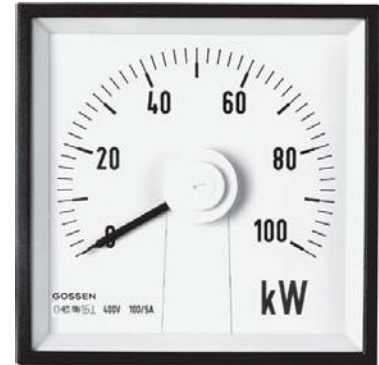


# Vario-Series • Square Panel Meters

For Direct Current or Direct Voltage



Moving-coil movement, 240° scale  
Narrow front frame per DIN 43 718, matt black



V-PQ 96-250

## Technical Data

Front Dimensions mm Type	48 x 48 V-PQ 48-250	72 x 72 V-PQ 72-250	96 x 96 V-PQ 96-250	144 x 144 PQ 144-250
Scale Length mm	73	113	151	235
Class	1.5	1.5	1.5	1.5
Weight approx. (kg)	0.16	0.2	0.25	0.65
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 Consumption <sup>1)</sup>

Measuring Range	Ri	Tolerance
100 μA	10300 Ω	±20 %
150 μA	8210 Ω	
250 μA	2870 Ω	
400 μA	1770 Ω	
600 μA	773 Ω	
1 mA	337 Ω	±20 %
1.5 mA	167 Ω	
2 mA	97 Ω	
2.5 mA	52 Ω	
4 mA	25 Ω	
5 mA	16.3 Ω	
6 mA	14.2 Ω	±30 %
10 mA	3 Ω	
15 mA	6.5 Ω	
20 mA	5 Ω	
4 ... 20 mA	6.5 Ω	
25 mA	6 Ω	Voltage Drop 150 mV Current Consumption 10 mA
> 25 mA Connection to Shunt		
150 mV	75 Ω	±20 %
250 mV	125 Ω	
400 mV	200 Ω	
600 mV	300 Ω	
≥ 1 V	1000 Ω/V	

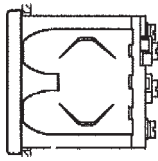
<sup>1)</sup> Indicated internal resistance is only valid for instruments with standard accuracy class.  
Please inquire regarding internal resistance (Ri) for moving-coil indicators with mechanical zero point at any desired scale value.

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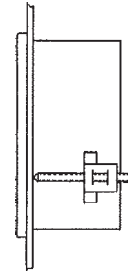


## Leaf Spring



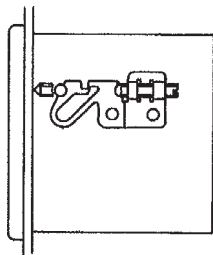
Control panel thickness 1 to 3 mm.  
For size 48 x 48 mm, not available for Mauell-Grid.  
Also available as option for sizes 72 x 72 and 96 x 96 mm.

## Screw Clip S



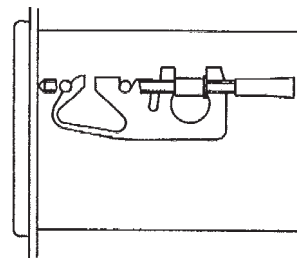
Control panel thickness 1 to 25 mm.  
Special screw clamp M4 required for sizes 72 x 72 and 96 x 96 mm.  
Also available as option for size 48 x 48 mm, not available for Mauell-Grid.

## Screw Clip G



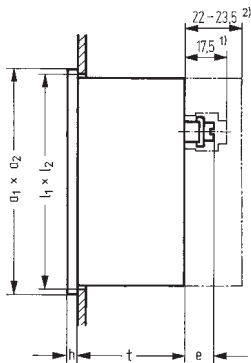
Control panel thickness 1 to 32 mm.  
Special screw clamp M4 required for size 144 x 144 mm.

## 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  
240° Scale  
0 ... 40 V Direct Voltage

Type <b>V-PQ 96-250</b>	Order No. <b>1605P, DC40</b>
----------------------------	---------------------------------

Front Dimensions mm	Nominal Dimensions		Cutout Dimensions $l_1 \times l_2$	Installation Depth t	Terminals	
	$a_1 \times a_2$	h			$\leq 4 A$	$> 4 A$
					M4 e	M6 e
48 x 48	48 x 48	5	$45^{+0.6} \times 45^{+0.6}$	43.5	12.5	—
72 x 72	72 x 72	5	$68^{-0.7} \times 68^{-0.7}$	43.5	12.5	17
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. ⇒	V-PQ 48-250 1668P	V-PQ 72-250 <sup>1)</sup> 1602P	V-PQ 96-250 <sup>1)</sup> 1605P	PQ 144-250 1621P
<b>Zero Point at left</b>	+ ↓				
<b>Direct Current</b>					
<b>Range:</b>					
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 <sup>2)</sup>	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	A	A	A
0 ... 20 mA	CB20	A	A	A	A
0 ... 25 mA	CB25	A	A	A	A
0 ... 40 mA	CB40	A	A	A	A
0 ... 50 mA	CB50	A	A	A	A
0 ... 60 mA	CB60	A	A	A	A
0 ... 100 mA	CB100	A	A	A	A
0 ... 150 mA	CB150	A	A	A	A
0 ... 250 mA	CB250	A	A	A	A
0 ... 400 mA	CB400	A	A	A	A
0 ... 600 mA	CB600	A	A	A	A
0 ... > 1 mA ... < 1 A <sup>2)</sup>	CB...	A	A	A	A
4... 20 mA <sup>3)</sup>	BC10	A	A	A	A
0/4... 20 mA <sup>4)</sup>	BC25	A	A	A	A
0 ... 1 A	CC1	A	A	A	A
0 ... 1.5 A	CC1.5	A	A	A	A
0 ... 2.5 A	CC2.5	A	A	A	A
0 ... 4 A	CC4	A	A	A	A
0 ... 6 A	CC6	-	A	A	A
0 ... 10 A	CC10	-	A	A	A
0 ... 15 A	CC15	-	A	A	A
0 ... 25 A	CC25	-	A	A	A
0 ... 40 A	CC40	-	A	A	A
0 ... > 1 A ... < 40 A <sup>2)</sup> (Max. 4 A with size 48 x 48 mm)	CC...	A	A	A	A

1) For sheet metal housings with cone head rivets please see "Housing Variants"

2) Specify in clear text

3) Mechanical suppressed

4) Electrical suppressed

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	Type Order No. ⇒	V-PQ 48-250 1668P	V-PQ 72-250 <sup>1)</sup> 1602P	V-PQ 96-250 <sup>1)</sup> 1605P	PQ 144-250 1621P
<b>Zero Point at left</b>	+ ↓				
<b>Connection to shunt (direct current)</b>					
... A / 60 mV	BE3	+	+	+	A
... A / 150 mV	BE4	+	+	+	A
... A / ... > 60 mV <sup>2)</sup>	BE981	A	A	A	A
<b>Scale:</b>					
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 <sup>3)</sup>	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 <sup>2)</sup>	CH...	+	+	+	+
<b>Direct Voltage</b>					
<b>Range:</b>					
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 ... > 150 mV ... < 1 V <sup>3)</sup>	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 <sup>3) 4)</sup>	DC...	—	A	A	A
<b>Connection to separate voltage divider<sup>5)</sup></b>					
... kV / 25 V (250 μA)	BE76	A	A	A	A

1) For sheet metal housings with cone head rivets please see „Housing Variants“

2) Upper value > 60 mV

3) Specify in clear text

4) Higher Voltages - see voltage dividers, page 129

5) Voltage dividers - see page 129

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Type Order No. ⇒	V-PQ 48-250 1668P	V-PQ 72-250 1602P	V-PQ 96-250 1605P	PQ 144-250 1621P
<b>GENERAL VARIANTS</b>				
<b>Identification</b> + ↓				
<b>Zero Point</b>				
Zero point at left	BC1	N	N	N
Zero point at center	BC2	A	A	A
Zero point as desired (specify in clear text)	BC20	A	A	A
Zero point at left, mech. suppressed (not 4-20 mA) (Max. Suppression 20%; measuring ranges ≥250 μA / ≥250 mV, Ri 1kΩ/V; specify in clear text)	BC16	A	A	A
<b>Internal Resistance with Voltmeters</b>				
Standard (see technical data)	IR99	N	N	N
Ri approx. 10 kΩ/V (measuring input ≥ 4 V)	IR10	A	A	A
Ri = 1 kΩ / V ± 1 % at nominal temperature (measuring input ≥ 1 V)	IR30	A	A	A
Ri = 10 kΩ/V ± 1 % at nominal temperature (measuring input ≥ 4 V)	IR53	A	A	A
<b>Potentiometer for Adjustment with Voltmeters</b>				
Voltmeters without potentiometer for adjustment	MP99	N	N	N
Voltmeters with potentiometer for adjustment	MP1	-	A	A
Adjustment range ±15 % (Measuring input ≥ 6 V / ≤ 550 V; Ri as listed; Class 1.5 only)				
<b>Lead Resistor when connecting to</b>				
<b>Shunt Resistors ...A / 60 mV and ...A / 150 mV</b>				
Standard version 0.06 Ω	IG99	N	N	N
Differing from 0.06 Ω (specify in clear text)	IG999	A	A	A
Limiting values: ...A / 60 mV for class 1.5 max. 1 Ω ...A / 150 mV in Klasse 1.5 max. 7 Ω				
<b>Accuracy</b>				
Class 1.5	IE15	N	N	N
Class 1.0 (Measuring input ≥ 100 μA / ≥ 60 mV; with 72 x 72 in combination with fine division and beam pointer with knife-edge only)	IE11	-	A	A
<b>Position of Use</b>				
Control panel vertical	LA1	N	N	N
Control panel horizontal	LA2	+	+	+
Other	LA999	A	A	A
(Please specify angle between scale and horizontal)				
<b>Special Features</b>				
Normal vibration and shock resistance	LN99	N	N	N
Suitable for marine use with the following approvals:				
Germanischer Lloyd	LN2	A	A	A
BV 0591 German Navy	LN1	-	+ <sup>1)</sup>	+ <sup>1)</sup>
BV 3340 German Navy	LN6	-	- <sup>2)</sup>	- <sup>3)</sup>
Vibration resis. 2.5 g, Shock resis. 30 g	LN56	A <sup>5)</sup>	A	A
Vibration resis. 5 g, Shock resis. 50 g	LN55	A <sup>5)</sup>	A	A
				A <sup>6)</sup>
				} on request

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

2) Type PQS 72-250 according to special data sheet

3) Type PQS 96-250 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. ⇒	V-PQ 48-250 1668P	V-PQ 72-250 1602P	V-PQ 96-250 1605P	PQ 144-250 1621P
<b>SCALE VARIANTS</b>					
<b>Identification</b> + ↓					
<b>Scale</b>					
In accordance with measuring input	<b>GF99</b>	N	N	N	N
Blank Scale (lower/upper value markings, company logos, symbols)	<b>GF28</b>	+	+	+	+
<b>Scale Characteristics</b>					
Current / Voltage linear	<b>SD1</b>	N	N	N	N
According to curve (not current / voltage linear)	<b>SD6</b>	A	A	A	A
<b>Division and Pointer</b>					
Single division	<b>GD1</b>	N	N	N	N
Double division	<b>GD2</b>	A	A	A	A
Coarse-fine division	<b>SE1</b>	N	N	N	N
Fine division	<b>SE3</b>	-	A	A	A
Beam pointer with knife-edge for single division	<b>RA1</b>	N	N	N	N
Beam pointer with knife-edge for double division	<b>RA2</b>	+	+	+	+
Knife-edge pointer for single division	<b>RA10</b>	A	A	A	A
Knife-edge pointer for double division	<b>RA11</b>	-	A	A	A
Bar indicator for single division	<b>RA40</b>	A	A	A	A
<b>Additional Imprint</b>					
Second numbering (specify in clear text)	<b>SK992</b>	A	A	A	A
Inscription:					
Without additional inscription	<b>SM99</b>	N	N	N	N
Inscription ≤ 15 characters German	<b>SM991</b>	A	A	A	A
Inscription > 15 characters German	<b>SM992</b>	A	A	A	A
Inscription ≤ 15 characters other language	<b>SM993</b>	A	A	A	A
Inscription > 15 characters other language	<b>SM994</b>	A	A	A	A
(Other language in Latin lettering. specify in clear text)					
Coloured mark red RAL 2002 (specify in clear text)	<b>ST991</b>	A	A	A	A
Coloured sectors yellow RAL 1021. green RAL 6018 or red RAL 2002 (specify in clear text)	<b>SU991</b>	A	A	A	A
<b>Scale Characteristics</b>					
Interchangeable scale	<b>SA10</b>	N	N	N	-
Screw mounted scale	<b>SA11</b>	A	A	A	N <sup>1)</sup>
Anti-parallax scale (with bar indicator and single division)	<b>SA5</b>	A	A	A	A

1) Standard version without extra charge

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'N' = Standard Version · 'A' = Extra Charge · '+' = Available without extra Charge · '-' = Not available

	Type Order No. ⇒	V-PQ 48-250 1668P	V-PQ 72-250 1602P	V-PQ 96-250 1605P	PQ 144-250 1621P
<b>SCALE VARIANTS</b>					
<b>Identification</b> + ↓					
<b>Scale / Pointer Colours</b>					
Scale white; imprint and pointer black	<b>SG99</b>	N	N	N	N
Scale balck; imprint and pointer white	<b>SG1</b>	A <sup>1)</sup>	A <sup>1)</sup>	A <sup>1)</sup>	A <sup>1)</sup>
Scale black; imprint and pointer yellow	<b>SG2</b>	A <sup>1)</sup>	A <sup>1)</sup>	A <sup>1)</sup>	A <sup>1)</sup>
Scale black; imprint white, pointer yellow	<b>SG3</b>	A <sup>1)</sup>	A <sup>1)</sup>	A <sup>1)</sup>	A <sup>1)</sup>
Without scale; pointer black	<b>SG10</b>	+	+	+	-
Without scale; pointer white	<b>SG11</b>	A	A	A	-
Without scale; pointer yellow	<b>SG12</b>	A	A	A	-
Versions without scales available only for panel meters that are connected to transformers or shunts					
<b>Dial Illumination</b>					
Without dial illumination	<b>PA99</b>	N	N	N	N
With direct dial illumination (Plexiglass scale, scale and dial illumination white) Note: Completion with Voltage Order No. <b>PB...</b> necessary. Size 48 x 48: dial illumination available only for ≤ 4 A / ≤ 660 V together with single terminal cover.	<b>PA1</b>	-	A	A	A
With indirect dial illumination:					
Light conductor with mask, dial illumination white	<b>PA6</b>	-	A	A	A
Light conductor with mask, dial illumination red	<b>PA7</b>	-	A	A	A
Note: Completion with Voltage Order No. <b>PB...</b> and <b>SG</b> necessary (SG 99 as light conductor with mask not available). Dial illumination available only with screw mounted scale (Order No. SA11)					
<b>Voltage for Dial Illumination</b>					
12 V	<b>PB3</b>	-	+	+	+
24 V	<b>PB5</b>	-	+	+	+
28 V	<b>PB6</b>	-	+	+	+
<b>HOUSING VARIANTS</b>					
<b>Application</b>					
Standard version	<b>LB99</b>	N	N	N	N
Tropic resistant	<b>LB1</b>	A	A	A	A
<b>Protection</b>					
Standard (see technical data)	<b>LH99</b>	N	N	N	N
Front housing-panel protection IP54. clamps IP00	<b>LH21</b>	A	A	A	A
Earthquake-proof (possible combination: LH99 or LH21)	<b>LH10</b>	A	A	A	A
<b>Front Frame Colour</b>					
Matt black	<b>MA2</b>	N	N	N	N
Matt grey RAL 7037	<b>MA11</b>	A	A	A	A
Matt stone grey RAL 7032	<b>MA12</b>	A	A	A	A
Matt light grey RAL 7035	<b>MA14</b>	A	A	A	-
Matt dark beige approx. RAL 1019	<b>MA21</b>	A	A	A	A
<b>Intermediate Frame, Height 3 mm</b>					
Without intermediate frame	<b>MC99</b>	N	N	N	N
Intermediate frame shiny black	<b>MC1</b>	A	A	A	-
Intermediate frame shiny grey RAL 7037	<b>MC2</b>	A	A	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. ⇒	V-PQ 48-250 1668P	V-PQ 72-250 1602P	V-PQ 96-250 1605P	PQ 144-250 1621P
<b>HOUSING VARIANTS</b>					
	<b>Identification</b> + ↓				
<b>Glass Window</b>					
Standard version	<b>MG99</b>	N	N	N	N
Anti-glare glass	<b>MG1</b>	A	A	A	A
<b>Housing</b>					
Standard housing	<b>ML99</b>	N	N	N	N
Sheet metal housing with cone head rivets	<b>ML4</b>	-	A	A	N <sup>1)</sup>
Housing for Mauell-Grid	<b>ML5</b>	+	- <sup>2)</sup>	- <sup>2)</sup>	- <sup>3)</sup>
Housing for H&B Unibloc-Grid	<b>ML6</b>	+ <sup>4)</sup>	- <sup>2)</sup>	- <sup>2)</sup>	- <sup>3)</sup>
<b>Mounting</b>					
2 leaf springs	<b>MN2</b>	N	+	+	-
2 leaf springs for H&B Unibloc-Grid (bronze-springs)	<b>MN4</b>	A	-	-	-
4 leaf springs	<b>MN1</b>	A	A	A	-
Screw Clip S	<b>MN14</b>	A	N <sup>1)</sup>	N <sup>1)</sup>	-
Screw Clip G	<b>MN13</b>	-	-	-	N
Fastener B DIN 43 835	<b>MN11</b>	-	A <sup>5)</sup>	A <sup>5)</sup>	A
Subklew fastener (Screw Clip S without cone point)	<b>MN32</b>	A	A	A	-
Without fastener	<b>MN88</b>	+ <sup>6)</sup>	+	+	+
<b>Identification</b>					
Without Identification	<b>MZ99</b>	N	N	N	N
Identification on backside (specify in clear text)	<b>MZ998</b>	A	A	A	A
<b>Marker Pointer</b>					
Without marker pointer	<b>PM99</b>	N	N	N	N
Adjustable red index pointer	<b>PM1</b>	A	A	A	
<b>Label Strip</b>					
Without label strip	<b>SS99</b>	N	N	N	N
Label on front face (specify in clear text)	<b>SS992</b>	A	A	A	A
<b>Contact Protection</b>					
Without terminal cover	<b>VB99</b>	N	N	N	N
Overall terminal cover	<b>VB2</b>	A	A	A	A
Single terminal cover (Voltmeter and Ammeter ≤ 4 A)	<b>VB1</b>	+	+	+	+

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