

Excellent Technology, Efficiency and Quality



## Testing, Measuring and Safety Instruments

Voltage Tester, Continuity Tester and Phase Sequence Indicator

Digital Multimeter

Digital Current Clamp Multimeter

Appliance Tester

Installation Tester

Measuring Devices for Photovoltaic

# NEW!

## BENNING SDT 1

BENNING SDT 1 socket tester with contact sensor for active PE error detection and for testing the tripping function of a 30 mA RCD



Socket is installed correctly, contact sensor checks the PE contact for dangerous contact voltage



Socket with wiring error, danger to life! External conductor (L) and protective conductor (PE) have been inverted!



Testing the tripping function of a 30 mA RCD by pressing the FI/RCD TEST key

### Application:

Quick and easy testing of shock-proof sockets, cable reels and extension cables for correct connection. Wiring errors and inadmissibly high contact voltages at the PE connection are indicated directly. In addition, it is possible to test the tripping function of a 30 mA RCD by pressing the FI/RCD TEST key.

### Testing functions:

- Indication of correct wiring via LEDs.
- Wiring errors such as missing PE, N and L conductors as well as an inversion of the L and PE conductors are clearly indicated via three LEDs.
- An active PE test by means of a contact electrode and via the LC display warns of a dangerous contact voltage (> 50 V) being applied to the PE connection.
- FI/RCD TEST key for testing the tripping function of 30 mA RCDs.

### Features:

- Safe and easy operation by trained personnel
- An easily understandable status table provides information about the correct connection (OK, green) and the type of existing errors (red) at the shock-proof socket.

### Status table:

N	PE	L	⚠	Status	N	PE	L	⚠	Status
●	●	●	●	OK, (FI/RCD)	●	●	●	●	PE offen/open
●	●	●	●	OK, L<N	●	●	●	⚠	L<PE verläuscht reverse
●	●	●	●	offen/open	●	●	●	⚠	L<PE & PE
●	●	●	●	offen/open	●	●	●	●	L<N & PE

Technical data	BENNING SDT 1
<b>Indication:</b>	visually by means of three red signal LEDs for N, PE, L conductor and LC display „⚠“
<b>Voltage range:</b>	230 V AC, ± 10 %
<b>Frequency range:</b>	50 Hz - 60 Hz
<b>PE test response threshold:</b>	U <sub>a</sub> < 50 V AC to earth
<b>RCD testing current:</b>	I <sub>ΔN</sub> approx. 30 mA
<b>Power supply:</b>	via test object (no batteries required)
<b>Measuring category:</b>	CAT II 300 V
<b>Safety:</b>	DIN EN 61010-1, DIN EN 61010-2-033
<b>Appliance dimensions:</b>	80 x 72 x 78 mm (l x w x h)
<b>Weight:</b>	70 g
<b>Item no.:</b>	020053

# NEW!

## BENNING MM 6-1, MM 6-2

TRUE RMS Digital Multimeter mit CAT IV 600 V



Scope of delivery  
BENNING MM 6-1



### Application:

The TRUE RMS measuring method and the highest measuring category CAT IV 600 V allow the device to be used in industrial environments and ensure reproducible measuring results. The measuring functions meet the manifold requirements of qualified electricians in industry, trade and service. For HVAC technicians, the BENNING MM 6-1 offers a temperature range and a microampere current range.

### Measuring functions:

- TRUE RMS AC/ DC voltage measurement up to 1000 V
- TRUE RMS AC/ DC current measurement up to 10 A (MM 6-2)
- resistance (40 M $\Omega$ ), frequency (100 kHz) and capacity measurement (10 mF)
- continuity test with buzzer and red LED for loud environments
- diode tests up to a conducting-state voltage of 1.5 V
- Volt sensor for non-contact signaling of phase voltages and cable breaks in lines
- temperature measurement and  $\mu$ A current range (MM 6-1)

### Features:

- "AutoV" function for automatic AC/DC voltage detection and low input impedance LoZ (< 3 k $\Omega$ ) to suppress reactive voltages
- compact and handy housing design
- protective rubber holster for use in harsh industrial environments
- suspension possibility by means of integrated magnet in the rubber holster
- large LC display with illumination
- memory of measured value (HOLD) and peak value (P<sub>MAX</sub>, P<sub>MIN</sub>)
- relative value function (REL) for null balance and differential current measurement
- automatic switch-off after 20 minutes (can be disabled)
- overload protection for all measuring ranges
- delivery including high quality protection carrying case, 4 mm measuring leads, battery, protective rubber holster with magnetic holder and wire temperature sensor (MM 6-1)

Technical data	BENNING MM 6-1/MM 6-2
Display:	6000 digit, 15 mm digit height, illuminated
Basic accuracy:	0.5 %
Measuring range selection:	automatic/ manual
AC/DC Voltage:	0.1 mV - 1000 V
Resistance:	0.1 $\Omega$ - 40 M $\Omega$
Continuity:	buzzer + red LED up to approx. 20 $\Omega$
Diode:	up to 1.5 V
Frequency:	0.01 Hz - 100 kHz
Capacity:	1 nF - 10 mF
Volt sensor	buzzer + red LED $\geq$ approx. 200 V
Memory function:	HOLD, P <sub>MIN</sub> , P <sub>MAX</sub> , REL
Measuring method:	TRUE RMS
Measuring category:	CAT III 1000 V, CAT IV 600 V

Additional	BENNING MM 6-1
AC/DC $\mu$ A current:	0.1 $\mu$ A - 600 $\mu$ A
Temperature:	-40 °C - +400 °C
Item no.:	044086

Additional	BENNING MM 6-2
AC/DC current:	1 mA - 10 A (—11 A, 1000 V, 20 kA)
Item no.:	044087

**BENNING**

**MM 12**

Wireless Logging TRUE RMS  
Digital-Multimeter

**NEW!**



**1000 V AC/DC  
TRUE RMS &  
CAT IV 600 V**

**BENNING MM 12  
TRUE RMS Digital Multimeter  
with logging function and  
Bluetooth® interface**

- data logger and memory function
- Bluetooth® and optical interface
- including PC software and free app "BENNING MM-CM Link"
- TRUE RMS measuring method
- highest measuring category CAT IV 600 V
- calibration certificate



App in preparation





# BENNING MM 12

Wireless Logging TRUE RMS Digital-Multimeter

## Anwendung:

For all sophisticated measuring tasks in industry and trade. Monitor, store and share the measured values for further evaluation within your organization via the free "BENNING MM-CM Link" app.

## Application:

- TRUE RMS AC/ DC voltage measurement up to 1000 V
- TRUE RMS AC/ DC current measurement up to 10 A
- resistance (40 M $\Omega$ ), frequency (100 kHz) and capacity measurement (40 mF)
- continuity (10  $\Omega$  - 50  $\Omega$ ) and diode test (2.0 V)
- temperature measurement (- 200 °C up to + 1200 °C)

## Features:

- precise due to TRUE RMS measuring method (AC, AC+DC)
- data logger function "LOG" (40,000 measured values, sampling arte: 1 s to 10 min.)
- memory function "MEM" (1,000 measured values, automatic storage of stable measured values and manual storage with a simple keystroke)
- Bluetooth® Low Energy 4.0 and optical interface via USB connection
- IOS and Android app for data link to smartphone/tablet
- "AutoV" function for automatic AC/DC voltage detection and low input impedance LoZ (< 3 k $\Omega$ ) to suppress reactive voltages
- low-pass filter (HFR) for measurements at pulsed motor drives
- easy selection of menu functions via cursor key
- memory of measured value (HOLD), peak value (P-HOLD), relative value function (REL), maximum/minimum/average values (MAX/MIN/AVG) and level measurement (dB/dBm)
- measuring category CAT IV 600 V, CAT III 1000 V
- incl. PC software, serial data cable with USB connection, protective rubber holster, magnetic holder, carrying case, set of batteries (4 x 1.5 V Mignon/AA), measuring leads, wire temperature sensor and calibration certificate

## PC software BENNING PC-Win MM 12

- transmission of measured values via serial data cable with USB connector to PC/laptop computer
- storage of up to 100,000 measured values in MS EXCEL®
- download of the data logger (LOG) and of the memory (MEM)



## free app "BENNING MM-CM Link"

- viewing, storing and sharing measured values
- transmission of measured values via Bluetooth® interface to smartphone and tablet (IOS/Android)
- simultaneous monitoring of up to 5 digital multimeters from a safe distance
- storage of measured values in CSV format
- app in preparation (information will be available soon on our website)

Technical data	BENNING MM 12
<b>Display:</b>	max. 40,000 digit, 15 mm digit height, illuminated
<b>Basic accuracy:</b>	0.5 %
<b>Measuring range selection:</b>	automatic /manual
<b>AC/DC voltage:</b>	0.01 mV - 1000 V
<b>AC/DC current:</b>	0.01 mA - 10 A (≡11 A, 1000 V, 20 kA)
<b>Resistance:</b>	0.1 $\Omega$ - 40 M $\Omega$
<b>Continuity:</b>	buzzer, threshold value of 10 $\Omega$ to 50 $\Omega$ (adjustable)
<b>Diode:</b>	up to 2.0 V
<b>Frequency:</b>	0.1 Hz - 100 kHz
<b>Capacity:</b>	0.01 nF - 40 mF
<b>Temperature:</b>	-200 °C up to + 1200 °C
<b>Data logger/memory:</b>	40,000/1,000 storage locations
<b>Memory function:</b>	HOLD, PEAK-HOLD, MAX/MIN/AVG, REL
<b>Measuring method:</b>	TRUE RMS AC, AC+DC
<b>Measuring category:</b>	CAT III 1000 V, CAT IV 600 V
<b>Item no.:</b>	044088

## Scope of delivery BENNING MM 12:





# The generation *DUSPOL*® voltage testers safe voltage testing up to 1000 V

## The international standard for voltage testers DIN EN 61243-3 (VDE 0682-401):2015 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 DIN EN 61243-3 (VDE 0682-401):2015. The standard creates uniform testing and safety criteria on an international level and remarkably which concentrates on user safety.

The generation of *DUSPOL*® voltage testers exceeds the demands of the standards concerning both the protection category for housings (IP 65) and overvoltage protection (CAT IV 600 V). The nominal voltage range has been increased to a minimum of 1000 V AC/DC in order to ensure safe testing of increased system voltages of industrial applications, photovoltaic systems and wind power plants as well as of hybrid automotive engineering.



**CAT IV  
600 V**

tested and  
approved



DIN EN 61243-3  
(VDE 0682-401):  
2015 standard

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.

## *DUSPOL*® voltage testers The original!

### Product safety at the highest level:

- safe voltage testing up to 1000 V AC/DC
- direct display without actuating a push-button (high-impedance testing)
- load connection via push-button (low-impedance testing)
- battery-independent voltage indication from 50 V AC/DC on
- vibration alert in the test handle
- robust round housing with rubberized gripping surface for outdoor use (protection category IP 65)
- tested and approved in compliance with the current DIN EN 61243-3 (VDE 0682-401):2015 standard

# DUSPOL® voltage testers – the testers with the VDE mark of conformity PROFIPOL®+ a plus in functionality

## The generation DUSPOL® voltage testers

- safe voltage testing up to 1000 V AC/DC
- load connection with vibration alert
- intentional tripping of a 30 mA RCD
- phase sequence test in a three-phase mains
- single-pole external conductor test (phase)

### Additionally for DUSPOL® expert, DUSPOL® digital:

- acoustic continuity test with loud test buzzer and visual indication by means of yellow LED
- measuring point illumination by means of white high-power LED
- phase sequence test by means of green LED (left/right)
- detector for non-contact localization of cable breaks on exposed and live lines

### Additionally for DUSPOL® digital:

- voltage testing up to 1000 V AC TRUE RMS/1200 V DC
- TRUE RMS measuring method
- low-volt range: 1.0 V to 11.9 V
- frequency indication up to 1000 Hz
- resistance measurement up to 300 kΩ
- conducting-state voltage measurement of diodes
- automatic LC display illumination by means of a light sensor

### Optional DUSPOL® stand-by case:



010911  
(see page 18)

## The new PROFIPOL®+ voltage tester with additional functions and convenient design

- slim and compact design
- test handle lock for one-hand operation on sockets and for safe storage
- indicating steps from 12 V to 690 V AC/DC, fully operational even with batteries being exhausted or removed
- reduced testing current without RCD tripping
- acoustic continuity test with loud buzzer and visual indication by means of yellow LED
- single-pole external conductor test (phase) and polarity test
- non-contact cable break detector (yellow LED)



CAT III 600 V

PROFIPOL®+

## Voltage and Continuity Tester

	DUSPOL® analog	DUSPOL® expert	DUSPOL® digital	PROFIPOL®+
<b>indication</b>	plunger system (illuminated)/LED	LED	LED/LCD (illuminated)	LED
<b>voltage range</b>	12 – 1000 V AC/DC	12 – 1000 V AC/DC	1.0 – 1000 V AC/1200 V DC	12 – 690 V AC/DC
<b>frequency range</b>	–	–	1 – 1000 Hz	–
<b>acoustic and visual continuity test</b>	–	buzzer + yellow LED 0 – 100 kΩ	buzzer + yellow LED 0 – 100 kΩ	buzzer + yellow LED 0 – 100 kΩ
<b>diode test</b>	–	conducting-state/ non-conducting direction	0.3 – 2.0 V	–
<b>resistance measuring range</b>	–	–	0.1 kΩ – 300 kΩ	–
<b>phase-sequence test</b>	LCD (“R” symbol)	green LEDs (right/left)	green LEDs (right/left)	–
<b>single-pole outer conductor test</b>	LCD (“R” symbol)	red “lightning” LED	red “lightning” LED	red “lightning” LED
<b>polarity test</b>	LED (+/-)	LED (+/-)	LCD (+/-)	LED (+/-)
<b>cable break detector</b>	–	yellow LED (flashing)	yellow LED (flashing)	yellow LED
<b>load connection via push button</b>	I <sub>S</sub> = 550 mA (1000 V) 30 mA RCD trip	I <sub>S</sub> = 550 mA (1000 V) 30 mA RCD trip	I <sub>S</sub> = 550 mA (1000 V) 30 mA RCD trip	–
<b>vibrating alarm</b>	yes	yes	yes	–
<b>measuring point illumination</b>	–	white LED	white LED	–
<b>protection class</b>	IP 65	IP 65	IP 65	IP 54
<b>item no.</b>	050261	050262	050263	020023



# Digital Multimeter BENNING MM P3, MM 1-1 – MM 1-3, MM 1 – MM 4 safety and functional diversity without any compromises

## 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

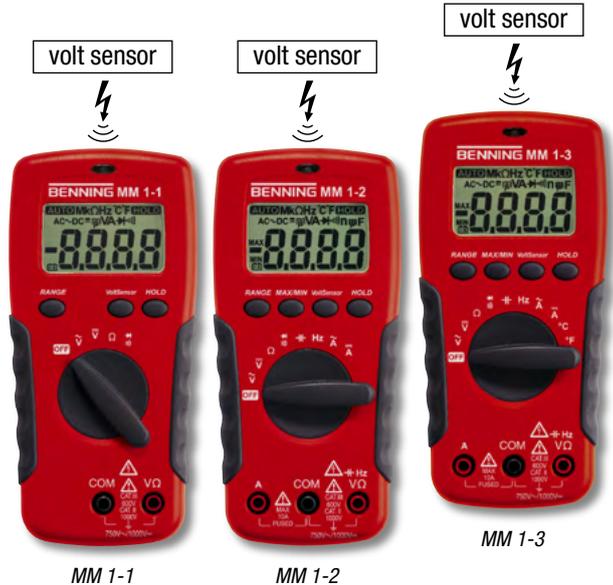


MM P3



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

- the integrated Volt sensor signals 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 1-1

MM 1-2

MM 1-3



MM 1



MM 2



MM 3

## BENNING MM 1, MM 2, MM 3 and MM 4 Digital Multimeter

### Technology that inspires, Quality that convinces

- 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

# TRUE RMS Digital Multimeter BENNING MM 5-1, MM 5-2, MM 7-1 – MM 11

## TRUE RMS measuring method to satisfy highest demands on accuracy

### BENNING MM 5-1, MM 5-2

#### compact, precise and innovative

- TRUE RMS measuring method
- compact dimensions: 140 x 70 x 33 mm (without holster)
- capacity and frequency measurement
- rubber holster with integrated magnetic hanger
- Volt sensor for non-contact cable break detection (red LED)
- continuity test by means of red LED and buzzer
- measuring input for AC/DC current, microampere DC and temperature as well as LC display with illumination (MM 5-2)

### BENNING MM 7-1, MM 10

#### 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 reactive voltages (MM 7-1)
- USB interface for measured value transmission (MM 10)
- delivery including software *BENNING PC-Win MM 10*



Software *PC-Win MM 10/ MM 11*



TRUE RMS

MM 11

### BENNING MM 11

#### TRUE RMS Precision Digital Multimeter with extraordinary features of performance

- highest measuring accuracy and a resolution of 20,000 digits
- data logger / storage function for 40,000 / 1,000 measured values for recording measuring processes
- sampling rate adjustable from 0.5 sec. to 10 min.
- transmitting measuring results via optical USB interface
- delivery including software *BENNING PC-Win MM 11*

#### TRUE RMS Digital Multimeter (except for MM 4)

	BENNING MM 4	BENNING MM 5-1	BENNING MM 5-2	BENNING MM 7-1	BENNING MM 9	BENNING MM 10	BENNING MM 11
indicating range	4200	6000	6000	6000	6000	6000	20000
basic accuracy	0.5 %	0.5 %	0.5 %	0.08 %	0.5 %	0.5 %	0.06 %
AC voltage	1 mV – 600 V	0.1 mV – 600 V	0.1 mV – 600 V	10 µV – 1000 V	0.1 mV – 750 V	0.1 mV – 750 V	1 µV – 750 V
DC voltage	1 mV – 600 V	0.1 mV – 600 V	0.1 mV – 600 V	10 µV – 1000 V	0.1 mV – 1000 V	0.1 mV – 1000 V	1 µV – 1000 V
AC current	0.1 A – 300 A	–	1 mA – 10 A	10 µA – 10 A	1 mA – 10 A	1 mA – 10 A	1 µA – 10 A
DC current	–	–	0.1 µA – 10 A	10 µA – 10 A	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 – 40 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	–	0.01 Hz – 50 kHz	0.01 Hz – 50 kHz	0.01 Hz – 100 kHz	1 Hz – 60 MHz	1 Hz – 60 MHz	0.01 Hz – 1 MHz
capacity	–	0.01 nF – 1 mF	0.01 nF – 1 mF	1 nF – 10 mF	1 pF – 6 mF	1 pF – 6 mF	1 pF – 40 mF
temperature	–	–	-40 °C up to +400 °C	-40 °C up to +400 °C	–	–	-200 °C up to +1.200 °C
volt sensor	–	yes	yes	yes	–	–	–
interface	–	–	–	–	–	USB	USB
software	–	–	–	–	–	PC-Win MM 10	PC-Win MM 11
memory	HOLD	HOLD, PEAK	HOLD, PEAK	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	TRUE RMS	TRUE RMS	TRUE RMS	TRUE RMS
measuring category	CAT III 300 V	CAT III 600 V	CAT III 600 V	CAT IV 600 V	CAT IV 600 V	CAT IV 600 V	CAT III 600 V
item no.	044073	044070	044071	044085	044078	044079	044080



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



# Digital Current Clamp Multimeter

for AC/DC current

## BENNING CM 1-1, CM 1-2, CM 1-3, CM 4 and CM 6 Digital Current Clamp Multimeter for AC current Innovative technology, practical design

- safe current measuring up to max. 1000 A AC
- measuring inputs for voltage, resistance, continuity and diode test
- integrated volt sensor signals 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)

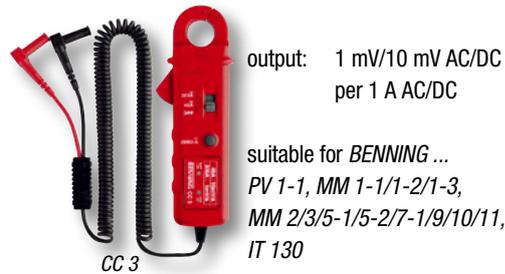
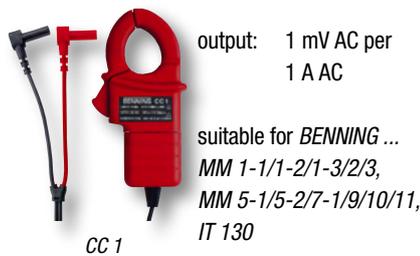
## BENNING CM 2 and CM 3 Digital Current Clamp Multimeter for AC/DC current

- 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)
- precise due to TRUE RMS measuring method (CM 2)



## BENNING CC 1 and CC 3 AC and AC/DC current clamp adapters

- safe current measuring up to max. 400 A AC
- connection via 4 mm safety measuring leads



### Digital Current Clamp Multimeter/Current Clamp Adapter

	BENNING CC 1	BENNING CC 3	BENNING CM 1-1	BENNING CM 1-2	BENNING CM 1-3	BENNING CM 3	BENNING CM 4	BENNING CM 6
indicating range	—	—	2000	2000	2000	2000	4000	4000
basic accuracy	1.9 %	1 % – 2 %	2 %	1 %	1 %	1.9 %	0.7 %	0.7 %
AC voltage	—	—	—	0.1 V – 600 V	0.1 V – 750 V	—	0.1 V – 600 V	0.1 V – 750 V
DC voltage	—	—	—	0.1 V – 600 V	0.1 V – 1000 V	—	0.1 V – 600 V	0.1 V – 1000 V
AC current	1 A – 400 A	0.2 A – 300 A	10 mA – 400 A	0.1 A – 400 A	0.1 A – 200 A	0.1 A – 600 A	0.1 A – 600 A	0.1 A – 1000 A
DC current	—	0.2 A – 300 A	—	—	—	0.1 A – 600 A	—	—
resistance	—	—	—	0.1 Ω – 20 MΩ	0.1 Ω – 20 MΩ	—	0.1 Ω – 400 Ω	0.1 Ω – 400 Ω
continuity/diode	—/—	—/—	—/—	yes/—	yes/yes	—/—	yes/—	yes/—
frequency	—	—	—	—	—	—	1 Hz – 400 Hz	1 Hz – 400 Hz
effective power	—	—	—	—	—	—	—	—
power factor (cos φ)	—	—	—	—	—	—	—	—
temperature	—	—	—	—	—	—	—	—
volt sensor	—	—	—	—	yes	—	—	—
memory	—	—	HOLD, MAX	HOLD	HOLD	HOLD	HOLD, MAX/MIN, PEAK	HOLD, MAX/MIN, PEAK
measuring method	—	—	RMS	RMS	RMS	RMS	RMS	RMS
max. clamp opening	30 mm	25 mm	30 mm	30 mm	16 mm	38 mm	37 mm	53 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 600 V	CAT IV 600 V
item no.	044037	044038	044061	044062	044063	044031	044056	044058

# TRUE RMS Digital Current Clamp Multimeter

## TRUE RMS measuring method to satisfy highest demands on accuracy

### BENNING CM 5-1, CM 7, CM 8

#### TRUE RMS AC/DC Current Clamp Multimeter

- highest measuring category CAT IV 600 V (CM 6, CM 7)
- automatic selection of the measuring function (V AC/DC, A AC/DC,  $\Omega$  and low input impedance LoZ (CM 5-1))
- effective power measurements (kW) and power factor measurements (CM 8)



CAT IV 600 V  
TRUE RMS

CM 5-1

CAT IV 600 V  
TRUE RMS

CM 7  
(CM 6 fig. similar)

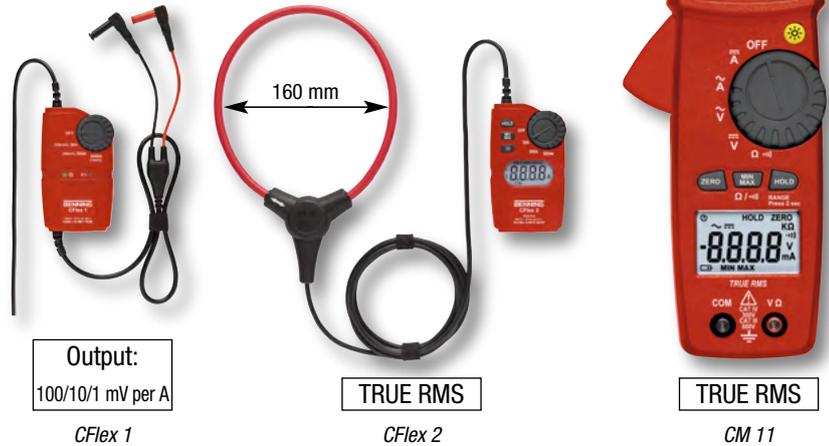
TRUE RMS

CM 8  
(CM 4 fig. similar)

### BENNING CFlex 1, CFlex 2

#### Flexible AC current transformers up to 3000 A

- measuring loop (46 cm) with high flexibility for narrow measuring points and large cable cross-sections
- length of connecting cable: 1.8 m
- analog output is universally applicable for all multimeters and oscilloscopes via 4 mm safety plugs (CFlex 1)
- large 4 digit LC display with illumination (CFlex 2)
- TRUE RMS measuring method (CFlex 2)



Output:  
100/10/1 mV per A

CFlex 1

TRUE RMS

CFlex 2

TRUE RMS

CM 11

### BENNING CM 9

#### TRUE RMS Leakage Current Clamp with a resolution of 1 $\mu$ A

- measurement of leakage currents and differential currents in electrical systems (IEC 60364) and devices (EN 62638)
- highest resolution of 1  $\mu$ A 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  
TRUE RMS

CM 9

### BENNING CM 11

#### TRUE RMS Milliampere AC/DC Current Clamp Multimeter with a resolution of 0.1 mA

- highest resolution of 0.1 mA AC/DC
- ideal for troubleshooting in electrical installations, devices, automotive engineering, control systems (4 to 20 mA process signals) as well as in fire and intrusion alarm systems
- multifunctional use fore voltage (600 V), resistance measurements (600 k $\Omega$ ) and continuity tests
- compact dimensions with a clamp opening of 23 mm



TRUE RMS

CM 11

### TRUE RMS Digital Current Clamp Multimeter

	BENNING CM 2	BENNING CM 5-1	BENNING CM 7	BENNING CM 8	BENNING CM 9	BENNING CM 11	BENNING CFlex 1	BENNING CFlex 2
indicating range	4000	9999	4000	6000	6000	6000	–	6000
basic accuracy	0.5 %	0.9 %	0.7 %	0.7 %	1 %	1.0 %	3 %	3 %
AC voltage	1 mV – 600 V	1.3 V – 750 V	0.1 V – 750 V	10 mV – 600 V	–	0.01 V – 600 V	–	–
DC voltage	0.1 mV – 600 V	0.7 V – 1000 V	0.1 V – 1000 V	10 mV – 600 V	–	0.1 mV – 600 V	–	–
AC current	100 mA – 300 A	0.9 A – 600 A	0.1 A – 1000 A	0.1 A – 600 A	1 $\mu$ A – 100 A	0.1 mA – 20 A	0.3 A – 3000 A	0.1 A – 3000 A
DC current	10 mA – 300 A	0.9 A – 600 A	0.1 A – 1000 A	0.1 A – 600 A	–	0.1 mA – 10 A	–	–
resistance	0.1 $\Omega$ – 40 M $\Omega$	1 $\Omega$ – 10 k $\Omega$	0.1 $\Omega$ – 400 $\Omega$	0.1 $\Omega$ – 20 k $\Omega$	–	0.1 $\Omega$ – 600 k $\Omega$	–	–
continuity/diode	yes/–	yes/yes	yes/–	yes/yes	–/–	yes/–	–	–
frequency	–	–	1 Hz – 400 Hz	0.1 Hz – 4 kHz	–	–	–	–
effective power	–	–	–	360 kW	–	–	–	–
power factor (cos $\phi$ )	–	–	–	$\pm$ 0.00 – 1.00	–	–	–	–
temperature	–	–	–	-50 °C up to +1000 °C	–	–	–	–
volt sensor	–	–	–	–	–	–	–	–
memory	HOLD, MAX	HOLD	HOLD, MAX/MIN PEAK, ZERO	HOLD, MAX/MIN PEAK, INRUSH	HOLD, PEAK	HOLD, PEAK	–	HOLD, MIN/MAX
measuring method	TRUE RMS	TRUE RMS	TRUE RMS	TRUE RMS	TRUE RMS	TRUE RMS	–	TRUE RMS
max. clamp opening	25 mm	35 mm	53 mm	40 mm	40 mm	23 mm	160 mm	160 mm
measuring category	CAT III 300 V	CAT IV 600 V	CAT IV 600 V	CAT III 600 V	CAT III 300 V	CAT IV 300 V	CAT III 600 V	CAT IV 600 V
item no.	044035	044066	044059	044064	044065	044067	044068	044069



# BENNING ST 710 Appliance Tester

mobile and network-independent testing of electrical appliances

## BENNING ST 710

### Battery-operated Appliance Tester for mobile testing of electrical devices

- testing in compliance with EN 62638, 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. electrical devices/tools with ON/OFF switch, motorized equipment, lamps, cable reels, multiple distributors and household appliances. The protective conductor current/contact current is measured by means of the **alternative leakage current measurement method**.

### Features BENNING ST 710

- 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 (6 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)



Forms for test certificates for "Testing of electrical devices" are available for download free of charge at [www.benning.de](http://www.benning.de)!



Test badges

TRUE RMS



Leakage

CM 9



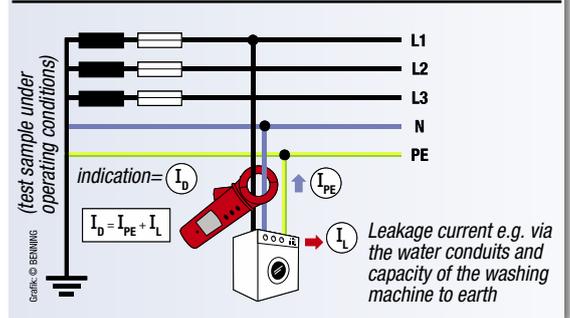
Shock-proof socket onto shock-proof plug for CM 9



16 A/32 A CEE coupling onto CEE plug, 5-pin, for CM 9

ST 710  
050309: with socket of type E (B/F/CZ/SK/PL)  
050315: with socket of type CH (CH)

### Differential current measurement method with BENNING CM 9



### BENNING ST 710 Battery-operated Appliance Tester

	BENNING ST 710
indication	graphic display
protective conductor resistance	0.05 Ω – 20 Ω
insulating resistance (500 V DC)	0.1 MΩ – 20 MΩ
protective conductor current/contact current by means of alternative leakage current measurement method	0.1 mA – 20 mA
line test	R <sub>PE</sub> , R <sub>ISO</sub> : 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 725/ST 750 A

- test badges "next test" (300 pieces) **item no. 756212**
- measuring adapters for three-phase loads (passive) (see page 19) **item no. 044122/044123**
- 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 adapters for leakage current clamp BENNING CM 9
  - single-phase, conductors led through individually and with double insulation shock-proof socket/shock-proof plug **item no. 044131**
  - three-phase, conductors led through individually and with double insulation 16 A CEE coupling-CEE plug, 5-pin **item no. 044127**
  - 32 A CEE coupling-CEE plug, 5-pin **item no. 044128**

See pages 18 + 19 for further accessories



Scope of delivery BENNING ST 710

# BENNING ST 725 Appliance Tester

## testing of electrical appliances under operating conditions

### BENNING ST 725

#### Mains-operated and battery-operated Appliance Tester for mobile testing of electrical devices

- testing in compliance with EN 62638, ÖVE/ÖNORM E 8701, NEN 3140
- quick – testing within a few seconds
- all-in-one – appliance tester and RCD tester in one single device
- unique – testing of single-phase and three-phase devices under operating conditions

#### Application

Testing of devices **with mains voltage-dependent switching elements/mains-supply units/relays** such as controlled devices/tools, devices of information and communication technology as well as of devices which can be tested completely with mains voltage only.

In mains operating mode, the protective conductor current/contact current is measured by means of the required **differential current/direct measurement method**.

#### Features BENNING ST 725

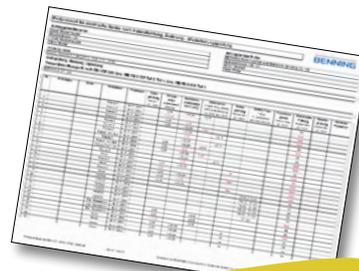
- mains operating mode for tests under operating conditions
- battery operating mode for mobile testing
- automatic testing procedure for devices of class I, class II and line test
- reduction of the ISO testing voltage to 250 V/500 V
- testing of RCDs with 30 mA
- measuring result with “pass/fail” information
- sufficient battery capacity for > 2500 test samples

#### New features

- storage locations for 999 test samples
- keys for storing, calling and printing the measured values
- mini-USB interface for downloading measured values
- download software for the preparation of test certificates in MS Excel®
- log printing by means of optional printer *BENNING PT 1*
- prolonged active functional test (max. 2 x 5 minutes)
- integrated real-time clock for storing the measured values including the test date

#### Measuring functions

- protective conductor resistance with a pulsed testing current of 200 mA DC and automatic polarity reversal
- insulating resistance with a testing voltage of 250 V/500 V DC
- mains operating mode: protective conductor current/contact current by means of differential current/direct measurement method with automatic mains pole reversal
- battery operating mode: protective conductor current/contact current by means of alternative leakage current measurement method
- tripping time measurement of RCDs with 30 mA
- voltage measurement on external shock-proof socket
- active testing of three-phase devices under operating conditions by means of optional measuring adapters (item no. 044140/044141)



• 999 storage locations  
 • mini USB interface  
 • download software  
 • logging in MS Excel®



BENNING PT 1  
044150



044140/044141 (active)  
only for ST 725

### BENNING ST 725 Mains-operated and battery-operated Appliance Tester

	BENNING ST 725
indication	graphic display
protective conductor resistance	0.05 Ω – 20 Ω
insulation resistance	0.1 MΩ – 20 MΩ
protective conductor current/ contact current by means of - differential current - alternative leakage current - direct measurement method	0.25 mA – 20 mA 0.25 mA – 20 mA 0.1 mA – 2 mA
line test	R <sub>PE</sub> , R <sub>ISO</sub> , short-circuit test and continuity test of phase conductor (L) and neutral conductor (N)
testing current of RCD	30 mA + 150 mA
tripping time	10 ms – 500 ms
protective conductor current of three-phase test objects under operating conditions (optional)	0.25 mA – 10 mA
voltage	50 V – 270 V
interfaces	mini-USB for PC, serial PS/2 for BENNING PT 1 printer
scope of delivery	carrying case, test cable with alligator clip, mains connection cable, appliance cable, battery set
item no.	050316

#### Optional accessories for BENNING ST 725

**measuring adapters for three-phase loads (active)**  
 for measuring R<sub>PE</sub> and I<sub>PE</sub> under operating conditions  
 16 A CEE 5-pin active **item no. 044140**  
 32 A CEE 5-pin active **item no. 044141**

**Portable log printer BENNING PT 1**  
 incl. serial PS/2 data cable for direct connection to the BENNING ST 725 Appliance Tester **item no. 044150**

For further measuring adapters, see page 19



Scope of delivery  
BENNING ST 725



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

## BENNING ST 750 A

### Appliance Tester for testing electrical appliances and medical electrical devices

- testing according to
  - DIN VDE 0701-0702 (EN 62638): testing of electrical appliances/equipment
  - DIN VDE 0751-1 (EN 62353): testing of medical electrical devices, such as hospital bed
  - German Health and Safety at Work Regulation
- innovative - indication and operation via colour LCD touchscreen
- powerful - memory card for more than 100000 tests
- all in one - one appliance tester for all VDE tests

### 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 SD card
- direct entry via touchscreen and external keyboard/mouse
- 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
- 3 x USB interface, 1 x RS 232 interface and SD card slot
- free firmware 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
- testing of three-phase loads by means of optional measuring adapters
- additionally for VDE 0751-1: device leakage current, leakage current of application part type B, type BF and type CF



ST 750 A



Touchscreen

### TRUE RMS



Leakage

CM 9

Active testing of three-phase loads by means of test procedures with BENNING CM 9 differential current clamp and measuring adapter



044127/044128

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

	BENNING ST 750 A
display	5.7" colour LCD touchscreen, ¼ VGA
protective conductor resistance	1 mΩ – 20 Ω
insulation resistance	0.1 MΩ – 100 MΩ
protective conductor current/ contact current via differential current measurement method, alternative leakage current measurement method or direct measurement	0.05 mA – 25 mA
device leakage current and leakage current of the applied part for medical electrical devices	0.05 mA – 25 mA
line test	R <sub>PE</sub> , R <sub>ISO</sub> , I <sub>PE</sub> , short-circuit test and continuity test of phase conductor (L) and neutral conductor (N)
voltage/current	1 V - 360 V/0.1 A - 16 A
effective power/apparent power	20 W - 4000 W
interface	3 x USB, 1 x RS 232
dimensions/weight	405 x 330 x 165 mm/approx. 6 kg
scope of delivery	tester in waterproof (IP 67), break-proof case, test cable with alligator clip, appliance cable, input stylus, SD card
item no.	050320

### Order recommendation

- appliance tester **BENNING ST 750 A** item no. 050320
- software **BENNING PC-Win ST 750** item no. 047001
- barcode scanner item no. 009369
- barcode labels (1000 pieces) item no. 756301
- test badges "next test" (300 pieces) item no. 756212

### Optional accessories for BENNING ST 750 A

#### measuring adapters for three-phase loads (passive)

for measurement of R<sub>PE</sub>, R<sub>ISO</sub> and I<sub>EA</sub>

16 A CEE coupling, 5-pin - shock-proof plug item no. 044122

32 A CEE coupling, 5-pin - shock-proof plug item no. 044123

**Leakage Current Clamp BENNING CM 9** for measurement of differential current, protective conductor current, load current of loads (see pages 7/8) item no. 044065

**measuring adapters for leakage current clamp BENNING CM 9 single-phase**, conductors led through individually and with double insulation shock-proof socket/shock-proof plug item no. 044131

**three-phase**, conductors led through individually and with double insulation 16 A CEE-CEE, 5-pin item no. 044127

32 A CEE-CEE, 5-pin item no. 044128

See pages 18 and 19 for further accessories

# BENNING PC-Win ST 750 documentation software

## helpful accessories for efficient testing



Software PC-Win ST 750

### Software BENNING PC-Win ST 750

- professional PC software for the management and documentation of recorded measuring values
- explicit database structure with customer, department, test sample and test result including the test date
- easily creating and copying customers and test samples
- printing of the test results as single log and serial log
- bidirectional data transmission PC ↔ BENNING ST 750 A
- import and export function of existing test sample and customer databases via MS Excel®
- free software update to the latest version available per download

### Portable log printer BENNING PT 1 with Bluetooth®

- the perfect solution for printing test records rapidly on site
- high printing speed due to direct thermal printing process
- data transmission via Bluetooth® or RS232 interface
- power supply by means of rechargeable NiMH battery pack
- width/length of thermographic paper rolls: 58 mm/13 m
- included in delivery: 6 V battery pack, mains supply unit, belt clip, wall fastening, Bluetooth® dongle for BENNING ST 750 A, 2 rolls of thermographic paper and RS232 cable



BENNING PT 1 printer



Roll of thermographic paper



Barcode label

### Test sample identification via barcode scanner/labels

- particularly suited for repetitive testing and identification of large test sample inventories in offices, administrations etc.
- highly adhesive PVC barcode labels with barcode and consecutive numbering (reels of 1000 pieces)
- barcode scanner with USB interface supports all conventional barcodes such as UPC/EAN/JAN, Code 39, Code 128 etc.



Barcode scanner (example figure)

### Test sample identification via RFID reader and RFID tags (transponders)

- test sample identification via radiofrequency ("Radio Frequency Identification") without visual contact or direct contact of the RFID tag
- each RFID tag is provided with a worldwide unique UID no. (unique identifier) which can be read by means of the RFID reader and assigned to the test sample without any contact
- particularly suitable for harsh industrial environments
- Multi-frequency RFID reader for reading the UID no. of RFID tags with a frequency of 125 kHz and 13,56 MHz
- RFID tag, self-adhesive (125 kHz), strongly adhesive, for attachment onto/into the housing (not suited for metal housings)
- RFID tag, cable tie (125 kHz) for attachment to the mains supply line or to the housing
- RFID tag, tag-type (125 kHz) for attachment by means of cable ties (not included in the delivery)

### Compact industrial keyboard

- high-quality functional keyboard with integrated trackball for comfortable input of test sample/customer data on site
- compact keyboard dimensions for safe transport in the BENNING ST 750 A appliance tester
- data transmission via Bluetooth® or USB interface
- increased protection against dust and splash water



Industrial keyboard (example figure)



Multi-frequency RFID reader 009372



RFID tag self-adhesive 044156



RFID tag tag-type 044158



RFID tag cable tie 044157

### Optional accessories for BENNING ST 750 A

<b>software BENNING PC-Win ST 750</b> on CD-ROM incl. USB cable	<b>item no. 047001</b>
<b>barcode scanner</b> with USB interface	<b>item no. 009369</b>
<b>barcode labels</b> with consecutive numeric representation (1000 pieces)	<b>item no. 756301</b>
<b>printer BENNING PT 1</b> with Bluetooth® and RS 232 interface	<b>item no. 044150</b>
<b>roll of thermographic paper</b> (20 pieces)	<b>item no. 044151</b>

<b>industrial keyboard</b> with USB interface	<b>item no. 044154</b>
<b>Multi-frequency RFID reader</b> with USB interface (125 kHz + 13.56 MHz)	<b>item no. 009372</b>
<b>RFID tag, self-adhesive</b> (100 tags)	<b>item no. 044156</b>
<b>RFID tag, cable tie</b> (100 tags)	<b>item no. 044157</b>
<b>RFID tag, tag-type</b> (100 tags)	<b>item no. 044158</b>

See pages 18 and 19 for further accessories



## Safety Instruments BENNING IT 101, IT 115 and IT 130 testing of electrical systems in compliance with the standards

### BENNING IT 101

#### Insulation and Resistance Measuring Device

- measurement of the insulating resistance with testing voltages of 50 V, 100 V, 250 V, 500 V and 1,000 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
- 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 leads, magnetic hook, alligator clips, rubber protective frame and batteries



CAT IV 600 V  
TRUE RMS

IT 101



Scope of delivery BENNING IT 115

### BENNING IT 115, BENNING IT 130

#### TRUE RMS Installation Testers for safety tests on electrical systems according to 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 50 V, 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 RCDs with nominal fault currents of 10/30/100/300/500/1000 mA
- measurement of contact voltage (without tripping), tripping time and tripping current (ramp test) of RCDs
- phase-sequence testing in three-phase mains
- earthing measurement by means of optional earthing kit (044113)
- TRUE RMS voltage measurement of up to 550 V
- unambiguous "PASS"/"FAIL" indication by means of green/red LEDs



IT 115

### BENNING IT 101

#### Insulation and Resistance Measuring Device

	BENNING IT 101
<b>indicating range</b>	4000 digits (illumination)
<b>low-impedance resistance</b>	0.01 $\Omega$ – 40 $\Omega$
<b>insulation resistance</b>	50 k $\Omega$ – 20 G $\Omega$
<b>resistance</b>	0.01 $\Omega$ – 40 k $\Omega$
<b>voltage</b>	0.1 V – 600 V AC/DC TRUE RMS
<b>supplementary function</b>	leakage current, polarization index (PI), dielectric absorption rate (DAR), automatic discharge function, null balance of the measuring leads
<b>measured value memory</b>	500 measuring results
<b>measuring category</b>	CAT IV 600 V
<b>item no.</b>	044033

### BENNING IT 115, IT 130

#### TRUE RMS Installation Testers

	BENNING IT 115	BENNING IT 130
<b>display</b>	graphic display (illuminated)	
<b>low-impedance resistance</b>	0.01 $\Omega$ – 2000 $\Omega$	
<b>insulation resistance</b>	10 k $\Omega$ – 1000 M $\Omega$	
<b>line impedance</b>	0.01 $\Omega$ – 10 k $\Omega$	
<b>loop impedance</b>	0.01 $\Omega$ – 10 k $\Omega$	
<b>short-circuit current</b>	0.01 A – 200 kA	
<b>RCD testing</b>	AC/A/F	AC/A/F/B/B+
<b>phase sequence</b>	yes	
<b>voltage, frequency</b>	1 V - 550 V, 0 Hz - 500 Hz	
<b>earth resistance</b>	yes by means of 044113	
<b>current (TRUE RMS)</b>	–	yes by means of 044038
<b>luminous intensity</b>	–	yes by means of 044111
<b>measured value memory</b>	–	up to 1800
<b>interfaces</b>	–	USB, RS 232
<b>logging software</b>	–	yes
<b>item no.</b>	044104	044103



Scope of delivery BENNING IT 101

# TRUE RMS Installation Testers BENNING IT 115, IT 130 the perfect solution for efficient testing

## Features BENNING IT 115, BENNING IT 130

- all measuring functions can be selected directly by means of a rotary switch
- graphic display and help function with connecting diagram
- current supply by means of 6 NiMH storage batteries (AA) with charger

## Additional functions BENNING IT 130

in addition to the BENNING IT 115:

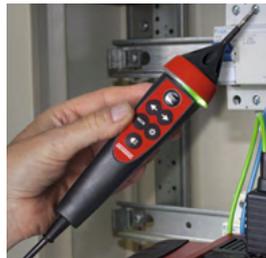
- testing of universal current-sensitive RCDs of type B/B+
- measured value memory covering four levels (object/block/ fuse/measuring point) for up to 1800 measurements
- bidirectional USB/ RS 232 interfaces
- BENNING PC-Win IT 130 software included
- including "Commander" probe tip with "TEST" and "MEM" keys as well as bright LED measuring point illumination
- connection for barcode scanner for identifying the measuring point and renaming the storage location
- current measurement (TRUE RMS) by means of current clamp adapter (optional)
- illumination measurement by means of lux sensor (optional)

## Logging software with Test Log according to ZVEH BENNING PC-Win IT 130

- creation and transmission of installation structures to the BENNING IT 130 for efficient periodic testing
- download of measured values and logging by means of test reports and ZVEH test certificates

## Professional accessories

- "Commander" probe tip (optional for BENNING IT 115)
- "Commander" test plug for shock-proof socket (optional)



"Commander" probe tip\*  
044155



"Commander" test plug  
044149



044148



044039  
Example figure



044038



IT 130

Testing of universal current-sensitive RCDs of type B



Test log according to ZVEH



Scope of delivery BENNING IT 130



044111

## Optional accessories

		item no.	applicable for
earthing set (2 earth rods, 3 test cables)	2 x 20 m, 1 x 4.5 m	044113	IT 115/IT130
measuring line BENNING TA 5	l = 40 m	044039	IT 115/IT130
CEE measuring adapter (V/rotary field)	16 A, 5-polig	044148	IT 115/IT130
"Commander" test plug	shock-proof sockets	044149	IT 115/IT130
"Commander" probe tip*	4 mm tip	044155	IT 115/IT130
current clamp adapter BENNING CC 3	0.2 A - 300 A AC/DC	044038	IT 130
BENNING Luxmeter type B	0.01 lux - 20 klux	044111	IT 130
barcode scanner with PS/2 connector	-	009371	IT 130

\* Included in the scope of delivery of the BENNING IT 130



009371



044113



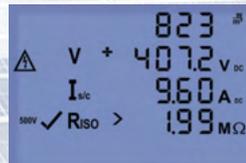
# BENNING PV 1-1 installation tester for photovoltaic systems

## Commissioning tests and periodic inspection of PV systems



### BENNING PV 1-1 PV installation tester for testing grid-connected PV systems

- tests in compliance with VDE 0126-23 (DIN EN 62446) standard
- easy – operation by means of keys with AUTO test procedure
- quick – testing within a few seconds only
- safe – contacting by means of PV connectors



Measured values transmitted via wireless connection



### Application

For commissioning tests and periodic inspection of grid-connected PV systems according to VDE 0126-23. Meets all requirements necessary for system documentation of the DC side. Ideal for troubleshooting, maintenance work and evaluation of PV systems.

### Features of the BENNING PV 1-1

- easy and safe operation by means of keys
- automatic test procedure for polarity, open-circuit voltage, short-circuit current and insulating resistance
- RISO measurement with "PASS/FAIL" indication
- memory of measured values for 200 PV strings
- integrated real-time clock with date/time stamp for each measurement
- USB interface and download software for the preparation of test certificates in MS Excel®
- safe contacting even during energy supply of the PV strings
- direct connection by means of MC4 and "Sunclix" connectors

### Measuring functions

- continuity test of the protective conductor and of the equipotential bonding conductor with a testing current of 200 mA
- polarity test of the DC current cables
- open-circuit voltage for each PV string of up to 1000 VDC
- short-circuit current for each PV string of up to 15 ADC
- insulating resistance with a testing voltage of 250 V, 500 V and 1000 VDC
- DC string current and AC current by means of *BENNING CC 3* current measuring clamp up to 40 A AC/DC (optional)

### Radio interface "Wireless SUN Link"

- wireless connection to the insolation and temperature measurement instrument *BENNING SUN 2* (optional)
- direct display of the insolation value in W/m<sup>2</sup>
- storage of the electric quantities to be measured considering the insolation and the module/ambient temperature in real time



BENNING CC 3

BENNING TA 5  
Example figure

### BENNING PV 1-1 Installation tester for photovoltaic systems

	BENNING PV 1-1
display	graphic display (illuminated)
protective conductor resistance	0.05 Ω – 199 Ω
insulating resistance	0.2 MΩ – 199 MΩ
open-circuit voltage with polarity	5 V to 1000 V DC
short-circuit current	0.5 A to 15 A DC
DC string current/ AC current	0.2 A to 40 A DC/AC (by means of <i>BENNING CC 3</i> )
insolation	100 to 1250 W/m <sup>2</sup> (by means of <i>BENNING SUN 2</i> )
PV module/ambient temperature	-30 °C to +125 °C (by means of <i>BENNING SUN 2</i> )
voltage via 4 mm sockets	30 to 440 V AC/DC
interface/radio interface	1 x USB/433 MHz signal
dimensions/weight	270 x 115 x 55 mm/2.6 kg
scope of delivery	carrying case, measuring lines, alligator clips, MC4 and "Sunclix" PV measuring lines, batteries, USB cable, download software on CD-ROM
item no.	050421

### Optional accessories for BENNING PV 1-1

Current clamp adapter *BENNING CC 3* for AC/DC current measurement 0.2 to 300 A AC/DC **item no. 044038**

Measuring line *BENNING TA 5* for protective conductor measurement Line length: 40 m **item no. 044039**



BENNING PV 1-1  
scope of delivery

# Insolation and temperature measuring instrument **BENNING SUN 2** with digital compass and inclinometer

## **BENNING SUN 2** Insolation and temperature measuring instrument for PV systems and solar thermal systems

Ideal for the planning, commissioning tests and periodic inspection of grid-connected PV systems according to VDE 0126-23 as well as for testing solar thermal systems.

### Features of the **BENNING SUN 2**

- universal 4-in-1 measuring instrument for all testing and maintenance work as well as for economic efficiency analysis
- temperature-compensated PV reference cell for precise insolation measurement
- precise temperature measurement by means of high-precision sensors
- data logger for 5000 data records, including insolation and module/ambient temperature
- integrated real-time clock with date/time stamp
- USB interface and download software for the preparation of test certificates in MS Excel®
- data logger with energy-saving stand-by mode
- shock-absorbing protective rubber holster

### Radio interface – “Wireless SUN Link”

- wireless transmission of insolation, module temperature and ambient temperature including date/time stamp to the **BENNING PV 1-1**



Wireless transmission of measuring data (alternatively import of measuring data by means of date/time stamp)

### Measuring functions

- insolation measurement in  $W/m^2$  or  $BTU/h/ft^2$
- dual-channel temperature sensor for measuring the module temperature and the ambient temperature
- digital compass for determining the cardinal direction
- inclinometer for determining the module/roof pitch



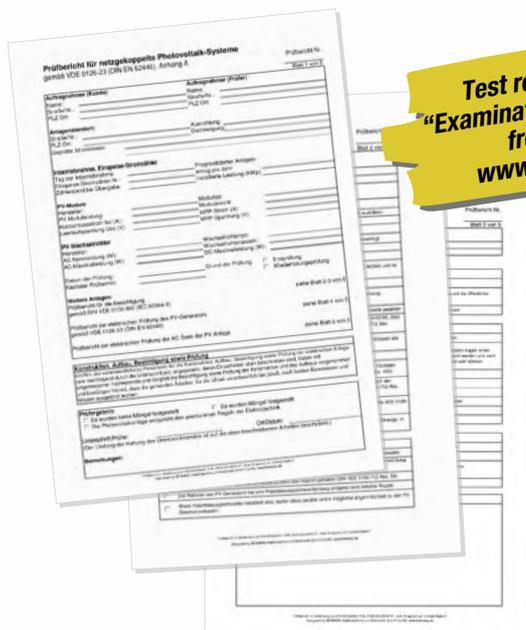
Insolation, angle of inclination and compass bearing



Insolation, PV module/ambient temperature

## **BENNING SUN 2** Insolation and temperature measuring instrument

	<b>BENNING SUN 2</b>
display	graphic display
insolation	100 to 1250 $W/m^2$
PV module/ambient temperature	-30 °C to +125 °C
compass bearing (orientation)	0° to 360°
angle of inclination measurement	0° to 80°
real-time clock	date/time stamp
measured value memory	5000 data records for insolation and temperature
interface/radio range	1 x USB/approx. 30 m for unobstructed view conditions
dimensions/weight	150 x 80 x 33 mm/350 g
scope of delivery	case, protective rubber holster, module/ambient temperature sensor, battery set, USB cable, download software on CD-ROM
item no.	050420



Test report forms  
“Examination of PV systems”  
free under  
[www.benning.de](http://www.benning.de)



**BENNING SUN 2**  
scope of delivery



# 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

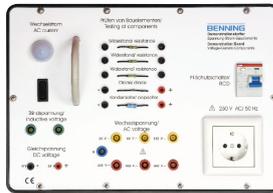
## BENNING DB 2

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

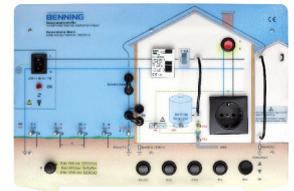
For further information visit our website [www.benning.de](http://www.benning.de)



particularly suited for teaching and education purposes, training courses and product presentations



portable case for simulation of electrical systems conforming to standards according to DIN VDE 0100/105



### Demonstration case

	<b>BENNING DB 1</b>
<b>power supply</b>	230 V, 50/60 Hz mains connection
<b>dimensions/weight</b>	405 x 330 x 160 mm, approx. 6 kg
<b>scope of delivery</b>	case with mains connection cable
<b>item no.</b>	044132

### Demonstration case

	<b>BENNING DB 2</b>
<b>power supply</b>	230 V, 50/60 Hz mains connection
<b>dimensions/weight</b>	450 x 330 x 110 mm, approx. 4.5 kg
<b>scope of delivery</b>	case with mains connection cable
<b>item no.</b>	044133

## Recommendation for the workshop equipment for enterprises of electrical engineer-craft according ZVEH and VDEW guidelines (Electricity Association)

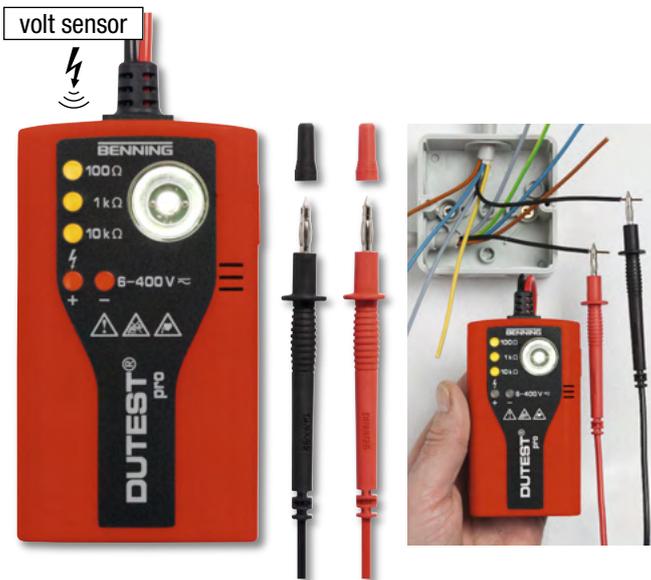
Required test and measurement	Tester/meter complying with standard	Single unit version I	Single unit/device combination version II	Single unit/device combination version III
Two-pole voltage tester	DIN VDE 0682-401 IEC/EN 61243-3	DUSPOL® analog item no. 050261	DUSPOL® expert item no. 050262	DUSPOL® digital item no. 050263
Voltage (min. 600 V) and current meter (min. 15 A)	DIN VDE 0411-1 IEC/EN 61010-1	MM 2 item no. 044028	MM 1-3 + CC 1 item no. 044084 + 044037	MM 7-1 + CC 1 item no. 044085 + 044037
Clip-on ammeter (min. 300 A)	DIN VDE 0411-1 IEC/EN 61010-1	CM 2 item no. 044035	CM 5-1 item no. 044066	CM 8 item no. 044064
Insulation tester	DIN VDE 0413-2 IEC/EN 61557-2	IT 101 item no. 044033		
Loop ohmmeter	DIN VDE 0413-3 IEC/EN 61557-3	–		
Ohmmeter	DIN VDE 0413-4 IEC/EN 61557-4	IT 101 item no. 044033	IT 115 item no. 044104	IT 130 item no. 044103
F/RCD-meter	DIN VDE 0413-6 IEC/EN 61557-6	–		
Phase sequence indicator	DIN VDE 0413-7 IEC/EN 61557-7	TRITEST® pro item no. 020052		
Instrument for testing electrical equipment (DIN VDE 0701-0702, 0751-1)	DIN VDE 0404-1 DIN VDE 0404-2	ST 710 item no. 050308	ST 725 item no. 050316	ST 750 A item no. 050320
<b>Additional recommendation ZVEH</b>				
Grounding gauge	DIN VDE 0413-6 IEC/EN 61557-6	–	Earthing set for IT 115 item no. 044113	Earthing set for IT 130 item no. 044113
Continuity tester	DIN VDE 0413-7 IEC/EN 61557-7		DUTEST® pro item no. 050156	
Light meter lux meter	–	–	–	Luxmeter type B for IT 130 item no. 044111
<b>Additional recommendation of BENNING</b>				
Differential current clamp for error current determination in electric equipment and systems	DIN VDE 0411-1 IEC/EN 61010-1 DIN VDE 0404-4	CM 9 item no. 044065	CM 9 item no. 044065	CM 9 item no. 044065

# Professional continuity tester and phase sequence indicator for three-phase mains

## DUTEST® pro

### Continuity and line tester for testing high-impedance and low-impedance resistances

- continuity and semiconductor test by means of LEDs and loud buzzer
- visual indication by means of three LED steps: 0 - 100 Ω/1 kΩ/10 kΩ
- acoustic indication via buzzer up to approx. 100 Ω
- external-voltage indication: 6 V to 400 V AC/DC (LEDs/ buzzer)
- polarity test, single-pole external conductor test (phase) and non-contact cable break detector (volt sensor)
- buzzer volume and brightness of the torch are adjustable
- precise and powerful LED torch
- integrated magnetic holder and belt clip at the rear of the housing



DUTEST® pro  
item no. 050156

## TRITEST® pro

### Phase sequence indicator with high-power LED torch and magnetic suspension

- indication of „clockwise“ and „counter-clockwise“ phase sequence by means of green/red LED
- indication of phase voltages L1, L2 and L3 by means of red LED
- voltage range: 400 V to 500 V AC (50 Hz to 60 Hz)
- luminous high-power LED torch
- integrated magnetic holder and belt clip at the rear of the housing
- including three attachable 4 mm probe tips and alligator clip



TRITEST® pro  
item no. 020052

## TRITEST® easy

### Non-contact phase/phase sequence tester

- phase sequence testing in three-phase mains
- phase testing on sockets and distribution boxes
- testing with regard to phase balance
- testing insulated lines (cable reel, chains of lights) of cable breaks
- indication via red/green probe tip and buzzer
- ON/OFF push-button with automatic switch-off
- voltage range: 200 V – 1000 V AC
- break-proof ABS housing and easy operation
- incl. Batteries and pen clip



CAT IV 600 V

TRITEST® easy  
item no. 020051



Phase sequence testing  
green = clockwise



Testing of cable breaks



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

### Practical stand-by cases

- stand-by case with belt loop (except for size M)
- made of hard-wearing nylon fabric

case	approx. dimensions	item no.
<b>DUSPOL®</b>	330 x 100 x 60 mm	<b>010911</b>
<b>Size S</b>	220 x 110 x 50 mm	<b>010912</b>
<b>Size M</b>	240 x 180 x 70 mm	<b>010913</b>



010911



010912



010913

### **BENNING TA 1**

item no. **044124**

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



Example figure

### **BENNING TA 2**

item no. **044125**

set of Ø 4 mm safety measuring leads, six pieces, red/black, professional equipment, consisting of:

- safety measuring leads (silicone), CAT III 1000 V
- safety test probes (4 mm measuring tip), CAT II 1000 V
- safety crocodile clips, CAT III 1000 V



Example figure

### **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



Example figure

### **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. **044146**

Ø 4 mm safety measuring leads 2 pieces, red/black, L = 1.40 m, with 2 mm measuring tip CAT IV 600 V/ CAT III 1000 V (with protective caps), CAT II 1000 V (without protective caps)



### Ø 4 mm safety measuring leads with 4 mm measuring tip

item no. **044145**

Ø 4 mm safety measuring leads 2 pieces, red/black, L = 1.40 m, with 4 mm measuring tip CAT IV 600 V/ CAT III 1000 V (with protective caps), CAT II 1000 V (without protective caps)



### **BENNING TA 5**

item no. **044039**

40 m measurement cable with practical winder, strap, for the measurement of protective and bonding conductors, Connection: Ø 4 mm safety test



Example figure

### Set of safety measuring leads for *BENNING MM 4*

item no. **044119**

set of Ø 4 mm safety measuring leads, 3 pieces, consisting of:

- safety measuring leads with 2 mm measuring tip
- 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 5-2*, *MM 7-1*, *MM 11* and *CM 8* digital measuring instruments



# Measuring adapters for BENNING ST 710/ST 725/ST 750 A appliance testers and BENNING CM 9 leakage current clamp

## Measuring adapters for BENNING ST 710/ST 725/ST 750 A

### Measuring adapters for single-phase loads (passive)

for measuring  $R_{PE}$ ,  $R_{ISO}$  and  $I_{EA}$ , CEE coupling (3-pin) with shock-proof plug

- 16 A CEE (3-pin) item no. 044143
- 32 A CEE (3-pin) item no. 044144



for ST 710/725/750 A

### Measuring adapters for three-phase loads (passive)

for measuring  $R_{PE}$ ,  $R_{ISO}$  and  $I_{EA}$ , CEE coupling (5-pin) with shock-proof plug

- 16 A CEE (5-pin) item no. 044122
- 32 A CEE (5-pin) item no. 044123



for ST 710/725/750 A

### Measuring adapter for single-phase and three-phase loads (passive)

for measuring  $R_{PE}$ ,  $R_{ISO}$  and  $I_{EA}$ , triple CEE coupling with shock-proof plug

- Triple CEE coupling: 16 A CEE (5-pin), 32 A CEE (5-pin), 16 A CEE (3-pin) item no. 044147



for ST 710/725/750 A

### Measuring adapter for BENNING ST 710/ST 725

Shock-proof plug with 4 mm plug for appliances without shock-proof plug

item no. 044142



for ST 710/725

### Measuring adapters for BENNING ST 725 (active)

Measuring adapters for three-phase loads for measuring  $R_{PE}$  and  $I_{PE}$  (direct measurement method) by means of current transformer, CEE (5-pin) with shock-proof plug

- 16 A CEE (5-pin) item no. 044140
- 32 A CEE (5-pin) item no. 044141



for ST 725

### Measuring adapters for BENNING CM 9 leakage current clamp (active)

for measuring the differential/protective conductor/load current, conductors led through individually, with double insulation

- Single-phase, shock-proof plug/coupling item no. 044131

- Three-phase, 16 A CEE (5-pin) item no. 044127
- 32 A CEE (5-pin) item no. 044128



for CM 9

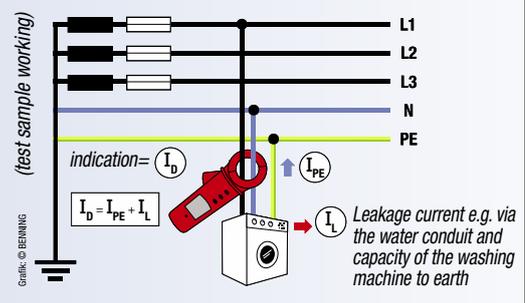
for CM 9

### BENNING CM 9 leakage current clamp

for measuring the differential/protective conductor/load current of single-phase and three-phase loads (1  $\mu$ A to 100 A AC) (see page 7)

item no. 044065

TRUE RMS





## Professional VDE seminars Service hotline with 24h service

### 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 725/ST 750 A* 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.

### VDE 0126-23 seminar Testing of grid-connected photovoltaic systems

#### Features:

The seminar is intended for qualified electricians who have to carry out commissioning tests and periodic inspection of grid-connected photovoltaic systems in compliance with the VDE 0126-23 standard. 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 photovoltaic tester *BENNING PV 1-1* as well as of the insulation and temperature measuring instrument *BENNING SUN 2*.

#### Content:

Regulations, testing of the AC side, testing of the DC side (polarity test, open-circuit voltage, short-circuit current, insulating resistance and operating current measurement for each PV string of the PV generator) as well as minimum requirements for system documentation in compliance with VDE 0126-23.



Factory II, Robert-Bosch-Straße 20, D-46397 Bocholt

Your distributor:

### 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 115/IT 130* testers as well as of the *BENNING PC-Win IT 130* 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.

**Seminar venue:** BENNING GmbH & Co. KG,  
Robert-Bosch-Straße 20, 46397 Bocholt  
to be agreed upon

**Seminar dates:** We are happy to make you an offer

**Seminar fee:** phone +49 (0) 28 71/93 - 557, Fax -585  
e-mail: trainingcenter@benning.de

**Contact:** 4 or 6 hours

**Duration:** 4 or 6 hours  
**Scope of services:** Intensive training in small groups of up to 5 persons, training material, certificate of attendance and refreshments during the seminar

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

**free  
24h service**

**Service Hotline:  
+49 (0) 28 71/93 - 555**

### Testing, measuring and safety instruments The whole range of testers from one supplier

Developing safe and practical testing and measuring instruments which comply with the relevant standards is an integral part of BENNING's product philosophy for more than 65 years now. Today, BENNING offers a comprehensive product range of high-quality testing, measuring and safety devices the quality requirements of which are orientated according to the demands of professional users. With the generation of *DUSPOL*® voltage testers and with the measuring and safety devices, BENNING sets pioneer standards worldwide concerning safety, functionality and design.

# BENNING

BENNING Elektrotechnik und Elektronik GmbH & Co.KG  
Münsterstraße 135-137 • D-46397 Bocholt  
Tel.: + 49 / (0) 2871 / 93-111 • Fax: + 49 / (0) 2871 / 93-429  
**www.benning.de • E-Mail: duspol@benning.de**