BENNING
World Class Test Equipment

2009/2010

IEC/EN 61243-3
DIN VDE 0682-401
voltage class B

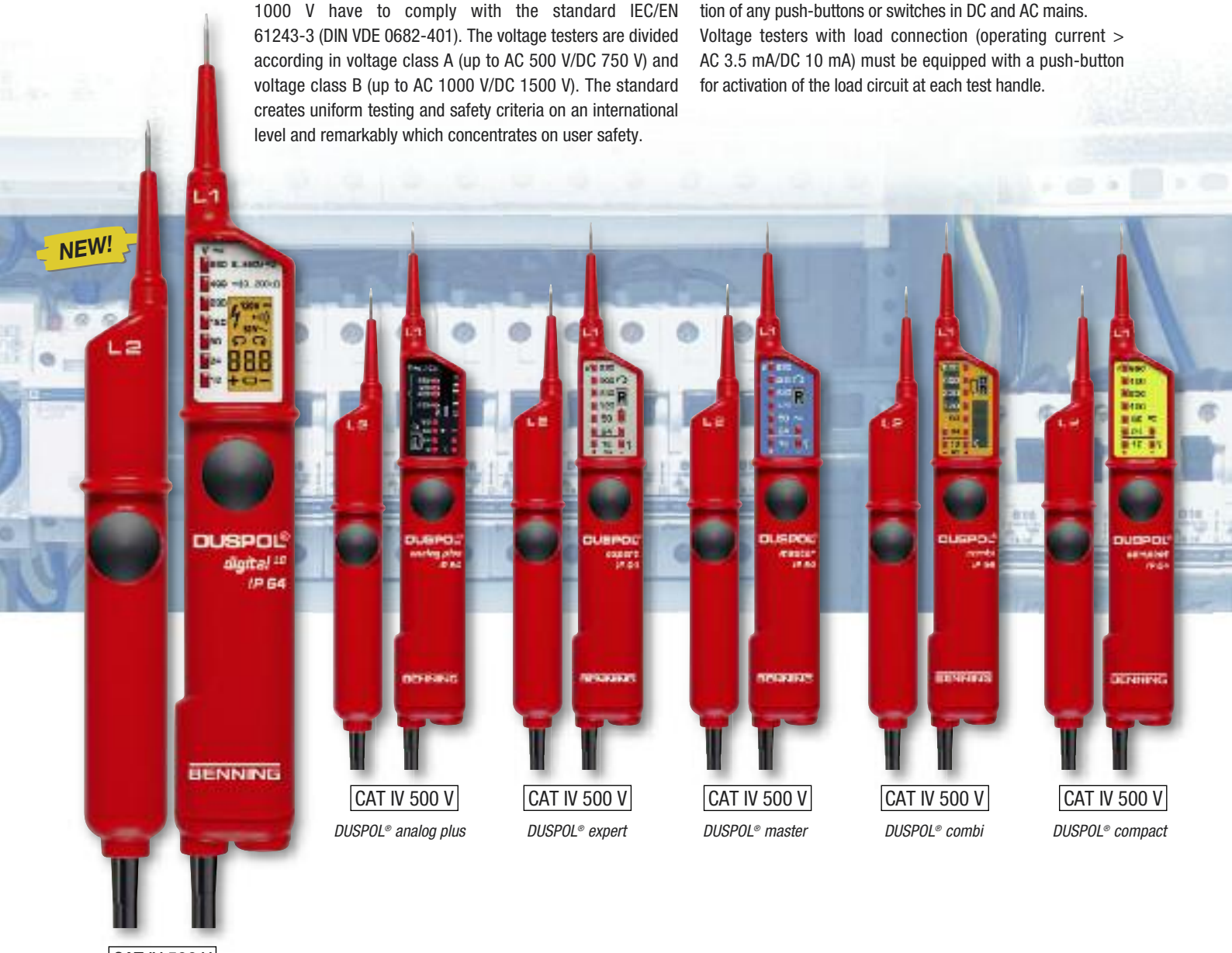
Testing, Measuring and Safety Instruments

Top-class test equipment
DUSPOL® voltage testers – the testers with the VDE mark of conformity

The international standard for voltage testers IEC/EN 61243-3 (DIN VDE 0682-401) increases safety for work under voltage.

Your work as an expert requires safe testing. Therefore, you should not make any compromises concerning safety! Voltage testers which are used on electrical systems of up to 1000 V have to comply with the standard IEC/EN 61243-3 (DIN VDE 0682-401). The voltage testers are divided according in voltage class A (up to AC 500 V/DC 750 V) and voltage class B (up to AC 1000 V/DC 1500 V). The standard creates uniform testing and safety criteria on an international level and remarkably which concentrates on user safety.

An essential safety aspect of the standard is that voltage testers must allow a direct indication of the voltage status "presence of voltage" or "absence of voltage" without actuation of any push-buttons or switches in DC and AC mains.
Voltage testers with load connection (operating current > AC 3.5 mA/DC 10 mA) must be equipped with a push-button for activation of the load circuit at each test handle.



CAT IV 500 V
DUSPOL® digital LC

CAT IV 500 V
DUSPOL® analog plus

CAT IV 500 V
DUSPOL® expert

CAT IV 500 V
DUSPOL® master

CAT IV 500 V
DUSPOL® combi

CAT IV 500 V
DUSPOL® compact

All *DUSPOL®* voltage testers are equipped with a direct display system without loading the test point. In case of need, a load circuit can be connected via a push-button which suppresses inductive and capacitive reactive voltages. Thus, it is possible to clearly distinguish between high-energy and low-energy electric circuits.

A vibrating motor can be activated additionally. The vibrating power of this motor increases proportionally to the applied voltage. This is an additional indication of voltage being applied.

The *DUSPOL®* voltage testers underlines once again the BENNING expertise in the field of testing, measuring and safety technology. With a *DUSPOL®* voltage tester you acquire an innovative product which has been tested and approved by the independent VDE Test and Certification Institute.

The test equipment *DUSPOL®* voltage testers

Product safety on the highest level:

- direct displaying without pressing a push-button (high-impedance test)
- load connection via push-buttons (low-impedance test)
- continuity check via buzzer and LED or LCD respectively
- vibrating alert in the test handle
- measuring point illumination

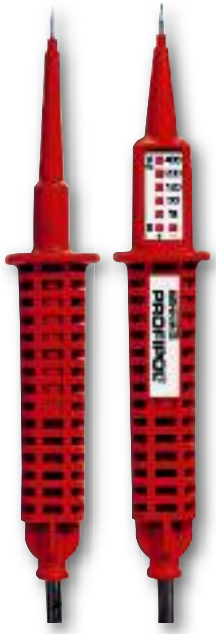
Top-class test equipment
DUSPOL® digital LC, for highest precision

Top-class test equipment
DUSPOL® voltage testers

- tested and approved according to the international standard IEC/EN 61243-3 (DIN VDE 0682-401), voltage class B
- high-impedance voltage test without actuating a push-button
- connectable load circuit, no measuring errors due to irritating capacitive and inductive voltages by means of intended load connection via push buttons
- intended release of a 30 mA FI safety switch
- acoustic continuity check via buzzer and LED/LCD
- phase-sequence indication with arrows „↻,↺“
- safe single-pole phase test
- precise illumination of the measuring point
- shock-resistant, dust-proof and splash-proof housing (protection class IP 64)
- automatically background lighting via light sensor

Voltage and Continuity Tester

	DUSPOL® digital LC	*DUSPOL® analog plus*	*DUSPOL® expert*	*DUSPOL® master*	*DUSPOL® combi*	*DUSPOL® compact*	*PROFIPOL®*
indication	LED/LCD	plunger system/LED	LED/LCD	LED/LCD	LED/LCD	LED	LED
indication steps	6 - 750 V	12 - 690 V	12 - 690 V	12 - 690 V	12 - 690 V	12 - 690 V	6 - 400 V
continuity test	buzzer + LCD 200 kΩ	–	buzzer + LED 108 kΩ	–	LCD 600 kΩ	–	–
phase-sequence test	yes/LCD	yes/LCD	yes/LCD	yes/LCD	–	–	–
single-pole phase test	yes/LCD	yes/LCD	yes/LCD	yes/LCD	yes/LCD	–	–
polarity test	yes/LCD	yes/LED	yes/LED	yes/LED	yes/LED	yes/LED	yes/LED
load connection via push buttons	I_S = 200 mA (750 V_{DC})	I_S = 250 mA (750 V_{DC})	I_S = 200 mA (750 V_{DC})	I_S = 200 mA (750 V_{DC})	I_S = 200 mA (750 V_{DC})	I_S = 200 mA (750 V_{DC})	–
30 mA FI triggering via push button	yes	yes	yes	yes	yes	yes	–
vibrating alarm	yes	yes	yes	yes	yes	–	–
measuring point illumination	yes/LED	–	yes/LED	–	–	–	–
protection class	IP 64	IP 64	IP 64	IP 64	IP 64	IP 64	IP 65
item no.	050258	050257	050253	050252	050254	050251	020022



PROFIPOL®

Digital Multimeter BENNING MM P3, MM 1-1 – MM 1-3, MM 1 – MM 4
reliable and precise in each and every situation

MM P3

BENNING MM P3
Pocket-Size Digital Multimeter

- top-class functionality and design
- even smaller and narrower with lower weight (only 130 g)
- minimum dimensions: 132 x 86 x 19 mm
- for all-purpose use with leather case and measuring leads

BENNING MM 1-1, MM 1-2 and *MM 1-3*
Digital Multimeters with Volt Sensor Function

- the integrated Volt sensor signalises phase voltages by means of an acoustic signal and a red LED signal
- it localizes cable breaks and defective lamps in exposed cables (cable reel, light chains) via the feeding side of the phase

MM 1

MM 2

MM 3

MM 1-1

MM 1-2

MM 1-3

tested and approved

IEC/EN 61010-1
(DIN VDE 0411-1)

BENNING MM 1, MM 2, MM 3 and *MM 4*
Digital Multimeter
Technology that inspires, Quality that convinces

Million fold proven as well as tested and approved by the independent VDE Test and Certification Institute according to current international standards.

- basic measuring for current, voltage, resistance, continuity, diode, capacity and frequency
- automatic and/or manual measuring range selection
- safe current measuring up to 300 A AC via attachable current clamp adapter (*MM 4*)

MM 4

Digital Multimeter

	BENNING MM P3	*BENNING MM 1-1*	*BENNING MM 1-2*	*BENNING MM 1-3*	*BENNING MM 1*	*BENNING MM 2*	*BENNING MM 3*
indicating range	5000	2000	2000	2000	3200	2000	2000
basic accuracy	0.6 %	0.5 %	0.5 %	0.5 %	0.5 %	0.5 %	0.5 %
AC voltage	0.1 mV - 600 V	0.1 mV - 750 V	0.1 mV - 750 V	0.1 mV - 750 V	1 mV - 600 V	0.1 mV - 750 V	0.1 mV - 600 V
DC voltage	0.1 mV - 600 V	0.1 mV - 1000 V	0.1 mV - 1000 V	0.1 mV - 1000 V	0.1 mV - 600 V	0.1 mV - 1000 V	0.1 mV - 600 V
AC current	–	–	1 mA - 10 A	1 mA - 10 A	–	0.1 µA - 20 A	0.1 µA - 20 A
DC current	–	–	1 mA - 10 A	1 mA - 10 A	0.1 µA - 3.2 mA	0.1 µA - 20 A	0.1 µA - 20 A
resistance	0.1 Ω - 40 MΩ	0.1 Ω - 20 MΩ	0.1 Ω - 20 MΩ	0.1 Ω - 20 MΩ	0.1 Ω - 32 MΩ	0.1 Ω - 20 MΩ	0.1 Ω - 20 MΩ
continuity/diode	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes
frequency	1 mHz - 5 MHz	–	1 Hz - 20 MHz	1 Hz - 20 MHz	–	–	1 Hz - 200 kHz
capacity	10 pF - 100 µF	–	1 pF - 2 mF	1 pF - 2 mF	–	–	1 pF - 200 µF
temperature	–	–	–	-20 °C up to +800 °C	–	–	–
volt sensor	–	yes	yes	yes	–	–	–
interface	–	–	–	–	–	–	–
software	–	–	–	–	–	–	–
memory	HOLD	HOLD	HOLD, MAX/MIN	HOLD, MAX/MIN	HOLD	–	–
Data Log function	–	–	–	–	–	–	–
measuring method	RMS	RMS	RMS	RMS	RMS	RMS	RMS
measuring category	CAT III 300 V	CAT III 600 V	CAT III 600 V	CAT III 600 V	CAT III 600 V	CAT III 600 V	CAT III 300 V
item no.	044084	044081	044082	044083	044027	044028	044029

Digital Multimeter BENNING MM 7 – MM 11
safety and functional diversity without any compromises

BENNING MM 7-1
Digital Multimeter offering highest safety for industrial applications

- TRUE RMS measuring method for precise measuring results even for non-sinusoidal signal characteristics
- highest measuring category CAT IV 600 V for highest safety
- AutoV function for automatic AC/DC voltage detection and low input impedance (LoZ) to suppress capacitively/inductively induced voltages
- integrated Volt sensor for non-contact signalling of phase voltages and cable breaks in lines
- LC display with bargraph indication and background lighting

BENNING MM 8, MM 9, MM 10
Digital Multimeter of the highest measuring category CAT IV

NEW!

- highest measuring category CAT IV 600 V allows measurements direct at the source of the low-voltage installation
- precise due to TRUE RMS measuring method
- transmitting measuring results via optical USB interface
- delivery including software *BENNING PC-Win MM 10*

volt sensor

CAT IV 600 V

TRUE RMS

MM 7-1
(available as of 2010)
MM 7 fig. similar

BENNING MM 11
Precision Digital Multimeter with extraordinary features of performance

- highest measuring accuracy of 0.06 % due to TRUE RMS measuring method and 20000 digit resolution
- an ideal measuring device for recording of measuring processes
- large memory capacity of 1000 storage locations and 40000 storage locations for Data Log functions
- transmitting measuring results via optical USB interface
- delivery including software *BENNING PC-Win MM 11*

USB

TRUE RMS

MM 11

USB

CAT IV 600 V
MM 8

CAT IV 600 V
TRUE RMS
MM 9

CAT IV 600 V
TRUE RMS
MM 10

Software ***PC-Win MM 10/MM 11***

tested and approved

IEC/EN 61010-1
(DIN VDE 0411-1)

BENNING PC-Win MM 10/MM 11
Software for logging and analysis

- software for reading and logging of measurement series
- visualisation of measurement series via line diagram and table
- scanning rate variable from 0.5 sec. up to 10 min.
- storage of measurement series as text file

Digital Multimeter

	BENNING MM 4	*BENNING MM 7*	*BENNING MM 7-1*	*BENNING MM 8*	*BENNING MM 9*	*BENNING MM 10*	*BENNING MM 11*
indicating range	4200	4000	6000	6000	6000	6000	20000
basic accuracy	0.5 %	0.25 %	0.08 %	0.5 %	0.5 %	0.5 %	0.06 %
AC voltage	1 mV - 600 V	1 mV - 750 V	0.1 mV - 1000 V	0.1 mV - 750 V	0.1 mV - 750 V	0.1 mV - 750 V	1 µV - 750 V
DC voltage	1 mV - 600 V	0.1 mV - 1000 V	10 µV - 1000 V	0.1 mV - 1000 V	0.1 mV - 1000 V	0.1 mV - 1000 V	1 µV - 1000 V
AC current	0.1 A - 300 A	10 µA - 10 A	10 µA - 10 A	–	1 mA - 10 A	1 mA - 10 A	1 µA - 10 A
DC current	–	10 µA - 10 A	10 µA - 10 A	0.1 µA - 6 mA	0.1 µA - 10 A	0.1 µA - 10 A	1 µA - 10 A
resistance	0.1 Ω - 42 MΩ	0.1 Ω - 40 MΩ	0.1 Ω - 40 MΩ	0.1 Ω - 60 MΩ	0.1 Ω - 60 MΩ	0.1 Ω - 60 MΩ	10 mΩ - 2 GΩ
continuity/diode	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes
frequency	–	1 Hz - 40 MHz	0.1 Hz - 100 kHz	1 Hz - 60 MHz	1 Hz - 60 MHz	1 Hz - 60 MHz	0.01 Hz - 1 MHz
capacity	–	1 pF - 40 mF	1 nF - 10 mF	1 pF - 6 mF	1 pF - 6 mF	1 pF - 6 mF	1 pF - 40 mF
temperature	–	-20 °C up to +800 °C	-40 °C up to +400 °C	–	–	–	-200 °C up to +1200 °C
volt sensor	–	–	yes	–	–	–	–
interface	–	–	–	–	–	USB	USB
software	–	–	–	–	–	*PC-Win MM 10*	*PC-Win MM 11*
memory	HOLD	HOLD, MAX/MIN	HOLD, MAX/MIN	HOLD, MAX/MIN	HOLD, MAX/MIN	HOLD, MAX/MIN	1000 memory locations
Data Log function	–	–	–	–	–	–	40000 memory locations
measuring method	RMS	TRUE RMS	TRUE RMS	RMS	TRUE RMS	TRUE RMS	TRUE RMS
measuring category	CAT III 300 V	CAT III 600 V	CAT IV 600 V	CAT IV 600 V	CAT IV 600 V	CAT IV 600 V	CAT III 600 V
item no.	044073	044076	044085	044077	044078	044079	044080

All Digital Multimeters including protective case, safety leads and battery set.

Digital Current Clamp Multimeter
BENNING CM 1-1 – CM 1-3, CM 2, CM 3, CC 1, CC 2

BENNING CM 1-1, CM 1-2 and *CM 1-3*
Digital Current Clamp Multimeter for AC current
Innovative technology, practical design

- safe current measuring up to 400 A AC
- measuring inputs for voltage, resistance, continuity and diode test
- integrated volt sensor signalises phase voltages by means of an acoustic signal and a red LED signal (*CM 1-3*)
- it localizes cable breaks and defective lamps in exposed cables (cable reel, light chains) via the feeding side of the phase (*CM 1-3*)

BENNING CM 2 and *CM 3*
Digital Current Clamp Multimeter for AC/DC current

- safe and non-contact measuring of high currents
- DC and AC current measuring up to 600 A AC/DC
- measurement of low currents (automotive, photovoltaics, industry) (*CM 2*)
- measuring inputs for voltage, resistance and continuity test (*CM 2*)

CM 1-1 *CM 1-2* *CM 1-3*

Our best seller!

CM 2 *CM 3*

BENNING CC 1 and *CC 2*
Current Clamp Adapter for Multimeter

- safe AC current measuring up to 200 A/400 A
- connection via 4 mm safety measuring leads
- output: 1 mV AC/1 A AC (*CC 1*), 1 mA AC/1 A AC (*CC 2*)

CC 1 *CC 2*

tested and approved

IEC/EN 61010-1
(DIN VDE 0411-1)

Digital Current Clamp Multimeter/Current Clamp Adapter

	BENNING CC 1	*BENNING CC 2*	*BENNING CM 1-1*	*BENNING CM 1-2*	*BENNING CM 1-3*	*BENNING CM 2*	*BENNING CM 3*
indicating range	–	–	2000	2000	2000	4000	2000
basic accuracy	1.9 %	1 % - 3 %	2 %	1 %	1 %	0.5 %	1.9 %
AC voltage	–	–	–	0.1 V - 600 V	0.1 V - 750 V	0.1 mV - 600 V	–
DC voltage	–	–	–	0.1 V - 600 V	0.1 V - 1000 V	0.1 mV - 600 V	–
AC current	1 A - 400 A	0.5 A - 200 A	10 mA - 400 A	0.1 A - 400 A	0.1 A - 200 A	10 mA - 300 A	0.1 A - 600 A
DC current	–	–	–	–	–	10 mA - 300 A	0.1 A - 600 A
resistance	–	–	–	0.1 Ω - 20 MΩ	0.1 Ω - 20 MΩ	0.1 Ω - 40 MΩ	–
continuity/diode	–/–	–/–	–/–	yes/–	yes/yes	yes/–	–/–
frequency	–	–	–	–	–	–	–
effective power	–	–	–	–	–	–	–
power factor (cos φ)	–	–	–	–	–	–	–
temperature	–	–	–	–	–	–	
volt sensor	–	–	–	–	yes	–	–
memory	–	–	HOLD, MAX	HOLD	HOLD	HOLD, MAX	HOLD
measuring method	–	–	RMS	RMS	RMS	RMS	RMS
max. clamp opening	30 mm	21 mm	30 mm	30 mm	16 mm	25 mm	38 mm
measuring category	CAT III 300 V	CAT III 600 V	CAT III 600 V	CAT III 600 V	CAT IV 600 V	CAT III 300 V	CAT III 300 V
item no.	044037	044110	044061	044062	044063	044035	044031

Digital Current Clamp Multimeter

BENNING CM 4 – CM 9

BENNING CM 4 – CM 7

Digital Current Clamp Multimeter of the highest measuring category

- precise due to TRUE RMS measuring method
- safe current measuring up to 1000 A AC/DC
- highest measuring category CAT IV 600 V offering optimum safety

TRUE RMS

CM 5
(CM 4 fig. similar)

CAT IV 600 V
TRUE RMS

CM 7
(CM 6 fig. similar)

CAT IV 600 V
TRUE RMS

CM 5-1
(available as of 11/2009)

NEW! AUTOTEST-function

BENNING CM 8

Power Current-Clamp Multimeter
Power analysis for single-phase and three-phase mains

- TRUE-RMS measurements up to 1000 V, 600 A AC/DC
- effective power measurements up to 600 kW
- calculation of the power factor cos φ
- indication of the load type (inductive, capacitive)
- bipolar phase sequence test in three-phase mains
- measuring inputs for voltage, resistance, continuity, diode, frequency and temperature
- measurement of inrush currents (motors etc.)

TRUE RMS

CM 8

BENNING CM 9

Leakage Current Clamp with a Resolution of 1 µA
The alternative solution for insulation measurements

- measurement of leakage currents and differential currents in electrical systems (VDE 0100) and devices (VDE 0701-0702, BGV A3, BetrSichV (= German Health and Safety at Work Regulations))
- highest resolution of 1 µA in the 6 mA measuring range
- measurement without switch-off during normal operation of the system/device, the perfect solution for preventive maintenance
- precise and reproducible measuring results up to 100 A
- optimum screening against external magnetic fields

Leakage

CM 9

BENNING CM 5-1

Digital Current-Clamp Multimeter

- automatic selection of the correct measuring function for TRUE RMS voltage/current (AC/DC), resistance, continuity and diode test
- safe and easy operation – measuring errors due to incorrect measuring range selection are excluded
- short response time due to 5 scanning values per second
- voltage measurement with low input impedance (LoZ) to suppress capacitively/inductively induced voltages

Digital Current Clamp Multimeter

	BENNING CM 4	*BENNING CM 5*	*BENNING CM 5-1*	*BENNING CM 6*	*BENNING CM 7*	*BENNING CM 8*	*BENNING CM 9*
indicating range	4000	4000	9999	4000	4000	6000	6000
basic accuracy	0.7 %	0.7 %	0.9 %	0.7 %	0.7 %	0.7 %	1 %
AC voltage	0.1 V - 600 V	0.1 V - 600 V	1.3 mV -750 V	0.1 V - 750 V	0.1 V - 750 V	10 mV - 1000 V	–
DC voltage	0.1 V - 600 V	0.1 V - 600 V	0.7 V - 1000 V	0.1 V - 1000 V	0.1 V - 1000 V	10 mV - 1000 V	–
AC current	0.1 A - 600 A	0.1 A - 600 A	0.9 A - 600 A	0.1 A - 1000 A	0.1 A - 1000 A	0.1 A - 600 A	1 µA - 100 A
DC current	–	0.1 A - 600 A	0.9 A - 600 A	–	0.1 A - 1000 A	0.1 A - 600 A	–
resistance	0.1 Ω - 400 Ω	0.1 Ω - 400 Ω	0.1 Ω - 10 kΩ	0.1 Ω - 400 Ω	0.1 Ω - 400 Ω	0.1 Ω - 20 kΩ	–
continuity/diode	yes/–	yes/–	yes/yes	yes/–	yes/–	yes/yes	–/–
frequency	1 Hz - 400 Hz	1 Hz - 400 Hz	–	1 Hz - 400 Hz	1 Hz - 400 Hz	0.1 Hz - 4 kHz	–
effective power	–	–	–	–	–	1 W - 600 kW	–
power factor (cos φ)	–	–	–	–	–	± 0.00 - 1.00	–
temperature	–	–	–	–	–	-50 °C up to +1000 °C	–
volt sensor	–	–	–	–	–	–	–
memory	HOLD, MAX/MIN PEAK	HOLD, MAX/MIN PEAK, ZERO	HOLD	HOLD, MAX/MIN PEAK	HOLD, MAX/MIN PEAK, ZERO	HOLD, MAX/MIN PEAK, INRUSH	HOLD, PEAK
measuring method	RMS	TRUE RMS	TRUE RMS	RMS	TRUE RMS	TRUE RMS	RMS
max. clamp opening	37 mm	45 mm	35 mm	53 mm	53 mm	40 mm	40 mm
measuring category	CAT III 600 V	CAT III 600 V	CAT IV 600 V	CAT IV 600 V	CAT IV 600 V	CAT III 600 V	CAT III 300 V
item no.	044056	044057	044066	044058	044059	044064	044065

tested and approved

IEC/EN 61010-1
(DIN VDE 0411-1)

All Digital Current Clamps Including protective case, Safety measuring leads and battery set.

BENNING ST 710 Appliance Tester (VDE 0701-0702)
mobile and network-independent testing of electrical appliances

BENNING ST 710 also available with plug type E („French" system)

BENNING ST 710
Battery-operated Appliance Tester for mobile testing of electrical devices

- testing in compliance with DIN VDE 1-0702, BGV A3, BetrSichV (German Health and Safety at Work Regulations), ÖVE/ÖNORM E 8701, NEN 3140
- easy - operation by means of three keys
- quick - complete testing within 10 seconds
- mobile - testing can be made network-independently

Application:
Safety-related testing of electrical devices/work equipment such as e.g. electric tools, motorized equipment, lamps, extension cables, household appliances, electrical office machines, consumer electronics and information technology.

Features:
- automatic testing procedure for devices of class I (key 1), class II/III (key 2) and line test (key 3)
- testing of cable reels, multiple distributors and device connecting cables with rubber connector
- measuring result with "pass/fail" information
- limiting values preset in compliance with DIN VDE standard
- indication of correct function key in case of incorrect operation and if the test sample is not switched on
- sufficient battery capacity (4 x 1.5 V, mignon, AA, IEC LR6) for 2500 test samples
- three-phase test objects can be tested by means of optional measuring adapter

Measuring functions:
- protective conductor resistance with a testing current of 200 mA DC and automatic polarity reversal
- insulating resistance with a testing voltage of 500 V DC
- protective conductor current and contact current by means of alternative leakage current measurement method
- voltage measurement on external shock-proof socket (L-N, L-PE, N-PE)

ST 710

test badges

16 A /32 A CEE coupling onto shock-proof plug for ST 710/ST 750

shock-proof plug onto shock-proof coupling for CM 9

16 A/32 A CEE coupling onto CEE plug for CM 9

CM 9

Scope of delivery BENNING ST 710

BENNING ST 710
Battery-operated Appliance Tester

	BENNING ST 710
indicating range	graphic display
protective conductor resistance	0.01 Ω - 20 Ω
insulation resistance	0.01 MΩ - 20 MΩ
protective conductor current/ contact current by means of alternative leakage current measurement method	0.01 mA - 20 mA
line test	R_{PE}, R_{ISO}, short-circuit test and continuity test of phase conductor (L) and neutral conductor (N)
voltage	50 V - 270 V
scope of delivery	carrying case, test cable with alligator clip, appliance cable, battery set
item no.	050308

Optional accessories for *BENNING ST 710/ST 750*

test badges „next test" (300 pieces) **item no. 756212**

measuring adapter for three-phase loads
for measurement of R_{PE}, R_{ISO} and I_{EA}
16 A CEE coupling - shock-proof plug **item no. 044122**
32 A CEE coupling - shock-proof plug **item no. 044123**

Leakage Current Clamp *BENNING CM 9* for the measurement of differential current, protective conductor current and load current of single-phase and three-phase loads (see page 7) **item no. 044065**

measuring adapter for leakage current clamp *BENNING CM 9*
single-phase, conductors led through individually and with double insulation
shock-proof plug/shock-proof coupling **item no. 044131**
three-phase, conductors led through individually and with double insulation
16 A CEE coupling - CEE plug **item no. 044127**
32 A CEE coupling - CEE plug **item no. 044128**

BENNING ST 750 Appliance Tester (VDE 0701-0702, VDE 0751)
testing of electrical appliances and medical electrical devices

BENNING ST 750
Appliance Tester for testing electrical appliances and medical electrical devices

- testing according to
  - **DIN VDE 0701-0702:** testing of electrical appliances/equipment
  - **DIN VDE 0751 (EN 62353):** testing of medical electrical devices, such as hospital bed
  - **BGV A3, BetrSichV (German Health and Safety at Work Regulation), ÖVE/ÖNORM E 8701** and **NEN 3140**
- innovative - indication and operation via colour LCD touchscreen
- powerful - 2 GB memory card for more than 100000 tests
- all in one - one appliance tester for all tests according to VDE 0701-702 and VDE 0751

Features:

- automatic and auto-configurable testing procedures
- complete test sample/customer database can be stored on SD card and thus is directly available at the place of inspection
- management of large test sample inventories with more than 100000 storable device tests per 2 GB SD card
- direct test sample/customer entry via touchscreen keypad
- measuring result with “pass/fail” indication and acoustic warning signal, if the test has been failed
- help function and schematic connecting diagrams
- separate 4 mm test sockets and IEC connector
- 2 x USB interface for external keyboard, printer and USB stick
- 1 x RS 232 interface for barcode scanner/RFID reader/writer and SD card slot
- software update possible via SD card/USB stick

Measuring functions:

- protective conductor resistance with 200 mA DC and a testing current of 10 A AC
- insulating resistance with a testing voltage of 50 V to 500 V (adjustable)
- protective conductor current/contact current via differential current measurement method, alternative leakage current measurement method or direct measurement
- functional test with indication of leakage current, mains voltage, load current, effective power, apparent power and measuring time
- testing of device connecting cables and extension cables
- additionally for VDE 0751: device leakage current, leakage current of application part type B, type BF and type CF

BENNING PC-Win ST 750 Software

- professional PC software for the management and documentation of recorded measuring values
- import and export function of existing test sample and customer databases via MS Excel®

Barcode scanner/labels and RFID reader/writer or transponder

- easy and quick test sample identification by means of barcode scanner and RFID technology
- RFID technology stores the test sample data and measuring values directly onto a memory chip (transponder) on the test sample
- particularly suited for repetitive testing and management of large test sample inventories

ST 750
(available as of 2010)

BENNING ST 750
Appliance Tester (VDE 0701-0702, VDE 0751)

	BENNING ST 750
display	5.7“ colour LCD touchscreen, ¼ VGA
protective conductor resistance	1 mΩ - 20 Ω
insulation reistance	0.01 MΩ - 300 MΩ
protective conductor current/ contact current via differential current measurement method, alternative leakage current measurement method or direct measurement	1 µA - 20 mA
line test	R_{PE}, R_{ISO}, short-circuit test and continuity test of phase conductor (L) and neutral conductor (N)
voltage/current	0.1 V - 300 V/0.01 A - 16 A
effective power/apparent power	1 W - 4000 W
interface	2 x USB, 1 x RS 232
dimensions/weight	405 x 330 x 165 mm/approx. 6 kg
scope of delivery	tester in a waterproof (IP 67) and break-proof case, test cable with alligator clip, appliance cable, 2 GB SD card
item no.	050310

***BENNING ST 750* Set**	**item no. 050311**
• Appliance Tester ***BENNING ST 750***	**item no. 050310**
• software ***BENNING PC-Win ST 750***	**item no. 047001**
• barcode scanner	**item no. 090369**
• barcode labels (1000 pieces)	**item no. 756301**
• test badges „next test“ (300 pieces) (see page 8)	**item no. 756212**

software PC-Win ST 750

Optional accessories for *BENNING ST 750*

PC-software ***BENNING PC-Win ST 750***		**item no. 047001**
barcode scanner		**item no. 090369**
barcode labels with consecutive numeric representation 1000 pieces		**item no. 756301**
RFID reader/writer		**item no. 009370**
RFID transponder	on request	**item no. 044137**

See page 8 for further accessories

barcode scanner

barcode label

Safety Instruments BENNING IT 101, IT 110 and IT 120
Testing of electrical systems in compliance with the standards

BENNING IT 101
Insulation and Resistance Measuring Device

- measurement of insulating resistance and calculation of the resulting leakage current
- testing voltages of 50 V, 100 V, 250 V, 500 V and 1000 V
- selectable limiting values for ISO measurement, green LED for "PASS", red LED for testing voltage/external voltage
- resistance measurement with a testing current of 200 mA for testing protective conductor connections
- measurement of polarization index (PI) and dielectric absorption rate (DAR)
- switchable probe tip for triggering the measuring process
- internal memory for 100 measuring values per measuring function
- TRUE RMS voltage measurement with low-pass filter
- including case, switchable probe tip, silicone measuring lines, magnetic hook, alligator clips, rubber protective frame and batteries

BENNING IT 110, BENNING IT 120
Installation Testers
For safety tests on electrical systems according to DIN VDE 0100 and IEC 60364

Multifunctional installation testers for complete testing and efficient troubleshooting of electrical systems

- measurement of the protective conductor line and of the equipotential bonding line with a testing current of 200 mA
- measurement of the insulation resistance with testing voltages of 100 V, 250 V, 500 V and 1000 V
- line impedance and loop impedance measurement (optional without tripping of the RCD) with calculation of the short-circuit current (PFC/PSC)
- complete testing of the residual-current-operated device (RCD)
- measurement of contact voltage (without tripping), tripping time and tripping current (ramp test) of residual current operated device (RCD)
- phase-sequence testing in three-phase mains
- voltage measurement up to 500 V and online voltage monitoring

CAT IV 600 V
TRUE RMS

IT 101

IT 110

Scope of delivery BENNING IT 101

BENNING IT 101
Insulation and Resistance Measuring Device

	BENNING IT 101
indicating range	4000 digits (illumination)
low-impedance resistance	0.01 Ω - 40 Ω
insulation resistance	1 kΩ - 20 GΩ
resistance	0.01 Ω - 40 kΩ
voltage	0.1 V - 600 V AC/DC TRUE RMS
supplementary function	leakage current, polarization index (PI), dielectric absorption rate (DAR), automatic discharge function, null balance of the measuring lines
measured value memory	500 measuring results
measuring category	CAT IV 600 V
item no.	044033

BENNING IT 110
Installation Tester

	BENNING IT 110
display	graphic display (illuminated)
low-impedance resistance	0.01 Ω - 2000 Ω
insulation resistance	1 kΩ - 1000 MΩ
line impedance (L-N/L)	0.01 Ω - 2000 Ω
loop impedance (L-PE)	0.01 Ω - 2000 Ω
short-circuit current	0.01 A - 24.4 kA
RCD testing	tripping time, tripping current, contact voltage
phase sequence	yes
voltage, frequency	1 V - 500 V, 45 Hz - 65 Hz
item no.	044100

BENNING IT 110, IT 120 Installation Testers
The perfect solution for efficient testing

Features
BENNING IT 110, BENNING IT 120

- all measuring functions can be selected directly by means of a rotary switch
- switchable probe tip for releasing the measuring process
- graphic display and help function with connecting diagram
- complete measuring result with measuring parameters, limiting value and symbols for PASS/FAIL
- current supply by means of 6 NiMH storage batteries (AA) with charger

Additional functions
BENNING IT 120

in addition to the *BENNING IT 110*:

- current measurement (TRUE RMS) by means of current clamp adapter (optional)
- illumination measurement by means of lux sensor (optional)
- earthing measurement by means of three-wire measuring method (optionally with earthing set)
- integrated measured value memory for 500 measurements
- USB and RS 232 interface
- *BENNING PC-Win IT 120* software included in delivery

Logging software with Test Log according to ZVEH
BENNING PC-Win IT 120

- PC software for reading the stored test data
- creation of test logs with handover and status report according to ZVEH
- structuring and export function of the test data

NEW! Test log according to ZVEH

Scope of delivery of the BENNING IT 120

IT 120

BENNING CC 2

BENNING luxmeter type B/type C

BENNING IT 120 Installation Testers

	BENNING IT 120
display	graphic display (illuminated)
low-impedance measurement	0.01 Ω - 2000 Ω
insulation resistance	1 kΩ - 1000 MΩ
line impedance (L-N/L)	0.01 Ω - 2000 Ω
loop impedance (L-PE)	0.01 Ω - 2000 Ω
short-circuit current	0.01 A - 24.4 kA
RCD testing	tripping time, tripping current, contact voltage
phase sequence	yes
voltage, frequency	1 V - 500 V, 45 Hz - 65 Hz
earth resistance	0.01 Ω - 2000 Ω
current (TRUE RMS)	0.1 mA - 20 A (by means of the clamp)
luminous intensity	0.01 lux - 20 klux (by means of sensor)
measured value memory	500 measuring results
interfaces	USB, RS 232
incl. software	*BENNING PC-Win IT 120*
item no.	044101

Scope of delivery of the installation testers

	BENNING IT 110	***BENNING IT 120***
tester incl. carrying case / carrying strap	x	x
switchable probe tip	x	x
test cable with shock-proof plug	x	x
universal test cable, 3 x L = 1.5 m	x	x
3 x test probe, 3 x crocodile clips	x	x
charger with 6 NiMH storage batteries (AA)	x	x
PC software BENNING PC-Win IT 120		x
USB and RS 232 cable		x

Optional accessories for BENNING IT 120

Current clamp adapter ***BENNING CC 2***
0.5 A - 20 A AC (200 A AC) **item no. 044110**

Illumination sensor ***BENNING luxmeter type B***
Accuracy: 5 % **item no. 044111**

Illumination sensor ***BENNING luxmeter type C***
Accuracy: 10 % **item no. 044112**

Earthing set consisting of 2 earth rods and 3 test cables
item no. 044113

Earthing set

Demonstration case for practice-oriented application of testers, measuring instruments and safety instruments

BENNING DB 1

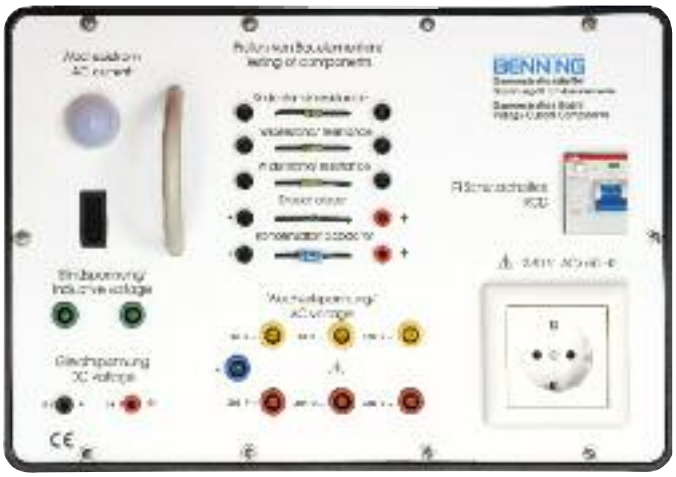
Demonstration case for testing and measuring primary quantities of electrical engineering

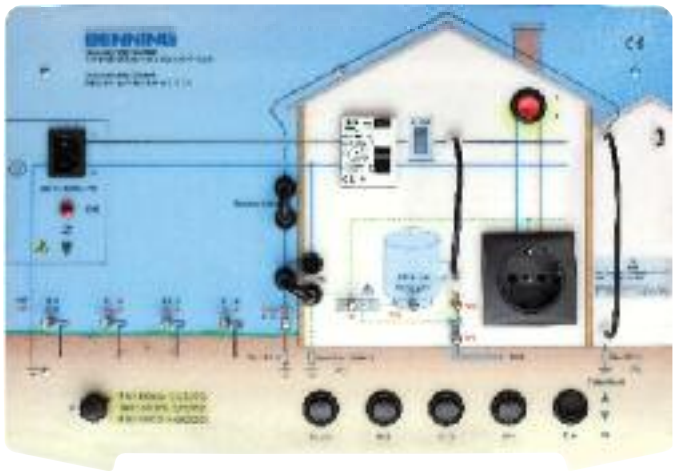
- particularly suited for teaching and education purposes, training courses and product presentations
- practice-oriented application of voltage testers/continuity testers, digital multimeters, current clamps and FI/RCD testers
- protected voltage steps of 24 V, 50 V, 120 V, 230 V, 400 V, 690 V AC and 24 V DC by means of isolating transformer
- lamp circuit with ON/OFF switch and current loop for non-contact current measurement (A) by means of a current measuring clamp
- test possibility for polarity, diode and single-pole phase testing
- measuring on resistors and capacitors
- simulation of a reactive voltage (induced voltage) for indication by means of digital multimeter (high-impedance) and suppression by *DUSPOL*® voltage tester with load connection (low-impedance)
- shock-proof socket with 30 mA FI safety switch for demonstration of the *DUSPOL*® voltage testers with load connection (FI release) and of FI/RCD testers
- rugged and dust-proof housing type

BENNING DB 2

Demonstration Case for practice-oriented application and training concerning VDE 0100 installation testers

- portable case for simulation of electrical systems conforming to standards according to DIN VDE 0100
- realistic presentation of a low-voltage installation of a single-family house (TN/TT system)
- real components such as FI safety switches, shock-proof socket, ON/OFF switch with lamp and current measuring loop of a hot-water tank
- simulated components with connecting terminals for equipotential busbar, ground connection, water conduits and lightning arrester
- fault simulation can be set by means of 5 toggle switches
- measurement of protective conductor resistance (R_{PE}), insulating resistance (R_{ISO}), loop impedance (Z_{L-PE}) and line impedance (Z_{L-N})
- 30 mA FI safety switch for measuring release time, release current and contact voltage
- different measuring methods can be used for earthing measurement (two-/three-/four-wire measuring method and without any earth rods by means of a current clamp)
- shock-proof socket for voltage and frequency measurement as well as single-pole testing of the external conductor (phase)
- rugged and dust-proof housing type





Demonstration case

	BENNING DB 1
power supply	230 V, 50/60 Hz mains connection
dimensions/weight	405 x 330 x 160 mm, approx. 5 kg
scope of delivery	case with mains connection cable
item no.	044132

Demonstration case

	BENNING DB 2
power supply	230 V, 50/60 Hz mains connection
dimensions/weight	450 x 330 x 110 mm, approx. 3,5 kg
scope of delivery	case with mains connection cable
item no.	044133

Voltage and Continuity Tester
Phase-Sequence Indicator

PROFIPOL®
Voltage Testers for universal applications

- indicating DC and AC voltage within the range of 6 - 400 V
- indicating steps 6, 12, 50, 120, 230, 400 V
- polarity test for DC voltage
- shock-proof housing made of rugged high-pressure PE material
- compact dimensions and increased grip
- dustproof and waterproof, protection category IP 65

DUTEST®
Continuity and line tester

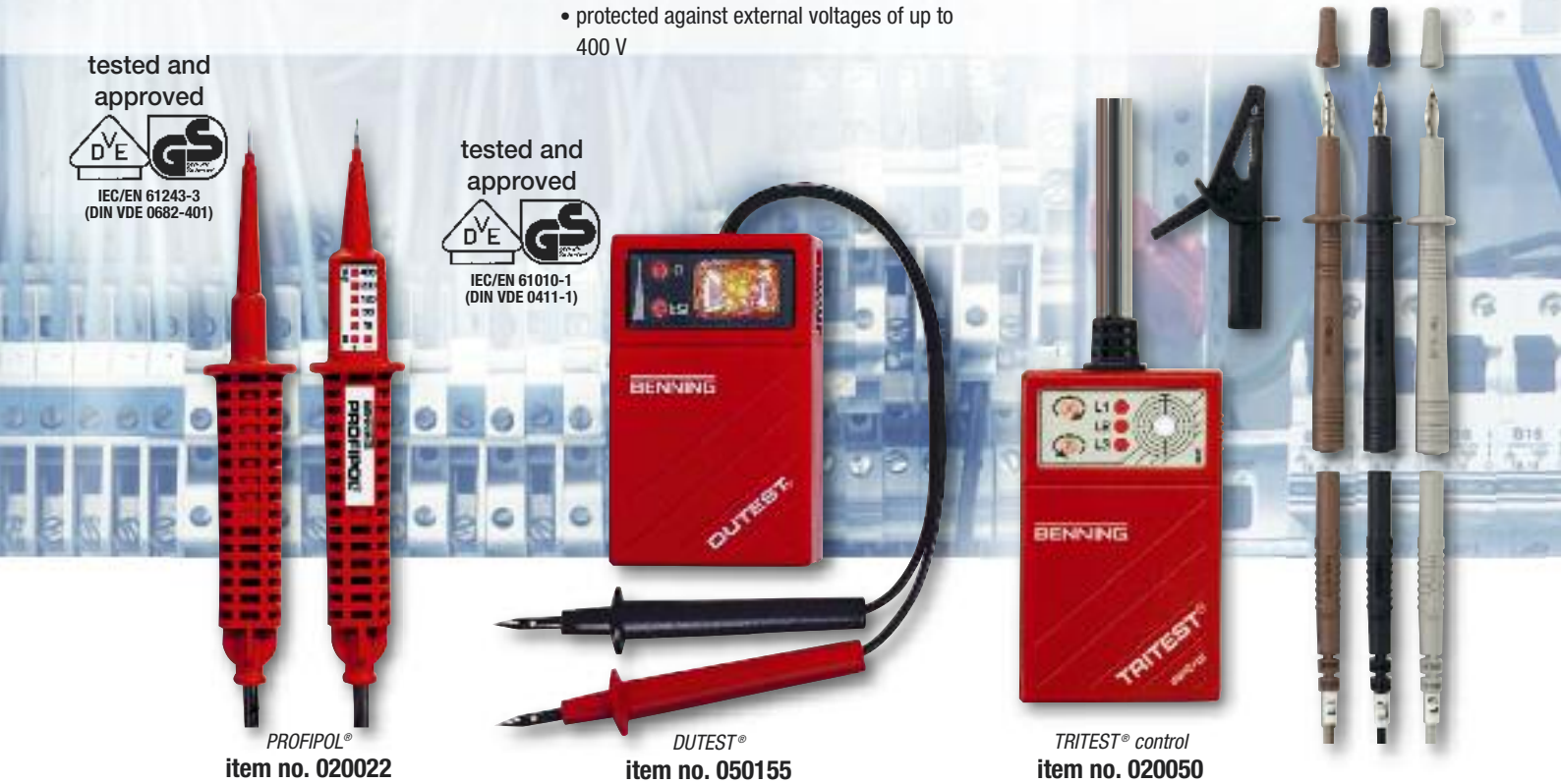
- reliable detection of faulty wiring, contacting errors and cable interruptions
- quick localization of defective fuses, lamps, lines and short-circuits
- indication of high-impedance (0 - 90 kΩ) and low-impedance (0 - 900 Ω) resistances
- acoustic indication by means of loud testing buzzer
- visual indication by means of high-contrast light-emitting diodes (LED)
- powerful torch function
- protected against external voltages of up to 400 V

TRITEST® control
Phase-sequence indicator for testing the phase sequence in three-phase mains

- indication of clockwise and anti-clockwise phase sequence
- indication of phase voltages (L1, L2, L3) by means of high-contrast LEDs
- voltage range: 400 - 690 V (50 - 60 Hz)
- bright LED pocket lamp function
- including safety probe tips and alligator clip

tested and approved
IEC/EN 61243-3
(DIN VDE 0682-401)

tested and approved
IEC/EN 61010-1
(DIN VDE 0411-1)



PROFIPOL®
item no. 020022

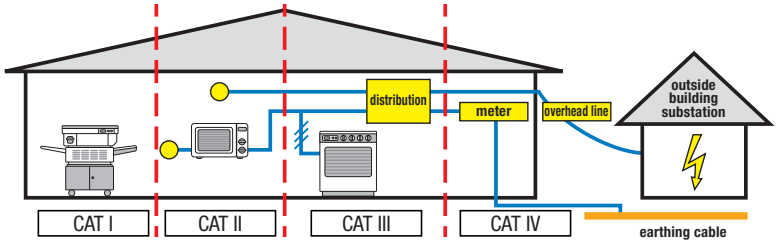
DUTEST®
item no. 050155

TRITEST® control
item no. 020050

Tips for practical use

- Always observe the five safety rules for “working under voltage”!
- For determining the absence of voltage on electrical systems of up to 1000 V, only use two-pole voltage testers complying with the current IEC/EN 61243-3 standard.
- Always check voltage testers for correct functioning immediately before and after use.
- Voltage testers with connectable load suppress capacitively and inductively induced voltages. Thus, incorrect measurements are excluded!
- Voltage testers for outdoor use must comply at least with protection category IP 44.
- *DUSPOL®* voltage testers are designed for safe working under voltage. Operating errors due to incorrect measuring range selection are excluded. The handles with grip limit offer the highest safety possible and sufficient distance to the measuring object. The display is arranged directly in the user's field of vision.
- A standards-compliant design of a voltage tester/measuring instrument is confirmed by independent testing and certification institutes by granting a mark of conformity (e.g. VDE/GS mark of conformity).
- Digital multimeters and current clamps with TRUE RMS measuring method offer increased accuracy in case of distorted and non-sinusoidal signal characteristics in industrial use.
- Please take into consideration the high-impedance input resistance (~10 MΩ) of a digital multimeter which indicates capacitively and inductively induced voltages and which very often might only simulate the existence of voltage.
- Use digital multimeters and current clamps only for the area of application for which they are designed. The measuring inputs must be marked unambiguously with the measuring category (CAT I - CAT IV) and the maximum nominal voltage to earth.

Measuring categories CAT I to CAT IV:



Tester and Measuring Instrument Kits
basic equipment that proved to be reliable

BENNING Tester and Measuring Instrument Kits

The selection of convenient kits of testers and measuring instruments depends on the user's professional requirements and experience. Moreover, the testers and measuring instruments shall guarantee safety and reliability for many years.

BENNING testers and measuring instruments comply with these requirements in any way possible and guarantee a high degree of inspection reliability and measuring quality for decades.

The five BENNING Tester and Measuring Instrument Kits are adapted to the professional requirements of apprentices, craftsmen, master craftsmen as well as for service technicians and industrial master craftsmen. Choose a BENNING Tester and Measuring Instrument Kit at a special price too!

Order pays off!

The practical and large case for testers / measuring instruments for professional storage of the device made of hard-wearing polyester fabric (black), with carrying handle and detachable shoulder strap.

device case
item no. 711019

Starter kit 2009 — item no. 050412

1 x *DUSPOL® expert*, item no. 050253
1 x *DUTEST®*, item no. 050155
1 x *BENNING MM 2*, item no. 044028
1 x device case, item no. 711019

Electrician's kit 2009 — item no. 050402

1 x *DUSPOL® expert*, item no. 050253
1 x *BENNING MM 1-3*, item no. 044083
1 x *BENNING CM 2*, item no. 044035
1 x device case, item no. 711019

Master craftsman's kit 2009 — item no. 050413

1 x *DUSPOL® digital LC*, item no. 050258
1 x *BENNING MM 7,* item no. 044076
1 x *BENNING CM 5,* item no. 044057
1 x device case, item no. 711019

Industry kit 2009 — item no. 050414

1 x *DUSPOL® digital LC*, item no. 050258
1 x *TRITEST® control*, item no. 020050
1 x *BENNING MM 7,* item no. 044076
1 x *BENNING CM 8*, item no. 044064
1 x *BENNING IT 101*, item no. 044033
1 x device case, item no. 711019

VDE kit 2009 — item no. 050415

1 x *BENNING ST 710*, item no. 050308
1 x *BENNING IT 120*, item no. 044101

Accessories for BENNING testers and measuring instruments
safe – functional – indispensable

Case for testers and measuring instruments
item no. 711019

High-quality cases for testers and measuring instruments for professional storage of all testers and measuring instruments, made of polyester fabric with carrying handle and detachable shoulder strap

Tester case
item no. 010910

Practical carrying case made of leather cloth with zipper, suitable for all *DUSPOL*® voltage testers and *DUTEST* ® and *TRITEST* ® *control* testers

BENNING TA 1
item no. 044124

Ø 4 mm safety crocodile clips, two pieces, red/black, professional equipment, CAT III 1000 V

BENNING TA 2
item no. 044125

set of Ø 4 mm safety measuring leads, six pieces, red/black, professional equipment, CAT III 1000 V, consisting of:
- safety measuring leads (silicone)
- safety test probes (4 mm measuring tip)
- safety crocodile clips

BENNING TA 3
item no. 044126

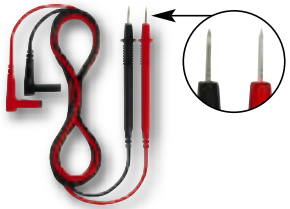
set of Ø 4 mm safety measuring leads, eight pieces, red/black, professional equipment, CAT III 1000 V, consisting of:
- safety measuring leads (silicone)
- safety test probes (slender measuring tip)
- safety claw clamps
- safety crocodile clips

BENNING TA 4
item no. 044120

magnetic holder for Multimeter and BENNING IT 101, 3 pieces, consisting of:
- magnetic holder
- adapter and belt, for attachment of BENNING Multimeters to switching cabinets, machine and system parts

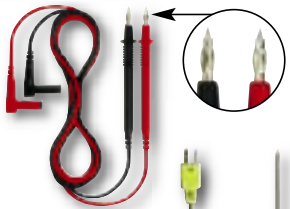
Ø 4 mm safety measuring leads with 2 mm measuring tip
item no. 044117

Ø 4 mm safety measuring leads
2 pieces, red/black, CAT III 1000 V,
L = 1.40 m, with 2 mm measuring tip



Ø 4 mm safety measuring leads with 4 mm measuring tip
item no. 044118

Ø 4 mm safety measuring leads
2 pieces, red/black, CAT III 1000 V,
L = 1.40 m, with 4 mm measuring tip



Set of safety measuring leads for *BENNING MM 4*
item no. 044119

set of Ø 4 mm safety measuring leads, 4 pieces, consisting of:
- safety measuring leads with 2 mm measuring tip
- crocodile clip
- 2 measuring probes with 2 mm measuring tip

Temperature probe (type K)
item no. 044121

insertion probe (V4A steel tube) for flexible substances, liquids, gases and air, measuring range:
-196 °C to +800 °C, suitable for *BENNING MM 1-3*, *MM 7*, *MM 7-1*, *MM 11* and *CM 8* digital measuring instruments

VDE Seminars, Service Hotline, 24h Service
sales promotion for specialized trade

For further information visit our website **www.benning.de**

VDE 0701-0702 seminar
Testing of electrical appliances/equipment

Features:
The seminar addresses qualified electricians, competent persons as well as electrotechnically trained persons who have to do the testing and its documentation according to the DIN VDE 0701-0702 standard for repaired or modified electrical devices or the repetitive testing of electrical devices.
The participants of the seminar will be given an intensive training in order to be able to do this inspection according to regulations considering the optimum use of the *BENNING ST 710/ST 750* testers as well as of the *BENNING PC-Win ST 750* logging software. At the end of the seminar, the participants will get a certificate of attendance.

Content:
Regulations, definitions, measurements (continuity of the protective conductor, insulation, protective conductor current/contact current), test sample management and documentation according to ZVEH.

Duration: approx. 4 hours
Seminar fee: 285.00 € per company/specialized company for 1-2 persons, 142.50 € for every additional person
Seminar venue: BENNING GmbH & Co. KG, phone +49 (0) 28 71/93 - 470
Seminar dates: to be agreed upon

We are pleased to send you our directions and to recommend to you hotels in direct vicinity of the seminar venue.

VDE 0100 seminar
Testing of electrical installations of up to 1000 V

Features:
The seminar addresses qualified electricians who have to do the testing and its documentation of electrical installations of up to 1000 V according to the DIN VDE 0100 standard.
The participants of the seminar will be given an intensive training in order to be able to do this inspection independently and according to regulations considering the optimum use of the *BENNING IT 101/IT 110/IT 120* testers as well as of the *BENNING PC-Win IT 120* logging software.
At the end of the seminar, the participants will get a certificate of attendance.

Content:
Regulations, definitions, measurements (insulation, continuity of the protective conductor, loop impedance/line impedance, short-circuit current, FI/RCD testing, earthing, rotary field, voltage, frequency), management of measuring data and documentation according to ZVEH.

Online-Shop for specialized trade

www.benning-shop.de
(available as of autumn 2009)

free
24h service
Service Hotline:
+49 (0) 28 71/93 - 555

Sales promotion for specialized trade

For sales promotion and for presentation purposes, several presentation possibilities are available for the specialized trade. Please do not hesitate to contact us.

Free vertical display cabinet
When purchasing an assortment variant for a display cabinet, the vertical display cabinet will be given to the specialized trade free of charge. The glass cabinet is equipped with a revolving door with safety lock, three shelves, bottom and top made of light beech veneer and device labels with technical data.
Dimensions (w x d x h): 430 x 370 x 1620 mm

Customized sales promotion brochures
Upon agreement, we offer customized sales promotion brochures for the specialized trade with imprint of source of supply.

BENNING is pleased to submit an individual offer under:
Münsterstraße 135-137 • D-46397 Bocholt
Phone: +49 (0) 28 71/93 - 420 • Fax: +49 (0) 28 71/93 - 429
www.benning.de • E-Mail: duspol@benning.de

showcase

wall display with promotion brochures

sales display stand

roll-up

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