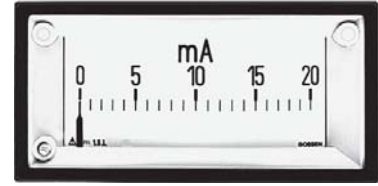


Vario-Series • Rectangular Panel Meters

For Direct Current or Direct Voltage



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



Technical Data

PFN 96 x 48

Front Dimensions Type	48 x 24 PF 48 x 24	72 x 36 PF 72 x 36	96 x 48 PFN 96 x 48	144 x 72 PF 144 x 72
Scale Length mm	29	44	65	96
Class	2.5	1.5	1.5	1.5
Weight approx. (kg)	0.07	0.2	0.45	1.0
Operating Voltage	100 V	600 V	600 V	150 V
Test Voltage	1.5 kV	5.8 kV	5.8 kV	2.2 kV
Front Housing-Panel Protection	IP 50	IP 52	IP 52	IP 50
Fasteners (see next page)	expanding spring	screw spindle	screw spindle	fastener C
Housing Material	sheet metal	polycarbonate	polycarbonate	sheet metal

Description

Analog panel meter with moving-coil movement

Display

Scale Division Coarse-fine
 Exception: special division for 48 x 24 mm meters
 Pointer Beam pointer with knife-edge
 Exception: Bar indicator for 48 x 24 mm meters

Mechanical Design

housing Material Polycarbonate, self-extinguishing and drip-proof per UL 94 V-0 or sheet metal housing (see above).
 Replaceable Glass windows and front frame
 ⇒ May only be replaced under voltage-free conditions!
 Terminals for sizes
 48 x 24 tab connectors 2.8 x 0.8
 72 x 36 tab connectors 6.3 x 0.8 or
 96 x 48 2 x 2.8 x 0.8 (IP 20 protection)
 144 x 72 terminal clip M 5
 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 / Power Consumption ¹⁾

Measuring Range	Front Dim. mm				Tolerance
	48 x 24	72 x 36	96 x 48	144 x 72	
100 µA	2400 Ω	2180 Ω	1920 Ω	2000 Ω	± 20 %
150 µA	1590 Ω	1040 Ω	2177 Ω	2000 Ω	
250 µA	950 Ω	458 Ω	1965 Ω	1080 Ω	
400 µA	283 Ω	155 Ω	84 Ω	497 Ω	
600 µA	140 Ω	67 Ω	77 Ω	163 Ω	
1 mA	66 Ω	18.5 Ω	76 Ω	69 Ω	
1.5 mA	30 Ω	11 Ω	72 Ω	26.5 Ω	
2 mA	17 Ω	8.5 Ω	75 Ω	20 Ω	
2.5 mA	11.3 Ω	6.5 Ω	90 Ω	10.8 Ω	
4 mA	7 Ω	4.5 Ω	74 Ω	7.1 Ω	
5 mA	5 Ω	5 Ω	60 Ω	5.8 Ω	± 30 %
6 mA	1.8 Ω	1.3 Ω	51 Ω	2.4 Ω	
10 mA	3.5 Ω	6 Ω	30 Ω	1.6 Ω	
15 mA	4 Ω	4 Ω	20 Ω	4 Ω	
20 mA	3 Ω	3 Ω	15 Ω	3 Ω	
4 ... 20 mA	3 Ω	3 Ω	18 Ω	3 Ω	
25 mA	2.4 Ω	2.4 Ω	12 Ω	2.4 Ω	
Voltage drop at > 25 mA / < 1 A	60 mV	73 mV	300 mV	60 mV	
> 25 mA / ≥ 1 A	60 mV		90 mV	60 mV	
Power consumption for connection to shunt (lead resistance 0.06 Ω)	6 mA	6 mA	6 mA	6 mA	
60 mV ... 400 mV	1 kΩ/V	1 kΩ/V	2.5 kΩ/V	1 kΩ/V	
> 400 mV	1 kΩ/V	1 kΩ/V	1 kΩ/V	1 kΩ/V	

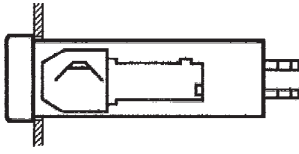
¹⁾ Indicated internal resistance is only valid for instruments with standard accuracy class. Please inquire regarding internal resistance (Ri) for moving-coil indicators with mechanical zero point at any desired scale value.

Vario-Series • Rectangular Panel Meters

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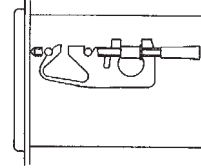


Expanding Springs



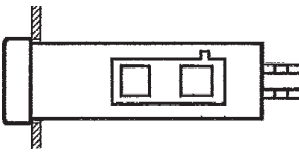
Control panel thickness ≥ 1 mm
Size 48 x 24 for mounting in DIN-Grid,
Siemens-Grid M 25 and Kreutzenbeck-Grid

Fastener B DIN 43 835



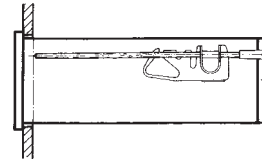
Control panel thickness 1 to 40 mm
Screw clamp M 4 for size 72 x 36 for mounting in
DIN-Grid

Catch Spring I



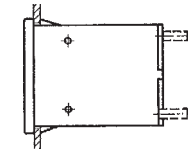
As option for size 48 x 24 for Mauell-Grid,
H & B Unibloc-Grid and Hein-Grid

Fastener C DIN 43 835



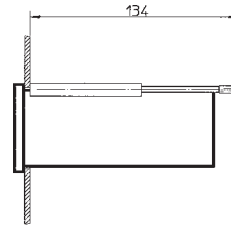
Control panel thickness 1 to 40 mm
Screw clamp M 5, longer version, for size 144 x 72 for mounting in
DIN-Grid

Slider



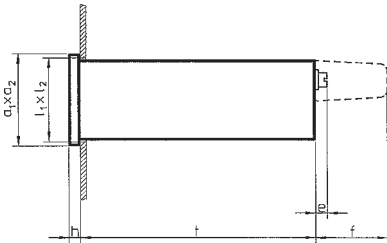
Control panel thickness 1 to 5 mm
As option for size 48 x 24 for DIN-Grid
For heightened requirements

Screw Spindle



Control panel thickness up to 40 mm
Screw spindle for size 96 x 48 for mounting in
DIN-Grid and all remaining grids

Basic Dimensions



Drawings to Scale (on request)

0101A247 for size 48 x 24
0101A203 for sizes 72 x 36 and 144 x 72

Ordering Example

Panel Meter 96 x 48 mm
0 ... 40 V Direct Voltage

Techn. Data Type: PFN 96 x 48	Order No. 1594P, DC40
---	---------------------------------

Front in mm	Nominal Dimensions		Cutout Dimensions $l_1 \times l_2$	Inst. Depth t	Terminals e		Connector contact protection $f =$ overall terminal cover
	$a_1 \times a_2$	h			$\leq 4A$	$> 4A$	
48 x 24	48 x 24	5	$45^{+0.6} \times 22.2^{+0.3}$	65	11	—	31
72 x 36	72 x 36	5	$68^{+0.7} \times 33^{+0.6}$	105	0	0	—
96 x 48	96 x 48	5	$92^{+0.8} \times 45^{+0.6}$	126	0	0	—
144 x 72	144 x 72	8	$138^{+1} \times 68^{+0.7}$	168	4	6	—



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	Type	PF 48 x 24	PF 72 x 36	PFN 96 x 48	PF 144 x 72
	Order No. →	1511P	1505P	1594P	1584P
	+ ↓				
Landscape	HQ1	N	N	N	N
Portrait	HQ2	+	+	+	+
Zero Point - at left (landscape)					
- at bottom (portrait)					
Direct Current					
Range:					
0 ... 100 μ A	CA100	A	A	A	A
0 ... 150 μ A	CA150	A	A	A	A
0 ... 250 μ A	CA250	A	A	A	A
0 ... 400 μ A	CA400	A	A	A	A
0 ... 600 μ A	CA600	A	A	A	A
0 ... > 100 μ A ... < 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	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 ¹⁾	CB...	A	A	A	A
Mech. suppressed					
4... 20 mA landscape:	BC10	A	A	A	A
4... 20 mA portrait:	BC14	A	A	A	A
Electr. suppressed					
0/4 ... 20 mA landscape:	BC25	A	-	-	A
0/4 ... 20 mA portrait:	BC27	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
0 ... 15 A	CC15	-	A	-	A
0 ... 25 A	CC25	-	A	-	A
0 ... 40 A	CC40	-	-	-	A
0 ... 60 A	CC60	-	-	-	A
0 ... > 1 A ... < 6 A ^{1) 2)}	CC...	A	A	A	A

1) Specify in clear text

2) > 1 A / < 25 A with type PF 72 x 36

> 1 A / < 60 A with type PF 144 x 72



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	Type Order No.	⇒	PF 48 x 24 1511P	PF 72 x 36 1505P	PFN 96 x 48 1594P	PF 144 x 72 1584P
	+ ↓					
Landscape	HQ1		N	N	N	N
Portrait	HQ2		+	+	+	+
Zero Point - at left (Landscape) - at bottom (Portrait)						
Connection to Shunt (direct current)						
... A / 60 mV	BE3		A	A	A	A
... A / 150 mV	BE4		A	A	A	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	CG500		+	+	+	+
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		+	+	+	+
6 kA	CH6		+	+	+	+
10 kA	CH10		+	+	+	+
> 1 kA ^{1) 2)}	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
0 ... > 100 mV ... < 600 mV ¹⁾	DB...		—	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
0 ... 250 V	DC250		—	A	A	—
0 ... 400 V	DC400		—	A	A	—
0 ... 500 V	DC500		—	A	A	—
0 ... 600 V	DC600		—	A	A	—
0 ... > 1 V ... < 600 V ^{1) 2)}	DC...		—	A	A	—

1) Specify in clear text

2) For higher voltages see voltage dividers



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	Type Order No. ⇒	PF 48 x 24 1511P	PF 72 x 36 1505P	PFN 96 x 48 1594P	PF 144 x 72 1584P
Identification + ↓					
Landscape	HQ1	N	N	N	N
	HQ2	+	+	+	+
Portrait	HQ1	N	N	N	N
	HQ2	+	+	+	+
GENERAL VARIANTS					
Zero Point					
Zero point at left (landscape)	BC1	N	N	N	N
Zero point at bottom (portrait)	BC4	+	+	+	+
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 (landscape), mech. suppressed (not for 4-20 mA)	BC16	A	A	A	A
Zero point at bottom (portrait), mech. suppresses (not for 4-20 mA) (max. suppression 20 %; measuring range $\geq 250 \mu\text{A}$ / $\geq 250 \text{ mV}$. Ri 1 k Ω /V; specify in clear text)	BC18	A	A	A	A
Internal Resistance with Voltmeters					
Standard (see technical data)	IR99	N	N	N	N
Ri approx. 10 k Ω /V (measuring input $\geq 2 \text{ V}$; exception: $\geq 5 \text{ V}$ / $\leq 150 \text{ V}$ with 96 x 48 a. 72 x 36)	IR10	A	A	A	A
Ri = 1 k Ω /V $\pm 1\%$ at nominal temperature (measuring input $\geq 1 \text{ V}$)	IR30	A	-	-	A
Ri = 10 k Ω /V $\pm 1\%$ at nominal temperature (measuring input $\geq 2 \text{ V}$)	IR40	A	-	-	A
Potentiometer for Adjustment with Voltmeters					
Voltmeter without potentiometer for adjustment	MP99	N	N	N	N
Voltmeter with potentiometer for adjustment	MP1	-	-	A	A
Adjustment range $\pm 15\%$ (measuring input $\geq 6 \text{ V}$ / $\leq 400 \text{ V}$; class 1.5 only; Ri ¹⁾ according to list)					
Lead Resistance when connected to					
Shunts ...A/60 mV a. ...A/150 mV					
Standard version 0.06 Ω	IG99	N	N	N	N
Other than 0.06 Ω (specify in clear text), Limiting value: ...A/60 mV for class 1.5 max. 1 Ω ...A/150 mV for class 1.5 max. 7 Ω	IG999	A	A	A	A
Accuracy					
Class 2.5	IE25	N	-	-	-
Class 1.5 (for sizes 48 x 24 / 24 x 48 available only in combination with tube pointer)	IE15	A	N	N	N
Class 1.0 (measuring input $\geq 40 \mu\text{A}$ / $\geq 60 \text{ mV}$)	IE10	-	-	-	A
Position of Use					
Control panel vertical	LA1	N	N	N	N
Control panel horizontal	LA2	+	+	+	+
Other	LA999	A	A	A	A
(Please specify angle between scale and horizontal)					
Special Features					
Normal vibration and shock resistance	LN99	N	N	N	N
Suitable for marine use with the following approvals: Germanischer Lloyd (class 1.5 only)	LN2	-	-	-	A ²⁾
Vibration resis. 2.5 g, shock resis. 30 g	LN56	A ³⁾	A	A	A

1) Exception: The standard version (size 96 x 48) of the potentiometer for adjustment has a current consumption of approx. 100 μA

2) 0 ... 1 mA, 0 ... 20 mA, 4 ... 20 mA, $\geq 1.5 \text{ V}$

3) Available only in combination with slider



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	Type Order No. ⇒	PF 48 x 24 1511P	PF 72 x 36 1505P	PFN 96 x 48 1594P	PF 144 x 72 1584P
Identification + ↓					
SCALE VARIANTS	Landscape	HQ1	N	N	N
	Portrait	HQ2	+	+	+
Scale					
In accordance with measuring input	GF99	N	N	N	N
Blank scale (lower/upper value markings, company logos, symbols)	GF28	+	+	+	+
Scale Characteristics					
Current / Voltage linear	SD1	N	N	N	N
According to curve (not current / voltage linear)	SD6	A	A	A	A
Division and Pointer					
Single division	GD1	N	N	N	N
Double division	GD2	A	A	A	A
Coarse-fine division	SE1	-	N	N	N
Fine division	SE3	-	-	-	A
Special division	SE5	N	-	-	-
Beam pointer with knife-edge for single division	RA1	-	N	-	N
Beam pointer with knife-edge for double division	RA2	-	-	-	+
Beam pointer with knife-edge for single division and double division	RA4	-	N	N	-
Knife-edge pointer for single division	RA10	-	-	-	A
Knife-edge pointer for double division	RA11	-	-	-	A
Bar indicator for single division	RA40	N	-	-	-
Tube pointer for single division	RA30	A	-	-	-
Tube pointer for double division	RA31	A	-	-	-
Additional Imprint					
Second numbering (specify in clear text)	SK992	A	A	A	A
Inscription:					
Without additional inscription	SM99	N	N	N	N
Inscription ≤ 15 characters German	SM991	A	A	A	A
Inscription > 15 characters German	SM992	A	A	A	A
Inscription ≤ 15 characters other language	SM993	A	A	A	A
Inscription > 15 characters other language	SM994	A	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	A
Coloured sectors yellow RAL 1021, green RAL 6018 or red RAL 2002 (specify in clear text)	SU991	A	A	A	A



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	Type Order No. ⇒	PF 48 x 24 1511P	PF 72 x 36 1505P	PFN 96 x 48 1594P	PF 144 x 72 1584P
	Identification + ↓				
SCALE VARIANTS	landscape	HQ1	N	N	N
	portrait	HQ2	+	+	+
Scale / Pointer Colours					
Scale white; imprint and pointer black	SG99	N	N	N	N
Scale balck; imprint and pointer white	SG1	A ¹⁾	A ¹⁾	A ¹⁾	A ¹⁾
Scale black; imprint and pointer yellow	SG2	A ¹⁾	A ¹⁾	A ¹⁾	A ¹⁾
Scale black; imprint white, pointer yellow	SG3	A ¹⁾	A ¹⁾	A ¹⁾	A ¹⁾
Dial Illumination					
Without Dial Illumination	PA99	N	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.					
Light conductor with mask, dial illumination white	PA6	-	-	-	A ²⁾
Light conductor with mask, dial illumination red	PA7	-	-	-	A ²⁾
Note: Completion with Voltage Order No. PB... and SG necessary. (SG 99 as light conductor with mask not available)					
Voltage for Dial Illumination					
24 V	PB5	-	+	+	+
28 V	PB6	-	+	+	+

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

2) Prices on request



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	Type Order No. ⇒	PF 48 x 24 1511P	PF 72 x 36 1505P	PFN 96 x 48 1594P	PF 144 x 72 1584P
HOUSING VARIANTS					
	Identification + ↓				
Landscape	HQ1	N	N	N	N
	HQ2	+	+	+	+
Portrait	LB99	N	N	N	N
	LB1	A	A	A	A
Application					
Standard version					
conditionally tropic resistant					
Protection					
According to list	LH99	N	N	N	N
Front housing-panel protection IP54, clamps IP00	LH21	A	-	-	A
Front housing-panel protection IP54, clamps IP20	LH22	-	A	A	-
Earthquake-proof (possible combination: LH99 or LH21)	LH10	A	A	A	A
Front Frame Colour					
Matt black	MA2	N	N	N	N
Matt grey RAL 7037	MA11	A	A	A	A
Matt stone grey RAL 7032	MA12	A	A	A	A
Matt dark beige approx. RAL 1019	MA21	A	A	A	A
Matt light grey RAL 7035	MA14	A	-	A	A
Intermediate Frame, Height 3 mm					
Without intermediate frame	MC99	N	N	N	N
Intermediate frame shiny black	MC1	A	-	-	-
Intermediate frame shiny grey RAL 7037	MC2	A	-	-	-
<i>Intermediate frame with size 48 x24 available only in combination with shortened expanding spring (MN 24)</i>					
Glass Window					
Standard version	MG99	N	N	N	N
Anti-glare glass	MG1	A	A	A	A
Fasteners					
Expanding spring	MN20	N	-	-	-
Shortened expanding spring (necessary when version with intermediate frame)	MN24	+	-	-	-
Catch spring	MN21	+	-	-	-
Subklew (stiled slider)	MN32	+	-	-	-
Slider	MN50	+	-	-	-
Angled slider for APE-Grid	MN51	+	-	-	-
Fastener B DIN 43 835	MN11	-	-	-	-
Screw spindle	MN22	-	N	N	-
Fastener C	MN12	-	-	-	N
Identification					
Without identification	MZ99	N	N	N	N
Identification on the back (specify in clear text)	MZ998	A	A	A	A
Inscription Stripes					
Without inscription stripes	SS99	N	N	N	N
Inscription on front face on top (specify in clear text)	SS991	A ¹⁾	-	A ¹⁾	A ¹⁾
Inscription on front face at bottom (specify in clear text)	SS992	A ¹⁾	A ¹⁾	A ¹⁾	A ²⁾
Contact Protection					
Without terminal cover	VB99	N	N	N	N
Overall terminal cover	VB2	A	-	-	-
Single terminal cover (Voltmeter and Ammeter ≤ 4 A)	VB1	+	+	+	+

1) For landscape only

2) For portrait only

Vario-Series • Rectangular Panel Meters

For Direct Current or Direct Voltage



Moving-coil movement, slim-line scale
Front frame matt black



PFFN 96 x 24

Technical Data

Front Dimensions mm Type	48 x 18.5 PFF 00	72 x 18.5 PFF 0	72 x 24 PFF 72 x 24	96 x 24 PFFN 96 x 24	144 x 36 DPR 144 F
Scale Length mm	29	50	50	65	96
Class	2.5	2.5	2.5	1.5	1.5
Weight approx. (kg)	0.05	0.09	0.1	0.13	0.5
Operating Voltage	100 V	150 V	100 V	300 V	150 V
Test Voltage	1.5 kV	2.2 kV	1.5 kV	3.5 kV	2.2 kV
Front Housing-Panel Protection	IP 50	IP 50	IP 50	IP 52	IP 50
Fasteners (see next page)	slider	slider	exp. spring	screw spindle	screw spindle
Housing Material	sheet metal	sheet metal	sheet metal	polycarbonate	sheet metal

Description

Analog panel meter with moving-coil movement

Internal Resistance / Voltage Drop / Power Consumption ¹⁾

Display

Scale Division	for sizes	
	48 x 18.5	} Special division
	72 x 18.5	
	72 x 24	
	96 x 24	
	144 x 36	} coarse-fine
Pointer	for sizes	
	48 x 18.5	} Bar indicator
	72 x 18.5	
	72 x 24	
	96 x 24	
	144 x 36	Beam pointer with knife-edge
		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).
Replaceable	Glass window and front frame. ⇒ May only be replaced under voltage-free conditions!
Terminals	for sizes
	48 x 18.5 tab connectors 2.8 x 0.8
	72 x 18.5 tab connectors 2.8 x 0.8
	72 x 24 tab connectors 2.8 x 0.8
	96 x 24 tab connectors 6.3 x 0.8 or 2 x 2.8 x 0.8 (IP20 protection)
	144 x 36 tab connectors 4.8 x 0.8
Contact Protection	available as option (not for 144 x 36)

Reference Conditions

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

Measuring Range	Front Dimensions mm			Tolerance
	48 x 18.5 72 x 18.5 72 x 24	96 x 24	144 x 36	
	Ri	Ri	Ri	
100 µA	2400 Ω	1920 Ω	1706 Ω	± 20 %
150 µA	1590 Ω	2177 Ω	1706 Ω	
250 µA	950 Ω	1965 Ω	525 Ω	
400 µA	283 Ω	84 Ω	290 Ω	
600 µA	140 Ω	77 Ω	110 Ω	
1 mA	66 Ω	76 Ω	110 Ω	
1.5 mA	30 Ω	72 Ω	30 Ω	
2 mA	17 Ω	75 Ω	6 Ω	
2.5 mA	11.3 Ω	90 Ω	6 Ω	
4 mA	7 Ω	74 Ω	4 Ω	
5 mA	5 Ω	60 Ω	4 Ω	
6 mA	1.8 Ω	51 Ω	3 Ω	
10 mA	3.5 Ω	30 Ω	3 Ω	
15 mA	4 Ω	20 Ω	4 Ω	
20 mA	3 Ω	15 Ω	3 Ω	
4 ... 20 mA	3 Ω	18 Ω	4 Ω	
25 mA	2.4 Ω	12 Ω	2.4 Ω	
Voltage drop at > 25 mA / < 1A	60 mV	300 mV	60 mV	± 20 %
> 1A	60 mV	90 mV	60 mV	
Power consumption for connection to shunt	6 mA	6 mA	5 mA	
60 mV ... 400mV	1 kΩ/V	2.5 kΩ/V	1 Ω/mV	± 20 %
> 400 mV	1 kΩ/V	1 kΩ/V	1 kΩ/V	

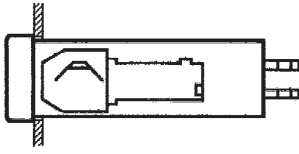
¹⁾ Indicated internal resistance is only valid for instruments with standard accuracy class. Please inquire regarding internal resistance (Ri) for moving-coil indicators with mechanical zero point at any desired scale value.

Vario-Series • Rectangular Panel Meters

For Direct Current or Direct Voltage

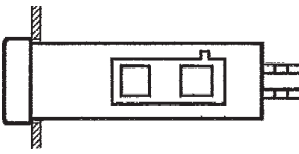


Expanding Springs



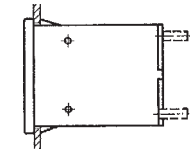
Control panel thickness ≥ 1 mm
 Size 72 x 24 for mounting in DIN-Grid,
 Siemens-Grid M 25 and Kreutzenbeck-Grid

Catch Spring I



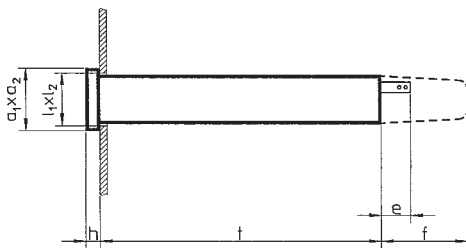
As option for size 72 x 24 for Mauell-Grid,
 H & B Unibloc-Grid and Hein-Grid

Slider

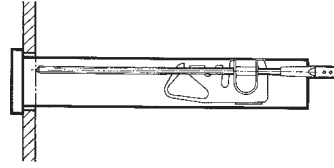


Control panel thickness 1 to 5 mm
 For sizes 48 x 18.5 and 72 x 18.5 for mounting in DIN-Grid,
 Also available as option for size 72 x 24.

Basic Dimensions

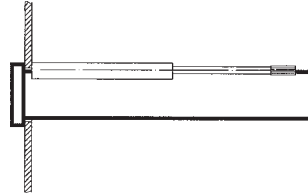


Fastener C DIN 43 835



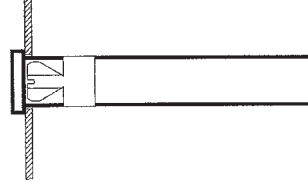
Control panel thickness 1 to 40 mm
 Screw clamp M5, longer version, for size 144 x 36 for mounting in
 DIN-Grid.

Screw Spindle



Control panel thickness up to 40 mm
 Screw spindle for size 96 x 24 for mounting in
 DIN-Grid and all remaining grids.

Clamping Springs



Control panel thickness ≥ 1 mm
 Available as option for size 96 x 24, retractable from front face,
 for mounting in DIN-Grid

Drawing to Scale (on request)

1303A 1839H0 for size 96 x 24

Drawing to Scales (on request)

0101A226 for sizes 48 x 18.5 and 72 x 18.5

0101A247 for size 72 x 24

95.207-95 for size 144 x 36

Ordering Example

Size 96 x 24 mm

0 ... 40 V Direct Voltage

Techn. Data Type: PFFN 96 x 24	Order No. 1524P, DC40
-----------------------------------	--------------------------

Front in mm	Nominal Dimensions		Cutout Dimensions $l_1 \times l_2$	Inst. Depth t	Terminals e	Contact Protection at Terminals f = Full Contact Protection
	$a_1 \times a_2$	h				
48 x 18.5	48 x 18.5	5	$44.8^{+0.15} \times 17.3^{+0.15}$	56	12	—
72 x 18.5	72 x 18.5	5	$69.3^{+0.15} \times 17.3^{+0.15}$	82	12	—
72 x 24	72 x 24	5	$68^{+0.7} \times 22^{+0.3}$	90	11	31
96 x 24	96 x 24	5	$92^{+0.8} \times 22^{+0.3}$	126	0	—
144 x 36	144 x 36	8	$138^{+1} \times 32.7^{+0.6}$	202	5	—

Vario-Series • Rectangular Panel Meters

For Direct Current or Direct Voltage



Moving-coil movement, slim-line scale
Front frame matt black

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

	Front Dim. mm	48 x 18.5	72 x 18.5	72 x 24	96 x 24	144 x 36
Type		PFF 00	PFF 0	PFF 72 x 24	PFFN 96 x 24	DPR 144 F
Order No. ⇒		1194P	1196P	1515P	1524P	21102...
	+ ↓					+ ↓
Landscape	HQ1	N	N	N	N	N
Portrait	HQ2	+	+	+	+	+
Zero Point - at left (landscape)						
- at bottom (portrait)						
Direct Current						
Range:						
0 ...100 µA	CA100	A	A	A	A	...34240
0 ...150 µA	CA150	A	A	A	A	...34270
0 ...250 µA	CA250	A	A	A	A	...34300
0 ...400 µA	CA400	A	A	A	A	...34320
0 ...600 µA	CA600	A	A	A	A	...34350
<hr/>						
0 ... > 100 µA ... < 1 mA ¹⁾	CA...	A	A	A	A	...31005
<hr/>						
0 ... 1 mA	CB1	+	+	+	+	...35110
0 ... 1.5 mA	CB1.5	+	+	+	+	...35120
0 ... 2.5 mA	CB2.5	+	+	+	+	...35130
0 ... 4 mA	CB4	+	+	+	+	...35140
0 ... 5 mA	CB5	+	+	+	+	...35150
0 ... 6 mA	CB6	+	+	+	+	...35160
0 ... 10 mA	CB10	+	+	+	+	...35170
0 ... 15 mA	CB15	A	A	A	A	...35180
0 ... 20 mA	CB20	A	A	A	A	...35190
0 ... 25 mA	CB25	A	A	A	A	...35200
0 ... 40 mA	CB40	A	A	A	A	...35210
0 ... 50 mA	CB50	A	A	A	A	...35220
0 ... 60 mA	CB60	A	A	A	A	...35230
0 ... 100 mA	CB100	A	A	A	A	...35240
0 ... 150 mA	CB150	A	A	A	A	...35270
0 ... 250 mA	CB250	A	A	A	A	...35300
0 ... 400 mA	CB400	A	A	A	A	...35320
0 ... 600 mA	CB600	A	A	A	A	...35350
<hr/>						
0 ... > 1 mA ... < 1 A ¹⁾	CB...	A	A	A	A	...31005
<hr/>						
Mech. suppressed						
4...20 mA landscape :	BC10	A	A	A	A	...35195
4...20 mA portrait :	BC14	A	A	A	A	...35196
Electr. suppressed						
0/4...20 mA landscape :	BC25	A	A	A	-	...35199
0/4...20 mA portrait :	BC27	A	A	A	-	...35198
<hr/>						
0 ... 1 A	CC1	A	A	A	A	...36110
0 ... 1.5 A	CC1.5	A	A	A	A	...36120
0 ... 2.5 A	CC2.5	A	A	A	A	...36130
0 ... 4 A	CC4	A	A	A	A	...36140
<hr/>						
0 ... > 1 A ... < 4 A ¹⁾	CC...	A	A	A	A	...31005

1) Specify in clear text



Vario-Series • Rectangular Panel Meters

For Direct Current or Direct Voltage

Moving-coil movement, slim-line scale

Front frame matt black

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

	Front Dim. mm	48 x 18.5	72 x 18.5	72 x 24	96 x 24	144 x 36
	Type	PFF 00	PFF 0	PFF 72 x 24	PFFN 96 x 24	DPR 144 F
	Order No. ⇒	1194P	1196P	1515P	1524P	21102...
		+ ↓				+ ↓
	Landscape	HQ1	N	N	N	N
	Portrait	HQ2	+	+	+	+
Zero Point - at left (landscape)						
- at bottom (portrait)						
Connection to Shunt (direct current)						
... A / 60 mV	BE3	A	A	A	A	...32230
... A / 150 mV	BE4	A	A	A	A	...32270
... A / ... > 60 mV ¹⁾	BE981	A	A	A	A	...31005
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	CG500	+	+	+	+	+
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	+	+	+	+	+
6 kA	CH6	+	+	+	+	+
10 kA	CH10	+	+	+	+	+
> 1 kA ¹⁾	CH...	+	+	+	+	+
Direct Voltage						
Range:						
0 ... 60 mV	DB60	A	A	A	A	...31230
0 ... 100 mV	DB100	A	A	A	A	...31240
0 ... 150 mV	DB150	A	A	A	A	...31270
0 ... 250 mV	DB250	A	A	A	A	...31300
0 ... 400 mV	DB400	A	A	A	A	...31320
0 ... 600 mV	DB600	A	A	A	A	...31350
0 ... > 60 mV... < 1 V ¹⁾	DB...	A	A	A	—	...31005
0 ... > 100 mV... < 600 mV ¹⁾	DB...	—	—	—	A	...31005
0 ... 1 V	DC1	A	A	A	A	...33110
0 ... 1.5 V	DC1.5	A	A	A	A	...33120
0 ... 2.5 V	DC2.5	A	A	A	A	...33130
0 ... 3 V	DC3	A	A	A	A	...33135
0 ... 4 V	DC4	A	A	A	A	...33140
0 ... 6 V	DC6	A	A	A	A	...33160
0 ... 10 V	DC10	A	A	A	A	...33170
0 ... 15 V	DC15	A	A	A	A	...33180
0 ... 25 V	DC25	A	A	A	A	...33200
0 ... 40 V	DC40	A	A	A	A	...33210
0 ... 60 V	DC60	A	A	A	A	...33230
0 ... 100 V	DC100	A	A	A	A	...33240
0 ... 150 V	DC150	—	A	—	A	...33270
0 ... 250 V	DC250	—	—	—	A	—
0 ... 400 V	DC400	—	—	—	A	—
0 ... 500 V	DC500	—	—	—	A	—
0 ... 600 V	DC600	—	—	—	A	—
0 ... > 1 V ... < 600 V ^{1) 2)}	DC...	—	—	—	A	—

1) Specify in clear text

2) For higher voltages see voltage dividers



Vario-Series • Rectangular Panel Meters

For Direct Current or Direct Voltage

Moving-coil movement, slim-line scale

Front frame matt black

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Order No. with Identification No. N (standard model) can be left out.

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

Front Dim. mm	48 x 18.5	72 x 18.5	72 x 24	96 x 24	144 x 36	
Type	PFF 00	PFF 0	PFF 72 x 24	PFFN 96 x 24	DPR 144 F	
Order No. ⇒	1194P	1196P	1515P	1524P	21102...	
	+ ↓					
Landscape	HQ1	N	N	N	N	
Portrait	HQ2	+	+	+	+	
GENERAL VARIANTS						
Zero pint at left (landscape)	BC1	N	N	N	N	
Zero point at bottom (portrait)	BC4	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 the left (landscape), mech. suppressed (not 4-20 mA)	BC16	A	A	A	A	
Zero point at bottom (portrait),	BC18	A	A	A	A	
(Max. suppression 20 %; measuring range $\geq 250 \mu\text{A}$ / $\geq 250 \text{ mV}$, Ri 1 k Ω /V; specify in clear text)						
Internal Resistance for Voltmeters						
Standard (see technical data)	IR99	N	N	N	N	
Ri approx. 10 k Ω /V (measuring input $\geq 2 \text{ V}$; Exception: $\geq 5 \text{ V}$ / $\leq 150 \text{ V}$ size 96 x 24)	IR10	A	A	A	A	
Ri = 1 k Ω /V $\pm 1\%$ at nominal temperature (measuring input $\geq 1 \text{ V}$)	IR30	A	A	A	A	
Ri = 10 k Ω /V $\pm 1\%$ at nominal temperature (measuring input $\geq 2 \text{ V}$)	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	-	-	-	-	
Adjustment range $\pm 15\%$ (measuring input $\geq 6 \text{ V}$ / $\leq 400 \text{ V}$; Class 1.5 only; Ri according to list ¹⁾)						
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). Limiting values: ...A / 60 mV for class 1.5 max. 1 Ω ...A / 150 mV for class 1.5 max. 7 Ω	IG999	A	A	A	A	
Accuracy						
Class 2.5	IE25	N	N	N	-	
Class 1.5	IE15	A ²⁾	A ²⁾	A ²⁾	N ³⁾	
Class 1.0 (measuring input $\geq 100 \mu\text{A}$ / $\geq 60 \text{ mV}$)	IE10	-	-	-	A	
Position of Use						
Control panel vertical	LA1	N	N	N	N	
Control panel horizontal	LA2	+	+	+	+	
Other	LA999	A	A	A	A	
(Please specify angle between scale and horizontal)						
Special Features						
Normal vibration and shock resistance	LN99	N	N	N	N	
Vibration resis. 2.5 g, shock resis. 30 g	LN56	A	A	A ⁴⁾	-	

1) Exception: The standard version (size 96 x 48) of the potentiometer for adjustment has a current consumption of approx. 100 μA

2) Available only in combination with tube pointer

3) Standard version without extra charge

4) Available only in combination with slider



Vario-Series • Rectangular Panel Meters

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Front frame matt black

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	Front Dim. mm	48 x 18.5	72 x 18.5	72 x 24	96 x 24	144 x 36
Type		PFF 00	PFF 0	PFF 72 x 24	PFFN 96 x 24	DPR 144 F
Order No. ⇒		1194P	1196P	1515P	1524P	21102...
	+ ↓					
Landscape	HQ1	N	N	N	N	N
Portrait	HQ2	+	+	+	+	+
SCALE VARIANTS						
Scale						
In accordance with measuring input	GF99	N	N	N	N	N
Blank scale (lower/upper value markings, company logos, symbols)	GF28	+	+	+	+	+
Scale Characteristics						
Current / Voltage proportional	SD1	N	N	N	N	N
According to curve (not current / voltage proportional)	SD6	A	A	A	A	A
Division and Pointer						
Single division	GD1	N	N	N	N	N
Double division	GD2	A	A	A	A	A
Special division	SE5	N	N	N	N	A
Coarse-fine division	SE1	-	-	-	-	N
Bar indicator for single division	RA40	N	N	N	-	-
Tube pointer for double division	RA31	A	A	A	-	-
Beam pointer with knife-edge for single and double division	RA4	-	-	-	N	-
Knife-edge pointer for single division	RA10	-	-	-	-	N
for double division	RA11	-	-	-	-	A
Additional Imprint						
Second numbering (specify in clear text)	SK992	A	A	A	A	A
Inscription:						
Without additional inscription	SM99	N	N	N	N	N
Inscription ≤ 15 characters German	SM991	A	A	A	A	A
> 15 characters German	SM992	A	A	A	A	A
≤ 15 characters other language	SM993	A	A	A	A	A
> 15 characters other language	SM994	A	A	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	A	A
Coloured sector yell. RAL 1021, green RAL 6018 or red RAL 2002 (specify in clear text)	SU991	A	A	A	A	A



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	Front Dim. mm	48 x 18.5	72 x 18.5	72 x 24	96 x 24	144 x 36
Type		PFF 00	PFF 0	PFF 72 x 24	PFFN 96 x 24	DPR 144 F
Order No. ⇒		1194P	1196P	1515P	1524P	21102...
	+ ↓					
Landscape	HQ1	N	N	N	N	N
Portrait	HQ2	+	+	+	+	+
SCALE VARIANTS						
Scale / Pointer Colours						
Scale white; imprint and pointer black	SG99	N	N	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⁾
Dial Illumination						
Without dial illumination	PA99	N	N	N	N	N
With direct dial illumination	PA1	A	A	A	A	-
(Plexiglass scale, scale and dial illumination white)						
Note: Completion with Voltage Order No. PB... necessary.						
Voltage for Dial Illumination						
24 V	PB5	-	-	-	+	-
28 V	PB6	-	-	-	+	-
24 V (2 x 12 V-lamps connected in series)	PB7	+	+	+	-	-
28 V (2 x 14 V-lamps connected in series)	PB8	+	+	+	-	-

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



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

	Front Dim. mm	48 x 18.5	72 x 18.5	72 x 24	96 x 24	144 x 36
Type		PFF 00	PFF 0	PFF 72 x 24	PFFN 96 x 24	DPR 144 F
Order No. ⇒		1194P	1196P	1515P	1524P	21102...
	+ ↓					
Landscape	HQ1	N	N	N	N	N
Portrait	HQ2	+	+	+	+	+
HOUSING VARIANTS						
Application						
Standard version	LB99	N	N	N	N	N
Tropic resistant	LB1	A	A	A	A	A
Protection						
Standard (see technical data)	LH99	N	N	N	N	N
Front housing-panel protection IP54, con. IP00	LH21	-	-	A	-	A
Front housing-panel protection IP54, con. IP20	LH22	-	-	-	A	-
Earthquake-proof (possible combination: LH99 or LH21)	LH10	-	-	-	A	-
Front Frame Colour						
Matt black	MA2	N	N	N	N	N
Matt grey RAL 7037	MA11	A	A	A	A	A
Matt stone grey RAL 7032	MA12	-	-	A	A	-
Matt light grey RAL 7035	MA14	-	-	A	A	-
Matt dark beige approx. RAL 1019	MA21	-	-	A	A	-
Glass Window						
Standard version	MG99	N	N	N	N	N
Anti-glare glass	MG1	A	A	A	A	A
Mounting						
Slider	MN50	N	N	A	-	-
Expanding spring	MN20	-	-	N	-	-
Catch spring	MN21	-	-	+	-	-
Screw spindle	MN22	-	-	-	N	N
Clamping Spring	MN23	-	-	-	+	-
Fastener C	MN12	-	-	-	-	-
Subklew (stiled slider)	MN32	-	-	A	-	-
Angled slider for APE-Grid	MN51	-	-	A	-	-
Identification						
Without identification	MZ99	N	N	N	N	N
Identification on the back (specify in clear text)	MZ998	A	A	A	A	A
Label Strip						
Without label strip	SS99	N	N	N	N	N
Label on front face on top (spec. in clear text)	SS991	-	-	A ¹⁾	A ¹⁾	-
Label on front face at bottom (specify in clear text)	SS992	-	-	A ¹⁾	A ¹⁾	-
Contact Protection						
Without terminal cover	VB99	N	N	N	N	N
Overall terminal cover	VB2	-	-	A	-	-
Single terminal cover	VB1	+	+	+	+	-

1) Available only for landscape format