

Vario-Series • Square Panel Meters

For Direct Current or Direct Voltage



Moving-coil movement, 90° scale
Narrow front frame per DIN 43 718, matt black



PQS 48 W

Technical Data

Front Dimensions mm Type	48 x 48 PQS 48 W	72 x 72 V-PQS 72	96 x 96 V-PQS 96	144 x 144 PQS 144
Scale Length mm	40	66	94	143
Class	1.5	1.5	1.5	1.5
Weight approx. (kg)	0.08	0.2	0.25	0.6
Operating Voltage	300 V	600 V	600 V	600 V
Test Voltage	3.5 kV	5.8 kV	5.8 kV	5.8 kV
Front Housing-Panel Protection	IP 52	IP 52	IP 52	IP 52
Fasteners (see next page)	leaf spring	screw clip S	screw clip S	screw clip G
Housing Material	polycarbonate	polycarbonate	polycarbonate	sheet metal
Interchangeable Scale	yes	yes	yes	no

Description

Analog panel meter with moving-coil movement

Display

Scale Division Coarse-fine
Pointer Beam pointer with knife-edge

Mechanical Design

Housing Material Polycarbonate, self-extinguishing and drip-proof per UL 94 V - 0 or sheet metal housing (see above).
Sheet metal housing available as option for type V-PQS 72 and V-PQS 96

Replaceable Glass windows, front frames and scales (interchangeable scales not available for panel meters with front panel dimensions of 144 x 144 mm)
⇒ May only be replaced under voltage-free conditions!

Terminals M4 (Voltmeter and Ammeter ≤ 4 A) or M6 (Voltmeter > 4 A).
M4 screw terminals with self-lifting terminal clips. Screws can be turned with a cross-head or standard screw drivers

Contact Protection Available as option

Reference Conditions

Reference Quantities	Reference Conditions
Ambient Temperature	23 °C ± 2 °C
Position of Use	control panel vertical ± 1°
Other	DIN EN 60 051

Internal Resistance/Voltage Drop/Current Consumption¹⁾

Measuring Range	Front Dimensions mm		Tolerance
	48 x 48 72 x 72 96 x 96	144 x 144	
100 µA	1943 Ω	2000 Ω	± 20 %
150 µA	1547 Ω	2000 Ω	
250 µA	1233 Ω	1080 Ω	
400 µA	375 Ω	497 Ω	
600 µA	202 Ω	163 Ω	
1 mA	79 Ω	69 Ω	
1.5 mA	37.5 Ω	26.5 Ω	
2 mA	21 Ω	20 Ω	
2.5 mA	11.4 Ω	10.8 Ω	
4 mA	6.7 Ω	7.1 Ω	± 30 %
5 mA	4.8 Ω	6.1 Ω	
6 mA	3 Ω	2.4 Ω	
10 mA	3.4 Ω	1.6 Ω	
15 mA	4 Ω	4 Ω	
20 mA	3 Ω	3 Ω	
4 ... 20 mA	3 Ω	3 Ω	
25 mA	2.4 Ω	2.4 Ω	
> 25 mA	Voltage Drop 60 mV		
Connection to shunt	Current Consumption 6 mA		± 20 %
≥ 60 mV	1000 Ω / V		

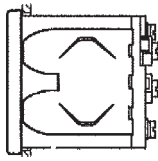
¹⁾ Indicated internal resistance is only valid for instruments with standard accuracy class.
Please inquire regarding internal resistance (Ri) for moving-coil indicators with mechanical zero point at any desired scale value.

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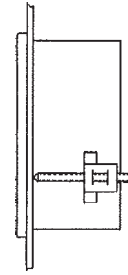


Leaf Spring



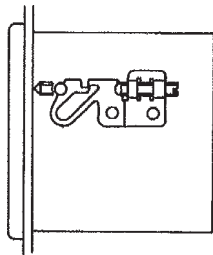
Control panel thickness 1 to 3 mm.
For size 48 x 48 mm, not available for Mauell-Grid.
Also available as option for sizes 72 x 72 and 96 x 96 mm.

Screw Clip S



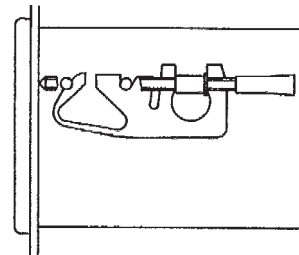
Control panel thickness 1 to 25 mm.
Special screw clamp M4 required for size 72 x 72 and 96 x 96 mm.
Also available as option for size 48 x 48 mm, not available for Mauell-Grid.

Screw Clip G



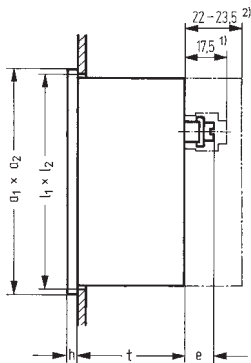
Control panel thickness 1 to 32 mm.
Special screw clamp M4 required for size 144 x 144 mm.

Fastener B DIN 43 835



Control panel thickness 1 to 40 mm.
Screw clamp M4 as option for:
Sheet metal housings 72 x 72 and 96 x 96 mm with cone head rivets and size 144 x 144 mm

Basic Dimensions



Drawings to Scale (on request)

0101A258 for size 48 x 48 mm
0101A259 for sizes 72 x 72 and 96 x 96 mm
0101A261 sheet 1 for size 144 x 144 mm

Ordering Example

Panel meter 96 x 96 mm
90° Scale
0 ... 40 V Direct Voltage

Type V-PQS 96	Order No. 1604P, DC40
-------------------------	---------------------------------

Front Dimensions mm	Nominal Dimensions		Cutout Dimensions $l_1 \times l_2$	Installation Depth t	Terminals	
	$a_1 \times a_2$	h			≤ 4 A M4 e	> 4 A M6 e
48 x 48	48 x 48	5	$45^{+0.6} \times 45^{+0.6}$	43.5	12.5	17
72 x 72	72 x 72	5	$68^{-0.7} \times 68^{-0.7}$	43.5	12.5	18
96 x 96	96 x 96	5	$92^{-0.8} \times 92^{-0.8}$	43.5	12.5	18
144 x 144	144 x 144	8	$138^{+1} \times 138^{+1}$	44.5	12.5	18

1) Single terminal cover
2) Overall terminal cover (22 mm for panel meters with front panel dimensions of 48 x 48 mm only)

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	Type Order No. ⇒	PQS 48 W 1670P	V-PQS 72 1601P	V-PQS 96 1604P	PQS 144 1620P
Direct Current	+ ↓				
Range:					
0 ... 100 μA	CA100	A	A	A	A
0 ... 150 μA	CA150	A	A	A	A
0 ... 250 μA	CA250	A	A	A	A
0 ... 400 μA	CA400	A	A	A	A
0 ... 600 μA	CA600	A	A	A	A
0 ... > 100 μA ... < 1 mA ¹⁾	CA...	A	A	A	A
0 ... 1 mA	CB1	+	+	+	+
0 ... 1.5 mA	CB1.5	+	+	+	+
0 ... 2.5 mA	CB2.5	+	+	+	+
0 ... 4 mA	CB4	+	+	+	+
0 ... 5 mA	CB5	+	+	+	+
0 ... 6 mA	CB6	+	+	+	+
0 ... 10 mA	CB10	+	+	+	+
0 ... 15 mA	CB15	+	+	+	A
0 ... 20 mA	CB20	+	+	+	A
0 ... 25 mA	CB25	+	+	+	A
0 ... 40 mA	CB40	+	+	+	A
0 ... 50 mA	CB50	+	+	+	A
0 ... 60 mA	CB60	+	+	+	A
0 ... 100 mA	CB100	+	+	+	A
0 ... 150 mA	CB150	+	+	+	A
0 ... 250 mA	CB250	+	+	+	A
0 ... 400 mA	CB400	+	+	+	A
0 ... 600 mA	CB600	+	+	+	A
0 ... > 1 mA ... < 1 A ¹⁾	CB...	A	A	A	A
4 ... 20 mA ²⁾	BC10	A	A	A	A
0 / 4 ... 20 mA ³⁾	BC25	A	A	A	A
0 ... 1 A	CC1	+	+	+	A
0 ... 1.5 A	CC1.5	+	+	+	A
0 ... 2.5 A	CC2.5	+	+	+	A
0 ... 4 A	CC4	+	+	+	A
0 ... 6 A	CC6	+	+	+	A
0 ... 10 A	CC10	+	+	+	A
0 ... 15 A	CC15	+	+	+	A
0 ... 25 A	CC25	+	+	+	A
0 ... 40 A	CC40	A	A	A	A
0 ... 60 A	CC60	A	A	A	A
0 ... > 1 A ... < 60 A ¹⁾	CC...	A	A	A	A

1) Specify in clear text

2) Mechanical suppressed

3) Electrical suppressed

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	Type Order No. ⇒	PQS 48 W 1670P	V-PQS 72 1601P	V-PQS 96 1604P	PQS 144 1620P
Direct Current	+ ↓				
Con. to Shunt					
... A / 60 mV	BE3	+	+	+	A
... A / 150 mV	BE4	+	+	+	A
... A / ... > 60 mV ¹⁾	BE981	A	A	A	A
Scale:					
1 A	CG1	+	+	+	+
1.5 A	CG1.5	+	+	+	+
2.5 A	CG2.5	+	+	+	+
4 A	CG4	+	+	+	+
6 A	CG6	+	+	+	+
10 A	CG10	+	+	+	+
15 A	CG15	+	+	+	+
25 A	CG25	+	+	+	+
40 A	CG40	+	+	+	+
60 A	CG60	+	+	+	+
100 A	CG100	+	+	+	+
150 A	CG150	+	+	+	+
250 A	CG250	+	+	+	+
400 A	CG400	+	+	+	+
500 A	CG350	+	+	+	+
600 A	CG600	+	+	+	+
0 ... > 1 A < 1 kA ¹⁾	CG...	+	+	+	+
1 kA	CH1	+	+	+	+
1.5 kA	CH1.5	+	+	+	+
2.5 kA	CH2.5	+	+	+	+
4 kA	CH4	+	+	+	+
5 kA	CH5	+	+	+	+
6 kA	CH6	+	+	+	+
10 kA	CH10	+	+	+	+
15 kA	CH15	+	+	+	+
> 1 kA ¹⁾	CH...	+	+	+	+
Direct Voltage					
Range:					
0 ... 60 mV	DB60	A	A	A	A
0 ... 100 mV	DB100	A	A	A	A
0 ... 150 mV	DB150	A	A	A	A
0 ... 250 mV	DB250	A	A	A	A
0 ... 400 mV	DB400	A	A	A	A
0 ... 600 mV	DB600	A	A	A	A
0 ... > 60 mV ... < 1 V ¹⁾	DB...	A	A	A	A
0 ... 1 V	DC1	A	A	A	A
0 ... 1.5 V	DC1.5	A	A	A	A
0 ... 2.5 V	DC2.5	A	A	A	A
0 ... 3 V	DC3	A	A	A	A
0 ... 4 V	DC4	A	A	A	A
0 ... 6 V	DC6	A	A	A	A
0 ... 10 V	DC10	A	A	A	A
0 ... 15 V	DC15	A	A	A	A
0 ... 25 V	DC25	A	A	A	A
0 ... 40 V	DC40	A	A	A	A
0 ... 60 V	DC60	A	A	A	A
0 ... 100 V	DC100	A	A	A	A
0 ... 150 V	DC150	A	A	A	A
0 ... 250 V	DC250	A	A	A	A
0 ... 400 V	DC400	—	A	A	A
0 ... 500 V	DC500	—	A	A	A
0 ... 600 V	DC600	—	A	A	A
0 ... > 1 V ... < 600 V ^{1) 2)}	DC...	—	A	A	A
Connection to separate voltage divider ³⁾					
... kV / 25 V (250 μA)	BE76	A	A	A	A

1) Specify in clear text

2) Higher voltages - see voltage dividers, page 129

3) Voltage dividers - see page 129

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	Type Order No.	PQS 48 W ⇒ 1670P	V-PQS 72 1601P	V-PQS 96 1604P	PQS 144 1620P
GENERAL VARIANTS	Identification + ↓				
Zero Point					
Zero at left	BC1	N	N	N	N
Zero point at center	BC2	A	A	A	A
Zero point as desired (specify in clear text)	BC20	A	A	A	A
Zero point at left, mech. suppressed (not 4-20 mA) (Max. Suppression 50%; measuring ranges ≥250 μA / ≥250 mV, Ri 1kΩ/V; specify in clear text)	BC16	A	A	A	A
Internal Resistance with Voltmeters					
Standard (see technical data)	IR99	N	N	N	N
Ri approx. 10 kΩ/V (measuring input ≥ 2 V)	IR10	A	A	A	A
Ri = 1 kΩ / V ± 1 % at nominal temperature (measuring input ≥ 1 V)	IR30	A	A	A	A
Ri = 10 kΩ/V ± 1 % at nominal temperature (measuring input ≥ 2 V)	IR40	A	A	A	A
Potentiometer for Adjustment with Voltmeters					
Voltmeters without potentiometer for adjustment	MP99	N	N	N	N
Voltmeters with potentiometer for adjustment	MP1	-	A	A	A
Adjustment range ±15 % (Measuring input ≥ 6 V / ≤ 550 V; Ri as listed; Class 1.5 only)					
Lead Resistor when connecting to Shunt Resistors ...A / 60 mV and ...A / 150 mV					
Standard version 0.06 Ω	IG99	N	N	N	N
Differing from 0.06 Ω (specify in clear text)	IG999	A	A	A	A
Limiting values: ...A / 60 mV for class 1.5 max. 1 Ω ...A / 150 mV for class 1.5 max. 7 Ω					
Accuracy					
Class 1.5	IE15	N	N	N	N
Class 1.0 (Measuring input ≥ 100 μA / ≥ 60 mV; with 72 x 72 in combination with fine division and bar indicator with knife-edge only)	IE10	-	A	A	A
Position of Use					
Control panel vertical	LA1	N	N	N	N
Control panel horizontal	LA2	+	+	+	+
Other (Please specify angle between scale and horizontal)	LA999	A	A	A	A
Special Features					
Normal vibration and shock resistance	LN99	N	N	N	N
Suitable for marine use with the following approvals:					
Germanischer Lloyd	LN2	A	A	A	A
BV 0591 German Navy	LN1	-	A ¹⁾	A ¹⁾	A
BV 3340 German Navy	LN6	-	- ²⁾	- ³⁾	+ ⁴⁾
Vibration resis. 2.5 g, Shock resis. 30 g	LN56	A ⁵⁾	A	A	A
Vibration resis. 5 g, Shock resis. 50 g	LN55	A ⁵⁾	A	A	A ⁶⁾
					} on request

1) Contains sheet metal housing with cone head rivets (Ident. ML4) and fastener B (Ident. MN11)

2) Type PQS 72 according to special data sheet

3) Type PQS 96 according to special data sheet

4) See special data sheet

5) Available only in combination with screw clip S

6) Available only in combination with fastener B DIN 43835

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Type Order No.	PQS 48 W ⇒ 1670P	V-PQS 72 1601P	V-PQS 96 1604P	PQS 144 1620P
SCALE VARIANTS				
Identification + ↓				
Scale				
In accordance with measuring input	GF99	N	N	N
Blank scale with zero point at left (lower/upper value markings, company logos, symbols)	GF24	+	+	+
Blank scale with zero point at center (lower/upper value markings, company logos, symbols)	GF28	+	+	+
Scale Characteristics				
Current / Voltage linear	SD1	N	N	N
According to curve (not current / voltage linear)	SD6	A	A	A
Division and Pointer				
Single division	GD1	N	N	N
Double division	GD2	A	A	A
Coarse-fine division	SE1	N	N	N
Fine division	SE3	-	A	A
Beam pointer with knife-edge for single division	RA1	N	N	N
Beam pointer with knife-edge for double division	RA2	+	+	+
Knife-edge pointer for single division	RA10	A	A	A
Knife-edge pointer for double division	RA11	A	A	A
Additional Imprint				
Second numbering (specify in clear text)	SK992	A	A	A
Inscription:				
Without additional inscription	SM99	N	N	N
Inscription ≤ 15 characters German	SM991	A	A	A
Inscription > 15 characters German	SM992	A	A	A
Inscription ≤ 15 characters other language	SM993	A	A	A
Inscription > 15 characters other language	SM994	A	A	A
(Other language in Latin lettering, specify in clear text)				
Coloured mark red RAL 2002 (specify in clear text)	ST991	A	A	A
Coloured sectors yellow RAL 1021, green RAL 6018 or red RAL 2002 (specify in clear text)	SU991	A	A	A
Scale Characteristics				
Interchangeable scale	SA10	N	N	N
Screw mounted scale	SA11	A	A	A
Mirror interchangeable scale	SA8	-	-	A
Mirror screw mounted scale	SA9	-	A	A
(Mirror interchangeable scales and mirror screw mounted scales together with fine division and beam pointer with knife-edge only)				

1) Standard version without extra charge

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Type	PQS 48 W	V-PQS 72	V-PQS 96	PQS 144
Order No. ⇒	1670P	1601P	1604P	1620P
SCALE VARIANTS				
Identification + ↓				
Scale / Pointer Colours				
Scale white; imprint and pointer black	SG99	N	N	N
Scale black; imprint and pointer white	SG1	A ¹⁾	A ¹⁾	A ¹⁾
Scale black; imprint and pointer yellow	SG2	A ¹⁾	A ¹⁾	A ¹⁾
Scale black; imprint white, pointer yellow	SG3	A ¹⁾	A ¹⁾	A ¹⁾
Without scale; pointer black	SG10	+	+	-
Without scale; pointer white	SG11	A	A	-
Without scale; pointer yellow	SG12	A	A	-
Versions without scales available only for panel meters that are connected to transformers or shunts				
Dial Illumination				
Without dial illumination	PA99	N	N	N
With direct dial illumination (Plexiglass scale, scale and dial illumination white)	PA1	A	A	A
Note: Completion with Voltage Order No. PB... necessary. Size 48 x 48: dial illumination available only for ≤ 4 A / ≤ 660 V together with single terminal cover.				
With indirect dial illumination:				
Light conductor with mask, dial illumination white	PA6	-	A	A
Light conductor with mask, dial illumination red	PA7	-	A	A
Note: Completion with Voltage Order No. PB... and SG necessary. (SG 99 as light conductor with mask not available). Dial illumination available only with screw mounted scale (Order No. SA11)				
Voltage for Dial Illumination				
12 V	PB3	+	+	+
24 V	PB5	+	+	+
28 V	PB6	+	+	+
HOUSING VARIANTS				
Application				
Standard version	LB99	N	N	N
Tropic resistant	LB1	A	A	A
Protection				
Standard (see technical data)	LH99	N	N	N
Front housing-panel protection IP54, terminals IP00	LH21	A	A	A
Earthquake-proof (possible combination: LH99 or LH21)	LH10	A	A	A
Front Frame Colour				
Matt black	MA2	N	N	N
Matt grey RAL 7037	MA11	A	A	A
Matt stone grey RAL 7032	MA12	A	A	A
Matt light grey RAL 7035	MA14	A	A	-
Matt dark beige approx. RAL 1019	MA21	A	A	A
Intermediate Frame, Height 3 mm				
Without intermediate frame	MC99	N	N	N
Intermediate frame shiny black	MC1	A	A	-
Intermediate frame shiny grey RAL 7037	MC2	A	A	-
Intermediate frame available only in combination with screw clip S or fastener B DIN 43 835				

1) Additional one-off costs for special scale printing on request

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	Type Order No.	PQS 48 W ⇒ 1670P	V-PQS 72 1601P	V-PQS 96 1604P	PQS 144 1620P
HOUSING VARIANTS					
	Identification + ↓				
Glass Window					
Standard version	MG99	N	N	N	N
Anti-glare glass	MG1	A	A	A	A
Housing					
Standard housing	ML99	N	N	N	N
Sheet metal housing with cone head rivets	ML4	-	A	A	N ¹⁾
Housing for Mauell-Grid	ML5	+	- ²⁾	- ²⁾	- ³⁾
Housing for H&B Unibloc-Grid	ML6	+ ⁴⁾	- ²⁾	- ²⁾	- ³⁾
Mounting					
2 leaf springs	MN2	N	+	+	-
2 leaf springs for H&B Unibloc-Grid (bronze-springs)	MN4	A	-	-	-
4 leaf springs	MN1	A	A	A	-
Screw Clip S	MN14	A	N ¹⁾	N ¹⁾	-
Screw Clip G	MN13	-	-	-	N
Fastener B DIN 43 835	MN11	-	A ⁵⁾	A ⁵⁾	A
Subklew fastener (Screw Clip S without cone point)	MN32	A	A	A	-
Without fastener	MN88	+ ⁶⁾	+	+	+
Identification					
Without identification	MZ99	N	N	N	N
Identification on backside (specify in clear text)	MZ998	A	A	A	A
Constant Display					
Without constant display	PK99	N	N	N	N
Constant display 1-2-3	PK1	A	-	-	-
Constant display 1-1.5-2-2.5-3-4-5-6-7.5-8-10	PK5	-	A	A	A
Marker Pointer					
Without marker pointer	PM99	N	N	N	N
Adjustable red index pointer	PM1	A	A	A	A
Label Strip					
Without label strip	SS99	N	N	N	N
Label on front face (specify in clear text)	SS992	A	A	A	A
Contact Protection					
Without terminal cover	VB99	N	N	N	N
Overall terminal cover	VB2	A	A	A	A
Single terminal cover (Voltmeter and Ammeter ≤ 4 A)	VB1	+	+	+	+

1) Standard version without extra charge

2) Standard housing (ML99) in combination with fastener MN2, also suitable for Mauell-Grid and H&B Unibloc-Grid

3) Standard housing (ML99) in combination with fastener MN11, also suitable for Mauell-Grid and H&B Unibloc-Grid

4) Available only in combination with Order No. MN4 (2 leaf springs for H&B Unibloc-Grid)

5) Available only in combination with Order No. ML4 (sheet metal housing with cone head rivets)

6) ML5 (housing for Mauell-Grid) standard version