz
	60 Hz	58.5 ... 61.5 Hz
voltage	rated voltage U_N : 60 V, 415 V, 440 V others (>57.8 V ... <500 V) on request	
voltage range	100 ... 120 V : $\sqrt{3}$ 100 ... 120 V 208 ... 230 V 380 ... 400 V	

case

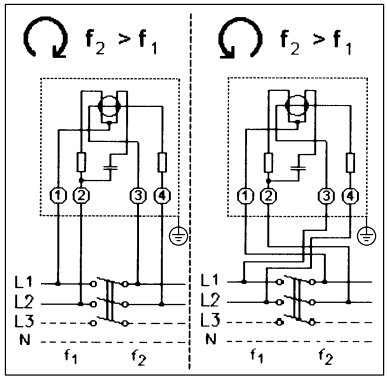
window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	on request 15°...165°
increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	climatic class 3 according to VDE/VDI 3540
with operating temperature range	−10 ... +55°C
(relative humidity	≤ 75% annual average, non−condensing)
climatic suitability	"limited use in the tropics"
with operating temperature range	−25 ... +55°C
(relative humidity	≤ 75% annual average, non−condensing)
marine application	non−certified
enclosure code	IP 54 splash−water protected front
terminals	connector blades 6.3 x 0.8
terminal protection against accidental contact	rubber nozzles

dial

logo on the dial	none or on request

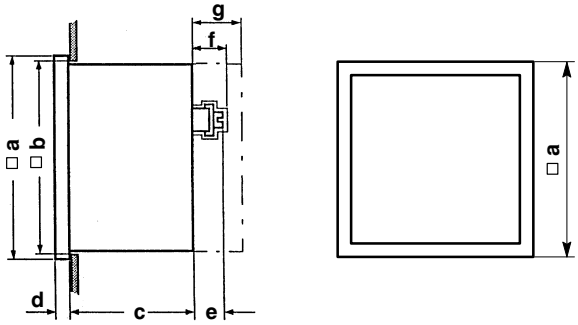
Connections

Note: The rotation direction depends on connection.



See also meter label

Dimensions



dimensions (in mm)	**SY 96 S**	**SY 144 S**
a	96	144
b	92	138
c	100	103
d	5	8
e	6.5	3
f	19 *)	–
g	–	14

*) including cover for external series resistor

Ordering Information

type **SY**	 synchronoscope
front dimensions **96 S** **144 S**	 96 mm x 96 mm 144 mm x 144 mm
rated voltage	60 V 100 V 110 V 230 V *) 400 V 415 V 440 V 500 V others **) (>57.8 V ... <500 V)
rated frequency	16 $^2/_3$ Hz 50 Hz *) 60 Hz
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) on request 15 ... 165° **)
mechanical loads	shock 15 g, vibration 2.5 g *) shock 30 g, vibration 5 g
climatic suitability	class 2, −10 ... +40°C *) class 3, −10 ... +55°C “limited use in the tropics”, −25 ... +55°C
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminals	screws M3 x 6 and wire clamps *) connector blades 6.3 x 0.8 additional lettering on request **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.

ordering example

SY 96 S, rated voltage AC 230 V, rated frequency 50 Hz,
window non−glaring glass, no logo

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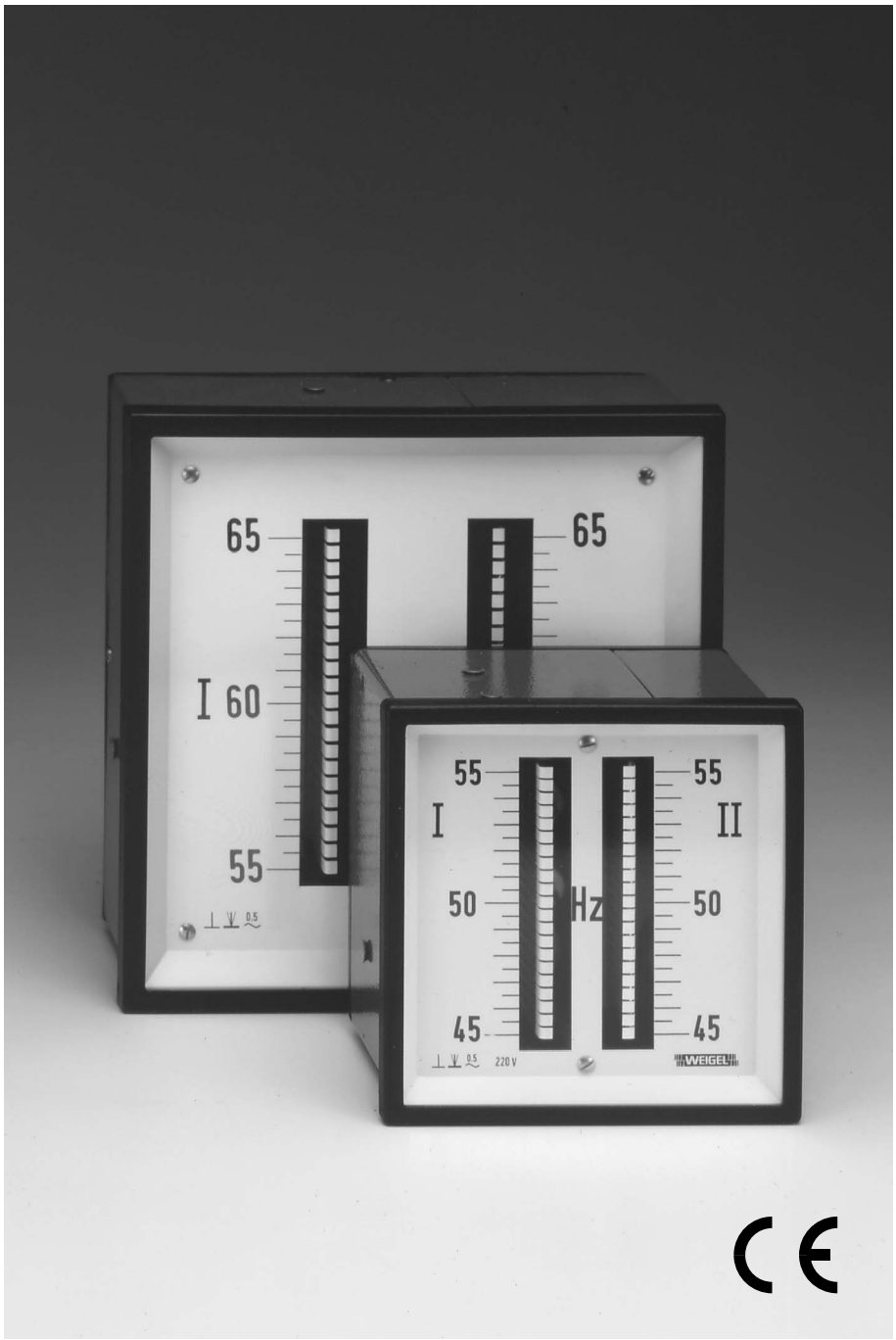
TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
031.D.101.05

Double Frequency Meters with Vibrating Reed Movements

FQ 96 /2
FQ 144 /2



CE

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Application

The double frequency indicators **FQ 96 /2** and **FQ 144 /2** (M series) comprise two electrically independant vibrating reed movements for simultaneously measuring the frequencies of two AC voltages, that of a generator and of a power supply system for instance.

Double frequency indicators are also available with consecutive frequency ranges to one voltage.

The instruments are suitable to be mounted in generating sets, power supply control panels, switchboards or mosaic panels.

Functional Principle

Vibrating reed−type movements with two lines of steel reeds. Each reed is tuned to a different value in the frequency span.

Mechanical Data

case details	square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable
material of case	pressed steel
material of window	glass
colour of bezel	black (similar to RAL 9005)
position of use	vertical ±5˚
panel fixing	WEIGEL screw clamps
panel thickness	1 ... 15 mm
mounting	stackable next to each other
terminals	hexagon studs, M3 x 6 screws and wire clamps

dimensions	**FQ 96 /2**	**FQ 144 /2**
bezel	□ 96 mm	□ 144 mm
case	□ 90 mm	□ 137 mm
depth	66 mm	58 mm
panel cutout	□ $92^{+0.8}$ mm	□ 138^{+1} mm
weight approx.	0.65 kg	1.0 kg

Electrical Data

measuring units	two frequencies
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltages
5 s max.	2 times rated voltages
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case ◗ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact

◗ for other ratings refer to "Options"

Measuring Ranges

two identical measuring ranges	number of steel reeds
2x 47 ... 50 ... 53 Hz	2x 13
2x 45 ... 50 ... 55 Hz	2x 21
2x 57 ... 60 ... 63 Hz	2x 13
2x 55 ... 60 ... 65 Hz	2x 21

two consecutive measuring ranges		number of steel reeds
left right	47 ... 50 ... 53 Hz and 57 ... 60 ... 63 Hz	2x 13
left right	45 ... 50 ... 55 Hz and 55 ... 60 ... 65 Hz	2x 21

rated voltage	power consumption each movement		operating voltage	
	FQ 96 /2	FQ 144 /2	FQ 96 /2	FQ 144 /2
100 V	< 1.1 VA	< 1.1 VA	300 V	300 V
110 V	< 1.1 VA	< 1.1 VA	300 V	300 V
230 V	< 1.2 VA	< 1.2 VA	300 V	300 V
400 V	< 2.0 VA	< 1.8 VA	300 V	300 V
500 V	< 2.5 VA	< 2.4 VA	300 V	300 V
600 V	< 2.9 VA	< 2.9 VA	600 V	600 V

Scaling

scale division	coarse−fine
reed arrangement	vertical

Accuracy at Reference Conditions

accuracy class	0.5 acc. to DIN EN 60 051
reference conditions	
ambient temperature	23˚C±1K
position of use	nominal position ±1˚
input	rated measuring value
others	DIN EN 60 051
influence quantities	
ambient temperature	−25˚C ... +23˚C ... +40˚C
position of use	nominal position ±5˚
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 according to VDE/VDI 3540 sheet 2
operating temperature range	−25 ... +40˚C
storage temperature range	−25 ... +65˚C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
031.D.101.05

Double Frequency Meters with Vibrating Reed Movements

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

case

window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	on request 15˚...165˚

performance

increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540
with operating temperature range	−10 ... +55˚C
marine application	non−certified
enclosure code	IP 54 splash−water protected front

dial

reed arrangement	horizontal
additional lettering	on request e.g. ”generator”
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request

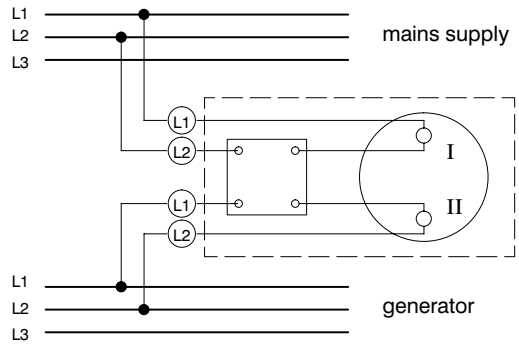
accessories

terminal protection against accidental contact
full−sized rear cover or protective sleeves SW6

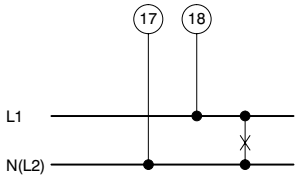
terminals	connector blades 6.3 x 0.8

Connections

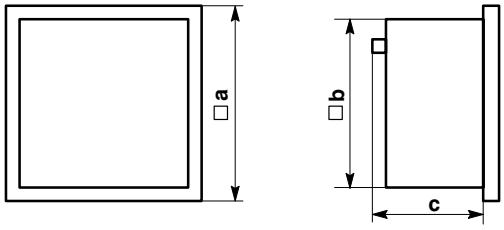
two AC voltages



one AC voltage



Dimensions



dimensions (in mm)	**FQ 96 /2**	**FQ 144 /2**
a	96	144
b	90	137
c	66	58

Ordering Information

type **FQ**	 reed−type frequency meter
front dimensions **96** **144**	 96 mm x 96 mm 144 mm x 144 mm
version **/2**	 two movements
measuring ranges	refer to preceding table
rated voltage	refer to preceding table
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) on request 15 ... 165° **)
increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	class 2, −25 ... +40°C *) class 3, −10 ... +55°C
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal protection	none *) full−sized rear cover ***) protective sleeves
terminals	screws M3 x 6 and wire clamps *) connector blades 6.3 x 0.8
reed arrangement	vertical *) horizontal
dial	scale division & measuring range alike *) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.
***) FQ 96 /2 only

ordering example

FQ 96 /2. measuring range 2x 45 ... 50 ... 55 Hz,
rated voltage AC 230 V, window non−glaring glass, no logo

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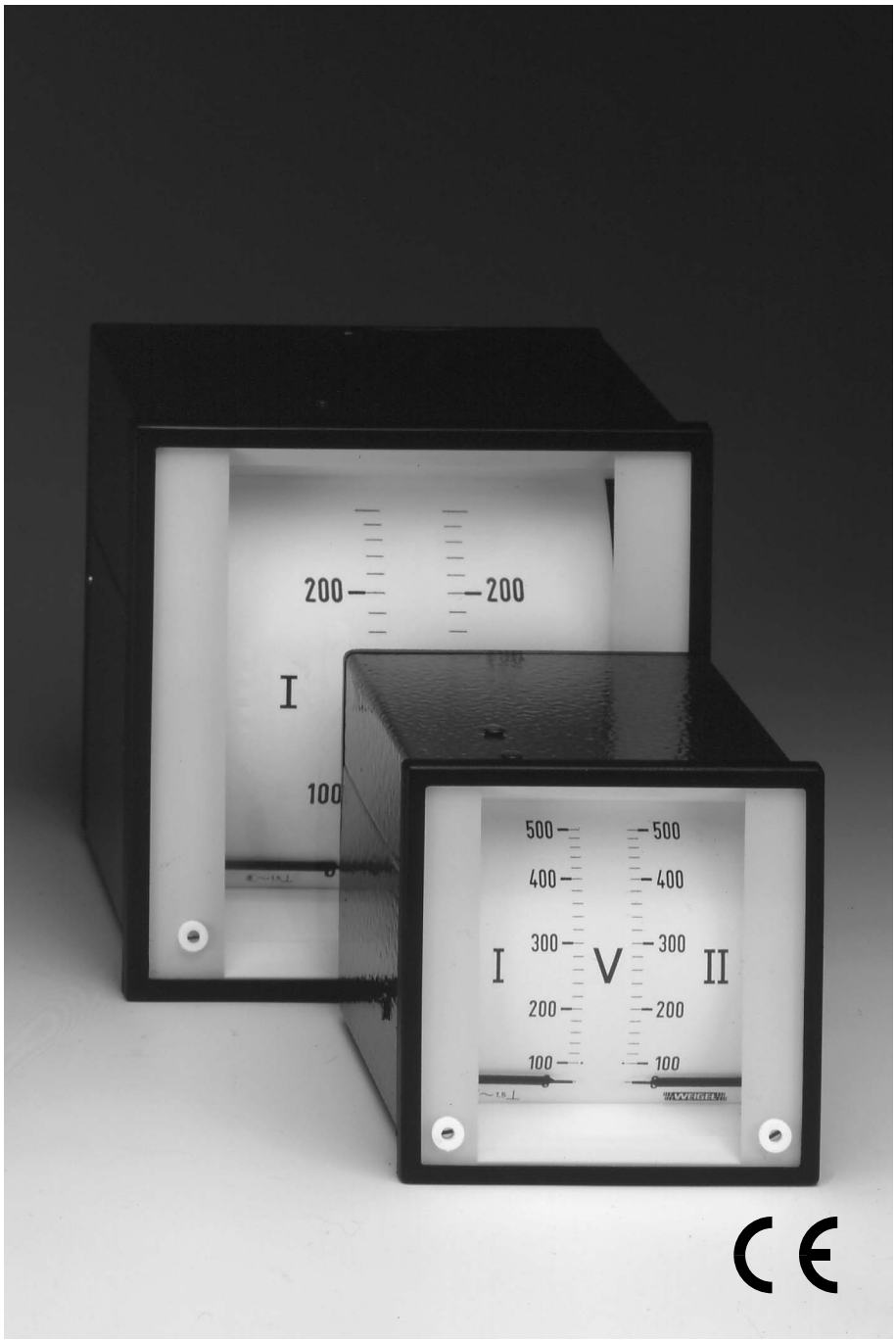
TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
023.D.101.05

Analog Meters with Two Moving–Iron Movements

WQ 96/2S
WQ 144/2S



WEIGEL

Application

The dual voltmeters **WQ 96 /2S** and **WQ 144 /2S** (M series) comprise two electrically independent moving−iron movements for simultaneously measuring two AC voltages, one to indicate the generator voltage, the other to indicate the power supply voltage.

The dual voltmeters are housed in pressed steel cases. They are suitable to be mounted in generating sets, power supply control panels, switchboards or mosaic panels.

Functional Principle

Two electrically independent moving−iron movements, pivot suspended. Spring loaded jewel bearings and silicon oil damping for vibration and shock resistance.

Mechanical Data

case details	square case suitable to be mounted in control / switchgear panels or mosaic panels, stackable
material of case	pressed steel
material of window	glass ◗
colour of bezel	black (similar to RAL 9005) ◗
position of use	vertical ±5° ◗
mounting	stackable next to each other
terminals	hexagon studs, M3 x 6 screws and wire clamps connector blades 6.3 x 0.8 for protective wire (WQ 96/2 only)

dimensions	**WQ 96 /2S**	**WQ 144 /2S**
bezel	□ 96 mm	□ 144 mm
case	□ 90 mm	□ 137 mm
depth	115 mm	121 mm
panel cutout	□ $92^{+0.8}$ mm	□ 138^{+1} mm
panel thickness	1...15 mm	1...40 mm
panel fixing	4 pieces WEIGEL screw clamps	2 pieces type B screw clamps acc. to DIN 43 835
weight approx.	1.2 kg	1.5 kg

Electrical Data

measuring units	two AC voltages
frequency range	50 ... 100 Hz
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltages
5 s max.	2 times rated voltages
enclosure code	IP 52 case IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2

◗ also refer to "Options"

Measuring Ranges

AC voltages	operating voltage	power consumption approximately WQ 96 2/S	WQ 144 2/S
2 x 0 ... 100 V *)	300 V	1.8 VA	2.5 VA
2 x 0 ... 110 V *)	300 V	2.0 VA	2.3 VA
2 x 0 ... 150 V	300 V	2.2 VA	2.6 VA
2 x 0 ... 250 V	300 V	2.3 VA	3.9 VA
2 x 0 ... 500 V	300 V	2.1 VA	3.8 VA
2 x 0 ... 600 V	600 V	2.5 VA	4.5 VA

*) also for use on voltage transformer, please state primary rating of voltage transformer.

Scaling

pointer	bar / knife−edge pointer	
pointer deflection	0 ... 60°	
scale characteristics	practically linear down to $^1/_5$ th of full−scale rating	
scale division	coarse−fine	
scale length	**WQ 96 /2S** 60 mm	**WQ 144 /2S** 97 mm

Accuracy at Reference Conditions

accuracy class	1.5 acc. to DIN EN 60 051
reference conditions	
ambient temperature	23°C±1K
position of use	nominal position ±1°
input	rated measuring value
others	DIN EN 60 051
influence quantities	
ambient temperature	−25°C ... +23°C ... +40°C
position of use	nominal position ±5°
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 ◗ according to VDE/VDI 3540 , sheet 2
operating temperature range	−25 ... +40°C
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5...55 Hz

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
023.D.101.05

Analog Meters with Two Moving–Iron Movements

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

case

window	non–glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	on request 15˚...165˚

performance

climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540
with operating temperature range	–10 ... +55˚C
marine application	non–certified
enclosure code	IP 54 splash–water protected front
dielectric test	3 kV based on 50 Hz, 1 min acc. to DIN 57 410

dial

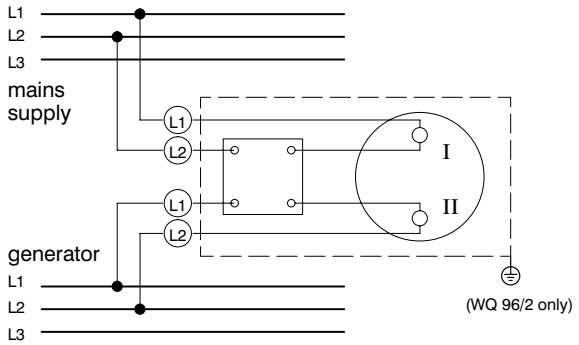
blank dial	pencil–marked on initial and end values
scale division and figuring	0 ... 100% or deviating from standard, captions on request
additional lettering	on request e.g. ”generator”
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request

accessories

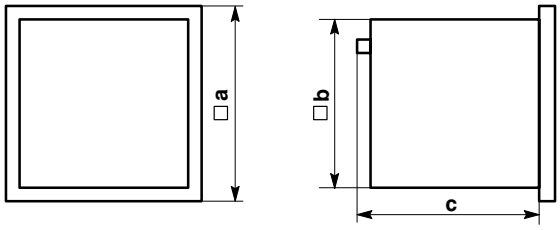
terminal protection against accidental contact
full–sized rear cover (WQ 96 /2S only) or protective sleeves SW6

terminals	connector blades 6.3 x 0.8

Connections



Dimensions



dimensions (in mm)	**WQ 96 /2S**	**WQ 144 /2S**
a	96	144
b	90	137
c	115	121

Ordering Information

type **WQ**	 dual moving−iron voltmeter
front dimensions **96** **144**	 96 mm x 96 mm 144 mm x 144 mm
version **/2S**	 two movements
measuring ranges	refer to preceding table
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) on request 15 ... 165° **)
climatic suitability	class 2, −25 ... +40°C *) class 3, −10 ... +55°C
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal protection	none *) full−sized rear cover ***) protective sleeves
terminals	screws M3 x 6 and wire clamps *) connector blades 6.3 x 0.8
dial	scale division & measuring range alike *) blank dial scale division and figuring 0 ... 100% deviating from standard **) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.
***) WQ 96 /2S only

ordering example

WQ 96 /2S, measuring range 2x 0 ... 150 V,
window non−glaring glass, dial 0 ... 100%, no logo

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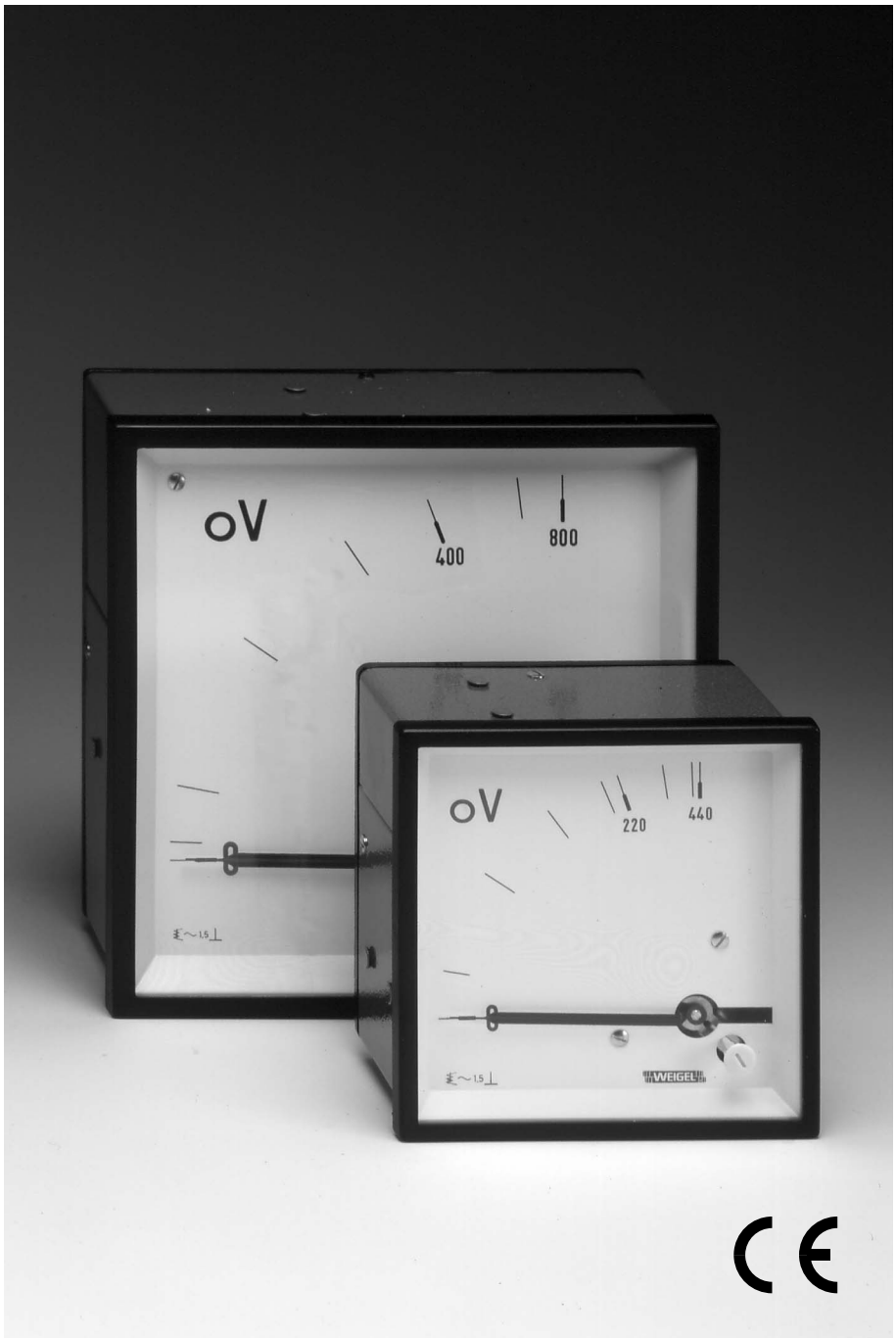
TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
022.D.101.04

Analog Meters
Null Voltmeters with Moving-Iron Movement
90°-Dial

WQ 96/0S
WQ 144/0S



CE

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Application

The null voltmeters **WQ 96**/**144** /**0S** (M series), housed in pressed steel cases, contain a moving−iron movement which scale is extremely expanded in its initial value range. Even small voltage differences of two AC voltages can be detected, e.g. those of a generator and of the mains supply.

The meters are suitable to be mounted in switchboards, synchronizing wall brackets or mosaic grid panels.

Functional Principle

Moving−iron movement; spring loaded jewel bearings and silicon oil damping for vibration and shock resistance.

Mechanical Data

case details	square case suitable to be mounted in control / switchgear panels or mosaic grid panels, stackable	
material of case	pressed steel	
material of window	glass ◗	
colour of bezel	black (similar to RAL 9005) ◗	
position of use	vertical ±5° ◗	
mounting	stackable next to each other	
terminals	hexagon studs, M3x6 screws and wire clamps C6 connector blades 6.3 x 0.8 for protective wire (WQ 96/0S only)	
panel thickness	1 ... 15 mm	
panel fixing	4 pieces WEIGEL screw clamps	
dimensions (in mm)	**WQ 96 /0S**	**WQ 144 /0S**
bezel	□ 96 mm	□ 144 mm
case	□ 90 mm	□ 137 mm
depth	60 mm	60 mm
panel cutout	□ $92^{+0.8}$ mm	□ 138^{+1} mm
weight approx.	0.6 kg	0.7 kg

Electrical Data

measuring unit	difference in voltages of two AC supplies
frequency range	50 ... 100 Hz
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times
5 s max.	2 times
measurement category	CAT III
operating voltage	300 V
pollution level	2
enclosure code	IP 52 case ◗ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact

◗ for other ratings refer to "Options"

Measuring Ranges

rated voltage	power consumption **WQ 96 /0S**	power consumption **WQ 144 /0S**
0 ... 115/230 V	approx. 4.2 VA	approx. 4.9 VA
0 ... 230/460 V	approx. 4.5 VA	approx. 5.4 VA
0 ... 400/800 V	approx. 5.4 VA	approx. 5.8 VA
0 ... 500/1000 V	approx. 5.9 VA	approx. 7.2 VA
for use on voltage transformer		
0 ... 100/200 V	approx. 4.2 VA	approx. 4.9 VA
0 ... 110/220 V	approx. 4.2 VA	approx. 4.9 VA

Please state primary rating of voltage transformer.

Scaling

pointer	bar / knife−edge pointer	
pointer deflection	0 ... 90°	
scale characteristics	initial scale range greatly expanded	
scale division	coarse−fine	
scale length	WQ 96 /0S 94 mm	WQ 144 /0S 146 mm

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23°C±1K
position of use	nominal position ±1°
input	rated measuring value
frequency	50 Hz
wave form	sinusoidal, distortion factor <5%
others	DIN EN 60 051
influences	
ambient temperature	−25°C ... +23°C ... +40°C
position of use	nominal position ±5°
frequency	50 ... 100 Hz
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 ◗ according to VDE/VDI 3540 sheet 2
operating temperature range	−25 ... +40°C ◗
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms ◗
vibration resistance	2.5 g, 5 ... 55 Hz ◗

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
022.D.101.04

Analog Meters Null Voltmeters with Moving-Iron Movement 90˚-Dial

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 43 802	scales and pointers for electrical measuring instruments
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

case

window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or to be specified 15˚...165˚

performance

increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540 sheet 2
with operating temperature range	−10 ... +55˚C
marine application	non−certified
enclosure code	IP 54 splash−water protected front

accessories

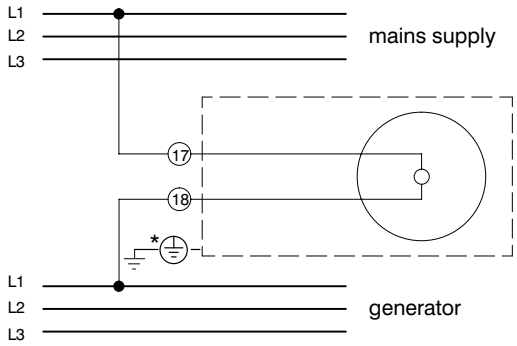
terminal protection against accidental contact
full−sized rear cover (WQ 96 /0S only) or protective sleeves SW6

terminals	connector blades 6.3 x 0.8

dial

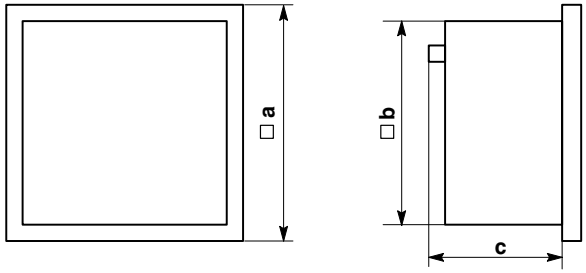
blank dial	pencil−marked initial and end values
scale division and figuring	0 ... 100/200%
additional lettering	to be specified e.g. ”generator”
additional figuring	to be specified
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or as specified

Connections



* WQ 96 /0S

Dimensions



dimensions (in mm)	**WQ 96 /0S**	**WQ 144 /0S**
a	96	144
b	90	137
c	60	60

Ordering Information

type **WQ**	 moving−iron panel meter
front dimensions **96** **144**	 96 mm x 96 mm 144 mm x 144 mm
version **/0S**	 null voltmeter
measuring ranges	refer to preceding table
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) to special order 15 ... 165° **)
mechanical loads	shock 15 g, vibration 2.5 g *) shock 30 g, vibration 5 g
climatic suitability	class 2, −25 ... +40°C *) class 3, −10 ... +55°C
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal protection	none *) full−sized rear cover ***) protective sleeves
terminals	screws and wire clamps *) connector blades 6.3 x 0.8
dial	scale division & measuring range alike *) blank dial scale division and figuring 0 ... 100/200% additional lettering to be specified **) additional figuring to be specified **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.
***) WQ 96 /0S only

ordering example

WQ 96 /0S, measuring range and dial 0 ... 230/460 V,
window non−glaring glass, no logo

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DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

Edgewise Series
010.D.231.01

Analog Edgewise Meters with Moving-Coil Movement for Railway Applications

P 96 PrS Bahn

CE

WEIGEL

Application

The edgewise moving-coil panel meters **P 96 PrS Bahn** with a curved dial are used for measurement of DC currents or DC voltages.

The meters **for railway application** are specially used in rail vehicles where robustness and reliability are mandatory.

Typical applications are display of rotational speed, temperature, pressure, velocity or other physical quantities.

The moving-coil movements are characterized by a low power consumption, high precision and excellent damping, also in extreme enviromental conditions.

Movements

Moving-coil movement with core-type magnet and bilateral pivot suspensions.

Mechanical Data

desiggn	edgewise case suitable to be mounted in control panels, machine tool consoles or mosaic panels, stackable
case	material pressed steel surface thick-film passivated
front window	non-glaring glass ➧
colour of bezel	black (similar to RAL 9005) ➧
position of use	any
panel fixing	screw clamps DIN-B
mounting	stackable next to each other
terminals	
voltmeters and ammeters ≤ 3 A	hexagon studs, M3 screws and wire clamps
ammeters >3 A up to ≤ 25 A	hexagon studs, M5 screws and wire clamps
ammeters >25 A	hexagon studs, M6 screws and wire clamps
protection ground	connector blades 6.3 x 0.8
dimensions	
bezel	96 mm x 48 mm
case	91 mm x 43 mm
case depth including hexagon studs	99 mm with M3, 102 mm with M5, M6
panel depth including clamps	107 ... 118 mm (depends on panel thickness)
panel cutout	$92^{+0.8}$ mm x $45^{+0.6}$ mm
panel thickness	1 ... 12 mm
weight approx.	0.45 kg

Electrical Data

measuring unit	DC voltage or DC current
overload capacity (according to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
5 s max.	
voltmeters	2 times rated voltage
ammeters	10 times rated current
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case front ➧ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact
dial illumination	LED 24 V DC dimmable, approx. 1.2 VA colour white ➧

Measuring Ranges

DC current ➧	voltage drop approx.	operating voltage
1 mA	48 mV	150 V
1.5 mA	60 mV	150 V
2.5 mA	60 mV	150 V
4 mA	60 mV	150 V
5 mA	60 mV	150 V
6 mA	60 mV	150 V
10 mA	60 mV	150 V
15 mA	60 mV	150 V
20 mA	60 mV	150 V
25 mA	60 mV	150 V
40 mA	60 mV	150 V
60 mA	60 mV	150 V
100 mA	60 mV	150 V
150 mA	60 mV	150 V
250 mA	60 mV	150 V
400 mA	60 mV	150 V
600 mA	60 mV	150 V
1 A	60 mV	150 V
1.5 A	60 mV	150 V
2.5 A	60 mV	150 V
4 A	60 mV	150 V
6 A	60 mV	150 V
10 A	60 mV	150 V
15 A	60 mV	150 V
25 A	60 mV	150 V
40 A	60 mV	150 V
for use on transducer		
4 ... 20 mA mechanically suppressed zero	60 mV	150 V

DC voltage ➧	sensitivity ➧	operating voltage
60 mV	1000 Ω/V ±20%	50 V
100 mV	1000 Ω/V ±20%	50 V
150 mV	1000 Ω/V ±20%	50 V
250 mV	1000 Ω/V ±20%	50 V
400 mV	1000 Ω/V ±20%	50 V
600 mV	1000 Ω/V ±20%	50 V
1 V	1000 Ω/V ±20%	50 V
1.5 V	1000 Ω/V ±20%	50 V
2.5 V	1000 Ω/V ±20%	50 V
4 V	1000 Ω/V ±20%	50 V
6 V	1000 Ω/V ±20%	50 V
10 V	1000 Ω/V ±20%	50 V
15 V	1000 Ω/V ±20%	50 V
25 V	1000 Ω/V ±20%	50 V
40 V	1000 Ω/V ±20%	50 V
60 V	1000 Ω/V ±20%	100 V
72 V	1000 Ω/V ±20%	100 V
for use with external shunt		
60 mV	1000 Ω/V ±20%	150 V
150 mV	1000 Ω/V ±20%	150 V

A total lead resistance of 0.05 Ω for interconnecting leads 1 m, 2 x 0.75 mm^2 is considered in the calibration. ➧

➧ also refer to "Options"

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

Edgewise Series
010.D.231.01

Analog Edgewise Meters with Moving-Coil Movement for Railway Applications

Scaling

pointer	bar pointer
pointer colour	orange to RAL 2007 ◗
response time	1 s for full-scale deflection
scale arrangement	vertical (bottom zero) ◗
scale characteristics	linear
scale division	coarse-fine
scale length	67 mm
dial colour	black ◗
scale figuring	white ◗

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051-1
reference conditions	
ambient temperature	23°C±1K
input	rated measuring value
others	DIN EN 60 051-1
influences	
ambient temperature	−25°C ... +23°C ... +40°C
stray magnetic field	0.5 mT

Environmental

climatic suitability	category 1, class B according to DIN EN 61 373
operating temperature range	−25 ... +55°C
storage temperature range	−25 ... +65°C

Rules and Standards

DIN EN 50121 ...		Railway applications − Electromagnetic compatibility
	-1	Part 1: General
	-3-2	Part 3-2: Rolling stock − Apparatus
	-4	Part 4: Emission and immunity of the signalling and telecommunications apparatus
DIN EN 50155		Railway applications − Electronic equipment used on rolling stock
DIN EN 60051 ...		Direct acting indicating analogue electrical instruments and their accessories
	-1	Part 1: Definitions and general requirements common to all parts
	-2	Part 2: Special requirements for ammeters and voltmeters
DIN EN 60068-1		Environmental testing − Part 1: General and guidance
DIN EN 60068 ...		Environmental testing − Tests −
	-2-1	Part 2-1: Test A: Cold
	-2-2	Part 2-2: Test B: Dry heat
	-2-27	Part 2-27: Test Ea and guidance: Shock
	-2-30	Part 2-30: Test Db: Damp heat, cyclic (12 h + 12 h cycle)
	-2-47	Part 2-47 Mounting of specimens for vibration, impact and similar dynamic tests
	-2-64	Part 2-64: Test Fh: Vibration, broadband random and guidance
DIN EN 61010-1		Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: General requirements
DIN EN 61373		Railway applications − Rolling stock equipment − Shock and vibration tests category 1 class B
DIN IEC 61554		Devices for mounting in control stands Electrical measuringg devices Dimensions for mounting in control stands
DIN 16 257		Nominal position of use and position symbols applicable for measuring instruments
DIN 43 718		Measuring, control, regulate; bezels and front panels for MSR devices; main dimensions
DIN 60529		Enclosure codes by housings (IP-code)

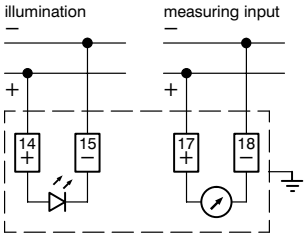
Options

measuring range	
special measuring range	on request
sensitivity adjustment	to ±1% at 23°C
lead resistance	calibration of a total value >0.05Ω
case	
front window	glass
colour of bezel	gray (similar to RAL 7037)
performance	
enclosure code	IP 55 splash-water protected front (with rear zero adjustment)
accessories	
terminal protection against accidental contact	protective sleeves for hexagon studs SW6 (for M3 screws) SW10 (for M5/M6 screws)
pointer	other colour on request
dial	
scale arrangement	horizontal (left-hand zero)
dial background	other colour on request
scale figuring	other colour on request
dial illumination	other colour on request
scale division and figuring	0 ... 100%, linear, full-scale values acc. to standardized series (1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 7.5 and their decimal multiples e.g. 150 m^3/h) or deviating from standard; special calibration from non-linear graph or chart; scaling of voltmeters in ohms; captions on request
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request
zero position	centre zero or off-set zero, mechanically suppressed zero, no zero adjustment, max. 40% of full-scale value

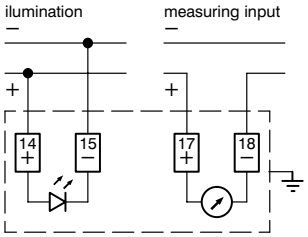
◗ for other ratings refer to "Options"

Connections

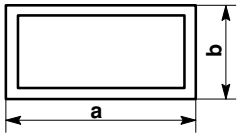
DC voltage

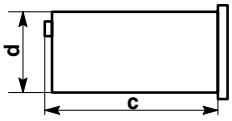


DC current



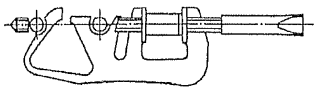
Dimensions



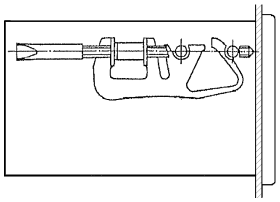


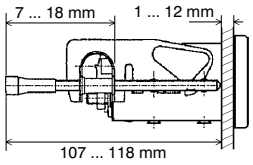
dimensions	P 96 PrS Bahn	
a	96 mm	
b	48 mm	
c	99 mm	(M3)
	102 mm	(M5, M6)
d	43 mm	

DIN-B panel fixing

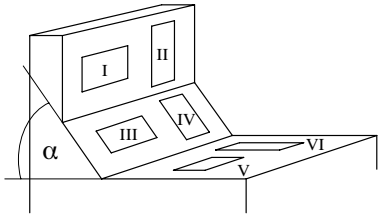


DIN-B panel fixing mounting details





scales and position of use



vertical mounting
I horizontal scale
II vertical scale

inclined mounting
III horizontal scale
IV vertical scale

horizontal mounting
V horizontal scale
VI vertical scale

Ordering Information

Type **P 96 PrS Bahn**	edgewise moving-coil panel meter for railway applications for DC voltage or DC current 96 mm x 48 mm
measuring ranges	refer to preceding table
sp. measuring range	on request **)
adjustment	to internal resistance to ±20% *) to internal resistance to ±1% at 23°C for lead resistance >0.05 Ω
front window	non-glaring glass *) glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
enclosure code (case front)	IP 52 *) IP 55 splash-water protected front
terminal protection	none *) protective sleeves SW6 or SW10
scale arrangement	vertical *) horizontal
dial	scale division & measuring range alike *) scale division and figuring according to standardized series **) 0 ... 100% linear deviating from standard **) calibration fr. non-linear graph or chart **) scaling in ohms for voltmeters **) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
ponter colour	orange *) other colour on request **)
dial colour	black *) other colour on request **)
figuring colour	white *) other colour on request **)
dial illumination	white *) other colour on request **)
logo	WEIGEL *) none OEM logo **)
zero position	bottom or left-hand zero *) centre zero or off-set zero **) mechanically suppressed zero **)

*) standard
**) Please clearly add the desired specifications.

ordering example

P 96 PrS Bahn, measuring range 0 ... 20 mA, horizontal scale 0 ... 100%, front window non-glaring glass, OEM logo (template included)

– specifications subject to change without notice; date of issue 02/10 –

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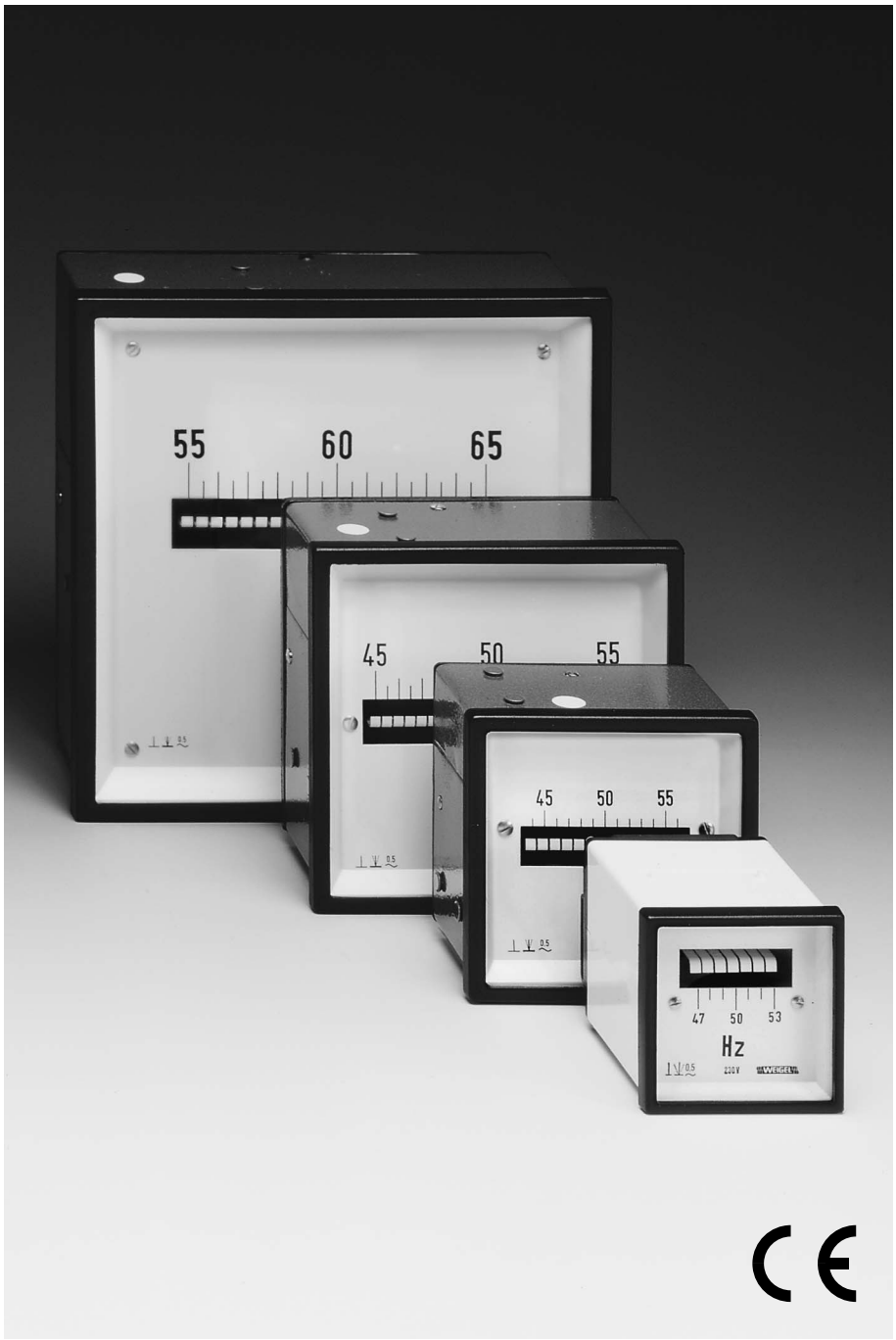
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
030.D.101.03

Frequency Meters with Vibrating Reed Movement

FQ 48
FQ 72
FQ 96
FQ 144



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Application

The frequency indicators **FQ 48**/**72**/**96**/**144** (M series) are used to measure frequencies of power supplies and/or generator sets in spans of rated frequencies 50 Hz or 60 Hz.

The indicators are suitable to be mounted in switchboards, generator sets, machine tool consoles or mosaic grid panels.

Movement

Vibrating reed movement.
Each reed is tuned to a different value in the frequency span.

Mechanical Data

case details	square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic grid panels, stackable
material of case	thermoplastics, flame retardant (FQ 48) pressed steel (FQ 72/96/144)
material of window	glass ⧫
colour of bezel	black (similar to RAL 9005) ⧫
position of use	vertical ±5° ⧫
panel fixing	plate springs (FQ 48) WEIGEL screw clamps (FQ 72/96/144)
panel thickness	1 ... 15 mm
mounting	stackable next to each other
terminals	hexagon studs, M3 x 6 screws and wire clamps C6 ⧫

dimensions (in mm)	FQ 48	FQ 72	FQ 96	FQ 144
bezel	□ 48	□ 72	□ 96	□ 144
case	□ 45	□ 66.5	□ 90.5	□ 137
depth	61	52	58	58
panel cutout	$\square 45.2^{+0.3}$	$\square 68.3^{+0.4}$	$\square 92^{+0.8}$	$\square 138^{+1}$
weight approx.	0.15 kg	0.3 kg	0.4 kg	0.8 kg

Electrical Data

measuring unit	frequency
variation permissible	rated voltage ±10%
overload capacity (acc. to DIN EN 60 051) continuously	1.2 times rated voltage
measurement category	CAT III
operating voltage	refer to Measuring Ranges
pollution level	2
enclosure code	IP 52 case ⧫ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact

⧫ for other ratings refer to "Options"

Measuring Ranges

frequency ranges	resolution	number of reeds	
47 ... 50 ... 53 Hz	1 Hz	7	(FQ 48 only)
47 ... 50 ... 53 Hz	½ Hz	13	(except FQ 48)
44 ... 50 ... 56 Hz	1 Hz	13	(except FQ 48)
45 ... 50 ... 55 Hz	½ Hz	21	(except FQ 48/72)
57 ... 60 ... 63 Hz	1 Hz	7	(FQ 48 only)
57 ... 60 ... 63 Hz	½ Hz	13	(except FQ 48)
54 ... 60 ... 66 Hz	1 Hz	13	(except FQ 48)
55 ... 60 ... 65 Hz	½ Hz	21	(except FQ 48/72)

rated voltage	approx. power consumption	operating voltage FQ 48	FQ 72	FQ 96	FQ 144
100 V	0.4 VA	600 V	100 V	300 V	300 V
110 V	0.5 VA	600 V	600 V	300 V	300 V
230 V	1.0 VA	600 V	600 V	300 V	300 V
400 V	1.5 VA	600 V	600 V	300 V	300 V
500 V	<3 VA	600 V	600 V	300 V	300 V
600 V	<3 VA	600 V	600 V	600 V	600 V

Scaling

scale division	coarse−fine
reed arrangement	horizontal

Accuracy at Reference Conditions

accuracy class	0.5 acc. to DIN EN 60 051
reference conditions	
ambient temperature	23°C±1K
position of use	nominal position ±1°
input	rated measuring value
others	DIN EN 60 051
influences	
ambient temperature	−25°C ... +23°C ... +40°C
position of use	nominal position ±5°
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 acc. to VDE/VDI 3540 sheet 2 ⧫
operating temperature range	−25 ... +40°C ⧫
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms ⧫
vibration resistance	2.5 g, 5 ... 55 Hz ⧫

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

M Series
030.D.101.03

Frequency Meters with Vibrating Reed Movement

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

case

window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	to be specified 15˚...165˚

performance

increased mechanical loads	shock 30 g, 11 ms vibration 5 g, 5 ... 55 Hz
climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540 sheet 2
with operating temperature range	−10 ... +55˚C
marine application	non−certified
enclosure code	IP 54 splash−water protected front

accessories

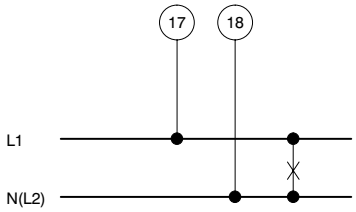
projection mounting outfit
terminal protection against accidental contact
full−sized rear cover or protective sleeves SW6

terminals	connector blades 6.3 x 0.8

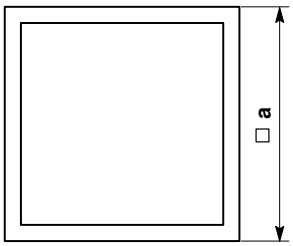
dial

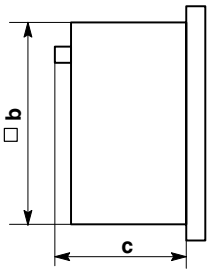
additional lettering	to be specified e.g. ”generator”
additional figuring	to be specified
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or to be specified

Connections



Dimensions





dimensions (in mm)	**FQ 48**	**FQ 72**	**FQ 96**	**FQ 144**
a	48	72	96	144
b	45	66.5	90.5	137
c	61	52	58	58

Ordering Information

type **FQ**	 reed type frequency indicator
front dimensions **48** **72** **96** **144**	 48 mm x 48 mm 72 mm x 72 mm 96 mm x 96 mm 144 mm x 144 mm
measuring ranges	refer to preceding table
rated voltage	refer to preceding table
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) to special order 15 ... 165° **)
performance loads	shock 15 g, vibration 2.5 g *) shock 30 g, vibration 5 g
climatic suitability	class 2, −25 ... +40°C *) class 3, −10 ... +55°C
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal safety protection	none *) full−sized rear cover ***) protective sleeves SW6
terminals	screws M3 x 6 and wire clamps *) connector blades 6.3 x 0.8
dial	scale division & measuring range alike *) additional lettering to be specified **) additional figuring to be specified **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.

ordering example

FQ 144, measuring range 47 ... 50 ... 53 Hz, 13 reeds,
rated voltage 230 V~ , window non−glaring glass,
WEIGEL logo

WEIGEL − MESSGERÄTE GmbH

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TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

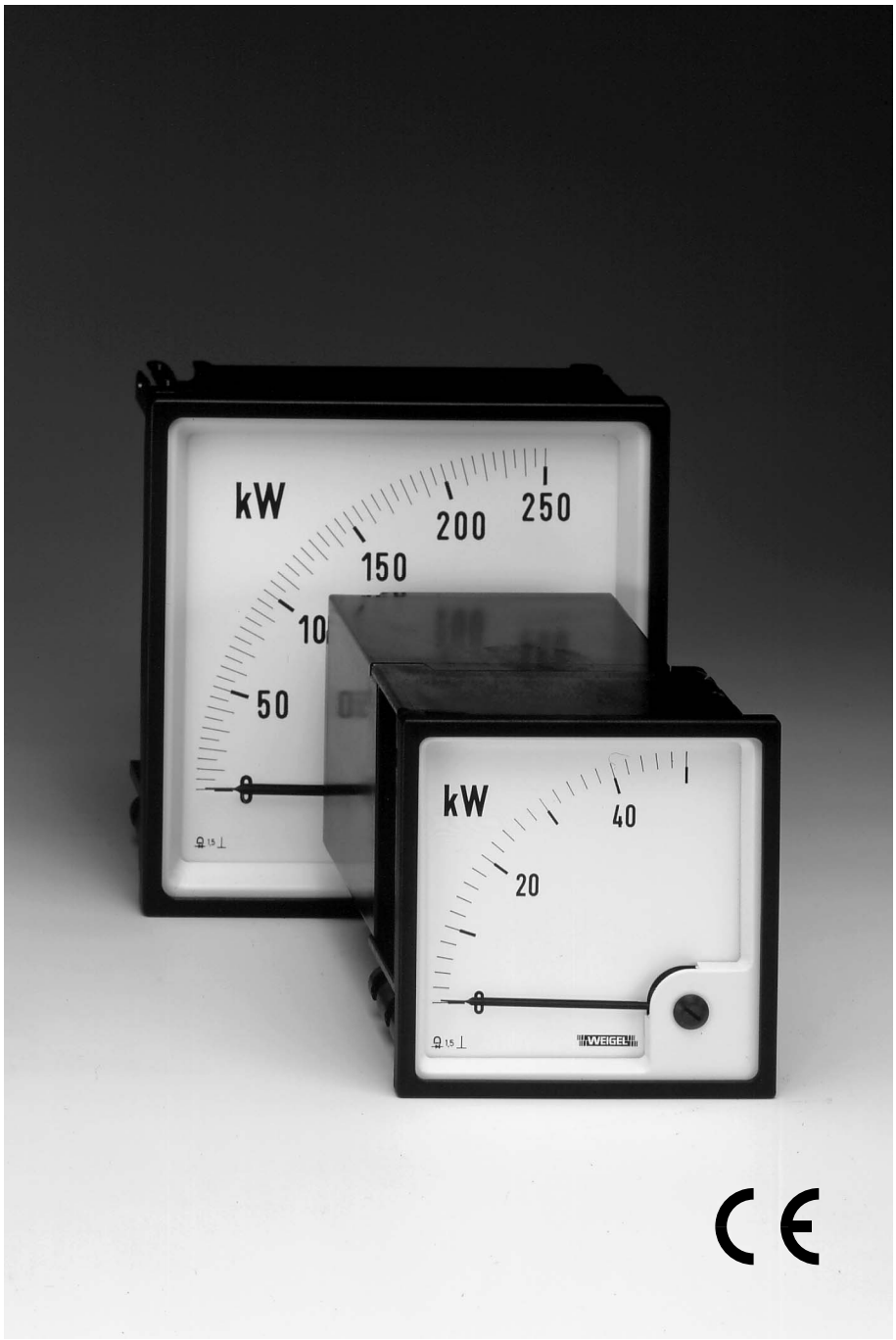
Data Sheet

K Series
470.D.101.07

Analog Watt and VAr Meters, Electronic, 90° or 240° Dial

LQ 96 K
LQ 144 K
LSL 96 K

with Slide-In-Dial



CE

WEIGEL

Application

The electronic Watt and VAr moving-coil meter models **LQ 96**/**144 K** with 90° dial or **LSL 96 K** with 240° dial of the K series are offered for the following AC systems:

– single phase,
– 3 phase balanced load, 3 or 4 wire,
– 3 phase unbalanced load,3 or 4 wire.

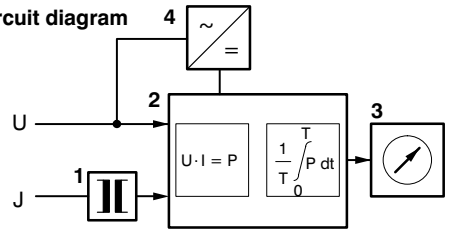
These wattmeters are suitable to indicate forward (export) and reverse (import) power flow as well as inductive and capacitive reactive power. They can be used both on sinusoidal and non–sinusoidal current.

The instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels. The bezel, the glass window and the dial can be easily exchanged on–site.

Functional Principle

The meters consist of a moving-coil movement with core-magnet (LQ) or pivot suspended spring loaded jewel bearings (LSL) system and a power converter. Both devices are included in a common plastic case.

block circuit diagram



The power converter uses one, two or three multiplier systems **2** depending on the measurement of balanced or unbalanced load AC systems. Current transformers **1** adapt the input current to the multiplier electronics.

The multipliers form the product of the instantaneous values of current and voltage (TDM principle). Subsequently, the product resultant is integrated, thereby suppressing the AC ripple. A DC voltage output signal is fed to the moving-coil movement **3**.

Power supply is obtained from voltage input in block **4**.

Mechanical Data

case details	moulded square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable		
material of case	polycarbonate thermoplastics, flame retardant with UL rating of 94 V – 0		
material of window	glass ➧		
colour of bezel	black (similar to RAL 9005) ➧		
position of use	vertical ±5° ➧		
panel fixing	screw clamps		
mounting	stackable next to each other		
panel thickness	≤ 40 mm		
terminals	hexagon studs with M4 screws		
dimensions	**LQ 96 K**	**LQ 144 K**	**LSL 96 K**
bezel	□ 96 mm	□ 144 mm	□ 96 mm
case	□ 90 mm	□ 136 mm	□ 90 mm
depth	129 mm VW/B 3 versions	129 mm	129 mm all versions
depth	104 mm EW/B1, DW/B 1, VW/B 1, DW/B 2 versions	104 mm	–
panel cutout	$\square 92^{+0.8}$ mm	$\square 138^{+1}$ mm	$\square 92^{+0.8}$ mm
weight approx.	1.1 kg	1.1 kg	1.1 kg

Electrical Data

measuring unit	active or reactive power
response time	4 s
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
5 s max.	2 times rated voltage, 10 times rated current
power consumption	
current path	≤ 0.2 VA / each
voltage path types	
EW 1, DW 1, DB 1, VW 1, VB 1	≤ 3.0 VA / each
EB 1	≤ 3.5 VA / each
DW 2, DB 2	≤ 3.4 VA / each
VW 3	≤ 3.9 VA / each
VB 3	≤ 4.3 VA / each
pollution level	2
operating voltage	refer to Measuring Ranges
measurement category	CAT III
enclosure code	IP 52 case IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact ➧

Measuring Ranges

type	active power	reactive power
single phase system	**EW 1**	**EB 1**
3 phase 3 wire system balanced load	**DW 1**	**DB 1**
3 phase 4 wire system balanced load	**VW 1**	**VB 1**
3 phase 3 wire system unbalanced load	**DW 2**	**DB 2**
3 phase 4 wire system unbalanced load	**VW 3**	**VB 3**

selection of measuring range

The apparent power P_S is calculated from the primary ratings of current transformers and voltage transformers:

single phase $P_S = U \cdot I$

3 phase $P_S = \sqrt{3} \cdot U \cdot I$

Select full–scale values between 0.5 and 1.2 times the calculated apparent power preferably from DIN series (acc. to DIN 43 701): 1 – 1.2 – 1.5 – 2 – 2.5 – 3 – 4 – 5 – 6 –7.5 – 8 and their decimal multiples.

single phase system 3 phase 3 wire system **rated voltage**	operating voltage LQ 96 K LSL	 144 K 96 K	3 phase 4 wire system **rated voltage**	operating voltage LQ 96 K LSL	 144 K 96 K
57.7 V (100 V : $\sqrt{3}$)	150 V	150 V	57.7/100 V	150 V	150 V
63.5 V (110 V : $\sqrt{3}$)	150 V	150 V	63.5/110 V	150 V	150 V
100 V	150 V	150 V			
115 V	150 V	150 V			
120 V	150 V	150 V			
127 V (220 V : $\sqrt{3}$)	150 V	150 V	127/220 V	150 V	150 V
230 V (400 V : $\sqrt{3}$)	300 V	600 V			
289 V (500 V : $\sqrt{3}$)	300 V	600 V			
400 V	600 V	600 V	230/400 V	600 V	600 V
440 V	600 V	600 V	254/440 V	600 V	600 V
500 V	600 V	600 V	289/500 V	600 V	600 V

rated current 1 A or 5 A
If used on current transformer, please state transformer ratio on the order.

➧ also refer to "Options"

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

K Series
470.D.101.07

Analog Watt and VAr Meters, Electronic, 90° or 240° Dial

Scaling

dial	flat dial		
pointer	bar / knife–edge pointer		
pointer deflection	0 ... 90° (LQ) 0 ... 240° (LSL)		
scale characteristics	linear		
scale division	coarse–fine		
scale length	LQ 96 K 97 mm	LQ 144 K 146 mm	LSL 96 K 142 mm

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23°C±2K
position of use	nominal position ±1°
input	full–scale power value P_N
calibration factor	$\lambda = P_N / P_S$
power factor	$\cos \varphi = \lambda / 0.6$ resp. $\sin \varphi = \lambda / 0.6$ for $0.3 \leq \lambda < 0.6$ $\cos \varphi = 1$ resp. $\sin \varphi = 1$ for $0.6 \leq \lambda \leq 1.5$
voltage	rated voltage
frequency	50 Hz ±2%
warm–up	≥ 15 min
others	DIN EN 60 051
influences	
ambient temperature	–10°C ... +23°C ... +55°C
position of use	nominal position ±5°
stray magnetic field	0.5 mT
power factor	1 ind ... 0 ... 1 cap

Environmental

climatic suitability	climatic class 3 acc. to VDE/VDI 3540 sheet 2
operating temperature range	–10 ... +55°C
storage temperature range	–25 ... +65°C
relative humidity	≤ 75% annual average, non–condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 43 802	scales and pointers for electrical measuring instruments
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

case

window	non–glaring glass
colour of bezel	gray (similar to RAL 7037)
index marking pointer	red, front adjustable
position of use	on request 15°...165°
marine application	non–certified or with approbation by "Germanischer Lloyd" (LQ 96/144 K only)

terminal protection against accidental contact

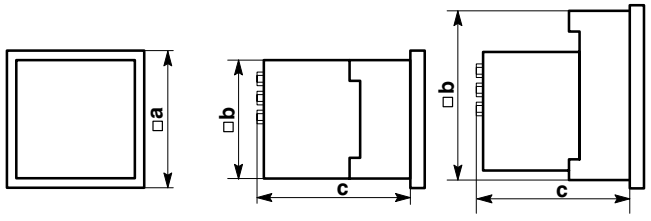
protective sleeves

protection against accidental contact (hand and fingers) acc. to VBG 4 / DIN 57 106, sec. 100

dial

additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request

Dimensions

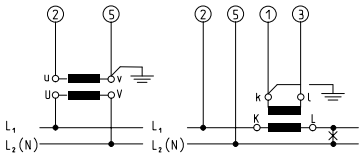


LQ/LSL 96 K **LQ 144 K**

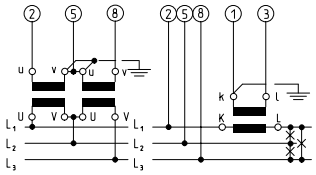
dimensions (in mm)	**LQ 96 K**	**LQ 144 K**	**LSL 96 K**
a	96	144	96
b	90	136	90
c (EW/B1, DW/B 1, VW/B 1, DW/B 2 versions)	104	104	129
c (VW/B 3 versions)	129	129	129

Connections

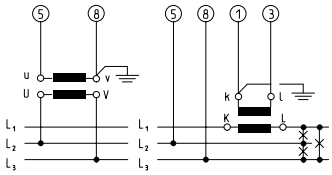
LQ/LSL 96/144 K EW1/EB1



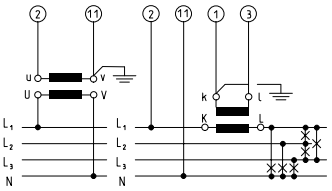
LQ/LSL 96/144 K DW1



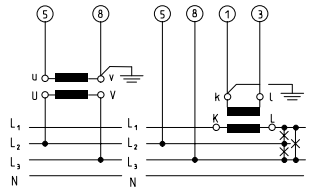
LQ/LSL 96/144 K DB1



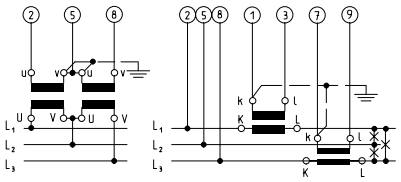
LQ/LSL 96/144 K VW1



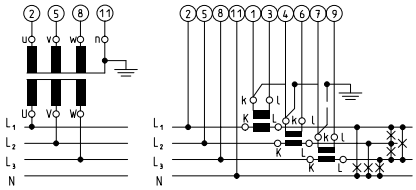
LQ/LSL 96/144 K VB1



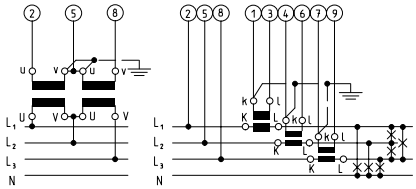
LQ/LSL 96/144 K DW2/DB2



LQ/LSL 96/144 K VW3



LQ/LSL 96/144 K VB3



Ordering Information

type **LQ** **LSL** (96 K only)	Watt and VAr meters, electronical with moving-coil movement. 90° dial with moving-coil movement. 240° dial
front dimensions **96 K** **144 K**	 96 mm x 96 mm 144 mm x 144 mm
type **EW1, EB1** **DW1, DB1** **VW1, VB1** **DW2, DB2** **VW3, VB3**	 single phase system 3 phase 3 wire system balanced load 3 phase 4 wire system balanced load 3 phase 3 wire system unbalanced load 3 phase 4 wire system unbalanced load
measuring ranges	refer to preceding table
rated voltages	refer to preceding table
rated currents	1 A 5 A
window	glass *) non–glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
index marking pointer	none *) red, front adjustable
position of use	vertical *) on request 15 ... 165° **)
marine application	none *) non–certified with approbation by "Germanischer Lloyd" ***)
terminal protection	none *) protective sleeves
dial	scale division & measuring range alike *) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.
***) LQ 96/144 K only

ordering example

LQ 96 K VW3 for active power, 3 phase 4 wire system, unbalanced load,
measuring range 0 ... 400 kW, rated voltage AC 230/400 V,
for use on current transformer 600/5 A,
window non–glaring glass, no logo

– specifications subject to change without notice; date of issue 12/05 –

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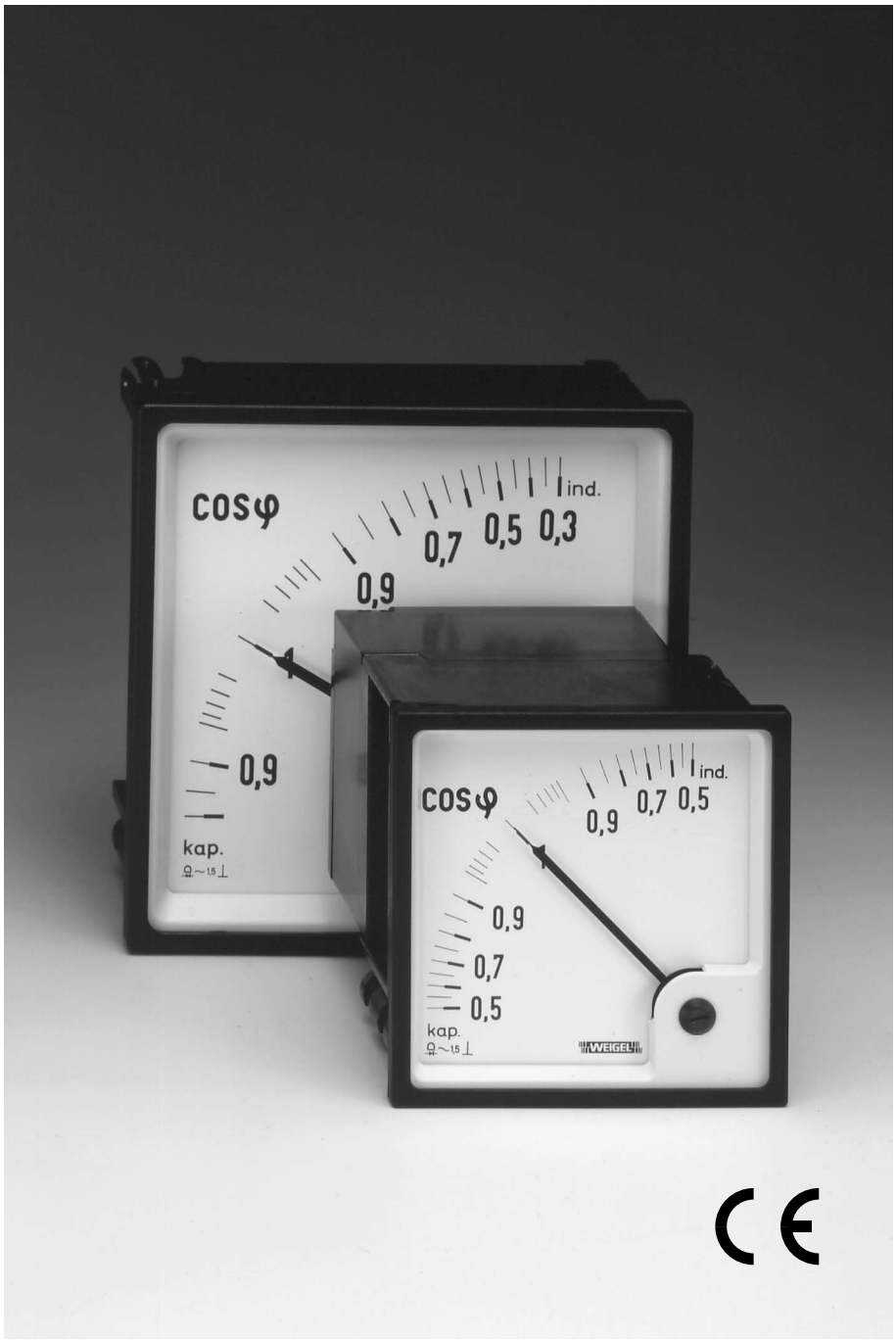
TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

K Series
460.D.101.06

Analog Power Factor Meters, Electronic, 90° or 240° Dial

CQ 96 K
CQ144 K
LSC 96 K



with Slide-In-Dial

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Application

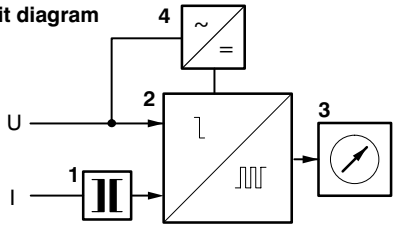
The moving - coil meter models **CQ 96**/**144 K** with 90° dial or **LSC 96 K** with 240° dial of the K series are suitable to measure the power factor as a ratio of active and reactive power in single phase AC or in balanced 3 phase systems:

The instruments are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels. The bezel, the glass window and the dial can be easily exchanged on−site.

Functional Principle

The meters consist of a moving - coil movement with core - magnet (CQ) or pivot suspended spring loaded jewel bearings (LSC) system and a measuring converter. Both devices are included in a common plastic case.

block circuit diagram



A current transformer **1** of the phase angle converter adapts the input current to the electronic circuit. Both the input voltage and the current are passed to a bistable flip−flop stage **2**.

The pulse duty cycle of the flip−flop is proportional to the phase angle φ . A low−pass filter forms the mean value which is fed to the moving−coil movement **3**. The standard dial is scaled with the cosinus of the phase angle φ .

Power supply is obtained from voltage input in block **4**.

Mechanical Data

case details	moulded square case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable
material of case	polycarbonate thermoplastics, flame retardant with UL rating of 94 V − 0
material of window	glass ◗
colour of bezel	black (similar to RAL 9005) ◗
position of use	vertical ±5° ◗
panel fixing	screw clamps
mounting	stackable next to each other
panel thickness	≤ 40 mm
terminals	hexagon studs with M4 screws

dimensions	**CQ/LSC 96 K**	**CQ 144 K**
bezel	□ 96 mm	□ 144 mm
case	□ 90 mm	□ 136 mm
depth	104 mm	104 mm
panel cutout	$\square 92^{+0.8}$ mm	$\square 138^{+1}$ mm
weight approx.	0,55 kg	0,75 kg

◗ also refer to "Options"

Electrical Data

measuring unit	power factor (phase angle φ)
frequency range	49 ... 50 ... 51 Hz (single phase system) 45 ... 50 ... 65 Hz (3 phase system)
overload capacity (acc. to DIN EN 60 051)	
continuously	1.2 times rated voltage / current
5 s max.	2 times rated voltage, 10 times rated current
power consumption	
current path	≤ 0.1 VA
voltage path	≤ 3.0 VA
pollution level	2
operating voltage	refer to Measuring Ranges
measurement category	CAT III
enclosure code	IP 52 case IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact

Measuring Ranges

type

E	single phase system
D	3 phase 3 wire system balanced load

measuring ranges

cos φ	cap 0.5 ... 1 ... 0.5 ind
cos φ	cap 0.8 ... 1 ... 0.3 ind
cos φ	cap 0.8 ... 1 ... 0.8 ind

single phase system **rated voltages**	operating voltage CQ 96 K LSC	 144 K 96 K	3 phase system **rated voltages**	operating voltage CQ 96 K LSC	 144 K 96 K
57.7 V (100 V :$\sqrt{3}$)	150 V	150 V			
63.5 V (110 V :$\sqrt{3}$)	150 V	150 V			
100 V *)	150 V	150 V	100 V *)	150 V	150 V
110 V *)	150 V	150 V	110 V *)	150 V	150 V
115 V	150 V	150 V	115 V	150 V	150 V
120 V	150 V	150 V	120 V	150 V	150 V
127 V (220 V :$\sqrt{3}$)	150 V	150 V	127 V	150 V	150 V
208 V	300 V	600 V	208 V	300 V	600 V
230 V	300 V	600 V	230 V	300 V	600 V
289 V (500 V :$\sqrt{3}$)	600 V	600 V	289 V	600 V	600 V
400 V	600 V	600 V	400 V	600 V	600 V
			415 V	600 V	600 V
			440 V	600 V	600 V
			500 V	600 V	600 V

*) also for use on voltage transformer

rated currents

1 A
5 A

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

K Series
460.D.101.06

Analog Power Factor Meters, Electronic, 90° or 240° Dial

Scaling

dial	flat dial		
pointer	bar / knife−edge pointer		
pointer deflection	0 ... 90° (CQ) 0 ... 240° (LSC)		
scale characteristics	non-linear		
scale division	coarse − fine		
scale length	CQ 96 K 97 mm	CQ 144 K 146 mm	LSC 96 K 142 mm

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23°C±2K
position of use	nominal position ±1°
voltage	rated voltage
frequency	50 Hz ±0.1%
wave form	sine wave
distortion factor	≤ 0.1%
current	95 ... 100 % rated current
warm-up	≥ 5 min
others	DIN EN 60 051
influences	
ambient temperature	−10°C ... +23°C ... +55°C
position of use	nominal position ±5°
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 3 acc. to VDE/VDI 3540 sheet 2
operating temperature range	−10 ... +55°C
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms
vibration resistance	2.5 g, 5 ... 55 Hz

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 43 802	scales and pointers for electrical measuring instruments
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

case	
window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
index marking pointer	red, front adjustable
position of use	on request 15°...165°
marine application	non−certified or with approbation by "Germanischer Lloyd" (CQ 96/144 K only)

terminal protection against accidental contact

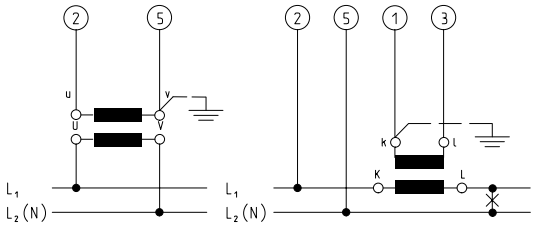
protective sleeves

protection against accidental contact (hand and fingers) acc. to VBG 4 / DIN 57 106, sec. 100

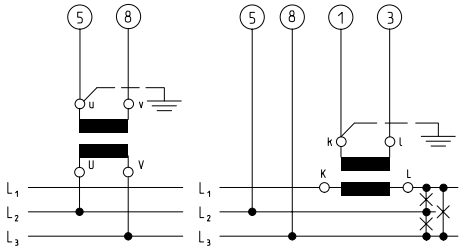
dial	
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured sector	red, green or blue within scale division
logo on the dial	none or on request

Connections

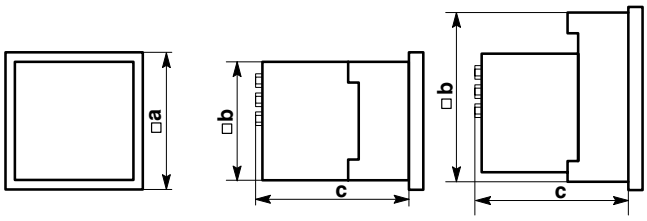
CQ 96/144 K E, LSC 96 K E



CQ 96/144 K D, LSC 96 K D



Dimensions



CQ/LSC 96 K **CQ 144 K**

dimensions (in mm)	**CQ/LSC 96 K**	**CQ 144 K**
a	96	144
b	90	136
c	104	104

Ordering Information

type **CQ** **LSC** (96 K only)	power factor meter, electronical with moving-coil movement. 90° dial with moving-coil movement. 240° dial
front dimensions **96 K** **144 K**	 96 mm x 96 mm 144 mm x 144 mm
type **E** **D**	 single phase system 3 phase system balanced load
measuring ranges	cap 0.5 ... 1 ... 0.5 ind cap 0.8 ... 1 ... 0.3 ind cap 0.8 ... 1 ... 0.8 ind
rated voltages	refer to preceding table
rated currents	1 A 5 A
window	glass *) non–glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
index marking pointer	none *) red, front adjustable ***)
position of use	vertical *) on request 15 ... 165° **)
marine application	none *) non–certified with approbation by "Germanischer Lloyd" ***)
safety terminal **touch protection**	none *) protective sleeves
dial	scale division & measuring range alike *) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)

*) standard
**) Please clearly add the desired specifications.
***) CQ 96/144 K only

ordering example

CQ 96 K D for 3 phase system balanced load,
measuring range (cos φ) cap 0.5 ... 1 ... 0.5 ind, rated voltage AC 230 V,
rated current 1 A, window non–glaring glass, no logo

– specifications subject to change without notice; date of issue 12/05 –

WEIGEL – MESSGERÄTE GmbH

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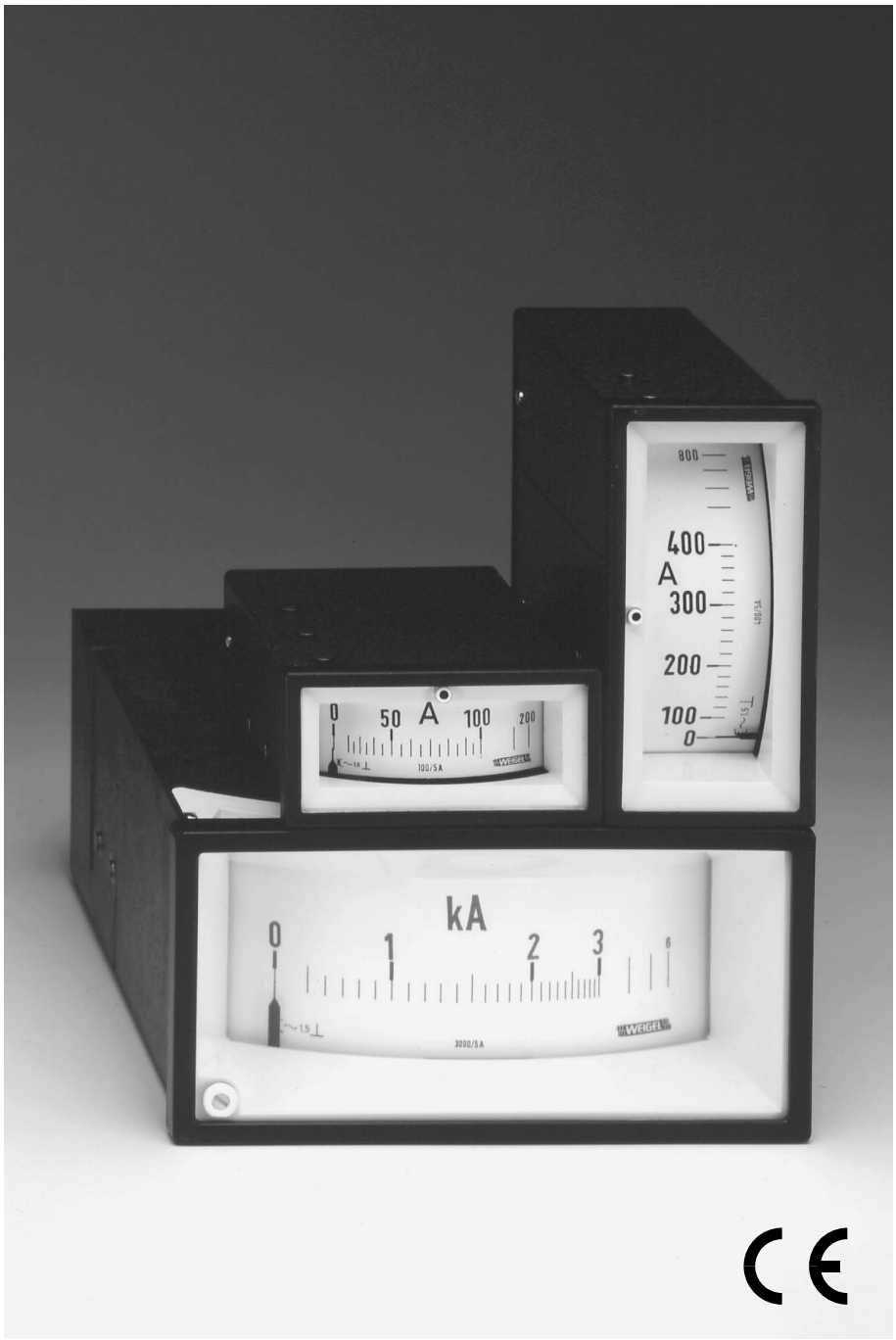
TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

Edgewise Series
020.D.201.03

Analog Meters Edgewise with Moving–Iron Movement

W 72 PrS
W 96 PrS
W144 PrS



CE

WEIGEL

Application

The edgewise moving-iron panel meters **W 72/96/144 PrS** with a curved dial are mainly used for the measurement of AC currents and voltages in the usual technical frequency range of $16^2/_3$ ... 100 Hz. Special calibration for a definite frequency up to 1000 Hz on request.

Moving-iron meters indicate rms values practically independent of wave form even of high harmonics. Error of indication may occur for extreme wave forms (e.g. phase gating controls) and / or frequencies above 100 Hz.

These meters are **not** suitable for use with shunts or tachogenerators due to their high power consumption.

They are suitable to be mounted in switchboards, control panels, machine tool consoles and mosaic panels.

Movements

Moving-iron movement with pivot suspension. Spring loaded jewel bearings and silicon oil damping for vibration and shock resistance.

Mechanical Data

case details	edgewise case suitable to be mounted in control / switchgear panels, machine tool consoles or mosaic panels, stackable
material of case	pressed steel (W 72/96 PrS) thermoplastics (W 144 PrS)
material of window	glass ◗
colour of bezel	black (similar to RAL 9005) ◗
position of use	vertical $\pm 5^\circ$
panel fixing	screw clamps
mounting	stackable next to each other (except W 144 PrS)
terminals	
voltmeters and ammeters ≤ 3 A	hexagon studs, M3 screws and wire clamps C6 (W 72/96 PrS), connector blades 6.3 x 0.8 (W 144 PrS)
ammeters >3 A	hexagon studs, M5 screws and wire clamps C10
voltmeters 600 V	connector blades 6.3 x 0.8 for protective wire (W 72/96 PrS)

dimensions (in mm)	W 72 PrS	W 96 PrS	W 144 PrS
bezel	72 x 36	96 x 48	144 x 72
case	66 x 32	91 x 43	137 x 67
depth	94	107	192
panel cutout	$68^{+0.7}$ x $33^{+0.6}$	$92^{+0.8}$ x $45^{+0.6}$	$138^{+1.0}$ x $68^{+0.7}$
panel thickness	1 ... 25	1 ... 12	≤ 40
weight approx.	0.28 kg	0.45 kg	1.0 kg

Electrical Data

measuring unit	AC voltages or AC currents	
frequency range	$16^2/_3$ ... 100 Hz	
power consumption	W 72/96 PrS	W 144 PrS
voltmeters	<4 VA	<4 VA
ammeters ≤ 15 A	<0.5 VA	<1,7 VA
ammeters >15 A	<0.8 VA	–
overload capacity (acc. to DIN EN 60 051)		
continuously	1.2 times rated voltage / current	
5 s max.	2 times rated voltage, 10 times rated current	
measurement category	CAT III	
operating voltage	refer to Measuring Ranges	
pollution level	2	
enclosure code	IP 52 case ◗ IP 00 for terminals without protection against accidental contact IP 20 for terminals protected against accidental contact	

Measuring Ranges

measuring ranges	operating voltage		
AC current [1]	W 72 PrS	W 96 PrS	W 144 PrS
100; 150; 250; 400; 600 mA			
1; 1.5; 2.5; 4; 5; 6; 10; 15; 25[*] **A**	300 V	300 V	600 V
AC voltage	W 72 PrS	W 96 PrS	W 144 PrS
6; 10; 15; 25; 40; 60; 100; 150 V	100 V	100 V	100 V
250 V, 400 V, 500 V	300 V	300 V	600 V
600 V	600 V	600 V	600 V
for use on VT/CT	W 72 PrS	W 96 PrS	W 144 PrS
N/1 A, N/5 A [1]	100 V	100 V	600 V
N/100 V, N/110 V [2]	100 V	100 V	100 V

Please state transformer ratio when ordering.

[*]) W 72/96 PrS only
[1]) full scale value = 2 times rated value (overload scaling) ◗
[2]) full scale value = 1.2 times rated value (– " –)

Scaling

pointer	bar / knife–edge pointer		
response time	1 s for full–scale deflection		
scale arrangement	horizontal (left–hand zero)		
scale characteristics	practically linear down to $^1/_5$ th of rated full–scale value. The initial scale is compressed.		
scale division	coarse–fine		
scale length	W 72 PrS	W 96 PrS	W 144 PrS
	45 mm	67 mm	92 mm
overload scaling			
ammeters	2 times rated current		
voltmeters for use on voltage transformers	1.2 times rated voltage		

◗ for other ratings refer to "Options"

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

Edgewise Series
020.D.201.03

Analog Meters Edgewise with Moving–Iron Movement

Accuracy at Reference Conditions

accuracy class	1.5 according to DIN EN 60 051
reference conditions	
ambient temperature	23˚C±1K
position of use	nominal position ±1˚
input	rated measuring value
frequency	$16^2/_3$ ... 100 Hz
wave form	sinusoidal, distortion factor <5%
others	DIN EN 60 051
influences	
ambient temperature	−25˚C ... +23˚C ... +40˚C
position of use	nominal position ±5˚
frequency	≥ 100 Hz
stray magnetic field	0.5 mT

Environmental

climatic suitability	climatic class 2 ➧ according to VDE/VDI 3540 sheet 2
operating temperature range	−25 ... +40˚C ➧
storage temperature range	−25 ... +65˚C
relative humidity	≤ 75% annual average, non−condensing
shock resistance	15 g, 11 ms ➧
vibration resistance	2.5 g, 5 ... 55 Hz ➧

Rules and Standards

DIN 43 700	measuring and control instruments for panel mounting; nominal case and cutout dimensions
DIN 43 701	electrical switchboard instruments
DIN 43 718	bezels and front panels
DIN 16 257	nominal position of use and position symbols applicable for measuring instruments
DIN 40 050	enclosure codes; protection of electrical equipment against ingress of solid foreign bodies and of water
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 61 010	safety requirements for electrically operated measuring, control and laboratory equipment
VDE/VDI 3540 sheet 2	reliability of measuring and control equipment (classification of climates)

Options

measuring range	
special measuring range	deviating from standard
accuracy class	1.0 with fine scale division (as far as possible)
calibration	for a definite frequency 100 ... 1000 Hz
case	
window	non−glaring glass
colour of bezel	gray (similar to RAL 7037)
position of use	horizontal or on request 15 ... 165˚
performance	
climatic suitability	limited use in the tropics climatic class 3 according to VDE/VDI 3540 sheet 2
with operating temperature range	−10 ... +55˚C
marine application	non−certified
enclosure code	IP 54 splash−water protected front (without zero adjustment)

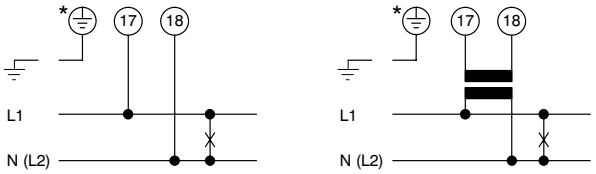
accessories

terminal protection against accidental contact
protective sleeves SW6, SW10 (ammeters >3A) for W 72/96 PrS

dial	
scale arrangement	vertical (bottom zero)
blank dial	pencil−marked on initial and end values
scale division and figuring	0 ... 100%, deviating from standard; special calibration from customer's non−linear graph or chart; captions on request
additional lettering	on request e.g. "generator"
additional figuring	on request
coloured marks	red, green or blue for important scale values
coloured segment	red, green or blue within scale division
logo on the dial	none or on request
zero position	mechanically suppressed zero, no zero adjustment, max. 40% of full−scale value
overload scaling (ammeters)	no overload scale
expanded scale	on request

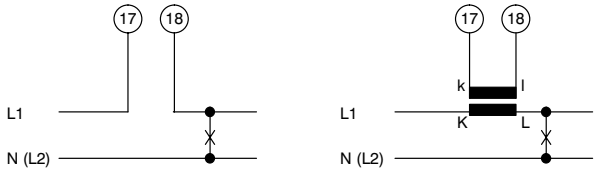
Connections

AC voltage



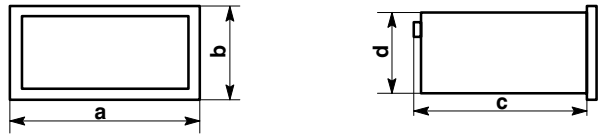
* W 72/96 PrS voltmeters 600 V

AC current

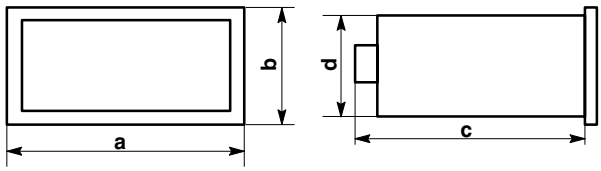


Dimensions

W 72/96 PrS

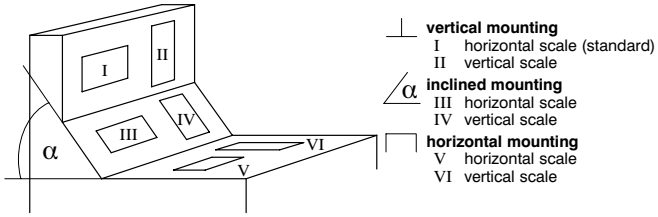


W 144 PrS



dimensions (in mm)	**W 72 PrS**	**W 96 PrS**	**W 144 PrS**
a	72	96	144
b	36	48	72
c	94	107	192
d	32	43	67

scales and position of use



Ordering Information

type **W**	edgewise−type moving−iron panel meter
front dimensions **72 PrS** **96 PrS** **144 PrS**	 72 mm x 36 mm 96 mm x 48 mm 144 mm x 72 mm
measuring ranges	refer to preceding table
sp. measuring range	on request **)
accuracy class	1.5 *) 1.0 with fine scale division ***)
calibration	none *) for a definite frequency 100 ... 1000 Hz **)
window	glass *) non−glaring glass
colour of bezel	black (similar to RAL 9005) *) gray (similar to RAL 7037)
position of use	vertical *) horizontal on request 15 ... 165° **)
climatic suitability	class 2, −25 ... +40°C *) class 3, −10 ... +55°C
marine application	none *) non−certified
enclosure code	IP 52 *) IP 54 splash−water protected front
terminal protection	none *) protective sleeves SW6 / SW10
scale arrangement	horizontal *) vertical
dial	scale division & measuring range alike *) blank dial scale division and figuring 0 ... 100% deviating from standard **) calibration fr. non−linear graph or chart **) additional lettering on request **) additional figuring on request **) coloured marks red, green or blue **) coloured sector red, green or blue **)
logo	WEIGEL *) none OEM logo **)
zero position	mechanically suppressed zero **)
overload scaling (ammeters)	2 times rated current *) no overload scale
expanded scale	on request **)

*) standard
**) Please clearly add the desired specifications.
***) as far as possible

ordering example

W 72 PrS, measuring range 0 ... 250 mA, horizontal scale, vertical mounting, window non−glaring glass, WEIGEL logo

− specifications subject to change without notice; date of issue 02/07 −

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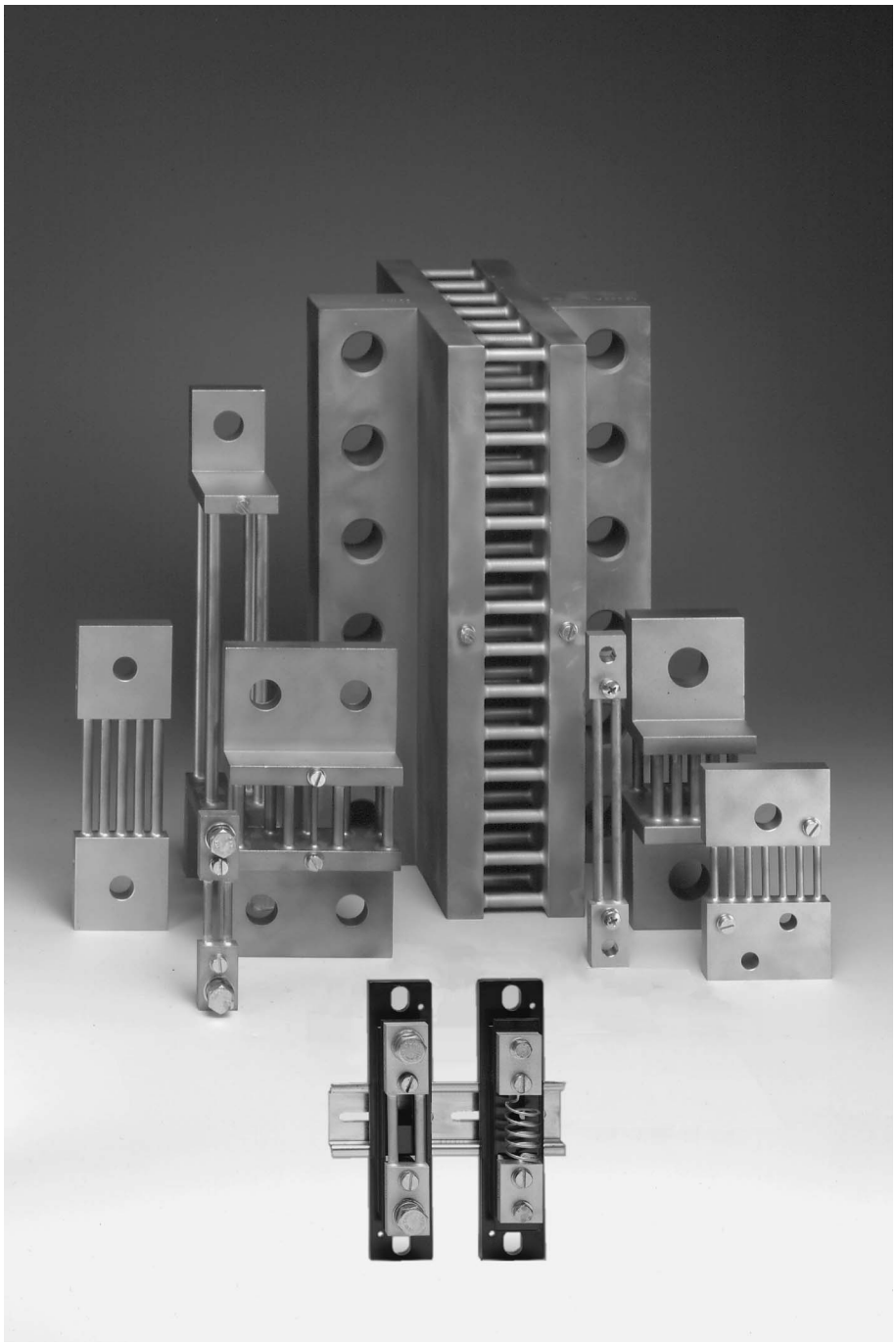
TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

800.D.101.05

Shunts
Class 0.5

60 mV
100 mV
150 mV
300 mV



WEIGEL

Application

Shunts provide an accurate DC millivolt signal to drive ammeter indicators, overload protection and control devices, especially for higher amperage. They supply a voltage drop proportional to the DC current which is measured and indicated by a moving−coil meter with the dial calibrated in amps.

In accordance with DIN standard 43 703 shunts are available from 1 A up to 15,000 A with an accuracy of 0.5%. Standard voltage drop is 60 mV or 150 mV. Intermediate current ratings, other voltage outputs, better accuracy and purpose−built shunts can be supplied.

Shunts are manufactured in three different format versions depending on current ratings.

Operating Principle

The current passing through the shunt produces a proportional voltage drop. A moving coil instrument connected to the shunt measures the voltage drop across the shunt terminals.

Shunts are calibrated in such a way that they produce an accurately defined voltage drop (60 mV, 150 mV or other).

General Data

format version A	insulating base mounted shunts clamping to DIN mounting rail or wall mounting (up to 25 A / 60, 100, 150 or 300 mV); without insulating base (30 ... 150 A) ➧
format version B	L−profile end blocks
format version C	T−profile end blocks
material	
resistance bars	manganin
end blocks	
format version A	high conductivity brass
format version B	high conductivity brass/solid copper
format version C	solid copper
base material format version A	Lexan, black self-extinguishing to UL rating 94 V−0
connections	thread screws
current	please refer to "Dimensions"
voltage	M5x8
mounting format version A	screw mounting (M8 max.) or clamping to DIN mounting rail (to DIN EN 50 022 − 35)
enclosure code	IP 00
dimensions	please refer to "Dimensions"
weight	please refer to table below

rated current ➧	weight approx. for **rated voltage drop** ➧			
	60 mV	**100 mV**[1])	**150 mV**	**300 mV**[1])
1 A	0.12 kg	0.12 kg	0.12 kg	0.14 kg
1.5 A	0.13 kg	0.12 kg	0.12 kg	0.14 kg
2 A [1) 2)]	0.13 kg	0.12 kg	0.12 kg	0.14 kg
2.5 A	0.12 kg	0.12 kg	0.12 kg	0.14 kg
3 A [1) 2)]	0.12 kg	0.12 kg	0.12 kg	0.14 kg
4 A	0.13 kg	0.12 kg	0.12 kg	0.14 kg
5 A [1) 2)]	0.12 kg	0.12 kg	0.12 kg	0.14 kg
6 A	0.12 kg	0.12 kg	0.13 kg	0.14 kg
8 A [1) 2)]	0.13 kg	0.13 kg	0.13 kg	0.15 kg
10 A	0.13 kg	0.13 kg	0.13 kg	0.15 kg
12 A [1) 2)]	0.13 kg	0.13 kg	0.13 kg	0.15 kg
15 A	0.13 kg	0.13 kg	0.13 kg	0.15 kg
20 A [1) 2)]	0.13 kg	0.14 kg	0.14 kg	0.16 kg
25 A	0.13 kg	0.14 kg	0.14 kg	0.16 kg
30 A [1) 2)]	0.12 kg	0.13 kg	0.15 kg	0.20 kg
40 A	0.12 kg	0.14 kg	0.16 kg	0.20 kg
50 A [1) 2)]	0.12 kg	0.14 kg	0.16 kg	0.20 kg
60 A	0.12 kg	0.14 kg	0.17 kg	0.20 kg
80 A [1) 2)]	0.12 kg	0.15 kg	0.18 kg	0.20 kg
100 A	0.12 kg	0.17 kg	0.20 kg	0.25 kg
150 A	0.13 kg	0.20 kg	0.23 kg	0.30 kg
200 A [1) 2)]	0.61 kg	0.65 kg	0.68 kg	0.80 kg
250 A	0.61 kg	0.65 kg	0.68 kg	0.80 kg
300 A [1) 2)]	0.61 kg	0.68 kg	0.72 kg	0.90 kg
400 A	0.83 kg	1.00 kg	1.05 kg	1.30 kg
500 A [1) 2)]	0.83 kg	1.10 kg	1.15 kg	1.40 kg
600 A	0.85 kg	1.11 kg	1.16 kg	1.60 kg
800 A [1) 3)]	0.90 kg	1.12 kg	1.30 kg	1.80 kg
1,000 A	1.45 kg	2.00 kg	2.15 kg	2.80 kg
1,200 A [1) 2)]	1.45 kg	2.10 kg	2.25 kg	3.10 kg
1,500 A	1.96 kg	2.50 kg	3.10 kg	3.70 kg
2,000 A [1)]	2.30 kg [3)]	2.80 kg [3)]	5.10 kg [2)]	6.40 kg [2)]
2,500 A	2.90 kg	3.20 kg	5.20 kg	6.00 kg
3,000 A [1)]	3.00 kg [3)]	3.50 kg [3)]	9.80 kg [2)]	11.7 kg [2)]
4,000 A	4.25 kg	5.80 kg	10.5 kg	13.1 kg
5,000 A [1)]	4.30 kg [3)]	7.30 kg [3)]	13.4 kg [2)]	16.8 kg [2)]
6,000 A	10.5 kg	12.0 kg	15.0 kg	17.7 kg
8,000 A [1)]	12.0 kg [3)]	–	25.4 kg [2)]	–
10,000 A	21.0 kg	–	28.0 kg	–
15,000 A	32.0 kg	–	–	–
20,000 A [1)]	44.0 kg	–	–	–

1) ratings deviating from DIN standard
2) dimensions equal to next higher current rating
3) dimensions equal to next lower current rating

overload range (according to DIN EN 60 051)

continuously	1.2 times rated current
5 s max. ≤ 2,000 A	5 times rated current
>2,000 ... 10,000 A	2 times rated current

Accuracy at Reference Conditions

accuracy	class 0.5 ➧
reference conditions	
ambient temperature	23˚C±1K

Environmental

climatic suitability	climatic class 3 acc. to VDE/VDI 3540
operating temperature range	−10 ... +55˚C
storage temperature range	−25 ... +65˚C
relative humidity	≤ 75% annual average, non−condensing

Rules and Standards

DIN 43 703	Shunts
DIN EN 60 051	direct acting indicating electrical measuring instruments and their accessories
DIN EN 50 022-35	mounting rails

Options

rated voltage drop	on request
rated current	on request
accuracy	class 0.2
insulating base	suitable for shunts 30 ... 150 A / 60 mV others on request
purpose built shunts	on request

➧ for other ratings refer to "Options"

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

800.D.101.05

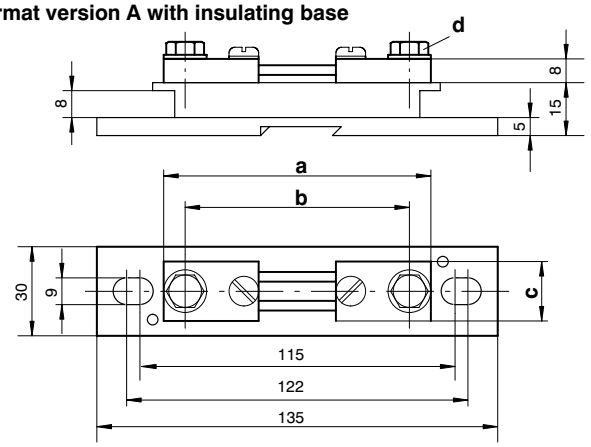
Shunts
Class 0.5

Accessory

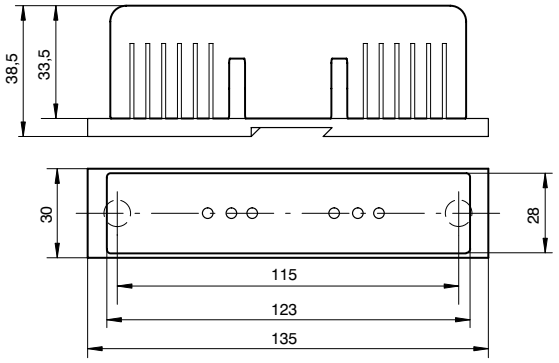
cover for shunts with insulating base
1 ... 25 A / 60 mV – 100 mV – 150 mV
30 ... 150 A / 60 mV

Dimensions

format version A with insulating base

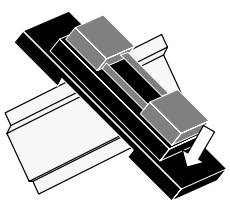


format version A with insulating base and cover

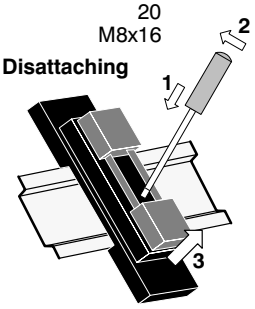


rated voltage drop	**60 ... 300 mV**	**60 mV**
dimensions (in mm)	**1 ... 25 A**	**30 .... 150 A**
a	90	100
b	78	80
c	20	20
d	M5x12	M8x16

Attaching



Disattaching

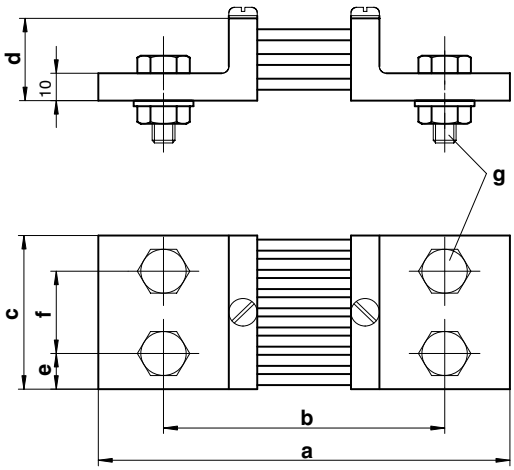


format version A without insulating base

rated voltage drop	**100 mV**	**150 mV**	**300 mV**
dimensions (in mm)	**30 .... 150 A**	**30 .... 150 A**	**30 .... 150 A**
a	145	225	384
b	125	205	364
c	25	25	25
d	M8x16	M8x16	M8x16

Dimensions

format version B



rated voltage drop 60 mV

dimensions (in mm)	**200 A 250 A**	**400 A 600 A**	**1.000 A**	**1.500 A**	**2.500 A**
a	145	145	165	165	165
b	105	105	115	115	115
c	30	40	60	90	120
d	30	30	30	30	30
e	15	20	30	21	30
f	–	–	–	48	60
g	M12x40	M16x45	M20x50	M16x45	M20x50
number of current connections	2x 1	2x 1	2x 1	2x 2	2x 2

rated voltage drop 100 mV

a	190	190	210	210
b	150	150	160	160
c	30	40	60	120
d	30	30	30	30
e	15	20	30	30
f	–	–	–	60
g	M12x40	M16x45	M20x50	M20x50
number of current connections	2x 1	2x 1	2x 1	2x 2

rated voltage drop 150 mV

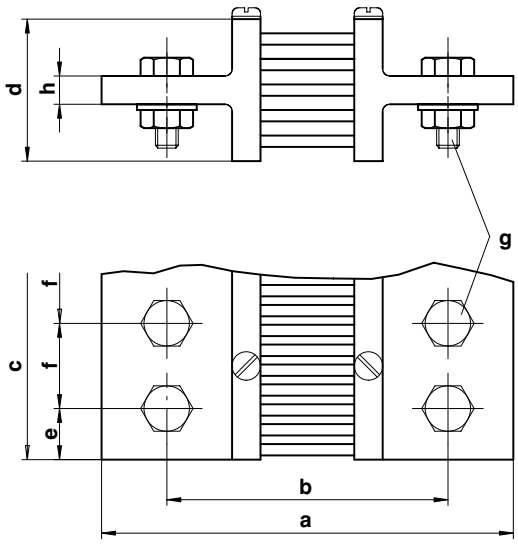
a	270	270	290
b	230	230	240
c	30	40	70
d	50	50	60
e	15	20	35
g	M12x40	M16x45	M20x50
number of current connections	2x 1	2x 1	2x 1

rated voltage drop 300 mV

a	429	429	449
b	389	389	399
c	30	40	70
d	50	50	60
e	15	20	35
g	M12x40	M16x45	M20x50
number of current connections	2x 1	2x 1	2x 1

Dimensions

format version C



rated voltage drop 60 mV

dimensions (in mm)	**4.000 A**	**6.000 A**	**10.000 A**	**15.000A**	**20.000A**
a	165	175	185	185	185
b	115	125	135	135	135
c	120	154	206	310	362
d	60	130	170	170	170
e	30	25	25	25	25
f	60	52	52	52	52
g	M20x50	M20x75	M20x80	M20x80	M20x80
h	15	25	30	30	30
number of current connections	2x 2	2x 3	2x 4	2x 6	2x 7

rated voltage drop 100 mV

dimensions (in mm)	**2,500 A**	**4,000 A**	**6,000 A**
a	210	220	220
b	160	170	170
c	120	120	154
d	60	130	130
e	30	30	25
f	60	60	52
g	M20x50	M20x50	M20x75
h	15	25	25
number of current connections	2x 2	2x 2	2x 3

rated voltage drop 150 mV

dimensions (in mm)	**1,500 A**	**2,500 A**	**4,000 A**	**6,000 A**	**10,000A**
a	290	290	300	300	310
b	240	240	250	250	260
c	90	120	120	154	206
d	60	60	130	130	170
e	21	30	30	25	25
f	48	60	60	52	52
g	M16x60	M20x60	M20x75	M20x75	M20x80
h	15	15	25	25	30
number of current connections	2x 2	2x 2	2x 2	2x 3	2x 4

rated voltage drop 300 mV

dimensions (in mm)	**1,500 A**	**2,500 A**	**4,000 A**	**6,000 A**
a	449	449	459	459
b	399	399	409	409
c	90	120	120	154
d	60	60	130	130
e	21	30	30	25
f	48	60	60	52
g	M16x60	M20x60	M20x75	M20x75
h	15	15	25	25
number of current connections	2x 2	2x 2	2x 2	2x 3

Ordering Information

type	shunt
rated voltage drop	60 mV 100 mV 150 mV 300 mV purpose built on request **)
rated current	please refer to table inside purpose built on request **)
accuracy	class 0.5 *) class 0.2
insulating base	included (up to 25 A) *) not included (more than 25 A) *) included (more than 25 A)
cover	none *) for shunts with insulating base
purpose built	on request **)

*) standard
**) Please clearly add the desired specifications.

ordering example

shunt, rated voltage drop 60 mV, rated current 1,000 A, accuracy class 0.5

– specifications subject to change without notice; date of issue 06/07 –

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DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

055.8e

Multi-Functional Transducer for Currents, Voltages, Power

MMU 3.0

WEIGEL

Application

The multi-functional transducer **MMU 3.0** accepts any measurable quantity in existing single-phase or three-phase power supply systems, converts these input signals into a load independent DC current and/or impressed DC voltage (current and voltage are synchronous on analog output 1) and issues the measured values parametrically to an interface RS 232 and RS 485. A digital output is also available in the basic version. Transducers with additional analog outputs (voltage or current programmable) and/or four resp. eight additional digital outputs are optionally available.

Inputs (exept 10 V measuring input) are galvanically isolated from outputs and the auxiliary voltage input. The outputs are short-circuit proof and safe against idling.

The transducers comply with the safety requirements and are tested for interference immunity.

The transducers are designed to be mounted in machines/systems. Regulations for installation of electrical systems and equipment have to be observed.

Measurement

The multi-functional transducer processes input currents up to 5 A and input voltages up to 519 V at rated frequencies of 50 Hz and 60 Hz. Depending on the measurement task, input terminals not required remain idle.

Measurement is effected in **true RMS-values** including wave forms **up to the 50th harmonics**.

Analog Outputs

Any of the measurable quantities (current, voltage, active-, reactive-power, frequency etc.) can be allocated to each of the analog outputs.

The analog output available in the basic version synchronously provides voltage and current (4 terminals). The output signal of each of the optional analog outputs can be parametrized freely (0/4 ... 20 mA, 0/2 ... 10 V, −10 ... 10 mA; linear or **buckled** characteristic curve). Selection between current or voltage output is effected by software.

It is possible to connect more than one indicator, recorder or controller to the output circuit provided the total impedance does not exceed the rating.

RS 232/485

The transducers are equipped with both a RS 232 and a RS 485 interface enabling to request measured values and to perform adjustments. When using the RS 485 interface, up to 32 devices can be networked and read out via a 2-wire line (1000 m maximum length).

Digital Outputs

The digital outputs can be used as switching contacts for setpoint controlling.

Auxiliary Supply

Power supply is effected by a separate auxiliary voltage input.

Software

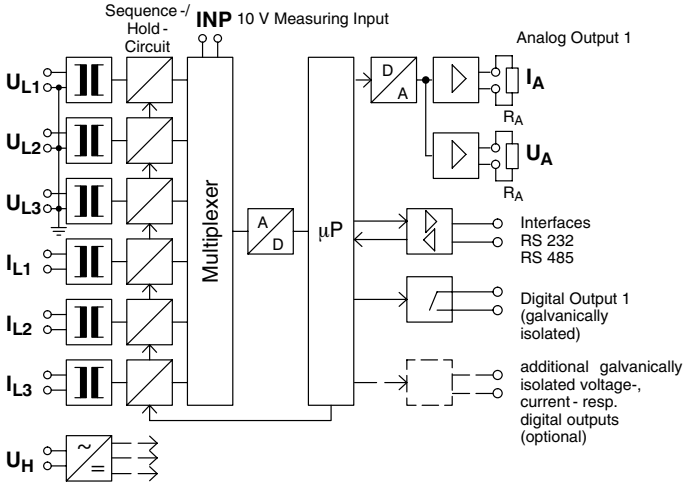
The software **WSoft** ready for execution on Windows® 95/98/2000/XP is available for control of functions and for read-out of measured values. The control is effected by the widespread machine language **SCPI**.

Operating Principle

Transformers in the current and voltage circuits galvanically isolate the power inputs from the electronic circuitry. Hold-/sequence-circuits process the input signals and transfer them via a multiplexer and a AD-converter to the microprocessor which processes the signals and computes all important measuring quantities.

The transducer is connected to the PC via a commercially available RS232 cable (9-contact 1:1 connection, socket-plug. An optional connection will be a 3-contact cable provided the signals DTR and DSR as well as RTS and CTS will be two-way bridged.)

Block Circuit Diagram



General Technical Data

case details	projecting case clamping to TH 35 DIN rail according to DIN EN 60 715
material of case	Cycoloy C2950 black self-extinguishing to UL rating 94 V−0
terminals	screw-terminals, maximum torque 0.8 Nm
wire cross-section	4 mm^2 max.
enclosure code	IP 40 case IP 20 terminals
dielectric test	
2.2 kV 3.7 kV, 50 Hz sinusoidal	all circuits to case currents to each other and to voltages; inputs (exept 10 V measuring input) to outputs, auxiliary voltage and interfaces;
1000 V=	auxiliary voltage to outputs and interfaces; outputs to each other (the analog output 1 is galvanically connected to 10 V measuring input and to interfaces.)
operating voltage	300 V (rated voltage phase to zero)
class of protection	II
measurement category	CAT III
pollution level	2
dimensions	basic version: 3 modules in single-phase system resp. 4 modules in three-phase systems, optional outputs: additional 1 to 3 modules
each module WxHxL	22.5 mm x 80 mm x 115 mm
weight	approx. 0.6 kg (basic version)

DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

055.8e

Multi-Functional Transducer for Currents, Voltages, Power

Inputs

input quantities	AC current and AC voltage
voltages	L1, L2, L3 (3 terminals), N (1 terminal)
currents	I1, I2, I3 (6 terminals)
auxiliary supply	U_H (2 terminals)
10 V measurement input	e.g. connecting an analog converter
rated input current I_{EN}	N/5 A ⧫
rated input voltage U_{EN}	519 V (inter-connected) ⧫
operating voltage	519 V max.
modulation range	1.2 U_{EN} and 1.2 I_{EN}
overload limits	1.2 U_{EN}, 1.6 I_{EN} continuously 2 U_{EN}, 10 I_{EN} max. 1 s
frequency range	50 ... 60 Hz
power consumption	2 mA ±10% each voltage circuit ≤ 0.1 VA each current circuit for I_{EN} = 1 A ≤ 1.6 VA each current circuit for I_{EN} = 5 A

Measuring Quantities

Measuring Quantity	Total	L1	L2	L3
voltage (U)	U	U_1	U_2	U_3
current (I)	I [1])	I_1	I_2 [1])	I_3
active power (P)	P	P_1	P_2 [1])	P_3
reactive power (Q)	Q	Q_1	Q_2 [1])	Q_3
apparent power (S)	S	S_1	S_2 [1])	S_3
active factor (PF)	PF	PF_1	PF_2 [1])	PF_3
reactive factor (QF)	QF	QF_1	QF_2 [1])	QF_3
phase angle (PH)	PH	PH_1	PH_2 [1])	PH_3
frequency (f)		F		

Depending on power system, it will not be possible to measure all these values.

10 V measuring input	INP	(±10 V)

Outputs

Outputs ⧫

analog output 1	voltage & current synchronous (2 terminals each)
interfaces	RS 232 (SUB–D jack) RS 485 (2 terminals)

(All outputs listed above and the analog input have one and the same potential.)

digital output	contact-free via opto coupler, max. 230 V / 100 mA, internal resistance 25 ... 35 Ω, insulation voltage 2.3 kV, switching frequency admissible ≤2 Hz

1, 2, or 3 additional analog outputs (galvanically isolated) and up to 8 additional digital outputs (galvanically isolated) are optional ⧫

response time based on 50 Hz	≤ 500 ms, exception for 3-phase 3-wire unbalanced load system for quantities marked with [1]) (see table **Measuring Quantities**): ≤ 750 ms
additional response time for serial output	20 ms for each value (RS 232/485, 19,200 baud)

⧫ refer also to **Extras**

current output

output current	I_A	load independent DC current
rated current	I_{AN}	0 (4) ... 20 mA or 0 ... 10 mA (parameterizable)
load range	R_A	0 ... 500 Ω (based on 20 mA) 0 ... 1000 Ω (based on 10 mA)
load error		≤ 0.1% based on 50% load change
residual ripple		≤ 1%$_{rms}$ of I_{AN} with load R_A
idling voltage		≤ 16 V
current limitation		up to 24 mA

voltage output

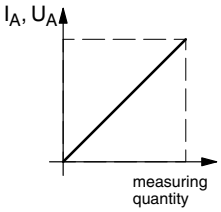
output voltage	U_A	load independent DC voltage
rated voltage	U_{AN}	0 (2) ... 10 V (parameterizable)
load	R_A	≥ 4 kΩ (based on U_{AN})
load error		≤ 0.1% based on 50% load change
residual ripple		≤ 1%$_{rms}$ of U_{AN} with load R_A = U_{AN} / 2 mA
idling voltage		≤ 16 V
voltage limitation		up to 12 V

Inputs (exept 10 V measuring input) and outputs are galvanically isolated.

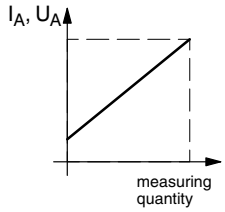
Conversion Characteristics

examples

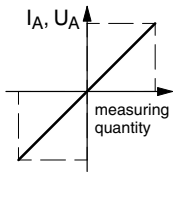
standard

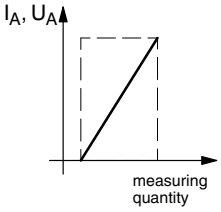


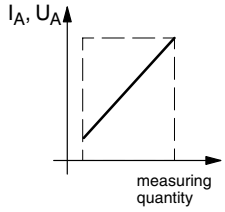
"live zero"

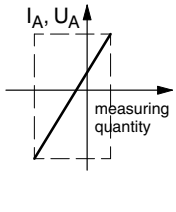


incoming and outgoing

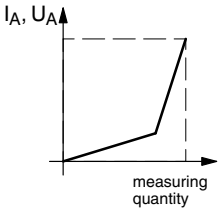


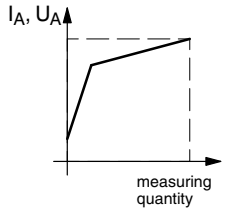


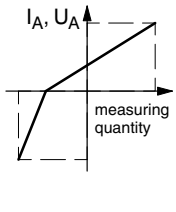




buckled characteristic curve







Interfaces

type	RS 232 (V.24) and RS 485 (SCPI commands)
Baud rate	19200 Baud
data bit	8
parity	none
stop bit	2

Auxiliary Supply

auxiliary voltage U_{HN}	**wide-range supply** 20 ... 90 V DC resp. 15 ... 65 V AC, 90 ... 357 V DC resp. 65 ... 253 V AC
power consumption	< 10 VA

Accuracy at Reference Conditions

accuracy	better than **class 0.5** (±0.5% of end value) exception for 3-phase 3-wire unbalanced load system for quantities marked with [1]) (see table **Measuring Quantities**) These ratings are calculated values (Aron circuit): **class 1.5** (±1.5% of end value)
temperature coefficient	≤ 0.06%/K
valid for standard products and a life-period of 1 year maximum	
reference conditions	
input current	I_{EN} ±0.5%
input voltage	U_{EN} ±0.5%
power factor	cos φ = 1
frequency	50 Hz
wave form	sine wave, distortion factor ≤ 1%
auxiliary voltage	U_{HN} ±1%, 48 ... 62 Hz
load	0.5 $R_{A\ max}$ ±1% based on current 10 kΩ ±1% based on voltage
ambient temperature	23°C ±1K
warm-up	≥5 min

Environmental

climatic suitability	climatic class 3 to VDE/VDI 3540 sheet 2
operating temperature range	−10 ... +55°C
storage temperature range	−25 ... +65°C
relative humidity	≤ 75% annual average, non-condensing

Rules and Standards

DIN EN 60 529	Enclosure codes by housings (IP-code)
DIN EN 60 688	Electrical measuring transducers converting AC quantities into analog or digital signals
DIN EN 60 715	Dimensions of low voltage switching devices: standardized DIN rails for mechanical fixation of electrical devices in switchgears
DIN EN 61 010-1	Safety requirements for electrical measuring, control and laboratory equipment Part 1: General requirements
DIN EN 61 326-2-1	Electrical equipment for measurement, control and laboratory use − EMC requirements Part 2-1: Particular requirements − Test configurations, operational conditions and performance criteria for sensitive test and measurement equipment for EMC unprotected applications (IEC 61 000-4-3 evaluation criterion B)
VDE/VDI 3540 sheet 2	Reliability of measuring and control equipment (classification of climates for equipment and accessories)

TÜV CERT
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

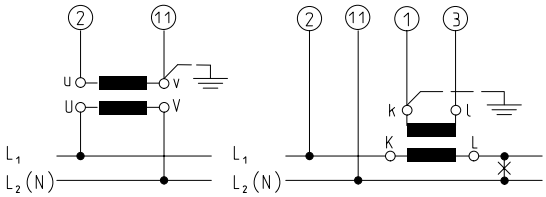
055.8e

Multi-Functional Transducer for Currents, Voltages, Power

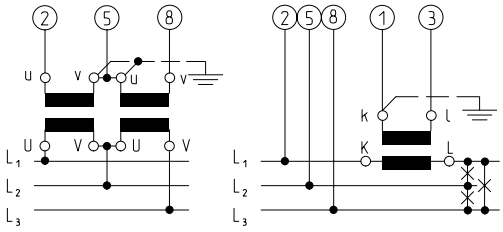
Connections

input

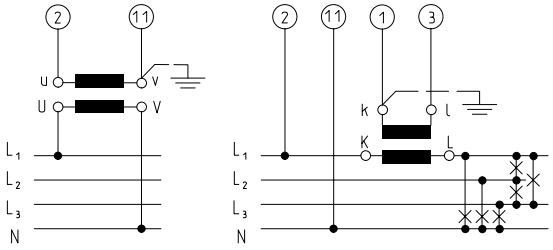
active and reactive power, single-phase



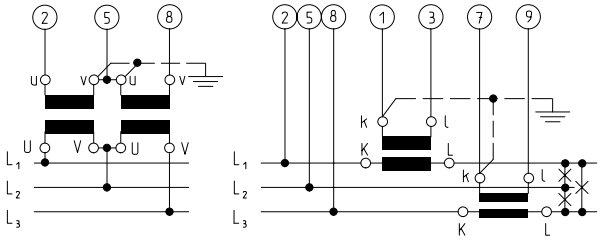
active and reactive power, 3-phase, 3-wire, balanced load



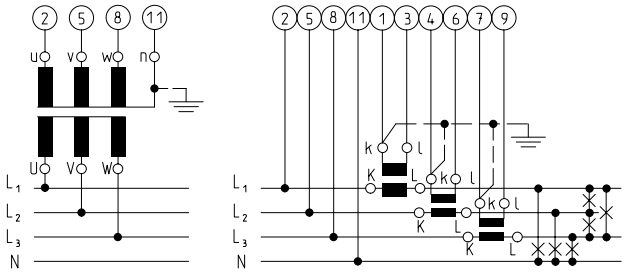
active and reactive power, 3-phase, 4-wire, balanced load



active and reactive power, 3-phase, 3-wire, unbalanced load

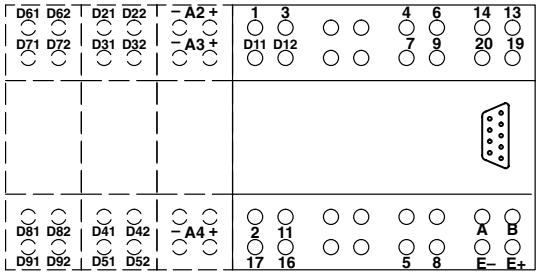


active and reactive power, 3-phase, 4-wire, unbalanced load



Terminals

front view



digital outputs 6 to 9 | digital outputs 2 to 5 | analog outputs 2 to 4 | basic version for 3-phase network (one module inapplicable for single-phase network)

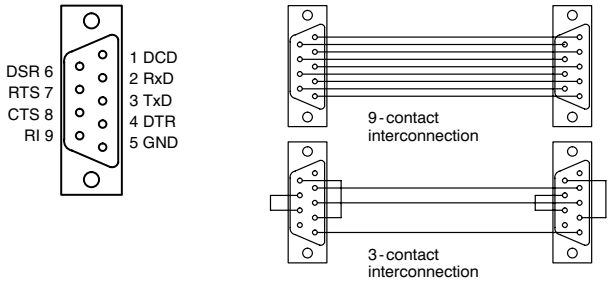
terminal	MMU 3.0
1	I_E L_1
2	U_E L_1
3	I_E L_1
4	I_E L_2
5	U_E L_2
6	I_E L_2
7	I_E L_3
8	U_E L_3
9	I_E L_3
11	U_E N
13	U_{A1} (+)
14	U_{A1} (–)
16	U_H L_1 (+)
17	U_H N (–)
19	I_{A1} (+)
20	I_{A1} (–)
E+	U_E (+)
E–	U_E (–)
A	RS 485
B	RS 485
SUB-D	RS 232
Dn1	digital output n, contact 1, (n = 1 ... 9)
Dn2	digital output n, contact 2, (n = 1 ... 9)
Am–	analog output m, negative pole, (m = 2 ... 4)
Am+	analog output m, positive pole, (m = 2 ... 4)

Depending on the measurement task, input- resp. output-terminals remain idle.

I_E current input
U_E voltage input
The numbers on the terminals correspond to details in connection diagrams (refer to DIN 43 807).

I_A current output
U_A voltage output
U_H auxiliary voltage input

RS232-Interconnection



Extras

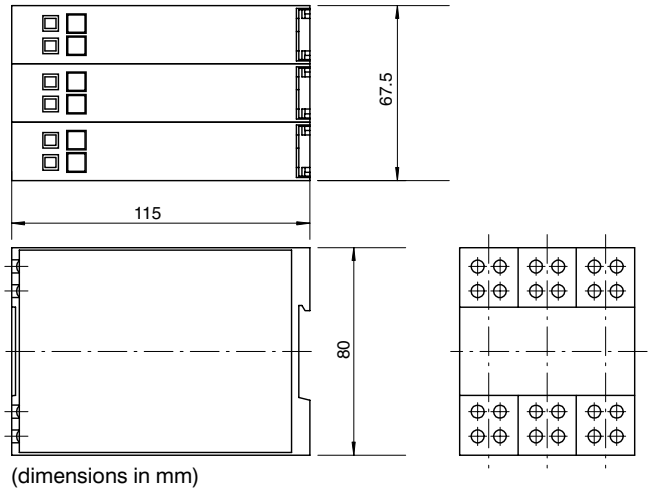
outputs

1, 2 or 3 additional analog outputs	can be parametrized via software between 20 mA (load < 500 Ω) and 10 V (load > 4 kΩ); galvanically isolated, power supply unit integrated (width: 1 module)
4 or 8 additional digital outputs	230 V, galvanically isolated (width: 1 resp. 2 modules)
rated input current I_{EN}	N/1.2 A (also programmable for N/1 A, with same accuracy)
rated input voltage U_{EN}	N/120 V (inter-connected) (also programmable for N/100 V or N/110 V, with same accuracy)

Dimensions

example: basic version with 3 modules, width: each module 22.5 mm

side view front view



(dimensions in mm)

Ordering Guide

type	multi-functional transducer for currents, voltages, power
	MMU 3.0
E	basic version for single-phase AC
D	basic version for 3-phase network
	outputs *)
	analog output 1 (voltage & current synchronous)
	digital output 1
	analog outputs
A1	1 additional analog output with basic version
A2	2 additional analog outputs with basic version
A3	3 additional analog outputs with basic version
Ax	additional analog outputs with basic version**)
	digital outputs
D4	4 additional digital outputs with basic version
D8	8 additional digital outputs with basic version
	auxiliary supply
H4	DC 20 ... 90 V / AC 15 ... 65 V
H5	DC 90 ... 357 V / AC 65 ... 253 V
	programming
P0	by user *)
P1	by factory

	accessory
WSoft	software on CD for configuration and read-out of measured values
RS 232 cable	serial connection cable
AP-RS232/485	RS232-485 converter

*) standard
**) on request

Note: Data relating to input, measuring range and to the output assignment are not required, as the transducers are suitable to be configured with a PC or laptop.

ordering example

MMU 3.0	D D4 H5 P0 WSoft

multi-functional transducer for use on 3-phase network
(1 analog output and 1 digital output included),
not any additional analog outputs,
4 additional digital outputs,
auxiliary voltage DC 90 ... 357 V / AC 65 ... 253 V,
user-programming; software WSoft

– specifications subject to change without notice; date of issue 03/09 –

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DIN EN ISO 9001
Certificate: 01 100 80407

Product Guide

800.U.001.04

Transducers

J / U =

P/Q =

P+Q =

f =

φ =

≈ ~ = RS232 RS485

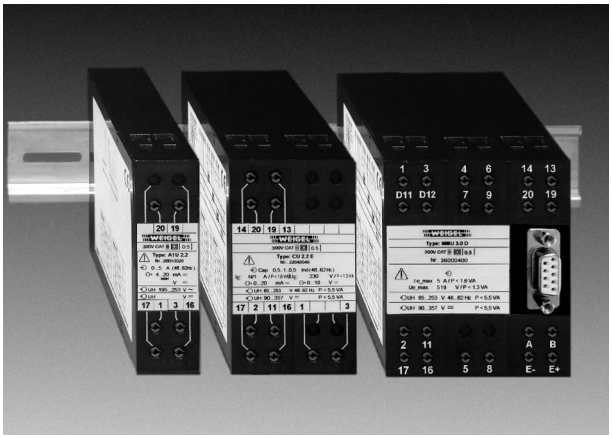
= =

ϑ =

= RS232 RS485

RS232 RS485

- ✓ **for AC Current or AC Voltage: A1U / V1U 2.2 – also self-powered: AU / VU 2.0 A1U / V1U 2.3**
- ✓ **for AC Current (Co–generation): A1U 2.2 E/D**
- ✓ **for Active or Reactive Power EW/B / DGW/B / DUW/B / VGW/B / VUW/B 2.2 *new:* EW/B / DGW/B / DUW/B / VGW/B / VUW/B 2.3**
- ✓ **for Active *and* Reactive Power EW+B / DGW+B / DUW+B / VGW+B / VUW+B 2.2**
- ✓ **Programmable Multi-Functional Transducer: MMU 3.0**
- ✓ **for Frequency: FU 2.2**
- ✓ **for Phase Angle (cos φ): CU 2.2**
- ✓ **for DC Current or DC Voltage: AUD / VUD 2.2**
- ✓ **for RMS Current or RMS Voltage: AUE / VUE 2.2**
- ✓ **for Temperature: PTU 2.0**
- ✓ **Isolation Transducers for Standard Signals: TUA 2.2 also self-powered: TUP 2.0**
- ✓ **Standard Signal Interface Converter: MU-RS232/485**
- ✓ **RS232-RS485 Converter: AP-RS232/485**
- ✓ SMD and microprocessor controlled technology
- ✓ Accuracy: class 0.5
- ✓ Mounting on DIN-rail 35 mm
- ✓ Case width: 22.5 mm each module
- ✓ Auxiliary supply AC 115/230 V (50/60 Hz), DC 24 V or wide range supply



CE

WEIGEL

General Data

Transducers

Application

Transducers convert power current and voltage quantities or proccess control inputs into proportional load independent DC current or voltage outputs.

for measuring	AC current or AC voltage, active or reactive power, frequency, phase angle (φ) / power factor (cos φ), DC current or DC voltage, standard signals, temperature

Technical Data

case details	projecting case clamping to TH35 mounting rail according to DIN EN 60 715
material of case	ABS/PC black self - extinguishing to UL rating 94 V–0
terminals	screw - terminals
wire cross - section	4 mm^2 max.
enclosure code	IP 40 case IP 20 terminals
class of protection	II
measuring category	CAT III
pollution level	2
operating voltage	300 V (rated mains voltage phase to zero)
climatic suitability	climatic class 3 acc. to VDE/VDI 3540 sheet 2
operating temperature range	–10 ... +55°C
storage temperature range	–25 ... +65°C
relative humidity	≤ 75% annual average, non - condensing

Output Ratings

current output

output current	I_A	load independent DC current 0 ... 20 mA or optionally 0 ... 10 mA, 0 ... 5 mA, 4 ... 20 mA (”live zero”), –20 ... 0 ... 20 mA (bipolar output only with wide range supply)
load range	R_A	0 ... 10 V / I_{AN}
current limitation		to approx.120% of full–scale value, other ratings on request

voltage output

output voltage	U_A	load independent DC voltage 0 ... 10 V or optionally 2 ... 10 V (”live zero”), –10 ... 0 ... 10 V (bipolar output only with wide range supply)
load	R_A	≥ 4 kΩ
load error		≤ 0.1% based on 50% load change
residual ripple		≤ 1%$_{rms}$
response time		approx. 500 ms
idling voltage		≤ 15 V

(Ratings do not apply completely to self - powered transducers.)

Auxiliary Supply

auxiliary voltage U_{HN}	230 V AC (195 ... 253 V), 48 ... 62 Hz
optional	115 V AC (98 ... 126 V), 48 .. 62 Hz 24 V DC (20 ... 72 V)
wide range supply	20 ... 100 V DC resp. 20 ... 70 V AC 90 ... 357 V DC resp. 65 ... 253 V AC

galvanic isolation between input, output and auxiliary supply circuits

Short Form Data

Transducers for AC Current or AC Voltage, Self - Powered

AU 2.0
VU 2.0

Input Ratings

input quantity	sinusoidal AC current (AU 2.0) sinusoidal AC voltage (VU 2.0)	
type rated input	**AU 2.0** current I_{EN} 1 A *), 1.2 A, 5 A *), 6 A other rating on request	**VU 2.0** voltage U_{EN} 57.7 V, 63.5 V, 100 V *), 110 V *), 150 V, 250 V, 400 V, 500 V
	*) also for use on transducer	
measuring range	0 ... I_{EN}	0 ... U_{EN}
modulation range overload limit	1.2 I_{EN} 1.5 I_{EN} continuously 10 I_{EN} 1 s max.	1.2 U_{EN} 1.2 U_{EN} continuously 2 U_{EN} 1 s max.
frequency range	48 ... 62 Hz	
power consumption	voltage transformer current transformer 5A current transformer 1A	< 3 VA < 4 VA < 2 VA

Output Ratings

current output

output current	I_A	load independent DC current
rated current	I_{AN}	0 ... 20 mA
load range	R_A	0 ... 500 Ω
load error		≤ 0.4% based on 50% load change
idling voltage		≤ 20 V
accuracy		**class 0.5** (±0.5% of end value)

Other Ratings

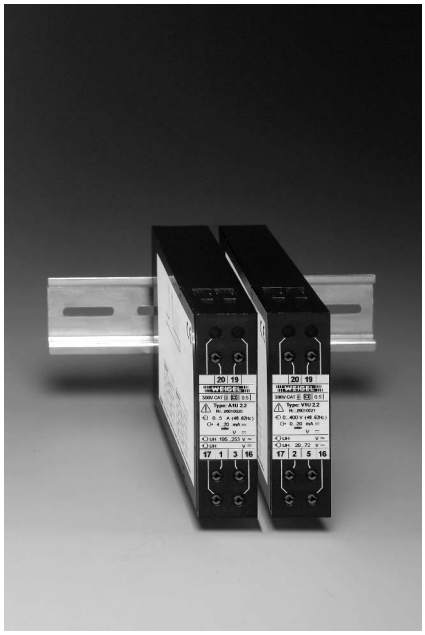
auxiliary voltage	*none required*
dimensions WxHxL	22.5 mm x 80 mm x 115 mm
weight	approx. 0.35 kg

for detailed information refer to Data Sheet No. 045.##

Short Form Data

Transducers for AC Current or AC Voltage

A1U 2.2
V1U 2.2



Input Ratings

input quantity	sinusoidal AC current or sinusoidal AC voltage	
type	**A1U 2.2**	**V1U 2.2**
meeasuring unit	AC current	AC voltage
rated input	current I_{EN}	voltage U_{EN}
in the range	0 ... 200 µA up to 5 A (also for use on transformer)	0 ... 60 mV up to 519 V
measuring range	0 ... I_{EN}	0 ... U_{EN}
	current input	**voltage input**
modulation range	1.2 I_{EN}	1.2 U_{EN}
overload limit	1.2 I_{EN} continuously 10 I_{EN} 1 s max.	1.2 U_{EN} continuously 2 U_{EN} 1 s max.
frequency range	48 ... 62 Hz or $16^2/_3$ Hz, 100 Hz, other ratings on request	
power consumption	≤ 0.4 VA	

Output Ratings

output current *or* voltage output
refer to **General Data**

Other Ratings

accuracy **class 0.5** (±0.5% of end value)
auxiliary voltage *refer to* **General Data**
dimensions WxHxL 22.5 mm x 80 mm x 115 mm
weight approx. 0.12 kg

for detailed information refer to Data Sheet No. 061.##

Short Form Data

Transducers for AC Current or AC Voltage

A1U 2.3
V1U 2.3

Input Ratings

input quantity	sinusoidal AC current or sinusoidal AC voltage	
type	**A1U 2.3**	**V1U 2.3**
meeasuring unit	AC current	AC voltage
rated input	current I_{EN} 1 A*) / 5 A*) *) also for use on transformer	voltage U_{EN} 100 V*) / 250 V / 500 V
measuring range	0 ... I_{EN}	0 ... U_{EN}
	current input	**voltage input**
modulation range	1.2 I_{EN}	1.2 U_{EN}
overload limit	1.2 I_{EN} continuously 10 I_{EN} 1 s max.	1.2 U_{EN} continuously 2 U_{EN} 1 s max.
frequency range	48 ... 62 Hz	
power consumption	≤ 0.4 VA	

Output Ratings

current output

output current	I_A	load independent DC current
rated current	I_{AN}	0 ... 20 mA or 4 ... 20 mA
load range	R_A	0 ... 600 Ω
current limitation		to 120 ... 140% of end value

or **voltage output**

output voltage	U_A	impressed DC voltage
rated voltage	U_{AN}	0 ... 10 V or 2 ... 10 V
load	R_A	≥ 4 kΩ

load error, residual ripple, response time *refer to* **General Data**
idling voltage ≤ 20 V

Other Ratings

accuracy **class 0.5** (±0.5% of end value)
auxiliary voltage U_{HN} 230 V AC (195 ... 253 V), 48 ... 62 Hz
optional 115 V AC (98 ... 126 V), 48 .. 62 Hz
galvanic isolation between input, output and auxiliary supply circuits
dimensions WxHxL 22.5 mm x 80 mm x 115 mm
weight approx. 0.16 kg

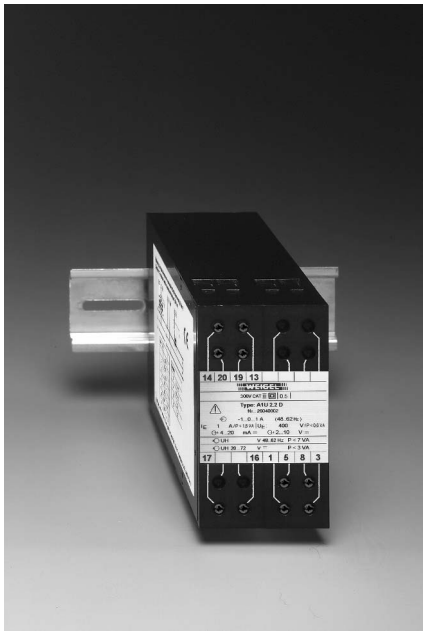
for detailed information refer to Data Sheet No. 068.##

J/U =

Short Form Data

Transducers for AC Current (Co-generation)

A1U 2.2 E
A1U 2.2 D



Input Ratings

input quantity	sinusoidal AC current
type / meeasuring unit	AC current with co-generation indication
A1U 2.2 E	single-phase AC system
A1U 2.2 D	3-phase 3- or 4-wire balanced load system
rated input current	**measuring range**
I_{EN}	$-I_{EN}$ ... 0 ... $+I_{EN}$
1 A	–1 A (input) ... 0 ... +1 A (output)
5 A	–5 A (input) ... 0 ... +5 A (output) (also for use on transformer)
rated input voltage U_{EN}	ranging from 57.7 V to 500 V
modulation range	1.2 I_{EN}
overload limit	1.2 I_{EN} continuously 10 I_{EN} 1 s max.
frequency range	50 ... 60 Hz
power consumption	<1 mA each voltage circuit ≤ 0.1 VA each current circuit for I_{EN} = 1 A ≤ 1.6 VA each current circuit for I_{EN} = 5 A

Output Ratings

outputs	current *and* voltage outputs *refer to* **General Data**

Other Ratings

outputs	*refer to* **General Data**
accuracy	**class 0.5** (±0.5% of end value)
auxiliary voltage	*refer to* **General Data**
dimensions WxHxL	45 mm x 80 mm x 115 mm
weight	approx. 0.27 kg

for detailed information refer to Data Sheet No. 065.##

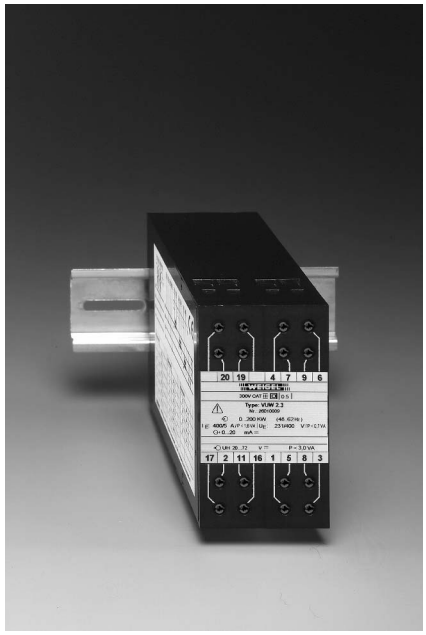
P/Q =

Short Form Data

Transducers for Active or Reactive Power, Fixed Calibration

EW 2.3
EB 2.3
DGW 2.3
VGW 2.3
DUW 2.3
VUW 2.3
DGB 2.3
VGB 2.3
DUB 2.3
VUB 2.3

with μP



Input Ratings

input quantity	sinusoidal AC current and voltage	
measuring unit P_E or Q_E	active / reactive power	
single-phase AC system	**EW 2.3**	**EB 2.3**
3-phase 3-wire balanced load system	**DGW 2.3**	**DGB 2.3**
3-phase 4-wire balanced load system	**VGW 2.3**	**VGB 2.3**
3-phase 3-wire unbalanced load system	**DUW 2.3**	**DUB 2.3**
3-phase 4-wire unbalanced load system	**VUW 2.3**	**VUB 2.3**
measuring range	0 ... P_N P_N=calibration factor · P_S	
single phase AC	$P_S = U \cdot I$ (calibration factor=0.87)	
3-phase system	$P_S = \sqrt{3} \cdot U \cdot I$ (calibration factor=0.72)	
rated input voltage	U_{EN} 0 ... 230 V / 0 ... 400 V	
rated input current	I_{EN} 0 ... 1 A / 0 ... 5 A (also for use with CT)	
modulation range	1.2 U_{EN} and 1.2 I_{EN}	
overload limits	1.2 U_{EN}, 1.2 I_{EN} continuously 2 U_{EN}, 10 I_{EN} 1 s max.	
frequency range	48 ... 62 Hz	
power consumption	<1 mA each voltage circuit ≤ 0.1 VA each current circuit for I_{EN} = 1 A ≤ 1.6 VA each current circuit for I_{EN} = 5 A	

Output Ratings

outputs	current *and* voltage output *refer to* **A1U/V1U 2.3**

Other Ratings

accuracy	**class 0.5** (±0.5% of end value)		
auxiliary voltage U_{HN}	230 V AC (195 ... 253 V), 48 ... 62 Hz		
optional	115 V AC (98 ... 126 V), 48 .. 62 Hz 24 V DC (20 ... 72 V)		
dimensions WxHxL	45 mm x 80 mm x 115 mm		
weight approx.	EW/B 2.3 DGW/B 2.3 VGW/B 2.3	DUW/B 2.3	VUW/B 2.3
	0.18 kg	0.20 kg	0.22 kg

for detailed information refer to Data Sheet No. 069.##

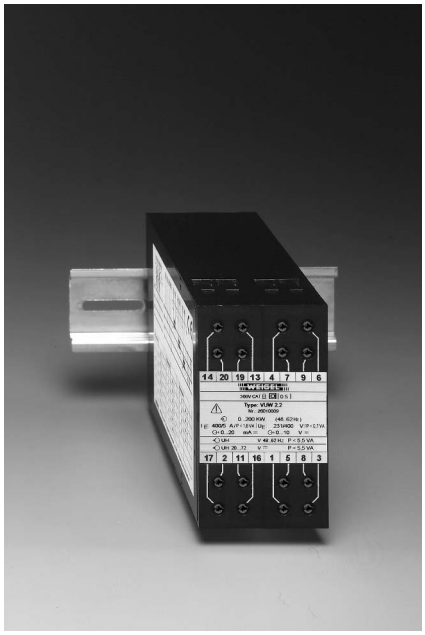
P/Q
=

Short Form Data

Transducers for Active or Reactive Power

EW 2.2
EB 2.2
DGW 2.2
VGW 2.2
DUW 2.2
VUW 2.2
DGB 2.2
VGB 2.2
DUB 2.2
VUB 2.2

with μP



Input Ratings

input quantity	sinusoidal AC current and voltage
measuring unit P_E / type	active / reactive power
single-phase AC system	**EW 2.2** **EB 2.2**
3-phase 3-wire balanced load system	**DGW 2.2** **DGB 2.2**
3-phase 4-wire balanced load system	**VGW 2.2** **VGB 2.2**
3-phase 3-wire unbalanced load system	**DUW 2.2** **DUB 2.2**
3-phase 4-wire unbalanced load system	**VUW 2.2** **VUB 2.2**
measuring range	0 ... P_N or $-P_N$ ... 0 ... P_N P_N= (0.3 ... 1.5) · P_S P_S = U · I (single-phase AC system) $P_S = \sqrt{3}$ · U · I (3-phase systems)
rated input voltage U_{EN}	ranging from 50 V to 519 V
rated input current I_{EN}	1 A or 5 A (also for use on transformer) or ranging from 0.5 to 5 A
modulation range	1.2 U_{EN} and 1.2 I_{EN}
overload limits	1.2 U_{EN}, 1.2 I_{EN} continuously 2 U_{EN}, 10 I_{EN} 1 s max.
frequency range	48 ... 62 Hz
power consumption	<1 mA each voltage circuit ≤ 0.1 VA each current circuit for I_{EN} = 1 A ≤ 1.6 VA each current circuit for I_{EN} = 5 A

Output Ratings

outputs	current *and* voltage output *refer to* **General Data**

Other Ratings

accuracy	**class 0.5** (±0.5% of end value)		
auxiliary voltage	*refer to* **General Data**		
dimensions WxHxL	45 mm x 80 mm x 115 mm		
weight approx.	EW/B 2.2 DGW/B 2.2 VGW/B 2.2	DUW/B 2.2	VUW/B 2.2
	0.27 kg	0.29 kg	0.31 kg

for detailed information refer to Data Sheet No. 062.##

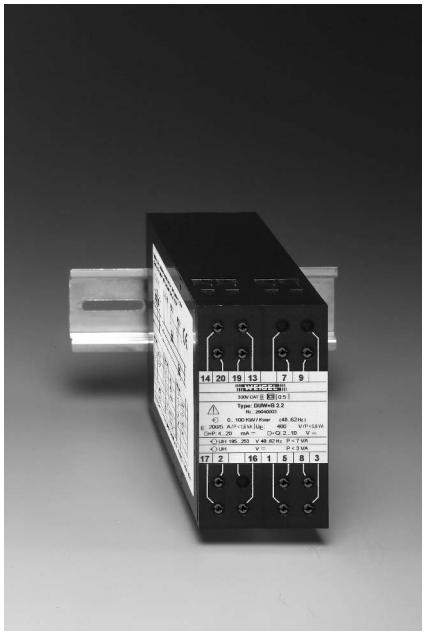
P+Q
=

Short Form Data

Transducers for Active *and* Reactive Power

EW+B 2.2
DGW+B 2.2
VGW+B 2.2
DUW+B 2.2
VUW+B 2.2

with μP



Input Ratings

input quantity	sinusoidal AC current and voltage
measuring unit P_E / type	active *and* reactive power
single-phase AC system	**EW +B 2.2**
3-phase 3-wire balanced load system	**DGW+B 2.2**
3-phase 4-wire balanced load system	**VGW+B 2.2**
3-phase 3-wire unbalanced load system	**DUW+B 2.2**
3-phase 4-wire unbalanced load system	**VUW+B 2.2**
equal active and reactive power ranges, optonally also *not* equal	
measuring range	0 ... P_N or $-P_N$ ... 0 ... P_N P_N= (0.3 ... 1.5) · P_S P_S = U · I (single-phase AC system) $P_S = \sqrt{3}$ · U · I (3-phase systems)
rated input voltage U_{EN}	ranging from 50 V to 519 V
rated input current I_{EN}	1 A or 5 A (also for use on transformer)
modulation range	1.2 U_{EN} and 1.2 I_{EN}
overload limits	1.2 U_{EN}, 1.2 I_{EN} continuously 2 U_{EN}, 10 I_{EN} 1 s max.
frequency range	48 ... 62 Hz
power consumption	<1 mA each voltage circuit ≤ 0.1 VA each current circuit for I_{EN} = 1 A ≤ 1.6 VA each current circuit for I_{EN} = 5 A

Output Ratings

outputs	current *or* voltage outputs *refer to* **General Data**

Other Ratings

accuracy	**class 0.5** (±0.5% of end value)		
auxiliary voltage	*refer to* **General Data**		
dimensions WxHxL	45 mm x 80 mm x 115 mm		
weight approx.	EW+B 2.2 DGW+B 2.2 VGW+B 2.2	DUW+B 2.2	VUW+B 2.2
	0.27 kg	0.29 kg	0.31 kg

for detailed information refer to Data Sheet No. 066.##

Short Form Data

Transducer for Frequency

FU 2.2

with μP

Input Ratings

input quantity	AC voltage
measuring unit	frequency f_E $f_{Emin} \geq 14$ Hz $f_{Emax} \leq 500$ Hz

measuring ranges

f_{Emin} ...	f_N ...	f_{Emax}	Δf	class
45 ...	50 ...	55 Hz	10 Hz	**0,2**
48 ...	50 ...	52 Hz	4 Hz	**0,3**
55 ...	60 ...	65 Hz	10 Hz	**0,2**
58 ...	60 ...	62 Hz	4 Hz	**0,5**
360 ...	400 ...	440 Hz	80 Hz	**0,2**
380 ...	400 ...	420 Hz	40 Hz	**0,2**
other ratings on request			($\Delta f = f_{Emax} - f_{Emin}$)	

rated input voltage	U_{EN} 100 V, 110 V, 115 V, 120 V, 230 V, 240 V, 380 V, 400 V, 415 V, 440 V
overload limit	1.2 U_{EN} continuously 2 U_{EN} 1 s max.
current consumption	≤ 1 mA

Output Ratings

outputs	current *and* voltage output *refer to* **General Data**

Other Ratings

accuracy	*refer to* **measuring ranges**
auxiliary voltage	*refer to* **General Data**
dimensions WxHxL	45 mm x 80 mm x 115 mm
weight	approx. 0.22 kg

for detailed information refer to Data Sheet No. 064.##

Short Form Data

Transducer for Phase Angle (cos φ)

CU 2.2 E
CU 2.2 D

with μP

Input Ratings

input quantity	sinusoidal AC current / voltage
type / measuring unit **CU 2.2 E** **CU 2.2 D**	phase angle φ (power factor) in single-phase AC system or 3-phase 3-wire balanced load system
measuring ranges	
–37° ... 0 ... 37°	corresponds to cos φ : cap 0.8 ... 1 ... 0.8 ind
–60° ... 0 ... 60°	corresponds to cos φ : cap 0.5 ... 1 ... 0.5 ind
optional –180° ... 0 ... 180°	to be specified in the range corresponds to cos φ : ind. (output) –1 ... 1 ... –1 cap. (output) (unique measuring range –175° to + 175°)
rated input voltage U_{EN}	ranging from 50 V to 519 V
rated input current I_{EN}	1 A or 5 A (also for use on transformer) or ranging from 0.5 to 5 A
modulation range	1.2 U_{EN} and 1.5 I_{EN}
overload limits	1.2 U_{EN}, 1.6 I_{EN} continuously 2 U_{EN}, 10 I_{EN} 1 s max.
frequency range	48 ... 62 Hz
power consumption	<1 mA each voltage circuit ≤ 0.1 VA each current circuit for I_{EN} = 1 A ≤ 1.6 VA each current circuit for I_{EN} = 5 A

Output Ratings

outputs	current *and* voltage output *refer to* **General Data**

Other Ratings

accuracy	**class 0.5** (±0.5% of end value)
auxiliary voltage	*refer to* **General Data**
dimensions WxHxL	45 mm x 80 mm x 115 mm
weight	approx. 0.27 kg

for detailed information refer to Data Sheet No. 063.##

Short Form Data

Programmable Multi-Functional Transducer for AC Currents, AC Voltages and Powers

MMU 3.0

with μP

Input Ratings

input quantities	AC current and AC voltage in single phase or 3 phase system
voltages	L1, L2, L3 (3 terminals), N (1 terminal) 519 V (inter-connected) or optionally N/120V (also for N/100V or N/110V)
currents	I1, I2, I3 (6 terminals) N/5 A or optional N/1.2 A (also for N/1 A)

Measuring Units	Total	L1	L2	L3
voltage (U)	U	U_1	U_2	U_3
current (I)	I	I_1	I_2	I_3
active power (P)	P	P_1	P_2	P_3
reactive power (Q)	Q	Q_1	Q_2	Q_3
apparent power (S)	S	S_1	S_2	S_3
active factor (PF)	PF	PF_1	PF_2	PF_3
reactive factor (QF)	QF	QF_1	QF_2	QF_3
phase angle (PH)	PH	PH_1	PH_2	PH_3
frequency (f)		F		

Depending on power system, not all these values van be measured.

10 V measuring input	INP	(±10 V)

Other Ratings

analog output 1	voltage & current synchronous (2 terminals each) *refer to* **General Data**
interfaces	RS 232 (SUB–D jack), RS 485 (2 terminals)
digital output	contact-free via opto coupler

1, 2, or 3 additional analog outputs (galvanically isolated) and up to 8 additional digital outputs (galvanically isolated) are optional

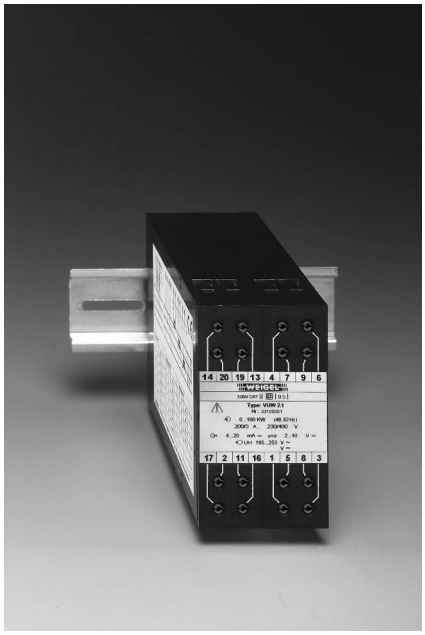
accuracy	**class 0.5** (±0.5% of end value)
auxiliary voltage	wide range supply *refer to* **General Data**
dimensions	basic version: 3 modules in single-phase resp. 4 modules in three-phase systems, optional outputs: additional 1 to 3 modules
each module WxHxL	22.5 mm x 80 mm x 115 mm
weight	approx. 0.6 kg (basic version)

for detailed information refer to Data Sheet No. 055.##

Short Form Data

Transducers for Active Power or Reactive Power

DUW 2.1
DUB 2.1
VUW 2.1
VUB 2.1



Input Ratings

input rating	sinusoidal AC current and sinusoidal AC voltage
measuring unit P_E / type	active / reactive power
3-phase 3-wire unbalanced load system	**DUW 2.1** **DUB 2.1**
3-phase 4-wire unbalanced load system	**VUW 2.1** **VUB 2.1**
measuring range	0 ... P_N or $-P_N$ ... 0 ... P_N $P_N = (0.3 \ldots 1.5) \cdot P_S$ $P_S = \sqrt{3} \cdot U \cdot I$
rated input voltage U_{EN}	65 V, 100 V, 110 V, 240 V, 400 V, 415 V, 440 V, 500 V or deviating from standard inputs ranging from 0 ... (60 V ... U_{EN} ... 519 V)
rated input current I_{EN}	N/1 A, N/5 A or deviating from standard inputs ranging from 0 ... (0,5 A ... I_{EN} ... 5 A)
modulation range	1.2 U_{EN} and 1.2 I_{EN}
overload limits	1.2 U_{EN}, 1.2 I_{EN} continuously 2 U_{EN}, 10 I_{EN} 1 s max.
frequency range	50 Hz (48 ... 52 Hz) or $16^2/_3$ Hz, 60 Hz, 100 Hz, others on request
power consumption	<1 mA each voltage circuit ≤ 0.1 VA each current circuit for I_{EN} = 1 A ≤ 1.6 VA each current circuit for I_{EN} = 5 A

Output Ratings

outputs	current *and* voltage output *refer to* **General Data**

Other Ratings

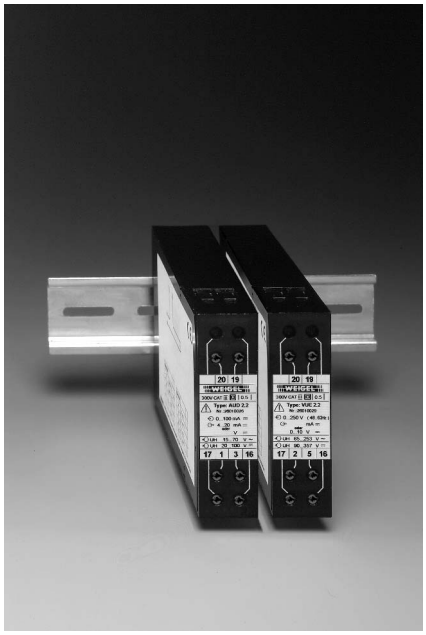
accuracy	**class 0.5** (±0.5% of end value)	
auxiliary voltage	*refer to* **General Data**	
dimensions WxHxL	45 mm x 80 mm x 115 mm	
weight	**DUW/DUB 2.1** approx. 0.29 kg	**VUW/VUB 2.1** approx. 0.31 kg

for detailed information refer to Data Sheet No. 051.##

Short Form Data

Transducers for DC Current/Voltage, RMS Current/Voltage, Isolating Transducers

AUD 2.2
VUD 2.2
AUE 2.2
VUE 2.2
TUA 2.2



Input Ratings

	current input	voltage input
measuring range	0 ... I_{EN}	0 ... U_{EN}
modulation range	1.2 I_{EN}	1.2 U_{EN}
overload limit	1.2 I_{EN} continuously 10 I_{EN} max. 1 s	1.2 U_{EN} continuously 2 U_{EN} max. 1 s
power consumption	≤ 0.4 VA	

model	input quantities	rated input value
AUD 2.2	DC current	I_{EN} = 200 µA – 5 A
VUD 2.2	DC voltage	U_{EN} = 60 mV – 300 V
AUE 2.2	non-sinusoidal AC current (true RMS value) *)	I_{EN} = 200 µA – 5 A
VUE 2.2	non-sinusoidal AC voltage (true RMS value) *)	U_{EN} = 60 mV – 519 V
TUA 2.2	DC standard signals	I_{EN} = 20 mA U_{EN} = 60 mV, 10 V

*) also for use on transformer

AUE/VUE 2.2:

frequency range	48 ... 62 Hz or $16^2/_3$ Hz, 100 Hz, other ratings on request
crest factor	≤ 4 (peak value / rms value)

Output Ratings

output	current *or* voltage output *refer to* **General Data**

Other Ratings

as an option	selectable from standard output ratings via jumpers located behind front panel
accuracy	**class 0.5** (±0.5% of end value)

class 0.2 (±0,2% of end value) only for DC models on request

auxiliary voltage	*refer to* **General Data**
dimensions WxHxL	22.5 mm x 80 mm x 115 mm
weight	approx. 0.12 kg

for detailed information refer to Data Sheet No. 061.##

Short Form Data

Isolating Transducer for Standard Signals, Self-Powered

TUP 2.0

Single or Dual Channel

Input Ratings

input quantity	I_E	DC current
rated input current	I_{EN}	20 mA
measuring range		0 ... I_{EN}
modulation range		1.2 I_{EN}
overload limit continuously		2 I_{EN} max.
max. input voltage permissible		16 V
power consumption		2.4 V based on 20 mA

Output Ratings

current output

output current	I_A	load independent DC current
rated current	I_{AN}	0 ... 20 mA
load range	R_A	0 ... 500 Ω (rated load 250 Ω)
load error		≤ 0.1% based on 50% load change
residual ripple		≤ 30 mV_{ss}
idling voltage		≤ 25 V
response time		≤ 0.05 s based on $R_{A\ max}$

Input and output are galvanically isolated.

Other Ratings

accuracy	**class 0.2** (±0.2% of end value)
auxiliary voltage	*none required*
dimensions WxHxL	22.5 mm x 80 mm x 115 mm
weight	approx. 0.12 kg
dual channnel unit	on request

for detailed information refer to Data Sheet No. 049.##

Short Form Data

Standard Signal Interface Converter

MU-RS232/485

with μP

Input Ratings

input quantity	I_E U_E	DC current or DC voltage	
rated input current voltage	 I_{EN} U_{EN}	 20 mA 10 V / 1 V	input resistance 50 Ω 1 MΩ / 100 kΩ
measuring range		current input 0 ... I_{EN} "live zero" option	voltage input 0 ... U_{EN}
modulation range, admissible		1.2 I_{EN}	1.2 U_{EN}
overload limit continuously 1 s max.		 1.2 I_{EN} 2 I_{EN}	 1.2 U_{EN} 2 U_{EN}

Interfaces

type	RS232 (V.24) and RS485 (SCPI commands)
Baud-rate	19200 Baud
as an option:	
switching output open collector	8 ... 40 V DC / 10 ... 30 mA insulation voltage 1 kV
switching output MOS FET	for voltages up to 230 V AC/DC and currents up to 100 mA insulation voltage 3 kV

Other Ratings

accuracy	±0.1% and ±1 count (for 0 ... I_{EN} resp. 0 ... U_{EN})
auxiliary voltage	*refer to* **General Data**
dimensions WxHxL	22.5 mm x 80 mm x 115 mm
weight	approx. 0.12 kg

for detailed information refer to Data Sheet No. 052.##

Short Form Data

RS232-RS485 Converter

AP-RS232/485

Function

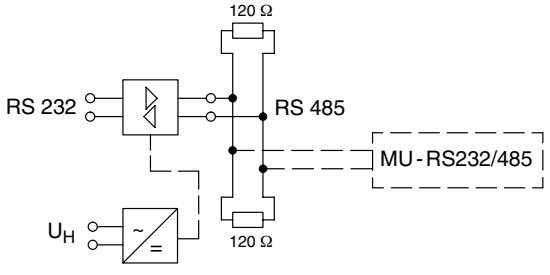
The converter is directly plugged to a 9-contact serial interface of a PC. It converts the RS232 signals of the PC into standardized RS485 signals. This conversion enables to simultaneously connect several devices by a 2-wire junction to one interface and to inquire one after another.

The device is protocol-transparent, i.e. the RS485 signals are translated 1:1 into the signals of the RS232 interface.

Depending on the 2-wire junction of the RS485, a half-duplex operation only will be possible. This means, only one device may send in the network at a time. By that a simultaneous operation of sending and receiving will not be possible.

Ratings

case details	metalized thermoplastic case
terminals	SUB-D 9 contact (RS232 interface on the PC) screw-terminals 2 contacts, wire-cross section 4 mm² max. (RS485 interface)
auxiliary supply	power adapter prim. AC 230 V, ±10%, 50 Hz, sec. DC 9 V / 250 mA included with supply
dimensions	73 mm x 34 mm x 12 mm
weight	approx. 50 g



for detailed information refer to Data Sheet No. 054.##

Short Form Data

Transducers for Temperature (Pt 100)

PTU 2.0 L

Input Ratings

input quantity temperature (for RTD Pt 100)

Initial Temperature T_{E1}	**Spans** ΔT
–200 ˚C	100 K
–150 ˚C	150 K
–100 ˚C	200 K
– 50 ˚C	300 K
0 ˚C	400 K
+ 50 ˚C	500 K
+100 ˚C	600 K
+150 ˚C	700 K (for $T_{E1} \leq$ 100˚C only)
+200 ˚C	800 K (for $T_{E1} \leq$ 0˚C only)
	900 K (for $T_{E1} \leq$ –100˚C only)
	1000 K (for T_{E1} = –200˚C only)

or deviating from standard values in the range of 100 ... 1000 K

measuring range T_{E1} ... $T_{E2} = T_{E1} + \Delta T$
input potential–free differential input
connection 2–, 3– or 4–wire system

Output Ratings

current output

output current	I_A	load independent DC current
rated current	I_{AN}	4 ... 20 mA
load range	R_A	0 ... 500 Ω (based on 20 mA)
load error		≤ 0.1% based on 50% load change
residual ripple		≤ 1%$_{rms}$ of I_{AN} with load R_{AN}
idling voltage		≤ 16 V
response time		≤ 1 s based on $R_{A\,max}$

Other Ratings

accuracy ±0.5% referred to the span ΔT
auxiliary voltage *refer to* **General Data**
dimensions WxHxL 22.5 mm x 80 mm x 115 mm
weight approx. 0.12 kg

for detailed information refer to Data Sheet No. 050.##

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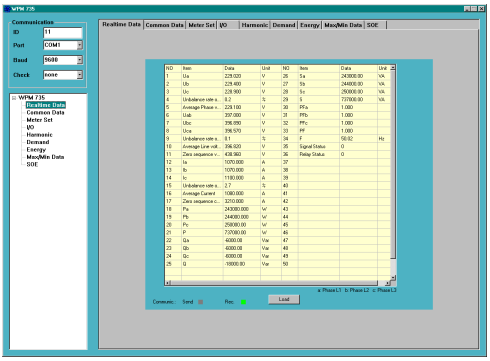
– specifications subject to change without notice; date of issue 02/10 –

Digital Multifunctional Power Meter with LCD Display: Software

WPM 735 E
WPM 735 P



Contents

1. General Information

1.1. System requirements

The WPM 735 software is suitable to run in Windows 98/2000/XP. The software can be copied into any directory, and then, it can by started by double-clicking without installation.

Minimum hardware requirements:

CPU: Pentium 50 Mhz

RAM: 256MB

Screen resolution: min. 1024x768, recommended 1280x1024 or higher

Hard disk: min. 1MB free disk space

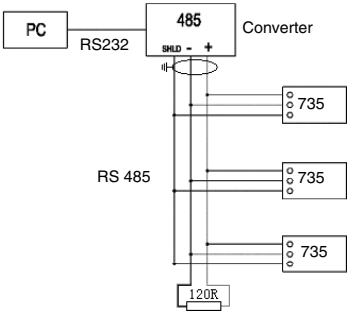
Mouse

The PC should have at least one serial port.

RS485-RS232 converter with cables

1.2. Connection

♦ Connect the RS485 bus according to the following figure.



Terminal	Description
15 RS485A+	RS485+
16 RS485B–	RS485 –
17 SHLD	Shield

♦ Connect the RS232 cable to the PC and the converter.

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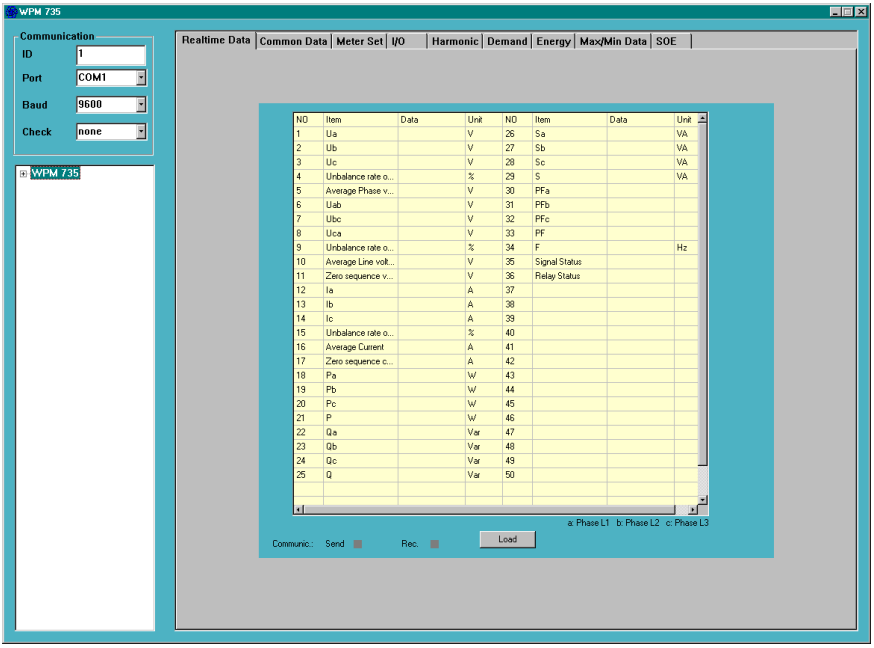
e-mail: vertrieb@weigel-messgeraete.de

1.3. Starting the software

- Double-click WPM735_en.exe



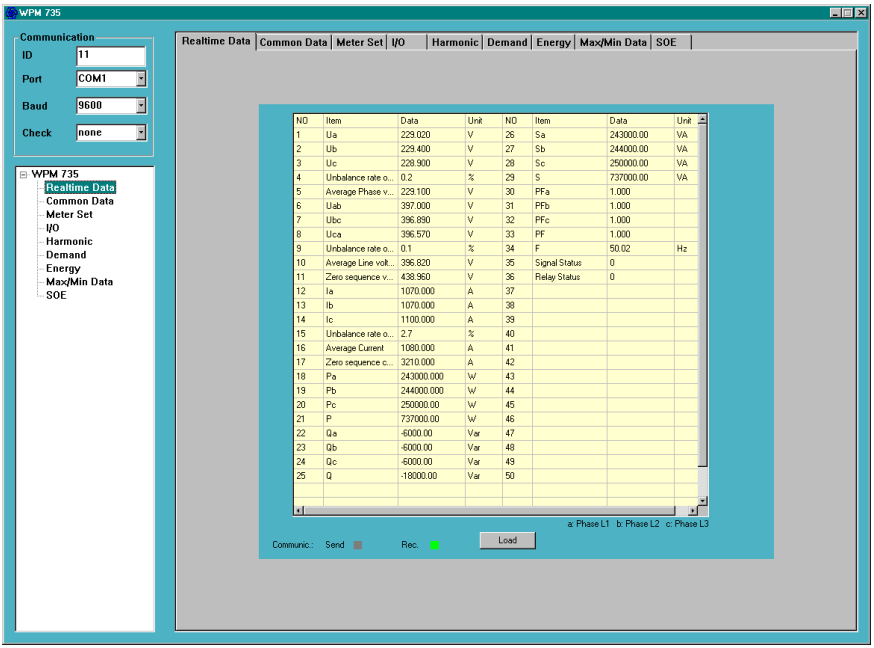
Note: With a screen resolution of 1024x768 the card stack on top will not be shown.

- Enter the meter address inte the **ID** field top left.
- Select the serial port to which the RS485 converter is connected from the **Port** selection list.
- Select the boud rate set on the meter from the **Baud** selection list.
- Select **none** from the **Check** selection list.

2. Displaying Measured Values

2.1. Realtime Data

♦ Click the ⊞ symbol to the left of the window and then click **Realtime Data**.



In the table on the right part of the window, the real-time measured values Ua, Ub, Uc, etc. are displayed and updated continuously. (a = Phase L1, b = Phase L2, c = Phase L3)

♦ To update data manually, click **Load**.

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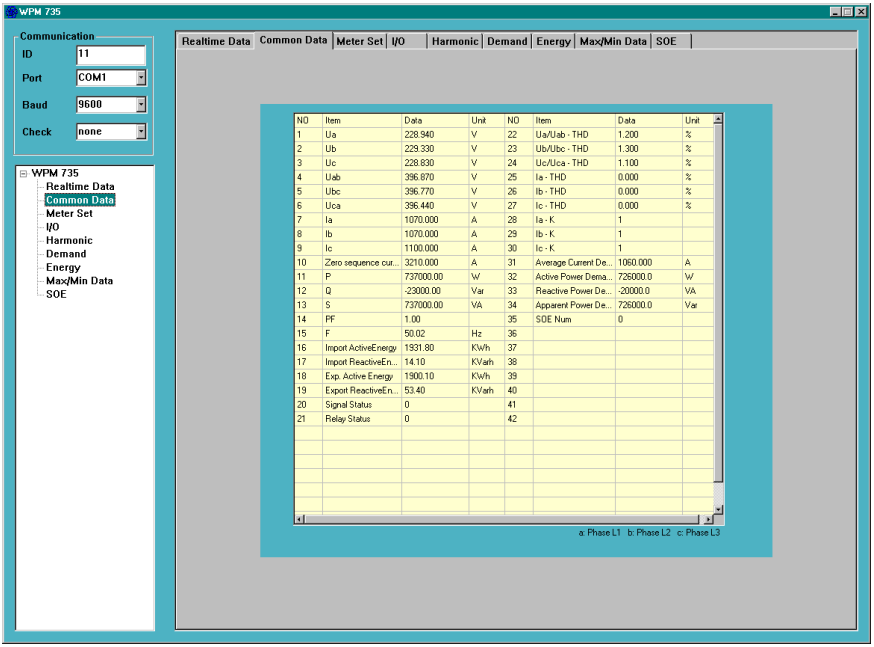
2.2. Common Data

The “Common Data” are the most important measured values, which are summarized on one page.

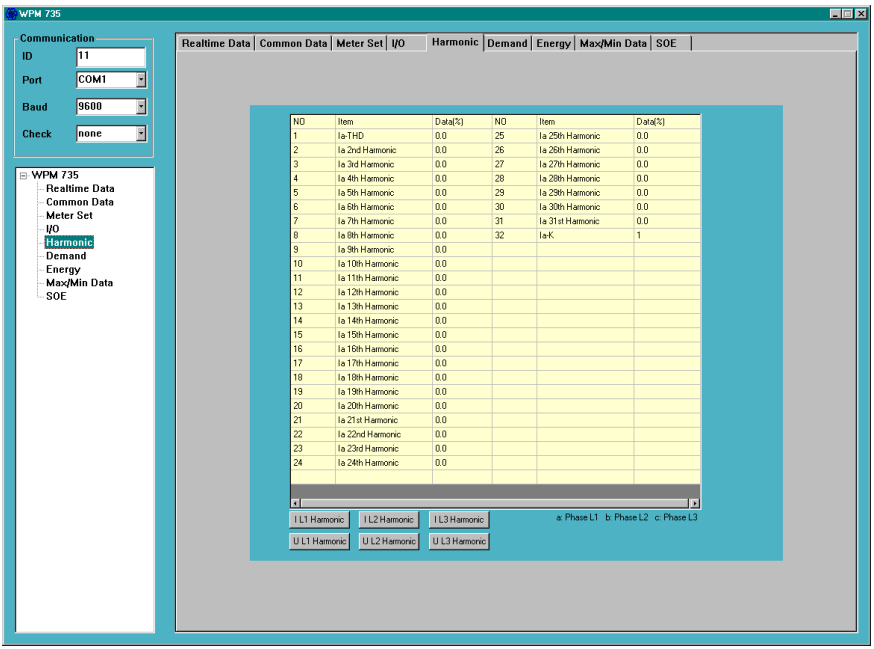
♦ Click **Common Data** to the left of the window or click the **Common Data** tab.



In the table on the right part of the window, the most important measured values are displayed and updated continuously.

2.3. Harmonics

♦ Click **Harmonic** to the left of the window or click the **Harmonic** tab.



In the table on the right part of the window, the harmonics (2nd to 31st harmonic), the total harmonic distortion THD and the K factor of L1 phase current are displayed.

♦ Click the **I L2 Harmonic** or **I L3 Harmonic** button to display the L2 or L3 phase current harmonics.

♦ Click the **U L2 Harmonic**, **U L2 Harmonic**, or **U L3 Harmonic** button to display the L1, L2, or L3 phase voltage harmonics.

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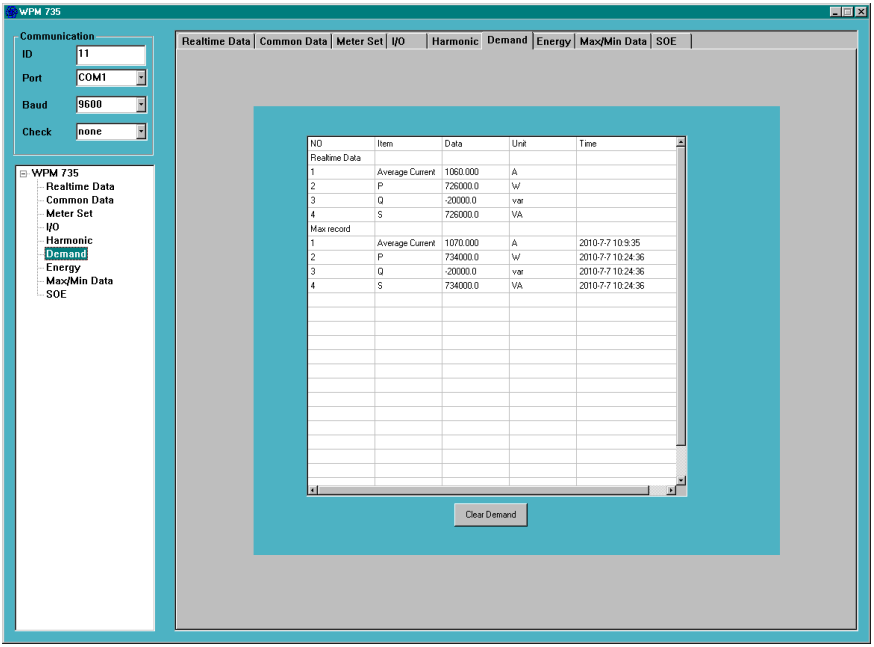
2.4. Demand

♦ Click **Demand** to the left of the window or click the **Demand** tab.



2.4.1. Reading demand data

In the table on the right part of the window, demand data are displayed.

- Underneath **Realtime Data**, the actual demand values (15 min values) for current, active power, reactive power, and apparent power are displayed.
- Underneath **Max record**, the maximum demand values for current, active power, reactive power, and apparent power are displayed with time stamp (date and time).

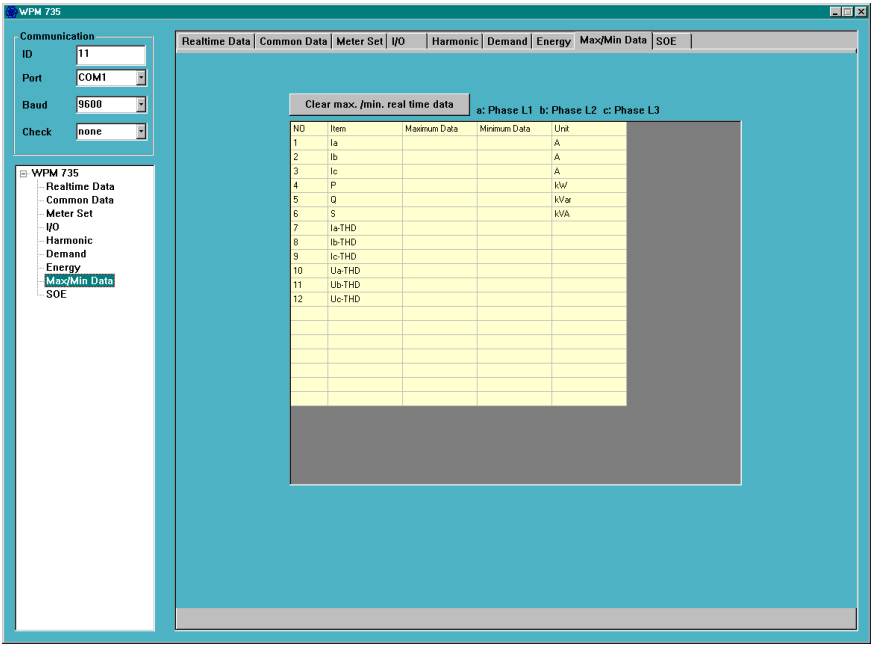
2.4.2. Clearing demand values

♦ Click **Clear Demand**.

All maximum demand values are reset to 0.

2.5. Maximum/minimum values

♦ Click **Max/Min Data** to the left of the window or click the **Max/Min Data** tab.



2.5.1. Reading maximum/minimum values

In the table on the right part of the window, maximum and minimum values of the currents, active power, reactive power, and apparent power, as well as the total harmonic distortions THD of currents and voltages are displayed.

2.5.2. Clearing maximum/minimum values

♦ Click **Clear max./min. real time data**.

All limit values are deleted.

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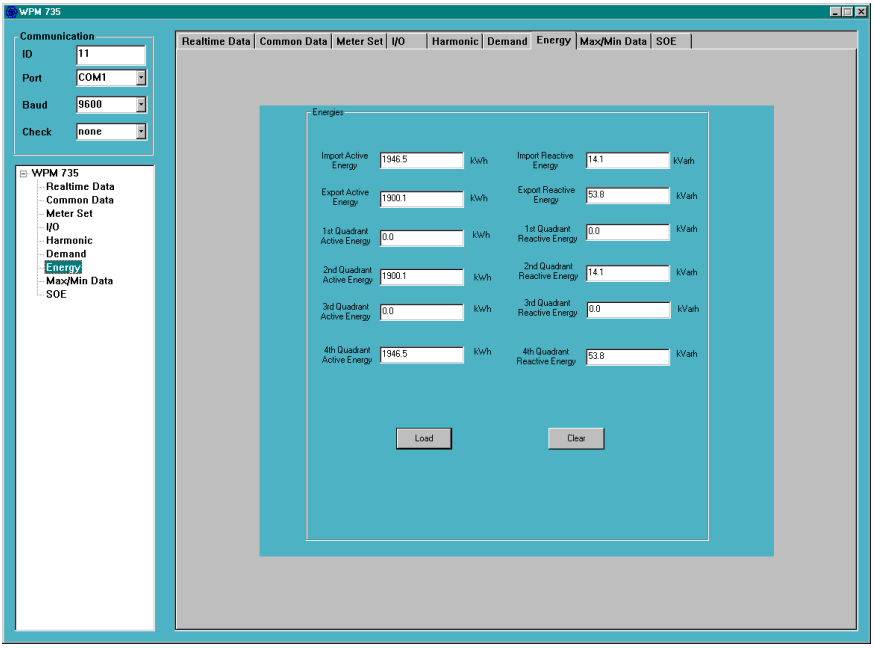
2.6. Energy counters

♦ Click **Energy** to the left of the window or click the **Energy** tab.



2.6.1. Reading energy counters

In the table on the right part of the window, the imported and exported active and reactive energies of the four quadrants are displayed.

♦ To update data, click **Load**.

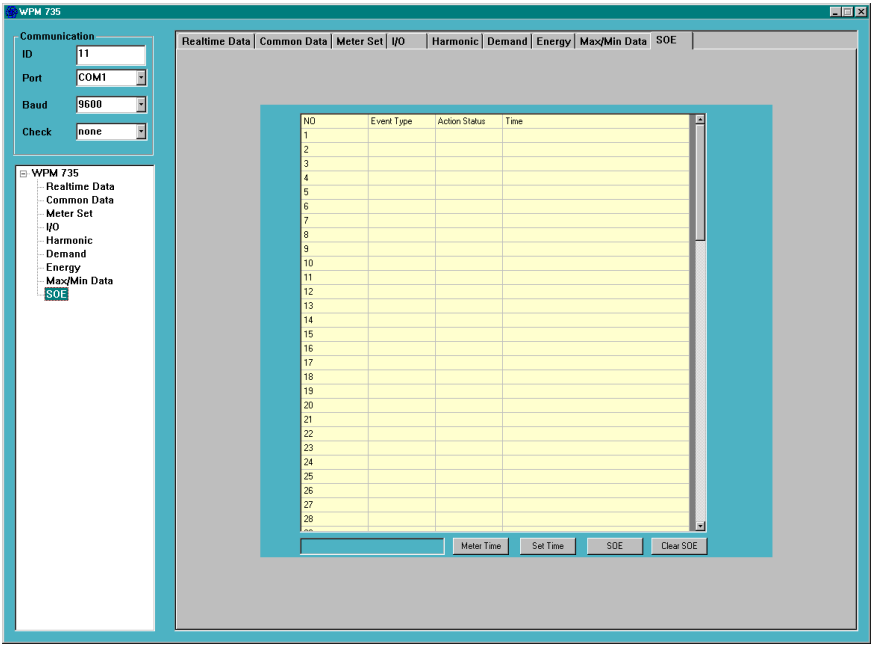
2.6.2. Resetting energy counters

♦ Click **Clear**.

All the energy counters are reset.

2.7. SOE events

♦ Click **SOE** to the left of the window or click the **SOE** tab.



In the table on the right part of the window, the list of events is displayed.

2.7.1. Updating the event list

♦ Click **SOE**.

The event list is loaded again from the meter.

2.7.2. Clearing the event list

♦ Click **Clear SOE**.

All events are deleted in the meter and from the list.

2.7.3. Displaying date and time of the meter

♦ Click **Meter Time**.

Date and time of the meter are shown bottom left.

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2.7.4. Setting date and time of the meter

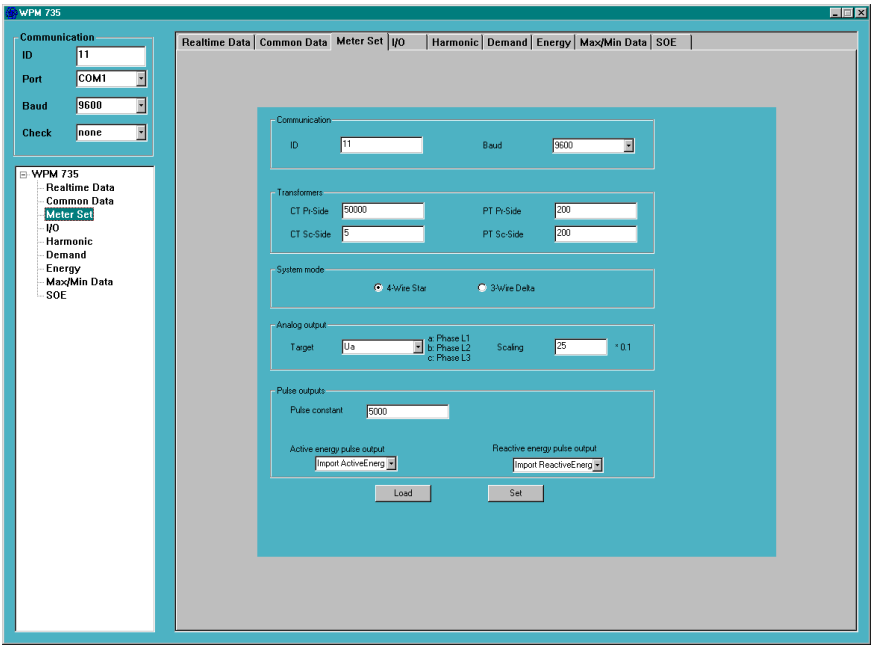
♦ Click **Set Time**.

Date and time of the connected PC are taken over to the meter.

3. Programming

3.1. Displaying meter settings

♦ Click **Meter Set** to the left of the window or click the **Meter Set** tab.



The communication parameters, the transformer ratings, the system mode, and the settings for the analog output and pulse outputs are displayed.

♦ To update display, click **Load**.

3.2. Changing meter settings

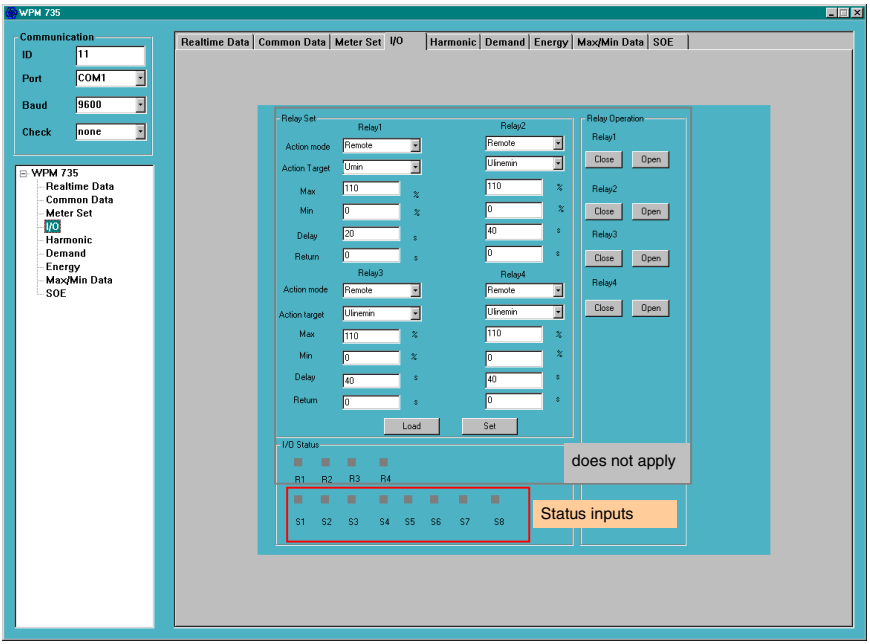
- Change the settings as required.
  (for details see Operating Manual No. 679.B.121.##)
- To transfer the settings to the meter, click **Set**.

Note: If communication parameters have been changed, you must set the same parameters in the window top left.

- Check the setting by clicking **Load**.

4. Status Inputs

- Click **I/O** to the left of the window or click the **I/O** tab.



In the right part of the window, the the status of switch contact inputs are indicated on bottom.

- Specifications subject to change without notice; date of issue 07/10 -

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DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

679.D.121.03

Digital Multifunctional Power Meter with LCD Display

WPM 735 E
WPM 735 P

WEIGEL

Application

The digital **Weigel Power Meters** have been designed to display the electrical parameters in low voltage systems. The meters are suitable for use in 3-phase 3-wire or 3-phase 4-wire systems 230/400 V and for use with current transformers N/5 A.

- **WPM 735 E-H-T-AO-V3** is equipped with harmonics analysis, SOE (event monitoring) as well as 8 status inputs, 2 pulse outputs and 1 analog output
- **WPM 735 P-H-V3** is equipped with harmonics analysis and Profibus

The panel meters display the electrical parameters in the network: voltages phase to neutral and phase to phase, currents of the 3 phases, neutral current; unbalance rates for currents and voltages; active power, reactive power, apparent power and power factor of the 3 phases and in total; frequency; active energy and reactive energy in 4 quadrants (imported/exported, inductive/capacitive); demand and maximum demand of the currents and powers; harmonics of current and voltage up to the 31st harmonics as well as total harmonic distortion (THD). Various ratings are displayed at the same time and can be selected by pressing buttons.

Special events SOE (Status of Events) are recorded with date and time stamp.

Using the integrated RS485 or Profibus interface, all measured ratings and the events can be read out and settings can be made.
Software for read out and configuration is available via download from www.weigel-messgeraete.de

Using the front-side buttons, the voltage and current transformer ratios, the system type and communication parameters can be set and the energy counters and demand values can be reset.

Functional Principle

WPM 735 is a microprocessor-controlled digital measuring device for measuring, calculating, and indicating electrical ratings.

The meter has 3 voltage inputs and 3 current inputs to enable simultaneous evaluation of voltage, current and power for all three phases.

The meter must be connected via current transformers.

General Technical Data

Case

case details	suitable to be mounted in switch gear panels
material of case	plastics, black
panel fixing	plastic clips
enclosure code	IP 50 front of case IP 20 rear of case
insulation voltage	2 kV AC inputs – outputs – auxiliary supply
pulse withstand voltage	5 kV (peak), 1.2/50 µS
insulation resistance	≥50 MΩ
MTBF	≥50000 h
operating elements	6 buttons
Terminals	3 plugable screw-terminal barrier strips
wire-cross section	2.5 mm^2 max.

Dimensions

bezel	□ 96 mm
bezel height	18 mm
panel cutout	□ $90^{+0.5}$ mm
mounting depth	80 mm minus panel thickness
panel thickness	≤ 5 mm
weight	approx. 0,7 kg

Electrical Data

system type	3-phase 3-wire or 3-phase 4-wire system, unbalanced loads
rated voltage	230/400 V
PT ratio	adjustable 1 to 2500
rated current	5 A
current connection	via CTs N/5 A
CT ratio	adjustable 1 to 10000
overload capacity	
current	1.2 times continously 10 times for 1 sec.
voltage	1.2 times continously 2 times for 1 sec.
frequency range	35 ... 65 Hz

Auxiliary Supply

auxiliary voltage	85 ... 265 V AC or 80 ... 300 V DC
power consumption	<3 VA

Display/Measuring/Accuracy

display: LCD display, green, 65 mm x 65 mm with backlight (when pressing a button)

Measured quantities

voltages	U	L-L and L-N
currents	I	L1, L2, L3 and N
active power	P	L1, L2, L3 and ΣP
reactive power	Q	L1, L2, L3 and ΣQ
apparent power	S	L1, L2, L3 and ΣS
power factor	PF	L1, L2, L3 and in total
frequency	F	F
active energy		imported and exported
reactive energy		induktive and capacitive

demand and maximum demand of currents and powers
demad time: 15 min (fixed)
unbalance rates of voltages und currents
recording of maximum and minimum ratings of I, P, Q, S
individual harmonics of current and voltage up to the 31st harmonics
THD: total harmonic distortion

Measuring unit	Measuring range	Resolution	Accuracy
voltages (L-L, L-N)	0 ... 600 V	0.01 V	0.2%
currents (L1, L2, L3, N)	0 ... 50 kA	0.001 A	0.2%
active power	0 ... ±100 MW	0.1 W	0.2%
reactive power	0 ... ±100 MVar	0.1 Var	0.2%
apparent power	0 ... ±100 MVA	0.1 VA	0.2%
power factor	–1 ... +1 ... –1	0.001	0.2%
frequency	35 ... 65 Hz	0.01 Hz	0.1%
active energy*)	0 ... 99,999,999.9 kWh	0.1 kWh	1.0%
reactive energy*)	0 ... 99,999,999.9 kVarh	0.1 kVarh	1.0%
unbalance rate	0 ... 100%	0.001	1.0%
individual harmonics	0 ... 100%	0.001	1.0%
THD	0 ... 100%	0.001	1.0%

*) The accuracy for energy measurement is class 1 according to IEC 62053–21.

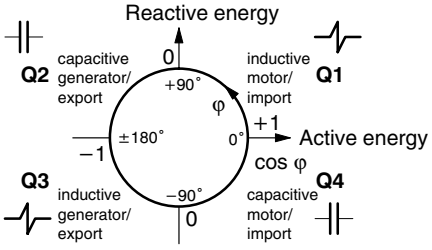
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

679.D.121.03

Digital Multifunctional Power Meter with LCD Display

4 Quadrants Measurement

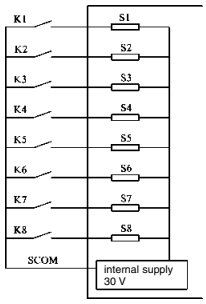


Environmental

operating temperature range	–25 ... +70˚C
storage temperature range	–40 ... +85˚C
relative humidity	5% ... 95% non-condensing

Status Inputs

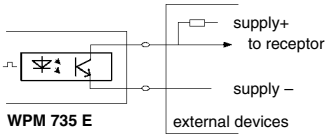
WPM 735 E is equipped with 8 status inputs which can be used, e.g. for recording switch positions.



Pulse Outputs

WPM 735 E is equipped with two pulse outputs:

- Output P1 provides pulses for total active energy.
- Output P2 provides pulses for total reactive energy.



type	optocoupler open–collector, max. 50 V, 50 mA
pulse weight	adjustable 1000 ... 5000, depending on CT ratio, i.e. with 1 kWh/kvarh X CT the set pulse count will be output
pulse width	max. 200 ms

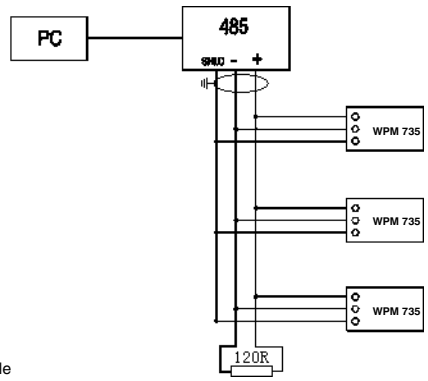
Analog Output

WPM 735 E is equipped with one analog output, to which a measured rating can be assigned.

type	4 ... 20 mA
burdan range	0 ... 500 Ω
scale factor	1 ... 10 adjustable

RS485 Interface

type	RS485
protocol	MODBUS–RTU
baud rate	2400, 4800, 9600, 19200
address	1 ... 247

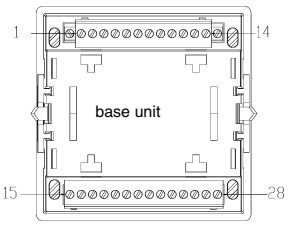


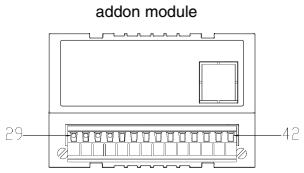
example

Standards

EN 55022	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
EN 55024	Information technology equipment – Immunity characteristics – Limits and methods of measurement
EN 60950–1	Information technology equipment – Safety – Part 1: General requirements
EN 61000–3	Electromagnetic compatibility (EMC) – Limits –
–2	Part 3–2: Limits for harmonic current emissions (equipment input current <= 16 A per phase)
–3	Part 3–3: Limitation of voltage changes, voltage fluctuations and flicker in public low–voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection
IEC 61000–4	Electromagnetic compatibility (EMC) – Testing and measurement techniques –
–2	Part 4–2: Electrostatic discharge immunity test.
–3	Part 4–3: Radiated, radio–frequency, electromagnetic field immunity test
–4	Part 4–4: Electrical fast transient/burst immunity test
–5	Part 4–5: Surge immunity test
–6	Part 4–6: Immunity to conducted disturbances, induced by radio–frequency fields
–8	Part 4–8: Power frequency magnetic field immunity test
–11	Part 4–11: Voltage dips, short interruptions and voltage variations immunity tests

Terminals





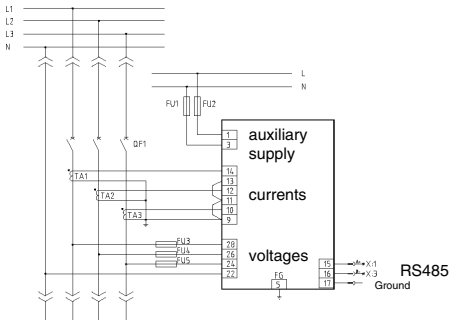
No.	Term.	Description
1	L/+	auxiliary supply
2	NC	not connected
3	N/–	auxiliary supply
4	NC	not connected
5	FG	protective ground
6	NC	not connected
7	NC	not connected
8	NC	not connected
9	I32	current L3
10	I31	current L3
11	I22	current L2
12	I21	current L2
13	I12	current L1
14	I11	current L1
15	RS485A+	RS485+
16	RS485B–	RS485 –
17	SHLD	shield
18	NC	not connected
19	NC	not connected
20	A1	analog output+
21	AG	analog output –
22	VN	neutral
23	NC	not connected
24	V3	voltage L3
25	NC	not connected
26	V2	voltage L2
27	NC	not connected
28	V1	voltage L1

No.	Term.	WPM 735 E only
29	P2–	pulse output
30	P2+	reactive energy
31	P1–	pulse output
32	P1+	active energy
33	Scom	supply +30V
		status inputs common
34	S8	status input 8
35	S7	status input 7
36	S6	status input 6
37	S5	status input 5
38	S8	status input 4
39	S7	status input 3
40	S6	status input 2
41	S5	status input 1
42	NC	not connected

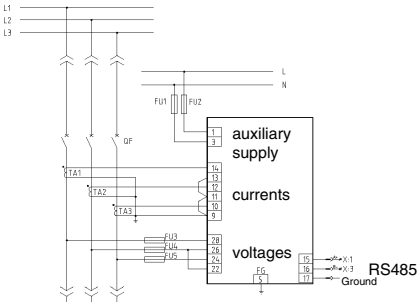
No.	Term.	WPM 735 P only
29	RB	termination resistor B
30	P–	Profibus –
31	P+	Profibus +
32	RA	termination resistor A
33	SHLD	shield
34	NC	not connected
35	NC	not connected
36	NC	not connected
37	NC	not connected
38	NC	not connected
39	NC	not connected
40	NC	not connected
41	NC	not connected
42	NC	not connected

Connections

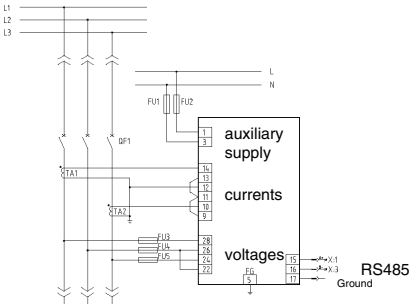
3–phase 3–wire system



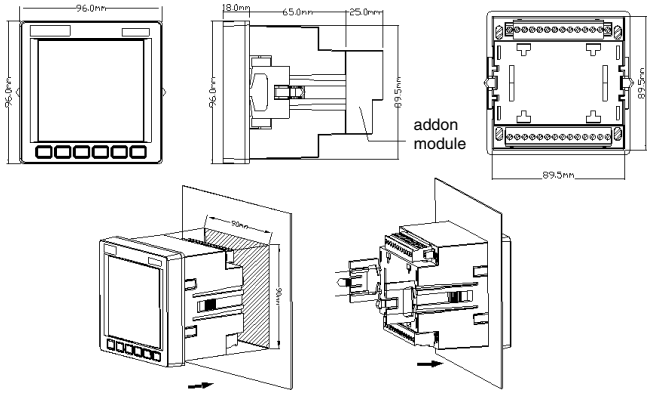
3–phase 3–wire system, 3 CTs



3–phase 3–wire system, 2 CTs



Dimensions



Ordering Information

Multifunctional Power Meter with LCD Display, 96 mm x 96 mm
WPM 735 E-H-T-AO-V3 with harmonics analysis, SOE, 8 status inputs, 2 pulse outputs and 1 analog output
WPM 735 P-H-V3 with harmonics analysis and Profibus

Ordering Example

WPM 735 P-H-V3
Multifunctional Power Meter with LCD Display, harmonics analysis, and Profibus

– specifications subject to change without notice; date of issue 08/10 –

WEIGEL – MESSGERÄTE GmbH

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DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

679.D.101.04

Digital Multifunctional Power Meter with LED Display

WPM 600B-Z

WEIGEL

Application

The digital **Weigel Power Meters** have been designed to display electrical parameters in low voltage systems.

WPM 600 B-Z is suitable for use in 3-phase 4-wire systems 230/400 V.

This panel meter displays the following electrical parameters: voltage, current, active power, reactive power, power factor, frequency, active energy and reactive energy. The ratings are displayed one after the other or can be selected by pressing a button.

Using the front-side buttons, the current transformer ratio can be set and the energy values can be reset.

Functional Principle

Microprocessor-controlled digital measuring device that measures, calculates and indicates electrical ratings.

WPM 600 B-Z has 3 voltage inputs and 3 current inputs to enable simultaneous evaluation of voltage, current and power for all three phases.

The meter must be connected via current transformers.

General Technical Data

Case

case details	suitable to be mounted in switch gear panels
material of case	plastics, black
panel fixing	plastic clips
enclosure code	IP 50 front of case IP 20 rear of case
insulation voltage	2 kV
insulation resistance	50 MΩ
MTBF	50000 h
operating elements	4 membrane keys
Terminals	2 screw-terminal barrier strips
wire-cross section	2.5 mm^2 max.
Dimensions	**WPM 600 B-Z**
bezel	□ 96 mm
bezel height	12 mm
panel cutout	□ $90^{+0.5}$ mm
mounting depth	58 mm minus panel thickness
panel thickness	≤ 4 mm
weight	approx. 0,5 kg

Electrical Data

system type	3-phase 4-wire system, unbalanced loads
rated voltage	230/400 V
rated current	5 A
current connection	via CTs N/5 A
CT ratio	adjustable 1 to 1999
overload capacity	
current	1.2 times continously 10 times for 1 sec.
voltage	1.2 times continously 2 times for 1 sec.
frequency range	35 ... 65 Hz

Display

display	3x 4-digit 7-segment LED display, red, and 8 red LEDs for measuring unit
digit height	15 mm

Measured Quantity	LED	WPM 600 B-Z	Unit
voltage	U	4 digits	V
current	I	4 digits	A
active power	P	4 digits	kW
reactive power	Q	4 digits	kvar
power factor (cos φ)	PF	3 digits	–
frequency	F	4 digits	Hz
active energy	E_P	9 digits*)	kWh
reactive energy	E_Q	9 digits*)	kvarh

*) spread over 3 displays

Auxiliary Supply

auxiliary voltage	85 ... 265 V AC or 80 ... 300 V DC
power consumption	<2 VA

Accuracy at Reference Conditions

voltage	0.5%
current	0.5%
power	1.0%
active energy	class 1

Environmental

operating temperature range	–25 ... +70˚C
storage temperature range	–40 ... +85˚C
relative humidity	5% ... 95% non-condensing

Standards

DIN EN 61010–1	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements
DIN EN 61326–2–1	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 2–1: Particular requirements – Test configurations, operational conditions and performance criteria for sensitive test and measurement equipment for EMC unprotected applications

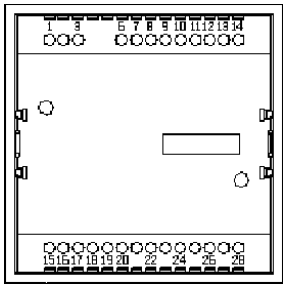
DIN EN ISO 9001
Certificate: 01 100 80407

Data Sheet

679.D.101.04

Digital Multifunctional Power Meter with LED Display

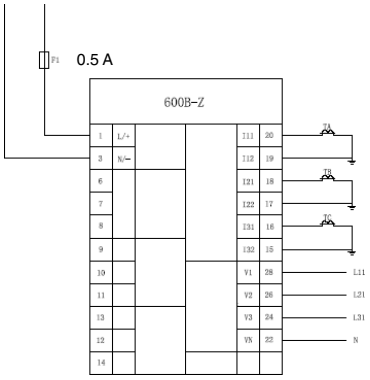
Terminals/Connection Diagram



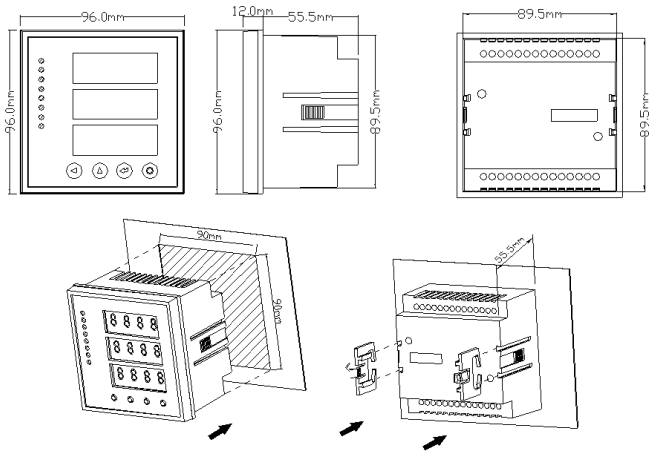
1 L/+ auxiliary supply
3 N/– auxiliary supply
6–14 reserved

15 I32 current L3
16 I31 current L3
17 I22 current L2
18 I21 current L2
19 I12 current L1
20 I11 current L1

22 N neutral
24 L3 phase L3
26 L2 phase L2
28 L1 phase L1



Dimensions



Ordering Information

Type	Multifunctional Power Meter with LED Display
WPM 600 B - Z	for use in 3 - phase 4 - wire systems, for voltage, current, active power, reactive power, power factor, frequency, active energy, reactive energy, 96 mm x 96 mm

Ordering Example

WPM 600B - Z
Multifunctional Power Meter with LED Display
for use in 3 - phase systems

– specifications subject to change without notice; date of issue 06/10 –

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DIN EN ISO 9001
Certificate: 01 100 80407

Product Guide

DG – Series
730.U.001.02

Digital Large-Sized Displays and Meters, programmable

192 x 96
240 x 96
288 x 96
336 x 96
384 x 96
336 x 144
432 x 144
528 x 144
624 x 144
720 x 144

- ✓ for DC Current and Voltage, Standard Signals
- ✓ for Parallel BCD-Input
- ✓ for Serial Input
  RS 232 C / V.24, 20 mA / TTY, RS 422 and RS 485
- ✓ Digit Height 57 or 100 mm
- ✓ LED red or green
- ✓ 3, 4, 5 Digits
- ✓ Choice of Caption, e.g. °C, km/h
- ✓ Auxiliary Supply 100 ... 240 V AC/DC or 18 ... 35 V DC
- ✓ Wall-Mounting Case (optional)

CE

WEIGEL

General Data

Digital Large-Sized Displays and Meters, programmable

Application

used to display information to be viewed a great distance off, e.g. to indicate operating conditions, malfunctions, alarm signals, nominal/ actual values, order- / production line numbers, stock numbers, quantities, weights, rate, speed, power output and other units to be measured in industrial use.

Additional fields of application: automation of production, display of date, time of day, display of local weather conditions / environmental influence.

Digital large-sized indicators using LED-technology are utmost robust. They are suitable under nearly all environmental conditions. Moreover, they are a low-priced solution in the line of large-sized indicators.

Custom-made designs (size of display, digit heights, number of digits and arrangement, LED-colour, inputs, additional lettering, case configuration (e.g. wall-mounting case) are available on request.

for mounting in	switchboards, machine tools, mosaic grid panels (optional) wall-, ceiling- or outdoor mounting
for measuring	DC current or DC voltage, standard signals
display of	BCD or serial data, display of date / time of day (optional)
data format	analog inputs direct or for use on transducer, shunt, transformer digital inputs parallel or multiplex, SPS 24 V active high

Mechanical Data

case details	rectangular format
material of case	aluminium, black, anodized
front bezel	aluminium, black, anodized, mat
terminals	screw terminal barrier strip
enclosure code	IP 65 front of case IP 20 rear of case
panel fixing	screw clamps
mask lettering	caption, custom logo or extra lettering to special order
operating elements	on rear side of case
climatic suitability	
operating temperature range	0°C ... +23°C ... +50°C
storage temperature range	–20°C ... +23°C ... +70°C
relative humidity	≤75% annual average, non-condensing

dimensions (in mm)	digit height / number of digits **–/D** : without/with caption (e.g. °C)		
DGA/DGP/DGS	**57–30**	**57–40** **57–30/D**	**57–50** **57–40/D** **57–30/D1**
DGU			**57–40**
front bezel	192 x 96	240 x 96	288 x 96
panel cutout	186 x 90	234 x 90	282 x 90
mounting depth	94	94	94
bezel height	4	4	4
DGA/DGP/DGS	**57–60** **57–50/D** **57–40/D1**	**57–60/D** **57–50/D1**	**57–60/D1**
DGU		**57–60**	
front bezel	336 x 96	384 x 96	432 x 96
panel cutout	330 x 90	378 x 90	426 x 90
mounting depth	94	94	94
bezel height	4	4	4
DGA/DGP/DGS	**100–30**	**100–40** **100–30/D**	**100–50** **100–40/D** **100–30/D1**
DGU			**100–40**
front bezel	336 x 144	432 x 144	528 x 144
panel cutout	330 x 138	426 x 138	522 x 138
mounting depth	94	94	94
bezel height	4	4	4
DGA/DGP/DGS	**100–50/D** **100–40/D1**	**100–50/D1**	
DGU		**100–60**	
front bezel	624 x 144	720 x 144	
panel cutout	618 x 138	714 x 138	
mounting depth	94	94	
bezel height	4	4	

Display

display	7–segment LED	
DGA/DGP/DGS/DGU	**57**	**100**
digit height	57 mm	100 mm
viewing distance max.	approx. 20 – 25 m	approx. 40 – 45 m
display colour	red or green	

Extras

lettering	please specify
custom logo	please specify
special measuring range	on request
factory calibration	please specify
non-standard auxiliary voltage	on request
display	tendency symbols or special arrangement of digits on request
non-standard set of symbols code-table	on request
enclosure code IP 65 for overall product	housed in sheet metal case for wall-, ceiling- or outdoor mounting on request

additional options	on request
additional data	on request
prices	refer to Price Sheet No. 730.P.000.##

Short Form Data

mA, V

Large-Sized Indicators for DC Current and DC Voltage, Standard Signals

DGA 57
192 x 96 mm
240 x 96 mm
288 x 96 mm
336 x 96 mm
384 x 96 mm

DGA 100
336 x 144 mm
432 x 144 mm
528 x 144 mm
624 x 144 mm
720 x 144 mm

Digits		Display Span
30	3 digits	–199 ... 999
40	4 digits	–1999 ... 9999
50	5 digits	–19999 ... 30000
Input		
A	DC Current 20 / 200 mA and DC Voltage 2 / 10 / 40 / 200 V	
Auxiliary Voltage		
1	18 ... 35 V DC, electr. insulated	
2	100 ... 240 V AC/DC, electr. insulated	
Options		
0	none	
x	on request	
Display Colour		
R	red	
G	green	
Caption		
–	none	
D	with 2 digit measuring unit	
D1	with 4 digit measuring unit	

Electrical Data

measuring ranges	input resistance
DC current	
±20 mA	100 Ω
±200 mA	10 Ω
DC voltage	
±2 V	100 kΩ
±10 V	560 kΩ
±40 V	2.2 MΩ
±200 V	12 MΩ
measuring principle	dual-slope, integrating
conversion rate	approx. 1 read per second
error, max.	±0.01% of reading, ±1 count
auxiliary voltage	DC 24 V (18 ... 35 V), electrically insulated or AC/DC 100 ... 240 V, electrically insulated
power consumption	12 VA max. (DGA 57), 18 VA max. (DGA 100)

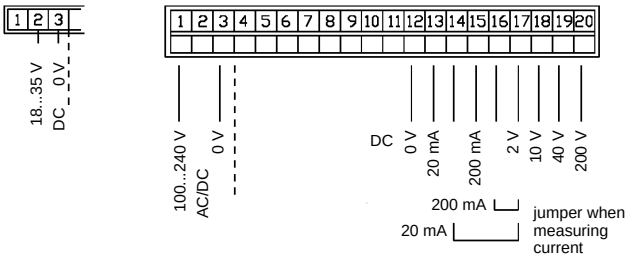
Display

overrange indication	center segments will flash
mean value set-up	adjustable from 1 up to 99 readings
round-off last digit	adjustable: 2nd, 5th, 10th steps, none

zero point and end value programmable

Connection

plug-in terminal barrier strip



ordering example	DGA	100	–	30	A	1	0	R	–	

Short Form Data

BCD

Digital Large-Sized Displays with BCD-Input

DGP 57
192 x 96 mm
240 x 96 mm
288 x 96 mm
336 x 96 mm
384 x 96 mm

DGP 100
336 x 144 mm
432 x 144 mm
528 x 144 mm
624 x 144 mm
720 x 144 mm

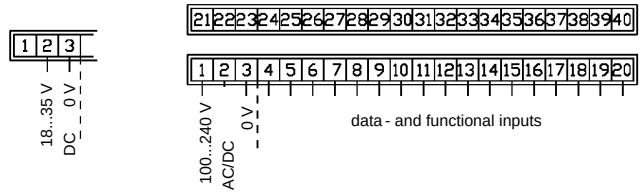
Digits	
30	3 digits
40	4 digits
50	5 digits
Input	
A	BCD Input, 24 V active high
Auxiliary Voltage	
1	18 ... 35 V DC, electr. insulated
2	100 ... 240 V AC/DC, electr. insulated
Display Colour	
R	red
G	green
Caption	
–	none
D	with 2 digit measuring unit
D1	with 4 digit measuring unit

Electrical Data

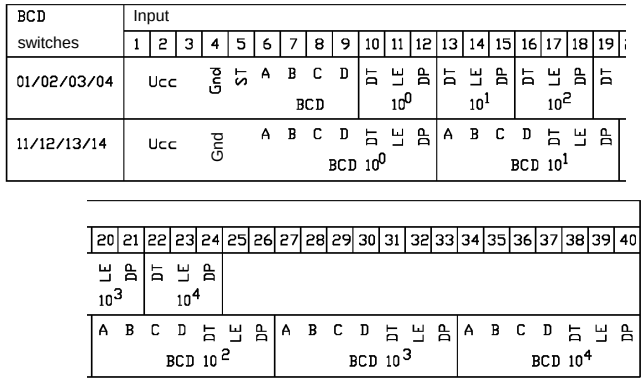
inputs	24 V (35 V max.) active high, parallel or multiplex low: < 7 V, high: >10 V
input resistance	15 kΩ
pulse width	2 ms min.
functional inputs	ST display test DT display blanking DP decimal point LE latch enable
auxiliary voltage	DC 24 V (18 ... 35 V), electrically insulated or AC/DC 100 ... 240 V, electrically insulated
power consumption	12 VA max. (DGP 57), 18 VA max. (DGP 100)

Connection

plug-in terminal barrier strip, double-row



input assignment



ordering example	DGP	100	–	40	A	1	G	D	

Short Form Data

Digital Large-Sized Displays with Serial Input

DGS 57
192 x 96 mm
240 x 96 mm
288 x 96 mm
336 x 96 mm
384 x 96 mm
432 x 96 mm

DGS 100
336 x 144 mm
432 x 144 mm
528 x 144 mm
624 x 144 mm
720 x 144 mm

Digits
30 3 digits
40 4 digits
50 5 digits
60 6 digits (DGS 57 only)

Input
A RS 232 C / V.24 and 20 mA / TTY and RS 422 resp. RS 485

Auxiliary Voltage
1 18 ... 35 V DC, electr. insulated
2 100 ... 240 V AC/DC, electr. insulated

Display Colour
R red
G green

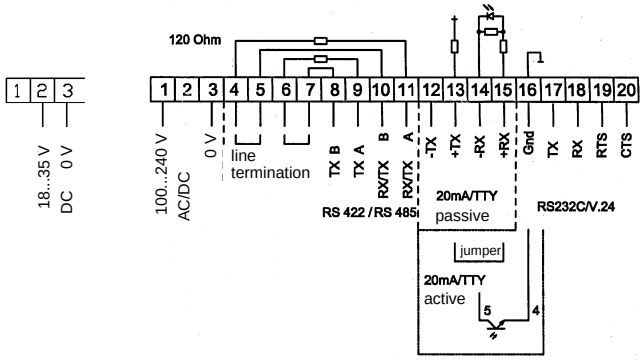
Caption
– none
D with 2 digit measuring unit
D1 with 4 digit measuring unit

Electrical Data

inputs	RS 232 C / V.24, 20 mA / TTY and RS 422 resp. RS 485
data transfer	150 / 300 / 600 / 1200 / 2400 / 4800 / 9600 / 19200 baud with/without parity bit, even / odd parity, 7 or 8 data bits with/without STX/ETX, CR, echo adjustable by DIP-switch
interval	100 ms min. between two telegrams
software functions	display test, fore-running zeros, fading-out, fading-out of up to 98 fore-running symbols, flashing sign, display annunciator direction left→right / right→left
device addresses	01 ... 99
auxiliary voltage	DC 24 V (18 ... 35 V), electrically insulated or AC/DC 100 ... 240 V, electrically insulated
power consumption	12 VA max. (DGS 57), 18 VA max. (DGS 100)
set of symbols	on request

Connection

plug-in terminal barrier strip



ordering example	DGS	57	–	60	A	2	G	–	

Short Form Data

Digital Large-Sized Indicators for Date/Time Quartz Clocks / DCF 77

DGU 57
288 x 96 mm
384 x 96 mm

DGU 100
528 x 144 mm
720 x 144 mm

Digits
40 4 digits
60 6 digits

Input
D for DCF 77 reception module

Auxiliary Voltage
1 18 ... 35 V DC, electr. insulated
2 100 ... 240 V AC/DC, electr. insulated

Options
0 none
x on request

Display Colour
R red
G green

Electrical Data

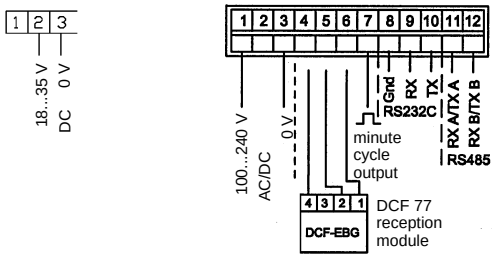
time-of-day clock	quartz clock, battery-buffered
time-base accuracy	±5 ppm max. / year
battery backup	lithium torch battery 3 V
input	for DCF 77 reception module **DCF–EBG** with remote supply
auxiliary voltage	DC 24 V (18 ... 35 V), electrically insulated or AC/DC 100 ... 240 V, electrically insulated
power consumption	12 VA max. (DGU 57), 18 VA max. (DGU 100)

Display

display modes	24-hour clock operation only (separated by colons) or date only (separated by decimal points) or change time of day / date each 1 ... 99 s programmable
intensity	adjustable

Connection

plug-in terminal barrier strip



ordering example	DGU	57	–	60	D	2	0	G	

DCF 77 Reception Module

reception module for DCF 77-transmitter in Braunschweig

case	thermoplastic case for wall-mounting
dimensions (lxwxd)	120 mm x 80 mm x 60 mm
enclosure code	IP 65

ordering example	DCF	–	EBG	

WEIGEL – MESSGERÄTE GmbH

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DIN EN ISO 9001
Certificate: 01 100 80407

Product Guide

L Series
720.U.001.04

Digital Bargraph Indicators, programmable

72x24
96x24
144x48

- ✓ for DC Current and Voltage, Standard Signals
- ✓ 72x24, 96x24 or 144x48 mm Bezel
- ✓ Vertical or Horizontal Display
- ✓ 20, 30, 40 or 50 Segments
- ✓ Red or Green LEDs
- ✓ One or two Bargraphs
- ✓ With or without additional 7-Segment Display
- ✓ Auxiliary Supply 115/230 V AC, 50 Hz or 24 V DC

WEIGEL

General Data

Digital Bargraph Indicators, programmable

Application

for standard applications in switchboard-, control equipment-, process control-, and machine tool industry.

for mounting in	switchboards, machine tools or mosaic grid panels (optional)
for measuring	DC current or DC voltage, standard signals
connection	direct or for use on transducer, shunt

Mechanical Data

case details	rectangular format
material of case	glass-fibre reinforced thermoplastics, black
bezel	black, mat or optionally gray varnished (similar to RAL 7037) or siliceous gray varnished (similar to RAL 7032)
terminals	screw terminal barrier strip
enclosure code	IP 50 front of case IP 20 rear of case
panel fixing	screw clamps
mask lettering	0 ... 100% standard, extra caption, custom logo or special lettering to special order
operating elements	behind removable display lens
climatic suitability	
operating temperature range	0°C ... +23°C ... +50°C
storage temperature range	–20°C ... +23°C ... +70°C
relative humidity	≤75% annual average, non-condensing

dimensions (in mm)	**LEA 20**	**LEA 23/30**
bezel	72 x 24	96 x 24
panel cutout	$68^{+0.7}$ x $22.2^{+0.3}$	$92^{+0.8}$ x $22.2^{+0.6}$
panel thickness	≤5	≤5
mounting depth	120	120
bezel height	5.2	7.5
weight approx.	0.15 kg	0.25 kg

dimensions (in mm)	**LEA/LZA 43/50**
bezel	144 x 48
panel cutout	$138^{+1.0}$ x $45^{+0.6}$
panel thickness	≤45
mounting depth	120
bezel height	8.5
weight approx.	0.6 kg

mounting in mosaic grid panels
please specify type / manufacturer of mosaic grid when ordering

options refer to last page

Short Form Data

Bargraph Indicator for DC Current and DC Voltage, programmable

LEA 20
72 x 24 mm

Bargraph
20 20 Segments
Input
A DC Current / 200 mA and DC Voltage 2 / 10 / 40 / 200 V
Auxiliary Voltage
1 24 V DC electrically insulated
Options none
Display Colour
R red
G green
Appearance
H Vertical Display
Q Horizontal Display

Electrical Data

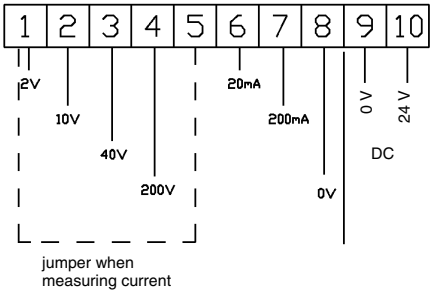
measuring ranges	input resistance
DC current	
±20 mA	100 Ω
±200 mA	10 Ω
DC voltage	
±2 V	100 kΩ
±10 V	560 kΩ
±40 V	2.2 MΩ
±200 V	10 MΩ
measuring principle	dual-slope, integrating
conversion rate	approx. 1 read per second
error, max.	±0.01% of reading ±1 count/segment
auxiliary voltage	24 V DC (20 ... 30 V), electrically insulated
power consumption	2.5 VA max.

Display

scale length	50 mm, 20 segments
display colour	red or green
appearance	vertical or horizontal display
overrange indication	each 2nd scale segment will flash
zero point/end value	programmable
scaling	0 ... 100 %

Connection

plug-in terminal barrier strip



ordering example	LEA	20	A	1	0	R	H	

Short Form Data

Bargraph Indicators for DC Current and DC Voltage, programmable

LEA 23
LEA 30
96 x 24 mm

Bargraph
23 20 Segments & 3-digit Display
30 30 Segments

Input
A DC Current 20 / 200 mA and DC Voltage 2 / 10 / 40 / 200 V

Auxiliary Voltage
1 24 V DC electrically insulated
2 115/230 V AC, 50 Hz electr. insulated

Options refer to last page

Display Colour
R red
G green

Appearance
H Vertical Display
Q Horizontal Display

Electrical Data

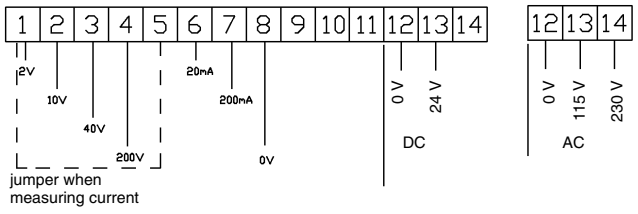
measuring ranges	input resistance
DC current	
±20 mA	100 Ω
±200 mA	10 Ω
DC voltage	
±2 V	100 kΩ
±10 V	560 kΩ
±40 V	2.2 MΩ
±200 V	10 MΩ
measuring principle	dual-slope, integrating
conversion rate	approx. 1 read per second
error, max.	±0.01% of reading, ±1 count/segment
auxiliary voltage	24 V DC (20 ... 30 V), electrically insulated or 115/230 V AC, 50 Hz, electrically insulated
power consumption	2.5 VA max.

Display

scale length	**LEA 30**	75 mm, 30 segments
	LEA 23	50 mm, 20 segments
Display	**LEA 23**	7-segment LED,
	digit height	7 mm
	display span	–99 ... 999
display colour	red or green	
appearance	vertical or horizontal display	
overrange indication	each 2nd scale segment and center segments will flash	
mean value set-up	adjustable from 1 to 500 reads	
round-off last digit	adjustable: 2nd, 5th, 10th step, none	
zero point/end value	programmable	
scaling	0 ... 100 %, caption on request	

Connection

plug-in terminal barrier strip



ordering example	LEA	30	A	2	0	G	H	–M	

Short Form Data

Bargraph Indicator for DC Current and DC Voltage, programmable

LEA 43
LEA 50
144 x 48 mm

Bargraph
43 40 Segments & 3-digit Display
50 50 Segments

Input
A DC Current 20 / 200 mA and DC Voltage 2 / 10 / 40 / 200 V

Auxiliary Voltage
1 24 V DC electrically insulated
2 115/230 V AC, 50 Hz electr. insulated

Options refer to last page

Display Colour
R red
G green

Appearance
H Vertical Display
Q Horizontal Display

Electrical Data

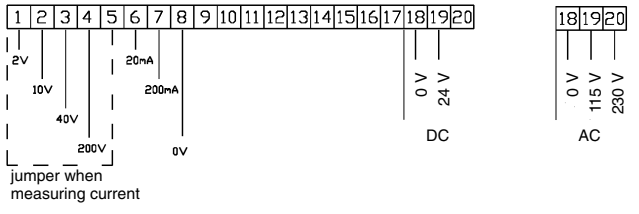
measuring ranges	input resistance
DC current	
±20 mA	100 Ω
±200 mA	10 Ω
DC voltage	
±2 V	100 kΩ
±10 V	560 kΩ
±40 V	2.2 MΩ
±200 V	10 MΩ
measuring principle	dual-slope, integrating
conversion rate	approx. 1 read per second
error, max.	±0.01% of reading, ±1 count/segment
auxiliary voltage	24 V DC (20 ... 30 V), electrically insulated or 115/230 V AC, 50 Hz, electrically insulated
power consumption	5 VA max.

Display

scale length	**LEA 50**	125 mm, 50 segments
	LEA 43	100 mm, 40 segments
Display	**LEA 43**	7-segment LED,
	digit height	7 mm
	display span	–99 ... 999
display colour	red or green	
appearance	vertical or horizontal display	
overrange indication	each 2nd scale segment and center segments will flash	
mean value set-up	adjustable from 1 to 500 reads	
zero point/end value	programmable	
scaling	0 ... 100 %, caption on request	

Connection

plug-in terminal barrier strip



ordering example	LEA	43	A	2	0	G	Q	

Short Form Data

Bargraph Indicator for DC Current, DC Voltage with 2 Inputs, programmable

LZA 43
LZA 50
144 x 48 mm

Bargraphs
43 2x 40 Segments & 2x 3-digit Display
50 2x 50 Segments

Inputs
A DC Current 20 / 200 mA and DC Voltage 2 / 10 / 40 / 200 V

Auxiliary Voltage
1 24 V DC, electrically insulated
2 115/230 V AC, 50 Hz electr. insulated

Options refer to right-side column

Display Colour
R red
G green

Appearance
H Vertical Display
Q Horizontal Display

Electrical Data

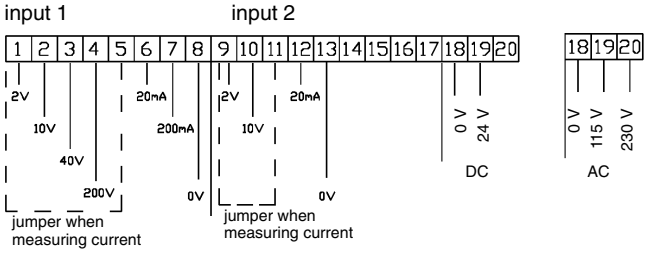
measuring ranges	input resistance	
DC current		
±20 mA	100 Ω	(input 1 & 2)
±200 mA	10 Ω	(input 1 only)
DC voltage		
±2 V	100 kΩ	(input 1 & 2)
±10 V	560 kΩ	(input 1 & 2)
±40 V	2.2 MΩ	(input 1 only)
±200 V	10 MΩ	(input 1 only)
measuring principle	dual-slope, integrating	
conversion rate	approx. 1 read per second	
error, max.	±0.01% of reading, ±1 count/segment	
auxiliary voltage	24 V DC (20 ... 30 V), electrically insulated or 115/230 V AC, 50 Hz, electrically insulated	
power consumption	5 VA max.	

Display

same as LEA 43, LEA 50 (refer to preceding page)

Connection

plug-in terminal barrier strip



ordering example	LZA	50	A	2	0	R	Q	

Options

Digital Bargraph Indicators, programmable

LEA 23
LEA 30
LEA 43
LEA 50
LZA 43
LZA 50

Options
0 **none**
1 * analog output 0 ... 10 V (load ≥1000 Ω)
2 * analog output 0/4 ... 20 mA (load ≤500 Ω)
7 * 1 control output open collector 30 V max., 0.5 A max., 12 W max.
8 2 control outputs open collector 30 V max. , 0.5 A max., 12 W max.
D * display blanking input active high, 24 V
H * display hold input active high, 24 V
R 2 setpoints relay N.O. / N.C.
S * serial output RS232
*LEA 23 / LEA 30 only

Additional Option
–M min./max. value storage (LEA 23/43, LZA 43 with reference measurement)

Options

R option

setpoints	2 relays N.O. / N.C.
LEA 23/30	max. 200V/0.05A, max. 20V/0.5A, max. 10 W
LEA/LZA 43/50	max. 250V/0.8A, max. 50V/4A, max. 200 W
response time	approx. 1 ms
hysteresis	adjustable, internal adjustment
status indication	small, single-digit 7-segment LED

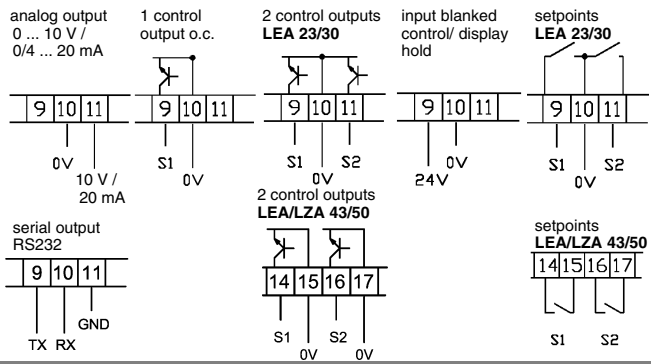
S option

RS232 serial output	baud rate (150 ... 19200 baud), parity, data bits, device address, write direction and protocol adjustable

Further options

scaling	non-standard (0 ... 100%)
extra lettering	please specify
custom logo	please specify
special measuring range	on request
factory calibration	please specify
non-standard auxiliary voltage	on request
mosaic grid mounting	on request

Connection



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– specifications subject to change without notice; date of issue 05/07 –

DIN EN ISO 9001
Certificate: 01 100 80407

Product Guide

DA Series
713.U.001.04

Digital Remote Displays, parallel, serial

48x24
48x48
72x24
72x48
96x24
96x48
144x48
144x72

- ✓ **for Parallel BCD Input**
- ✓ **for Serial Input**
  RS 232 C / V.24, 20 mA / TTY, RS 422 and RS 485
- ✓ **48x24, 48x48, 72x24, 72x48, 96x24, 96x48, 144x48 or 144x72 mm Bezel**
- ✓ **7.62 / 10 / 14 / 20 or 25 mm Digit Height**
- ✓ **Red or Green LEDs**
- ✓ **2, 3, 3½, 4, 4½, 5, 6 Digits**
- ✓ **Auxiliary Supply 5/15/24 V DC or 115/230 V AC, 50 Hz**

WEIGEL

General Data

Digital Remote Displays, parallel, serial

Application

for standard applications in switchboard-, control equipment-, process control-, and machine tool industry.

for mounting in	switchboards, machine tools or mosaic grid panels (optional)
display of	BCD or serial data
data format	digital BCD inputs parallel or multiplex, TTL 5 V or SPS 24 V, active high or active low
	digital inputs (serial) RS 232 C / V.24, 20 mA /TTY, RS 422, RS 485

Mechanical Data

case details	rectangular format
material of case	glass-fibre reinforced thermoplastics, black
bezel	black, mat or optionally gray varnished (similar to RAL 7037) or siliceous gray varnished (similar to RAL 7032)
terminals	screw terminal barrier strip
enclosure code	IP 50 front of case IP 20 rear of case
panel fixing	screw clamps
mask lettering	caption, custom logo or extra lettering to special order
operating elements	on rear side of case
climatic suitability	
operating temperature range	0°C ... +23°C ... +50°C
storage temperature range	–20°C ... +23°C ... +70°C
relative humidity	≤75% annual average, non-condensing

dimensions (in mm)	**DAP 08/10**	**...–4**	**...–7**
bezel	48 x 24	48 x 48	72 x 24
panel cutout	$45^{+0.6}$ x $22.2^{+0.3}$	$45^{+0.6}$ x $45^{+0.6}$	$68^{+0.7}$ x $22.2^{+0.3}$
panel thickness	≤5		
mounting depth	120 incl. terminal barrier strip		
bezel height	5.25		

dimensions (in mm)	**DAP/DAS 14**	**...–4**	**(2/3/4 digits)**
bezel	72 x 24	72 x 48	
panel cutout	$68^{+0.7}$ x $22.2^{+0.6}$	$68^{+0.7}$ x $45^{+0.6}$	
panel thickness	≤5		
mounting depth	120 incl. terminal barrier strip		
bezel height	5.25		

dimensions (in mm)	**DAP/DAS 14**	**...–4**	**(5/6 digits)**
bezel	96 x 24	96 x 48	
panel cutout	$92^{+0.8}$ x $22.2^{+0.6}$	$92^{+0.8}$ x $45^{+0.6}$	
panel thickness	≤5		
mounting depth	120 incl. terminal barrier strip		
bezel height	7.5		

dimensions (in mm)	**DAS 20/25**	**...–4**
bezel	144 x 48	144 x 72
panel cutout	$138^{+1.0}$ x $45^{+0.6}$	$138^{+1.0}$ x $68^{+0.7}$
panel thickness	≤45	
mounting depth	120 incl. terminal barrier strip	
bezel height	8.5	

Options

lettering, custom logo please specify

mosaic grid panel mounting, extra housing, non-standard auxiliary voltage, non-standard inputs, software, connection cable with socket connector on request, enclosure code IP 54 up to IP 65 front of case using rubber cover attachment 96x48.

additional options	on request
additional data	on request

Short Form Data

Digital Remote Displays with BCD Input

DAP 08
DAP 10

– 48 x 24 mm
–4 48 x 48 mm
–7 72 x 24 mm

Digits

30	3 digits
31	3½ digits
40	4 digits
41	4½ digits *
50	5 digits *

* DAP 08 only

Inputs

A	multiplex active high 24 V
B	multiplex active low 24 V
C	parallel active high 24 V
D	parallel active low 24 V
E	multiplex active high 5 V
F	multiplex active low 5 V
G	parallel active high 5 V
H	parallel active low 5 V

Auxiliary Voltage

1	24 V DC
3	15 V DC
4	5 V DC

Display Colour

R	red
G	green

Electrical Data

inputs	TTL 5 V or SPS 24 V, (input resistance 10 kΩ)
pulse width	2 ms min.
functional inputs	ST display test DT display blanking DP decimal point LE latch enabling
auxiliary voltage	24 DC (20 ... 30 V) or 15 DC (12.5 ... 17.5 V) or 5 DC (4.75 ... 5.25 V) electrically not insulated
power consumption	2.5 VA max.

Display

display	7-segment LED	
digit height	**DAP 08**	7.62 mm
	DAP 10	10 mm
display colour	red or green	

Connection

refer to last page

	1	2		3	4	5	6	7
ordering example	**DAP**	**08**	**–**	**30**	**D**	**1**	**G**	**–**

mounting in mosaic grid panel (all models)
please specify type / manufacturer of mosaic grid when ordering

ordering information

1	2		3	4	5	6	7
type	digit height	–	# digits	input	power supply	colour	case

Short Form Data

Digital Remote Displays with BCD Input

DAP 14

–	**72 x 24 mm**
–4	**72 x 48 mm**
–	**96 x 24 mm**
–4	**96 x 48 mm**

Digits

20	2 digits (**72x24/48**)
30	3 digits -"-
40	4 digits -"-
50	5 digits (**96x24/48**)
60	6 digits -"-

Input

A	multiplex, 24 V active high

Auxiliary Voltage

1	24 V DC

Display Colour

R	red
G	green

Electrical Data

inputs	24 V (35 V max.) active high, multiplex low: < 7 V, high: >10 V
input resistance	15 kΩ
pulse width	2 ms min.
functional inputs	ST display test DT display blanking DP decimal point LE latch enable
auxiliary voltage	24 V DC (20 ... 30 V) electrically not insulated
power consumption	2.5 VA max.

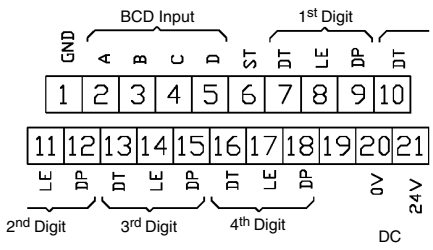
Display

display	7-segment LED
digit height	14 mm
display colour	red or green

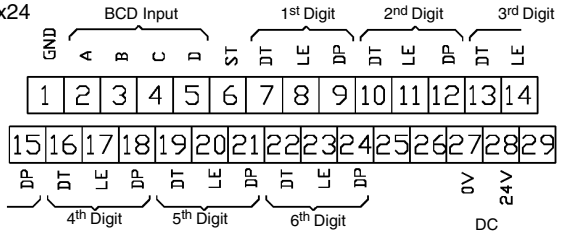
Connection

plug-in terminal barrier strip, double-row

72x24



96x24



NOTE: Close mounting on top of each other will generally not be possible due to both terminal barrier strips and cables.

	1	2		3	4	5	6	7
ordering example	**DAP**	**14**	**–**	**50**	**A**	**1**	**R**	**–4**

Short Form Data

Digital Remote Displays with Serial Input

DAS 14

–	**72 x 24 mm**
–4	**72 x 48 mm**
–	**96 x 24 mm**
–4	**96 x 48 mm**

Input

20	2 digits (**72x24/48**)
30	3 digits -"-
40	4 digits -"-
50	5 digits (**96x24/48**)
60	6 digits -"-

Input

A	RS 232 C / V.24 and 20 mA / TTY
B	RS 422
D	RS 485

Auxiliary Voltage

1	24 V DC

Display Colour

R	red
G	green

Electrical Data

inputs	RS 232 C / V.24 and 20 mA / TTY or RS 422 or RS 485
devices addresses	0 ... 9 or 00 ... 99
data transfer	1200 / 2400 / 4800 / 9600 / 19200 baud with / without parity bit, even / odd parity, 7 or 8 data bits with / without STX/ETX programmable
software functions	display test, show/hide pre-zeros, flashing characters/display, write direction left→right / right→left suppression of up to 99 characters, timout function
auxiliary voltage	24 V DC (20 ... 30 V) electrically not insulated
power consumption	2.5 VA max.

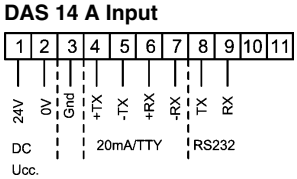
Display

display	7-segment LED
digit height	14 mm
display colour	red or green

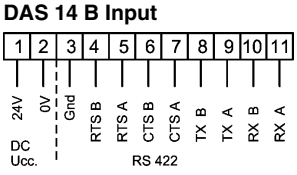
Connection

plug-in terminal barrier strip

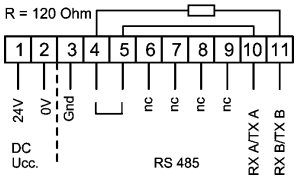
DAS 14 A Input



DAS 14 B Input



DAS 14 D Input



	1	2		3	4	5	6	7
ordering example	**DAS**	**14**	**–**	**40**	**B**	**1**	**R**	**-**

Short Form Data

Digital Remote Displays with Serial Input

DAS 20
DAS 25

– 144 x 48 mm
–4 144 x 72 mm

Digits
30 3 digits
40 4 digits
50 5 digits *
* DAS 20 only

Input
A RS 232 C / V.24 and 20 mA / TTY and RS 485

Auxiliary Voltage
1 24 V DC electrically insulated
2 115/230 V AC, 50 Hz electr. insulated

Display Colour
R red
G green

Electrical Data

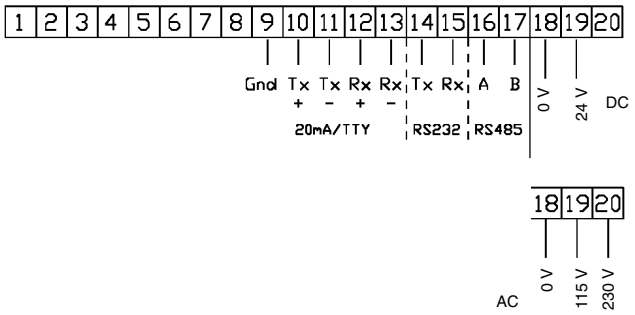
inputs	RS 232 C / V.24 and 20 mA / TTY and RS 485
device addresses	01 ... 98
data transfer	1200 / 2400 / 4800 / 9600 baud with / without parity bit, even / odd parity, 7 or 8 data bits with / without STX/ETX programmable
software functions	display test, show/hide pre-zeros, flashing characters/display, write direction left→right / right→left suppression of up to 99 characters
auxiliary voltage	24 V DC (20 ... 30 V), electrically insulated or 115/230 V AC, 50 Hz, electrically insulated
power consumption	5 VA max.

Display

display	7-segment LED	
digit height	**DAS 20**	20 mm
	DAS 25	25 mm
display colour	red or green	

Connection

plug-in terminal barrier strip



	1	2		3	4	5	6	7
ordering example	**DAS**	**20**	**–**	**40**	**A**	**1**	**R**	**–**

Short Form Data

Digital Remote Displays with BCD-Input (continued)

DAP 08
DAP 10

Connection

Sub-D Connector Pin Assignment, 26 poles

Input multiplex

1	A	BCD Input
2	B	
3	C	
4	D	
5	LE	1st Digit
6	DP	
7	LE	2nd Digit
8	DP	
9	LE	3rd Digit
10	DP	
11	LE	4th Digit
12	DP	
13	LE	5th Digit
14	DP	
15	n.c.	
16	n.c.	
17	n.c.	
18	n.c.	
19	n.c.	
20	n.c.	
21	+ V Ucc	
22	0 V Ucc/BCD	
23	ST	
24	DT	
25	n.c.	
26	n.c.	

Input parallel

1	A	1st Digit
2	B	
3	C	
4	D	
5	A	2nd Digit
6	B	
7	C	
8	D	
9	DP	
10	A	3rd Digit
11	B	
12	C	
13	D	
14	DP	
15	A	4th Digit
16	B	
17	C	
18	D	
19	DP	
20	LE	latch
21	+ V Ucc	
22	0 V Ucc/BCD	
23	ST	A (5th Digit*)
24	DT	B (5th Digit*)
25	n.c.	C (5th Digit*)
26	n.c.	D (5th Digit*)

*DAP 08 only

Accessories

connector plug with cover
cable 1 m with plug
cable 2 m with plug
cable 3 m with plug

– specifications subject to change without notice; date of issue 04/07 –

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DIN EN ISO 9001
Certificate: 01 100 80407

Product Guide

DP Series
712.U.001.04

Digital Panel Meters, programmable

48x24
48x48
72x24
96x24
96x48
96x96
144x48
144x72

- ✓ **for DC Current and Voltage**
- ✓ **for AC Current and Voltage**
- ✓ **for Standard Signals**
- ✓ **for Temperature (RTD Pt 100, Pt 1000)**
- ✓ **48x24, 48x48, 72x24, 96x24, 96x48, 96x96, 144x72 or 144x48 mm Bezel**
- ✓ **7.62 / 10 / 14 / 20 or 25 mm Digit Height**
- ✓ **Red or Green LEDs**
- ✓ **3, 3½, 4, 4½ or 5 Digits**
- ✓ **Auxiliary Supply AC 115/230 V, 50 Hz or DC 24 V**

CE

WEIGEL

General Data

Digital Panel Meters, programmable

Application

for standard applications in switchboard-, control equipment-, process control-, and machine tool industry.

for mounting in	switchboards, machine tools or mosaic grid panels (optional)
for measuring	DC current or DC voltage, AC current or AC voltage TRMS, standard signals, temperature
connection	analog inputs direct or for use on transducer, shunt, transformer

Mechanical Data

case details	rectangular format
material of case	glass-fibre reinforced thermoplastics, black
bezel	black, mat or optionally gray varnished (similar to RAL 7037) or siliceous gray (similar to RAL 7032)
terminals	screw terminal barrier strip
enclosure code	IP 50 front operating elements are accessible behind removable display lens. IP 20 front operating elements are passed through front mask IP 20 rear of case
panel fixing	screw clamps
mask lettering	caption, custom logo or extra lettering to special order
operating elements	behind removable display lens; on top side for meter DPA 08/10
climatic suitability	
operating temperature range	0°C ... +23°C ... +50°C
storage temperature range	–20°C ... +23°C ... +70°C
relative humidity	≤75% annual average, non-condensing

dimensions (in mm)	**DPA 08/10**	**...–4**	**...–7**
bezel	48 x 24	48 x 48	72 x 24
panel cutout	$45^{+0.6} \times 22.2^{+0.3}$	$45^{+0.6} \times 45^{+0.6}$	$68^{+0.7} \times 22.2^{+0.3}$
panel thickness	≤5		
mounting depth	120 incl. terminal barrier strip		
bezel height	5.25		

dimensions (in mm)	**DPA 14**	**...–4**	**...–9**
bezel	96 x 24	96 x 48	96 x 96
panel cutout	$92^{+0.8} \times 22.2^{+0.6}$	$92^{+0.8} \times 45^{+0.6}$	$92^{+0.8} \times 92^{+0.8}$
panel thickness	≤5		
mounting depth	120 incl. terminal barrier strip		
bezel height	7.5		

dimensions (in mm)	**DPA 20/25**	**...–4**
bezel	144 x 48	144 x 72
panel cutout	$138^{+1.0} \times 45^{+0.6}$	$138^{+1.0} \times 68^{+0.7}$
panel thickness	≤45	
mounting depth	120 incl. terminal barrier strip	
bezel height	8.5	

mounting in mosaic grid panels	**please specify type/manufacturer of mosaic grid when ordering**
options	refer to last page
additional data	on request

ordering information

1	2		3	4	5	6	7	8	9
type	digit height	–	digits	input	power supply	option	colour	case	min/max

Short Form Data

Digital Panel Meters, for Standard Signals

DPA 08
DPA 10

Input E
Input D

– 48 x 24 mm
–4 48 x 48 mm
–7 72 x 24 mm

Digits			Display Span
30	3	digits	–199 ... 999
31	3½	digits	–1999 ... +1999
40	4	digits	–1999 ... 9999
41	4½	digits *	–19999 ... +19999
50	5	digits *	–19999 ... 30000

*DPA 08 only

Input

E	DC Current –19 ... 20 mA and DC Voltage –10 ... 10 V
D	DC Voltage 0 ... 60 – 150 mV

Auxiliary Voltage

1	24 V DC electrically insulated

Options

0	none
F	Action Input: Display Dark/Hold/ON/OFF/HELP, Segment Test

Display Colour

R	red
G	green

Electrical Data

measuring range	
DC current	input resistance
0/4 ... 20 mA	100 Ω
DC voltage	input resistance
0 ... ±10 V	220 kΩ
0 ... ±60 – 150 mV	470 kΩ
measuring principle	dual-slope integration
conversion rate	approx. 1 read per second
error, max.	±0.01% of reading, ±1 count
overrange indication	center segments will flash
auxiliary voltage	DC 24 V (20 ... 30 V), electrically insulated
power consumption	2.5 VA max.

Display

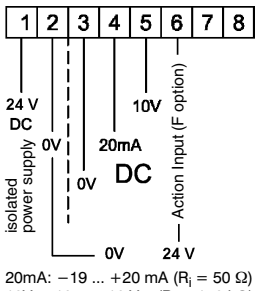
display	7-segment LED	
digit height	**DPA 08**	7.62 mm
	DPA 10	10 mm
display span	see above	
display colour	red or green	
overrange indication	center segments will flash	
mean value set-up	adjustable from 1 up to 99 readings	

zero point, end value, polarity sign and decimal point programmable

Connection

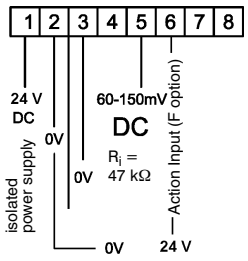
plug-in terminal barrier strip

E input



20mA: –19 ... +20 mA (R_i = 50 Ω)
10V: –10 ... +10 V (R_i = 150 kΩ)

D input



	1	2		3	4	5	6	7	8
ordering example	**DPA**	**08**	**–**	**30**	**E**	**1**	**0**	**G**	**–**

Short Form Data

Digital Panel Meters for DC Current and DC Voltage (mA / V)

DPA 14

Input A

–	**96 x 24 mm**
–4	**96 x 48 mm**
–9	**96 x 96 mm**

Digits		Display Span
30	3 digits	–199 ... 999
31	3½ digits	–1999 ... +1999
40	4 digits	–1999 ... 9999
41	4½ digits	–19999 ... +19999
50	5 digits	–19999 ... 30000

Input

A DC Current 20 / 200 mA and DC Voltage 2 / 10 / 40 / 200 V

Auxiliary Voltage

1 24 V DC electr. insulated

2 115/230 V AC, 50 Hz electr. insulated

Options refer to last page

Display Colour

R red

G green

Electrical Data

measuring ranges	input resistance
DC current	
±20 mA	100 Ω
±200 mA	10 Ω
DC voltage	
±2 V	100 kΩ
±10 V	560 kΩ
±40 V	2.2 MΩ
±200 V	12 MΩ
measuring principle	dual-slope integration
conversion rate	approx. 1 read per second
error, max.	±0.01% of reading, ±1 count
auxiliary voltage	DC 24 V (20 ... 30 V), electrically insulated or AC 115/230 V, 50 Hz, electrically insulated
power consumption	3 VA max.

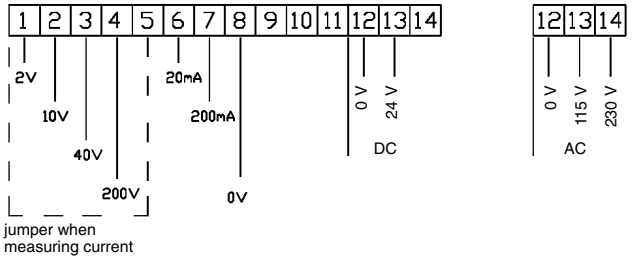
Display

display	7-segment LED
digit height	14 mm
display span	see above
display colour	red or green
display	standard or reciprocal
overrange indication	center segments will flash
mean value set-up	adjustable from 1 up to 500 readings
round-off last digit	adjustable: 2nd, 5th, 10th steps, none

zero point, end value, polarity sign and decimal point programmable

Connection

plug-in terminal barrier strip



	1	2		3	4	5	6	7	8	9
ordering example	**DPA**	**14**	**–**	**40**	**A**	**2**	**0**	**G**	**–4**	**–M**

Short Form Data

Digital Panel Meters for DC Current and DC Voltage (µA / mV)

DPA 14

Input D

–	**96 x 24 mm**
–4	**96 x 48 mm**
–9	**96 x 96 mm**

Digits		Display Span
30	3 digits	–199 ... 999
31	3½ digits	–1999 ... +1999
40	4 digits	–1999 ... 9999
41	4½ digits	–19999 ... +19999
50	5 digits	–19999 ... 30000

Input

D DC Current 100 µA / 1 mA and DC Voltage 60 / 125 / 150 / 300 mV

Auxiliary Voltage

1 24 V DC electr. insulated

2 115/230 V AC, 50 Hz electr. insulated

Options refer to last page

Display Color

R red

G green

Electrical Data

measuring ranges	input resistance
DC current	
±100 µA	560 Ω
±1 mA	68 Ω
DC voltage	
±60 mV	100 kΩ
±125 mV	220 kΩ
±150 mV	270 kΩ
±300 mV	560 kΩ
measuring principle	dual-slope integration
conversion rate	approx. 1 read per second
error, max.	±0.01% of reading, ±1 count
auxiliary voltage	DC 24 V (20 ... 30 V), electrically insulated or AC 115/230 V, 50 Hz, electrically insulated
power consumption	3 VA max.

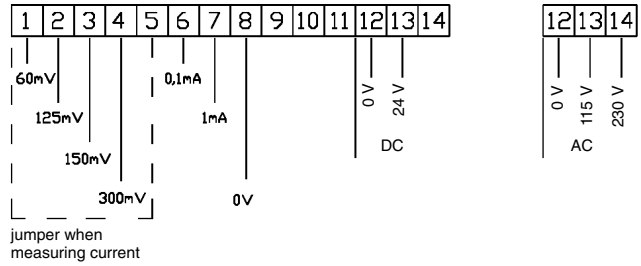
Display

display	7-segment LED
digit height	14 mm
display span	see above
display colour	red or green
display	standard or reciprocal
overrange indication	center segments will flash
mean value set-up	adjustable from 1 up to 500 readings
round-off last digit	adjustable: 2nd, 5th, 10th steps, none

zero point, end value, polarity sign and decimal point programmable

Connection

plug-in terminal barrier strip



	1	2		3	4	5	6	7	8	9
ordering example	**DPA**	**14**	**–**	**41**	**D**	**1**	**0**	**R**	**-**	**–M**

Short Form Data

Digital Panel Meters for DC Current and DC Voltage (mA / V), 2 Inputs

DPA 14

Input B

–	**96 x 24 mm**
–4	**96 x 48 mm**
–9	**96 x 96 mm**

		Display Span
Digits		
30	3 digits	–199 ... 999
40	4 digits	–1999 ... 9999
50	5 digits	–19999 ... 30000

Input

B 2x DC Current 20 mA and DC Voltage 10 V

Auxiliary Voltage

1 24 V DC electr. insulated
2 115/230 V AC, 50 Hz electr. insulated

Option

0 none

Display Colour

R red
G green

Electrical Data

measuring ranges	input resistance
2x DC current	
±20 mA	100 Ω
2x DC voltage	
±10 V	560 kΩ
change over	24 V DC (opto-coupler)
measuring principle	dual-slope integration
conversion rate	approx. 1 read per second
error, max.	±0.01% of reading, ±1 count
auxiliary voltage	DC 24 V (20 ... 30 V), electrically insulated or AC 115/230 V, 50 Hz, electrically insulated
power consumption	3 VA max.

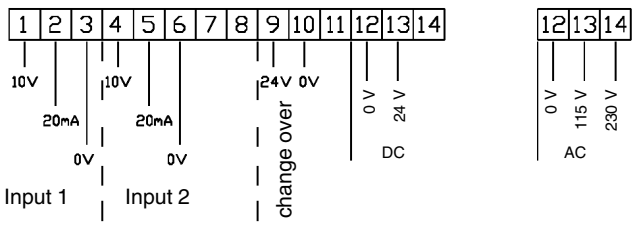
Display

display	7-segment LED
digit height	14 mm
display span	see above
display colour	red or green
display	standard or reciprocal
overrange indication	center segments will flash
wire-break detection	programmable for downscale detection
mean value set-up	adjustable from 1 up to 500 readings
round-off last digit	adjustable: 2nd, 5th, 10th steps, none

zero point, end value, polarity sign and decimal point programmable

Connection

plug-in terminal barrier strip



	1	2		3	4	5	6	7	8
ordering example	**DPA**	**14**	**–**	**50**	**B**	**2**	**0**	**G**	**–4**

Short Form Data

Digital Panel Meters for AC Current and AC Voltage TRMS

DPA 14

Input F

–	**96 x 24 mm**
–4	**96 x 48 mm**
–9	**96 x 96 mm**

		Display Span
Digits		
30	3 digits	0 ... 999
40	4 digits	0 ... 9999
50	5 digits	0 ... 20000

Input

F AC Current 3 / 6 A and AC Voltage 2 / 100 / 250 / 500 V

Auxiliary Voltage

1 24 V DC electr. insulated
2 115/230 V AC, 50 Hz electr. insulated

Options refer to last page

Display Colour

R red
G green

Electrical Data

measuring ranges	input resistance
AC current	
3 A	20 mΩ
6 A	10 mΩ
AC voltage	
2 V	10 kΩ
100 V	470 kΩ
250 V	1 MΩ
500 V	2.2 MΩ
measuring principle	dual-slope integration, true RMS
conversion rate	approx. 1 read per second
error, max.	±0.2% of reading, ±1 count
auxiliary voltage	DC 24 V (20 ... 30 V), electrically insulated or AC 115/230 V, 50 Hz, electrically insulated
power consumption	3 VA max.

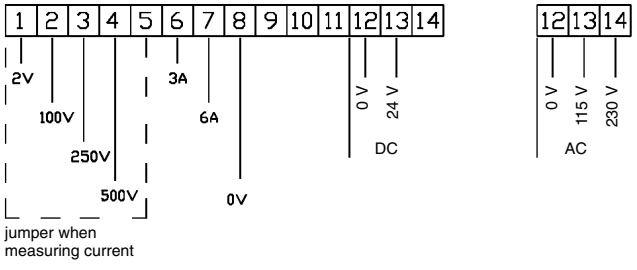
Display

display	7-segment LED
digit height	14 mm
display span	see above
display colour	red or green
display	standard or reciprocal
overrange indication	center segments will flash
mean value set-up	adjustable from 1 up to 500 readings
round-off last digit	adjustable: 2nd, 5th, 10th steps, none

zero point, end value and decimal point programmable

Connection

plug-in terminal barrier strip



	1	2		3	4	5	6	7	8	9
ordering example	**DPA**	**14**	**–**	**30**	**F**	**2**	**0**	**G**	**–4**	**–**

Short Form Data

Digital Panel Meters for Temperature Pt 100 / Pt 1000

DPA 14

Input M
Input L

–	**96 x 24 mm**
–4	**96 x 48 mm**
–9	**96 x 96 mm**

Digits		Display Span
31	3½ digits	–100.0 ... +199.9 °C –200 ... +800 °C –148 ... +392 °F –328 ... +1472 °F

Input
M for RTD Pt 100 Input
L for RTD Pt 1000 Input

Auxiliary Voltage
1 24 V DC electr. insulated
2 115/230 V AC, 50 Hz electr. insulated

Options refer to last page

Display Colour
R red
G green

Electrical Data

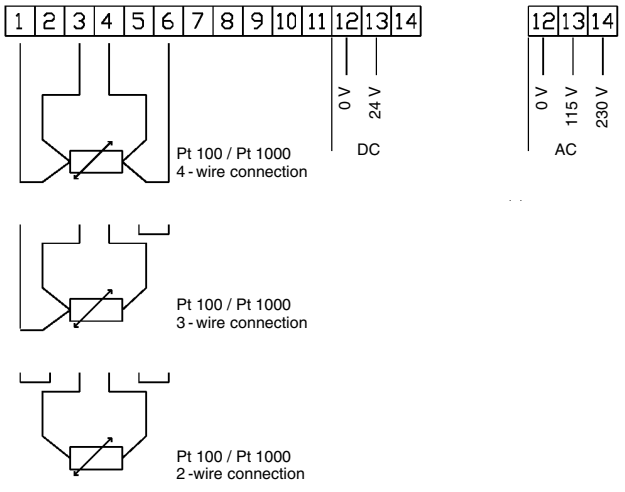
measuring ranges	for RTD input — resolution –100.0...+199.9°C/–148...+392°F ±0.1 K –200...+800°C/–328...+1472°F ±1 K
measuring principle	dual-slope integration
conversion rate	approx. 1 read per second
error, max.	±0.01% of reading, ±1 count
auxiliary voltage	DC 24 V (20 ... 30 V), electr. insulated or AC 115/230 V, 50 Hz, electr. insulated
power consumption	3 VA max.

Display

display	7-segment LED
digit height	14 mm
display span	see above
display colour	red or green
overrange indication	center segments will flash
zero adjustment	possible

Connection

plug-in terminal barrier strip



	1	2		3	4	5	6	7	8	9
ordering example	**DPA**	**14**	**–**	**31**	**M**	**2**	**0**	**G**	**–4**	**–M**

Short Form Data

Digital Panel Meters for DC Current and DC Voltage

DPA 20
DPA 25

Input A

–	**144 x 48 mm**
–4	**144 x 72 mm**

Digits		Display Span
30	3 digits	–199 ... 999
31	3½ digits	–1999 ... +1999
40	4 digits	–1999 ... 9999
41	4½ digits *	–19999 ... +19999
50	5 digits *	–19999 ... 30000

* DPA 20 only

Input
A DC Current 20 / 200 mA and
DC Voltage 2 / 10 / 40 / 200 V

Auxiliary Voltage
1 24 V DC electr. insulated
2 115/230 V AC, 50 Hz electr. insulated

Options refer to last page

Display Colour
R red
G green

Electrical Data

measuring ranges	input resistance
DC current	
±20 mA	100 Ω
±200 mA	10 Ω
DC voltage	
±2 V	100 kΩ
±10 V	560 kΩ
±40 V	2.2 MΩ
±200 V	10 MΩ
measuring principle	dual-slope integration
conversion rate	approx. 1 read per second
error, max.	±0.01% of reading, ±1 count
auxiliary voltage	DC 24 V (20 ... 30 V), electr. insulated or AC 115/230 V, 50 Hz, electr. insulated
power consumption	5 VA max.

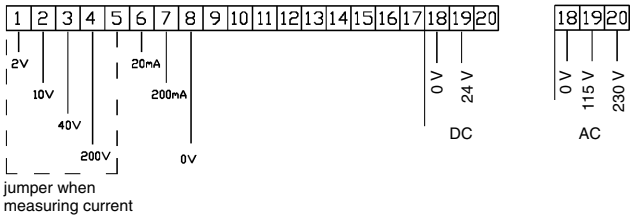
Display

display	7-segment LED	
digit height	**DPA 20**	20 mm
	DPA 25	25 mm
display span	see above	
display colour	red or green	
overrange indication	center segments will flash	
mean value set-up	adjustable from 1 up to 500 readings	

zero point, end value, polarity sign and decimal point programmable

Connection

plug-in terminal barrier strip



	1	2		3	4	5	6	7	8
ordering example	**DPA**	**20**	**–**	**31**	**A**	**1**	**0**	**G**	**–**

Short Form Data

Digital Panel Meters for AC Current / AC Voltage TRMS

DPA 20
DPA 25

Input F
– 144 x 48 mm
–4 144 x 72 mm

	Digits	Display Span
30	3 digits	0 ... 999
40	4 digits	0 ... 9999
50	5 digits *	0 ... 20000

* DPA 20 only

Input
F AC Current 3 / 6 A and AC Voltage 2 / 100 / 250 / 500 V

Auxiliary Voltage
1 24 V DC electr. insulated
2 115/230 V AC, 50 Hz electr. insulated

Options refer to right-side column

Display Colour
R red
G green

Electrical Data

measuring ranges	input resistance
AC current	
3 A	20 mΩ
6 A	10 mΩ
AC voltage	
2 V	10 kΩ
100 V	470 kΩ
250 V	1 MΩ
500 V	2.2 MΩ
measuring principle	dual-slope integration, true RMS
conversion rate	approx. 1 read per second
error, max.	±0.2% of reading, ±1 count
auxiliary voltage	DC 24 V (20 ... 30 V), electrically insulated or AC 115/230 V, 50 Hz, electrically insulated
power consumption	5 VA max.

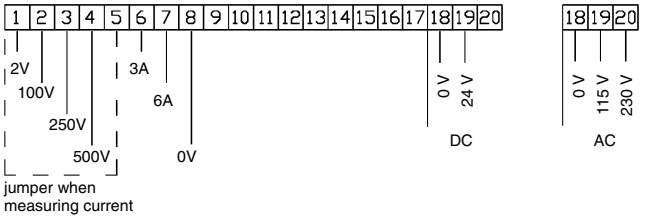
Display

display	7-segment LED	
digit height	**DPA 20**	20 mm
	DPA 25	25 mm
display span	see above	
display colour	red or green	
overrange indication	center segments will flash	
mean value set-up	adjustable from 1 up to 500 readings	

zero point, end value and decimal point programmable

Connection

plug-in terminal barrier strip



	1	2		3	4	5	6	7	8
ordering example	**DPA**	**25**	**–**	**40**	**F**	**2**	**0**	**G**	**–4**

Options

Digital Panel Meters, programmable

DPA 14
DPA 20
DPA 25

Input A/E
Input D
Input F
Input L
Input M

Options
0 none
1 * Analog Output 0 ... 10 V (load ≥1000 Ω)
2 * Analog Output 0/4 ... 20 mA (load ≤500 Ω)
4 * like 1, galvanically isolated
7 * 1 Control Output, open collector max. 30 V, max. 0.5 A, max. 12 W
8 * 2 Control Outputs, open collector max. 30 V, max. 0.5 A, max. 12 W
D * Input Blanked Control active high, 24 V
G * Segment Test Input
H * Display Hold Input active high, 24 V
R 2 Setpoints Relay N.O./N.C.
S * Rerial Output RS232

Additional Option
–M * Min./Max. Value Storage

* DPA 14 only (not with B input)

Extras

R option

setpoints		2 relays N.O./N.C.
capacity limit	**DPA 14**	max. 200 V, max. 0.5 A, max. 10 W
	DPA 20/25	max. 250 V, max. 4 A, max. 200 W
response time		approx. 1 ms
hysteresis		adjustable, internal adjustment
status indication		small, single-digit 7-segment LED

S option

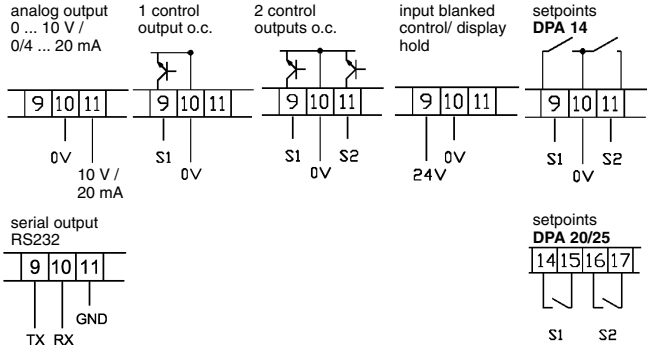
RS232 serial output	baud rate (150 ... 19200 baud), parity, data bits, device address, write direction and protocol adjustable

Further options

caption	please specify
extra lettering	please specify
logo on the lens	please specify
factory calibration	please specify

special measuring range on request
non-standard auxiliary voltage on request
enclosure code IP 54 to IP 65 front using rubber cover attachment 96x48

Connection



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– specifications subject to change without notice; date of issue 03/07 –

DIN EN ISO 9001
Certificate: 01 100 80407

Product Guide

DM Series
711.U.001.03

Digital Panel Meters, Standard

96x48
96x96

- ✓ **for DC Current and Voltage**
- ✓ **for AC Current and Voltage**
- ✓ **for Standard Signals**
- ✓ **96x48 mm or 96x96 mm Bezel**
- ✓ **14 mm Digit Height**
- ✓ **Red or Green LEDs**
- ✓ **3½ Digits**
- ✓ **Auxiliary Supply AC 115/230 V, 50 Hz**

WEIGEL

General Data

Digital Panel Meters, Standard

Application

for standard applications in switchboard-, control equipment-, process control-, and machine tool industry.

for mounting in	switchboards, machine tools or mosaic grid panels (optional)
for measuring	DC current or DC voltage, AC current or AC voltage
connection	direct or for use on transducer, shunt, transformer

Mechanical Data

case details	rectangular format
material of case	glass-fibre reinforced thermoplastics, black
bezel	black, mat or optionally gray varnished (similar to RAL 7037) or siliceous gray (similar to RAL 7032)
terminals	screw terminal barrier strip
enclosure code	IP 50 front IP 20 rear of case
panel fixing	screw clamps
mask lettering	caption, custom logo or extra lettering to special order
operating elements	behind removable display lens; for model DMA 14 – 31A20R – S3 on rear side
climatic suitability	
operating temperature range	0°C ... +23°C ... +50°C
storage temperature range	–20°C ... +23°C ... +70°C
relative humidity	≤75% annual average, non-condensing

dimensions (in mm)	**DMA 14**	**DMA 14 ... –9**
bezel	96 x 48	96 x 96
panel cutout	$92^{+0.8}$ x $45.0^{+0.6}$	$92^{+0.8}$ x $92^{+0.8}$
panel thickness	≤45	≤45
mounting depth	120	120
bezel height	8	8

Options

caption	please specify
extra lettering	please specify
logo on the lens	please specify
special measuring range	on request
factory calibration	please specify
non-standard auxiliary voltage	on request
enclosure code	IP 54 up to IP 65 meter front using rubber cover attachment 96x48
mounting in mosaic grid panels	**please specify type/manufacturer of mosaic grid when ordering.**

additional options	on request
additional data	on request

Survey

Digital Panel Meters, Standard

DMA 14

Input A
Input D
Input E
Input C
Input F

– 96 x 48 mm
–9 96 x 96 mm

Input

A – S1	DC Current 20 / 200 mA and DC Voltage 2 / 10 / 40 / 200 V
D – S1	DC Voltage 60 / 125 / 150 / 300 mV
E – S1	DC Current 20 / 200 mA and DC Voltage 2 / 10 / 40 / 200 V zero shifting
C – S1	DC Current 0/4 ... 20 mA and DC Voltage 0 ... 10 V
F – S	AC Current 3 / 6 A and AC Voltage 2 / 100 / 250 / 500 V
A – S3	DC Voltage 0 ... 20 V unipolar

Display Colour

R	red
G	green

Case

–	96 mm x 48 mm
–9	96 mm x 96 mm

Measuring Ranges	Type				Input		Colour		Case
mA / V =	**DMA**	**14**	**–**	**31**	**A**	**20**	**RG**	**–S1**	**– –9**
mV =	**DMA**	**14**	**–**	**31**	**D**	**20**	**RG**	**–S1**	**– –9**
mA / V = zero point	**DMA**	**14**	**–**	**31**	**E**	**20**	**RG**	**–S1**	**– –9**
standard signal	**DMA**	**14**	**–**	**31**	**C**	**20**	**RG**	**–S1**	**– –9**
A / V ~	**DMA**	**14**	**–**	**31**	**F**	**20**	**RG**	**–S**	**– –9**
20 V=	**DMA**	**14**	**–**	**31**	**A**	**20**	**RG**	**–S3**	**– –9**

Short Form Data

Digital Panel Meters for DC Current and DC Voltage (mA, V / mV)

DMA 14

Input A
Input D

– 96 x 48 mm
–9 96 x 96 mm

Digits
31 3½ digits

Input
A DC Current 20 / 200 mA and DC Voltage 2 / 10 / 40 / 200 V
D DC Voltage 60 / 125 / 150 / 300 mV

Auxiliary Voltage
20 115/230 V AC, 50 Hz electr. insulated

Display Colour, Case
please refer to **Survey**

Variant
–S1 adjustment by potentiometer and jumper behind display lens.

Electrical Data

measuring ranges

A input	input resistance	**D input**	input resistance
DC current		DC voltage	
±20 mA	110 Ω		
±200 mA	10 Ω		
DC Voltage			
±2 V	60 kΩ	±60 mV	60 kΩ
±10 V	270 kΩ	±125 mV	140 kΩ
±40 V	1 MΩ	±150 mV	160 kΩ
±200 V	4.7 MΩ	±300 mV	330 kΩ

measuring principle	dual-slope integration
conversion rate	approx. 1 read per second
error, max.	±0.1% of reading, ±1 count
auxiliary voltage	AC 115/230 V, 50 Hz, electrically insulated
power consumption	4 VA max.

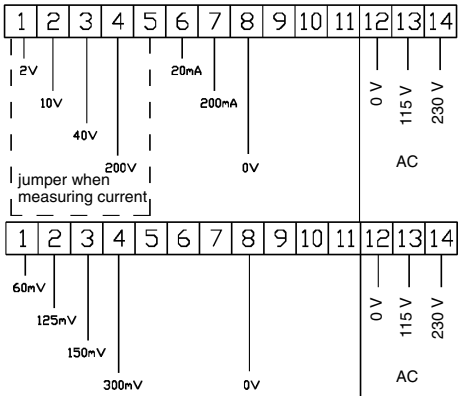
Display

display	7-segment LED, 14 mm
display span	–1999 ... +1999 counts
zero point	for **input A** fixed for **input D** programmable from –50 up to +50
end value	programmable
polarity sign	only – or ± programmable
decimal point	programmable
blanked display	programmable for 1st digit (right-side)
overrange indication	polarity display will flash, remaining numeric segments blanked

Connection

plug-in terminal barrier strip

input A



input D

ordering example	DMA	14	–	31	A	20	R	–S1	–

Short Form Data

Digital Panel Meters for DC Current and DC Voltage Zero Point Shifting

DMA 14

Input E
Input C

– 96 x 48 mm
–9 96 x 96 mm

Digits
31 3½ digits

Input
E DC Current 20 / 200 mA and DC Voltage 2 / 10 / 40 / 200 V
C DC Current 0/4 ... 20 mA and DC Voltage 0 ... 10 V

Auxiliary Voltage
20 115/230 V AC, 50 Hz electr. insulated

Display Colour, Case
please refer to **Survey**

Variant
–S1 adjustment by potentiometer and jumper behind display lens.

Electrical Data

measuring ranges

E input	input resistance	**C input**	input resistance
DC current		DC current	
±20 mA	110 Ω	0/4 ... 20 mA	100 Ω
±200 mA	10 Ω		
DC voltage		DC voltage	
±2 V	160 kΩ	0 ... 10 V	160 kΩ
±10 V	740 kΩ		
±40 V	2.2 MΩ		
±200 V	12 MΩ		

zero point	for **C input** programmable from 2 up to 6 mA
measuring principle	dual-slope integration
conversion rate	approx. 1 read per second
error, max.	±0.1% of reading, ±1 count
auxiliary voltage	AC 115/230 V, 50 Hz, electrically insulated
power consumption	4 VA max.

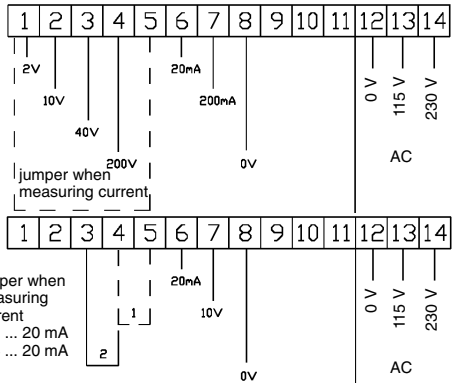
Display

display	7-segment LED, 14 mm
display span	–1999 ... +1999 counts
zero point	for **input E** programmable from –500 up to +500
end value	programmable
polarity sign	only – or ± programmable
decimal point	programmable
blanked display	programmable for 1st digit (right-side)
overrange indication	polarity display will flash, remaining numeric segments blanked

Connection

plug-in terminal barrier strip

input E



input C

ordering example	DMA	14	–	31	C	20	R	–S1	–9

Short Form Data

Digital Panel Meters for AC Current/Voltage, TRMS

DMA 14

Input F

– 96 x 48 mm
–9 96 x 96 mm

Digits
31 3½ digits

Input
F AC current 3 / 6 A and AC voltage 2 / 100 / 250 / 500 V

Auxiliary Voltage
20 230 V AC, 50 Hz electrically insulated

Display Colour, Case
please refer to **Survey**

Variant
–S adjustment by potentiometer and jumper behind display lens.

Electrical Data

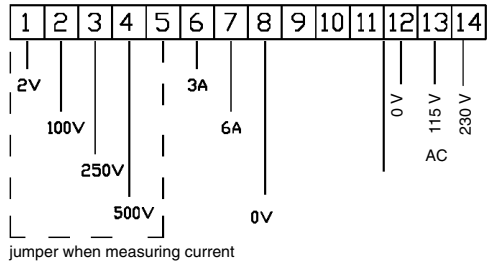
measuring ranges	input resistance
AC current	
3 A	20 mΩ
6 A	10 mΩ
AC voltage	
2 V	5 kΩ
100 V	270 kΩ
250 V	680 kΩ
500 V	1.3 MΩ
measuring principle	dual-slope integration, true RMS
conversion rate	approx. 1 read per second
error, max.	±0.2% of reading, ±1 count
auxiliary voltage	AC 115/230 V, 50 Hz, electrically insulated
power consumption	4 VA max.

Display

display	7-segment LED, 14 mm
display span	0 ... 1999 counts
zero point	programmable from 0 up to 20
end value	programmable
polarity sign	none
decimal point	programmable
blanked display	programmable for 1st digit (right-side)
overrange indication	polarity display will flash, remaining numeric segments blanked

Connection

plug-in terminal barrier strip



ordering example	DMA	14	–	31	F	20	R	–S	–

Short Form Data

Digital Panel Meters for DC Voltage (20V) Rear Potentiometer

DMA 14

Input A

– 96 x 48 mm
–9 96 x 96 mm

Digits
31 3½ digits

Input
A DC Voltage 0 ... 20 V unipolar

Auxiliary Voltage
20 230 V AC, 50 Hz electrically insulated

Display Colour, Case
please refer to **Survey**

Variant
–S3 adjustment by potentiometer on meter rear side

Electrical Data

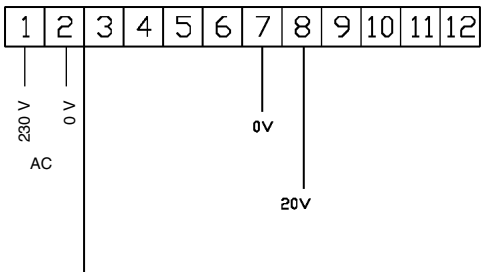
measuring ranges	
DC voltage	input resistance
20 V	530 kΩ
measuring principle	dual-slope integration
conversion rate	approx. 1 read per second
error, max.	±0.1% of reading, ±1 count
auxiliary voltage	AC 230 V, 50 Hz, electrically insulated
power consumption	4 VA max.

Display

display	7-segment LED, 14 mm
display span	0 ... 1999 counts
zero point	fixed
end value	programmable
polarity sign	none
decimal point	programmable
blanked display	programmable for 1st digit (right-side)
overrange indication	polarity display will flash, remaining numeric segments blanked

Connection

plug-in terminal barrier strip



ordering example	DMA	14	–	31	A	20	R	–S3	–9

WEIGEL – MESSGERÄTE GmbH

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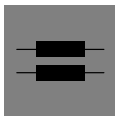
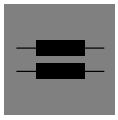
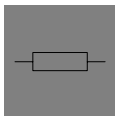
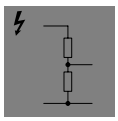
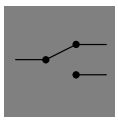
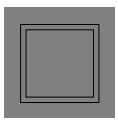
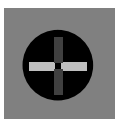
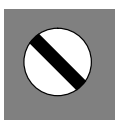
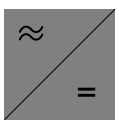
– specifications subject to change without notice; date of issue 01/07 –

DIN EN ISO 9001
Certificate: 01 100 80407

Product Guide

900.U.001.07

Meter Accessories

ASK **WSK**		**Window Type CT's and** **Wound Primary Type CT's**
KBU		**Split Core Current** **Transformers**
RH **HH**		**Insolating Spacers**
mV		**Shunts**
kV		**Voltage Dividers**
V **AU**		**Rotary Cam Switches**
AR **BA**		**Cover Frames** **Blind Covers**
Q		**Terminal Safety Protection**
SUS		**LED Type** **Switch Position Indicators**
PI **PIR**		**Electromechanical** **Switch Position Indicators**
SM **U**		**PLC Fault Annunciators** **Quartz Panel Watches**
NT		**DIN Rail Power Supplies**

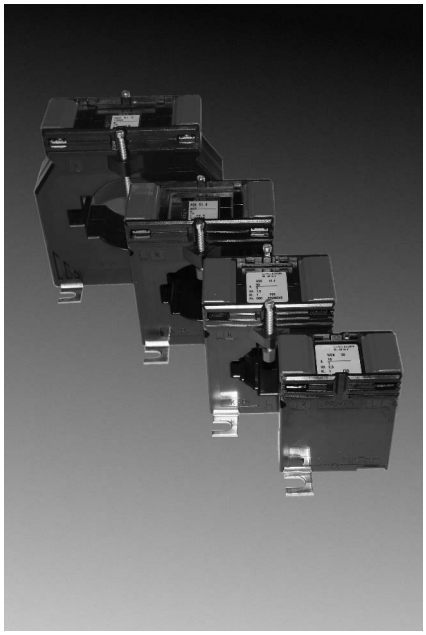
CE

WEIGEL

Short Form Data

Window Type and Wound Primary Type Current Transformers

ASK 421.4
ASK 31.3
ASK 41.4
ASK 51.4
ASK 561.4
ASK 81.4
ASK 101.4
WSK 30
WSK 40



Application

Window type CT's (**ASK**) are mounted on busbars and are suitable for primary currents from 30 A to 2500 A.

Wound primary CT's (**WSK**) have a primary winding for lower primary currents from 1 A to 30 A.

General Technical Data

standards	DIN 42 600-2, DIN EN 60 715, DIN EN 60044-1, VDE 0414-44-1, VBG 4
material of case	polycarbonate, flame retardant, self–extinguishing
mounting or optionally on ASK ASK31.3/41.4, WSK30/40	push-in fixing feet, busbar clamps or clamping attachment to 35 mm DIN rail
terminals	secondary terminals nickel-plated, with plus/minus combination screws M5x10, integrated terminal cover

Window Type CT's	Primary Current Ratings	Width of CT
ASK 421.4	30 – 500 A	71 mm
ASK 31.3	50 – 750 A	61 mm
ASK 41.4	50 – 1,000 A	71 mm
ASK 51.4	100 – 1,250 A	86 mm
ASK 561.4	200 – 1,250 A	86 mm
ASK 81.4	400 – 2,000 A	120 mm
ASK 101.4	500 – 2,500 A	130 mm
Wound Primary CT's	Primary Current Ratings	Width of CT
WSK 30	1 – 20 A	61 mm
WSK 40	1 – 30 A	71 mm

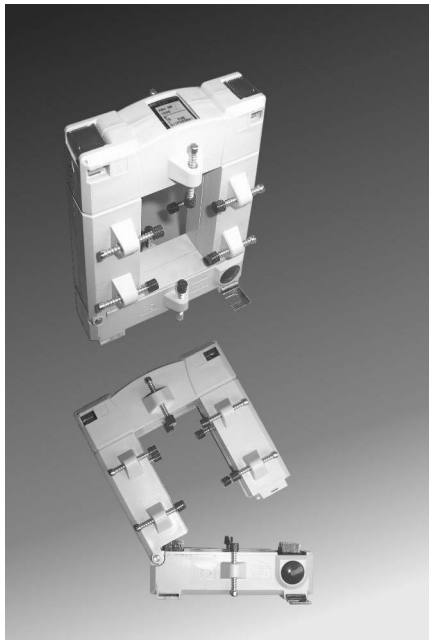
rated primary current	1; 2.5; 5; 10; 15; 20; 25; 30; 40; 50; 60; 75; 80; 100 A and any decimal multiple up to 2500 A as well as 1200; 1250; 1600 and 1800 A
rated secondary current	1 A or 5 A
rated output	1; 1.25; 1.5; 2.5; 3.75; 5; 7.5; 10; 15; 30; 45 VA
frequency range	50 ... 60 Hz, $16^2/_3$ Hz or 400 Hz on request
accuracy	classes 0.5 or 1
Special CT's	summation, saturation, protective or tube type CT's, special CT's suitable for H.R.C. fuse carriers or secondary switchable C.T's; calibratable or calibrated C.T's, with accuracy classes 0.2; 0.5 and 0.5s on request

additional data	refer to Data Sheet No. 500.D.001.##
prices	refer to Price Sheet No. 555 – 563.P.001.##

Short Form Data

Split Core Current Transformers

KBU 23
KBU 58
KBU 812
KBU 816



Application

The **KBU** split core current transformers can be attached subsequently to live wires.

The integrated **KBU** locking system allows simple mounting of the CT via snap-in. By pressing a button the CT can be removed easily.

General Technical Data

standards	DIN 42 600-2, DIN EN 60044-1, VDE 0414-44-1, VBG 4
material of case	polycarbonate, flame retardant, self-extinguishing according to UL 94 V-0
attachment	snap-in mounting and clamp screws
terminals	nickel-plated brass secondary terminals, each with two plus/minus combination screws

Primary Ratings	rated primary current I_N
KBU 23	100; 150; 200; 250; 300; 400 A
KBU 58	250; 300; 400; 500; 600; 750; 800; 1000 A
KBU 812	250; 300; 400; 500; 600; 750; 800; 1000; 1200; 1250; 1500 A
KBU 816	1000; 1200; 1500; 1600; 2000; 2500; 3000; 4000; 5000 A
rated continuous current	$I_D = 1{,}0 \cdot I_N$
rated peak current	$I_{th} = 60 \cdot I_N$ (max. 1 s)
rated excess factor	FS 5: up to 1500 A primary rated current FS 10: 1600 A and higher prim. rated current
Secondary Ratings	rated secondary current I_{Ns} 1 A or 5 A
rated output	1; 1.25; 1.5; 2.5; 3.75; 5; 7.5; 10; 15; 30 VA
rated frequency	50 Hz
accuracy	classes 0.5 or 1

additional data	refer to Data Sheet No. 566.D.001.##
prices	refer to Price Sheet No. 564 – 566.P.001.##

Short Form Data

Insolating Spacers

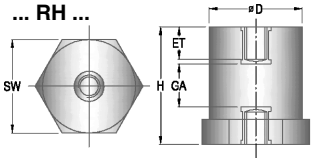
RH
HH

General Technical Data

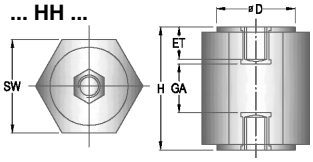
material	body	polyester, fibre-glass inforced, red, self-extinguishing, halogen-free
	insert nut	galvanized steel
fire resistance		according to UL 94 (class V–0)
rated voltage		up to 1000 V AC (when used in excess voltage categories I to IV according to IEC 60038)
breakdown voltage		min. 10 kV/mm
creep voltage strength		CTI 600 (according to EN 60112:2003–03)
peak voltage strength		>12 kV (according to IEC 61180–1:1994–09)

operating temperature range –40 ... +160˚C

... RH ...



... HH ...



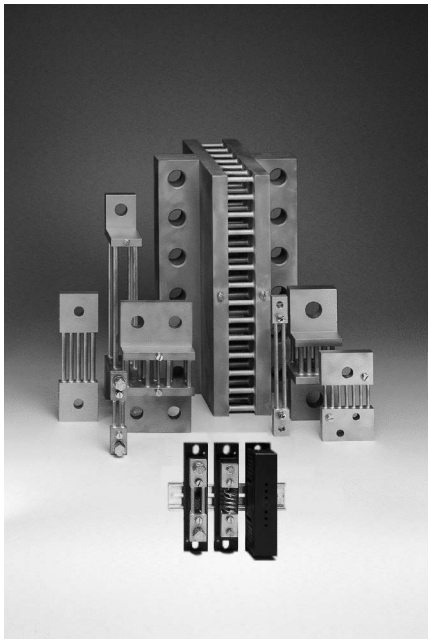
Type	Order No.	Dimensions [mm] H	SW	ET	D	GA	Thread	Break force [N]	Pulling force [N]	Maximum torque [Nm]	Weight [g]	Quantity per package [Pcs]
14 HH 420	666.5857	20	14	5	12	6	M4	-	-	-	10	300
20 HH 620	666.5858	20	20	7	16	2	M6	2000	> 3000	20	20	100
20 HH 625	666.229	25	20	8	16	5	M6	1800	> 3000	20	20	100
25 HH 625	666.5859	25	25	8	22	5	M6	2900	> 4000	20	33	100
25 HH 630	666.230	30	25	8	22	10	M6	2800	> 4000	20	33	100
25 HH 635	666.231	35	25	12	22	7	M6	2300	> 4000	20	40	100
25 HH 640	666.232	40	25	12	22	12	M6	1800	> 4000	20	45	100
25 HH 830	666.5919	30	25	10	21	6	M8	4000	> 4000	20	44	100
25 HH 1030	666.5920	30	25	10	21	6	M10	4200	> 4000	20	45	100
35 HH 630	666.236	30	35	8	32	10	M6	4300	> 6000	20	66	50
35 HH 635	666.237	35	35	10	32	11	M6	4000	> 6000	20	75	50
35 HH 640	666.238	40	35	12	32	12	M6	3500	> 6000	20	82	50
35 HH 830	666.239	30	35	10	32	6	M8	5500	> 7000	40	65	50
35 HH 835	666.5519	35	35	10	32	11	M8	4100	> 7000	40	75	50
35 HH 840	666.240	40	35	14	32	8	M8	4000	> 7000	40	87	50
35 HH 850	666.241	50	35	16	32	14	M8	3500	> 7000	40	109	50
35 HH 1030	666.233	30	35	10	32	6	M10	4500	> 8000	60	65	50
35 HH 1040	666.234	40	35	14	32	8	M10	4000	> 8000	60	87	50
35 HH 1050	666.235	50	35	18	32	10	M10	3500	> 8000	60	109	50
45 HH 840	666.245	40	45	14	42	8	M8	8000	> 10000	40	140	50
45 HH 1040	666.242	40	45	14	42	8	M10	8000	> 10000	60	140	50
45 HH 1050	666.243	50	45	18	42	10	M10	8000	> 10000	60	181	50
45 HH 1060	666.244	60	45	20	42	16	M10	6000	> 10000	60	209	25
60 RH 1050	666.246	50	60	18	60	10	M10	12000	> 15000	60	283	10
60 RH 1060	666.247	60	60	20	60	16	M10	11000	> 15000	60	330	10
60 RH 1250	666.248	50	60	15	60	16	M12	12000	> 15000	80	287	10
60 RH 1260	666.249	60	60	20	60	16	M12	11000	> 15000	80	344	10
60 RH 1280	666.250	80	60	25	60	26	M12	10000	> 15000	80	450	10

additional data refer to Data Sheet
prices refer to Price Sheet No. 666.P.101.##

Short Form Data

Shunts
Class 0.5

60 mV
100 mV
150 mV
300 mV



General Technical Data

The shunts herein referred to are manufactured with an accuracy class 0.5 according to DIN 43 703 in current ratings from 1 A up to 15,000 A having a voltage drop of 60 mV or 150 mV. On special order with a voltage drop and/or a rated current other than standard.

Format Version A	
with insulating base	up to 25 A / 60, 100, 150 or 300 mV optionally up to 150 A / 60 mV for screw mounting (max. M8) or clamping to 35 mm DIN rail
without insulating base	30 ... 150 A
Format Version B	L-profile end blocks
Format Version C	T-profile end blocks
material	
resistance bars	manganin
end blocks	
format version A	high conductivity brass
format version B	high conductivity brass/solid copper
format version C	solid copper
connections	threaded bolts
dimensions	complying with DIN 43 703
Rated Current	1; 1.2; 1.5; 2; 2.5; 3; 4; 5; 6; 8 A and any decimal multiple of these numbers
Rated Voltage Drop	60 mV; 100 mV; 150 mV or 300 mV
accuracy	class 0.5
Options	
rated voltage drop	other than standard on request
rated current	other than standard on request up to max. 20,000 A
accuracy	class 0.2
insulating base	suitable for shunts 30 ... 150 A / 60 mV others on request
purpose built shunts	on request
Accessories	
cover	for shunts with insulating base

additional data refer to Data Sheet No. 800.D.001.##
dimensions and weights
prices refer to Price Sheet No. 800.D.001.##

Short Form Data

Voltage Dividers 1,000 V ... 10,000 V

General Technical Data

External multipliers (voltage dividers) are used in connection with moving-coil instruments in the measurement of DC voltages in electrical installations connected to the ground.

construction	thermoplastic case containing cast resin insulated film resistors of accuracy class 0.5 to DIN.
panel fixing	by two screws M4
terminals	screws M3
weight approx.	0.2 kg
DC voltage	1,000 V 1,500 V 2,000 V 2,500 V 3,000 V 4,000 V 5,000 V 6,000 V 10,000 V
sensitivity	2 kΩ/V
for meter movement	25 V, 250 μA
accuracy	class 0.5

additional data	refer to Data Sheet No. 806.D.001.##
prices	refer to Price Sheet No. 806.P.001.##
suitable moving - coil *instruments*	**PSQ 48, PQ 72/96/144 RS** (M–Series, 90° – Dial) refer to Data Sheet No. 010.D.101.##

Short Form Data

Rotary Cam Switches for AC Voltage and AC Current

V 0
V 3
V 13
V 30
V 32
AU 11
AU 21
AU 31
AU 41

General Technical Data

The rotary cam switches comply with VDE 0660 and VBG 4.

Voltmeter Changeover Switches

Model **V 0**	for phase voltages to neutral in 3-phase 4-wire systems, switching positions: 0 – L1N – L2N – L3N
Model **V 3**	for delta voltages in 3-phase 3-wire systems, switching positions: 0 – L1L2 – L2L3 – L3L1
Model **V 13**	for delta voltages and 1 phase voltage to neutral in 3-phase 4-wire systems, switching positions: L3L1 – L2L3 – L1L2 – 0 – L1N
Model **V 30**	for delta voltages and phase voltages to neutral in 3-phase 4-wire systems, switching positions: L3L1 – L2L3 – L1L2 – 0 – L1N – L2N – L3N
Model **V 32**	for delta voltages in two 3-phase 3-wire systems, switching positions: L3L1 – L2L3 – L1L2 – 0 – L1L2 – L2L3 – L3L1

Ammeter Changeover Switches

Model **AU 11**	single-pole with off-position, 1 current transformer circuit, switching positions: 0 – 1
Model **AU 21**	single-pole with off-position, 2 current transformer circuits, switching positions: 1 – 0 – 2
Model **AU 31**	single-pole with off-position, 3 current transformer circuits, switching positions: 0 – 1 – 2 – 3
Model **AU 41**	single-pole without off-position, 4 current transformer circuits, switching positions: 1 – 2 – 3 – 4
construction	suitable for switchboard mounting
panel thickness	1 ... 5 mm
terminals	M3.5x6 screws and wire clamps
cross-section of connection	2x 2.5 mm^2
operating voltage	AC 660 V
continuous current	25 A acc. to VDE 0660 section 107
load switching capacity	25 A acc. to VDE 0660 section 1
frequency	up to 3 kHz
product classification	C3 acc. to VDE 0660

additional data	refer to Data Sheet No. 812.D.001.##
prices	refer to Price Sheet No. 812.P.001.##

Short Form Data

Cover Frames Glass-Inserted Blind Covers for DIN Cutouts

AR 48
AR 72
AR 96
AR 144
AR 96x48
AR 144x72
BA 48
BA 72
BA 96
BA 96x24

Application

The glass-inserted cover frames AR 48/72/96/144/96x48/144x72 and the blind covers BA 48/72/96/96x24 for clamp-fixing are used to cover standard DIN-cutouts in switchgear panels.

Mechanical Data

Cover Frames, glass-inserted

construction	case suitable for mounting in switchboards or mosaic grid panels, stackable
material of case	pressed steel
window	glass, non-glaring glass or frosted glass
colour of bezel	black or gray
panel fixing	clamp-mounting or screw clamps
panel thickness	1 ... 15 mm
mounting	stackable next to each other
mounting depth	27 mm

Blind Covers

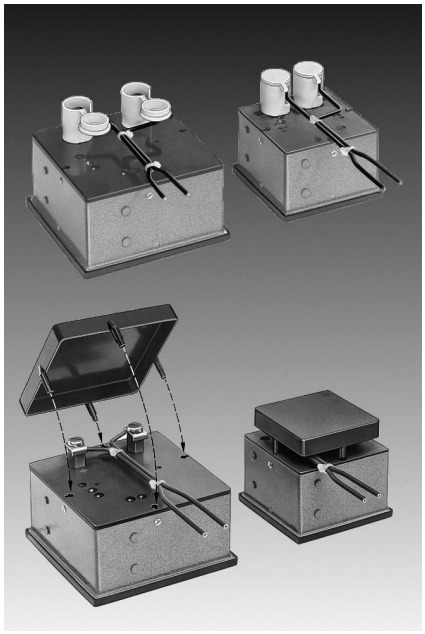
material	self-extinguishing thermoplastics
colour	black
panel fixing	clamp fixing
panel thickness	1 ... 4 mm
mounting	stackable next to each other

additional data	refer to Data Sheet No. 919.D.011.##
prices	refer to Price Sheet No. 919.P.011.##

Short Form Data

Terminal Safety Protection

Q 48
Q 72
Q 96
Q 144



Application

Protective sleeves or full-sized rear covers provide protection against accidental contact of meter terminals. They meet the requirements of VBG 4 / DIN 57 106 and are safe against backhanded and fingertip contact.

Mechanical Data

material	moulded thermoplastics
for use on K–Series	
full-sized rear cover	suitable for meter-sizes 48 x 48, 72 x 72, 96 x 96, 144 x 144
protective sleeves	suitable for meter terminals using hexagon studs with wire clamps E3 and M4 screws
for use on M–Series	
full-sized rear cover	suitable for the most applied meters of sizes 72 x 72, 96 x 96, 144 x 144
protective sleeves SW 6	suitable for voltmeters and ammeters up to 4 A rated current
protective sleeves SW 10	suitable for ammeters exceeding 4 A up to 30 A rated current
rubber nozzle	suitable for meters with screw terminals M5 or M6

additional data	refer to Data Sheet No. 919.D.101.##
prices	refer to Price Sheet No. 919.P.101.##

Short Form Data

LED Type Switch Position Indicators

SUS–01
SUS–02
SUS–95
SUS–99

Application

Switch position indicators are used to indicate the switching state in electrical installations.

The **SUS 01/02/95/99** switch position indicators are equipped with LED's of different colors. They can be used for operation in mimic circuit diagrams of switch gears as well control panels and switchboards.

	round	square	with LED test	front dimensions
SUS–01	*	**Q**	**T**	25 mm
SUS–02	*	**Q**	**T**	20 mm
SUS–95	*	**Q**	–	39 mm
SUS–99	*	**Q**	–	32 mm

General Technical Data

LED colors	red, green, blue, white, yellow, orange			
luminous power	depending on LED's used			
life cycle	min. 100,000 hours of operation			
operating voltage	12 V AC, DC up to 230V AC, DC			
rated current	max. 20 mA			
terminals	**SUS** max. 1,5 mm^2		**SUS ... T** connector blades 2,8x0,8x7,0	
enclosure code	**SUS**		**SUS ... T**	
case	IP 65		IP 65	
terminals	IP 20		IP 00	
operating temperature	–25 ... +60° C			
panel cutout	**SUS–01/95/99** ø 22 mm		**SUS–02** ø 16 mm	
cutout distance min.	**SUS–01** 30 mm	**SUS–02** 25 mm	**SUS–95** 40 mm	**SUS–95** 33 mm
panel thickness	max. 12 mm			

additional data refer to Data Sheet
prices refer to Price Sheet No. 652.P.101.##

Short Form Data

Electromechanical Switch Position Indicators

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

Application

The **PI/PIR 24/25/29/36** switch position indicators are equipped with a rotary magnet system. They can be used for operation in mimic circuit diagrams of switch gears as well control panels, switchboards and mosaic technology.

PI/PIR ... –1
PI/PIR ... –2
PI/PIR 29 –1
PI/PIR ... –3
PI/PIR ... –4
PI/PIR ... –5
PI/PIR ... –6–SPAW with amber/white display field
PI/PIR ... –7–SPRG with red/green display field

General Technical Data

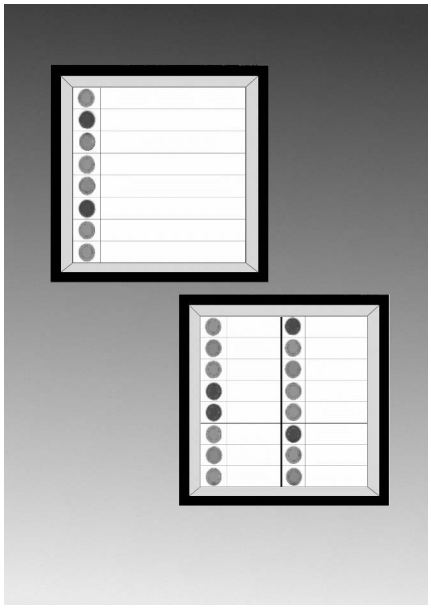
case format	round thermoplastic case with round or square front-bezel, suitable for mounting in switchboards (PI/PIR 25/29/36) or mosaic grid panels (PI/PIR 24)			
material of case	polycarbonate UL 94 VO			
position of use	any position permissible			
terminals	screw terminals up to 1.5 mm^2 with safety touch protection			
enclosure code	IP 54			
dimensions (in mm)	**PI 24 PIR 24**	**PI 25 PIR 25**	**PI 29 PIR 29**	**PI 36 PIR 36**
front-bezel	□ 24	□ 25	Ø 29	□ 36
case	Ø 21.8 mm			
mounting depth	94 mm			
panel cutout	$\phi 22^{+0.5}$ mm			
panel thickness	max. 12 mm			
operation voltage	DC voltage (**PI** type) or AC voltage (**PIR** type) in the range of 24 V to 230 V			
frequency range with AC voltage	40 Hz ... 10 kHz			
permissible voltage variation	±20%			

additional data refer to Data Sheet No. 644.D.101.##
prices refer to Price Sheet No. 664.P.101.##

Short Form Data

PLC Fault Annunciators with Slide-In Dial

SM 96/8
SM 96/16



Application

Using the PLC fault annunciators messages or faults can be indicated.
They can be operated with 24V/7mA directly by the PLC and also without PLC. Other rates are possible on request.

SM 96/8	8 LED's with caption fields
SM 96/16	16 LED's with caption fields

General Technical Data

indication	3–color LED's (red, green, orange) can be operated individually by terminals
LED diameter	5 mm
operation	24 V DC other ratings see **Options**

All inputs have common ground (minus).
The LED's can be tested via separate terminals rear accessible.

front dimensions	96mm x 96mm to DIN 43700
dimensions	96 mm x 96 mm
weight	520 g

Options

- common alarm for all messages
- common alarm only for red LEDs
- common alarm with or without latch
- flashing red LED's
- operation with 24 V AC, other ratings on request
- power supply and operation with 24 V AC (with common alarm)

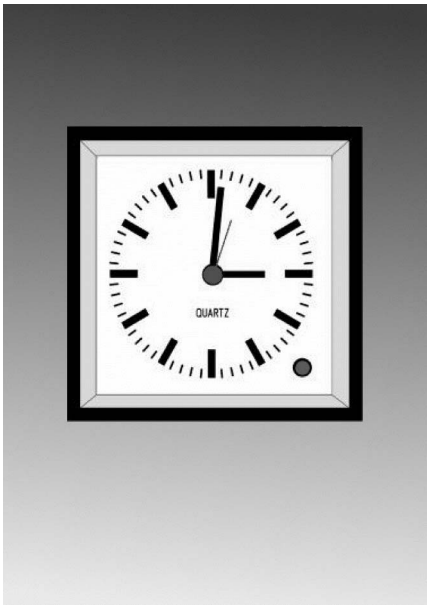
All options can be combined with each other.

additional data	refer to Data Sheet
prices	refer to Price Sheet No. 653.P.101.##

Short Form Data

Quartz Panel Watches

U 48
U 72
U 96
U 144



Application

The **U 48/72/96/144** quartz panel watches are equipped with a precise German clockwork.

A stepper motor and a high accurate quartz guarantee for a long life cycle and operation stability.

During power failure, an alkaliline battery drives the watch for approx. 1/2 year.

The U 144, U 96, U 72 watches can be optionally supplied with radio-controlled clockworks.

General Technical Data

stepper motor frequency	1 Hz
quartz frequency	32.768 kHz
operation stability	lower or less 1s/d to DIN 8325
time setting	via rear accessible knob
power supply	10 ... 30V DC
battery	AA type IEC LR6 1,5V
average power consumption	≤1 mA at 24 V
operation indication	green LED

dimensions (in mm)	**U 48**	**U 72**	**U 96**	**U 144**
front bezel	□ 48	□ 72	□ 96	□ 144
case	□ 42.5	□ 66	□ 90	□ 136
panel cutout	□ $45^{+0,6}$	□ $68^{+0,7}$	□ $92^{+0,8}$	□ 138^{+1}

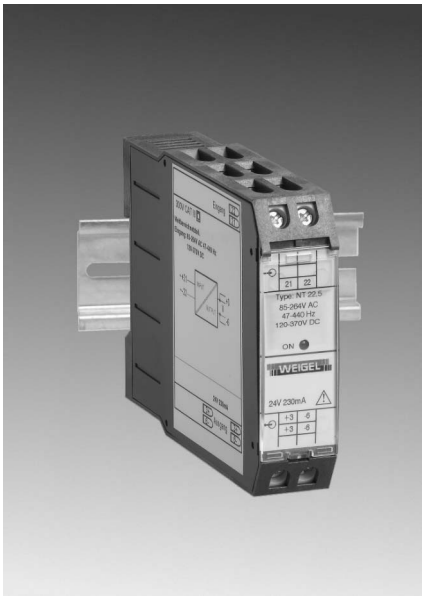
panel thickness	≤5 mm
position of use	any
operation temperature range	–5°C ... +50°C
storage temperature range	–20°C ... +70°C

additional data	refer to Data Sheet
prices	refer to Price Sheet No. 653.P.101.##

Short Form Data

DIN Rail
Power Supplies

NT 22.5



Application

The **NT 22.5** power supply can be used for multiple applications and can be supplied with various output voltages (5 V, 12 V, 15 V, 24 V). It is overload - and overtemperature - proof and has a function indication.

A green LED lights up if the output voltage is available.

The power supplies comply with safety requirements and are tested for interference immunity.

General Technical Data

case details	projecting case clamping to DIN mounting rail (to DIN EN 50 022 – 35)
material of case	ABS/PC black self - extinguishing to UL rating 94 V–0
terminals	screw - terminals
wire cross - section	input 2.5 mm^2 max. flex wire output 2.5 mm^2 max. flex wire or 1.5 mm^2 max. solid wire
enclosure code	IP 40 case IP 20 terminals to EN 60529
dielectric test	4 kV 50 Hz input to output
isolation	100 MΩ / 500 V DC
rated isolation voltage	600 V
class of protection	II to DIN EN 60601–1/ UL 60601–1
dimensions WxHxD	22.5 mm x 84 mm x 113 mm
weight	approx. 0.12 kg (10 W) approx. 0.10 kg (5 W)
indication	green LED lights if power is available

additional data	refer to Data Sheet No. 067.##
prices	refer to Price Sheet No. 067.##

Electrical Data

Input

input voltage	85 ... 264 V AC or 120 ... 370 V DC
frequency	47 ... 440 Hz

Output

output power/type	5 W or 10 W			
voltage	available fixed voltages			
	5 V DC	12 V DC	15 V DC	24 V DC
residual ripple	80 mV	150 mV	150 mV	240 mV
voltage accuracy	2.0%	1.0%	1.0%	1.0%

overload protection
switch - off at >105% of rated power and automatic switch - on after temperature drop

overvoltage protection
switch - off if output voltage is > 135% of U_N

overtemperature protection
switch - off at T_j > 140˚C and automatic switch - on after temperature drop

Environmental

climatic suitability	to VDE/VDI 3540 sheet 2
operating temperature range	–20 ... +70˚C
storage temperature range	–40 ... +85˚C
Vibration	10 ... 500 Hz, 2G 10 min./ 1 cycle, period 60 min. to all 3 axis
EMC emission	to EN 55011 (CISPR11), EN 55022 (CISPR22), class B
EMC immunity	to EN 61000–4–2,3,4,5,6,8,11; EN 50204, EN 55024, EN 60601–1–2 and EN 61204–3, crit. A

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– specifications subject to change without notice; date of issue 03/10 –