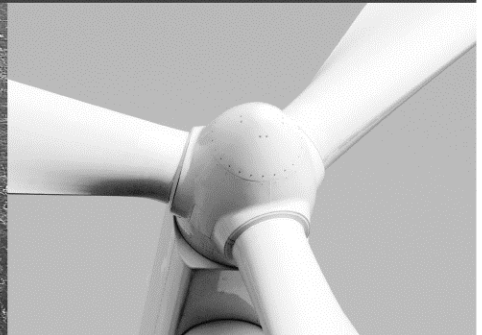
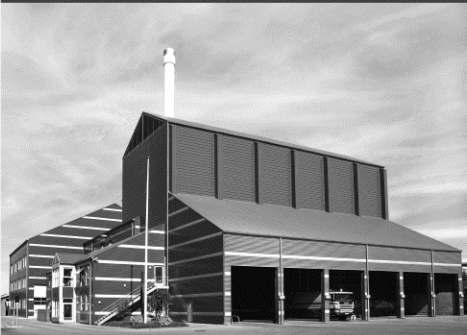




-power in control



DATA SHEET



Switchboard instruments, types DQ, VDQ, EQ

- Standard DIN sizes
- Quadratic instruments Q48, Q72, Q96, Q144
- Accuracy class 1.5
- Exchangeable scale (quadratic instruments)



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 Quadratic moving coil instruments with/without rectifier page 4
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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

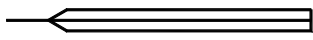
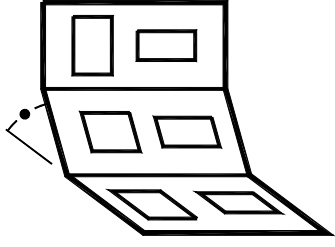
Special versions

General	Anti-glare 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: Ask for availability
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
	Optional graphics: E.g. a red line, own logo, specific numbers/figures, coloured section, two rows of numbers
Moving iron instruments	Adjusted to a specified frequency, 100...500 Hz (only necessary for voltmeters)
	Adjusted for DC measurement
Moving coil instruments	Suppressed zero (DQ../DQ../c/-xc: max. 20%)
	Zero at centre of scale or the like
	Integrated adjustment potentiometer (±10% standard, up to ±50% on request)
	Adjusted to accuracy class 1.0 (not possible for type Q48)

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.) Π horizontal mounting For edgewise instruments only, furthermore specify: Horizontal or vertical scale				DIN 16257
Measuring ranges	See pages 4-10. 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	
(Terminals)	Quadratic	Edgewise	Quadratic	Edgewise	
	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	15 g - 6 times - 3 directions 50 g/6 ms 22 g/20 ms				IEC 68-2-27, Test: Ea
Vibrations	3-13.2 Hz: 3 mm 13.2-100 Hz: 1 g				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 61000-6-3/4 EN 61000-6-1/2

Quadratic moving coil instruments (DQ)

Application: Measurement of DC currents and DC voltages

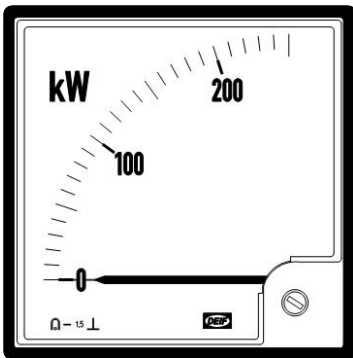
Scale: Linear

Scale lengths: DQ48/72/96/144-x: 41/62/92/135 mm
 DQ48/72/96/144-xc/-c: 75/113/151/230 mm

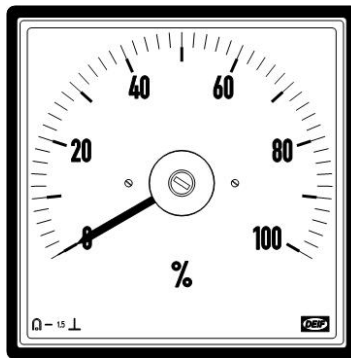
Accuracy: Class 1.5

Burdens: Voltmeters: 1 mA, R_i: 1 kΩ/V
 Ammeters: 60 mV...0.6 V
 Ammeters: 4...20 mA (see note 3 below)

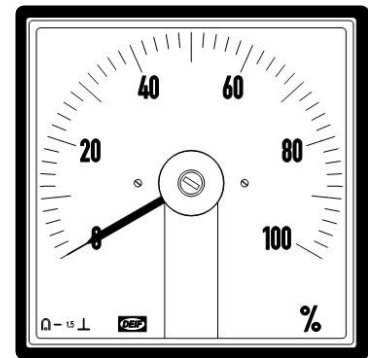
Housings: Plastic



DQ96-x (exchangeable scale)



DQ96-c (non-exch. scale)



DQ96-xc (exchangeable scale)

Type	Size (mm)	Measuring range – V ^{1) 2)}	Measuring ranges – A ^{1) 2)}
DQ48-x	48 x 48	60 mV ... 300 V	1 mA ... 600 mA, 4...20 mA ³⁾
DQ72-x	72 x 72	60 mV ... 300 V	1 mA ... 5-7.5 A, 10-22.5 A, 25-37.5 A and 40-50 A ⁴⁾ 4...20 mA ³⁾
DQ96-x	96 x 96	60 mV ... 300 V	1 mA ... 5-7.5 A, 10-22.5 A, 25-37.5 A and 40-50 A ⁴⁾ 4...20 mA ³⁾
DQ144-x	144 x 144	60 mV ... 300 V	1 mA ... 5-7.5 A, 10-22.5 A, 25-37.5 A and 40-50 A ⁴⁾ 4...20 mA ³⁾
DQ48-xc/DQ48-c	48 x 48	60 mV ... 300 V	1 mA ... 600 mA, 4...20 mA ³⁾
DQ72-xc/DQ72-c	72 x 72	60 mV ... 300 V	1 mA ... 5-7.5 A, 10-22.5 A, 25-37.5 A and 40-50 A ⁴⁾ 4...20 mA ³⁾
DQ96-xc/DQ96-c	96 x 96	60 mV ... 300 V	1 mA ... 5-7.5 A, 10-22.5 A, 25-37.5 A and 40-50 A ⁴⁾ 4...20 mA ³⁾
DQ144-xc/DQ144-c	144 x 144	60 mV ... 300 V	1 mA ... 5-7.5 A, 10-22.5 A, 25-37.5 A and 40-50 A ⁴⁾ 4...20 mA 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 300 V max. (515 V ph-ph (300 x √3))
- 3) 4...20 mA: Electrically suppressed, voltage drop at 20 mA = 1.6 V for -x and 1.80 V for -c/-xc
- 4) Higher measuring ranges: For use with standard shunt: 60 mV or 150 mV
 Supplied with shunt lead, 2 x 1 m – 1 mm² (0.035 Ω)

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 (Not available for size Q48)

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

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

Available variants

Item no.	Variant no.	Variant description
2961010420	01	DQ48-x All measuring inputs, without scale
2961010420	02	DQ48-x All measuring inputs, with standard scale
2961010420	03	DQ48-x Measuring input 4-20 mA DC with customised scale and anti-glare glass
2961010420	04	DQ48-x With Cos Phi scale
2961060420	01	DQ48-c/-xc All measuring inputs, without scale
2961060420	02	DQ48-c/-xc All measuring inputs, with standard scale
2961060420	03	DQ48-c/-xc With Cos Phi scale
2961010720	01	DQ72-x All measuring inputs, without scale (except direct current >5 A)
2961010720	02	DQ72-x All measuring inputs, with standard scale (except direct current >5 A)
2961010720	03	DQ72-x Direct current measurement with standard scale
2961010720	04	DQ72-x With Cos Phi scale
2961060720	01	DQ72-c/-xc All measuring inputs, without scale (except direct current >5 A)
2961060720	02	DQ72-c/-xc All measuring inputs, with standard scale (except direct current >5 A)
2961060720	03	DQ72-c/-xc Direct current measurement with standard scale
2961060720	04	DQ72-c/-xc With Cos Phi scale
2961010920	01	DQ96-x All measuring inputs, without scale (except direct current >5 A)
2961010920	02	DQ96-x All measuring inputs, with standard scale (except direct current >5 A)
2961010920	03	DQ96-x Direct current measurement with standard scale
2961010920	04	DQ96-x Measuring input 4-20 mA with customised scale incl. anti-glare glass
2961010920	05	DQ96-x Measuring input 4-20 mA with customised scale incl. anti-glare glass and red pointer in glass
2961010920	06	DQ96-x With Cos Phi scale
2961060920	01	DQ96-c/-xc All measuring inputs, without scale (except direct current >5 A)
2961060920	02	DQ96-c/-xc All measuring inputs, with standard scale (except direct current >5 A)
2961060920	04	DQ96-c/-xc Direct current measurement with standard scale
2961060920	05	DQ96-c/-xc With Cos Phi scale
2961011420	01	DQ144-x All measuring inputs, without scale (except direct current >5 A)
2961011420	02	DQ144-x All measuring inputs, with standard scale (except direct current >5 A)
2961011420	03	DQ144-x Direct current measurement with standard scale
2961011420	06	DQ144-x With Cos Phi scale
2961061420	01	DQ144-c/-xc All measuring inputs, without scale (except direct current >5 A)
2961061420	02	DQ144-c/-xc All measuring inputs, with standard scale (except direct current >5 A)
2961061420	03	DQ144-c/-xc Direct current measurement with standard scale
2961061420	06	DQ144-c/-xc With Cos Phi scale

Order specifications

Variants:

Mandatory information					Additional options to the standard variant	
Item no.	Type	Variant no.	Measuring range	Scale	Option	Option

Example:

Mandatory information					Additional options to the standard variant	
Item no.	Type	Variant no.	Measuring range	Scale	Option	Option
2961060420-02	DQ48-c	02	0...10V DC	0...100%	Glass w/red adjustable pointer	
2961010920-03	DQ96-x	03	0..40 A	0..40 A	IP54	
2961010920-02	VDQ96-x	02	0...100V AC	0...100 V	Red line at 75 V	Anti-glare glass

Quadratic moving iron instruments (EQ)

Application: Measurement of AC currents and AC voltages, adjusted for frequency range 16...65 Hz. Calibration for other frequency ranges (see p. 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 -/1 A, -/5 A and direct connections.

Scale range: The scale is standard designed with a 2 times overload range (non-standard scale - see p. 2)

Scale lengths: EQ48/72/96/144-x: 41/62/92/135 mm

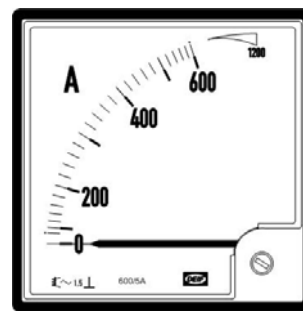
Accuracy: Class 1.5

Burdens: Voltmeters: Approx. 1.5...4 VA
 Ammeters: Approx. 0.5...1.2 VA

Housings: Plastic



EQ96-x (voltmeter)

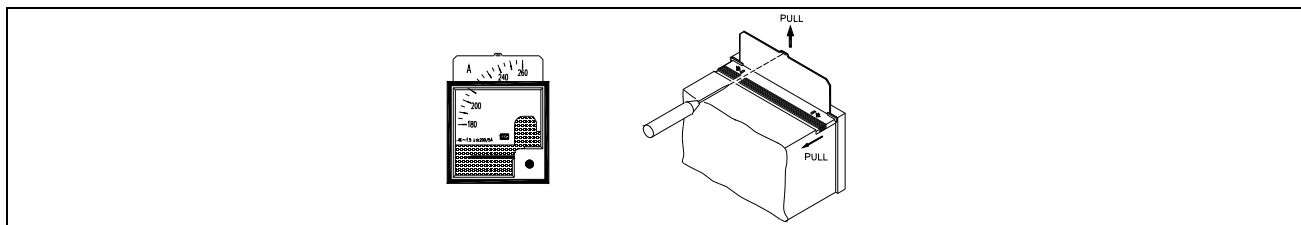


EQ96-x (ammeter)

Type	Size (mm)	Measuring range - V ^{1) 4)}	Measuring range - A ^{1) 2) 3)}
EQ48-x	48 x 48	40 V ... 300 V 500 V ⁵⁾	1 A ... 40 A
EQ72-x	72 x 72	40 V ... 800 V	1 A ... 60 A
EQ96-x	96 x 96	40 V ... 800 V	1 A ... 60 A
EQ144-x	144 x 144	40 V ... 800 V	1 A ... 60 A

- 1) Standard measuring range, current: 1 - 1.5 - 2.5 - 4 - 6 - 10 - 15 - 25 - 40 - 60. For CT: /1 A or /5 A
 Standard measuring range, voltage: 40 - 60 - 100 - 150 - 250 - 300 - 400 - 500 - 600. For VT: /110 V or /110 V
- 2) Safety: Cat. III 600 V max. ph-ph voltage according to scheme
- 3) Higher measuring ranges: For use with external current transformer, -/5 A, -/1 A
- 4) Higher measuring ranges: For use with external voltage transformer, -/100 V (-/110 V)
- 5) Safety: Cat. III 300 V/Cat. II 600 V

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). Calibration is not needed.

Note: Interrupt signal to terminals before exchanging the scale.

Available variants

Item no.	Variant no.	Variant description
2961110420	01	EQ48-x Volt with standard measuring input and standard scale
2961110420	02	EQ48-x Volt for VT or non-standard measuring input and standard scale
2961110420	03	EQ48-x Current /1 A or /5 A CT with standard scale
2961110420	05	EQ48-x Current for /1 A or /5 A CT with customised scale and anti-glare glass + red pointer in glass
2961110420	06	EQ48-x Current direct reading with standard scale
2961110720	01	EQ72-x Volt with standard measuring input and standard scale
2961110720	02	EQ72-x Volt for VT or non-standard measuring input and standard scale
2961110720	03	EQ72-x Current /1 A or /5 A CT with standard scale
2961110720	05	EQ72-x Current for /1 A or /5 A CT with customised scale and anti-glare glass + red pointer in glass
2961110720	06	EQ72-x Current direct reading with standard scale
2961110920	01	EQ96-x Volt with standard measuring input and standard scale
2961110920	02	EQ96-x Volt for VT or non-standard measuring input and standard scale
2961110920	03	EQ96-x Current /1 A or /5 A CT with standard scale
2961110920	05	EQ96-x Current for /1 A or 5 A CT and anti-glare + red pointer in glass
2961110920	06	EQ96-x Current direct reading with standard scale
2961111420	01	EQ144-x Volt with standard measuring input and standard scale
2961111420	02	EQ144-x Volt for VT or non-standard measuring input and standard scale
2961111420	03	EQ144-x Current /1 A or /5 A CT with standard scale
2961111420	05	EQ144-x Current for /1 A or 5 A CT and anti-glare + red pointer in glass
2961111420	06	EQ144-x Current direct reading with standard scale

Order specifications

Variants:

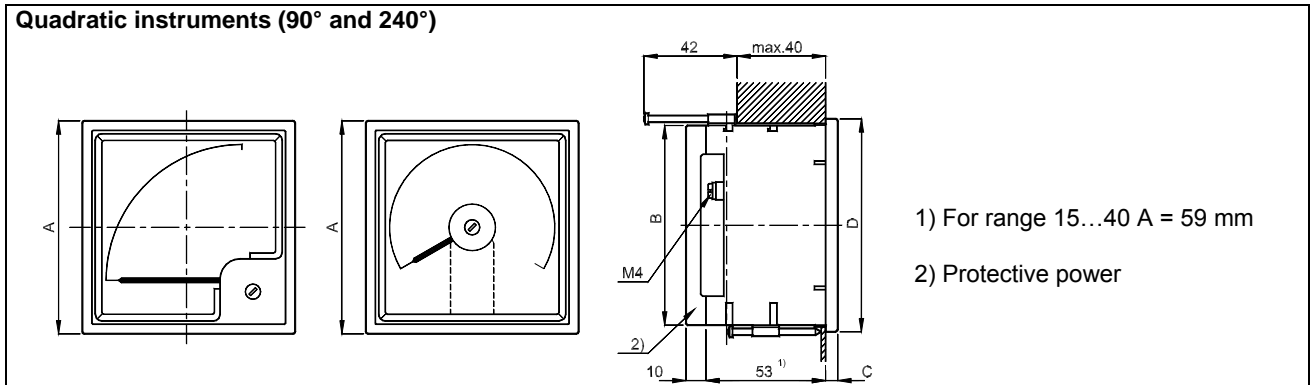
Mandatory information						Additional options to the standard variant	
Item no.	Type	Variant no.	Measuring range	Scale	VT primary/secondary	Option	Option

Example:

Mandatory information						Additional options to the standard variant	
Item no.	Type	Variant no.	Measuring range	Scale	VT primary/secondary	Option	Option
2961110420-01	EQ48-x	01	0...400 V	0...400 V		Glass w/red adjustable pointer	
2961110920-03	EQ96-x	03	CT 500/5 A	0...500 A (x2)		IP54	
2961110920-02	EQ96-x	02	(Determined by DEIF)	0...12 kV	11 kV/120V AC	Red line at 10.5 kV	

Note: When ordering an EQ meter for connection via a voltage transformer (VT), both primary and secondary of the VT must be stated as shown above.

Dimensional details



All dimensions in mm

Type	A	C	B	Panel cut-out	Weight (approx.)
90° Moving coil and moving iron instruments					
Q48-x	48 x 48	5.0	42.8 x 48.8	45 x 45 +0.3	0.090 kg
Q72-x	72 x 72	5.5	66.5 x 66.5	68 x 68 +0.4	0.200 kg
Q96-x	96 x 96	5.5	90 x 90	92 x 92 +0.4	0.210 kg
Q144-x	144 x 144	8.0	136 x 136	138 x 138 +0.5	0.350 kg
240° Moving coil instruments					
DQ48-xc/c	48 x 48	5.0	42.8 x 48.8	45 x 45 +0.3	0.180 kg
DQ72-xc/c	72 x 72	5.5	66.5 x 66.5	68 x 68 +0.4	0.220 kg
DQ96-xc/c	96 x 96	5.5	90 x 90	92 x 92 +0.4	0.250 kg
DQ144-xc/c	144 x 144	8.0	136 x 136	138 x 138 +0.5	0.400 kg

Due to our continuous development we reserve the right to supply equipment which may vary from the described.



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