

# BENNING

## Testing, Measuring and Safety Instruments



## Quality for industry, trade and service

### *Innovative developments and consistent manufacturing quality*

Innovative developments and consistent manufacturing quality are the basis for the excellent international reputation of BENNING products. Their design and implementation are based on the requirements of professional users.

#### **Voltage, continuity and phase sequence testers**

The DUSPOL® and DUTEST® product range is intended for voltage, phase, polarity, phase sequence, continuity and semiconductor testing.

#### **Digital multimeters and digital current clamps**

The product range offers the ideal solution for all requirements and applications. We manufacture both devices using the conventional averaging measuring method (RMS) and the TRUE RMS measuring method up to the highest measuring category CAT IV.

#### **Measuring devices for photovoltaics**

BENNING offers a range of measuring devices and accessories for commissioning tests, periodic testing and performance assessment of grid-connected PV systems in compliance with the standards IEC/EN 62446 (VDE 0126-23) and IEC/EN 61829 (VDE 0126-24). (**BENNING PV 1-1 / PV 2 / SUN 2 / SOLAR Manager**)

#### **The appliance testers**

##### **BENNING ST 710 / ST 725 / ST 755 / ST 760**

allow safe and time-saving safety and periodic testing of electrical appliances in compliance with the standards DIN VDE 0701-0702, DIN EN 62353 (VDE 0751-1), DIN EN 60974-4 (VDE 0544-4) and DGUV Regulation 3.

#### **Insulation multimeters and installation testers**

The insulation multimeter **BENNING IT 101** and the installation testers **BENNING IT 105 / IT 115 / IT 130** are intended for safety testing of low-voltage electrical installations according to the standard IEC/EN 60364 (DIN VDE 0100/0105).



## Any further questions?

### *Choose your contact person*

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## Voltage Tester and Continuity Tester

### *Socket Tester and Phase Sequence Indicator*

- DUSPOL® Voltage Tester – the original since 70 years
- PROFIPOL®+ Voltage Tester – a plus in functionality
- DUTEST® pro Continuity and Line Tester with LED torch
- BENNING SDT 1 Socket Tester
- TRITEST® pro Phase Sequence Indicator with LED torch
- TRITEST® easy non-contact Phase Sequence and Phase Tester



# The generation DUSPOL® Voltage Testers

safe voltage testing up to 1000 V



tested and approved



IEC/EN 61243-3  
(VDE 0682-01):  
2015 standard

## The international standard for voltage testers IEC 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 IEC/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.

- 1**  
phase-sequence test  
(counter-clockwise/clockwise)


- 2**  
sensor of non-contact  
cable break detector


- 3**  
single-pole  
phase test


- 4**  
measuring point  
illumination


- 5**  
acoustic and optical  
continuity test


- 6**  
frequency indication


- 7**  
LC display with  
background lighting



DUSPOL® analog

1000 V AC/DC CAT IV 600 V



DUSPOL® expert

1000 V AC/DC CAT IV 600 V



DUSPOL® digital

1000 V AC  
1200 V DC CAT IV 600 V



**7** voltage indication  
1 – 1000 V AC TRUE RMS  
1 – 1200 V DC

**TRUE RMS**

resistance measurement and diode test with conducting state voltage indication



**8** load connection via push buttons



**9** vibrating alert in the test handle



**10** housing with protection against dust and water jets



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 underline 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 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 (continuity tests even of live components, such as e. g. fuses in “intermeshed” systems).
- 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

## 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
- acoustic continuity test with loud buzzer and visual indication by means of yellow LED (continuity tests even of live components, such as e. g. fuses in “intermeshed” systems).
- single-pole external conductor test (phase) and polarity test
- non-contact cable break detector (yellow LED)



## Voltage and Continuity Tester

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

See page 8 for further accessories

# Professional Continuity Tester

## Socket Tester with contact sensor

6

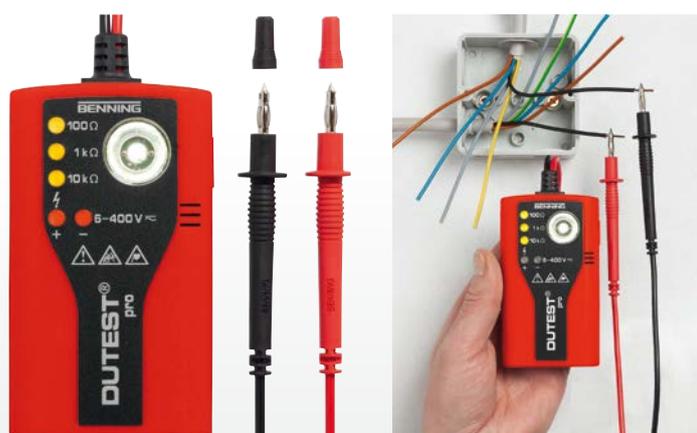
### DUTEST® pro continuity and line tester for testing high-impedance and low-impedance resistances

- 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

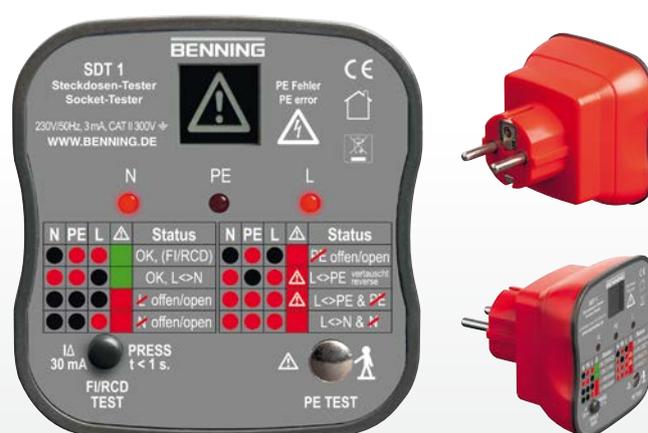
### BENNING SDT 1 socket tester with contact sensor for active PE error detection

- quick and easy testing of shock-proof sockets for correct connection
- 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
- contact sensor warns of a dangerous contact voltage at the PE contact via the LC display
- unambiguous indication via LEDs and LC display
- FI/RCD TEST key for testing the tripping function of 30 mA RCDs
- 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

DUTEST® pro



SDT 1



## Continuity and Line Tester

	DUTEST® pro
LED indication	3 x yellow, 2 x red
acoustic continuity test	loud test buzzer up to 100 Ω
visual continuity test	0 - 100 Ω/1 kΩ/10 kΩ (yellow LEDs)
voltage range	6 V - 400 V AC/DC (50 Hz/60 Hz)
single-pole external conductor test	•
polarity test	•
cable break detector	•
luminous LED torch	yes, adjustable to four levels
safety	IEC/EN 61010-1
measuring category	CAT III 300 V
batteries	3 x 1.5 V batteries of type AA (LR6)
scope of delivery	incl. set of measuring leads
item no.	050156

See page 8 for further accessories

## Socket Tester

	BENNING SDT 1
indication	3 red LEDs for N, PE, L conductor and LC display "⚠"
voltage range	230 V AC, ± 10 %
frequency range	50 Hz - 60 Hz
PE test response threshold	$U_b < 50$ V AC to earth
RCD testing current	$I_{\Delta n}$ approx. 30 mA
power supply	via test object (no batteries required)
safety	IEC/EN 61010-1, IEC/EN 61010-2-033
measuring category	CAT II 300 V
appliance dimensions	80 x 72 x 78 mm (L x B x H)
appliance weight	70 g
item no.	020053

# Phase Sequence Indicator for three-phase mains

## Non-contact Phase/Phase Sequence Tester

### 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® easy non-contact phase/phase sequence tester for easy and quick testing

- easy phase sequence testing in three-phase mains by means of green LED probe tip (lights up) = clockwise phase sequence  
red LED probe tip (lights up) = counter-clockwise phase sequence
- 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
- highest measuring category CAT IV 600 V
- break-proof ABS housing and easy operation
- incl. Batteries and pen clip

TRITEST® pro



TRITEST® easy



CAT IV 600 V

Phase sequence testing  
green = clockwise

Testing of cable breaks

## Phase Sequence Indicator

	TRITEST® pro	TRITEST® easy
indication	4 x red, 1 x green LEDs	LED probe tip/buzzer
phase sequence indication	green/red LED for clockwise/counter-clockwise phase sequence	green/red LED probe tip for clockwise/counter-clockwise phase sequence
single-pole external conductor test	–	red LED probe tip flashing/buzzer
voltage range	400 V - 500 V AC	200 V - 1000 V AC
frequency range	50 Hz - 60 Hz	45 Hz - 65 Hz
cable break detector	–	•
luminous LED torch	yes, single-level	–
safety	IEC/EN 61010-1, IEC/EN 61557-1, IEC/EN 61557-7	IEC/EN 61010-1
measuring category	CAT III 300 V	CAT IV 600 V, CAT III 1000 V
batteries	3 x 1.5 V batteries of type AA (LR6)	2 x 1.5 V batteries of type AAA (LR03)
scope of delivery	incl. set of measuring leads/test probes, alligator clip	incl. batteries
item no.	020052	020051

See page 8 for further accessories

# Accessories for Voltage Testers, Continuity and Line Tester, Phase Sequence Indicator

*functional and indispensable*

	Description	Product data	Item no.	DUSPOL®	PROFIPOL®+	DUTEST® pro	SDT 1	TRITEST® pro	TRITEST® easy
<b>Hard case / stand-by cases</b>									
	<b>Robust hard case</b> with foam insert, separate shelf and lid compartment for accessories and small parts. Safe transport protection for high-quality testing and measuring instruments.	Made of ABS material, dust and waterproof, dimensions 375 x 190 x 250 mm	10198412	•	•	•	•	•	•
	<b>Stand-by case DUSPOL®</b> dimensions: 330 x 100 x 60 mm	With belt loop on the back, made of hard-wearing nylon fabric	010911	•	•				
	<b>Stand-by case size S</b> dimensions: 220 x 110 x 50 mm	With belt loop on the back, made of hard-wearing nylon fabric	010912			•		•	•
<b>Test probe cap</b>									
 figure 1:1	<b>4 mm test probe cap (GS 38)</b> packaging unit = 10 test probe caps (sufficient for 5 voltage testers)	Rubberized test probe cap (GS 38) for reducing the test probe contact to a length of 4 mm	10184809	•	•				

## Digital Multimeter with safety and function without any compromises

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

### Digital Multimeter with proven quality and technology:

- BENNING MM P3 – a variety of function in pocket size
- BENNING MM 2/MM 3 – precise current measuring ranges of 200  $\mu$ A up to 20 A

### For precise measurements in trade, service and industry:

- BENNING MM 5 series – compact housing with magnetic hanger in a rubber holster
- BENNING MM 6 series, MM 7-1 – maximum safety thanks to highest measuring category
- BENNING MM 12 – with data logger, Bluetooth®, PC software and app



**BENNING**

# Digital-Multimeter BENNING MM P3, MM 1-1 - MM 1-3

*reliable and precise in each and every situation*

## BENNING MM P3

### pocket-size

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

## BENNING MM 1-1, MM 1-2 and MM 1-3

### with volt sensor function

- extremely compact housing type
- 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
- delivery including case, batteries, measuring leads and wire temperature sensor (MM 1-3)

MM P3



MM 1-1

volt sensor



MM 1-2

volt sensor



MM 1-3

volt sensor



## Digital-Multimeter

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

See page 14 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

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

*safety and functional diversity without any compromises*

## BENNING MM 1, MM 2 and MM 3

### quality that convinces

- basic measuring for current, voltage, resistance, capacity, frequency, continuity and diode test
- precise current measuring ranges (200  $\mu$ A and 2/20/200 mA) for ionization current measurement at the gas burner and for testing the sacrificial anode in the hot water tank (HVAC technicians) (MM 2/MM 3)
- automatic and/or manual measuring range selection
- delivery including rubber holster, case, battery/batteries and measuring leads

## BENNING MM 4

### with current clamp adapter

- basic measuring for AC current, voltage, resistance, continuity and diode test
- automatic and manual measuring range selection
- safe current measuring up to 300 A AC via attachable current clamp adapter (max. clamp opening 30 mm)
- delivery including case, batteries, measuring lead and measuring probes



## Digital-Multimeter

	BENNING MM 1	BENNING MM 2	BENNING MM 3	BENNING MM 4
indicating range	3200	2000	2000	4200
basic accuracy	0.5 %	0.5 %	0.5 %	0.5 %
AC voltage	1 mV - 600 V	100 $\mu$ V - 750 V	100 $\mu$ V - 600 V	1 mV - 600 V
DC voltage	100 $\mu$ V - 600 V	100 $\mu$ V - 1000 V	100 $\mu$ V - 600 V	1 mV - 600 V
AC current	–	0.1 $\mu$ A - 20 A	0.1 $\mu$ A - 20 A	0.1 A - 300 A
DC current	0.1 $\mu$ A - 3.2 mA	0.1 $\mu$ A - 20 A	0.1 $\mu$ A - 20 A	–
resistance	0.1 $\Omega$ - 32 M $\Omega$	0.1 $\Omega$ - 20 M $\Omega$	0.1 $\Omega$ - 20 M $\Omega$	0.1 $\Omega$ - 42 M $\Omega$
continuity/diode	• / •	• / •	• / •	• / •
frequency	–	–	1 Hz - 200 kHz	–
capacity	–	–	1 pF - 200 $\mu$ F	–
temperature	–	–	–	–
volt sensor	–	–	–	–
interface	–	–	–	–
software	–	–	–	–
memory	HOLD	–	–	HOLD
Data Log function	–	–	–	–
measuring method	RMS	RMS	RMS	RMS
measuring category	CAT III 600 V	CAT III 600 V	CAT III 300 V	CAT III 300 V
item no.	044027	044028	044029	044073

See page 14 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

# TRUE RMS Digital Multimeter BENNING MM 5-1, MM 5-2, MM 6-1, MM 6-2

TRUE RMS measuring method to satisfy highest demands on accuracy

## BENNING MM 5-1, MM 5-2 compact, precise and innovative

- compact dimensions: 140 x 70 x 33 mm (without holster)
- 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 (MM 5-2)
- LC display with illumination (MM 5-2)
- delivery including rubber holster with magnetic hanger, case, batteries, measuring leads as well as wire temperature sensor (MM 5-2)

## BENNING MM 6-1, MM 6-2 compact, precise, with highest safety

- highest measuring category CAT IV 600 V for highest safety
- “AutoV” function with low input impedance (LoZ) to suppress reactive voltages
- rubber holster with integrated magnetic hanger
- Volt sensor for non-contact signaling of phase voltages and cable breaks in lines (buzzer/red LED)
- continuity test by means of red LED and buzzer
- LC display with bar graph indication and illumination
- delivery including rubber holster with magnetic hanger, case, batteries, measuring leads as well as wire temperature sensor (MM 6-1)



## TRUE RMS Digital Multimeter

	BENNING MM 5-1	BENNING MM 5-2	BENNING MM 6-1	BENNING MM 6-2
indicating range	6000	6000	6000	6000
basic accuracy	0.5 %	0.5 %	0.5 %	0.5 %
AC voltage	100 $\mu$ V - 600 V	100 $\mu$ V - 600 V	100 $\mu$ V - 1000 V	100 $\mu$ V - 1000 V
DC voltage	100 $\mu$ V - 600 V	100 $\mu$ V - 600 V	100 $\mu$ V - 1000 V	100 $\mu$ V - 1000 V
AC current	–	20 mA - 10 A	0.1 $\mu$ A - 600 $\mu$ A	20 mA - 10 A
DC current	–	0.1 $\mu$ A - 10 A	0.1 $\mu$ A - 600 $\mu$ A	1 mA - 10 A
resistance	0.1 $\Omega$ - 40 M $\Omega$			
continuity/diode	• / •	• / •	• / •	• / •
frequency	0.01 Hz - 50 kHz	0.01 Hz - 50 kHz	0.01 Hz - 100 kHz	0.01 Hz - 100 kHz
capacity	0.01 nF - 1 mF	0.01 nF - 1 mF	1 nF - 10 mF	1 nF - 10 mF
temperature	–	-40 °C up to +400 °C	-40 °C up to +400 °C	–
volt sensor	•	•	•	•
interface	–	–	–	–
software	–	–	–	–
memory	HOLD, PEAK	HOLD, PEAK	HOLD, PEAK, REL	HOLD, PEAK, REL
Data Log function	–	–	–	–
measuring method	TRUE RMS	TRUE RMS	TRUE RMS	TRUE RMS
measuring category	CAT III 600 V	CAT III 600 V	CAT IV 600 V	CAT IV 600 V
item no.	044070	044071	044086	044087

See page 14 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

# TRUE RMS Digital Multimeter BENNING MM 7-1, MM 12

for all sophisticated measuring tasks in industry and trade

## BENNING MM 7-1

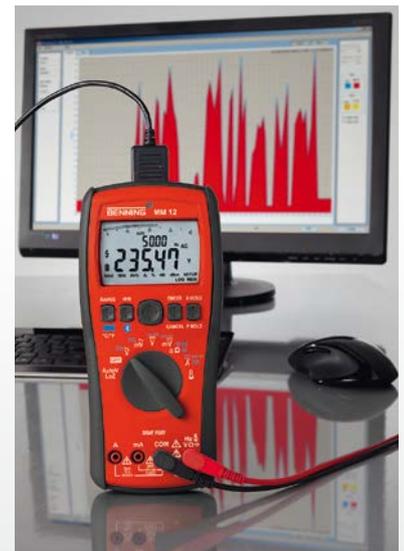
with highest safety for industrial applications

- 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
- the integrated Volt sensor signals non-contact phase voltages and cable breaks in cables (buzzer/LCD)
- LC display with bar graph indication and illumination
- delivery including rubber holster, case, battery, measuring leads and wire temperature sensor

## BENNING MM 12

with logging function and Bluetooth®

- data logger (40000 measured values) and memory function (1000 measured values)
- Bluetooth® Low Energy 4.0 and USB interface
- PC software for further evaluation
- free IOS and Android app for data link to smartphone/tablet
- "AutoV" function with low input impedance (LoZ) to suppress reactive voltages
- low-pass filter (HFR) for measurements at pulsed motor drives
- highest measuring category CAT IV 600 V for highest safety
- LC display with bar graph indication and illumination
- delivery including PC software, USB data cable, rubber holster, magnetic holder, case, batteries, measuring leads, wire temperature sensor and calibration certificate



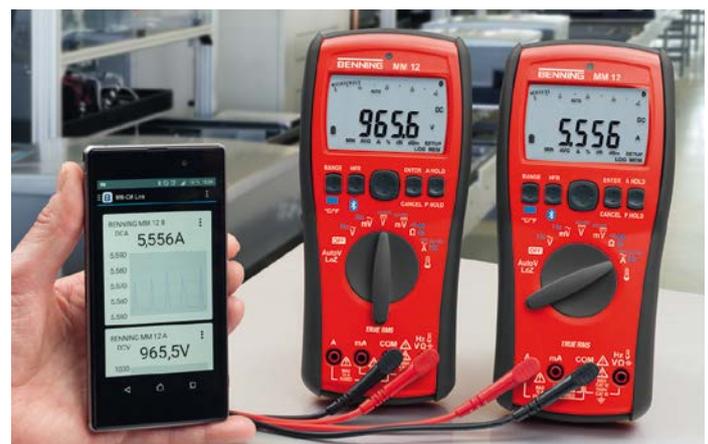
Evaluation via PC software

## TRUE RMS Digital Multimeter

	BENNING MM 7-1	BENNING MM 12
indicating range	6000	40000
basic accuracy	0.08 %	0.5 %
AC voltage	10 µV - 1000 V	10 µV - 1000 V
DC voltage	10 µV - 1000 V	10 µV - 1000 V
AC current	10 µA - 10 A	10 µA - 10 A
DC current	10 µA - 10 A	10 µA - 10 A
resistance	0.1 Ω - 40 MΩ	0.1 Ω - 40 MΩ
continuity/diode	• / •	• / •
frequency	0.01 Hz - 100 kHz	0.1 Hz - 100 kHz
capacity	1 nF - 10 mF	0.01 nF - 40 mF
temperature	-40 °C up to +400 °C	-200 °C up to +1200 °C
volt sensor	•	-
interface	-	Bluetooth®, USB
software	-	PC, App
memory	HOLD, MAX/MIN	HOLD, PEAK, MAX/MIN, SAVE
Data Log function	-	40000 measured values
measuring method	TRUE RMS	TRUE RMS
measuring category	CAT IV 600 V	CAT IV 600 V
item no.	044085	044088

See page 14 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.



Simultaneous monitoring of up to 5 digital multimeters from a safe distance

# Accessories for Digital Multimeter

safe – functional – indispensable

Image	Description	Product data	Item no.	MM P3	MM 1-1	MM 1-2	MM 1-3	MM 1	MM 2	MM 3	MM 4	MM 5-1	MM 5-2	MM 6-1	MM 6-2	MM 7-1	MM 12
<b>Current Clamp Adapters</b>																	
	<b>BENNING CC 1</b> AC current clamp adapter	basic accuracy: 1.9 % current: 1 A - 400 A AC output: 1 mV AC per 1 A AC	044037		•	•	•		•	•		•	•	•	•	•	•
	<b>BENNING CC 3</b> AC/DC current clamp adapter	basic accuracy: 1 % - 2 % current: 0.2 A - 300 A AC/DC output: 1 mV/10 mV AC/DC per 1 A AC/DC	044038		•	•	•		•	•		•	•	•	•	•	•
	<b>BENNING CFlex 1</b> AC current transformer	basic accuracy: 3 % current: 0.3 A - 3000 A AC output: 100 mV/10 mV/1 mV AC per 1 A AC	044068		•	•	•		•	•		•	•	•	•	•	•
<b>Hard case / stand-by cases</b>																	
	<b>Robust hard case</b> with foam insert, separate shelf and lid compartment for accessories and small parts. Safe transport protection for high-quality testing and measuring instruments.	Made of ABS material, dust and waterproof, dimensions 375 x 190 x 250 mm	10198412	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	<b>Stand-by case size S</b> dimensions: 220 x 110 x 50 mm	with belt loop on the back, made of hard-wearing nylon fabric	010912		•	•	•	•				•	•	•	•		
	<b>Stand-by case size M</b> dimensions: 240 x 180 x 70 mm	made of hard-wearing nylon fabric	010913	•	•	•	•	•	•	•	•	•	•	•	•	•	•
<b>Measuring accessories</b>																	
	<b>BENNING TA 1</b> crocodile clips, two pieces	Ø 4 mm plug-in technology, red/black, professional equipment, CAT III 1000 V	044124	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	<b>BENNING TA 2</b> set of measuring leads, six pieces	Ø 4 mm plug-in technology, red/black, professional equipment, consisting of: measuring leads (silicone) CAT III 1000 V, test probes (Ø 4 mm measuring tip) CAT II 1000 V, crocodile clips CAT III 1000 V	044125	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	<b>BENNING TA 3</b> set of measuring leads, eight pieces	Ø 4 mm plug-in technology, red/black, professional equipment, CAT III 1000 V, consisting of: measuring leads (silicone), test probes (slender measuring tip), claw clamps, crocodile clips	044126	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	<b>BENNING TA 4</b> magnetic holder, three pieces	For attachment of multimeters to switching cabinets, machine and system parts. Consisting of: magnetic holder, adapter and belt	044120	•	•	•	•	•	•	•						•	•
	<b>Ø 4 mm safety measuring leads with 2 mm measuring tip</b> , two pieces	Red/black, L = 1.40 m, with Ø 2 mm measuring tip (L = 18 mm), CAT IV 600 V/CAT III 1000 V (with protective caps), CAT II 1000 V (without protective caps)	044146	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	<b>Ø 4 mm safety measuring leads with 4 mm measuring tip</b> , two pieces	Red/black, L = 1.40 m, with Ø 4 mm measuring tip (L = 18 mm), CAT IV 600 V/CAT III 1000 V (with protective caps), CAT II 1000 V (without protective caps)	044145	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	<b>Set of measuring leads for BENNING MM 4</b> , Ø 4 mm plug-in technology, three pieces	Consisting of: measuring lead with Ø 2 mm measuring tip, 2 measuring probes with Ø 2 mm measuring tip	044119								•						
	<b>Temperature probe, type K, insertion probe</b> (V4A steel tube)	For flexible substances, liquids, gases and air. Measuring range: - 196 °C up to + 800 °C	044121				•						•	•		•	•
<b>Ceramic fuse</b>																	
	<b>440 mA fuses</b> packaging unit 10 pieces	fast-acting, breaking capacity 10 kA, rated voltage 1000 V, dimensions 10 x 35 mm	10016655													•	•
	<b>1 A fuses</b> packaging unit 10 pieces	fast-acting, rated current 1 A, rated voltage 500 V, dimensions 6.3 x 32 mm	749669						•	•							
	<b>10 A fuses</b> packaging unit 10 pieces	fast-acting, rated current 10 A, breaking capacity 50 kA, rated voltage 600 V, dimensions 10 x 38 mm	748263			•	•										
	<b>11 A fuses</b> packaging unit 10 pieces	fast-acting, rated current 11 A, breaking capacity 20 kA, rated voltage 1000 V, dimensions 10 x 38 mm	10016656													•	•
	<b>15 A fuses</b> packaging unit 10 pieces	fast-acting, rated current 15 A, breaking capacity 50 kA, rated voltage 600 V, dimensions 10.3 x 38.1 mm	10149447										•				
	<b>16 A fuses</b> packaging unit 10 pieces	fast-acting, rated current 16 A, rated voltage 500 V, dimensions 6.3 x 32 mm	749770						•	•							

## Digital Current Clamp Multimeter for AC/DC current

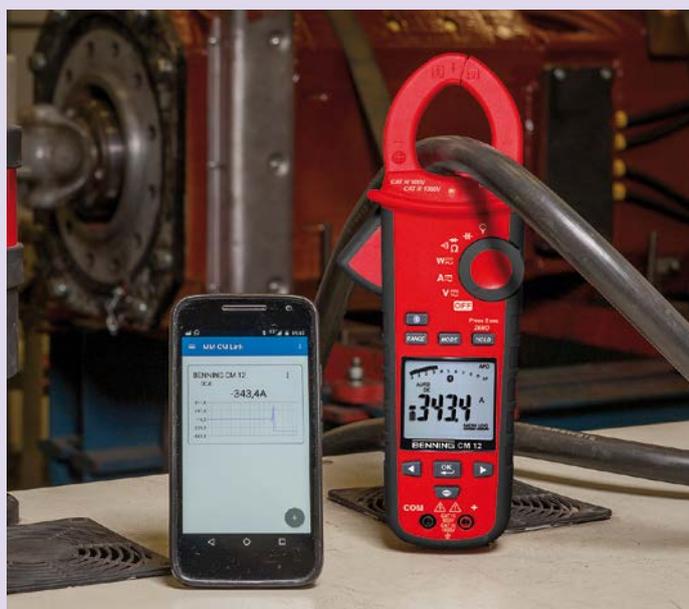
*TRUE RMS measuring method to satisfy highest demands on accuracy*

**Particularly for troubleshooting in electrical installations and devices:**

- BENNING CM 9 for measurement of leakage currents and differential currents (1  $\mu$ A - 100 A AC)
- BENNING CM 11 for process signals, automotive engineering and intrusion alarm systems

**For precise measurements in trade, service and industry:**

- BENNING CM P1/CM P2 – pocket size Mini Current Clamp Meters with low-pass filter
- BENNING CM 2 – our best seller for multifunctional use
- BENNING CM 12 – Power Current Clamp Multimeter with data logger, Bluetooth® and app



**BENNING**

# Digital Current Clamp Multimeter BENNING CM 1-1 - CM 1-3

## Current clamp adapters CC 1, CC 3

### BENNING CM 1-1, CM 1-2 and CM 1-3 for AC current

- safe current measuring up to 400 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)
- delivery including case and battery/ batteries and measuring leads (CM 1-2, CM 1-3)

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

- safe AC current measuring up to 200 A/400 A
- connection via 4 mm safety measuring leads
- delivery including case and measuring leads and battery (CC 3)



## Digital Current Clamp Meter

	BENNING CM 1-1	BENNING CM 1-2	BENNING CM 1-3	BENNING CC 1	BENNING CC 3
indicating range	2000	2000	2000	—	—
basic accuracy	2 %	1 %	1 %	1.9 %	1 % - 3 %
AC voltage	—	0.1 V - 600 V	0.1 V - 750 V	—	—
DC voltage	—	0.1 V - 600 V	0.1 V - 1000 V	—	—
AC current	10 mA - 400 A	100 mA - 400 A	100 mA - 200 A	1 A - 400 A	0.2 A - 300 A
DC current	—	—	—	—	0.2 A - 300 A
resistance	—	0.1 Ω - 20 MΩ	0.1 Ω - 20 MΩ	—	—
continuity/diode	—	• / -	• / •	- / -	- / -
frequency	—	—	—	—	—
capacity	—	—	—	—	—
effective power	—	—	—	—	—
power factor (cos φ)	—	—	—	—	—
temperature	—	—	—	—	—
volt sensor	—	—	•	—	—
interface	—	—	—	—	—
software	—	—	—	—	—
memory	HOLD, MAX	HOLD	HOLD	—	—
Data Log function	—	—	—	—	—
measuring method	RMS	RMS	RMS	—	—
max. clamp opening	30 mm	30 mm	16 mm	30 mm	21 mm
measuring category	CAT III 600 V	CAT III 600 V	CAT IV 600 V	CAT III 300 V	CAT III 600 V
item no.	044061	044062	044063	044037	044110

See page 20 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

# Mini Current Clamp Meters BENNING CM P1, CM P2

## flexible AC current transformers BENNING CFlex 1, CFlex 2

### BENNING CM P1 and CM P2 minimum dimensions, maximum safety

- TRUE RMS measuring method
- precise measurements of load currents of up to 400 A
- maximum resolution of 10 mA in the 40.00 A measuring range
- inrush current measurement (INRUSH) in the 40 A measuring range of motors and lighting systems
- low-pass filter (LPF, approx.. 160 Hz) to suppress high-frequency pulses at pulsed motor drives
- Volt sensor (NCV) for non-contact signaling of phase voltages (buzzer/LCD)
- LC display with illumination
- delivery including case and batteries

### BENNING CFlex 1, CFlex 2 flexible AC current transformers up to 3000 A

- TRUE RMS measuring method (CFlex 2)
- measuring loop (46 cm) with high flexibility for narrow measuring points and large cable cross-sections
- length of connecting cable: 1.8 m
- simple closing mechanism which can be operated with gloves
- analog output is universally applicable for all multimeters and oscilloscopes via 4 mm safety plugs (CFlex 1)
- output 100/10/1 mV per A (CFlex 1)
- large 4 digit LC display with illumination (CFlex 2)
- delivery including case and batteries



## Digital Current Clamp Meter and Current Transformers

	BENNING CM P1	BENNING CM P2	BENNING CFlex 1	BENNING CFlex 2
indicating range	4200	4200	-	6000
basic accuracy	2 %	2 %	3 %	3 %
AC voltage	-	-	-	-
DC voltage	-	-	-	-
AC current	0.01 A - 400 A	0.01 A - 400 A	0.3 A - 3000 A	0.1 A - 3000 A
DC current	-	0.01 A - 400 A	-	-
resistance	-	-	-	-
continuity/diode	-	-	-	-
frequency	-	-	-	-
capacity	-	-	-	-
effective power	-	-	-	-
power factor (cos φ)	-	-	-	-
temperature	-	-	-	-
volt sensor	•	•	-	-
interface	-	-	-	-
software	-	-	-	-
memory	HOLD, INRUSH, LPF	HOLD, INRUSH, LPF, ZERO	-	HOLD, MIN/MAX
Data Log function	-	-	-	-
measuring method	TRUE RMS	TRUE RMS	-	TRUE RMS
max. clamp opening	23 mm	23 mm	160 mm	160 mm
measuring category	CAT III 600 V	CAT III 600 V	CAT III 600 V	CAT IV 600 V
item no.	044678	044679	044068	044069

See page 20 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

# TRUE RMS Digital Current Clamp Meters BENNING CM 2, CM 5-1, CM 7, CM 8

for AC/DC current

## BENNING CM 2

**Our best seller!**

- safe and non-contact measuring of high currents
- DC and AC current measuring up to 300 A AC/DC
- measurement of low currents (automotive, photovoltaics, industry)
- measuring inputs for voltage, resistance and continuity test
- delivery including case, batteries and measuring leads

## BENNING CM 5-1 and CM 7 innovative technology

- safe current measuring up to max. 1000 A AC/DC
- highest measuring category CAT IV 600 V
- automatic selection of the measuring function (V AC/DC, A AC/DC,  $\Omega$  and low input impedance LoZ (CM 5-1))
- LC display with illumination
- delivery including case, battery and measuring leads

## BENNING CM 8

**power analysis for single-phase and three-phase mains**

- safe current measuring up to max. 600 A AC/DC
- measurement of inrush currents (motors etc.)
- effective power measurements up to 360 kW
- calculation of the power factor  $\cos \phi$
- indication of the load type (inductive, capacitive)
- bipolar phase sequence test in three-phase mains
- measuring inputs for voltage, resistance, frequency, temperature, continuity and diode test
- delivery including case, battery, measuring leads and wire temperature sensor



## TRUE RMS Digital Current Clamp Meter

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

See page 20 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

# TRUE RMS Digital Current Clamp Meters BENNING CM 9, CM 11, CM 12

TRUE RMS measuring method to satisfy highest demands on accuracy

## BENNING CM 9

with a resolution of 1  $\mu$ A

- measurement of leakage currents and differential currents in electrical systems (IEC/EN 60364) and devices
- highest resolution of 1  $\mu$ A in the 6 mA measuring range
- measurement without switch-off during normal operation of the system/device
- precise and reproducible measuring results up to 100 A
- switchable low-pass filter
- optimum screening against external magnetic fields
- delivery including case and batteries

## BENNING CM 11

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
- measurements of leakage currents, differential currents and load currents
- multifunctional use fore voltage (600 V), resistance measurements (600 k $\Omega$ ) and continuity test
- compact dimensions with a clamp opening of 23 mm
- delivery including case, batteries and measuring leads

## BENNING CM 12

with logging function and Bluetooth®

- effective power (AC/DC) and power factor measurement (cos  $\phi$ )
- measurement of inrush currents (motors etc.)
- low-pass filter (HFR), THD measurement of the harmonic
- Volt sensor for non-contact cable break detection (red LED)
- bipolar phase sequence test
- data logger (9999 measured values) and memory function
- Bluetooth® Low Energy 4.0 interface
- free IOS and Android app for smartphone/tablet
- AUTO SENSE function for automatic selection of measuring ranges and functions
- highest measuring category CAT IV 600 V for highest safety
- LC display with bar graph indication and illumination
- delivery including case, batteries and measuring leads



## TRUE RMS Digital Current Clamp Meter

	BENNING CM 9	BENNING CM 11	BENNING CM 12
indicating range	6000	6000	9999
basic accuracy	1 %	1 %	1 %
AC voltage	–	10 mV - 600 V	10 mV - 1000 V
DC voltage	–	10 mV - 600 V	10 mV - 1000 V
AC current	1 $\mu$ A - 100 A	0.1 mA - 20 A	10 mA - 600 A
DC current	–	0.1 mA - 10 A	10 mA - 600 A
resistance	–	0.1 $\Omega$ - 600 k $\Omega$	0.1 $\Omega$ - 100 k $\Omega$
continuity/diode	–	• / -	• / •
frequency	–	–	0.01 Hz - 10 kHz
capacity	–	–	1 nF - 4 mF
effective power	–	–	1 W - 600 kW
power factor (cos $\phi$ )	–	–	0.01 - 1.00
temperature	–	–	–
volt sensor	–	–	•
interface	–	–	Bluetooth®
software	–	–	App
memory	HOLD, PEAK	HOLD, MIN/MAX, ZERO	A-SAVE, HOLD, MIN, MAX, PEAK, AVG, INRUSH
Data Log function	–	–	9999 measured values
measuring method	TRUE RMS	TRUE RMS	TRUE RMS
max. clamp opening	40 mm	23 mm	33 mm
measuring category	CAT III 300 V	CAT IV 300 V	CAT IV 600 V
item no.	044065	044067	044680

See page 20 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

# Accessories for Digital Current Clamp Meter

safe – functional – indispensable

Description	Product data	Item no.	CFlex 1	CFlex 2	CM P1	CM P2	CM 1-1	CM 1-2	CM 1-3	CM 2	CM 5-1	CM 7	CM 8	CM 9	CM 11	CM 12
<b>AC current transformer</b>																
 <b>BENNING CFlex 1</b> AC current transformer	basic accuracy: 3 % current: 0.3 A - 3000 A AC output: 100 mV/10 mV/1 mV AC per 1 A AC	044068						•	•	•	•	•	•		•	•
<b>Hard case / stand-by cases</b>																
 <b>Robust hard case</b> with foam insert, separate shelf and lid compartment for accessories and small parts. Safe transport protection for high-quality testing and measuring instruments.	Made of ABS material, dust and waterproof, dimensions 375 x 190 x 250 mm	10198412	•	•	•	•	•	•	•	•	•	•	•	•	•	•
 <b>Stand-by case size S</b> dimensions: 220 x 110 x 50 mm	with belt loop on the back, made of hard-wearing nylon fabric	010912			•	•	•	•	•	•				•	•	
 <b>Stand-by case size M</b> dimensions: 240 x 180 x 70 mm	made of hard-wearing nylon fabric	010913	•	•	•	•	•	•	•	•			•	•	•	
<b>Measuring accessories</b>																
 <b>BENNING TA 1</b> crocodile clips, two pieces	Ø 4 mm plug-in technology, red/black, professional equipment, CAT III 1000 V	044124						•	•	•	•	•	•		•	•
 <b>BENNING TA 2</b> set of measuring leads, six pieces	Ø 4 mm plug-in technology, red/black, professional equipment, consisting of: measuring leads (silicone) CAT III 1000 V, test probes (Ø 4 mm measuring tip) CAT II 1000 V, crocodile clips CAT III 1000 V	044125						•	•	•	•	•	•		•	•
 <b>BENNING TA 3</b> set of measuring leads, eight pieces	Ø 4 mm plug-in technology, red/black, professional equipment, CAT III 1000 V, consting of: measuring leads (silicone), test probes (slender measuring tip), claw clamps, crocodile clips	044126						•	•	•	•	•	•		•	•
 <b>Ø 4 mm safety measuring leads with 2 mm measuring tip</b> , two pieces	Red/black, L = 1.40 m, with Ø 2 mm measuring tip (L = 18 mm), CAT IV 600 V/CAT III 1000 V (with protective caps), CAT II 1000 V (without protective caps)	044146						•	•	•	•	•	•		•	•
 <b>Ø 4 mm safety measuring leads with 4 mm measuring tip</b> , two pieces	Red/black, L = 1.40 m, with Ø 4 mm measuring tip (L = 18 mm), CAT IV 600 V/CAT III 1000 V (with protective caps), CAT II 1000 V (without protective caps)	044145						•	•	•	•	•	•		•	•
 <b>Temperature probe, type K, insertion probe</b> (V4A steel tube)	For flexible substances, liquids, gases and air. Measuring range: - 196 °C up to + 800 °C	044121											•			
<b>Measuring adapter for BENNING CM 9</b>																
 <b>Measuring adapter, single-phase, shock-proof plug/coupling</b> , conductors led through individually and with double insulation	Measurement: I <sub>PE</sub> by means of differential current/direct measurement method, load current	044131													•	
 <b>Measuring adapter three-phasic, 16 A CEE 5-pin</b> , conductors led through individually and with double insulation	Measurement: I <sub>PE</sub> by means of differential current/direct measurement method, load current	044127													•	
 <b>Measuring adapter three-phasic, 32 A CEE 5-pin</b> , conductors led through individually and with double insulation	Measurement: I <sub>PE</sub> by means of differential current/direct measurement method, load current	044128													•	

\* figure similar

## Appliance Tester - testing of electrical and medical electrical device

### PRCDs and arc welding equipment

#### Highlights of the new Appliance Testers BENNING ST 755/ST 760

##### PRCD testing - mobile personal protection



© PC Electric GmbH

Complete and automatic testing of 2-pin and 3-pin PRCDs of types S, S+ and K.

##### RCD test - mobile subdistributions or construction site distributions



The testing of RCDs of types AC, A, F, B, B+ offers new options for application.

##### Testing of arc welding equipment (ST 760)



© Fronius International GmbH

Standard-compliant and complete testing of arc welding equipment.

The testing of three-phase welding equipment requires the BENNING MA 2-16 adapter.

##### Enhanced and customer-specific visual inspection



Besides the standard visual inspection (2 points), it is possible to create an enhanced (18 points) and a customer-specific (unlimited) visual inspection with individual requests.

##### WLAN, RJ45 (LAN), USB, Bluetooth®, SD card slot - modern interfaces



The integration of the appliance tester into a network and modern interfaces allow automatic updates and form the basis for integrating further functions and applications.

##### Touch-Screen - modern user interface



Touch gestures (dragging, swiping, tapping) are supported. Texts are entered via a softkey pad (QWERTZ). Icons stand for the different functions.

##### Suitable for IT systems - testing in earthing systems



Generally, appliance testers require an earthed TN/TT system for mains voltage supply. By enabling the "On/Off slider", the new appliance testers can be used in an unearthed IT system.



# VDE 0701-0702 Appliance Tester BENNING ST 710

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 DIN VDE 0701-0702, ÖVE/ÖNORM E 8701, NEV, 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

- automatic testing procedure for devices of class I, class II/III and line test
- 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 in case of incorrect operation and if the test sample is not switched on
- sufficient battery capacity 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  
050309: with socket of type E (BE/FR/CZ/SK/PL)  
050315: with socket of type CH (CH)

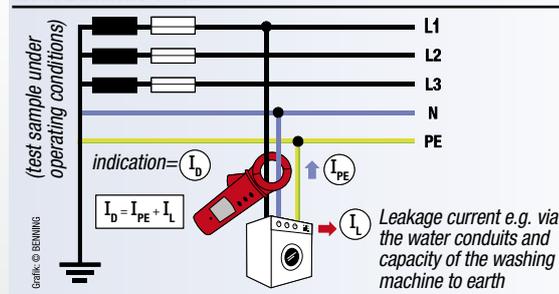


Scope of delivery



CM 9

### Differential current measurement method with BENNING CM 9



## Appliance Tester

	BENNING ST 710
display	graphic display
protective conductor resistance (R <sub>PE</sub> )	0.05 Ω - 20 Ω
insulation resistance (R <sub>iso</sub> )	0.1 MΩ - 20 MΩ (500 V DC)
protective conductor current/contact current by means of alternative leakage current measurement method (I <sub>EA</sub> )	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, batteries
item no.	050308

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

## Optional accessories

	item no.
<b>TRUE RMS leakage current clamp BENNING CM 9</b> for the measurement of differential current, protective conductor current and load current of single-phase and three-phase loads (see page 19)	044065
<b>measuring adapters for TRUE RMS leakage current clamp BENNING CM 9</b>	
single-phase, shock-proof plug/coupling (see page 26)	044131
three-phase, 16 A CEE-CEE, 5-pin (see page 26)	044127
three-phase, 32 A CEE-CEE, 5-pin (see page 26)	044128

See page 26 for further accessories

# VDE 0701-0702 Appliance Tester BENNING ST 725

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 DIN VDE 0701-0702, ÖVE/ÖNORM E 8701, NEV, 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

- measuring result with “pass/fail” information
- limiting values preset in compliance with DIN VDE standard
- storage locations for 999 test samples
- data transmission to the PC
- measured values support the creation of test certificates in MS Excel®
- keys for storing, calling and printing the measured values

### Measuring functions

- protective conductor resistance (200 mA pulsed testing current, max. 2 x 90 sec.)
- testing of RCDs with 30 mA with indication of tripping time
- reduction of the ISO testing voltage to 250 V / 500 V
- mains operating mode: protective conductor current/contact current by means of differential current/direct measurement method (max. 2 x 5 min.)
- battery operating mode: protective conductor current/contact current by means of alternative leakage current measurement method
- optional measuring adapters for passive/active testing of three-phase appliances with CEE connector (page 26)



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

## Appliance Tester

	BENNING ST 725
display	graphic display
protective conductor resistance (R <sub>PE</sub> )	0.05 Ω - 20 Ω
insulation resistance (R <sub>iso</sub> )	0.1 MΩ - 20 MΩ (250 V/500 V DC)
protective conductor current/contact current by means of	
- differential current	0.25 mA - 20 mA
- alternative leakage current	0.25 mA - 20 mA
- direct measurement method	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

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

	BENNING ST 725
measured value memory	999 storage locations
interfaces	micro USB for PC, PS/2 for printer BENNING PT 1
scope of delivery	carrying case, test cable with alligator clip, mains connection cable, appliance cable, batteries, micro USB data cable, download software (CD)
item no.	050316

### Optional accessories

	item no.
measuring adapter for appliances with 3-pin/5-pin CEE connector (see page 26)	
measuring adapter BENNING MA 1-16, 5-pin, active (see page 26)	044140
measuring adapter BENNING MA 1-32, 5-pin, active (see page 26)	044141
Portable log printer BENNING PT 1 incl. serial PS/2 data cable	044150

See page 26 for further accessories

# Appliance Tester BENNING ST 755, BENNING ST 760

testing of electrical appliances, medical electrical devices and welding equipment

## Testing in compliance with DGUV V3, BetrSichV according to

- DIN VDE 0701-0702:2008 for electrical appliances (ÖVE/ÖNORM E 8701, NEV, NEN 3140)
- IEC/EN 62353 for medical electrical devices (VDE 0751-1:2015, ÖVE/ÖNORM E 8751-1)
- IEC/EN 60974-4 for welding equipment (only ST 760) (VDE 0544-4:2017, ÖVE/ÖNORM EN 60974-4)

## BENNING ST 760 – standard-compliant testing of arc welding equipment

- measuring the crest value and TRUE RMS value of open-circuit voltage and contact current of the welding circuit
- testing the functionality of three-phase welding equipment via optional BENNING MA 2-16 measuring adapter
- scope of services of the BENNING ST 755

## Features

- **NEW!** Testing of PRCDs (2-pin/3-pin) of types S, S+, K
- **NEW!** Testing of RCDs of RCD type AC, A, F, B, B+ in mobile power distributions
- **NEW!** Interfaces: Wireless LAN, RJ45, USB, SD card slot and Bluetooth®
- **NEW!** Standard, enhanced and customer-specific visual inspections
- **NEW!** Testing of arc welding equipment (only ST 760)
- management of customers and equipment in databases with unambiguous ID no.
- creation and assignment of individual test procedures and intervals (risk assessment)
- low operating costs, free updates via WLAN, LAN, USB
- touchscreen for gestures, softkey pad (QWERTZ), icons stand for the different functions, "On/Off slider" for enabling/disabling functions



## Appliance Tester

	BENNING ST 755	BENNING ST 760
display	5.7" capacitive color touchscreen	
protective conductor resistance (R <sub>PE</sub> )	0.1 Ω - 30 Ω (> 200 mA + 10 A test current)	
insulation resistance (R <sub>iso</sub> )	0.1 MΩ - 100 MΩ (50 V - 1000 V test voltage)	
protective conductor current (I <sub>PE</sub> )	0.05 mA - 25 mA (differential, direct, alternative)	
contact current (I <sub>BER</sub> )	0.05 mA - 25 mA (differential, direct, alternative)	
testing of electrical appliances	•	•
testing of PRCD types	•	•
testing of medical electrical devices	•	•
testing of welding equipment	–	•
voltage/current	1 V - 360 V/0.1 A - 16 A	
effective power/apparent power	20 W - 4000 W	
interfaces	WLAN, Bluetooth®, 4 x USB, Mini-USB, RJ45	
dimensions/weight	405 x 330 x 165 mm/ca. 5.0 kg	
scope of delivery	tester in break-proof case (IP 67), set of measuring leads/crocodile clips, 2-pin test cable, appliance cable, SD card	
item no.	050322	050324

See page 26 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

## Optional accessories

	item no.
PC software BENNING PC-Win ST 750-760 on CD-ROM incl. USB data cable	047002
1D USB barcode scanner for 1D barcodes	009369
barcode labels with consecutive numeric representation (1000 pieces), further number ranges available	756301
test badges „next test“ (300 pieces)	756212

# Professional PC Software BENNING PC-Win ST 750-760

helpful accessories for efficient testing

## BENNING PC-Win ST 750-760 professional PC software for documentation

- management, documentation and evaluation of test results
- explicit database structure with customer, department and test sample ID
- import and export function via MS Excel®
- free software updates per download

## test sample identification via barcode scanner/labels

- 1D-USB barcode scanner for reading 1D barcodes such as code 39, code 128, ...
- 1D/2D barcode scanner with USB interface for barcodes and QR codes, Data Matrix codes, ...
- PVC barcode labels with consecutive numbering on reels (reels of 1000 pieces), further number ranges available

## test sample identification via RFID reader/RFID tags

- RFID reader for reading the UID no.
- RFID tag, self-adhesive for attachment onto the housing
- RFID tag, tag-type for attachment by means of cable ties
- RFID tag, cable tie for attachment to the mains supply line

## BENNING PT 1 portable direct thermal printer with Bluetooth®

- ideal for printing test records rapidly on site
- compact dimensions (47 x 92 x 108 mm), with storage-battery mode

## measuring adapter for three-phase loads

- BENNING MA 2-16 (active testing, also for welding equipment)
- BENNING MA 3 (passive testing, also for CEE extension cables)
- triple CEE measuring adapter (passive testing, without function)

1D/2D USB scanner (009373)



(figure similar)

Industrial keyboard (044154)  
Wireless keyboard (044161)



(figure similar)

Bluetooth® printer  
PT 1 (044150)



Measuring adapter MA 2-16  
(active/passive) (044160)



RFID reader with USB interface (009372)

RFID tag self-adhesive (044156)

RFID tag cable tie (044157)

RFID tag tag-type (044158)



Measuring adapter MA 3 (044160)



Triple CEE measuring adapter (passive) (044147)

## Optional accessories

	item no.
<b>1D/2D USB scanner</b> for barcodes and QR/Data Matrix codes	009373
<b>industrial keyboard</b> with USB interface	044154
<b>wireless keyboard</b> with USB receiver (2.4 GHz)	044161
<b>multifrequency RFID reader</b> with USB interface (125 kHz+13.56 MHz)	009372
<b>RFID tag self-adhesive</b> (125 kHz) 100 tags, Ø 18 mm	044156
<b>RFID- tag cable tie</b> (125 kHz) 100 tags, l x w: 30 x 15 mm, length of cable tie 200 mm	044157
<b>RFID tag tag-type</b> (125 kHz) 100 tags, l x w: 43 x 34 mm	044158

See page 26 for further accessories

	item no.
<b>measuring adapter BENNING MA 2-16</b> (16 A CEE 5-pin) for active testing of three-phase loads with function R <sub>PE</sub> , R <sub>INSU</sub> , I <sub>PE/CONT</sub> (alternative leakage current, differential current, direct method) and welding equipment	044160
<b>measuring adapter BENNING MA 3</b> (16 A CEE 3-pin, 16 A/32 A CEE 5-pin) for testing CEE extension cables (R <sub>PE</sub> , R <sub>INSU</sub> , I <sub>PE/CONT</sub> , functional test and phase sequence test) and single-/three-phased loads (passive)	044159
<b>triple CEE measuring adapter</b> 16 A 3-pin, 16 A/32 A 5-pin for passive testing of three-phase loads (R <sub>PE</sub> , R <sub>INSU</sub> , I <sub>PE/CONT</sub> (alternative leakage current measurement method)	044147
<b>printer BENNING PT 1</b> with Bluetooth®	044150
<b>roll of thermographic paper</b> (20 pieces)	044151

# Accessories for Appliance Tester BENNING ST 710, ST 725, ST 755 and ST 760

## measuring adapter for leakage current clamp BENNING CM 9

	Description	Product data	Item no.	ST 710	ST 725	ST 755
						ST 760

### Measuring adapter for single-phase loads

	<b>Measuring adapter 16 A CEE 3-pin</b> (passive testing)	RPE, RiSO, IPE, IBER.	044143	•	•	•
	<b>Measuring adapter 32 A CEE 3-pin</b> (passive testing)	RPE, RiSO, IPE, IBER.	044144	•	•	•
	<b>Measuring adapter 4 mm stackable safety plug</b> on shock-proof plug	RPE, RiSO, IPE, IBER.	044142	•	•	

### Measuring adapter for three-phase loads

	<b>Measuring adapter 16 A CEE 5-pin</b> (passive testing with L1-L2-L3 bridged)	RPE, RiSO, IPE/IBER. by means of alternative leakage current measurement method	044122	•	•	•
	<b>Measuring adapter 32 A CEE 5-pin</b> (passive testing with L1-L2-L3 bridged)	RPE, RiSO, IPE/IBER. by means of alternative leakage current measurement method	044123	•	•	•
	<b>Measuring adapter BENNING MA 1-16</b> , 16 A CEE 5-pin (active testing under operating conditions)	RPE, IPE by means of direct measurement method	044140		•	
	<b>Measuring adapter BENNING MA 1-32</b> , 32 A CEE 5-pin (active testing under operating conditions)	RPE, IPE by means of direct measurement method	044141		•	
	<b>Measuring adapter BENNING MA 2-16</b> , 16 A CEE 5-pin (active testing under operating conditions or passive testing with L1-L2-L3 bridged), testing of 3-phase welding equipment	RPE, RiSO, IPE/IBER. by means of alternative leakage current/differential current/direct measurement method	044160			•

### Measuring adapter for single-phase and three-phase loads

	<b>Measuring adapter triple 16 A/32 A CEE 5-pin</b> (passive testing with L1-L2-L3 bridged) and 16 A 3-pin	RPE, RiSO, IPE/IBER by means of alternative leakage current measurement method for three-phase loads	044147	•	•	•
	<b>Measuring adapter BENNING MA 3</b> , 16 A/32 A CEE 5-pin (testing of CEE extensions cables and passive testing 3-phase loads, 16 A CEE 3-pin (active testing)	RPE, RiSO, IPE/IBER (for three-phase loads only with alternative leakage current measurement method) extension cables with functional test/phase sequence test	044159		•	•

### TRUE RMS leakage current clamp BENNING CM 9 and measuring adapter

	<b>TRUE RMS leakage current clamp BENNING CM 9</b> with low-pass filter (LPF)	differential/protective conductor/load current of single-phase and three-phase loads (1 µA to 100 A AC)	044065	•	•	•
	<b>Measuring adapter single-phase, shock-proof plug/coupling</b> , conductors led through individually and with double insulation	IPE by means of differential and direct measurement method, load current	044131	•		
	<b>Measuring adapter three-phase, 16 A CEE 5-pin</b> , conductors led through individually and with double insulation	IPE by means of differential and direct measurement method, load current	044127	•	•	•
	<b>Measuring adapter three-phase, 32 A CEE 5-pin</b> , conductors led through individually and with double insulation	IPE by means of differential and direct measurement method, load current	044128	•	•	•

### Test cable for BENNING ST 755/ST 760

	<b>2 m test cable</b> (2-pin) with 4 mm test probe	RPE, RiSO, IBER.	10150829			•
	<b>5 m test cable</b> (2-pin) with 4 mm test probe	RPE, RiSO, IBER.	10154024			•

### Hard case

	<b>Robust hard case</b> with foam insert, separate shelf and lid compartment for accessories and small parts. Safe transport protection for high-quality testing and measuring instruments.	Made of ABS material, dust and waterproof, dimensions 375 x 190 x 250 mm	10198412	•	•	
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### Ceramic fuse

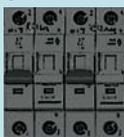
	<b>16 A fuses</b> packaging unit 10 pieces	fast-acting, rated current 16 A, breaking capacity 500 A, rated voltage 250 V, dimensions 5 x 20 mm	10019440		•	
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# Installation Tester - testing of stationary electrical installations

*safety testing in compliance with the standard IEC 60364*

## Highlights of TRUE RMS Installation Testers BENNING IT 115/IT 130:

**RCD testing** – in distribution connection boxes, construction site power boxes, controls, charging equipment (electric vehicles), ...



RCD testing can be carried out in four different versions for RCDs of types AC, A, F, B, B+, EV, MI (Typ B, B+, EV, MI only BENNING IT 130).



### Voltage drop



The "voltage drop" test is intended to check whether a voltage in an electrical installation remains above an admissible value if the maximum nominal current of the upstream fuse is flowing in the circuit.

### Power supply – via storage battery with integrated charging function



Voltage supply is ensured by storage batteries (NiMH) that are charged via an integrated charging current control. There is no need for external charging.

### Testing in IT systems – in hospitals, railway companies, ...



Besides tests in TT/TN systems, it is also possible to carry out tests in IT systems (unearthed earthing systems). In IT systems, the BENNING IT 130 additionally measures the fault current at the first error.

### Limit evaluation – for all IEC 60364 functions



Due to the selection of limits and testing parameters in all functions, the installation testers can evaluate the results and display a PASS/FAIL indication via LED. Parameters and limits can be set neutrally so that the test persons cannot evaluate the results. Thus, evaluation is reserved exclusively for experts.

### PC software for logging and creation of reports – included in the standard scope of delivery (IT 130)



The PC software BENNING PC-WIN IT 130 is part of the vast accessories for the BENNING IT 130 and is intended for logging and the creation of reports. Up to 1800 measurements can be managed in a structure comprising four levels.

# BENNING

# IT 105

VDE 0100 Installation tester

**NEW!**



## VDE 0100 multifunction installation tester

***BENNING IT 105 – testing of electrical installations according to IEC 60364***

- unbeatable price/performance ratio
- easy operation, all measuring functions can be selected directly by means of a rotary switch
- large LC display with illumination
- supplied in a hard-top case, test probe with „TEST“ key, set of measuring leads/ alligator clips, test cable with shock-proof plug, carrying strap, 6 x 1.5 V batteries (IEC LR6/ type AA) and calibration certificate



incl. calibration certificate





# BENNING IT 105

VDE 0100 Installation tester

## Application:

Safety-related tests of electrical installations after construction, modification or as periodic inspection can be carried out easily and efficiently by means of the BENNING IT 105 installation tester.

## Measuring functions:

- low-impedance resistance of protective conductor and equipotential bonding conductor connections (testing current: 200 mA)
- insulating resistance with testing voltages of 250 V, 500 V and 1000 V
- loop impedance (L-PE) without RCD tripping (NO-TRIP) with simultaneous display of the fault current (PFC)
- line impedance (L-N/L) with high testing current (HIGH CURRENT) with simultaneous display of the short-circuit current (PSC)
- testing of RCDs, standard and delayed (S) with sinusoidal (AC) and pulsating testing current (A)
- automatic measurement of the tripping time (1/2 x, 1 x und 5 x IΔN) and the tripping current using the ramp method
- voltage and frequency measurement up to 440 V
- phase sequence testing in three-phase mains (L1-L2-L3)

Scope of delivery IT 105:



## Features:

- extra large graphic display (95 x 55 mm) with background lighting
- test probe with TEST key for starting the measuring process
- AUTO start function for low-impedance, loop and line impedance measurements
- LOCK function (permanent measurement) of the insulating resistance
- compensation (null balance) of the der measuring lines up to 10 Ω
- supplied in a hard-top case, test probe with „TEST“ key, set of measuring leads/ alligator clips, test cable with shock-proof plug, carrying strap, 6 x 1.5 V batteries (IEC LR6/ type AA) and calibration certificate

Technical data	BENNING IT 105
Display:	graphic display (illuminated)
Low-impedance measurement:	0.15 Ω - 199 Ω
Insulating resistance:	0.20 MΩ - 199 MΩ
Loop impedance (L-PE):	0.20 Ω - 1999 Ω
Line impedance (L-N/L):	0.20 Ω - 1999 Ω
Short-circuit current:	up to 26 kA
RCD testing:	tripping time (1/2 x, 1x, 5x IΔN, AUTO) tripping current (ramp)
Testing current:	sinusoidal (AC), pulsating (A) 10/30/100/300/500 mA
Phase sequence test:	right/left
Voltage:	1 V - 440 V
Frequency:	45 Hz - 65 Hz
Item no.:	044105

## Optional accessories:



BENNING TA 5 40 m measuring lead  
with rewinder and wrist strap

Item no. 044039

# 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
- measurement of polarization index (PI) and dielectric absorption rate (DAR)
- selectable limiting values for ISO measurement, green LED for "PASS", red LED for  $\Delta$  testing voltage/external voltage
- resistance measurement with a testing current of 200 mA for testing protective conductor connections with null balance of the measuring leads
- 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



## BENNING IT 115, IT 130 TRUE RMS installation testers

Complete testing and efficient troubleshooting of electrical systems according to IEC 60364 with unambiguous "PASS"/"FAIL" indication by means of green/red LEDs

- measurement of the protective conductor line and of the equipotential bonding line with a testing current of 200 mA, with null balance of the measuring leads
- 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 shortcircuit current (PFC/PSC), sub-function: voltage drop
- testing of RCDs with nominal fault currents of 10/30/100/300/500/1000 mA by means of measurement of contact voltage (without tripping), tripping time and tripping current (ramp test)
- voltage measurement with frequency and phase sequence test
- earthing measurement by means of three-wire measuring method (optional earthing kit)
- delivery includes calibration certificate



## Insulation and Resistance Measuring Device

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

See page 30 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

## TRUE RMS Installation Testers

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

# TRUE RMS Installation Testers BENNING IT 115, IT 130

*the perfect solution for efficient testing*

## Features

- all measuring functions can be selected directly by means of a rotary switch
- 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

## 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

## Additional functions BENNING IT 130

- testing of universal current-sensitive RCDs of type B/B+ and type EV (charging equipment for electric vehicles), MI (mobile installations)
- 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)



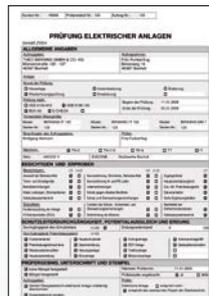
IT 130

TRUE RMS

Scope of delivery IT 130



"Commander" probe tip\*  
044155



Test log according to ZVEH



„Commander“ test plug  
044149

## Optional accessories

	item no.
<b>"Commander" probe tip*</b> with "PASS"/"FAIL" indication by means of green/red LED, "TEST" key and bright LED measuring point illumination	044155
<b>"Commander" test plug</b> for shock-proof socket, with "PASS"/"FAIL" indication by means of green/red LED and "TEST" key	044149
<b>earthing set</b> for earthing measurement, 2 earth rods, 3 test cables (2 x 20 m, 1 x 4.5 m)	044113
<b>measuring cable BENNING TA 5</b> 40 m measurement cable with winder and strap	044039
<b>CEE measuring adapter 16 A, 5-pin</b> voltage/phase-sequence (rotary field), frequency	044148

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

See page 30 for further accessories

# Accessories for Insulation and Resistance Measuring Device/ Installation Testers

## BENNING IT 101, IT 115 and IT 130

32

### professional accessories

	Description	Product data	Item no.	IT 101	IT 105	IT 115	IT 130
	<b>Robust hard case</b> with foam insert, separate shelf and lid compartment for accessories and small parts. Safe transport protection for high-quality testing and measuring instruments.	Made of ABS material, dust and waterproof, dimensions 375 x 190 x 250 mm	10198412	•	•	•	•
	<b>Stand-by case size M</b> dimensions: 240 x 180 x 70 mm	made of hard-wearing nylon fabric	010913	•			

### Measuring accessories

	<b>BENNING TA 3</b> set of measuring leads, eight pieces	Ø 4 mm plug-in technology, red/black, professional equipment, CAT III 1000 V, consisting of: measuring leads (silicone), test probes (slender measuring tip), claw clamps, crocodile clips	044126	•			
	<b>BENNING TA 4</b> magnetic holder, three pieces	For attachment of multimeters to switching cabinets, machine and system parts. Consisting of: magnetic holder, adapter and belt	044120	•			
	<b>BENNING TA 5</b> 40 m measuring cable	With practical winder and strap, for the measurement of protective and bonding conductors, connection Ø 4 mm test socket/plugs	044039	•	•	•	•
	<b>Ø 4 mm safety measuring leads with 2 mm measuring tip</b> , two pieces	Red/black, L = 1.40 m, with Ø 2 mm measuring tip (L = 18 mm), CAT IV 600 V/ CAT III 1000 V (with protective caps), CAT II 1000 V (without protective caps)	044146	•			
	<b>Ø 4 mm safety measuring leads with 4 mm measuring tip</b> , two pieces	Red/black, L = 1.40 m, with Ø 4 mm measuring tip (L = 18 mm), CAT IV 600 V/ CAT III 1000 V (with protective caps), CAT II 1000 V (without protective caps)	044145	•			
	<b>earthing set</b> for earthing measurement	Three-wire measuring method. Consisting of: 2 earth rods, 3 test cables (2 x 20 m, 1 x 4.5 m)	044113			•	•
	<b>CEE measuring adapter 16 A CEE 5-pin</b>	For measurement of voltage/phase-sequence (rotary field), frequency	044148			•	•
	<b>"Commander" test plug</b> for shock-proof socket	with "TEST"/"MEM" key, LED measuring point illumination, "PASS"/"FAIL" indication by means of green/red LED, PE contact electrode for protective conductor connection	044149			•	•
	<b>"Commander" probe tip</b> switchable	with "TEST"/"MEM" key, LED measuring point illumination, "PASS"/"FAIL" indication by means of green/red LED, PE contact electrode for protective conductor connection (BENNING IT 130 delivery including "Commander" probe tip)	044155			•	•

### Current Clamp Adapters

	<b>BENNING CC 3</b> AC/DC current clamp adapter	basic accuracy: 1 % - 2 % current: 0.2 A - 300 A AC/DC output: 1 mV/10 mV AC/DC per 1 A AC/DC	044038				•
	<b>BENNING CFlex 1</b> AC current transformer	basic accuracy: 3 % current: 0.3 A - 3000 A AC output: 100 mV/10 mV/1 mV AC per 1 A AC	044068				•

### illumination sensor

	<b>BENNING Luxmeter type B</b>	Adapter, measuring range 0.01 lx - 20 klx, accuracy 5 %. Precise illumination measurement for the planning and testing of interior and exterior lighting	044111				•
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### Barcode scanner

	<b>Barcode scanner</b> with PS/2 connector	For identifying the measuring point and renaming the storage location	009371				•
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### Ceramic fuse

	<b>315 mA fuses</b> packaging unit 10 pieces	superfast-acting (FF), breaking capacity 10 kA, rated voltage 1000 V, dimensions 6.3 x 32 mm	757213	•			
	<b>315 mA fuses</b> packaging unit 10 pieces	F1, medium slow-acting (M), rated voltage 250 V, dimensions 5 x 20 mm	757211			•	•
	<b>1,6 A fuses</b> packaging unit 10 pieces	superfast-acting (FF), breaking capacity 30 kA, rated voltage 1000 V, dimensions 6.3 x 32 mm	10194027		•		

\* figure similar

## Installation Tester for photovoltaic systems and curve tracer

*testing in compliance with DIN EN 62446 and DIN EN 61829*

### Installation Tester for photovoltaic systems and curve tracer BENNING PV 2 SET

#### Easy operation – with insolation and temperature sensors



The BENNING PV 2 excels by its easy operation and compact design. Once the BENNING PV 2 is connected to the PV string and coupled with the BENNING SUN 2, measurement can be started at the touch of a button.



#### Wireless connection – with insolation and temperature sensors



Only in combination with an insolation and temperature sensor (BENNING SUN 2) it is possible to evaluate the measuring results in detail. Insolation and temperature have a direct impact on the short-circuit current and the performance of a PV system.

#### BENNING PV Link app – for Android devices with NFC interface



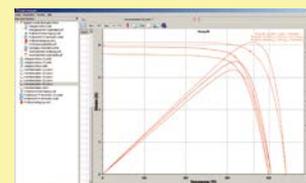
The free BENNING PV Link app enables the direct presentation of measured values and characteristic curves. The STC curve comparison is made via the integrated PV module database containing approx. 14000 module types. The app is available for BENNING PV 2 in the Android Playstore.

#### Testing electrical safety – DIN EN 62446



Measurements of connections (low-impedance measurements), of open-circuit voltages up to 1 kV, of short-circuit currents up to 15 A DC and of the insulating resistance are standard functions for PV systems. The BENNING PV 2 offers independent and permanent RINSU measurement for troubleshooting with testing voltages of 250 V, 500 V and 1000 V DC.

#### Curve / performance measurements – DIN EN 61829



On the display of the BENNING PV 2, the curve measurement displays current and voltage at the MPP as well as the filling factor, open-circuit voltage and short-circuit current. The curves are displayed by means of the BENNING SOLAR Manager or with the BENNING PV Link app.

#### Documentation and evaluation – of PV systems



The PC software BENNING SOLAR Manager is intended for visualizing and evaluating the results, the recorded I-V curve and the power curve of the BENNING PV 2. It displays the measured curve as well as the curve converted to STC. The nominal curve is selected from the module database and taken as a reference. Documents, drawings and reports of the PV system and its components can be archived and documented.

# PV 3

Tester for photovoltaic systems



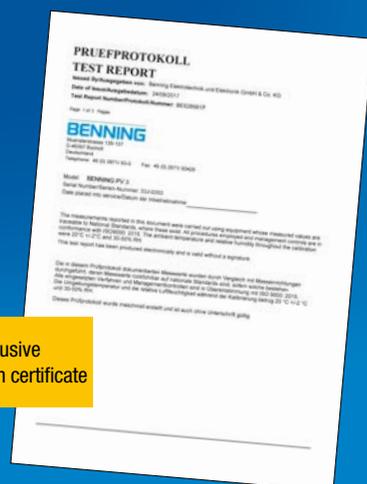
**NEW!**  
1500 V/40 A

# Powerful, safe & efficient

## BENNING PV 3 – testing of solar parks, power plants and large installations with 1500 V technology

- open-circuit voltage at the PV module, PV string and PV field with up to 1500 V DC
- powerful short-circuit current measurement of PV strings connected in parallel up to 40 A
- wireless connection to insolation and temperature measuring instrument BENNING SUN 2
- memory of measured values for 999 PV string tests
- large LC display with illumination
- scope of delivery: PV tester in robust protective case (IP 64), set of PV measuring leads (MC4), set of measuring leads with probe tip and alligator clips, charger with 3 pieces 3.7 V lithium-ion batteries and calibration certificate

inclusive  
calibration certificate



Scope of delivery:  
BENNING PV 3:



## BENNING PV 3

PV tester for PV systems with 1500 V technology

### Application:

Within the framework of commissioning tests and periodic inspection of grid-connected photovoltaic systems in compliance with VDE 0126-23 (DIN EN 62446), polarity tests as well as open-circuit voltage and short-circuit current measurements of PV strings connected in parallel can be carried out, stored and documented safely and efficiently up to 1500 V/40 A.

With radio connection to the optional BENNING SUN 2, the existing radiation conditions ( $W/m^2$ ) as well as the PV module temperature and ambient temperature ( $^{\circ}C$ ) are automatically stored for each test procedure.

### Measuring functions:

- polarity test of the PV generator/ PV cabling
- open-circuit voltage measurement for modern 1500 V DC systems
- short-circuit current measurement at PV strings up to 40 A DC
- insolation measurement ( $W/m^2$ ) and PV module temperature and ambient temperature ( $^{\circ}C$ ) by means of BENNING SUN 2 (optional)

### Optional accessories:

#### BENNING SUN 2

Insolation and temperature measuring instrument with inclinometer and compass bearing, data logger and wireless connection

Item no. 050420



Temperature sensor with suction cup for BENNING SUN 2, for practical attachment to the PV module back

Item no. 050424



#### PV module holder

for attachment of the BENNING SUN 2 to the PV module frame

Item no. 050425



### Features:

- automatic test procedure (+/-, Vo/c, Is/c,  $W/m^2$ ,  $^{\circ}C$ ) with reverse polarity protection
- powerful short-circuit current measurement, reserve is up to 4 x larger than for conventional PV testers with 10 A limitation
- reduced testing times and effort for disassembly, as the individual PV strings no longer have to be separated and tested one after the other
- reduces the risk of failure due to overload during testing of PV strings of unknown power
- integrated memory of measured values for 999 PV string/ PV fields
- real-time clock with date/time stamp per measurement
- USB interface and download software (CSV format)
- large LC display with illumination
- optimum transport and storage protection (IP 64)

Technical data	BENNING PV 3
Display:	graphic display (illuminated)
Polarity test:	automatic
Open-circuit voltage (Uo/c):	5.0 V - 1500 V
Resolution/ accuracy:	max. 0.1 V/ $\pm$ (0.5 % + 2 digits)
Short-circuit current (Is/c):	0.5 A - 40 A (max. 45 kW)
Resolution/ accuracy:	0.01 A/ $\pm$ (1 % + 2 digits)
With wireless connection BENNING SUN 2:	
• Insolation:	100 $W/m^2$ - 1250 $W/m^2$
• PV module/ambient temperature:	-30 $^{\circ}C$ - 125 $^{\circ}C$
Measured value memory:	999 display indications/ PV strings
Interface:	USB type B
PC software/data format:	BENNING SOLAR Datalogger/CSV
Wireless connection BENNING SUN 2:	433 MHz
Batteries:	3 x 3.7 V 18650 lithium-ion batteries
Dimensions/weight:	340x300x152 mm/5.0 kg
Protection class:	IP 40 (open), IP 64 (closed)
Item no.:	050428

# Installation Tester for photovoltaic systems BENNING PV 1-1, BENNING PV 2

commissioning tests, periodic inspection and curve measurement of PV systems

## BENNING PV 1-1, PV 2 installation tester for photovoltaic systems for testing grid-connected PV systems

- tests in compliance with 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

### Features

- automatic test procedure for Uo/c, Is/c and Riso
- insulating resistance with a testing voltage of 250 V, 500 V and 1000 V
- memory of measured values with real-time clock (date/time stamp)
- wireless connection BENNING SUN 2 (insolation/ temperature)
- USB interface and download software BENNING SOLAR Datalogger
- delivery including calibration certificate

## BENNING PV 2 installation tester for photovoltaic systems and curve tracer

- testing in compliance with DIN EN 62446 and DIN EN 61829 for documenting the performance data
- measurement of the current-voltage characteristic (I-V) and the power characteristic (P-V)
- indication of Umpp, Impp and filling factor (FF)

### Features

- automatic test procedures for curve measurement and Riso testing
- separate Riso measurement via 4 mm measuring leads
- optional PC software BENNING SOLAR Manager for the creation of test reports and documentation of characteristics
- free app BENNING PV Link (requires Android device with NFC)



## Installation Tester for PV systems

	BENNING PV 1-1	BENNING PV 2
display	graphic display (illuminated)	
protective conductor resistance (RPE)	0.05 Ω – 199 Ω	
open-circuit voltage with polarity (Uo/c)	5 V – 1000 V DC	
short-circuit current (Is/c)	0.5 A – 15 A DC	
insulating resistance (Riso)	0.05 MΩ – 199 MΩ (250/500/1000 V)	
insulating resistance (2-pin)	-	0.05 MΩ – 300 MΩ
AUTO measurement 1	+/-, Uo/s, Is/c, Riso	+/-, Uo/s, Is/c, Riso
AUTO measurement 2	-	characteristic (I-V, P-V)
AUTO measurement 3	-	measurement 1 + 2
DC string current/AC current	0.2 A – 40 A DC/AC (by means of BENNING CC 3)	
insolation	100 W/m <sup>2</sup> – 1250 W/m <sup>2</sup> by (means of BENNING SUN 2)	
PV module/ambient temperature	-30 °C – +125 °C (by means of BENNING SUN 2)	
voltage (2-pin)	30 V – 440 V AC/DC	
measured value memory	200	999
interfaces	USB/Funk	USB/Funk/NFC
dimensions/weight	270 x 115 x 55 mm/ca. 2.6 kg	
item no.	050421	050422

## Scope of delivery

	BENNING PV 1-1	BENNING PV 2
scope of delivery	carrying case, measuring/MC4/Sunclix leads, batteries, alligator clips, download software (CD), micro USB cable, calibration certificate	
	-	demo version of PC software BENNING SOLAR Manager (CD)

## Optional accessories

	item No.
PC software BENNING SOLAR Manager license key for a single-user license	050423
Bag with neck strap for PV suitable for BENNING PV 1-1/PV 2	050426

See page 34 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

# Insolation and Temperature Measuring Instrument BENNING SUN 2

professional accessories, PC software and free app

## BENNING SUN 2 insolation and temperature measuring instrument

- insolation measurement (W/m<sup>2</sup>) via PV reference cell
- PV module temperature and ambient temperature (°C)
- digital compass and inclinometer
- with wireless transmission (433 MHz) to the BENNING PV 1-1/ PV 2, the current insolation and temperature values of the measuring result are stored
- data logger (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®

## BENNING SOLAR Manager PC-Software (Windows®)

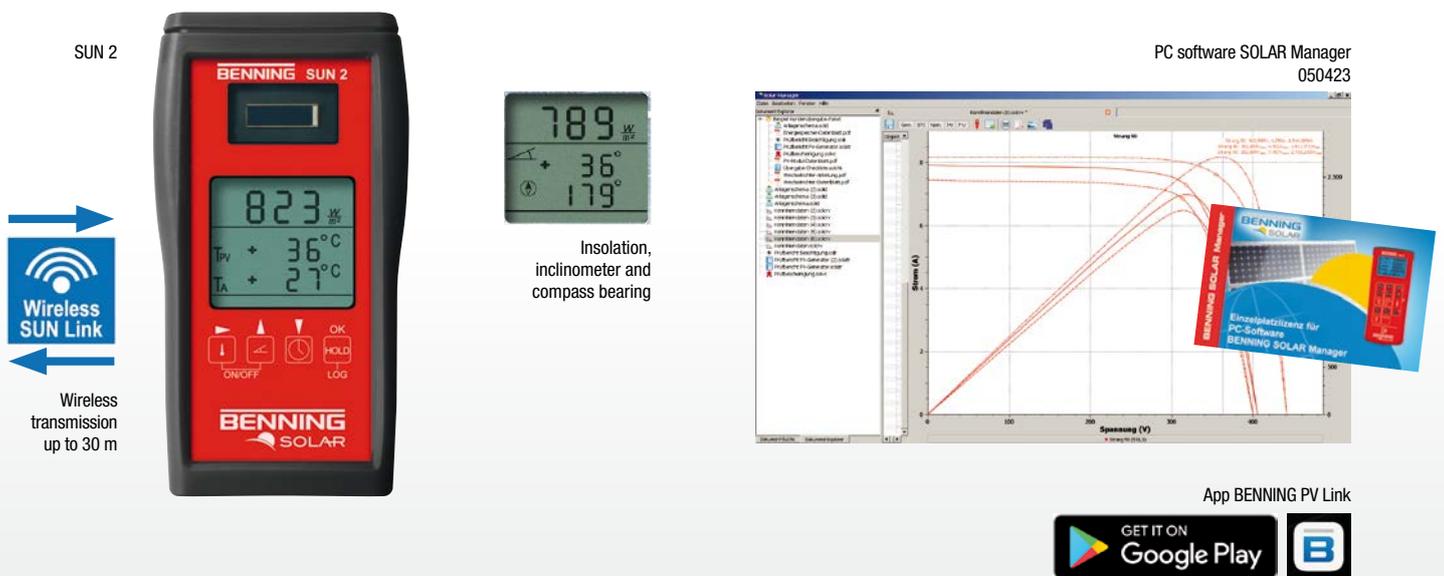
- documentation of the I-V and P-V characteristics measured by the BENNING PV 2
- STC conversion/ comparison with characteristic via integrated PV module database
- demo version available for download can be used free of charge for 14 days

## App BENNING PV Link

- displaying of curves via Android device with NFC interface
- STC comparison with characteristic via integrated PV module database
- available free of charge for the BENNING PV 2 in the Android Playstore

## BENNING SOLAR Datalogger download software

- download of measured values from the BENNING PV 1-1/PV 2 in CSV format
- further processing of measured values possible in MS Excel® möglich



## Insolation and temperature measuring instrument

	BENNING SUN 2
insolation	100 W/m <sup>2</sup> – 1250 W/m <sup>2</sup>
PV module/ambient temperature	-30 °C – +125 °C
compass bearing	0° – 360°
inclinometer (module/roof pitch)	0° – 80°
real-time clock	date/time stamp
measured value memory for W/m <sup>2</sup> and °C	5000 data records
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, batteries, USB cable, download software (CD), calibration certificate
item no.	050420

See page 34 for further accessories

Measuring range indications refer to ranges from highest resolution to the final measuring range value.

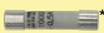
## Recommended accessories

	Item No.	BENNING PV 1-1	BENNING PV 2
BENNING SUN 2	050420	recommended	necessary for curve measurement
PC software BENNING SOLAR Manager	050423	-	necessary for documentation
Temperature sensor (suction cup) (SUN 2) (see page 34)	050424	recommended	recommended
PV module holder (SUN 2) (see page 34)	050425	recommended	recommended
AC/DC current clamp adapter BENNING CC 3 (see page 34)	044038	recommended	recommended
40 m measuring lead BENNING TA 5 (see page 34)	044039	recommended	recommended
Download software BENNING SOLAR Datalogger	free	download of measured values in CSV format	download of measured values in CSV format
App BENNING PV Link for presentation of characteristic	free	-	requires Android devices with NFC interface

# Accessories for Testers for Photovoltaic Systems BENNING PV 1-1, PV 2, SUN 2

## professional accessories

38

	Description	Product data	Item no.	PV 1-1	PV 2	SUN 2	PV 2 SET	PV 3
<b>PC software</b>								
	<b>BENNING SOLAR Manager</b>	License key for a single-user license. Documentation of the PV system as well as of I-V and P-V characteristic curves STC calculation and comparison of characteristic curves via integrated PV module database.	050423		•			
<b>Current Clamp Adapter</b>								
	<b>BENNING CC 3</b> AC/DC current clamp adapter	For DC operating currents and AC currents up to 40 A. Basic accuracy : 1 % - 2 %	044038	•	•		•	
<b>Stand-by cases</b>								
	<b>Stand-by case size S</b> dimensions: 220 x 110 x 50 mm	with belt loop on the back, made of hard-wearing nylon fabric	010912			•		
	<b>Bag with neck strap for PV</b> dimensions: 280 x 135 x 50 mm (without device)	Allows hands-free working on measuring points that are dangerous or difficult to access With shoulder strap and large viewing window for easy operation of the keys and viewing the display. Made of hard-wearing nylon fabric.	050426	•	•			
<b>Hard case</b>								
	<b>Robust hard case</b> with foam insert, separate shelf and lid compartment for accessories and small parts. Safe transport protection for high-quality testing and measuring instruments.	Made of ABS material, dust and waterproof, dimensions 375 x 190 x 250 mm	10198412	•	•	•	•	
<b>Measuring accessories</b>								
	<b>BENNING TA 1</b> crocodile clips, two pieces	Ø 4 mm plug-in technology, red/black, professional equipment, CAT III 1000 V	044124	•	•		•	
	<b>BENNING TA 2</b> set of measuring leads, six pieces	Ø 4 mm plug-in technology, red/black, professional equipment, consisting of: measuring leads (silicone) CAT III 1000 V, test probes (Ø 4 mm measuring tip) CAT II 1000 V, crocodile clips CAT III 1000 V	044125	•	•		•	
	<b>BENNING TA 3</b> set of measuring leads, eight pieces	Ø 4 mm plug-in technology, red/black, professional equipment, CAT III 1000 V, consisting of: measuring leads (silicone), test probes (slender measuring tip), claw clamps, crocodile clips	044126	•	•		•	
	<b>BENNING TA 5</b> 40 m measuring cable	With practical winder and strap, for the measurement of protective and bonding conductors, connection Ø 4 mm test socket/plugs	044039	•	•		•	
<b>Temperature sensor</b>								
	<b>Temperature sensor</b> with suction cup	For attachment of the module temperature sensor to the module back Contact sensor version. Cable length 2 m	050424			•		
<b>PV module holder</b>								
	<b>PV module holder</b>	For safe attachment of the SUN 2 to the PV module	050425			•		
<b>Ceramic fuse</b>								
	<b>500 mA fuses</b> packaging unit 10 pieces	fast-acting, breaking capacity 1 kA, rated voltage 1000 V, dimensions 6.3 x 32 mm	749771	•	•		•	

\* figure similar

# Seminars, demonstration cases for practice-oriented application

## recommendation of the workshop equipment

### Seminars

For further information on our seminars, visit our website at [www.benning.de/seminare-de.html](http://www.benning.de/seminare-de.html).

We offer seminars with regard to the following topics:

- Training on the appliance testers BENNING ST 710/ST 725/ST 750 A/ST 755 or ST 760 (appliance tests)
- Training on the installation testers BENNING IT 115/IT 130 (installation tests)
- Training on the PV measuring instruments BENNING PV 1-1/PV 2/SUN 2 (PV system tests)

For registration/date arrangements regarding training courses on BENNING testers and measuring instruments, please contact:  
 Training management · Tel. +49/ (0) 2871 / 93 557 · E-Mail: [trainingcenter@benning.de](mailto:trainingcenter@benning.de)

### BENNING DB 1 demonstration case for testing and measuring of primary quantities of electrical engineering

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

### BENNING DB 2 demonstration case for practice-oriented training concerning installation testers

- portable case for simulation of electrical systems confirming to standards according to IEC 60364



BENNING DB 1  
Item no.: 044132



BENNING DB 2  
Item no.: 044133

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
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### For enterprises of electrical engineer-craft according to Electricity Association

two-pole voltage tester	IEC/EN 61243-2	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)	IEC/EN 61010-1 IEC/EN 61010-2-033	MM 2 item no. 044028	MM 6-2 + CC 1 item no. 044087 + 044037	MM 12 + CC 1 item no. 044088 + 044037
current clamp meter	IEC/EN 61010-1 IEC/EN 61010-2-032	CM P2 item no. 044679	CM 2 item no. 044035	CM 12 item no. 044680
insulation tester	IEC/EN 61557-2	IT 101 item no. 044033	IT 115 item no. 044104	IT 130 item no. 044103
loop ohmmeter	IEC/EN 61557-3	IT 101 item no. 044033		
resistance measuring device	IEC/EN 61557-4		earthing set for IT 115 item no. 044113	earthing set for IT 130 item no. 044113
grounding gauge	IEC/EN 61557-5			
RCD meter	IEC/EN 61557-6		IT 115 item no. 044104	IT 130 item no. 044103
phase sequence indicator	IEC/EN 61557-7	TRITEST® pro item no. 020052		
instrument for testing electrical equipment (DIN VDE 0701-0702, DIN EN 62353)	IEC/EN 61557-16	ST 725 item no. 050316	ST 755 SET item no. 050323	ST 760 SET item no. 050325
measuring device for testing arc welding equipment (DIN EN 60974-4)	IEC/EN 61557-16			

### Additional recommendation of BENNING

differential current clamp for error current determination in electric equipment and systems	IEC/EN 61557-13 IEC/EN 61010-1 IEC/EN 61010-2-032	CM 9 item no. 044065	CM 9 item no. 044065	CM 9 item no. 044065
mA current clamp for measuring signal currents (4 to 20 mA DC), troubleshooting in electrical installations	IEC/EN 61010-1 IEC/EN 61010-2-032	CM 11 item no. 044067	CM 11 item no. 044067	CM 11 item no. 044067
continuity tester	IEC/EN 61010-1	DUTEST® pro item no. 050156	DUTEST® pro item no. 050156	DUTEST® pro item no. 050156
illumination sensor				Luxmeter type B for IT 130 item no. 044111

# BENNING

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