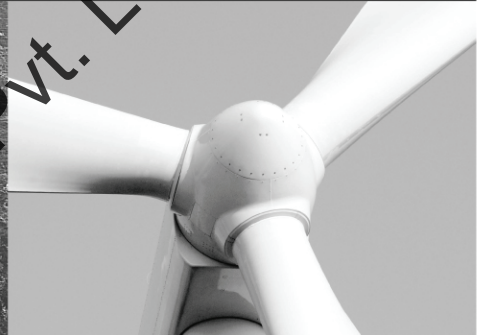
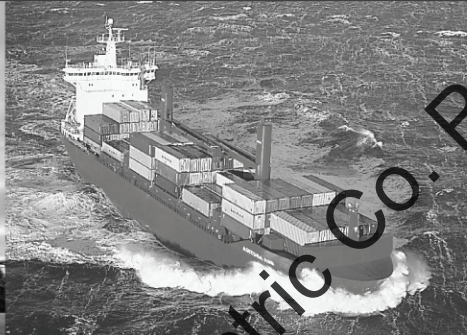




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Analogue Meters

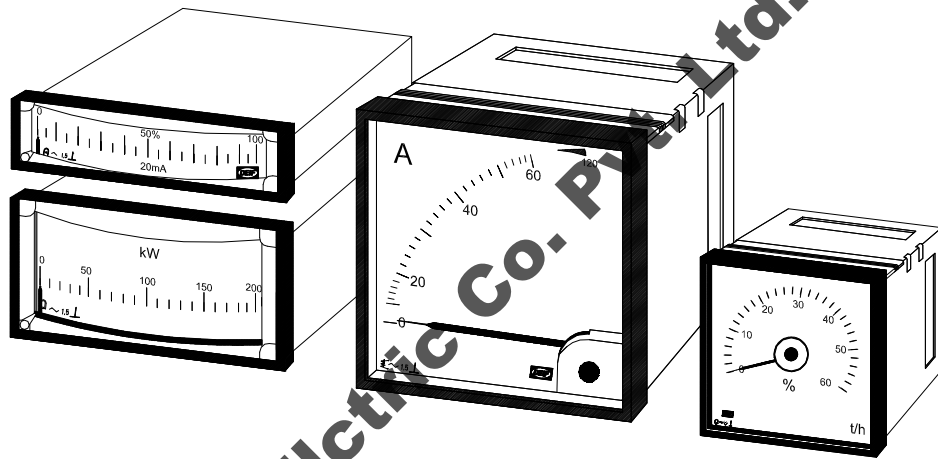


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Switchboard instruments

Types DQ, VDQ, DPR, DSM, EQ



- **Standard DIN sizes**

Quadratic instruments: Q48...Q144

Edgewise instruments: 48 x 24...144 x 72 mm

Slim edgewise instruments: 72 x 24...144 x 36 mm

- **Accuracy class 1.5**
- **Exchangeable scale (quadratic instruments)**

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Available types

Quadratic instruments				
	48 x 48 mm	72 x 72 mm	96 x 96 mm	144 x 144 mm
Moving coil 90°	DQ48-x	DQ72-x	DQ96-x	DQ144-x
Moving coil 240°	DQ48-c DQ48-xc	DQ72-c DQ72-xc	DQ96-c DQ96-xc	DQ144-c DQ144-xc
- with rectifier 90°		VDQ72-x	VDQ96-x	VDQ144-x
- with rectifier 240°		VDQ72-c VDQ72-xc	VDQ96-c VDQ96-xc	VDQ144-c VDQ144-xc
Moving iron 90°	EQ48-x	EQ72-x	EQ96-x	EQ144-x
Edgewise instruments				
	48 x 24 mm	72 x 36 mm	96 x 48 mm	144 x 72 mm
Moving coil	DPR48	DPR72	DPR96	DPR144
Slim edgewise instruments				
		72 x 24 mm	96 x 24 mm	144 x 36 mm
Moving coil		DSM72	DSM96	DSM144

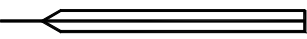
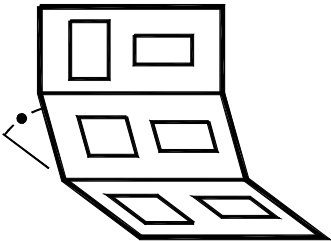
Special versions

General	Antiglare glass
	IP54 from front (incl. rubber gasket) (types DQ and EQ)
	Adjustable red pointer (types Q48-x, Q72-x, Q96-x, Q144-x) (IP52)
	Other measuring ranges than those stated in this data sheet
Scale	Non-standard scale e.g. ammeter with 3, 4, 5 or 6 times overload range
	Scale according to table or curve
	Single scale with double row of figures (standard scale)
	Double scale with 2 rows of figures (standard divisions)
	Single scale with fine divisions for standard pointer
	Red line at specified value
	Coloured section for specific scale range
	Additional text on scale, Roman types (e.g. "Generator")
Moving iron instruments	Adjusted to a specified frequency, 100...500Hz
	Adjusted for DC measurement
	Adjusted to accuracy class 1.0
Moving coil instruments	Suppressed zero (DQ..-x/DQ..-c/-xc: Max. 20%)
	Zero at centre of scale or the like
	Integrated adjustment potentiometer ($\pm 10\%$ standard, up to $\pm 50\%$ on request)
	Adjusted to accuracy class 1.0

Accessories: Blank covers types Q72, Q96, Q144

Blank covers are typically applied to cover panel cut-outs provided for later extension of the switchboard. The blank covers consist of a standard bezel with spring clamp for mounting in the panel, mounted with a white, opal PVC plate instead of glass. (Depth behind panel: Approx. 12 mm).

General technical specifications

Instruments are designed according to below mentioned standards					Standards
Accuracy	Class 1.5 (-10...15...30...55°C) Linear scales: ±1.5% of full scale value (FS) Non-linear scales: ±1.5% of scale length				EN 60051 and IEC 51
Instrument sizes	48 x 24 mm 48 x 48 mm	72 x 24 mm 72 x 36 mm 72 x 72 mm	96 x 24 mm 96 x 48 mm 96 x 96 mm	144 x 36 mm 144 x 72 mm 144 x 144 mm	DIN 43700
Bezels	Slim bezels				DIN 43718
Scale/pointer	 Standard pointer				DIN 43802
Mounting angle	Standard: Vertical (90 ±5°) Other angles: Specify angle to horizontal  ⊥ vertical mounting ∠60° 60° to horizontal (e.g.) □ horizontal mounting For edgewise instruments only, furthermore specify: Horizontal or vertical scale				DIN 16257
Measuring ranges	See pages 4-7. Others on request.				DIN 43701
Protection	Standard version		IP54 version*		*) Marked with label: "IP54 from front only when rubber gasket is mounted"
(Housings)	From front	From rear	From front	From rear	
	IP52	IP52	IP54	IP52	
	Quadratic	Edgewise	Quadratic	Edgewise	
(Terminals)	IP20	IP00	IP20	IP00	IEC 529 and EN 60529
Climate	Class HUE Short-term condensing allowed Max. 95% RH: Max. 30 days per year Max. 85% RH: Remaining days Max. 75% RH: Average per year				DIN 40040
Temperature	-10...55°C (nominal) -25...60°C (operating) -25...65°C (storage)				EN 60051 and IEC 51
Panel influence	The accuracy is affected neither by the material nor by the thickness of the panel				EN 60051 and IEC 51
Shock test	15g - 6 times - 3 directions 50g/6ms 22g/20ms				IEC 68-2-27, Test: Ea
Vibrations	3-13.2Hz: 3mm 13.2-100Hz: 1g				GL + LR: Test 1 DNV: Class A
Materials	All plastic materials are self-extinguishing				UL94 (V0)
Safety	For detailed information: Please see the individual types Pollution deg. 2 Quadratic instruments are supplied with protective cover fitted over terminals				EN 61010-1
EMC	CE classified for residential, commercial and light industry plus industrial environment				EN 50081-1/2 and EN 50082-1/2

Quadratic moving coil instruments

Application: Measurement of DC currents and DC voltages

Scale: Linear

Scale lengths: DQ48/72/96/144-x: 41/62/92/135 mm

DQ48/72/96/144-xc/-c: 75/113/151/230 mm

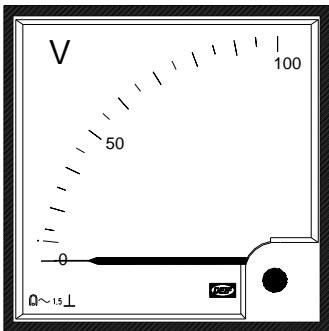
Accuracy: Class 1.5

Burdens: Voltmeters: 1mA, R_i : 1 k Ω /V

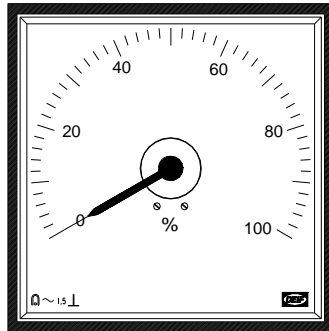
Ammeters: 60mV...0.5V

Ammeters: 4...20mA (see note 3 below)

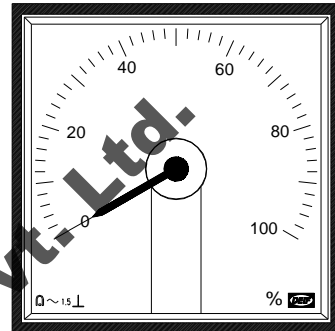
Housings: Plastic



DQ96-x (exchangeable scale)



DQ96-c (non-exch. scale)



DQ96-xc (exchangeable scale)

Type	Size (mm)	Measuring range - V ¹⁾	Measuring range - A ¹⁾
DQ48-x	48 x 48	60mV ... 300V	1mA ... 600mA ²⁾ , 4...20mA ³⁾
DQ72-x	72 x 72	60mV ... 300V	1mA ... 5-10-15-40A ²⁾ , 4...20mA ³⁾
DQ96-x	96 x 96	60mV ... 300V	1mA ... 5-10-15-40A ²⁾ , 4...20mA ³⁾
DQ144-x	144 x 144	60mV ... 300V	1mA ... 5-10-15-40A ²⁾ , 4...20mA ³⁾
DQ48-xc/DQ48-c	48 x 48	60mV ... 300V	1mA ... 600mA ²⁾ , 4...20mA ³⁾
DQ72-xc/DQ72-c	72 x 72	60mV ... 300V	1mA ... 5-10-15-40A ²⁾ , 4...20mA ³⁾
DQ96-xc/DQ96-c	96 x 96	60mV ... 300V	1mA ... 5-10-15-40A ²⁾ , 4...20mA ³⁾
DQ144-xc/DQ144-c	144 x 144	60mV ... 300V	1mA ... 5-10-15-40A ²⁾ , 4...20mA ³⁾

1) Standard measuring ranges: 1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 8 and multiples of 10 thereof

2) Safety: Cat. III 300V max. (515V ph-ph (300 x $\sqrt{3}$))

3) Higher measuring ranges: For use with standard shunt: 60mV or 150mV
Supplied with shunt lead, 2 x 1 m – 1 mm² (0.035 Ω)

4) 4...20mA: Electrically suppressed, voltage drop at 20mA = 1.6V for -x and 1.80V for -c/-xc

Quadratic moving coil instruments with rectifier

Application: Measurement of AC currents and AC voltages. Measures average value, calibrated to R.M.S. value at sinusoidal current/voltage

VDQ.. Voltmeters 25...300V: R_i : Approx. 1k Ω /V. Range <50V AC: Scale non-linear
Max. 515V derived from voltages with max. 300V to earth (300V – cat. III / 600V cat. II)

VDQ.. Ammeters 1...600mA: Voltage drop: Approx. 1.2V

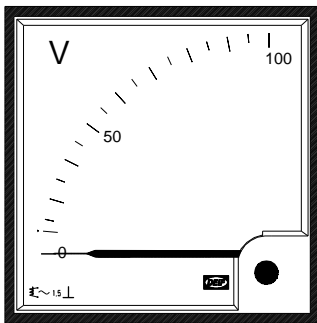
Order specifications

Examples:	Type/point of rotation of pointer ¹⁾	Measuring range	Scale
	DQ96-x	0...10V DC	0...100%
	VDQ96-x	0...100V AC	0...100V

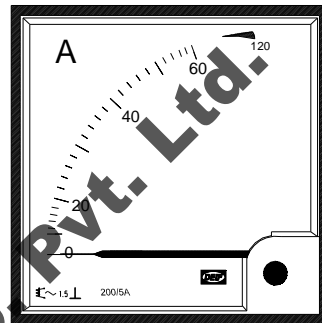
1) "-x": Lower right corner, exchangeable scale, "-c": Centre, "-xc": Centre, exchangeable scale.

Quadratic moving iron instruments

Application:	Measurement of AC currents and AC voltages, adjusted for frequency range 16..65Hz. Calibration for other frequency ranges (see page 2). The instruments measure true R.M.S.		
Working range:	Ammeters are designed according to EN60051-2 (Item 6.4.1 and 6.4.2) Continuous overload: $I_N \times 1.2$. Short duration overload: $I_N \times 5$ for 5 sec. $I_N \times 10$ for 0.5 sec. Valid for -/1A, -/5A and direct connections.		
Scale range:	The scale is standard designed with a 2 times overload range (non-standard scale – see page 2)		
Scale lengths:	EQ48/72/96/144-x:	41/62/92/135 mm	
Accuracy:	Class 1.5		
Burdens:	Voltmeters:	Approx. 1.5...4VA	
	Ammeters:	Approx. 0.5...1.2VA	
Housings:	Plastic		



EQ96-x (voltmeter)

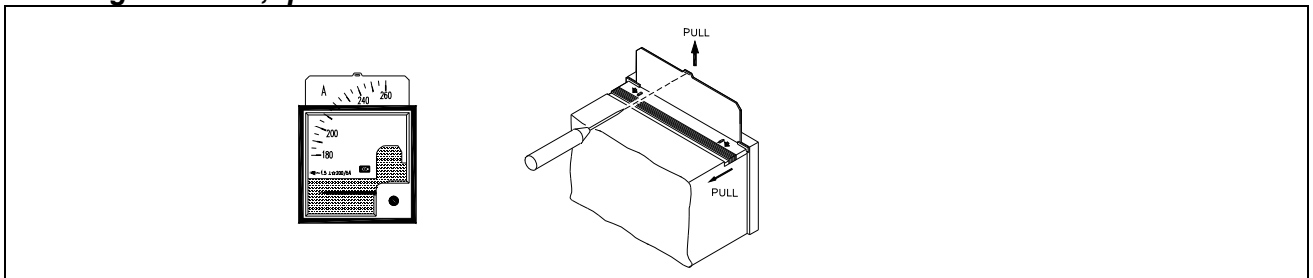


EQ96-x (ammeter)

Type	Size (mm)	Measuring range - V ¹⁾	Measuring range - A ¹⁾
EQ48-x	48 x 48	40V ... 300V ⁴⁾	1A ... 40A ^{2) + 3)}
EQ72-x	72 x 72	40V ... 800V ³⁾	1A ... 60A ²⁾
EQ96-x	96 x 96	40V ... 800V ³⁾	1A ... 60A ²⁾
EQ144-x	144 x 144	40V ... 800V ³⁾	1A ... 60A ²⁾

- 1) Standard measuring ranges: 1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 8 and multiples of 10 thereof
- 2) Safety: Cat. III 600V max. ph-ph voltage according to scheme
- 3) Higher measuring ranges: For use with external current transformer, -/5A, -/1A
- 4) Higher measuring ranges: For use with external voltage transformer, -/100V (-/110V)
- 5) Max. 515V derived from voltages with max. 300V to earth (300V – cat. III / 600V cat. II)

Exchange of scale, quadratic instruments



- 1) Press cover at top of instrument as shown
- 2) Remove scale by means of a suitable tool (e.g. screwdriver)
- 3) After exchange of scale: Refit cover (press till it snaps into place)

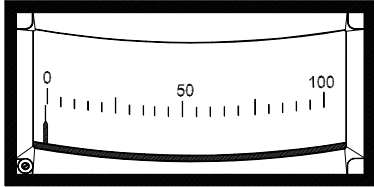
Note: Interrupt signal to terminals before exchanging the scale.

Order specifications

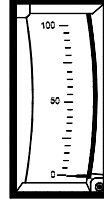
	Type	Measuring range	Scale
Example:	EQ96-x	0...500A AC, 500/1A	0...500A x 2

Edgewise moving coil instruments

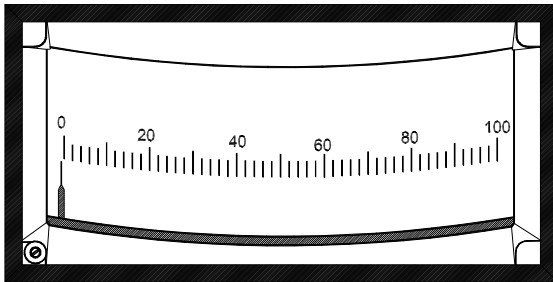
Application:	Measurement of DC currents and DC voltages	
Scale:	Linear	
Accuracy:	Class 1.5	
Burdens:	Voltmeters:	1mA, R _i : 1kΩ/V
	Ammeters:	60mV...0.5V
Housings:	Plastic	



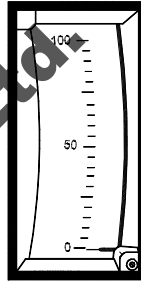
DPR96



DPR48



DPR144



DPR72

Type	Size (mm)	Measuring range - V ¹⁾	Measuring range - A ¹⁾
DPR48	48 x 24	1V ... 600V	1mA ... 600mA ²⁾ , 4...20mA
DPR72	72 x 36	1V ... 600V	1mA ... 600mA ²⁾ , 4...20mA
DPR96	96 x 48	1V ... 600V	1mA ... 600mA ²⁾ , 4...20mA
DPR144	144 x 72	1V ... 600V	1mA ... 600mA ²⁾ , 4...20mA

- 1) Standard measuring ranges: 1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 8 and multiples of 10 thereof
- 2) Safety: Cat. III 600V max. ph-ph voltage according to scheme
- 3) Higher measuring ranges: For use with standard shunt: 60mV or 150mV
Supplied with shunt lead, 2 x 1 m – 1 mm² (0.035Ω)

Order specifications

Example:	Type	Scale type/Mounting ¹⁾	Measuring range	Scale
	DPR96	Horizontal	4...20mA DC	0...10 bar

- 1) Horizontal or vertical scale.

Slim edgewise moving coil instruments

Application: Measurement of DC currents and DC voltages

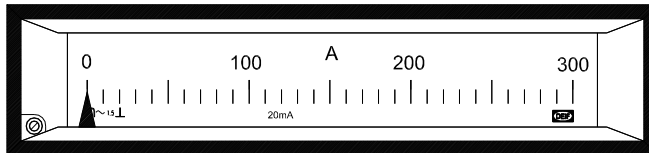
Scale: Linear

Scale lengths: DSM72/96/144: 52/70/95 mm

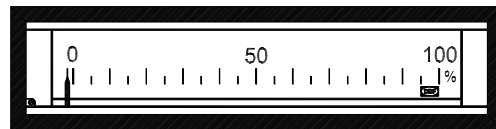
Accuracy: Class 1.5

Burdens: Voltmeters: 1mA, R_i: 1kΩ/V
Ammeters: 60mV...0.5V

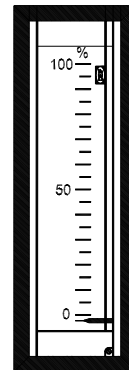
Housings: Plastic



DSM144



DSM96



DSM72

Type	Size (mm)	Measuring range - V ¹⁾	Measuring range - A ¹⁾
DSM72	72 x 24	60mV ... 600V	1mA ... 600mA ²⁾ , 4...20mA
DSM96	96 x 24	60mV ... 100V	1mA ... 600mA ²⁾ , 4...20mA
DSM144	144 x 36	60mV ... 300V	1mA ... 600mA ²⁾ , 4...20mA

1) Standard measuring ranges: 1 - 1.2 - 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 8 and multiples of 10 thereof

2) Safety
 DSM72: Cat. III 600V max. ph-ph voltage according to scheme
 DSM96: Cat. III 100V max. ph-ph voltage according to scheme
 DSM144: Cat. III 300V max. ph-ph voltage according to scheme

3) Higher measuring ranges: For use with separate standard shunt: 60mV or 150mV
 Supplied with shunt lead, 2 x 1 m – 1 mm² (0.035Ω)

Order specifications

Example:	Type	Scale type/Mounting ¹⁾	Measuring range	Scale
	DSM144	Horizontal	0...20mA DC	0...300A

1) Horizontal or vertical scale.