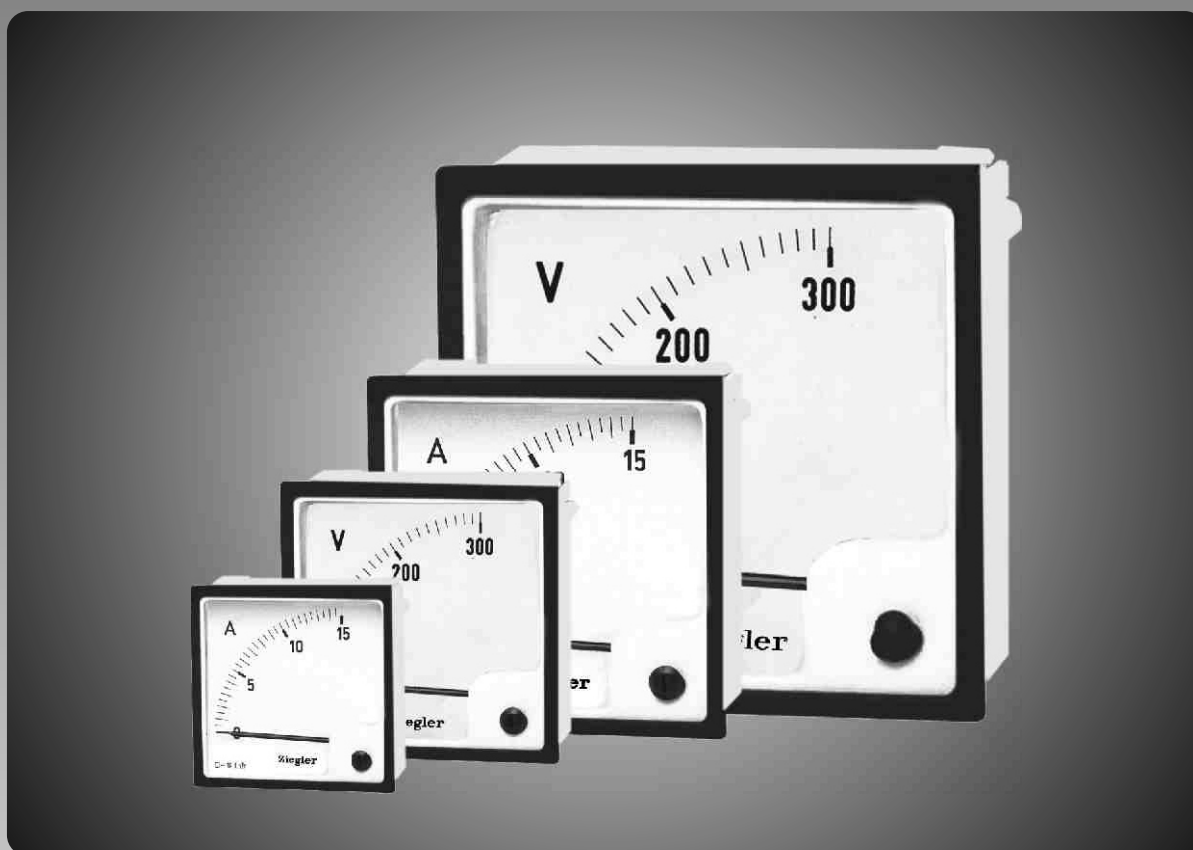


DS 48
DS 72
DS 96
DS 144



Data Sheet

Analogue Meters with
Moving - Coil Movement



Application

The moving-coil panel meters, DS 48/72/96/144 housed in moulded polycarbonate cases are suitable for the measurement of DC currents and voltages.

These instruments offer several advantages in switchboards and generating Set Panels. Number of meters can be mounted in a single cutout (mosaic mounting). Front glass, Bezel and the dial can easily be replaced.

Movement

Moving coil movement has pivots of very high hardness. Movement is suspended between spring loaded sapphire jewels. Movement is properly shielded & critically damped by eddy currents induced in coil former.

Mechanical Data

Case details	Moulded square case suitable for mounting in control / switchgear panels, machinery consoles.
Case material	Glass filled polycarbonate, Flame retardant and drip proof as per UL 94 V-O
Front facia	Glass
Colour of bezel	Black
Position of use	Vertical
Panel fixing	Swivel screw
Mounting	Stackable in a single cutout
Panel thickness	≤ 40 mm
Terminals	
Voltmeters and Ammeters < 6A	Hexagon studs, M4 screws and wire clamps E3 (DIN 46282)
Ammeters ≥ 6A	Threaded studs M6 with nuts
Ammeters > 60A	Threaded studs M8 with nuts

Electrical Data

Measured quantity	: DC voltage or current
Overload capacity	(acc. to IEC 51)
Continuously	: 1.2 times rated voltage / current
Short duration	: 2 times rated voltage, 5 s max 10 times rated current, 5 s max
Enclosures code (IEC 529)	: IP 52 case IP 00 for terminals without back cover IP 20 for terminals with back cover
Insulation class	: Group A according to VDE 0110
Rated insulating voltage	DS48 DS 72/96/144 660 V 1000 V
Proof Voltage	2 kV 3 kV
Installation category	600 V CAT III (IEC 1010)
Insulation resistance	> 50 Mohm at 500 V d.c.

⁴ Accuracy class 2.5

⁵ Not applicable for PQ 144

⁶ Total lead resistance of 0.035 ohm is considered for mV ranges while calibration

⁷ Not applicable for PQ 48

Standard Measuring Ranges

D.C. Current		D.C. Voltage	
Rated Value	Approx voltage drop	Rated Value	Sensitivity (±10%)
15mA ^{4 5}	140 mV	15 mV ⁵	3.33 kohm/V
25 mA ^{4 5}	240 mV	25 mV ⁵	3.33 kohm/V
40 mA ⁴	374 mV	40 mV	3.33 kohm/V
50 mA ⁴	424 mV	50 mV	3.33 kohm/V
60 mA ⁴	600 mV	60 mV	1 kohm/V
100 mA	400 mV	75 mV	1 kohm/V
150 mA	600 mV	100 mV	1 kohm/V
250 mA	140 mV	150 mV	1 kohm/V
400 mA	540 mV	250 mV	1 kohm/V
500 mA	540 mV	400 mV	1 kohm/V
600 mA	540 mV	600 mV	1 kohm/V
1 mA	37 mV	1 V	1 kohm/V
1.5 mA	196 mV	1.5 V	1 kohm/V
2.5 mA	196 mV	2.5 V	1 kohm/V
4 mA	196 mV	4 V	1 kohm/V
5 mA	196 mV	6 V	1 kohm/V
6 mA	196 mV	10 V	1 kohm/V
10 mA	11 mV	15 V	1 kohm/V
15 mA	60 mV	25 V	1 kohm/V
20 mA	60 mV	30 V	1 kohm/V
25 mA	60 mV	40 V	1 kohm/V
40 mA	60 mV	50 V	1 kohm/V
60 mA	60 mV	60 V	1 kohm/V
100 mA	60 mV	100 V	1 kohm/V
150 mA	60 mV	150 V	1 kohm/V
250 mA	60 mV	200 V	1 kohm/V
400 mA	60 mV	250 V	1 kohm/V
600 mA	60 mV	300 V	1 kohm/V
1 A	60 mV	400 V	1 kohm/V
1.5 A	60 mV	500 V	1 kohm/V
4 A	60 mV	600 V	1 kohm/V
5 A	60 mV	For use on external shunt	
6 A	72 mV		
10 A	60 mV	60 mV ⁶	1 kohm/V
15 A	60 mV	75 mV ⁶	1 kohm/V
20 A	60 mV	150 mV ⁶	1 kohm/V
25 A	60 mV		
30 A	60 mV		
40 A	60 mV		
60 A	72 mV		
100 A ⁷	60 mV		
For use on transducer 4-20 mA	60 mV		

Scale and pointer

Pointer	Knife-edge pointer
Pointer deflection	0 90°
Scale characteristics	Linear
Scale division	Coarse-fine
Scale length	DS 48 DS 72 DS 96 DS 144 41mm 63mm 97mm 146mm
interchangeability	interchangeable

Accuracy at Reference Conditions

Accuracy class	1.5 according to IEC 51 / DIN EN 60051
Reference conditions	
Ambient temperature	23°C ± 2°C
Position of use	Nominal position ± 1°
Input	Rated value of measured quantity
Other conditions	IEC 51 / DIN EN 60051

Nominal range of use

Ambient temperature	0...50°C
Position of use	Vertical ± 5°
External magnetic field	0.5 mT

Environmental conditions

Climatic suitability	Climatic class 3 according to VDE/VDI 3540
Operating Temperature	-10 ... + 55° C
Storage Temperature	-25 ... + 65° C
Relative humidity	≤ 75% annual average, non-condensing
Shock resistance	15g, 11 ms
Vibration resistance	10-150-10 Hz / 0.15 mm 1.5 g at about 50 Hz

Applicable standards

Nominal case & cutout dimensions for indicating Electrical instruments	: DIN 43700
Scales and pointer for electrical measuring instruments	: DIN 43802
Connections and Terminal markings for panel meters	: DIN 43807
Terminal bolts / leads	: DIN 46200/46282
Clamp straps for connections	: DIN 46282
Safety requirements and protective measures for Electrical indicating measuring instruments and their accessories	: DIN 40050 / 8-70 VDE 0110 / 11-72 VDE 0410 / 10-76 IEC 529, IEC 1010
Performance specifications for direct acting indicating analogue electrical measuring instruments and their accessories	: IEC 51/ DIN EN 60051 DIN 43701
Environmental conditions	: VDE / VDI 3540
Front frames for indicating measuring instruments Principle dimensions	: DIN 43718
UL Combustibility class	: UL 94 V-0
Technical conditions of delivery for electrical instruments	: DIN 43701
Mechanical strength (Free fall test, vibration test)	: VDE 0411, part 1, Sec.43/44, IEC 1010
Comply with following European directives : 89/336/EEC (EMC directive), 73/23/EEC (low voltage directive) & amendment 93/68/EEC, for CE marking.	

Options

Case

Front fascia	Antiglare glass
Colour of bezel	Red, Yellow, Blue, White
Red index pointer	Front adjustable on site
Position of use	On request 0° 180°

Dial

Blank dial	With initial and end values marked
Specific markings	Numbering / Lettering
Division dials	Basic divisions without numbering
Colour markings/bands	Red or green

Others

Zero position	Centre zero or off-set zero
Increased sensitivity	4kohm/V for voltmeters 1...600V 10kohm/V for voltmeters 15...150V
Adjustment of Resistance (sensitivity)	Within $\pm 1\%$ at 23° C

Data Sheet

Analogue Meters with Moving - coil Movement

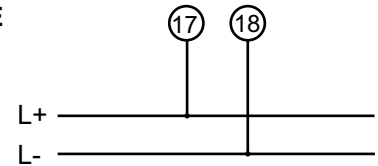
Accessories

Safety Terminal Protection

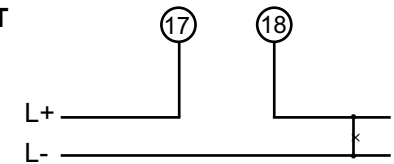
Full sized polycarbonate back cover to provide protection against accidental contact (hand and fingers) acc. to VDE 0410.

Connections

DC VOLTAGE

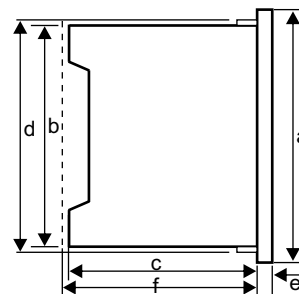


DC CURRENT

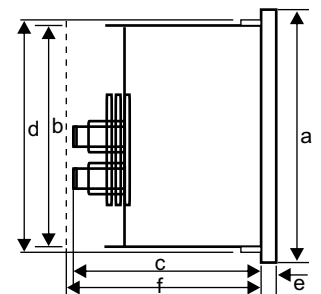


Dimensions

For Voltmeters & Ammeters < 6A



For Ammeters 6 - 100A



Dimensions (in mm)	DS48	DS72	DS96	DS144
Bezel a	□ 48	□ 72	□ 96	□ 144
Case b	□ 43.5	□ 66	□ 90	□ 136
Depth c*	53	53	53	53
d	□ 44.5	□ 67.5	□ 91.5	□ 137.5
e	5.5	5.5	5.5	5.5
cutout size	□ 45 ^{+0.6}	□ 68 ^{+0.7}	□ 92 ^{+0.8}	□ 138 ⁺¹
Wt. (approx.)	0.13 kg	0.18 kg	0.22 kg	0.43 kg
Depth with back cover f**	64	64	64	64

* c = 68mm, for I = 6 to 60 A

* c = 78mm, for I > 60 A

** f = 70 mm, for I = 6 to 60 A

** f = 75 mm, for PQ 48, I > 6A

Ordering Information

Type DS	Moving - coil panel meter
Front dimension 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 table inside
Front facia	Normal glass ¹ antiglare glass ³
Colour of Bezel	Black ¹ Red, Blue, Yellow, White ³
Position of use	Vertical ¹ on request 0...180° ³
Terminal protection	Full sized polycarbonate back cover
Zero position	Centre ¹ , off-set zero ³
Increased sensitivity	4 kohm/V for voltmeters 1...600 V ³ 10 kohm/V for voltmeters 15...150 V ³
Adjustment of resistance (sensitivity)	within $\pm 1\%$ to 23°C ³
Dial	Standard scale same as measuring range ¹ blank dial with division ³ additional lettering on request ³ additional numbering on request ³ coloured marking red or green ³ coloured sector red or green ³
logo	Without ³ OEM logo ³

¹ standard

³ please clearly add the desired specifications while ordering.

Safety precautions

- Instruments with damaged bezels or window glasses must be disconnected from the mains.
- Adequate safety clearance must be maintained to control panel fasteners and to sheet metal housing, if non-insulated connector wires are used.
- The back cover must be snapped into place after the connector wires have been clamped for protection against accidental contact.
- Scales should be replaced under voltage-free conditions.
- Bezels and window glasses should be replaced under voltage-free conditions.

Ordering example

DS 72 measuring range 0 ... 20 mA, dial with 0 ... 100 C, red mark at 37 C.

Specifications are subject to change without notice (07/02)

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