

Safety tests to VBG 4		of power system according to DIN VDE 0100, Part 600, Section												
		of power system according to DIN VDE 0701 and VDE 0702, Part												
Measurement/testing of		according to DIN VDE 0413, Part												
		Test device												
	Page	B4112	B4115	B4116	B4110	B4130 B4131	B4111	B4102	B4104	B4105	B4155	B4152	B4154	A1504
Voltage	1...400 V (AC)	2/2	2/3	2/4	2/6	2/9	2/10	2/12	2/13	2/15	2/19	2/17	2/18	2/25
U	-	-	-	-	-	-	-	1...600 V 20...1000 V	1...600 V UC	1...600 V 20...600 V	1...50 V Noise voltage	1...50 V Noise voltage	1...30 V Noise voltage	-
Test Voltage in VDC	500	100/250/500	100/250/500	500	500	100/500	500	50...1000	100/250/500	250...5000	16...400 Hz Interference freq.	16...400 Hz Interference freq.	-	-
Mains frequency <i>f</i>	15...457 Hz	15.3...420 Hz	15.3...420 Hz	-	-	-	-	-	-	45...400 Hz	16...400 Hz Interference freq.	16...400 Hz Interference freq.	-	-
Residual current-operat. e.i.c.syst.	•	•	•	-	-	-	-	-	-	-	-	-	-	6
Earthing resistance <i>R_E</i>	0.15...10 kΩ	0.15...10 kΩ	0.15...10 kΩ	-	-	-	-	-	-	-	0.02 Ω...300 kΩ	0.02 Ω...300 kΩ	0.15 Ω...2 kΩ	7
Isolation resistance <i>R_{iso}</i>	0.05...100 MΩ	0.05...300 MΩ	3 kΩ...300 MΩ	0.08...30 MΩ	0.08...30 MΩ	0.08...30 MΩ	0.2...10 MΩ	1 Ω...30 GΩ 10 kΩ...1 TΩ 3 GΩ...3 TΩ	1 Ω...10 GΩ 100 kΩ...10 GΩ 1 kΩ...300 GΩ	10 kΩ...300 GΩ 1 kΩ...300 GΩ	-	-	-	1
Loop resistance <i>R_S</i>	0.12...200 Ω	0.15...200 Ω	0.07...200 Ω	-	-	-	-	-	-	-	-	-	-	3
Phase sequence	•	•	•	-	-	-	-	-	-	-	-	-	-	9
DC resistance <i>R_{oc}</i>	0.12...20 Ω	0.15...20 Ω	0.12...999 Ω	0.1...3 MΩ	-	-	-	0.01 Ω...3 kΩ 0.01 Ω...10 kΩ	0.1 Ω...2 kΩ	-	-	-	-	4
Digital Analog	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Protective earth conductor test SE	•	•	•	•	-	-	-	-	-	-	-	-	-	8
Phase angle PL	•	•	•	-	-	-	-	-	-	-	-	-	-	-
Protective earth conductor resistance <i>R_{FE}</i>	-	-	-	0.1...10 Ω	-	0.1...30 Ω	0...1 Ω	-	-	-	-	-	-	1
Equivalent leakage current <i>I_{FE}</i>	-	-	-	-	-	0.2...30 mA	0.2...30 mA	0...16 mA	0.01...30 mA	-	-	-	-	-
Fault current <i>I_f</i>	-	-	-	0.015...3 mA	0.018...3 mA	0.018...3 mA	-	-	-	-	-	-	-	240
Current <i>I</i>	-	-	-	0.1 A...10 A	0.3 A...16 A	0.3 A...16 A	-	-	-	-	-	-	-	-
Power <i>P</i>	-	-	-	10 W...4 kW	10 W...4.5 kW	10 W...4.5 kW	-	-	-	-	-	-	-	-
Power factor cos phi	-	-	-	0.5...1	0.5...1	0.5...1	-	-	-	-	-	-	-	-
Temperature <i>T</i>	-	-	-	-50...+600 °C	-	-	-	-	-	-	-	-	-	-
Capacitance <i>C</i>	-	-	-	1 nF...30 µF	-	-	-	-	-	-	-	-	-	-
Standing surface AC isolation resistance	-	-	-	-	-	-	-	10 Ω...30 MΩ 0...100 MΩ	-	-	-	-	-	-
Digital Analog	-	-	-	-	-	-	-	-	-	-	-	-	-	10

Additional testing equipment: B4101 on Page 2/12; B4103, B4113 and B4114 on Page 2/11; B4106 on Page 2/14 as well as B4151 on Page 2/17

Operating and power measuring instruments

B4112 tester

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- Microprocessor-controlled device for testing the **protective measures to DIN VDE 0100** in TN, TT and IT systems
- Mains voltage $U \leq 500$ V (AC)
- Mains frequency $f \leq 457$ Hz
- Protective conductor break/touch voltage, terminal test
- Earth resistance $R_E \leq 10$ k Ω
- Loop resistance $R_S < 200$ Ω
- Isolation resistance $R_{ISO} < 100$ M Ω
- Residual-current circuit-breaker with/without tripping
- Selective residual-current circuit-breaker with/without tripping
- Resistance with line compensation $R < 20$ Ω
- Direction of rotating field



Technical data				
Voltage measurement				
Meas. range	Display range	Resolution	Frequency range	Error limits
1...400 V	0...500 V	1 V	45...65 Hz	\pm (1% o. m. v. + 1 digit)
Frequency measurement				
Meas. range	Resolution	Dyn. response	Error limits	
15.3...99.9...457 Hz	0.1...1 Hz	5...400 V	\pm (0.1% o. m. v. + 1 digit)	
Protective earth conductor test				
Voltage test range		Frequency range	Internal resistance	
AC 50...250 V between contact electrode and protective earth conductor		15.3...457 Hz	approx. 1.6 M Ω	
Phase connection detection		Rated voltage	AC 20...250 V	
		Frequency range	45...65 Hz	
		Internal resistance	approx. 470 k Ω	
Earthing resistance to DIN VDE 0413, Part 7				
Rated voltage		100...252 V, 45...65 Hz		
Meas. range	Resolution	Test current	Operating error	
0.1...0.15...2.99...15.0 Ω 15.0...99.9 Ω	0.01 Ω 0.01... 0.1 Ω	1 A 500 mA	\pm (10% o. meas. val. 3 digits)	
0.1...15...29.9...999 Ω 1...15...299...9.99 k Ω	1... 0 Ω	50 mA 5 mA		
Loop mains internal resistance measurement to DIN VDE 0413, Part 3				
Rated voltage		100...435 V, 45...65 Hz		
Meas. range	Resolution	Operating error		
0.01...0.15...2.99...99.9...199 Ω	0.01...0.1...1 Ω	\pm (5% o. m. v. + 3 digits)		
Operating error (SEV 3569), only possible in conjunction with probe				
Meas. range	Resolution	Generation of measured value		
0...200 V	0.1 V	1. Measur. R_S 2. Measur. R_E 3. Calcul. $U_{S-PE} = \frac{R_E}{R_S} \times U_{mains}$		
Isolation resistance to DIN VDE 0413, Part 1				
Meas. range	Resolution	Operating error		
0.01...0.05...9.99...99.9 Ω 0...520 V	10...100 k Ω 1 V	\pm (8% o. m. v. + 1 digit) \pm (10% o. m. v. + 5 digits)		
Resistance (low-resistance measurement) to DIN VDE 0413 Part 4				
Meas. range	Resolution	Operating error		
0.01...0.15...2.99...19.9 Ω	0.01...0.1 k Ω	\pm (5% o. m. val. + 3 digits)		

Residual-current circuit breaker test (FI) to DIN VDE 0413, Part 6 with/without tripping, with/without selective, with/without probe		
Adjustable rated residual current I_{AN} (mA)	Error limits of setpoint	Conduction interval with/without probe
- with tripping: 10, 30, 100, 300, 500, 1000	0...7 % 0...5 %	max. 10 periods at $U_L \geq 50$ V
- without tripping: 50 % of: 10, 30, 100, 300, 500, 1000	0...7 % 0...5 %	
- with \square (selective) 2 x: 10, 30, 100, 300, 500	0...7 % 0...5 %	
Contact voltage measuring (U_L)		Resolution
0...99.9 V		0.1 V
		Operating error
		0... -15 % o. m. v. + 2 digits
General data		
Working temperature range	-10 to +50 $^{\circ}$ C	
Service temperature	0 to 30 $^{\circ}$ C	
Storage temperature range	-20 to +60 $^{\circ}$ C	
Climatic class	JWG to DIN 40 040 (3/73)	
Degree of protection	IP 40 to EN 60 529	
Protection class	corresponds to protection class II to DIN VDE 0411, Part 1 and IEC 348	
Permissible overload	$U_{rms} = 500$ V in all functions	
Power supply	Mains-independent battery operation via six 1.5 V alkaline/manganese batteries to IEC LR6 or 1.5 V zinc/carbon batteries to IEC R6 or 1.2 V NiCd rechargeable batteries (R6), usual commercial	
Dimensions (w x h x d)	265 mm x 90 mm x 265 mm	

Ordering data			
Designation	kg	Order No.	
B4112 universal tester in transport case, with 3-core cable, 3 safety tapping clips, cable with earthed plug, probe set, batteries and instruction manual	5	7KB4112-8AA	
Accessories			
Cable	0.2	7KB9402-8DB	
Safety tapping clips, isolated (3 clips)	0.02	7KB9402-8DF	
Cable with earthed plug	0.2	7KB9402-8DC	
Probe set consisting of 1 earth spike and cable reel with 25 m cable	0.6	7KB9402-8DD	

- Measuring instrument for testing **protective measures to DIN VDE 0100** in installed TN, TT and IT networks
- Residual-current-operated circuit breaker test with/without tripping, with pulse or ramp, tripping current, tripping time
- Earth resistance measurement
- Insulation resistance measurement
- Loop network impedance measurement
- Short circuit current/earth current calculation
- Earth voltage measurement
- Direction of rotating field, also in 2-phase networks
- Low resistance measurement
- Compulsory protective conductor voltage and fracture control
- Phase connection testing
- 7KB4115-8DA with IrDA® interface and data memory for 248 measuring data sets
- 7KB4115-8DB additionally with serial interface RS232C



Technical data			
Direct voltages and sine-wave alternate voltages, frequency			
Measuring range	Display range	Resolution	Range oper. meas. device
5...50...440 V	0...550 V	1 V	DC, 15, 3...420 Hz ± (1% o. MV + 1 digit)
3.99...9.420 Hz	15.3...420 Hz	0.1...1 Hz	5...440 V ± (0.1% o. MV + 1 digit)
Inner resistance: 300 ... 400 kΩ (L - N - PE)			
Residual-current-operated circuit breaker and selective residual-current-operated circuit breaker test to IEC 61557-6			
with/without resolution, with/without probe, pulse or ramp, selective			
Voltage range: 95...145 V, 175...300 V, 15, 3...17, 5 Hz, 45...65 Hz			
Network impedance angle: $\cos \varphi > 0.5$ max. inductivity 5 mH			
Rated release operating current I_{AN} (mA)	Operating measurement deviation	Remarks	
- 0, 3 x I_{AN} : 10, 30, 100, 300, 500	0...10 % of 0.3 I_{AN}	Non-tripping test 500 / 2000 ms	
- 1 x I_{AN} : 10, 30, 100, 300, 500	0...+10 % of I_{AN}	Tripping test pulse, 500 ms	
- 2 x I_{AN} : 10, 30, 100, 300, 500	0...+10 % of I_{AN}	Tripping test pulse, $I_{ANmax}=500$ mA	
- 5 x I_{AN} : 10, 30, 100	0...+10 %	Tripping test, pulse	
27...105 % von I_{AN}	±10 % of I_{AN}	40 ms, $I_{ANmax}=200$ mA	
Variable rated release operating current 6 ... 1000, Resolution 1 mA	see above	see above	
Residual voltage measuring range U_F	Resolution	Operating measurement deviation	
0.5...99, 9 V	0.1 V	(0...+8% o. MV + 2 digit)	
Automatic cut-out at $U_F=50$ V corresponding with IEC 1010			
Tripping time measuring range (t_A)	Resolution	Operating measurement deviation	
0...500 ms (300 ms)	1 ms ± 4 ms		
Measuring range for loop impedance Z_s or earth resistance R_A	Resolution (Ω)	Operating measurement deviation	
0.2 Ω ... 9.99 kΩ	0.01 Ω ... 10 Ω	±10% o. MV + Digit	
Earth resistance RA (with probe) to IEC 61557-5			
Nominal voltage: 95...145 V, 175...300 V, 15, 3...17, 5 Hz, 45...65 Hz			
Measuring range	Resolution	Operating measurement deviation	
0.01...0.15...2.99 Ω	0.01 Ω	± (10% o. MV + 3 digit)	
3...14.9...99.9 Ω	0.1 Ω		
100...999 Ω	1 Ω		
1...9.99 kΩ	10 Ω		
Probe interference current: max. 20 V against PE potential	Probe resistance: max. 10 kΩ		
Probe voltage measuring range	Resolution	Operating measurement deviation	
1...10...70 V	1 V	± (2% o. MV + 1 digit)	
Insulation resistance to IEC 61557-2			
Nominal output voltage U_N : 100/250/600 V DC switchable			
Measuring range	Resolution	Operating measurement deviation	
3 kΩ...10 MΩ...29.9 MΩ...299 MΩ	1...100 kΩ...1 MΩ	± (8% o. MV + 1 Digit)	

Technische Daten		
Loop inner network impedance to IEC 61557-3		
Nominal voltage: 95...145 V, 175...300 V, L - N: 330...440 V 15.3...17.5 Hz, 45...65 Hz		
Measuring range	Resolution	Operating measurement deviation
0.01...0.7...2.99...99.9...199 Ω	0.01...0.1...1 Ω	± (5% o. MV + 3 Digit)
Load resistance: approx. 40 W/100 W/120 W		
Earth contact voltage (SEV 3588, earth voltage) only possible with probe		
Measuring range	Resolution	Measured value generation
0 ... U_N	0.1 V	1. Measurement $Z_{S,R}$ 2. Measurement R_A 3. Calculation $U_F = R_A \times U_N$ (setting 1..3 see short circuit current)
General data		
Display: 3-1/2 digit (1999 digits), 7 segment liquid crystal display, 17 mm high with illumination		
Reference temperature range: 23°C ± 2°C		
Operating temperature range: 0°C...+35°C		
Working temperature range: -10°C...+50°C		
Storage temperature range: -20°C...+60°C		
Climate class: Annual weather classification to DIN 40040 or IEC 654-1		
Type of protection: IP 40 to DIN 40050 or IEC 529-2		
Protection class: Corresponds to protection class II		
Safety: IEC 1010-1 300 V Installation category III		
Test voltage: 3.7 kV to IEC 1010-1/61010-1		
Quality standard: Developed, designed and built to DIN ISO 9001		
Permissible overload: $U_{eff} = 600$ V in all functions (software blocking)		
Emission values: EN 50081-1/EN 500811, class A		
Power supply: 5 only 1.5 V alkaline manganese batteries (IEC LR6) or accumulator pack (optional)		
Dimensions: 265 x 265 (110 with option), mm (l x w x h)		
Weight: Approx. 2.3 kg including batteries approx. 5.7 kg including batteries and accessories in carrying case		
Ordering data		
Designation	Order No.	
Testing instrument B4115	7KB4116-8DA	
Testing instrument B4116 with RS292C interface	7KB4115-8DB	
Extent of delivery: case, batteries, 2 connection cables, 1 earth spike, 1 cable reel 50 m, 1 measuring cable, 3 test prods, 3 alligator clips, shoulder strap operating instructions		
Bar-code reader	7KB9402-8BF	
Scanning head with START and illumination function	7KB9402-8DK	
Accumulator set with fast charging (1.5 Ah)	7KB9402-8EH	
PC Software WinSAT100 for B4115-8DA/DP for setting parameters, measured value registration and production of test reports. For B4115-8DA the interface must be available on the PC.	7KB9808-8AE	

Operating and power measuring instruments

Installation tester B4116

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- Measuring instrument for testing **protective measures to DIN VDE 0100** in installed TN, TT and IT networks
- e.l.c.b.-testing with/without resolution with pulse or ramp, tripping current, release time, fault voltage
- Earthing resistance measurement
- Insulation resistance measurement 100 – 250 – 500 V; programmable measuring sequence
- Loop-network impedance measurement
- Short circuit current/earthing current calculation
- Earthing voltage measurement
- Rotating field direction also in 2-phase networks
- Low ohm resistance measurement
- Compulsory protective conductor voltage/fracture control
- Phase connection test
- Voltage AC/DC; frequency
- IrDA® interface (Infrared Data Association) installed as standard, measured value report print-out possible
- Sensor input: temperature, current measurement with clip-on current converter, rating (W), $\cos \varphi$, energy (kWh)
- Programmable limit values



Technical data			
Direct voltages and sinusoidal alternate voltages, frequency			
Measuring range	Resolution	Range	Op. meas.error
0...50...440...550 V	1 V	DC, 15.3...420 Hz	$\pm (1\% \text{ o. mv} + 1 \text{ digit})$
15.3...99.9...420 Hz	0.1...1 Hz	5...440 V	$\pm (0.1\% \text{ o. mv} + 1 \text{ digit})$
Inner resistance: 300...400 k Ω (L - N - PE)			
Current-operated e.l.c.b. test (FI-RCB / IEC 61557-6)			
Voltage range: 95...145 V, 175...300 V			
Frequency range: 15.3...175 Hz, 45...65 Hz			
Permissible overload: max. $U_{\text{eff}} = 600 \text{ V}$			
Rated accuracy current $I_{\Delta N}$ (mA)	Operational meas. deviation	Remarks	
0.3 x $I_{\Delta N}$: 10, 30, 100, 300, 500	0...+10% of 0.3 $I_{\Delta N}$	Non-triggering test 500 / 2000 ms	
1 x $I_{\Delta N}$: 10, 30, 100, 300, 500	0...+10% of $I_{\Delta N}$	Triggering test, puls, 500 ms	
2 x $I_{\Delta N}$: 10, 30, 100, 300, 500	0...+10% of $I_{\Delta N}$	Triggering test puls, $I_{\Delta N \text{ max}} = 500 \text{ mA}$	
5 x $I_{\Delta N}$: 10, 30, 100	0...+10%		
27...125% of $I_{\Delta N}$	$\pm 10\%$ of $I_{\Delta N}$		
Fault voltage measuring range (U_f)			
0.5 ... 99.9 V	0.1 V	Operat. meas. deviations (0...+ 8% o.m.v.+ 2 Digit)	
Automatic cut-out at $U_f > 50 \text{ V}$ in accordance with IEC 1010			
Release time measuring range (t_A)			
0...500 ms	1 ms	Operat. meas. deviations $\pm 4 \text{ ms}$	
Measuring range for loop impedance Z_s or earthing resistance R_A			
0.2 Ω ...9.99 k Ω	0.01 Ω ...10 Ω	Operat. meas. deviations $\pm (10\% \text{ o.m.v.} + 4 \text{ Digit})$	
Duration of current flow to IEC 1010-1. Limitation of current flow period with due consideration of fault voltage to IEC 61557-6 and IEC 1010-1.			
Positive or negative pulsing direct current triggering test in accordance with main standards which permit 0.35 ... 1.4 I_N as release current.			

Technical data		
Earth resistance ($R_A \text{ ext}$) IEC 61557-5		
Measuring method:	current voltage measurement with probe	
Voltage frequency range:	as with e.l.c.b. testing	
Permissible overload:	max. $U_{\text{eff}} = 600 \text{ V}$ before start (< 5 V no start), measurement break-off at $U_{\text{eff}} > 50 \text{ V}$	
Automatic compensation	Stand. accessories	
Probe voltage	Resolution	Op.meas. error
1 ... 70 V	1 V	$\pm (2\% \text{ o.m.v.} + 1 \text{ Dig.})$
1 measurement range		
0.01 Ω ...0.15 Ω ...10 k Ω	0.1 Ω ... 10 Ω	$\pm (10\% \text{ o.m.v.} + 3 \text{ dig.})$
Earth resistance ($R_A \text{ int}$) IEC 61667-5		
Measuring methods: Current voltage measurement with probe Standard 3-pole measurement or special function 4-pole measurement		
Special function selective earth measurement		
As standard function but: Operational error of measurement: $\pm (20\% \text{ o.m.v.} + 3 \text{ digits})$ Minimum current through clip-on: 1 mA		
Special function spikeless earth measurement		
As selective earth measurement but: Measuring range: 0.01...9.9 Ω		
Insulation resistance (RISO) IEC 61557-2		
Measuring method:	current - voltage measurement	
Nominal output voltage:	100 / 250 / 500 V DC	
Nominal current:	> 1 mA DC (> 2.5 mA DC at 250 V)	
Short current:	< 7 mA DC	
Permissible overload:	max. $U_{\text{eff}} = 600 \text{ V AC}$; (measurement is not started)	
Measurement range	Resolution	Op. meas. error
1 k Ω ...3 k Ω ...300 M Ω : man	1k Ω ...1 M Ω	$\pm (8\% \text{ o.m.v.} + 1 \text{ digit})$
1 k Ω ...3 k Ω ...10 M Ω : auto	1k Ω ...100 k Ω	
auto: measuring sequence N - PE, L - PE, L - N, programmable		
Grounded voltage (SEV 3569)		
Earth voltage , only with probe		
Measuring range	Resolution	Meas. value forming
0... U_N	0.1 V	$U_F = R_A \cdot I_k$
Phase-sequence determination IEC 61557-7		
Voltage range: 20...440 V AC, 15.3...65 Hz		

Loop impedance (Zs / R) L - PE or L - N (L) IEC 61557-3		
Measuring method: Voltage depression IEC 61557 Nominal voltage: 95...145 V, 175...300 V, 330...440 V (only L - N [L])		
Measurement range	Resolution	Meas. op. range
0.07 ... 199 Ω	0.01 Ω ... 1 Ω	± (5% o.m.v. + 3 digits)
Short circuit current		
Measuring range	Display range	Resolution
1 A ... 10 kA	1 ... 40 kA	1...10...100 A
Op. meas. error: results from $I_k = \frac{U_N}{Z_s}$		
U _N equivalent setting 1 : 110 V, 230 V, 400 V; 2 : 127 V, 220 V, 380 V or 3 : measured voltage		
Current measurement (when using clip-on ammeter 7KA1408-8BA) sinusoidal alternate current 45 ... 65 Hz		
Measurement range	Resolution	Op. meas. error
1 ... 10 mA ... 199 A	1 mA ... 1 A	± (3% o.m.v. + 2 digit)
Energy Summation of measured active power over time for uniform or slowly changing capacities. Measuring rate: approx. 1 Hz		
Measurement range	Resolution	Op. error of meas.
0.00 ... 0.10 ... 99.9 kWh	0.01 W ... 0.1 kWh	± (3% o.m.v. + 3 digit)
Apparent power, power factor Both parameters are calculated values which are given out of the above-mentioned parameters and only apply for sinusoidal voltages and current.		
Dielectric test No load voltage: approx. 5 V DC Short circuit current: approx. 10 mA		
Active power Alternate voltage and current 45 ... 65 Hz, crest factor < 2, cos φ > 0,9 U = 50 ... 440 V, I = 20 mA ... 199 A		
Measurement range	Resolution	Op. error of meas.
0.1...1.0 ... 99.9 kW	0.1... 0.1 kW	± (3% v.MW + 3 Digit)
Low resistance measurement (R1 kΩ) IEC 61557-4		
Measurement range	Resolution	Op. error of meas.
0.01 ... 0.12 ... 2.99 ... 19.9 Ω ... 1 kΩ	0.01-0.1-1 Ω	± (5% o.m.v.+ 3 digits)

General data	
Operating temp. range:	0 °C ... + 35 °C
Working temperature range:	-10 °C ... + 50 °C
Storage temperature range:	-20 °C ... + 60 °C
Reference tem. range:	23 °C ± 2 °C
Temperature coefficient:	± 0.1% of MA / K
Operation measuring deviation:	related to working temperature range - IEC 61557-1
Climatic category:	Annual weather classification to DIN 40040 or IEC 654-1, respectively relative humidity at 65% at mid year max. 85%, no moisture condensation.
Type of protection:	IP 40 to DIN 40050 or IEC 529-2, respectively equivalent to Class of Protection II (II) 300 V, to Installation Category III to IEC 1010-1 / EN 61010-1, degree of contamination 2, increased insulation
Class of protection:	
Test voltage:	3.7 kV to IEC 1010-1 / EN 61010-1
Input protection:	by means of software barrier, additional various stores against voltage U _{eff} > 600 V and high capacity fuses (6.3 A / 500 V, super quick-acting fuse)
Max. voltage against earth:	U _{eff} = 300 V
Creep and clearance in air:	to IEC 1010-1 / EN 61010-1
Emission:	Class B to EN 50081-1 and IEC 61326-1
Immision:	Class A to EN 50082-1 and IEC 61326-1
Foreign influence:	corresponds to DIN VDE 43780
Quality standard:	developed, designed and produced to DIN ISO 9001
Auxiliary power:	6 only 1.5V alkaline manganese batteries IEC LR6 or accumulator pack 7.2 V / 1500 mAh (option)
Dimensions:	265 x 265 x 90 (110 with option) mm (l x w x h)
Weight:	approx. 5.7 kg SET in transport box

Order data	
Designation	Order No.
INSTALLATION TESTER B4116 in transport case comprising: 1 only measuring lead (instrument 3 plugs), 1 only measuring lead (instrument earthing pin plug), 3 only alligator clips, 3 only test probes, 1 only measuring lead (plug/test probe), 1 only shoulder carrying strap, 2 only belt fasteners, 2 only earth drills, 1 only cable reel (50 m wire), 1 only cable reels (25 m wire), 6 only batteries, 1 only battery holder, directions for use in English, German or French.	7KB4116-8AA
PC software WinSAT100 for installation tester B4116, for setting parameters, measured value acquisition and production of test reports. An IrDA® interface must be available on B4116-8AA.	7KB9808-8AE
IrDA® Adapter for PC	7KB9808-8BE

Order data	
Designation	Order No.
INSTALLATION TESTER B4116 inclusive RS 232 Interface: Barcode reader Probe with start and illumination function Active temperature probe (Type K) -60 ... 800 °C Accumulator set with fast charging PC software WinSAT 100 IrDA® adapter for PC IrDA® printer HP Deskjet 340 CBi Measuring set 1 Measuring set 2 Split-core-type current transformer Cable for current transformer Adapter powerless earth measurement 3 only alligator clips Plug adapter F (NFC61303) - AT (earthing pin plug) adapter for 3-phase plug box Consumer measuring adapter	7KB4116-8AB 7KB9808-8BF 7KB9402-8DK 7KB9102-8DE 7KB9402-8EH 7KB9808-8AE 7KB9808-8BE 7KB9808-8BD 7KB9402-8DX 7KB9402-8DY 7KB1408-8BA 7KB9402-8EE 7KB9402-8EF 7KB9402-8DF 7KB9402-8EJ 7KB9402-8EG 7KB9808-8BJ

Operating and power measuring instruments

B4110 tester

- Microprocessor-controlled device for testing the **protective measures to DIN VDE 0701** after repair or modification of electrical devices and data processing equipment; for measuring
 - Protective earth conductor resistance $R_{PE} \leq 10 \Omega$
 - Isolation resistance $R_{ISO} \leq 30 M\Omega$
 - Equivalent leakage current $I_{PE} \leq 30 \text{ mA}$
 - Fault current $I_f \leq 3 \text{ mA}$ (protection class 1)
- Automatic safety test of
 - Mains voltage $U_{RMS} \leq 300 \text{ V (AC)}$
 - Active/apparent power $P \leq 4 \text{ kW/kVA}$
 - Power factor 0.5 ... 1
- Multimeter functions: Measurement of
 - DC/AC voltage $U_{TRMS} \triangleq U_{rms} \leq 400 \text{ V}$
 - DC/AC voltage $I_{TRMS} \triangleq I_{rms} \leq 2 \text{ A}$
 - Resistance $R \leq 3 M\Omega$
 - Temperature $T \leq 1000 \text{ }^\circ\text{C}$
 - Capacitance $C \leq 30 \mu\text{F}$



2

Technical data				
Protective earth conductor resistance measurement to DIN VDE 0701, Part 1				
Meas. range	Display range	Resolution	Operating error	
0.1...10 Ω	0.01...9.99 Ω	0.01 Ω	$\pm (3 \% \text{ o. meas. value} + 3 \text{ digits})$	
Isolation resistance measurement to DIN VDE 0701, Part 1				
Meas. range	Display range	Resolution	Operating error	
0.08...30 Ω	0.01...29.99 M Ω	10 k Ω	$\pm (3 \% \text{ o. m. val.} + 2 \text{ digits})$	
Equivalent leakage current measurement to DIN VDE 0701, Part 1				
Meas. range	Display range	Resolution	Operating error	
0.2...30 mA	0.01...29.99 mA	10 μA	$\pm (5 \% \text{ o. m. val.} + 5 \text{ digits})$	
Fault current (isolation from supply by current measurement) to DIN VDE 0701, Part 240				
Meas. range	Display range	Resolution	Operating error	
0.015...3 mA 0.030...3 mA	0.001...2.999 mA	10 μA	AC signal: $\pm (2 \% \text{ o. m. v.} + 5 \text{ digits})$ DC/AC signal: $\pm (2 \% \text{ o. m. v.} + 10 \text{ digits})$	
Additional functions				
Mains voltage measurement on load (AC-RMS)				
Meas. range	Display range	Resolution	Frequency range	Operating error
15...300 V	0...299.9 V	0.1 V	45...65 Hz	$\pm (3 \% \text{ o. m. v.} + 5 \text{ dig.})$
Current measurement AC-RMS (Only with function test and power connection in multimeter range)				
Meas. range	Display range	Resolution	Frequency range	Operating error
0.1...10 A	0.01...18.00 A	10 mA	45...65 Hz	$\pm (5 \% \text{ o. m. v.} + 5 \text{ dig.})$
Power measurement - active/apparent power (only with function test)				
Meas. range	Display range	Resolution	Frequency range	Operating error
10...4000 W / VA	1...2999 W / VA 3.00...3.99 kW / kVA	1 W / VA 10 W / VA	45...65 Hz	$\pm (8 \% \text{ o. m. v.} + 5 \text{ digits})$
COS-PHI measurement (with function test only)				
Meas. range	Display range	Resolution	Frequency range	Operating error
0.5...1	0.01...1.00	0.01	45...65 Hz	$\pm (10 \% \text{ o. m. val.} + 10 \text{ digits})$
Multimeter function				
Voltage measurement DC/AC (mean Siemens r.m.s.)				
Meas. range	Display range	Resolution	Error limits	
0...400 V	0...299.9 V 300...500 V	0.1 V 1 V	DC / RMS + TRMS 40...400 Hz 16 Hz...1 kHz $\pm (1 \% \text{ o. m. v.} + 5 \text{ digits})$ $\pm (5 \% \text{ o. m. v.} + 5 \text{ digits})$	

Direct current/alternating current measurement (mean, RMS, true RMS)				
Meas. range	Display range	Resolution	Error limits	
AC/AC+DC 0...1 A DC: 0...2 A	0...299.9 mA 0.3...1999.9 A DC: 0.3...2.99 A	100 μA 1 mA 1 mA	DC / RMS + TRMS 40...400 Hz $\pm (1 \% \text{ o. m. v.} + 5 \text{ digits})$ 16 Hz...1 kHz $\pm (5 \% \text{ o. m. v.} + 5 \text{ digits})$	
Resistance				
Meas. range	Display range	Resolution	Error limits	
0.1 Ω ...3 M Ω	0.1 Ω ...2999 k Ω	0.1 Ω ...1 k Ω	$\pm (1 \% \text{ o. m. v.} + 2 \text{ digits})$	
Temperature				
Meas. range	Display range	Resolution	Sensor type	Error limits sensor included
-50...600 $^\circ\text{C}$	-273.1...299.9 $^\circ\text{C}$ -273.1...299.9 $^\circ\text{C}$	0.1 $^\circ\text{C}$ 1 $^\circ\text{C}$	Mo 1000 cl.A Pt 100	$\pm (0.5 \% \text{ o. m. v.} + 1 \text{ K})$ $\pm (1 \% \text{ o. m. v.} + 1.5 \text{ K})$
Capacitance				
Meas. range	Display range	Resolution	Error limits	
0...30 μF	0...2.999 μF 3...29.99 μF	1 nF 10 nF	$\pm (5 \% \text{ o. m. v.} + 3 \text{ digits})$	
General data				
Working temperature range		-10 to +50 $^\circ\text{C}$		
Service temperature		0 to 30 $^\circ\text{C}$ (DIN VDE 0701 functions)		
Rated temperature range		18 to 28 $^\circ\text{C}$ (multimeter functions)		
Climatic class		JWG to DIN 40 040 (3/73)		
Degree of protection		IP 40 to EN 60 529, power pack IP 30		
Protection class		corresponds to protection class II to DIN VDE 0411, Part 1 / IEC 348 and DIN 0404, Part 1		
Power supply		AC 45 to 65 Hz 230 V; for multimeter functions also mains independent battery operation using six 1.5 V alkaline/manganese batteries to IEC LR6 or zinc/carbon batteries to IEC R6		
Dimensions (w x h x d)		270 mm x 90 mm x 265 mm		

Ordering data			
Designation	kg	Order No.	
B4110 tester in transport case			
- without interface	5	7KB4110-8AA	
- with serial RS-232-C/V.24 interface, set-up and diagnostic software and instructions	5.4	7KB4110-8AB	
Accessories			
Printer, memory, RS 232 interface (option) with connection lead for a PC, 3,5-inch diskette with set-up and diagnostic software and instructions	1	7KB9402-8DJ	
Retrofitting of tester 7KB4110-8AB with option 7KB9402-8DJ: upgrading kit required depending on instrument release Further accessories (see Page 2/5)			on request

Ordering data			
Designation	kg	Order No.	
Ft1 immersion sensor Mo 1000, class A, sensor length 130 mm, Overall length 270 mm -50 ... +200 °C ... 250 °C 0.2% of measured value +0.15 °C	0.07	7KB9402-8EA	
Ft1 air sensor Mo 1000, class A, sensor length 150 mm, Overall length 270 mm -50 ... +200 °C ... 250 °C 0.5% of measured value +0.6 °C	0.07	7KB9402-8EB	
Ft2 baking oven sensor Pt 1000, class A, sensor length 30 mm, -50 ... + 400 °C ... 500 °C	0.06	7KB9402-8EC	
Ft2 surface sensor Pt 1000, class B, sensor length 140 mm, Overall length 280 mm -50 °C ... +500 °C 0.6% of measured value +0.5 °C For all sensors: connection cable 1.5 m long with 2 safety plugs	0.07	7KB9402-8ED	
Probe with start button and illumination		7KB9402-8CB	
Interface kit RS-232-C/V.24 for retrofitting testers 7KB4110-8AA, with 2 connection cables for printer and PC as well as set-up and diagnostic software	0.4	7KB9402-8CC	
C1606 thermal printer with RS 232 C/Seiko DPU-201 interface	1.4	7KC1606-8AA	
Paper for thermal printer (5 rolls)	0.1	7KB9402-8CG	
Data acquisition and evaluation programme for generating documents as proof of examination of protective measures to DIN VDE 0701		7KB9402-8DM	
Three-phase adapter for isolation and protective earth conductor measurements on multi-phase equipment		7KB9402-8DN	
Adapter for testing extension cables		7KB9402-8DP	



Ft1 immersion sensor (7KB9402-8EA)



Ft1 air sensor (7KB9402-8EB)



Ft2 baking oven sensor (7KB9402-8EC)



Ft2 surface sensor (7KB9402-8ED)

Differential current adapter for B 4110 or B1100 ... B1106 multimeter

The differential current adapter makes it possible to conveniently measure fault currents even in those cases where the specimen is conductive and connected to other earthed parts of the plant.

The differential current between external conductor L and neutral conductor N of the specimen is measured. The specimen can be subject to a complete function test whereby all the necessary connections (for example, transmission, operating means, etc.) are kept.

Measurement is by means of an active current converter. The electronic unit and thus also the output signal are isolated. The testing voltage between power circuit and measuring circuit is 3.7 kV AC.

The differential current adapter was developed and produced with due consideration to the Quality Assurance System DIN ISO 9001.

Unlike equivalent leakage current measurement the differential current adapter determines the actual leakage current (grounding current) at full mains nominal voltage.

Ordering data			
Designation	kg	Order No.	
Differential current adapter (for B 4110 tester or multimeter B 1025 ... B 1028)		7KB9402-8DQ	

Operating and power measuring instruments

Software package and accessories for testers

Software package for testers

Ordering data		
Designation	kg	Order No.
Software package for B4115 tester (7KB4115-8AA) in so far as equipped with optional "printer, memory, interface RS 232 (7KB9402-8DJ)" for parametering, measured value acquisition and production of test reports.		7KB9808-8AA
Software package for B4110 tester (7KB4110-8AB) for parametering, measured value acquisition and production of test reports.		7KB9808-8AB
Software package for isolation resistance meter Isowid B4102 (7KB4102-8AB) for parametering, measured value acquisition and production of test reports.		7KB9808-8AC
Software package for earth tester B4152 (7KB4102-8AB) for parametering, measured value acquisition and production of test reports.		7KB9808-8AD

Inexpensive tester sets

Ordering data		
Designation	kg	Order No.
System testing set B4115 (VDE 0100) instrument testing set B 4110 (VDE 0701) comprising tester B 4115 (7KB4115-8AA) and the optional "printer, memory, interface RS 232" (7KB9402-8DJ)		7KB4115-8CC
Equipment testing set B4110 (VDE 0701) comprising tester B4110 (7KB4110-8AB) and the optional "printer, memory, interface RS 232" (7KB9402-8DJ)		7KB4110-8CC
Isolation tester set B4102 comprising Isowid B4102 isolation tester (7KB4102-8AB) and the optional "printer, memory, interface RS 232" (7KB9402-8DJ)		7KB4102-8CC
Earth meter set B4152 comprising earth meter B4152 (7KB4152-8AB) and the optional "printer, memory, interface R S232" (7KB9402-8DJ)		7KB4152-8CC

DOCU-PACK

Technical data	
Interface level:	to EIA RS 232 specifications
Interface parameters:	19200 baud, 8 databits, no parity testing, 1 stop bit
Plug assignment:	1 DCD, 2 Rx/D, 3 Tx/D, 4 DTR, 5 GND, 6 DSR, 7 RTS, 8 CTS 9 +5 V (power supply for barcode reader)
Data flow control:	DOCU-PACK can send and receive data simultaneously. CTS and DSR cables are switched parallel and control the data transfer to DOCU-PACK: <ul style="list-style-type: none"> Level under -5 V, when the 255 byte buffer is almost full Level above +5 V, when the buffer 255 byte has capacity RTS- and DTR cable makes blocking data outputs to DOCU-PACK possible <ul style="list-style-type: none"> DTR and RTS is under -3 V: data output blocked. DTR and RTS greater than +3 V: data output blocked. A 1:1 (9-pole / 9-pole) connection cable is to be used for connection to a PC.
Battery service life for clock and data memory:	10 years
Electrical isolation to basic instruments:	in accordance with IEC 1010-1/2 300 V for installation category III or 600 V for installation category II. Test voltage: 3.7 kV/50 HZ for one minute. Max. permissible frequency voltage product: 10 ⁶ VHz.
Power supply:	Power supply from battery or rechargeable battery of the basic instrument or from the mains: Power consumption depending upon operating mode: Standby 2.5 mA Normal operation 25 mA Printing 2 A peak
Service temperature:	-10 °C... +50 °C
Storage temperature range:	-20 °C ...+60 °C
Climatic class:	JWG to DIN 40040 (3/73)
Relative air humidity:	less than 65 % mid year, maximum, 85 %, no condensation.
Dimensions (l x w x h):	210 mm x 90 mm x 38 mm
Weight:	approx. 0.4 kg



Technical data		
Special characteristics and functions		
Memory for saving texts specific to the customer:	max. 255 characters	
four digit object number:	for example, barcode reader	
64 byte memory:	of which 57000 byte for filling measured data	
Integrated clock:	date, time, setting and reading time control of data printout at adjustable intervals: print interval setting and reading	
Input buffer:	255 byte memory capacity	
Operating mode switch:	MEMORY, PRINT, RS 232	
Ordering data		
Designation	kg	Order No.
DOCU-PACK (printer/memory/RS 232) <ul style="list-style-type: none"> Included in delivery: DOCU-PACK, serial connection cable (9-pole/9-pole), 3 fastening rails, 1 battery cover, 1 diskette 3.5 inch, 1 instruction manual, 2 paper rolls 		7KB9402-8DJ
Thermosensitive paper rolls (5 m) for printer (A 6202 46 11)		7KB9402-8CG

- Safety tests - DIN VDE 701, DIN VDE 0106
- Repeat test - DIN VDE 0702, CENELEC BTTF 77
- RPE, RISO, IPE, IF, IΔ, capacity P₁ cos φ, energy kWh function test (network voltage, consumer current, effective capacity, apparent capacity, capacity factor, energy)
- Measurements with split-core current transformer (only B4130)
- IrDA®, infrared data interface (only B4130)
- Integrated measured data memory and clock (only B4130)
- Programmable test sequences
- Monitoring set LIMITS
- All necessary test functions combined in one compact instrument
- Protection against faulty operation (testing for correct measurement connection)
- Robust design, protection against contamination (IP56)
- Extensive overload protection



2

Technical data		
Protective conductor test:		
Voltage:	> 60 V against contact electrode (START key)	
Interruption:	> approx. 800 kW	
Switch on (connection) test:	consumers P > 5W are recognized	
Short circuit test (L-N):	AC resistor < 9W (equivalent to I _g > 25 A) Capacity measurement and differential current measurement are not started.	
Monitoring		
Consumer current (I):	Network switched out at I _g > 18 A (is continuously monitored in the case of capacity measurement)	
Protective conductor resistance (IEC 61557-4, DIN VDE 0701/Part 1):		
Measuring range	Resolution	Operating measurement deviation
0.1 ... 29.99 Ω	0.01 Ω	± (2% o.v.m. + 5 digits)
Limit stipulation:	> 0.3 Ω	
Nominal voltage:	8 V AC / 128 V	
Short circuit current:	> 200 mA AC	
Max. overload:	U _{eff} = 300 V	
Automatic recognition and testing for parallel earthing. Measurement by means of clip-on ammeter for permanent connected consumers (option)		
Insulation resistance (IEC 61557-2, DIN VDE 0701/Part 1):		
Measuring range	Resolution	Operating measurement deviation
0.08 ... 29.99 MΩ	1 kΩ / 10 kΩ	± (3% o.v.m. + 2 digits)
Measuring range	< 0.5 MΩ for SK 1, < 2 MΩ for SK 2	
Limit stipulation:	500 / 100 V DC switchable, (100 V corresponds to DIN VDE 804-22-2.2)	
Short circuit current:	> 1.5 mA, < 12 mA DC	
Nominal voltage:	1 mA DC	
Substitute leakage current (DIN VDE 0701/Part 1):		
Measuring range	Resolution	Operating measurement deviation
0.20 ... 29.99 mA	10 μA	± (8% o.v.m. + 5 digits)
Measuring range	> 7mA for SK 1, > 1mA for SK 2	
Limit stipulation:	approx. 70 V AC, 50 Hz	
Measuring voltage:	0 ... 299.9 V switchable	
Fault current (safe isolation through current measurement) to VDE 0701 / Part 240:		
Measuring range	Resolution	Operational error or measurement
018 ... 2.999 mA	1 μA	AC signals ± (2% o.v.m. + 5 digit)
030 ... 2.999 mA		DC / AC signals ± (5% o.v.m. + 10 digits)
Preset limit value:	> 0.25 mA	
Inner resistance:	approx. 2 kΩ	
Current limitation:	> 5mA, break time: < 200 μs	
Max. overload:	U _{eff} = 400 V	

Technical data				
Differential current measurement I _Δ (DIN VDE 0702)				
Measuring range	Resolution	Operational error or measurement		
0.2 ... 29.99 mA	10 μA	± (3% o.v.m. + 3D + 5 digits / 10 A I _Δ)		
Preset limit value: 3.5 mA for SK 1, 0.5 mA for SK 2				
Measurement I _{ΔN} through clip-on ammeter possible with permanent connected consumers.				
Supplementary functions:				
Voltage AC-RMS (only with function test)				
Meas.range	Display range	Resolution	Frequency range	Intrinsic error
207...253 V	130...299.9 V	0.1 V	45...65 Hz	± (2% o.v.m. + 5 digits)
Crest factor: 2 at measuring range upper range value				
Current AC-RMS: (only with function test)				
Meas.range	Display range	Resolution	Frequency range	Intrinsic error
0.30 ... 16 A	0 ... 18.00 A	10 mA	45 ... 65 Hz	± (2% o.v.m. + 5 digit)
Crest factor: 2 at measuring range upper range value				

Ordering data	
Designation	Order No.
Electrical equipment tester B4130 - SET 1 Basic instrument (protective cover + carrying strap), infrared interface IrDA® (for data transfer) Alligator clip, fully insulated Measuring cable + probe, black Directions for use	7KB4130-8AA
Electrical equipment tester B4130 - SET 2 Content as set 1 and in addition: Split-core-type current transformer 0.3 ... 300 mA Spec. cable set for perm. connected consumers	7KB4130-8AC
Split-core-type current transformer 0.3 ... 300 mA Special cable set for permanently connec. consumers Probe (START, illumination) Option RS 232 Serial Interface, interface cable Option BARCODE READER (only in connection with option RS 232) Option PC software	7KA1413-8AA 7KB9808-8BH 7KB9402-8CB 7KB9808-8BK
IrDA® adapter for PCs without integrated IrDA® port IrDA® A 4 printer HP-Deskjet 340 CBi with accum.	7KB9808-8BF 7KB9808-8AF 7KB9808-8BE 7KB9808-8BD
Option PC software WinSAT 702 for parameter setting, measured data acquisition and production of test report. Electrical equipment tester must be equipped with a serial interface RS232C or the PC with IrDA® interface.	7KB9808-8AF
Electrical equipment tester B4131 Basic instrument (protective cover + carrying strap) Alligator clip, fully insulated Measuring cable + probe, black Directions for use	7KB4131-8AA

Operating and power measuring instruments

Equipment tester B4130 / B4131

2

Technical data				
Power, active and apparent power: (only with function test)				
Meas.range	Display range	Resolution	Frequency range	Intrinsic error
10...4500 W/VA	0...2999 W/VA 3.0.4.50kW/kVA	1 W / VA 10 W / VA	45 ... 65 Hz	± (5% o.m.v. + 5 d)
Power factor (only with function test)				
Meas. range	Display range	Resolution	Frequency range	Intrinsic error
0.5 ... 1	0.01 ... 1.00	0.01	45 ... 65 Hz	± (10% o.m.v. + 10 d)
Measuring procedure: calculation from active and apparent power				
Energy: Summation of active power related to measuring interval (approx. 0.5 Hz) Details for slow changing powers.				
Measuring range	Resolution	Operational error of measurement		
0,10 ... 99,9 kWh	1 µWh...1 MWh	± (5% o.m.v. + 5 digits)		
Inducting state voltage: (B 4130 only) High voltage diodes measurement with high induction stage voltage up to 100 V.				
Measurement range	Display range	Resolution	Intrinsic error	
12...120 V	0...300 V	1 V	± (5% o.m.v. + 5 digits)	
Measured data memory: 248 measured object data equivalent to approx. 3000 measured values can be saved. Integrated real time clock with date.				
Data interface: (B4130 only)				
Built-in infrared interface IrDA® for communication with printer or PC (remote control, data transfer and memory readout).				

Technical data	
General data	
Working temperature range:	-10 °C ... + 50 °C
Operating temp. range:	0 °C ... + 35 °C (protective measuring test)
Reference temp. range:	23 °C ± 2 °C
Storage temperature range:	-20 °C ... 60 °C
Op. measurement deviation:	refers to the operating temperature range
Intrinsic error:	refers to the reference temperature range
Climatic category:	Annual weather classification to DIN 40040
Type of protection:	IP 56 to EN 60529
Safety:	☑ to IEC 1010-1, 300 V, CAT II, degree of contamination 2
Test voltage:	2.3 kV AC (sinus) IEC 1010-1
Quality standard:	to DIN ISO 9001
Emission:	Class B to EN 50081-1 and IEC 61326-1 to EN 50082-1 and IEC 61326-1 Class B
Immission:	Class B to EN 50081-1 and IEC 61326-1 Class B
Working voltage range:	90 .. 253 V, 47 .. 63 Hz, approx. 10 VA power consumption
Nominal voltage:	230 V ± 10%
Dimensions:	234 x 175 x 115 mm (L x W x H)
Weight:	approx. 2.3 kg without accessories
Limit values can be altered individually. Warning when values are exceeded. Automatic sequence safety test. Subsequent function test with power measurement.	

Revitester 0701

- Testing of protective measures to **DIN VDE 0701** on electrical equipment for home use or similar. Application after repair or modification
- Single step test or automatic testing sequence
- Robust instrument in practical carrying case
- Easy operation
- Switchable limit values
- Clear go / no go evaluation through color underlayed fields on pointer instruments
- Ideal for workshop and test bed
- Low operating costs through long calibration interval (recommended every two years)

Technical data:	
Protective conductor test to DIN VDE 0701	
Measuring range:	0 - 1000 mΩ
Measuring current:	200 mA DC
Scale run:	linear
Insulation test to DIN VDE 0701	
Measuring range:	0,2 - 10 MΩ
Measuring voltage:	U _N = 500 V DC
Nominal current:	I _N = 1 mA
Short circuit current:	I _k = 4,8 mA
Leakage current measurement to DIN V DE 0701	
Measuring range:	0 - 18 mA
Measuring voltage, low protective voltage:	< 40 V AC
Scale run:	calibrated to 1.06 x 230 V AC to DIN VDE 0701




General data:	
Power supply:	230 V AC / 50 Hz
Power input:	approx. 6 VA
Testing voltage:	3 kV
Protection class:	II
Accuracy:	Class 2,5
Working temperature range:	0...15...35...+50 °C
Storage temperature range:	-20...+70 °C
Mechanical data:	
Connections:	Mains cable, 3-pole, 1.0 mm ²
Weight:	approx. 800 g
Instrument cleaning:	with dry cloth of circuit state
Standards:	DIN VDE 0701 DIN VDE 57413 EN 61010
Interference output:	EN 50081
Noise immunity / category:	EN 50082 Class B

Order data	
Designation	Order No.
Revitester 0701	
including test lead with probe insulated pick-off clip directions for use in carrying case	7KB4111-8AA

Industrial and power measuring instruments

Isolation meter, loop resistance tester, e. l. c. b. tester

2

Measuring instruments to check protective measures to to DIN VDE 0100 in installed systems	isolation meter B4103	loop resistance tester B4113	e.l.c.b. tester B4114
			
Technical data			
Fullfil standards Isolation test Normal version Version for battery-operated vehicles Rated voltage Loop resistance Short-circuit current Test resistance/test duration E.l.c.b. test Voltage measurement Operating error Deviation in measurement of measured value Overload protection Display Rated conditions U/f Temperature range Impedance angle Test voltage Power supply Special functions Dimensions (h x w x d) Weight	DIN VDE 0413, Part 1 0 ... 20/200 MΩ 0 ... 0.2/2 MΩ DC 500 V - - - - - - 20 ... 450 V AC/DC ≤ 30% of measured value 1.5 % ± 2 digits with 20 MΩ ± 10 digits with 200 MΩ U ≤ 600 V LCD, 3 1/2-digit, 10 mm digits - - - 4 kV 6 x 1.5 V IEC LR 6 Display illumination 58 mm x 92 mm x 235 mm Approx. 0.56 kg	DIN VDE 0413, Part 3 - - - 0.3 ... 20 Ω 11 ... 730 A 12 Ω/max 10 ms - - ≤ 30% of measured value Range 0.3 ... 1 Ω ± 30% 1 ... 20 Ω ± 0.24 Ω Fuse M 2.5 A / 500 V LCD, 3 1/2-digit, 10 mm digits 230 / 400 V / 50 / 60 Hz 0 ... 30 °C cos phi = 1...0.95 4 kV From power system to be tested Phase, neutral and protective conductor connection check 58 mm x 92 mm x 235 mm Approx. 0.67 kg	DIN VDE 0413, Part 6 - - - - - 10/30/100/300/500 mA 0 ... 200 V (touch voltage) ≤ 10% of measured value ± 10% of rated leakage current 0 ... 20% max leakage voltage Fuse M 0.4 A / 500 V LCD, 2 1/2-digit, 10 mm digits 230 / 400 V / 50 Hz 0 ... 30 °C Constant mains voltage 4 kV From power network to be tested Touch voltage measurement without e.l.c.b. switch release 58 mm x 92 mm x 235 mm Approx. 0.67 kg
Ordering data			
Designation	Order No.	Order No.	Order No.
	7KB4103-8AA	7KB4113-8AA	7KB4114-8AA
Accessories			
3-phase connection set	-	on request	on request
Safety tapping clips (1 set = 3 clips)	-	7KB9402-8DF	7KB9402-8DF
Carrying case for 1 tester	7KB9402-8FB	7KB9402-8FB	7KB9402-8FB

Operating and power measuring instruments

Isowid B4101 and B4102 isolation testers

- Wide range isolation testers
- Digital and analog displays, with dimensions and supplementary information
- Resistance measurement
 - B4101: 0.1 Ω to 30 G Ω , analog 0.01 Ω to 1 T Ω
 - B4102: 0.01 Ω to 30 G Ω , with GUARD test facility to 300 G Ω (3 T Ω)
- Measuring voltage DC 100 - 250 - 500 - 1000 V or variable DC 50 to 1000 V (10 V steps)
- Autoranging
- Limit input facility (locked via code input)
- Measuring line compensation
- Measured value memory
- DC/AC voltage measurement
- Overload protection
- Battery test
- Degree of protection IP 56 to EN 60 529 (splash-water proof)
- Location isolation resistance measurement (B4102)
- Equivalent leakage current measurement (B4102)



2

Technical data	
Voltage measurement	with automatic DC/AC detection
Meas. range	digital 1 to 600 V analog 20 to 1000 V
Frequency range	DC to 400 Hz
Isolation resistance measurement to DIN VDE 0413 Part 1 (9/80)	
Meas. range, digital display	70 Ω ... 3 G Ω , 70 Ω ... 30 G Ω 10 Ω ... 30 G Ω (without GUARD) 3 G Ω ... 3 T Ω (with GUARD)
Digital measuring range	10 k Ω ... 1 T Ω
Limit value input	$R_{ISO\ LIMIT} < 500\ k\Omega$ $U_{ISO\ LIMIT} = 1000\ V$
Setting time	approx. 3 s at 1 $\Omega <$ meas. value $<$ 2.9 M Ω approx. 5 s at 3 M $\Omega <$ meas. value $<$ 2.9 G Ω approx. 10 s at 3 G $\Omega <$ meas. value $<$ 29.9 G Ω 3 to 30 s
- B4101	
- B4102	
Resistance measurement	
Digital measuring range	0 to 30 k Ω
- B4101	0.03 to 2999 Ω
- B4102	
Analog measuring range	10 m Ω ... 100 k Ω
Limit value input	$R_{LIMIT} > 0.3\ \Omega$
Equiv. leakage current measurement (B4102), to DIN VDE 0701, Part 1	
Measuring range	0.11 to 29.99 mA
Limit value input	$I_{PE\ LIMIT} > 7\ mA$
Standing surface isolation resistance measurement (B4102) vectorial, AC + DC components to DIN VDE 0100, Part 600.10	
Digital measuring range	31 Ω to 2999 k Ω (without GUARD) 3 M Ω to 29.99 M Ω (with GUARD)
Analog measuring range	0 to 100 M Ω
Limit value input	$R_{AC\ LIMIT} < 50\ k\Omega$
General data	
Measurement rate	approx. 2 meas./s for digital display approx. 5 meas./s for analog display (resistance measurement: approx. 4)
Display	2999 digits, 7 segment LCD, 14 mm high digits and 56 division analog bargraph
Service temperature	0 to 30 $^{\circ}C$
Degree of protection	IP 56 to EN 60 529
Protective measures	II to IEC 348 (78) and DIN VDE 0411 Part 1
Test voltage	6 kV to IEC 348 (78)

Power supply	via six 1.5-V alkaline/manganese batteries to IEC LR6 or rechargeable batteries (No. 5006; 1.24V/600 m Ah, Mignon 601 Rs, IEC KR 15/51 (R6), usual in the trade)
Mains-independent battery operation	
Operating time	At least \geq 800 measurements
Dimensions (h x w x d)	90 mm x 220 mm x 240 mm

Ordering data		
Designation	kg	Order No.
Isowid B4101 isolation tester including 1 pair of test leads, batteries and instruction manual in transport case	3.5	7KB4101-8AA
Isowid B4102 isolation tester as Isowid B 4101 but in addition 1 laboratory cable with safety tapping clips	3.5	7KB4102-8AA
Isowid B4102 isolation tester with serial RS-232C/V.24 interface and cable connectors for printer and PC, rechargeable battery set otherwise diagnosis software as 7KB4101-8AA	3.7	7KB4102-8AB
Accessories		
Probe with start button and illumination		7KB9402-8CB
Rechargeable battery set for Isowid isolation testers		7KB9402-8DH
RS-232-C/V.24 interface kit retrofit kit for Isowid B 4102 isolation tester, with rechargeable battery set, cable connectors for printer and PC, set-up and diagnosis software.		7KB9402-8CE
C1606 thermal printer with RS 232 C/Seiko DPU-201 interface	1.4	7KC1606-8AA
Paper for thermal printer (5 rolls)	0.1	7KB9402-8CG
Printer, memory RS 232 interface (option 3 with connection lead for a PC, 3.5-inch diskette with set-up and diagnosis software and instructions)	1	7KB9402-8DJ
Retrofitting of isolation tester 7KB4102-8AA with option 7KB9402-8DJ; retrofit kit required depending on to instrument release		on request



- Digital and analog display, with dimensions and additional information
- Resistance measurement up to 10 GΩ
- Measuring voltage DC 100 - 250 - 500 V
- DC/AC voltage measurement
- Overload protection
- Battery level control
- Degree of protection IP 40
- Active display illumination
- Separate compartment for 9-V battery
- RS 232 interface for printer or PC connection (option)

Technical data				
Isolation resistance measurement		Measuring method		
		Current and voltage measurement to DIN VDE 0413 Part 1/80 (3/93) and prEN 50197-5		
Meas. range	Resolution	Display range	Operating error	Error limits
1.8 kΩ... 2 GΩ	0.1 kΩ... 1 MΩ	0...199.9 MΩ	± (4 % o. meas. value + 3 digits)	± 8 % o. meas. value + 4 digits
2 GΩ... 10 GΩ	100 MΩ	0...19.9 GΩ	± (6 % o. meas. value + 3 digits)	± 12 % o. meas. value + 3 digits
Rated voltage U_N		DC 100 - 250 - 500 V		
No-load voltage U_0		< 1.2 x U_N		
Rated current		≥ DC 1 mA with U_N ≥ DC 2.5 mA on 100 kΩ in 250 V range		
Short-circuit current		< DC 10 mA		
Resistance measurement R_{DC} and continuity test				
Measuring method		Current and voltage measurement		
Meas. range	Resolution	Display range	Error limits	
200 Ω	0.1 Ω	0...199.9 Ω	±5% o. meas. value + 3 digits	
2 kΩ	1 Ω	200...1999 Ω		
No-load voltage		approx. 4.5 V		
Short-circuit current		2.5 mA (max 6.5 mA)		
Series interference voltage suppression (NMR)		approx. 60 dB at 50 and 60 Hz		
Common-mode voltage suppression (CMR)		> 80 dB with 50 and 60 Hz		
Buzzer response		< 100 ms, response threshold < 100 Ω		
Voltage measurement				
Meas. range	Resolution	Operating error		
AC/DC 0...600 V	1 V	10 % for pure AC and DC signals		
General data				
Display		7-segment LCD, 3 1/2 digit (1999 digits), 16 mm high digits, 16 division analog bar graph with over and undershoot display and additional marking, connectable illumination		

Service temperature range	0 to +35 °C
Reference temperature	23 °C ± 2°C
Protective measures	Protection class 2, IEC 1010-1 600 V CAT II, pollution degree 2
Degree of protection to EN 60 529	IP 40
Operating time	> 1000 measurements to DIN VDE 0413 with reference temperature
Operating error	related to reference temperature and guaranteed for 3 years
Power supply	9 V battery, IEC 6LR61
Dimensions (w x h x d)	54 mm x 113 mm x 216 mm

Ordering data		
Designation	kg	Order No.
Isowid B4104 isolation tester with 1 pair of test leads with test probes, tapping clips, battery, battery compartment, instructions and rubber cover	1	7KB4104-8AA
Isowid B4104 with built-in RS 232 interface and cable connectors for printer and PC, with software on 3.5-inch diskette, otherwise 7KB4104-8AA	1.2	7KB4104-8AB
Accessories		
Probe with start button and illumination	0.2	7KB9402-8CB
Rechargeable battery set for Isowid isolation testers, comprising rechargeable battery and power pack with 2-pole plug	0.6	7KB9402-8CF
Interface for Isowid isolation testers (retrofitting only possible in service shops), including connecting cable for printer, PC software and PC adapter	0.15	7KB9402-8CH
Thermal printer C 1606 with interface RS 232 C/Seiko DPU-201	1.4	7KC1606-8AA
Paper for thermal printer (5 rolls)	0.2	7KB9402-8CG

Operating and power measuring instruments

B4106 isolation tester 5 kV

2

- For testing high voltage systems to 400 kV
- Test voltage selection possible
- Directly readable displays
- Earth connections
- Developed with emphasis on user safety
- Robust case
- Analog digital LCD display
- Built-in timer
- Lockable testing cables



5 kV isolation testers are suitable for a number of isolation testing methods on high voltage systems.

The application possibilities completely cover requirements. These include, for example, acceptance and maintenance tests on running electric motors, transformers, high voltage isolators and high tension cables from the low voltage range up to 400 kV.

Through the large number of testing and voltage supply systems this series of testers is particularly ideal for use both in local network stations and in the industrial plant sector.

Measurements can be also taken over the entire service life of a specific plant to document stage for stage deterioration of isolation material due to influencing factors such as corrosion, pollution, grease and humidity. Such studies make it possible for the engineer in charge of plant maintenance to estimate the expected life of the isolation for the future and draw up planning documentation.

The instruments can be used to make isolation improvements obvious as occur when the coil isolation of motors, generators and transformers is subject to drying operations. These processes could become necessary if the parts of the plant concerned are subject to high humidity.

Regular periodic checks can indicate isolation weaknesses.

Technical data	
Testing voltages (D.C.)	500, 1000, 2500, 5000V
Accuracy (at 20 °C)	± 5 % on 100 MΩ load
Isolation resistance measuring range	Digital: 10 kΩ - 50 GΩ at 500 V 10 kΩ - 100 GΩ at 1000 V 10 kΩ - 250 GΩ at 2500 V 10 kΩ - 500 GΩ at 5 kV Analog: 100 kΩ - 1 TΩ with all voltages
Accuracy (at 20 °C)	± 5 % of display value of 1 MΩ to 100 GΩ at 5 kV
Short circuit current	2 mA rated
Voltage range	50.. 1000 V direct or alternate voltage
Accuracy (at 20 °C)	± 5 %, ± 1 V
Display	analog/digital
Interference suppression	1 mA effective per kV to max. 2 mA
Capacity discharge time	< 2 s per microfarad at discharge from 5000 to 50 V
Leakage current measurement	not applicable
Capacity measurement	not applicable
Temperature coefficient	for the range from 0... 30 °C: 0.2 % per °C for testing current > 100 nA 0.1 % per °C for testing voltages
Temperature range	Operation: -20... + 50 °C Storage: -25... + 65 °C
Humidity range	90 % relative air humidity at 40 °C max.
Scale length	70 mm
Timer	automatic; 0... 60 min
Dimensions	344 mm x 245 mm x 158 mm
Weight	5.6 kg

Ordering data		
Designation	kg	Order No.
Isolation tester 5 kV B4106	5.6	7KB4106-8AA

Isowid B4105 isolation tester

2

- Isolation measurements to DIN VDE 0410 and DIN VDE 0701 to 5000 V
Isolation resistance 10 Ω ... 300 GΩ
- Measuring voltage 500-1000-2500-5000 VDC
- Variable measuring voltage 250 ... 5000 VDC
- Digital analog display with illumination
- Voltage measurement 0... 600 V AC/DC
- Dielectric absorption ratio
- Polarisation index
- GUARD measuring technology
- Measuring current 1 mA
- Accumulator operation
- Interface (option)



Technical data				
Analog display:				
The display can be switched over to the actual voltage of the measured object				
Meas. range	Display range	Fault in use *)		
10 kΩ ... 300 GΩ	56 graduations	± 1 graduation		
*) at measuring voltage = 1000V				
Measuring sequence: approx. 3/s				
Digital display:				
Meas. range with GUARD	1kΩ ... 300 GΩ			
Display range with GUARD	1 Ω ... 299.9 GΩ			
Measuring voltage	500 V, 1000 V, 2500 V, 5000 V			
Operating error	± (3 % of meas. value + 20 digits)			
Automatic discharge of measuring path after isolation measurement:				
Discharge time:	at 1 μF 2.5 s			
Stipulated limit value:	< 500 kΩ			
Rated voltage:	250... 5000 V DC variable in 50 V steps and as fixed settings 500/1000/2500/5000 V DC			
No-load voltage:	max. 1.15 x rated voltage			
Measuring current:	≥ 1 mA DC at rated voltage			
Short-circuit current:	< 3.5 mA DC			
Measuring sequence:	approx. 2/s			
Max. overload:	1.2 x rated voltage (measurement will not be started)			
U _{eff} :	1000 V external voltage			
Voltage with automatic AC/DC recognition				
Analog display:				
Meas. range	Display range	Resolution	Frequency range	Operating error
20...600 V	1...1000 V	100 V	DC/45...400Hz	2 graduation
Digital display:				
Meas. range	Display range	Resolution	Frequency range	Operating error
1...600 V	1...1000 V	10 V	DC/45...400Hz	± (2 %v.MV+1D)
Internal resistance:	ca. 400 kΩ			
Max. overload:	U _{eff} 1000 V external voltage			
Polarisation index:	$I_p = \frac{R_{\text{after 10 min}}}{R_{\text{after 1 min}}}$ I _p < 1.5 means poor isolation I _p > 2 means good isolation			
Dielectric absorption ratio:	$R_{\text{ad}} = \frac{R_{\text{after 1 min}}}{R_{\text{after 30 s}}}$ R _{ad} < 1.1 means poor isolation R _{ad} > 1.25 means good isolation			
Built-in timer:	0 ... 10 min			
Signal tone:	When subjecting to a measured voltage of over 1000 V or when measuring continuously with timer			

Technical data	
General data	
Display:	4-digit (2999 digit) 7-segment liquid crystal display, 16 mm high, with fluorescent illumination, 56-digit analog scale for voltage and resistance display
Working temperature range:	-10 °C ... 50 °C
Service temperature range:	0 °C ... 30 °C
Storage temperature range:	- 30 °C ... 60 °C
Operating error:	based on service temperature range
Climatic class:	JWG to DIN VDE 40040
Degree of protection:	IP 56 to DIN VDE 40050
Protection class:	equivalent to protection class II to IEC 1010 and EN 61010
Testing voltage:	6 kV
Reference voltage:	600 V cat. III, pollution degree 2
Quality standard:	developed, designed and produced to DIN ISO 9001
Max. interference voltage:	at > 50 V no measurement is released
Power supply:	12 V nickel / metal hybrid rechargeable battery, 2.1 Ah
Dimensions: (l x w x h)	265 mm x 265 mm x 90 mm 110 mm with DOCU-PACK
Weight:	approx. 2.4 kg incl. rechargeable battery approx. 5.0 kg incl. accessories in transport case

Ordering data		
Designation	kg	Order No.
Isowid B4105 in transport case containing: 3 safety measuring cables with testing probes 1.2m long 3 alligator clips 1 carrying or shoulder strap 1 charger adapter 16 V / 0.3 A instruction manual		7KB4105-8AA
Set as above with RS 232 interface Set as above with DOCU-PACK		7KB4105-8AB 7KB4105-8CC
Accessories 3 safety measuring cables with testing probes 1.2m long (A 6003 14205) 3 alligator clips, isolated RS 232 interface (9-pole. Sub D) interface for DOCU-PACK VVIN ISO		on request 7KB9402-8DF 7KB9402-8DS 7KB9402-8DR 7KB9808-8AC

Operating and power measuring instruments

ISOWID 4107

2

Insulation measurement to IEC 61557-2

- Insulation resistance 10 Ω ... 30 GΩ with measuring voltages 50 ... 1000 V DC and automatic monitoring of regulation limit value
- Resistance 0.1 Ω ... 30 kΩ
- Direct or alternate voltage up to 600 V
- Fully automatic operator guidance for protection against faulty connection and damage
- Permanently saved setting values



Technical data			
Insulation resistance to IEC 61557-2			
Analog display:			
Display switching to actual measuring voltage on measured objects			
Measuring range	Display range	Operation error of meas. *)	
10 kΩ ... 30 GΩ	56 graduation marks	± 1 graduation mark	
*) at measuring voltage = 1000 V			
Measuring sequence: approx. 5 measurements/s			
Digital display:			
Measuring range	70 Ω ... 3 GΩ	70 Ω ... 30 GΩ	
Display range	10 Ω ... 2,999 GΩ	10 Ω ... 29,99 GΩ	
Measuring voltage	50 V ... 500 V	500 V ... 1000 V	
Oper. error of meas.	± (3% o.m.v. + 2 digit)		
Automatic discharge of measurement path after insulation measurement			
Stipulated limit value:	< 500 kΩ		
Nominal voltage:	50 ... 1000 V DC variable in 10 V steps and 100 / 250 / 500 / 1000 V DC in fixed positions		
No load voltage:	max. 1.05 x nominal voltage		
Measuring current:	> 1 mA DC at nominal voltage ≥ 2.5 mA DC bei Rx - 100 kΩ and measuring voltage > 250 V DC		
Short circuit current:	< 5 mA DC		
Measuring sequence:	approx. 2 measurements/s		
Battery service life:	with IEC LR6 > 800 measurements (1000 V / 1 mA)		
Max. overload:	1.2 x nominal voltage (measurement is not started) 600 V		
Resistance:			
Analog display:			
Meas. range	Display range	Resolution	Intrinsic error
10 mΩ ... 10 kΩ	10 mΩ ... 100 kΩ	10 mΩ ... 20 kΩ	± 1 scale graduation
Digital display:			
Meas. range	Display range	Resolution	Intrinsic error
0 ... 30 kΩ	0.1 ... 29,99 kΩ	0.1 Ω ... 10 Ω	± (5% o.m.v. + 3 digits)
Stipulated limit value:	> 0,3 Ω		
No load voltage:	< 20 V DC		
Short circuit current:	> 1.5 mA DC		
Max. overload:	U _{eff} = 600 V		
Voltage with automatic AC / DC recognition			
Analog display:			
Meas. range	Display range	Frequ. range	Intrinsic error
20 ... 600 V	20 V	DC /45 .. 400 Hz	± 1 graduation mark

Technical data			
Digital display:			
Meas. range	Resolution	Frequ. range	Intrinsic error
1 ... 600 V	1 V	DC /45 .. 400 Hz	± (1% o.m.v. + 1 digit)
Inner resistance:	approx. 600 kΩ		
Max. overload:	U _{eff} = 600 V		
General data			
Display:	4-digit (2999 digits), 7 segment liquid-crystal display, 16 mm high, with fluorescent illumination, 56 graduation analog scale for voltage and resistance display		
Working temperature range:	-10 °C ... 50 °C		
Operating temperature:	0 °C ... 35 °C		
Storage temperature range:	-30 °C ... 60 °C		
Operating meas. deviation:	installation position and supply voltage have no influence		
Climatic class:	JWG to DIN 40040		
Type of protection:	IP 56 to DIN 40050		
Class protection:	Corresponds to Protection Class II (□) to IEC 1010 600 V Cat. II		
Quality standard:	developed, designed and produced to DIN ISO 9001		
Auxiliary energy:	6 only 1.5 V alkaline manganese batteries (LR 6) or 1.5 V zinc carbon batteries (IEC R6) or 1.2 V accumulators		
Dimensions:	240 x 180 x 110 mm (l x w x h)		
Weight:	approx. 1.5 kg including batteries		

Ordering data	
Designation	Order No.
ISOWID B4107	7KB4107-8AA
including 1 pair safety measuring leads with probes	
1 only alligator clip, insulated	
Carrying or shoulder strap bag	
6 only batteries	
Directions for use	
Accessories for reordering	
Probe with START and illumination function	7KB9402-8CB
Accumulator set for recharging and external supply including accumulator block	7KB9402-8EH
1 pair safety measuring leads	7KB9102-8BC
Direction for use, German	A 1865 41GA1D
Direction for use, English	A 1865 41GA1E
Direction for use, French	A 1865 41GA1F

B4151 and B4152 earth testers

- Earthing resistance measurement
0.02 Ω to 300 k Ω to DIN VDE 0413 Part 7
- AC resistance measurement 0.001 Ω to 300 k Ω
- Interference frequency measurement up to 400 Hz
- Interference voltage measurement up to 50 V
- Automatic determination of auxiliary earth resistance and probe resistance

Additional functions with B4152 earth tester

- Selective earth resistance measurement, measurement of individual resistances in linked and meshed systems, e.g. on high voltage masts and lightning protection without influence of parallel resistances.
- Measurement of high-voltage earth impedance (R^*)
- Resistance measurement 0.001 Ω to 3 k Ω with automatic pole changing and high short-circuit current, in compliance with DIN VDE 0413/4
- Selectable display illumination
- RS 232 C/V.24 -interface for printer or PC (only 7KB4152-8AB)



Included in delivery

Earth tester in transport case with 1 cable reel with 50 m cable, 2 cable reels each with 25 m cable, 1 pair of test leads, 1.5 m, 4 earth drills, 2 safety tapping clips, batteries and instruction manual

Technical data	
Interference voltage measurement	
Radio interfer. test (DC and AC) (U_{ST})	
Measuring range	1 to 50 V
Resolution	0.1 V
Interference frequency meas. (F_{ST})	
Measuring range	16 to 400 Hz
Display range	16.0 to 299.9 to 999 Hz
Resolution	0.1 to 1 Hz
Earthing resistance measurement (R_E)	
Measuring range	0.020 Ω to 300 k Ω
Resolution	0.001 to 100 Ω
Resistance measurement ($R \sim$)	
Measuring voltage	AC 20 V
Measuring range	0.020 Ω to 300 k Ω
Resolution	0.001 to 100 Ω
Only earth tester B4152:	
Selective earthing resistance measurement with additional current transformer	
Measuring range	0.02 Ω to 30 k Ω
Resolution	0.001 to 100 Ω
Resistance measurement ($R \dots$)	
Measuring range	0.020 Ω to 3 k Ω
Resolution	0.001 to 10 Ω
Serial interface RS 232 C/V.24 (only 7KB4152-8AB)	
Transmission rate	2400 bit/s
General data	
Service temperature	0 to + 30 $^{\circ}$ C
Climatic class	JWG to DIN 40 040 (3/73)
Degree of protection	IP 56 to EN 60 529
Protection measures	Protection class II to IEC 348 (78), DIN VDE 0411 / Part 1
Power supply	Mains independent battery operation via six 15V alkaline/manganese batteries to (IEC LR6) or 1.5V zinc-carbon batteries to (IEC R6) or rechargeable 1.2V battery
Dimensions (w x h x d)	220 mm x 90 mm x 240 mm

Ordering data		
Designation	kg	Order No.
B4151 earth tester	5.5	7KB4151-8AA
B4152 earth tester		
- without interface	5.5	7KB4152-8AA
- with serial interface RS 232 C/V.24	5.5	7KB4152-8AB
Accessories		
Clip-on current transformer for selective earth testing		
54 mm dia.	0.65	7KA1408-8AA
12 mm dia.	0.1	7KA1410-8AA
Hinged transformer for testing selective earth resistance on h.v. pylons, 320 mm dia.	7.7	7KA1411-8AA
Safety tapping clips isolated (3 clips)	0.02	7KB9402-8DF
Adapter for earth testing without earth spike, with B 4152 earth tester, comprising 1 adapter unit with safety plugs and 1 clip-on connection cable, screened		7KB9402-8DG
Interface RS 232 C/V.24 for retrofitting B 4152 earth testers; with cable connectors for printer and PC, set-up and diagnosis software.		7KB9402-8CD
Rechargeable battery set for earth testers	1	7KB9402-8DH
C1606 thermal printer with interface RS 232 C/Seiko DPU-201	1.4	7KC1606-8AA
Paper for thermal printer (5 rolls)	0.2	7KB9402-8CG
Printer, memory RS 232 interface (option) with cable connector for a PC 3.5-inch diskette with set-up and diagnosis software and instructions	1	7KB9402-8DJ
Retrofitting of earth tester 7KB1452-8AA with 7KB9402-8DJ as option retrofitting kit required according to instrument release		on request

Operating and power measuring instruments

Geowid B4154 earth tester

2

- Earthing resistance measurement (3-pole) - 0.15 Ω to 2 k Ω
- Resistance measurement (2-pole) - 0.15 Ω to 2 k Ω
- Interference voltage measurement at 30 V
- Programmable limit values
- Automatic determination of auxiliary earth and probe resistance
- Switchable display illumination
- Separate compartment for 9 V battery/rechargeable battery
- RS 232 interface for printer or PC (option)



Technical data	
Interference voltage measurement (DC and AC) (U_{ST})	
Measuring range	1 to 30 V
Resolution	9.1 V
Error limits	10 % of measured value + 5 digits
Earthing resistance measurement (R_E , 3-pole)	
Measuring range	0.15 to 2000 Ω
Resolution	0.01 to 1 Ω
Operating error	6 % of measured value + 5 digits
Measuring range	Measuring mode and voltage meas. to DIN VDE 0413 Part 7 (3/93) and prEN 50 197
No-load voltage	< AC 25 V
Frequency	128 Hz, interference suppression at 16 $\frac{1}{3}$, 50 and 60 Hz > 80 dB
Resistance measurement (R , 2 pole)	
Measuring voltage	AC 20 V
Measuring range	0.15 to 2000 Ω
Resolution	0.01 to 1 Ω
Operating error	6 % of measured value + 5 digits
General data	
Display	7-segment LCD, 3 $\frac{1}{2}$ digit (1999 digits), 16 mm high digits, 16-part analog bar graph with overshoot or undershoot display and additional marking, switchable illumination
Climatic class	KGW to DIN 40040 (3/87)
Working temperature range	-10 to +50 °C
Operating temperature range	0 to +30 °C
Storage temperature range	-20 to +60 °C
Reference temperature	23 °C \pm 2 °C

Protective measures	Protection class 2, IEC 1010-1 600 V CAT II, pollution degree 2
Degree of protection to EN 60 529	IP 40
Operating time	> 1000 measurements to DIN VDE 0413 at reference temperature related to reference temperature, ensured for 3 year
Operating error	
Power supply	9 V battery, IEC 6LR61
Dimensions (w x h x d)	54 mm x 113 mm x 216 mm

Ordering data		
Designation	kg	Order No.
Geowid B4154 earth tester with battery, instructions and rubber cover	0.7	7KB4154-8AA
Geowid B4154 earth tester in transport case with 1 cable reel with 50 m cable, 1 cable reel with 25 m cable, 1 pair of test leads, 1.5 m long, 2 earth drills, 2 tapping clips, battery, instructions and rubber cover	3.8	7KB4154-8AB
Accessories		
Rechargeable battery set for Geowid earth tester , comprising rechargeable battery and power pack with 2-pole plug	0.6	7KB9402-8CF
Interface for Geowid earth tester, (retrofitting only in service shops), with cable connector for a printer, PC software and PC adapter,	0.15	7KB9402-8CH
C1606 thermal printer with RS 232 C/Seiko CPU-201 interface	1.4	7KC1606-8AA
Paper for thermal printer (5 rolls)	0.2	7KB9402-8CG

- Earth measuring to IEC 61557-5
- R_A (R_E) earth resistance, 3-pole and 4-pole measurement to 0.001 Ω ... 300 k Ω with voltage of 20 V / 48 V AC with frequencies of 94, 105, 111, 128 Hz or AFC (automatic frequency control) with autom. jack connection control
- R - resistance 2-pole AC 0.001 Ω ... 300 k Ω
- Interference voltage at 50 V
- R^* measurement of earthing impedance of high voltage masts
- Autom. determination of auxiliary earthing and probe resistance
- Autom. limit value monitoring
- Permanently saved setting values



Technical data				
Earthing resistance R_A (R_E)				
Measuring method:		Current-voltage measurement with probe to IEC 61557-5		
Measuring voltage:		Switching from 20 / 48 V, AC		
Short circuit current:		250 mA		
Measuring frequency:		94 / 105 / 111 / 128 Hz manual or autom. (AFC) switching, 55 Hz at R^*		
Max. permissible overload:		$U_{\text{eff}} = 250$ V		
Switch setting	Meas. range	Resolution	Intrinsic error	Op. error of meas.
R_A 3 pole 4 pole	0.020 Ω ..299.9k Ω	0.001..100 Ω	\pm (2% o.m.v.+2d)	\pm (5% o.m.v.+5d)
Automatic range selection and resolution switchover				
Measuring time:		typ. 8 s. at a selected fixed frequency max. 30 s. at AFC and full run-through of all measuring frequencies		
Max. probe resistance:		< 1 M Ω		
Max. aux. earth resistance:		< 1 M Ω Display of exceeded limit value of R_S or R_{ref} , respectively when error of measurement for example: >30% of measured value or R_{ref} ; $R_A = 5000 : 1$ and $R_S = 3$ k Ω		
Max. interference voltage:		24 V, no measurement is started above this		
Interference volt. suppression:		120 dB (16 $\frac{2}{3}$, 50, 60 and 400 Hz)		
Interference voltage measurement (DC + AC) (U_{eff})				
Measuring method:		Full path same direction		
Meas. range	Display range	Resolution	Frequ. range	Intrinsic error
1 ... 50 V	0.0 ... 50 V	0.1 V	DC / AC 45..400 Hz sinus	\pm (5% o.m.v.+5d)
Meas. sequence:		approx. 4 measured values / s		
Inner resistance:		approx. 1.5 M Ω		
Max. permissible overload:		$U_{\text{eff}} = 250$ V		
Interference frequency measurement (Fsr):				
Measuring method:		Period continuous meas. of interference voltage		
Meas. range	Display range	Resolution	Dynamics	Intrinsic error
16 ... 400 Hz	16.0..299.9..999 Hz	0.1..1Hz	1V..50 V	\pm (1% o.m.v.+2d)
Resistance measurement (R-):				
Measuring method:		Current - voltage measurement, 2-pole		
Measuring voltage:		20 V AC		
Short circuit:		250 mA AC		
Measuring frequency:		94 / 105 / 111 / 128 Hz manual or autom. (AFC) switching		
Switch setting	Meas. range	Resolution	Intrinsic error	Op. error of meas.
R- 2 pole	0.020 Ω ..299.9k Ω	0.001..100 Ω	\pm (2% o.m.v.+2d)	\pm (5% o.m.v.+5d)

Technical data	
Measuring time:	typical 6 s.
Max. interference voltage:	24 V, no measurement started above this
Max. permissible overload:	$U_{\text{eff}} = 250$ V
General data	
Display:	4-digit (2999 digits), 7 segment liquid crystal display, 16 mm high, with fluorescent illumination
Working temperature range:	-10 °C ... 50 °C
Operating temperature:	0 °C ... 35 °C
Reference temp. range:	+23 °C \pm 2 °C
Storage temp. range:	-30 °C ... 60 °C
Operating meas. deviation:	installation position and supply voltage have no influence refers to reference temperature range
Intrinsic error:	Annual weather classification to DIN 40040
Climatic class:	IP 56 to DIN 40050
Type of protection:	corresponds to Protection Class II (II) to IEC 1010, 300 V Cat. II
Class protection:	Developed, designed and produced to DIN ISO 9001
Quality standard:	at > 24 V no measurement is shown
Max. interference voltage:	6 only 1.5 V alkaline manganese batteries (LR 6) or 1.5 V zinc carbon batteries (IEC R6) or 1.2 V accumulators
Auxiliary energy:	Dimensions: 240 x 180 x 110 mm (l x w x h) Weight: approx. 1.5 kg including batteries

Ordering data	
Designation	Order No.
GEOUID B4155 including 2 measuring leads, 1.5 mm, 2 alligator clips Carrying or shoulder strap bag 6 only batteries Directions for use	7KB4155-8AA
Accessories for reordering Accumulator set, 1.5 AH with charger and mains adapter function 1 only earth spike 1 only cable reel 25 m 1 only cable reel 50 m Directions for use, German Direction for use, English Direction for use, French	7KB9402-8EH 7KB9402-8DU 7KB9402-8DV 7KB9402-8DW A 1885 41GA1D A 1885 41GA1E A 1885 41GA1F

Operating and power measuring instruments

A1515 test panel

2

A1515 test panel, the low-price version

- Designed according to requirements of the Federal German Installation Committee ZVEH
- Compact cabinet design with dimensions (h x w x d) 800 mm x 600 mm x 225 mm, sheet-steel enclosure, color RAL 8032
- Circuit diagram printed on panel
- Ammeter selector
- Current consumption on single-phase and three-phase AC consumers, max. 25 A
- For measurement of protective measures to VDE 0701, testing leakage current, isolation resistance and protective earth conductor resistance
- Version 7KA1515-8AB with additional emergency-off equipment



Technical data

A1515 test panel is equipped with:

- 1 master switch 25 A, lockable
- 1 residual current circuit breaker 3 x 25 A, tripping current 30 mA
- 1 back-up fuse 3 x 25 A
- 2 automatic circuit breakers B 16 A
- 3 automatic circuit breakers C 16 A
- 1 reversing switch 3 x 25 A
- 1 voltmeter selector for measuring line-to-line and phase voltages
- 1 voltmeter 72 mm x 72 mm, 0 to 12 V/0 at 60 V
- 1 voltmeter 72 mm x 72 mm, 0 to 500 V
- 1 ammeter 72 mm x 72 mm, 5/10 A, 15/20 A
- 1 low voltage selector 3, 5, 8, 12, 24, 42 V
- 1 isolating and low voltage transformer 230 V with low voltages 3, 5, 8, 12, 24, 42 V at 250 VA
- 1 automatic circuit breaker 2 A
- 1 automatic circuit breaker 4 A
- 1 isolating transformer 230 V/24 V
- 1 instrument for checking the protective measures to VDE 0701 on electrical equipment, such as protective earth conductor test, isolation resistance measurement, equivalent leakage, current measurement, for example
- 1 continuity test lamp
- 1 Perilex socket 16 A
- 2 earthed sockets 16 A
- 1 CEE socket 5 x 16 A
- 1 CEE socket 5 x 32 A
- 5 safety sockets for L1, L2, L3, N, PE
- 2 safety sockets for continuity test
- 3 safety sockets for tapping low voltage

The test panels correspond to the test panel guidelines DIN VDE 0104 and satisfy the requirement of the Federal German Installation Committee ZVEH.

The panels permit testing of electrical equipment according to the requirements of DIN VDE 0701, DIN VDE 0105, the accident prevention regulation VBG 4 as well as the trade regulations for precision mechanics and electrical engineering.

Ordering data

Designation	kg	Order No.	
A1515 test panel	20	7KA1515-8AA	
A1515 test panel with additional emergency-off equipment, external triggering also possible	22	7KA1515-8AB	

A1516 test panel, the universal version

- Designed according to requirements of the Federal German Installation Committee ZVEH
- Compact cabinet design with dimensions (h x w x d) 800 mm x 800 mm x 225 mm, sheet-steel enclosure, color RAL 8032
- Circuit diagram printed on panel
- Ammeter selector; (all phases can be measured)
- All meters DIN 96 x 96, class 1.5
- For measurement of single-phase and three-phase AC consumers, switch-selectable
- For measurement of protective measures to VDE 0701, leakage current, isolation resistance and protective earth resistance testing with low voltage supply and continuity lamp



Technical data

- 1 master switch 25 A, lockable
- 1 residual current circuit breaker 3 x 25 A tripping current 30 mA
- 3 phase lamps
- 1 back-up fuse 3 x 25 A
- 2 automatic circuit breakers L 16 A
- 3 automatic circuit breakers G 16 A
- 1 reversing switch 3 x 25 A
- 1 voltmeter selector for measuring line-to-line and phase voltage
- 1 current phase selector L1/L2/L3
- 1 voltmeter 96 mm x 96 mm, 0 to 10 V, moving-iron measuring element
- 1 voltmeter 96 mm x 96 mm, 0 to 60 V, moving-iron measuring element
- 1 voltmeter 96 mm x 96 mm, 0 to 500 V, moving-iron measuring element
- 1 ammeter selector 0 to 1.0 to 6.0 to 25 A
- 1 ammeter 96 mm x 96 mm, 0 to 1 A, moving-iron measuring element
- 1 ammeter 96 mm x 96 mm, 0 to 6 A, moving-iron measuring element
- 1 ammeter 96 mm x 96 mm, 0 to 25 A, moving-iron measuring element

Technical data

- 1 low voltage selector 3, 5, 8, 12, 24, 42 V
- 1 isolating and low voltage transformer 230 V with the low-voltages 3, 5, 8, 12, 24, 42 V at 250 VA
- 1 automatic circuit breaker 2 A
- 2 automatic circuit breakers 4 A
- 1 isolating transformer 230 V/24 V
- 1 instrument for checking the protective measures to VDE 0701 on electrical equipment, such as protective earth conductor test, isolation resistance measurement, for example equivalent leakage current measurement
- 1 continuity test lamp
- 1 Perilex socket 16 A
- 2 earthed sockets 16 A
- 1 CEE socket 5 x 16 A
- 1 CEE socket 5 x 32 A
- 5 safety sockets for L1, L2, L3, N, PE
- 2 safety sockets for continuity tests
- 3 safety sockets for tapping low voltage

Ordering data

Designation	kg	Order No.	
A1516 test panel	25	7KA1516-8AA	

Operating and power measuring instruments

A1517 test panel, A1603 lighting level meter

A1517 test panel with convenient features well above usual standards

- Test panel with additional emergency-off equipment
- Compact cabinet design with dimensions (h x w x d) 800 mm x 800 mm x 225 mm, sheet-steel enclosure, color RAL 8032
- Circuit diagram printed on panel
- All meters DIN 96 x 96, class 1.5
- Triple measurements are possible simultaneously
- Measuring ranges fused via separate heavy-duty circuit breakers
- Clamping sockets 400 V, 25 A
- For measurement of protective measures to VDE 0701, leakage current, isolation resistance and protective earth conductor resistance testing with low voltage supply and continuity lamp



Technical data

Emergency-off equipment fitted in test panel, additional emergency pushbutton connection outside danger area via terminals

- 1 master switch 25 A, lockable
- 1 residual-current circuit breaker 3 x 25 A, tripping current 30 mA
- 3 phase lamps
- 1 back-up fuse 3 x 25 A
- 2 automatic circuit breakers B 16 A
- 3 automatic circuit breakers C 16 A
- 1 reversing switch 3 x 25 A
- 1 voltmeter selector for measuring line-to-line and phase voltages
- 1 current phase selector L1/L2/L3
- 1 voltmeter 96 mm x 96 mm, 0 to 10 V, moving-iron measuring element
- 1 voltmeter 96 mm x 96 mm, 0 to 60 V, moving-iron measuring element
- 1 voltmeter 96 mm x 96 mm, 0 to 500 V, moving-iron measuring element
- 1 ammeter selector 0 to 1.0 to 6.0 to 25 A
- 1 ammeter 96 mm x 96 mm, 0 to 1 A, moving-iron measuring element
- 1 ammeter 96 mm x 96 mm, 0 to 6 A, moving-iron measuring element
- 1 ammeter 96 mm x 96 mm, 0 to 25 A, moving-iron measuring element
- 1 low voltage selector 3, 5, 8, 12, 24, 42 V

Technical data

- 1 Isolating and low voltage transformer 230 V with the low-voltages 3, 5, 8, 12, 24, 42 V at 250 VA
- 1 automatic circuit breaker 2 A
- 2 automatic circuit breakers 4 A
- 1 isolating transformer 230 V/24 V
- 1 instrument for checking the protective measures to VDE 0701 on electrical equipment, such as protective earth conductor test, isolation resistance measurement, equivalent leakage current measurement, for example
- 1 continuity test lamp
- 1 Perilex socket 16 A
- 2 earthed sockets 16 A
- 1 CEE socket 5 x 16 A
- 1 CEE socket 5 x 32 A
- 1 CEE socket 3 x 16 A
- 5 safety sockets for L1, L2, L3, N, PE
- 2 safety sockets for continuity test
- 3 safety sockets for tapping low voltage

Ordering data

Designation	kg	Order No.
A1517 test panel	25	7KA1517-8AA

A1603 lighting level meter with lux scale, ever-ready carrying case and battery

Technical data

Measuring ranges	0 to 20/60/200/600/2000/6000/20,000/60,000/200,000 lx or 0 to 2/6/20/60/200/600/2000/6000/20,000 fc
Error limits	3.5% of full-scale value with incandescent, light plus max. 3 % of measured value with other types of light
Light-sensitive area	approx. 20 mm dia.
Scale length	approx. 64 mm
Power supply	9-V battery to IEC 6 F22
Dimensions (w x h x d)	
Meter	79 mm x 35 mm x 110 mm
Ever-ready carrying case	90 mm x 75 mm x 170 mm
Sensor	32 mm x 105 mm x 29 mm
Weight	0.35 kg



Ordering data

Designation	kg	Order No.
Lighting level meter A1603 with lux scale, ever-ready carrying case and battery	0.35	7KA1603-8AA
Accessories		
Auxiliary luminance lens		7KA1901-8BA
Calculator with bag		7KA1901-8BC

Single-knob measuring bridge wiring tester, decades

Single-knob measuring bridges

Technical data																		
Measuring ranges																		
Thomson connection	<table> <tr> <td>0.2...</td> <td>2.2 mΩ</td> <td>1.5 % of meas. value</td> </tr> <tr> <td>2...</td> <td>22 mΩ</td> <td rowspan="3">} 1 % of meas. value</td> </tr> <tr> <td>20...</td> <td>220 mΩ</td> </tr> <tr> <td>200...</td> <td>2200 mΩ</td> </tr> </table>	0.2...	2.2 mΩ	1.5 % of meas. value	2...	22 mΩ	} 1 % of meas. value	20...	220 mΩ	200...	2200 mΩ							
0.2...	2.2 mΩ	1.5 % of meas. value																
2...	22 mΩ	} 1 % of meas. value																
20...	220 mΩ																	
200...	2200 mΩ																	
	Connection for external 2-V battery																	
Wheatstone connection	<table> <tr> <td>40...</td> <td>500 mΩ</td> <td>1 % of meas. value</td> </tr> <tr> <td>(max. 5</td> <td>mΩ)</td> <td rowspan="5">} 1 % of meas. value</td> </tr> <tr> <td>0.4...</td> <td>50 Ω</td> </tr> <tr> <td>4...</td> <td>50 Ω</td> </tr> <tr> <td>40...</td> <td>500 Ω</td> </tr> <tr> <td>400 ..</td> <td>5000Ω</td> </tr> <tr> <td>4...</td> <td>50 kΩ</td> <td></td> </tr> </table>	40...	500 mΩ	1 % of meas. value	(max. 5	mΩ)	} 1 % of meas. value	0.4...	50 Ω	4...	50 Ω	40...	500 Ω	400 ..	5000Ω	4...	50 kΩ	
40...	500 mΩ	1 % of meas. value																
(max. 5	mΩ)	} 1 % of meas. value																
0.4...	50 Ω																	
4...	50 Ω																	
40...	500 Ω																	
400 ..	5000Ω																	
4...	50 kΩ																	
	Connection for external 6 V or 60 V battery																	
Power supply	2x 1.5 V batteries to IEC R14																	
Dimensions (w x h x d)	112 mm x 84 mm x 192 mm																	



2

Ordering data			
Designation	kg	Order No.	
Single-knob measuring bridge (without batteries)			
• with Thomson connection	1.1	M273-A1	
• with Wheatstone connection	1.1	M273-A2	
Test leads, 1 pair, 1.5 m long, red and blue, with moulded plugs (with integrated sockets)	0.1	M05989-A4	

VD 35 wiring tester

Technical data	
Application	for cable continuity tests; for testing of capacitors and semiconductors
Measuring ranges	0 to 1/10/100 Ω
Response sensitivity	50 mΩ
Indication	optical and audible
Current load of specimen	3 mA
Voltage load	300 μV with 100 mΩ
Dielectric strength	$U_{\text{eff}} = 42 \text{ V} (< 1 \text{ s})$
Power supply	9-V battery (IEC 6F22)
Dimensions (w x h x d)	70 mm x 37.4 mm x 105 mm



Ordering data			
Designation	kg	Order No.	
VD 35 wiring tester including 9 V battery and 1 pair of test leads with test prods	0.25	7KA1501-8AA	
Ever-ready carrying case		M05025-A102-A5	

Decades

- Decade capacitor

Technical data	
Range	0 to 1.11 μF, 3 decades, 1 nF steps
Error limits	2 % of set value
Rated load	Max. DC 400 V or AC 200 V (U_s)
Rated frequency range	50 Hz to 100 kHz
Dimensions (w x h x d)	277 mm x 82 mm x 96 mm



Ordering data			
Designation	kg	Order No.	
Decade capacitor	0.72	7KA1300-8BA	

Operating and power measuring instruments

Decade resistors and decade inductors

Decade resistors

7KA1300-8AE

2

Technical data	
Range	0 to 11.1 M Ω , 3 decades, 10 k Ω steps
- Rated load	max. 1 W for individual resistor (max. 100 V) to 650 V (U_s) with 10 k Ω to 11.1 M Ω
- Rated frequency range	0 to 100 to 0.1 kHz
Error limits	2 % of set value
Service temperature	15 to 35 °C
Dimensions (w x h x d)	277 mm x 82 mm x 96 mm



Ordering data			
Designation	kg	Order No.	
Decade resistor range 0 to 11.1 M Ω	0.65	7KA1300-8AE	

7KA1300-8AA, -8AB and -8AC

Technical data		
Setting range	Error limits (of set value)	Max. current rating I_{max}
<ul style="list-style-type: none"> 7KA1300-8AA 10 x 0.1 Ω to 10 x 1 M Ω in steps of factor 10	1 % to 0.1 %	2 A to 0.6 A
<ul style="list-style-type: none"> 7KA1300-8AB 10 x 0.1 Ω to 10 x 100 Ω in steps of factor 10	1 % to 0.1 %	2 A to 60 mA
<ul style="list-style-type: none"> 7KA1300-8AC 10 x 1 k Ω to 10 x 1 M Ω	0.1 %	20 mA to 0.6 mA
Setting ranges	10 x 0.1 Ω to 10 x 1 M Ω in 8 steps 10 x 0.1 Ω to 10 x 100 Ω or 10 x 1 k Ω to 10 x 1 M Ω in 4 steps	
Isolation	Group A to DIN VDE 0110	
Frequency	max. 10 kHz	
Operating voltage	max. 650 V	
Dimensions (w x h x d)		
8-step decade	397 mm x 82 mm x 96 mm	
4-step decade	277 mm x 82 mm x 96 mm	



Ordering data			
Designation	kg	Order No.	
Decade resistor for direct and alternating currents			
8-step, 0.1 Ω to 1 M Ω	1	7KA1300-8AA	
4-step, 0.1 Ω to 1 k Ω	0.6	7KA1300-8AB	
4-step, 1 k Ω to 10 M Ω	0.6	7KA1300-8AC	

Decade inductors

Technical data	
Common data	
Error limits	2 % of set value
Overload limit	twice the rated current (error limits 5 %)
Parallel capacitance	approx. 100 pF
Dimensions (w x h x d)	277 mm x 82 mm x 96 mm
Range (7KA1300-8CA)	0 to 11 mH, 1 mH steps
Rated load	max. 150 to 75 mA with 1 to 11 mH
Rated frequency range	50 Hz to 20 kHz
Range (7KA1300-8CB)	0 to 110 mH, 10 mH steps
Rated load	max. 48 to 24 mA with 10 to 110 mH
Rated frequency range	50 Hz to 10 kHz
Range (7KA1300-8CC)	0 to 1.1 H, 0.1 H steps
Rated load	max. 15 to 75 mA with 0.1 to 1 H
Rated frequency range	50 Hz to 5 kHz



Ordering data			
Designation	kg	Order No.	
Decade inductor			
Range 0 to 11 mH	1.35	7KA1300-8CA	
Range 0 to 110 mH	1.35	7KA1300-8CB	
Range 0 to 1.1 mH	1.35	7KA1300-8CC	

Phase-sequence indicators

Technische Daten	A1504	M05025
Area of application	For determination of phase sequence in 3-phase systems and phase voltages with LEDs	For determination of phase sequence in 3-phase systems, particularly suitable for clocked circuits phase voltage indication with LEDs, direction of rotation indication by disk
Standard	to DIN VDE 0413, Part 9	-
Voltage range	90 to 660 V	100 to 660 V
Frequency range	45 to 1000 Hz	16 2/3 to 1000 Hz
Test voltage	6 kV	3 kV
Connection	with 3 fixed connection cables, approx. 0.75 m long	with 3 fixed connection cables, approx. 0.75 m long
Dimensions (w x h x d)	32 mm x 70 mm x 105 mm	32 mm x 70 mm x 105 mm
Weight		
- without ever-ready carrying case	0.22 kg	0.3 kg
- with ever-ready carrying case	0.42 kg	0.5 kg

Phase-sequence indicator A1504



Phase-sequence indicator M05025



2

Ordering data			
Designation	Order No.		Order No.
Phase-sequence indicator - without ever-ready carrying case - with ever-ready carrying case	7KA1504-8AA 7KA1504-8AB		M05025-A102-A4 M05025-A102-A3
Accessories Ever-ready carrying case	M05025-A102-A5		M05025-A102-A5

THERMIZET B4004

Technical Data	
Error limits (guaranteed for 1 year)	0.2 % of measured value + 1 digit Range 15 to 35 °C: 0.7 % of measured value + 2 K
THERMIZET with sensor Response time	approx. 12 s of surfaces, approx. 4 s in liquids, approx. 5 s with knife-edge temperature sensor
Digital display unit	3 1/2 digit, 13.8-mm-LED, 7-segment-digits, -1999 to +1999, automatic polarity and decimal point display
Measurement rate	4 measurements/s
Common-mode rejection	CMR: > 100 dB at 50 Hz
Series-mode rejection	SMR: > 40 dB at 50 Hz
Temperature coefficient	0,01 % of m.v. referred to 0 to 50 °C
Analogue output (4-mm sockets)	1 mV/digit (-50.0 to +185.0 to 1200 °C -500 to +1850 to +1200 mV); max. 1 mA
Temperature of use	0 to 50 °C \triangle
Voltage of sensor against earth	Protective low voltage max. 42 V
Dimensions (w x h x d)	220 mm x 76 mm x 230 mm
Temperature sensors	
Surface sensor	Measuring range
Short	-50 to +600 °C
Long	-50 to +1100 °C
Angled	-50 to +600 °C
Immersion sensor	
Short	-50 to +600 °C
Long	-50 to +1100 °C
Knife-edge sensor	-50 to +600 °C
For all temperature sensors:	
Sheathed material (Ø 3 mm)	High-grade steel (Inconel), acid resistant
Error limits	
-50 to +500 °C	1 K } to DIN
> 500 °C	0.2% o.m.v. } IEC 584



- -50 to +185 °C / 185 °C to 1200 °C
- Resolution 0,1 °C / 1 °C
- Autoranging
- NiCr/Ni sensor
- Analogue output for recorder connection
- Mains operation

Ordering data			
Designation	kg	Order No.	
THERMIZET B4004 temperature meter			
- without sensor	1.4	7KB4004-8AA	
- with 12-fold changeover switch to connect several sensors	1.4	7KB4004-8AB	
Surface sensor			
Short, with PVC handle	0.06	7KB9401-8AR	
Short	0.07	7KB9401-8AK	
Long	0.15	7KB9401-8AL	
Angled	0.09	7KB9401-8AT	
Immersion sensor			
Short	0.06	7KB9401-8AM	
Long	0.12	7KB9401-8AN	
Knife-edge sensor	0.06	7KB9401-8AP	
Test leads for analogue output	0.1	M05989-A4	

Operating and power measuring instruments

B4210 power harmonic analyzer

2

- Powerful measuring instrument for monitoring current network, performance and quality.
- Actualisation of real time display. The fast actualisation of displays makes dynamic display of actual conditions in power supply networks possible.
- Comprehensive measurements; Measurement of RMS, peak value and total harmonic distortion (THD) for complex voltages and currents without additional manual calculation.
- Display for 3-phase measurements. Automatic calculation of the power for the 3-phase network and the power factor for symmetrical loads is from simple single phase measurement.
- System-critical data. Direct display of power factor, apparent power in kVAR, crest factor and k-factor
- Display up to 31st harmonic
- Minimum, maximum and mean value measurement
- Storage of up to eight complete measured value sets (fluke 41B)
- Isolated serial interface for connection to printer and DOS or Windows compatible computer



Technical data		
Frequency range, basic	6-65 Hz and DC	
oscillation minimum input values:	5 V _{eff} Or 1A _{eff}	
Function	Range and resolution	Accuracy
Voltage	5.0 V to 600 VRMS (AC+DC) +/- 5.0V to +/- 933 V peak	(0.5 % + 2 digits) Peak or DC: +/- (2 % + 3 digits) (Plus 2 digits if < 15 V RMS)
Voltage current (1mV/A) isolated input	1.00 mV (A) to 1000 mV (tA) RMS (AC+DC) +/- 1.0 mV(A) to peak or DC: +/- 2000 mV(A) peak	+/- (0.5 % + 3 digits) sensor data +/- (2 % + 4 digits) + sensor data
Power/volt Ampere (1 mV/A) isolated input	0.0 W(VA) to 600 kW (kVA) mean value 0.0 W(VA) to +/- 2000 kW (kVA) peak	AC+DC: +/- (1 % + 4 digits) + sensor data
Harmonics (Harmonic part > 5 % with smooth 20)	Voltage: Fundamental frequency to 13. at 31. Current and power: fundamental frequency to 13. at 31.	+/- (2 % + 2 digits) +/- (8 % + 2 digits) +/- (3 % + 3 digits) + sensor data +/- (8 % + 3 digits) + sensor data
Frequency Power band width Crest factor (CF) Power factor (PF) COS (DPF) Phase angle k-factor (KF) %THD-F %THD-R	Fundamental frequency: 6.0 Hz to 99.9 Hz DC, 6Hz to 2.1 kHz 1.00 to 5.00 0.00 to 1.00 0.00 to 1.00 -179° to 180° 1.0 to 30.00 0.00 % to 99.9 % 0.0 % to 999 %	+/- 0.3 Hz +/- 4 % +/- 0.02 +/- 0.04 to +/- 0.03 (0.30 to 0.89) +/- 0.02 (0.90 to 1.00) +/- 10 % +/- (0.03 measured value + 2.0 %) +/- (0.03 measured value + 2.0 %)

Included in delivery: 500 A AC clip-on transformer measuring cables isolated RS 232 cable, VIEW software, instruction manual

Other features

- True RMS current up to 500 A (1000 A with optional clip-on current transformer)
- Total harmonic distortion (%THDF and %THDR)
- Active power up to 300 kW (600 kW optional clip-on current transformer)
- Apparent power (VA) and reactive power (VAR)
- Phase angle between fundamental oscillation and harmonic
- Signal form, numerical and spectral display
- Zoom function for presenting harmonic

Ordering data

Designation	kg	Order No.
Power harmonic analyzer B4210		7KB4210-8AA

- AC and DC ammeter for up to 1000 A
- Measurement of W, VA, VAR and power factor even with distorted waveforms
- Build-in 3-phase measurement facility for symmetric loads
 - True RMS frequency measurement for current and voltage
- Bar diagram and digital display for dual parameter external data logging on 1 PC
- Logging of lowest, highest average value as well as storage of complete file
- ICE 1010 Cat. III 600 V for higher safety in dangerous voltage ranges



2

Logging

The B4208 has the ability to store a complete file with measured values.

Continuous logging with all parameters on a personal computer as well as kWh and Ah measurements possible through digital outputs.

	Current	Voltage	Power	VA	Power factor	kWh
Measuring ranges (automatic)	400 A 1000 A	400 V, 600 V	4 kW, 40 kW 400 kW 600 kW	4 kVA, 40 kVA 400 kVA 600 kVA	0.3 cap. to 0.3 ind.	30 Hz to 1 kHz
Resolution	0.1 A 1 A	0.1 V, 1 V	1 W, 10 W 100 W, 1 kW	1 VA, 10 VA, 100 VA, 1 kVA	0.01	0.1 Hz
Accuracy	± 1,5 % display ± 5 digit	± 1 % display ± 5 digit	± 2,5 % display ± 5 digit	+2,5 % display ± 5 digit	± 3 degree	40-70 Hz, ± 0,5 % 30-1000 Hz ± 1 %
Max. meas. value	1000 A AC Peak 1000 A DC	600 V RMS 1000 V DC	1200 kW	1200 kVA		1000 Hz
Max. overload	10 000 A	1000 V peak	10 000 kW	10 000 kVA		10 000 A 1000 V peak

Technical data	
Display Size and type	LCD with 4000 element + bar diagram with 25 segments, digit size 2.5 mm/ 0.375"
Power supply Type of battery	8V alkaline: MN1604, PP3 IEX 6LRST or equivalent
Battery service life	15 hours, typical
Notes:	All accuracies are given for 23 °C ± 1 °C (73.4 + 1.5 °F)
Mechanical data Dimensions (h x w x d)	251 x 98 x 52 mm 9.88 x 3.80 x 2.05 inch
Weight	500 g / 1.1 lbs.
Jaw opening	1 x 50 mm / 2.0 inch dia. cable or 2 x 20 mm / 1.2 inch dia. cable
Ambient data Operating temperature	0 °C to 50 °C (40 °F to 122 °F)
Temperature coefficient	± 0.1 % of display °F ± 0.06 % of display °F
Storage temperature	- 20° to 60° (-4 °F to 140 °F)

Technical data	
Safety	All models comply with IEC1010-1, 600 W working capacity, Application class IV, Pollution degree 2
Maximum permissible voltage Current measurement (bare conductor)	500 V AC effective or DC between non isolated conductor and earth
Voltage measurement	500 V AC effective or DC between input terminals or between live voltage terminal and local earth

Ordering data			
Designation	kg	Order No.	
Power meter B4208 WINLOG PC software	0,5	7KB4208-8AA 7KB.....	

Industrial and power measuring instruments

B4207 clamp-on power meter

2

- Measurement of W, VA, VAR, kWh and power factor, even with distorted waveforms
- AC and DC clip-on powermeter for up to 2000 A
- True RMS value, peak value, crest factor, frequency for current and voltage
- Large background illuminated display for use as oscilloscope and presentation of a number of parameters
- Internal data recording of up to 5 parameters over 24 hours
- Memory for 8 files and registering lowest, highest and average value
- Built-in three-phase measurement facility for symmetric loads
- IEC 1010 cut IV for greater safety in dangerous voltage areas



Recording

The built-in data logger makes it possible to either record several parameters or a screen for storing; this means that up to 8 complete screen snapshots can be stored internally.

Each of these stored parameters can be called up again and displayed in real time.

Either single parameters can be stored for external recording on a PC or the internal logged data can be loaded into the PC with the help of resident PC programme for off-line analysis.

	Current	Voltage	Leistung W	Leistung VA	Power factor	kWh
Ranges (automatic)	40 A 400 A 2000 A	4 V, 40 V 400 V, 600 V	4 kW, 40 kW 400 kW 1200 kW	4 kVA, 40 kVA 400 kVA 1200 kVA	0.3 cap. to 0.3 ind.	4, 40, 400 4000 40000
Resolution	0.01 A 0.1 A 1 A	0.001 V 0.01 V, 0.1 V 1 V	1 W, 10 W 100 W, 1 kW	1 VA, 10 VA, 100 VA, 1 kVA	0.01	1, 10, 100, 1000 10000 Wh
Accuracy	± 1.5 % display ± 5 digits	± 1 % display ± 5 digits	± 2.5 % display ± 5 digits	+2.5 % display ± 5 digits	± 3 degrees	± 3 % display
Max. meas. value	2000 A AC peak 2000 A DC	600 V RMS 600 V DC	1200 kW	1200 kVA		28,800 kWh
Max. overload	10 000 A	1000 V peak	10.000 kW	10.000 kVA		10.000 kW

Technical data	
Display	Matrix-LCD 160 x 128 dots with background lighting
Current supply	
Type of battery	6 xAA alkaline MN1500, LR6
Battery service life	24 hours, typical (continuous operation)
Notes:	1. All accuracies are given for 23 °C ± 1 °C (73.4 ± 1.5 °F). 2. Through RMS measurements over 500 ms.
Mechanical data	
Dimensions (h x w x d)	300 x 98 x 52 mm, 12 x 3.75 x 2 inch
Jaw opening	62 mm, 60 mm dia.
Ambient data	
Operating temperature	0 °C to 50 °C (32 °F to 122 °F)
Temperature coefficient (current)	± 0.1 % of display each °C ± 0.06 % of display each °F
Storage temperature	- 20 to 60 (-4 °F to 140 °F)

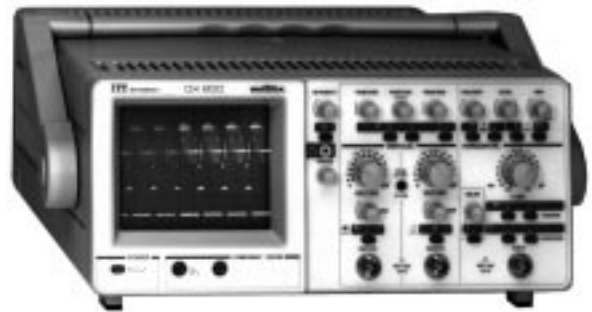
Technical data	
Safety	All models comply with IEC1010-1, 600 W working capacity, Application class IV, Pollution degree 2
Highest permissible voltages	
Current measurement (bare conductor)	600 V effective or DC between unisolated conductor and earth
Voltage measurement	600 V effective or DC between input terminals or between live voltage terminal and local earth

Ordering data			
Designation	kg	Order No.	
Clamp-on power meter B4207 WINLOG PC software	0,75	7KB4207-8AA 7KB.....	

35 MHz analog oscilloscope

OSCILLARZET D1017

Microprocessor-controlled analog oscilloscope with alternate and peak value triggering for convenient curve form synchronisation and presentation. Unique automatic trigger delay on 35 MHz analog oscilloscopes.



2

Technical data		
Vertical amplifier		
Band width (-3 dB):	10 Hz to 35 MHz	
AC coupling:	0 to 35 MHz	
DC coupling:	2 mV/div to 20 V/division $\pm 3\%$ (1-2-5)	
Sensitivity:	1...1/2.5 (with "UNCAL" LED)	
Fine adjustment :	1 M Ω 25 pF	
Input impedance:	< 175 ns	
Rise time:	CH1; \pm CH2; CH1 und \pm CH2 alternating or chopped; addition or subtraction	
Operating modes :	± 400 V max. (DC or peak AC at 1 kHz); category II	
Input voltage :		
XY- operation		
Type of function:	CH1 as X; CH2 as Y	
Sensitivity:	2 mV/division to 20 V/division	
Band width channel X (-3 dB):	0 to 2 MHz	
Input impedance:	1 M Ω 25 pF	
Phase error:	< 3° at 120 kHz	
Time base		
Time coefficient:	0.5 μ s/div. to 0.2 s/div. $\pm 3\%$; division 1-2-5	
Fine adjustment:	1... 2.5 (with "UNCAL" LED) to 0.2 μ s/division	
Expansion x 10:	max. 20 ns/division $\pm 5\%$	
Holding time (hold off):	variable, from 1 to 10	
Triggerung		
Display:	LED	
Source:	CH1, CH2, ALT (CH1 and CH2 alternating), EXT (external), LINE (mains)	
Sensitivity:	CH1, CH2, ALT, EXT	
Frequency range	CH1, CH2, ALT	EXT
0-10 MHz	0.5 division	50 mV _{eff}
10-20 MHz	1 division	100 mV _{eff}
20-30 MHz	2 divisions	200 mV _{eff}
30-40 MHz	3 divisions	300 mV _{eff}
Type:	NORM, PEAK TO PEAK, trigger delay	
Coupling :	DC, AC	
Flank:	LF and HF filter (10 kHz), TV-V, TV-H	
	positive, negative	
	Automatic delay with increased intensity in search operation.	
	Adjustable delay 1 to 10 divisions	
Component test	Voltage 12 V eff. (15 mA eff. max.) / 50 Hz Output to safety jacks, 4 mm dia.	

Technical data	
Calibrator	
Signal:	square
Amplitude:	2 V $\pm 1\%$
Frequency:	1 kHz $\pm 1\%$
Screen tube	
Screen:	8 x 10 cm, inner screen
Acceleration voltage :	approx. 2 kV
Trace search	
Trace setting	
Time-modulation	
Input (at back):	BNC
Sensitivity :	TTL level (max. ± 20 VDC)
Input impedance :	2 k Ω
Input frequency:	max. 4 MHz
Autoset	automatic setting of trigger mode, time base and input sensitivity
Temperature	
Reference range :	+18 °C to +28 °C
Working range:	0 °C to +40 °C
Storage range:	-20 °C to +70 °C
Air humidity:	< 80 % relative air humidity at +40 °C
Safety	IEC 1010-1 Kl. 1 Overvoltage category II Pollution degree 2
EMC	IEC 801 stage 3; EN 55011 and VDE 871 Kl. B
Power supply	110 V - 230 V - 240 V $\pm 10\%$ (50/60 Hz)
Consumption	50 W max.
Dimensions (d x w x h)	450 x 340 x 155 mm
Weight	6 kg

Ordering data

Designation	kg	Order No.	
Oscillarzet D1017 35-MHz analog oscilloscope incl. 2 probes	6	7KD1017-8AA	
Interface RS 232		on request	

Oscilloscopes

TDS 221 / 220

60 / 100 MHz - 2 channel digital real-time oscilloscope

- 60 MHz or 100 MHz band width
- 1 GS / s scanning rate per channel
- Double time base
- Auto set up
- Memory for signals and front plate settings
- Automatic measurements
- Multi language user display
- Optional module for RS-232, GPIB, hard copy, FFT and additional measurements



The digital real-time oscilloscope, TDS 210 with 60 MHz and TDS 220 with 100 MHz are unbeatable as far as economical operation is concerned because they are outstanding for their high capacity and reliability at very moderate cost. Fast, error-free measurements and the low costs make it easy for users oriented on conventional models analog oscilloscopes to change to digital instruments.

Technical data	
Signal acquisition	
Band widths:	TDS 210: 60 MHz TDS 220: 100 MHz
Scanning rate:	1 GS / s per channel
Channels:	2 uniform channels plus internal trigger
Sensitivity (with calibrated fine setting):	10 mV to 5 V / division with full band width; 2 mV to 5 mV / div. at 20 MHz
Calibrated position range:	V / div. setting, offset range 2 mV to 200 mV / div. ± 2 V >200 mV to 5 V / div. ± 50 V
DC amplification accuracy:	± 3%
Vertical resolution:	8 Bits (256 stages over 10.24 vertical sub-divisions)
Automatic measurements:	Period, frequency, cycle effective value, mean value, peak to peak
Acquisition mode:	Scanning, mean value, peak value acquisition
Time base system (main and window time base)	
Time/part range:	horizontal zoom function 5 ns to 5 s / division
Memory depth:	2500 scanning points per channel
Horizontal accuracy:	± 0.01%
Non-volatile memory:	
Signals:	2 reference signals each with 2500 points
Instrument settings:	5 settings
Trigger system (only main system)	
Types of trigger:	Flank (positive or drop-out edge); video, settings to 50%
Types of video triggers:	Triggering follows on half picture or lines from negative picture scan out synchronous signals; triggered through video signals in NTSC-, PAL or SECAM standard.
Trigger mode:	Auto, normal, single deflection
Trigger source:	CH1, CH2, Ext, Ext/5
Cursor:	
Types:	Voltage, time
Measurements:	DT, 1/DT, DV
Signal processing:	
Sources:	Arithmetical calculation systems: addition, subtraction, inverting
auto set up:	CH1, CH2
Presentation system:	
Interpolation:	Robust background illuminated LCD monitor
Modes:	Sine (x) / x
Formats:	Vector, point and point resistance YT and XY

Technical data	
Hard copy extension module TDS2HM:	Centronics, parallel connection
Communication extension module TDS2CM:	Centronics Parallel connection: Programmable through RS-232: Programmable through GPIB-Bus:
Hard copy function:	Printer / file formats
Measurement extension module TDS2MM:	FFT:
Autom. measurements:	Scanning points: 2048 Presentation: Hanning, Flat Top, rectangular
Interface:	Rise, drop-out time, positive/negative pulse width Centronics, RS-232, GPIB
Ambient and safety:	
Temperature:	0 °C to + 50 °C (operation) - 20 °C to + 60 °C (not in use)
Humidity:	Up to 90% relative humidity at or under +40 °C Up to 60% relative humidity from 41 °C to 50 °C (in or out of operation)
Electromagnetic emission:	Complies with Directive 89/336/EC for electromagnetic compatibility; FCC standard for US Federal Regulation 47 CFR, Part 15, Subpart B, Class A
Safety:	UL 3111, EN61010, CAN/CSA-C22.2 No. 1010.1-92

Ordering data		
Designation	kg	Order No.
Digital real-time memory oscilloscope TDS 220 , 100 MHz / 1GS/s 2 channel digital real-time memory oscilloscope 2 only passive 100 MHz probes, Type P6112, operating instructions mains cable	ca. 1,7	TOU: TDS220
Digital real-time memory oscilloscope TDS 210 , 60 MHz / 1GS/s 2 channel digital real-time memory oscilloscope 2 only passive 100 MHz probes Type P6112, operating instructions mains cable	ca. 1,7	TOU: TDS210
Communication extension module		TOU: TDS2CM
Hard copy extension module		TOU: TDS2HM
Hard copy extension module incl. FFT and 4 additional measurements		TOU: TDS2MM
Carrying case for TDS210 / 220		TOU: AC220
Rack mounting kit		TOU: RM200
Wavestar software for oscilloscope		TOU: WSTRO

The D1080 Scope meter is a complete digital 100 MHz storage oscilloscope, a fully equipped digital multimeter and a frequency counter in a portable, handy and robust housing.

It can be used at any location as a result of the battery power supply and completely enclosed housing which means even in damp and dirty surroundings. It is very easy to read even in dark surroundings due to the illuminated display.

- Powerful signal presentation. With 100 MHz band width and a measuring rate of max. 25 megasamples/s single-shot phenomena with a resolution of 40 ns and repetitive signals up to 100 MHz can be digitalized, studied and stored. In addition the Scope meter offers 40 ns glitch acquisition.
- Versatile true RMS value multimeter with 18 measuring functions. Measures direct and alternate current (to 5 MHz!) to 600 V effective (1700 V/ss), resistance to 40 M Ω . Current transformers or temperature measuring modules, respectively, are available for current and temperature measurements.
- Measuring function menu. You select the required measuring function easily from a list of 40 measuring functions and the Scope meter automatically adjusts and shows the result on the screen.



Technical data	
100 MHz digital storage oscilloscope, 2 channel	
3 2/3-digit true RMS multimeter	
Continuous autoset	
Measuring function menu > 40 automatic set-ups	
Min/max. TrendPlot - long period recording	
Multimeter display with signal presentation	
Time base ranges (5 ns/division to 60 s/division)	
Deflection coefficient (1 mV/division to 100 V/division)	
Digital trigger delay (cycles, number, events, time and zoom)	
Special multimeter measuring functions - rpm, speed and others	
Oscilloscope input scaling for current transformer display in amperes	
Oscilloscope cursor measuring functions	
Glitch acquisition, 40 ns	
Screen memory	10
Signal form	20
Set-up memory	40
Mathematical signal form	
Signal generator output with 4 fixed frequencies	
Component tester output - voltage and current	
Optically isolated RS 232 C interface *	
Printer connection	
Signal form and screen transmission and remote operation	
Switching contrast display with background illumination	
German online information and help function	
* optional adapter cable necessary	

- Continuous autoset. The Scope meter automatically adapts to the changing input signals and presents them as stable signals in this autoset mode.
- Online information. Information on the measuring functions and instrument setting appears immediately at the press of the info button no matter what function you are using at the given point in time.
- Large supplementary memory. The Scope meter D1080 is equipped with additional memories. It stores up to 40 front panel settings, 20 signal forms and 10 complete screens for separate analysis and printout.
- Min/max TrendPlot presents trends graphically from 15s/division up to 40 days. Minimum, maximum and mean value of one signal are presented in graphical and numerical form.
- Display with background lighting. The grey scale display with background lighting, which is similar to an analog display, shows signal details which could never be seen before on a digital display.
- Optically isolated (600 V) RS 232 interface for transmission of instrument settings, signal forms and screen contents from or to a PC. Required for this purpose are the additionally available interface cable PM 9080 and software for Windows or DOS.

Ordering data			
Designation	kg	Order No.	
Scope meter D1080 100 MHz digital storage oscilloscope, 2 channels	2.4	7KD1080-8AA	
Diverse accessories		on request	

Oscilloscopes

Scope meter D1081

Industrial Scope meter D1081

The D1081 scope meter is the ideal aid in the search for faults in industrial plant, instruments, regulating and power supply systems.

2 This is robust, reliable portable two-channel oscilloscope combined with a multimeter which has the ability of a "paperless" recorder. The new and patented "Connect-and-View" free hand control saves a great deal of time in the search for faults and thus contributes to minimizing system breakdown times.



- For testing and searching for faults in AC and DC motor drives, sensors and actuators, power supply systems, transformers and rectifiers, analog and digital control circuits.
- The free hand "Connect-and-View" control provides an extremely stable, reliable and reproducible signal presentation without but one key having to be pressed even in the case of very complex signals, motor drives and video applications.
- Intuitive operation with the possibility of making all measurements with just one measuring cable. One and same measuring cable for signal presentation, multimeter measured values, capacity and resistant measurement as well as continuity testing.
- Recording of signals in one time range from nanoseconds up to several days through the integration of three mostly used measuring instruments for fault finding: oscilloscope, multimeter and recorder.
- 20-MHz two channel digital storage oscilloscope and fully integrated two channel multimeter.

- True RMS two channel multimeter with 5000 digits display capacity, 0.50% accuracy and 26 measuring functions, for example, direct voltage, true RMS alternate voltage, frequency, scanning ratio, pulse width, phase A to B, amperes, temperature, crest factor, dBV, dBm, resistance, continuity, diode test and capacitor measurement.
- Two channel TrendPlot for tracing sporadic occurring errors to the recording of measured values over minutes to days with indication of time and date for the minimum and maximum measured values. Two channels for examining "cause and effect".
- Large and bright cold cathode fluorescence display with background lighting offers excellent contrast and ensures good reading under all lighting conditions.
- Chargeable battery operation with charge status display so that you can use the scope meter everywhere. Up to 5 hours battery operation and fast charging.
- Can be combined with numerous accessories, for example, current transformer and temperature sensors.
- Printer and PC interface as well as optional windows software facilitates documentation.

Safety

Fulfills the safety requirements for measurements on industrial power supply systems to category III - 600 Veff with the supplied measuring cables.

Equivalent to IEC 1010-1/EN61010.1 Cat. III,
UL 3111, CSA C22.2 No. 1010.1, ANSI/ISO S 82

Technical data	
Oscilloscope specifications	D1081
Band width	20 MHz
Max. time equivalent scanning rate with repetitive signals	1.25 GS/s
Max. scanning rate for single shot	25 MS/s
Number of channels	2
Rise time	< 175 ns
Time/division	20 ns - 60 s
Voltage/division	5 mV - 500 V
Recording length (bytes)	512
Memory for screen display, Signal form/setting	2 / - / 10
Pre and post trigger setting in divisions	- 10 to + 10
Specifications for auto ranging true RMS multimeter	
Number of DMM channels	2
Displayed measured value (basic accuracy DC 0.5%)	5000 digits
TrendPlot recording with time and date indication	2 channels
General specifications	
NiCd chargeable battery operation	up to 5 hours
Automatic measuring functions	26
Dimensions (h x w x d)	23 x 11.5 x 5 cm

Included in delivery

Sheathed measuring cables, NiCd battery pack, mains adapter/battery charging unit

Ordering data

Designation	kg	Order No.	
Scope meter D1081 digital storage oscilloscope, 2 channels	1.1	7KD1081-8AA	
Diverse accessories		on request	

Digital hand-held oscilloscopes THS730A / THS720A / THS710A / THS720P

THS700-Serie

- Two channels and two A/D converters
- External triggering
- 3-3/4 digit DMM (digital multimeter) with data logger
- Roll mode
- Particularly bright, background illuminated display
- 8 ns interference peak acquisition
- Safety through signal insulating oscilloscope and signal insulating DMM channels
- Pretriggering delay, pulse and video (half picture and one time)
- NiCd battery and AC adapter
- 21 automatic measurements
- RS-232, programmable / data transmission THS720P
- Measurement up to 31. harmonic (50/60 Hz)
- Automatic power measurement with statistics



Technical data				
Oscilloscope functions	THS730A	THS720A	THS720P	THS710A
Band width	200 MHz	100 MHz	100 MHz	60 MHz
Scanning rate (per channel)	1 GS / s	500 MS / s	500 MS / s	250 MS / s
Time-base sweep/division	2 ns to 50 s / div	5 ns to 50 s / div	5 ns to 50 s / div	10 ns to 50 s / div

Technical data	
Channel:	Two
Sensitivity:	5 mV to 50 V/div (up to 500 V/div with 10x probe)
Position range:	± 10 div.
Direct current amplification accuracy:	± 2%
Vertical resolution:	8 bit
Dataset length:	2500 points
Sensitivity:	5 mV to 50 V/div (up to 500 V/div with 10x probe)
Horizontal accuracy:	± 200 ppm
Trigger modes:	auto, normal
Types of trigger:	flank, pulse, video, external
Video trigger formats and field values:	odd number field, even number field and line
Internal trigger input:	5 MHz TTL compatible
Processing wave form:	addition, subtraction, multiplication calculation Watt = V x I
Saving wave form:	10 wave forms
Acquisition modes:	scanning, envelope curve, average
Cursor measurement:	Δ volt, Δ time, 1/Δ time (Hz), degree (phase)
Types of cursor:	horizontal bars, vertical bars, coupled (volt / time)
Display system:	interpolation: Sine (x) / x mode: vector, point, vector summation, point summation format: YT und XT
Automatic measurements	
Periods	Frequency
+ width	rise time
- width	drop out time
+ pulse duration	+ overshoot
- pulse duration	- overshoot
High	max
Low	min
Peak to peak	amplitude
Mean	Effective value
Pulse mean	pulse effective value
Specifications, digital multimeter	
Voltage ranges	
Direct current:	400.0 mV to 880 V (± 0.5% of display value + 5 count steps)
Alternate current true effect values:	400.0 mV to 640 V
max. floating voltage:	600 V _{eff} per channel (dependent on probe)
Resolution:	4000 count steps, 3-3/4 digits (± 2% of display value + 5 count steps)
Resistance ranges:	400.0 Ω to 40.00 MΩ

Technical data	
Diode testing / dielectric testing	
Modes:	min, max, Δ max min, average, hold
Non-volatile memory:	10 DMM monitor entries
General specifications	
Settings:	10 settings, instrument font
Safety certification:	UL 3111-1 registered, IEC1010 CAT II, III, equivalent to EN61010-1
Voltage supply:	rechargeable NiCd battery set with direct current adapter (both supplied)
Battery service life:	approx. 2 hours when fully charged
Display:	background illuminated LCD display
Display resolution:	320 x 240
Dimensions:	177 x 217 x 51 mm (w x h x d)

Only THS 720P

Power measurements

W	Active power
VA	Apparent power
VAR	Reactive power
V	Volt (effective value, peaks)
A	Amperes (effective value, peaks)
THD-F	Total harmonic distortion as percentage of fundamental waves
THD-R	Total harmonic distortion of input signal effective value
PF	Power factor
DPF	Power factor offset
φ	Phase difference between voltage and current

Ordering data

Designation	kg	Order No.
Digital hand-held oscilloscope THS710A , 60 MHz / 250MS/s 2 channel oscilloscope	approx. 1.5	TOU:THS710A
Digital hand-held oscilloscope THS720A , 100 MHz / 500MS/s 2 channel oscilloscope		TOU:THS720A
Digital hand-held oscilloscope THS730A , 200 MHz / 1GS/s 2 channel oscilloscope		TOU:THS730A
Extent of delivery: 2 only probes Type P6117, standard measuring cable set, rechargeable NiCd accumulator, power pack, carrying bag, cable and adapter RS232, operating instr.		
Digital hand-held oscilloscope THS720P , 100 MHz / 500MS/s 2 channel oscilloscope	approx. 1.5	TOU:THS720P
Extent of delivery: 2 only probes Type P6117, standard measuring cable set, rechargeable NiCd accumulator, power pack, carrying bag, cable and adapter RS232, operating instr.		
Wavestar SW for oscilloscope (WSTRO)		TOU:WSTRO

Temperature and climate measuring instruments

Hand-held tachometers

2



B2201 digital hand-held tachometer

Mechanical hand-held tachometer for measurement by contact



B2202 optical digital hand-held tachometer

Optical hand-held tachometer



B2203 optical digital hand-held tachometer

For either optical or contact measurement

General

The mode of operation of the electronic tachometers supplied by Siemens is based on the frequency method. The shaft speed to be measured is converted by appropriate sensors into an electric frequency which is then measured and processed electronically in analog or digital mode.

The various devices of our systems are clearly separated by function and can be simply combined on the modular element principle. The resulting test set-ups are very flexible, and can be extended or adapted to suit new requirements at any time.

Supplied accessories, included in delivery

B2201 digital hand-held tachometer

- 1 bag
- 3 batteries (ISO standard AA/R 6 or similar)
- 1 driver with large tip
- 1 driver with small tip
- 1 measuring drum
- 1 Instruction manual in 4 languages

B2202 digital hand-held tachometer

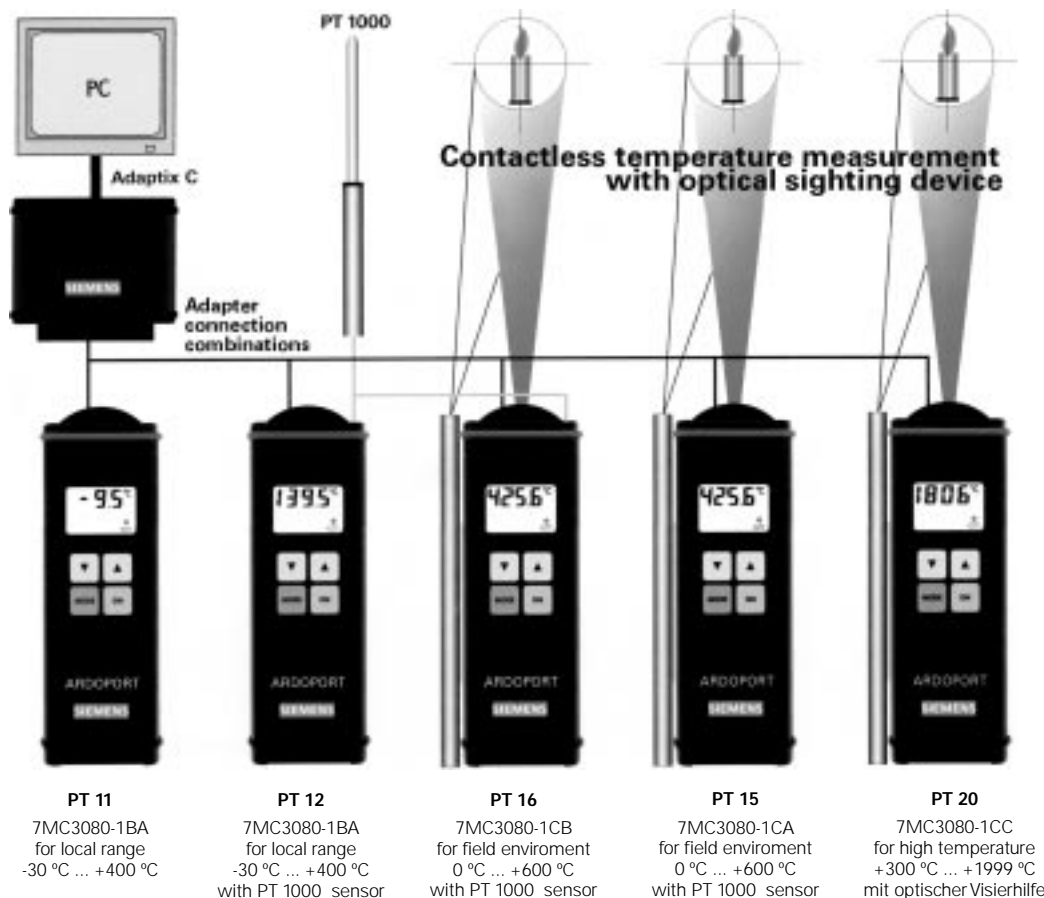
- 1 bag batteries (ISO standard AA/R 6 or similar)
- 1 sheet with 30 self-adhesive reflexion markers 12 mm x 12 mm
- 1 Instruction manual in 4 languages

B2203 digital hand-held tachometer

- As B2201 plus:
- 1 adapter
- 1 sheet of reflexion markers 12 mm x 12 mm

Technical data	
Exceptional reading and system accuracy 3 measuring ranges with automatic selection	
Error limits	0.02 % of measured value \pm 1 digit
Permissible ambient temperature	
- Operation	0 to +50 °C
- Transport and storage	-20 to +60 °C
B2201 digital hand-held tachometer	
Resolution measuring range	10 to 20 000 rpm with plug-on driver
Speed range	1.50 to 3000 m/min (5.00 to 10 000 ft/min) with same measuring drum
Dimensions (h x w x d)	220 mm x 150 mm x 42 mm
Weight	approx. 0.5 kg
B2202 Digital hand-held tachometer	
Measuring range	10 to 100 000 rpm with reflexion marker affixed to the measured object
Optical display (target) facilitates alignment with the reflexion marker	
Dimensions (h x w x d)	220 mm x 150 mm x 42 mm
Weight	Approx. 0.4 kg
B2203 Digital hand-held tachometer	
Resolution measuring range	10 to 100 000 rpm with reflexion marker attached to the measured object
Speed range	1.50 to 3000 m/min (5.00 to 10 000 ft/min) with measuring drum/plug-on driver
Dimensions (h x w x d)	220 mm x 150 mm x 42 mm
Weight	Approx. 0.5 kg

Ordering data		
Designation	Order No.	
Digital hand-held tachometer	7KB2201-8AA	
Optical digital hand-held tachometer B2202	7KB2202-8AA	
Optical digital hand-held tachometer B2203	7KB2203-8AA	



Special features

- Also as combination instrument for contactless and contact temperature measurement
- Robust aluminium case with IP 65 type of enclosure
- Can be used even under roughest industrial conditions
- Integrated data memory for 64 measured values
- Data transfer to PC with help of Adaptix C interface
- Adjustable degree of emission
- High measuring accuracy through microprocessor control
- Calibration to international approved comparison normal
- High resolution from 0.1 °C
- Easy operation
- LCD multifunction display
- Automatic switch-off
- Battery control
- Pilot light or scope for sighting
- Compact, handy shape
- Versatile accessories
- Including battery

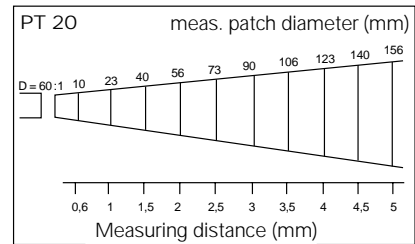
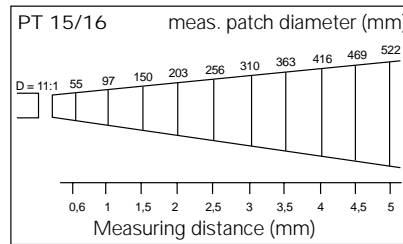
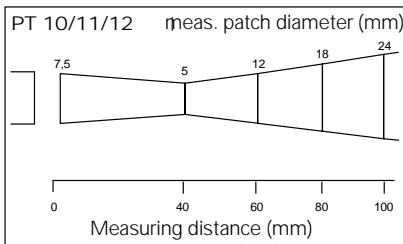
Ordering data			
Designation	kg	Order No.	Price
Ardoport PT10 -30 to +400 °C	app. 0.27	7MC3080-1AA	
Ardoport PT11 -30 to +400 °C incl. data memory for 64 meas. values	app. 0.27	7MC3080-1BA	
Ardoport PT12 -30 to +400 °C incl. data memory for 64 meas. values incl. PT 1000 insert sensor	app. 0.35	7MC3080-1BB	
Ardoport PT15 0 to +600 °C incl. data memory for 64 meas. values incl. sighting facility	app. 0.40	7MC3080-1CA	
Ardoport PT16 0 to +600 °C incl. data memory for 64 meas. values incl. PT 1000 insert sensor incl. sighting facility	app. 0.50	7MC3080-1CB	
Ardoport PT20 +300 to +1999 °C incl. data memory for 64 meas. values incl. sighting facility	app. 0.50	7MC3080-1CC	
Insert sensor for PT12 and PT16	app. 0.07	7MC3900-8BA	
ADAPTIX plug-fitted infrared interface module for saved measured value transmission from Ardoport to PC, including driver software for MS-DOS-PC	app. 0.15	7MC3900-8BB	
Visualisation software for evaluation of measured values on Excel basis		7MC3900-8BC	
Carrying case		7MC3900-8BD	

Temperature and climate measuring instruments

ARDOPORT family

2

Technical data			
	ARDOPORT PT 10 / 11 / 12	ARDOPORT PT 15 / 16	ARDOPORT PT 20
Measuring range	- 30 ... +400 °C	0 ... +600 °C	+300 ... +1999 °C
Sensor	thin film thermopile	thin film thermopile	InGaAs photo diode
Spectral range	7 ... 16 μm	8 ... 16 μm	1.1 ... 1.7 μm
Average distance ratio		11 : 1	60 : 1
Measuring patch in focus	5 mm dia at 40 mm meas. distance	55 mm dia at 0.6 m meas. distance	10 dia at 0.6 m meas. distance
Sighting facility	pilot light with 2 red LEDs	scope with measuring patch marking for 1 m, ∞	scope with measuring patch marking for 1 m, 2.5 m, ∞
Measurement uncertainty at $\tilde{\epsilon} = 1$ and $T_u = 23\text{ °C}$	1,5 K + 1 digit (-30 ... +199,9 °C) 0,75% of MV + 1 digit (+200 ... +400 °C)	2 K + 1 digit (0 ... +199,9 °C) 1% of meas. value + 1 digit (+200 ... +600 °C)	4 K or 0.5% of meas. value the larger value is valid (< 1500 °C), 0,75% of m. v. + 1 digit (> 1500 °C)
Temperature coefficient	$\leq 0,07\%$ /K from MV /K deviation to $T_u = 23\text{ °C}$ und $\tilde{\epsilon} = 1$	$\leq 0,07\%$ /K of measuring value /K deviation to $T_u = 23\text{ °C}$ and $\tilde{\epsilon} = 1$	0,05% /K of meas. value/K deviation to $T_u = 23\text{ °C}$
Dimensions (l x w x h)	175 x 60.5 x 35.5 mm	182 x 60.5 x 35.5 mm	182 x 60.5 x 35.5 mm
Functions	min/max value memory integrated data memory for 64 MV (PT11 / 12)	min/max value memory integrated data memory for 64 MV	min/max value memory integrated data memory for 64 MV
Measuring uncertainty Sensor measurement PT 1000 (PT12/PT16)	0.3 K or 0.4% of MV + 1 digit at $T_u = 23\text{ °C}$	0.3 K or 0.33% of MV (the larger value is valid) + 1 digit at $T_u = 23\text{ °C}$	(the larger value is valid)
Setting time t_{90}	≤ 1 sec.		
Resolution	0.1 K (<200 °C); 1.0 K (>200 °C)		
Reproducibility	1 K at $\tilde{\epsilon} = 1$ and $T_u = 23\text{ °C}$		
Display	3 ½ digit LC display		
Voltage supply	9V battery 6 LR 61		
Admissible ambient temp.	-10 ... +50 °C		
Storage temperature	-20 ... +60 °C		
Case material	aluminium		
Type of protection DIN 40050	IP 65		
Weight	approx. 270 g incl. battery		
Battery service life	with pilot light approx. 20 h continuous operation, without pilot light approx. 60 h continuous operation		
Degree of emission $\tilde{\epsilon}$	20 ... 100% adjustable (step width 0.1%, only for pyrometer measurement)		



Examples of application

- Food industry:
 - Fast temperature control in the storage, transport and processing of foods, fresh meat, deep frozen produce, milk products and sausage without touching the product.
- Electrical systems:
 - No-risk measurement of live objects such as switch cabinets, electronic components, transformers for maintenance and safety checks.
- Rotating and moving objects:
 - Checking inadmissible heat development in ball bearings, rollers and motors while running to prevent damage and accidents.
- Heating, air conditioning and ventilation engineering (testing circulating pumps, thermostats and heating tubes):
 - Servicing and testing refrigeration and ventilation plant as well as testing heating systems for isolation damage and leakage.
- Sanitary and heating engineering:
 - Upstream and downstream temperature measurement and checking radiators and isolation.
- Electronics and electrical engineering:
 - Maintenance of electric plant, checking operating temperature of electric components.

Temperature and climate measuring instruments

Climate printer for room monitoring of temperature and humidity

Compact, accumulator-operated climate measuring instrument with printer for graphic or alphanumeric logging of temperature and relative air humidity.

This precise measuring and recording instrument is suitable for all applications where a test protocol has to be produced.

It is suitable more especially for recording measured values in climate testing chambers, air-conditioned rooms, museums, show cases, galleries, computer rooms, in clean room engineering and the assessment of buildings under historical, monumental protection in the need of repair.



Climate printer
7MC5900-8CA



Humidity sensor
7MC5002-8AE

2

Technical data		
	7MC5900-8CA Compact climate printer	7MC5900-8CB Climate data logger with ring memory 128 kB
Connections	1 ALMEMO input socket/1 ALMEMO output socket	
Paper feed	programmable from 0.03 to 640 mm/h (sensible range 2 to 10 mm/h)	
Printing cycle	programmable from 2 s to 12 h, in sleep mode from 1 min to 12 h	
Display	LCD display 13 mm high, 6 digit 7-segment for measured values, 2 digit 16-segment for dimension and function	
Self-calibration	automatic correction zero point	
Measuring procedure	Multislope integrating, AD converter 16 bits	
Microprocessor	HD 6303 Y	
System accuracy	± 0.03 % of measured value ± 2 digits, temperature drift 0.01 %/°C	
Nominal temperature	22°C ± 2 K	
Battery control	"BAT" symbol in display	
Voltage supply	Built-in accumulator 900 mAh or mains adapter 7.5 V/450 mA	
Current consumption	switched-off 0.04 mA, switched-on without printing 15 mA, approx. 500 mA (2 s) when printing	
Operating period	with one accumulator charge: 60 hours without printing cycle in SLEEP mode: alphanumeric: 5000 cycles, graphic: 15,000 cycles (min. 7 days)	
Printer	Printing speed 0.6 lines/s, digit size 2.4 x 1.1 mm, 40 digits per line (alphanumeric), 8 x 280 dots per line (graphic)	
Diagram width	2 x 34 mm alongside each other or 1 x 68 mm	
Housing	Tough, impact-proof ABS, resistant up to 70 °C, 180 x 150 x 50/70 mm	
Working temperature	- 10 to + 40 °C, max. ambient humidity 75 %	
Storage temperature	- 30 to + 70 °C	
Memory	-	Ring memory 128 kB for approx. 25000 measured values
Memory printout	-	Selectable starting time/date and completion time/date, adjustable output: plotting ranges, plot format, list printout or interference value printout as list with exceeded limit values

Order data			
Designation	kg	Order no.	
Climate print measuring instrument ALMEMO 6290-7K Mains adapter, 2 rolls thermal paper		7MC5900-8CA	
Climate data logger ALMEMO 6290-7KS with ring memory 128 kB, mains adapter, 2 rolls thermal paper		7MC5900-8CB	
Recommended temperature/ humidity sensors		7MC5002-8AD	
FH A646-1 Compact humidity/temperature sensor (Ntc) for climate measurements directly connected with ALMEMO plug: 5 to 98 % relative humidity/- 20 to + 60 °C, 12 mm dia., 87 mm long, protective cap and plug in plastic		7MC5002-8AE	
FH A646-6 Humidity/temperature sensor (Ntc) for measuring climate or separate arrangement of sensor and			

Designation	kg	Order No.	
instrument with 1.5 m cable, 5 to 98 % relative humidity/- 20 to + 80 °C, 12 mm dia., 162 mm long, sensor tube/-grip in aluminium, protective cap SK2 in plastic			
Recommended software ALMEMO control ONLINE for 1 instrument		7MC5900-8CC	
Accessories			
ALMEMO data cable RS 232 metallically isolated (handshake hardware)		on request	
ALMEMO output cable for limit value alarm with optocoupler		on request	
Measuring instrument case		on request	
Mains adapter (replacement)		on request	
Thermal paper roll		on request	

Temperature and climate measuring instruments

Display unit, data logger, connectable measured value sensor

Display unit ALMEMO 2290-2

For checking measurements with 5 keys for calling functions; analog and digital data output via output module

Data logger ALMEMO 2290-8

For automatic measurement, storage and output of measured values; with 5 input sockets and 2 output sockets

Common features

New patented measuring procedure (intelligent input plugs)



Display unit
7MC5900-8AD



Data logger
7MC5900-8AE

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Special features

- 16-bit analog/digital converter, automatic sensor recognition
- All sensors can be connected without programming the unit
- Operating errors impossible
- Sensor errors can be corrected
- Factory test certificate
- Data output via analog module or V.24 output module
- Software for data processing
- 128-kbyte memory
- Current-saving sleep mode

Technical data			
Sensor	Measuring range	Resolution	Tolerance
Resistance thermometers			
Pt 100, 1 and 4-wire	-200 to + 300 °C	0.1 K	± 0.05 K ± 0.05 % of m. val.
Pt 100, 2 and 4-wire	-200 to + 400 °C	0.01 K	± 0.05 K
Thermocouples			
NiCr-Ni (type K)	-200 to + 1370 °C	0.1 K	± 0.05 K ± 0.05 % of m. val.
Fe-CuNi (type L)	-200 to + 900 °C	0.1 K	± 0.05 K ± 0.05 % of m. val.
Fe-CuNi (type J)	-200 to + 1000 °C	0.1 K	± 0.05 K ± 0.05 % of m. val.
Cu-CuNi (type U)	-200 to + 600 °C	0.1 K	± 0.05 K ± 0.05 % of m. val.
Cu-CuNi (type T)	-200 to + 400 °C	0.1 K	± 0.05 K ± 0.05 % of m. val.
PtRh10-Pt (type S)	0 to +1760 °C	0.1 K	± 0.3 K
PtRh13-Pt (type R)	0 to +1760 °C	0.1 K	± 0.3 K
PtRh30-PtRh6 (type B)	+ 400 to +1800 °C	0.1 K	± 0.3 K
NTC sensor			
NTC-type N	-50 to +125 °C	0.01 K	± 0.05 K
Electric signals			
DC voltage (mV)	-26 to +26 mV	1 µV	-
DC voltage (mV)	-260 to +260 mV	0.01 mV	-
DC voltage (V)	-2.6 to +2.6 V	0.1 mV	-
Differential voltage (DC, mV)	-26 to +26 mV	1 µV	-
Differential voltage (DC, mV)	-260 to +260 mV	0.01 mV	-
Differential voltage (DC, V)	-2.6 to +2.6 V	0.1 mV	-
Direct current (mA)	-32 to +32 mA	1 µA	-
% (4 to 20 mA DC)	0 to 100 %	0.01 %	-
Resistance (Ω)	0 to 500 Ω	0.01 Ω	-
Frequency	0 to 25000 Hz	1 Hz	-
Pulses/cycle	0 to 65000	-	-
Capacitive humidity sensor			
NTC type N	-50 to +100 °C	0.01 K	± 0.05 K
Relative humidity	5 to 98 %	0.1 %	-
Dew point temperature	-25 to +100 °C	0.1 K	± 0.2 K
Mixing ratio	0 to 500 g/kg	0.1 g/kg	± 0.5 %
Psychrometers			
Dry bulb temperature	-50 to +125 °C	0.01 K	± 0.05 K
Wet bulb temperature	-50 to +100 °C	0.01 K	± 0.05 K
Relative humidity	0 to 100 %	0.1 %	± 1.0 %
Dew point temperature	-25 to +100 °C	0.1 K	± 0.2 K
Mixing ratio	0 to 500 g/kg	0.1 g/kg	± 0.5 K
Partial vapour pressure	0 to 1013.2 mbar	0.1 mbar	± 0.1 mbar ± 0.1 % of m. val.

Temperature and climate measuring instruments

Display unit, data logger, sensor

2

Technical data			
Sensor	Measuring range	Resolution	Tolerance
Flow sensors			
Normal vane	0.3 to 20 m/s	0.01 m/s	$\pm 0.1 \text{ m/s} \pm 0.2 \% \text{ of measured value}$
Normal vane	0.4 to 40 m/s	0.01 m/s	$\pm 0.2 \text{ m/s} \pm 0.2 \% \text{ of measured value}$
Micro vane	0.5 to 20 m/s	0.01 m/s	$\pm 0.1 \text{ m/s} \pm 0.2 \% \text{ of measured value}$
Micro vane	0.6 to 40 m/s	0.01 m/s	$\pm 0.2 \text{ m/s} \pm 0.2 \% \text{ of measured value}$
Micro vane	0.1 to 20 m/s	0.01 m/s	$\pm 0.1 \text{ m/s} \pm 0.2 \% \text{ of measured value}$
Back-pressure sensor	1.8 to 90 m/s	0.1 m/s	$\pm 0.1 \text{ m/s}$
Further sensors			
Measurement sensor			
Infrared detector	- 18 to + 260 °C	0.1 K	-
pH probe	pH 0 to pH 14	pH 0.01	-
Differential pressure sensor	0 to 6800 Pa	1 Pa	-
Relative pressure sensor	0 to 1 bar	0.1 mbar	-
Relative pressure sensor	0 to 2 bar	0.1 mbar	-
Relative pressure sensor	0 to 5 bar	1 mbar	-
Relative pressure sensor	0 to 10 bar	1 mbar	-
Relative pressure sensor	0 to 20 bar	1 mbar	-
Input sockets	ALMEMO 2290-2 7MC5900-8AD		ALMEMO 2290-8 7MC5900-8AE
Output sockets	1		5, metallically isolated
Pt 100 measuring current	2	1 mA	2
A/D converter		Multi-slope, integrating, 16 bit resolution	
Measurement rate		3 measurements/s	
Self-calibration		automatic zero correction, sensor open-circuit detection and interface recognition, nominal temperature 22 °C \pm 2 K	
Error limits		$\pm 0.03 \% \text{ of measured value} \pm 2 \text{ digit}$	
Temperature drift		0.005 %/°C	
Cold junction compensation		effective in range -30 to +100 °C	
Display		6x7-segment LCD and 2x16-segment LCD, 13 mm	
Memory			130 kbyte for 25,000 measured values
V.24 interface		8-bit serial data, ASCII-code, 1 start bit, 1 stop bit, no parity bit; output modules required	
Print cycle	1 s to 59 h 59 min 59 s (called via V.24-module)		directly programmable
Measuring cycle	1 s to 59 h 59 min 59 s (called via V.24-module)		directly programmable
Time	1 s to 23 h 59 min 59 s, non-buffered		Buffered time
Date	not buffered, no month/year correction		Buffered date
Power supply		9-V alkaline/manganese battery (service time approx. 70 h) or mains adapter 9V, 50 mA	
Sensor supply		7.2...12 V non-stabilized, max. 100 mA/device	
Current supply	7 mA		9 mA, sleep mode 50 mA
Permissible ambient temperature			
- Operation		-10 to +60 °C	
- Storage		-30 to +60 °C	
Housing		ABS, impact-resistant, temperature-resistant up to 70 °C	
Dimensions		180 mm x 85 mm x 33 mm	
Weight		Approx. 0.4 kg	

Ordering data		
Designation	Order No.	
Display unit ALMEMO 2290-2	7MC5900-8AD	
Data logger ALMEMO 2290-8	7MC5900-8AE	
Sensors	see page 2/40,41	

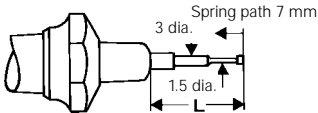
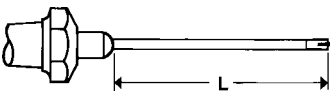
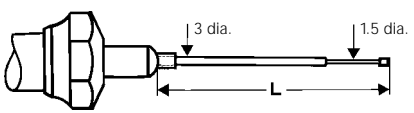
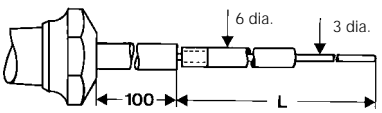
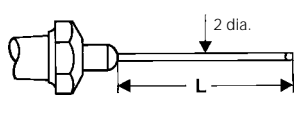
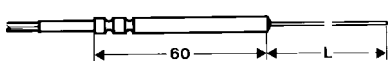
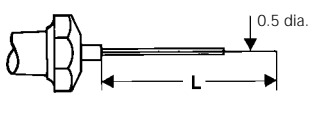
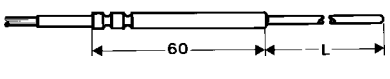
Temperature and climate measuring instruments

Sensors for climate meters

The sensors with handles listed below are delivered as complete units with fitted input plugs; cable length 1.2 m (other cable lengths are specified with the appropriate sensors).

Temperature sensors with NiCr-Ni thermocouple sensor (type K) to DIN IEC 584-2

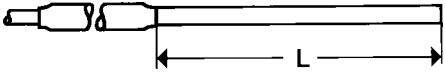
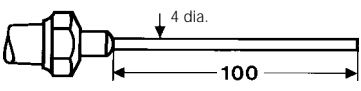
2

 <p>Type FT A 120 spring mounted temperature sensor for temperature measurements on bare metallic surfaces $T_{max} = 500\text{ °C}$ Length L = 25 mm Order No. 7MC5000-8AA Length L = 150 mm 12 dia. Order No. 7MC5000-8AB</p>	 <p>Type FT A 253-5 band-type temperature sensor, for temperature measurements on all types of surfaces; $T_{max} = 250\text{ °C}$ Length L = 100 mm Order No. 7MC5000-8AH</p>
 <p>Type FT A 222 rigid temperature sensor for temperature measurements on bare metallic surfaces and in liquids $T_{max} = 500\text{ °C}$ Length L = 50 mm Order No. 7MC5000-8AC Length L = 100 mm Order No. 7MC5000-8AD</p>	 <p>Type FT A 126 temperature sensor, for temperature measurements in air and gases, removable protective tube; $T_{max} = 1100\text{ °C}$ Length L = 530 mm Order No. 7MC5000-8AJ</p>
 <p>Type FT A 223 knife-edge temperature sensor for measurements in soft metals; $T_{max} = 500\text{ °C}$ Length L = 50 mm Order No. 7MC5000-8AE Length L = 100 mm Order No. 7MC5000-8AF</p>	 <p>Type FT A 431-L jacket thermocouple for temperature measurements of air in liquids; cable length 2 m; $T_{max} = 800\text{ °C}$ Length L = 100 mm Order No. 7MC5000-8AK Length L = 200 mm Order No. 7MC5000-8AL Length L = 300 mm Order No. 7MC5000-8AM</p>
 <p>Type FT A 227 special air temperature sensor, also suitable for temperature measurements in liquids; $T_{max} = 500\text{ °C}$ Length L = 50 mm Order No. 7MC5000-8AG</p>	 <p>Type FT A 432-L jacket thermocouple for temperature measurements of air in liquids; cable length 2 m; $T_{max} = 110\text{ °C}$ Length L = 100 mm Order No. 7MC5000-8AN Length L = 200 mm Order No. 7MC5000-8AP Length L = 500 mm Order No. 7MC5000-8AQ</p>

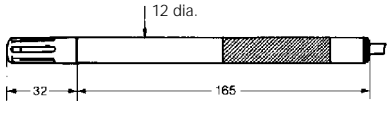

Temperature and climate measuring instruments

Sensors for climate meters



Temperature sensor with Pt 100 resistance thermometers to DIN IEC 751, Class B

 <p>Type FP A405 rigid temperature sensor without handle, for temperature measurements of air in liquids; $T_{\max} = 200\text{ °C}$ Length L = 100 mm Order No. 7MC5001-8AA</p>	 <p>Type FP A206 1 temperature sensor with handle, for measurements of air in liquids; $T_{\max} = 300\text{ °C}$ Length L = 100 mm Order No. 7MC5001-8AB</p>
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Combined humidity/temperature sensor

 <p>Type FH 646 sensor for humidity, temperature, dew point and mixing ratio with capacitive sensor (resistant to condensation) with NTC sensor; can be connect to a socket $T_{\max} = 80\text{ °C}$</p> <table border="1"> <thead> <tr> <th>Measuring range</th> <th>Error limits</th> </tr> </thead> <tbody> <tr> <td>Humidity 5 to 98 %</td> <td>< 2 %</td> </tr> <tr> <td>Temperature -20 to 80 °C</td> <td>0.2 °C</td> </tr> </tbody> </table> <p>Length L = 165 mm Order No. 7MC5002-8AA</p>	Measuring range	Error limits	Humidity 5 to 98 %	< 2 %	Temperature -20 to 80 °C	0.2 °C	 <p>Type FNA 846 sensor for relative humidity temperature, dew point, mixing ratio and partial pressure, with 2 NTC sensors; error limits 1 % relative humidity;</p> <p>Order No. 7MC5002-8AB</p>
Measuring range	Error limits						
Humidity 5 to 98 %	< 2 %						
Temperature -20 to 80 °C	0.2 °C						

Air velocity sensor (vane wheels)

 <p>Type FVA 915 S1 xx standard vane for measurement of air velocity; generation of mean value over time and number of measurements; $T_{\max} = -30\text{ to }+140\text{ °C}$</p> <p>Measuring range 0.3 to 20 m/s (S 120) Order No. 7MC5003-8AA Measuring range 0.4 to 40 m/s (S 140) Order No. 7MC5003-8AB</p>	 <p>Type A915 S2 xx mini vane measurement of air velocity; generation of mean value over time and number of measurements; $T_{\max} = -30\text{ to }+140\text{ °C}$</p> <p>Measuring range 0.5 to 20 m/s (S 220) Order No. 7MC5003-8AC Measuring range 0.6 to 40 m/s (S 240) Order No. 7MC5003-8AD</p>
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Infrared detector

	<p>Type MR 7841 10 infrared sensor with chopper for temperature measurement of objects</p> <table border="1"> <tbody> <tr> <td>Measuring range</td> <td>-18 to +260 °C</td> </tr> <tr> <td>Emission</td> <td>0.95</td> </tr> <tr> <td>Spectral sensitivity</td> <td>8 to 14</td> </tr> <tr> <td>Error limits</td> <td>1.5 %</td> </tr> <tr> <td>Emission setting</td> <td>0.1 to 1</td> </tr> </tbody> </table> <p>Order No. 7MC5004-8AA</p>	Measuring range	-18 to +260 °C	Emission	0.95	Spectral sensitivity	8 to 14	Error limits	1.5 %	Emission setting	0.1 to 1
Measuring range	-18 to +260 °C										
Emission	0.95										
Spectral sensitivity	8 to 14										
Error limits	1.5 %										
Emission setting	0.1 to 1										

