2023

BENNING











DUSPOL 75 YEARS 1948 – 2023

# 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.

**The appliance testers**
**BENNING ST 760+ / ST 755+ / ST 725 / ST 710** allow safe and time-saving safety and periodic testing of electrical appliances in compliance with the standards EN 50678, EN 50699, IEC 62353 and IEC 60974-4. **Measuring adapters**, such as the **BENNING MA 4** support standard-compliant testing.

**Installation testers and insulation instruments**
The installation testers **BENNINGIT IT 130 / IT 115 / IT 105** and the insulation instruments **BENNING IT 101 / IT 100** are intended for safety testing of low-voltage electrical installations according to the standard IEC/EN 60364. The **BENNING CM E1 earth measuring clamp** is intended for quick and safe measurements without using rods.

**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 62446 and IEC 61829. **(BENNING PV 1-1 / PV 2 / PV 3 / SUN 2 / SOLAR Manager).** The measuring instruments **BENNING CM 10-PV** and **BENNING MM 10-PV** allow making precise and safe measurements on PV systems with 1500 V technology.

**Voltage, continuity and phase sequence testers**
The **DUSPOL®** and **DUTEST®** product range is intended for voltage, phase, polarity, phase sequence, continuity and semiconductor testing. **Socket testers** and **non-contact phase, phase sequence and magnetic field testers** complete the range of testers on offer.

**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. For precise and safe measurements on PV systems with 1500 V technology and for all demanding measuring tasks, measuring instruments with data logger, Bluetooth®, PC software and app are also available.




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

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# Any further questions?

## *choose your contact person*

**Product Advice (Sales Department)**
Tel. +49 / (0) 2871 / 93 111 · E-Mail: duspol@benning.de

Do you need support for selecting the right testing, measuring and safety equipment as well as the right accessories? Don't hesitate to call us! We would be pleased to advise you.

Would you like to be up-to-date regarding our latest news, promotions etc.? Simply subscribe to our newsletter "Testing, Measuring and Safety Equipment" at www.duspol.de. You can unsubscribe from the newsletter at any time.

**Technical Support (After Sales Service)**
Tel. +49 / (0) 2871 / 93 555 · E-Mail: hotline@benning.de

You have problems regarding application, questions on software, etc.? Don't hesitate to contact our After Sales Service. Many years of experience, in-depth product knowledge and access to data sheets as well as internal documents help to ensure expert assistance.

**Returns Management (Warranty, Repairs)**
Tel. +49 / (0) 2871 / 93 554 · E-Mail: returns@benning.de

If you have any questions regarding warranty/repairs, please don't hesitate our returns management team.

Please send faulty or damaged testing, measuring and safety instruments to the address stated below via your specialized trade.

**Calibration**
Benning guarantees compliance with the technical and accuracy specifications stated in the operating manual for the first 12 months after the delivery date. Für die Einhaltung einer angemessenen The user is responsible for ensuring that the devices are recalibrated in due time.

The manufacturer's calibration can be provided by us in the Bocholt factory. It includes installing the latest updates for the appliance testers BENNING ST 760(+) / ST 755(+) / ST 750 A.

**Address for general returns/calibrations:**
BENNING Elektrotechnik und Elektronik GmbH & Co. KG
Quality Service / Returns Management · Robert-Bosch-Str. 20
46397 Bocholt · Germany

Testing, measuring and safety instruments that have not been calibrated by BENNING or require a "DKD/DAkkS" calibration, will be sent to our partner for calibration services ELMTEC. You can also send the devices directly to ELMTEC yourself.

ELMTEC Ingenieurgesellschaft mbH · Kattreppeln 28 · D-38154 Königslutter
Tel. +49 / (0) 5353/ 9545-0 · E-Mail: info@elmtec.de








# New Products

DISCOVER MORE NEW PRODUCTS
ON PAGES 46/47 AND 61/62!



*discover the following innovations in this catalogue*

## BENNING ST 760+ / ST 755+

item no.: 050334 / 050332

page 7 - 8



Appliance tester for testing electrical devices according to EN 50678, EN 50699, medical electrical devices acc. to IEC 62353 and welding equipment acc. to IEC 60974-4

Proven series of appliance testers with new features

- brilliant and high-definition 7" colour touchscreen
- innovative additional functions
- Smart menu with individual device templates (QuickTest) and favourites keys
- auto-ID, automatic incrementation of the identification number
- calibration certificate included in delivery

as well as the well-known features such as testing of various PRCD/ RCD types, visual inspections (standard, enhanced, customer-specific), creation of individual test procedures, free updates, etc.

## BENNING IT 100

item no.: 044107

page 19




Compact and convenient insulation measuring instrument with automatic locking in case of external voltage

## BENNING TA 7-16 / -32 / -63

item no.: 044040, 044041, 044042

page 22

- the ideal complement for installation testers to perform the required testing of 5-pin CEE sockets
- easy and safe contacting without having to open the CEE sockets
- for testing of 5-pin, 16 A, 32 A resp. 63 A CEE sockets
- available in three versions



## BENNING MM 7-2

item no.: 044690

page 40 - 43




The new benchmark in measuring technology - the new TRUE RMS digital multimeter is suited for the most challenging measuring tasks

- Electrical trade:
  - LoZ voltage measurement with low input impedance (> 2 kΩ)
  - measurement of the CP control signal (duty cycle/amplitude) of EV charging stations (wall boxes) for electric vehicles (via optional accessories)
- Industry:
  - TRUE RMS voltage and frequency measurement for frequency converter drives and loads with superimposed harmonics
  - measurement of the 4 mA to 20 mA current loop signal in process technology
- Service:
  - AutoV function with automatic switching (AC/ DC) and measuring range selection for quick troubleshooting
  - visual and acoustic continuity test with fast response time
- HVAC technology:
  - measurements on flame sensors (ionisation current)
  - measurement of the sacrificial anode current of hot water storage tanks
  - measurement of temperature and exhaust gas temperature in HVAC systems

## BENNING CM 2-1

item no.: 044689

page 57



TRUE RMS current clamp multimeter, universally applicable for various applications

# Note

BENNING

# Appliance Tester - testing of electrical and medical electrical device

## *PRCDs and arc welding equipment*

NEW Smart-menu QuickTest Press & test



Modern, powerful testing devices organize entire test procedures.

Intuitive software creates test reports, overviews and statistics.





WLAN, LAN, Bluetooth®, USB interfaces enable updates and the integration of I/O devices.




Workshops with expert speakers and application specialists help with professional testing and refresh expert knowledge.



Measuring adapters and cases for active and passive testing of three-phase equipment



# Appliance Tester

*testing of electrical appliances, medical electrical devices and welding equipment*

**NEW!**

## Testing according to

- EN 50678 for electrical appliances after repair
- EN 50699 for recurrent test of electrical appliances
- IEC 62353 for medical electrical devices
- IEC 60974-4 for welding equipment (only ST 760+)

## 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 4 or BENNING MA 2-16 measuring adapter (see page 9)
- scope of services of the BENNING ST 755+

## Features

- testing of PRCDs of types S, S+, K, 2-pin/3-pin and of RCDs type AC, A, F, B, B+ in mobile power distributions
- testing of arc welding equipment (only ST 760+)
- standard, enhanced and customer-specific visual inspections
- management of customers and equipment in databases
- creation of individual test procedures and intervals (time-dynamically optimized)
- Smart menu for quick creation of new devices (QuickTest), up to 24 templates per standard, auto-ID, favourites menu for frequently used levels
- low operating costs, free updates via WLAN, LAN, USB
- multiple measurements (e. g. Rpe test repetitions) and other functions can be enabled by “On/Off sliders”
- touchscreen can be mirrored on PC or tablet
- external test data access to network-connected appliance testers
- powerful switching relays (80 A) are designed for a long service life

NEW Smart-menu QuickTest Press & test

**Only in German**
**English language available 2023**

BENNING ST 755+ (050332)
BENNING ST 760+ (050334)

BENNING ST 760+ (version CH): 10228221
BENNING ST 755+ (version CH): 10228220

WLAN
USB
FREE UPDATE



**Only in German**
**English language available 2023**

Optional accessories

Barcode scanner (009369)





PC Software PC-WIN ST 750-760 (047002)

Barcode labels (756301)





Test badges (756212)

## Appliance Tester

| | BENNING ST 760+ | BENNING ST 755+ |
|---|---|---|
| **display** | 7" capacitive color touchscreen | |
| **protective conductor resistance ($R_{PE}$)** | 0.5 Ω - 10 Ω (> 600 mA + 10 A test current) | |
| **insulation resistance ($R_{INSU}$)** | 0.1 MΩ - 100 MΩ (100 V - 1000 V test voltage) | |
| **protective conductor current ($I_{PE}$)** | 0.03 mA - 25 mA (differential, direct, alternative) | |
| **contact current ($I_{CONT}$)** | 0.03 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 - 2300 W | |
| **interfaces** | W-LAN, LAN, Bluetooth®, 4 x USB, Mini-USB | |
| **dimensions/weight** | 405 x 330 x 165 mm/ca. 6.0 kg | |
| **scope of delivery** | tester in case (IP 67), set of measuring leads/alligator clips, 2-pin test cable, appliance cable, SD card, calibration certificate | |
| **item no.** | 050334 | 050332 |

**See page 14 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** | 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 |

*active measuring adapters for three-phase equipment up to 32 A CEE*

## BENNING PC-Win ST 750-760
## Database software for documentation and management of equipment and customers

- management, documentation and evaluation of test results
- explicit database structure with customer, department and test sample ID
- database merging for tests with several appliance testers
- creation of individual test procedures and visual inspections
- integrated “ReportDesigner” enables report layout adjustments
- import of test sample databases from external systems via MS Excel®
- direct conversion of SDF databases of the BENNING ST 750 A
- database export function including all attributes and results
- free software updates per download
- search function for appliance testers integrated in the network with memory access
- remote control of appliance testers via MS Cerhost®

## BENNING MA 4
## Active Measuring Adapter case up to 32 A

- suitable for equipment with CEE connection
- rotary switch positions “Cable” and “Function” with self-test
- complies with IEC/EN 61010-1 and EN 61557-16
- supports the following tests/measurements:
  - protective conductor and insulation resistance
  - alternative leakage current, differential current and direct protective conductor current
  - cable test, functional test and phase sequence test
  - testing of PRCDs and arc welding equipment

## BENNING MA 2-16
## Active Measuring Adapter up to 16 A

measurements: $R_{PE}$, $R_{INSU}$, $I_{PE}/I_{CONT}$ (differential, direct, alternative)

PC SOFTWARE PC-WIN ST 750-760 (047002)

FREE UPDATE

**Only in German and English language**





Mains connection cable to the MA 4 (044163)



Measuring adapter case MA 4 (active/passive) (044162)

- for tests in combination with appliance testers
- current carrying capacity up to 32



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

- current carrying capacity up to 16 A

## Optional accessories

| | item no. |
|---|---|
| **PC software BENNING PC-Win ST 750-760** | 047002 |

**See page 14 for further accessories**

| | item no. |
|---|---|
| **measuring adapter BENNING MA 4** (16 A + 32 A CEE 5-pin, 16 A CEE 3-pin) suitable for all appliance testers (except BENNING ST 710) and third-party devices which actively connect a mains voltage of 230 V , leakage current measurement active/ passive, 32 A CEE mains connection cable | 044162 |
| **16 A mains connection cable to the BENNING MA 4** 16 A/ 400 V CEE plug - 32 A/ 400 V CEE coupling, length: 1 m | 044163 |
| **measuring adapter BENNING MA 2-16** (16 A CEE 5-pin) suitable only for BENNING ST 760(+) / ST 755(+) | 044160 |

# Passive measuring adapters for single-phase and three-phase equipment up to 32 A

*leakage current, fault current and load current measurements by means of leakage current clamp*

## BENNING MA 3 measuring adapter

- easy to use for efficient and quick testing
- connection for equipment with CEE connector
- suitable for all appliance testers (except BENNING ST 710)
- test functions in combination with appliance testers:
- protective conductor resistance and insulating resistance
- functional test and phase sequence test of CEE cables
- alternative leakage current measurements

## BENNING triple CEE measuring adapter

- connection for equipment with CEE connector
- suitable for all common appliance testers
- test functions in combination with appliance testers:
  - protective conductor resistance and insulating resistance
  - alternative leakage current measurements

## BENNING CM 9-1 TRUE RMS Leakage Current Clamp

When using passive test adapters for testing in compliance with DGUV Regulation 3, an additional active leakage/fault current measurement may be required. For this, current clamps with a suitable filter and low resolution can be used.

- leakage/fault current measurement from 0.001 mA AC (1 µA AC)
- preset filter (1 kHz) for appliance testing
- connectable low-pass filter LPF (40 Hz to 70 Hz)
- load current measurement up to 60.00 A AC
- voltage measurement: 0.01 V - 600.0 V AC/DC
- resistance measurement up to 600 kΩ
- continuity test

Intermediate adapters are required for current measurement and for correct contacting for differential current measurement, direct protective conductor current measurement or load current measurement (see table below).



Measuring adapter MA 3 (passive) (044159)



Triple CEE measuring adapter (passive) (044147)

CM 9-1 (044682)





Measuring adapter (044131) e.g. for CM 9-1



Measuring adapter (044127/044128) e.g. for CM 9-1

## Optional accessories

| | item no. |
|---|---|
| **measuring adapter BENNING MA 3**<br>(16 A CEE 3-pin, 16 A/32 A CEE 5-pin) for testing CEE extension cables ($R_{PE}$, $R_{INSU}$, $I_{PE}$/$I_{CONT}$, functional test and phase sequence test) and single-/ three-phase loads (passive). Suitable for BENNING appliance testers and third-party devices which actively connect a mains voltage of 230 V, only passive leakage current measurement. | 044159 |
| **triple CEE measuring adapter**<br>16 A 3-pin, 16 A/32 A 5-pin for passive testing of three-phase loads ($R_{PE}$, $R_{INSU}$, $I_{PE}$/$I_{CONT}$ (alternative leakage current measurement method) | 044147 |

**See page 14 for further accessories**

## Leakage Current Clamp and suitable Measuring Adapter

| | item no. |
|---|---|
| **TRUE RMS leakage current clamp BENNING CM 9-1**<br>Ideal for supporting active leakage and fault current measurements during appliance testing. With multimeter functions. See page 54. | 044682 |
| **TRUE RMS leakage current clamp BENNING CM 9-2**<br>Ideal for supporting active leakage and fault current measurements during appliance testing. With Bluetooth® function and app. See page 54. | 044685 |
| **measuring adapters with individual lines led through for current measurements on CEE equipment** | |
| **single-phase,** shock-proof plug/coupling | 044131 |
| **three-phase,** 16 A/ 400 V CEE plug/ coupling | 044127 |
| **three-phase,** 32 A/ 400 V CEE plug/ coupling | 044128 |

# Test sample identification via barcode, QR code or RFID technology

BENNING

*I/O devices as useful accessories for rational testing*

## Barcode, QR code

Test sample identification via barcodes with corresponding scanners has proven useful in daily use.

- 1D-USB barcode scanner for reading barcodes such as Code 39, Code 128, ...
- 1D/2D barcode scanner for barcodes and QR codes, Data Matrix codes, …
  - corded with USB interface
  - cordless for connection to the Bluetooth® and radio interfaces of the BENNING ST 755+ / ST 760+
- barcode labels with consecutive numbering on reels (reels of 1000 pieces), further number ranges available

## RFID technology

ideal in dirty and rough environments

- RFID reader (125 kHz/13.56 MHz) 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

## Input keyboards support operation

Two keyboards are available for coupling to the BENNING ST 755+ / ST 760+ appliance testers.

- industrial keyboard with trackball and mouse buttons, compact design, dustproof and splash-proof (USB)
- wireless keyboard with touchpad and mouse buttons (2.4 GHz radio trans mission via USB dongle)

## BENNING PT 2 - direct printing at the test object NEW!

The perfect solution for printing labels and test certificates rapidly on site, e. g. for order or repair reports.

- portable direct thermal printer
- ideal for printing label and test records rapidly on site
- high printing speed
- data transmission via Bluetooth®
- compact dimensions (62 x 92 x 125 mm), with storage-battery mode
- delivery incl. one roll of labels and thermographic paper

1D USB scanner
(009369)

1D/2D USB scanner
(009373)

1D/2D cordless scanner
(009374)




(firgure similar)

RFID reader with USB interface
(009372)





RFID tag self-adhesive
(044156)



RFID tag tag-type
(044158)

Industrial keyboard (044154)
Wireless keyboard (044161)




(firgure similar)

Bluetooth® printer
PT 2 (10225404)



Brush probe
(10217861)



Rolls of labels for PT 2
(10225408)



Rolls of thermographic paper
for PT 2 (10225407)



## Optional accessories

| | item no. |
|---|---|
| **1D USB scanner** for barcodes | 009369 |
| **1D/2D USB scanner** for barcodes and QR-/Data Matrix codes | 009373 |
| **1D/2D cordless scanner** for barcodes and QR-/Data Matrix codes | 009374 |
| **multifrequency RFID reader** with USB interface (125 kHz+13.56 MHz) | 009372 |
| **RFID tag self-adhesive** (125 kHz) 100 tags, Ø 18 mm | 044156 |
| **RFID tag tag-type** (125 kHz) 100 tags, l x w: 43 x 34 mm | 044158 |

**See page 14 for further accessories**

| | item no. |
|---|---|
| **industrial keyboard** with USB interface | 044154 |
| **wireless keyboard** with USB receiver (2.4 GHz) | 044161 |
| **printer BENNING PT 2 with Bluetooth®** incl. 6 V NiMH battery pack, power supply unit, belt clip, wall mounting kit, 1 roll of labels and 1 roll of thermographic paper | 10225404 |
| **rolls of labels for PT 2** 8 rolls, 300 self-adhesive labels per roll, label size l x w: 37 x 52 mm, material: polypropylene | 10225408 |
| **rolls of thermographic paper for PT 2** 20 rolls, roll length/width: 33 m/58 mm | 10225407 |
| **rolls of thermographic paper for PT 1** 20 rolls, roll length/width: 13 m/58 mm | 044151 |
| **4 mm brush probe** for gentle contacting of accessible conductive parts, such as sensitive metal surfaces and rotating/vibrating parts, e. g. drill chucks, orbital sanders, etc. | 10217861 |

# Appliance Tester in compliance with EN 50678, EN 50699

*testing of electrical appliances under operating conditions*

## BENNING ST 725
## Mains-operated and battery-operated Appliance Tester for mobile testing of electrical devices

- testing in compliance with EN 50678 and EN 50699
- 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

- automatic testing procedure with “pass/fail” information
- limiting values preset in compliance with 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

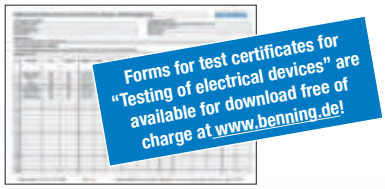
- protective conductor resistance (200 mA pulsed testing current, max. 2 x 90 sec.)
- testing of RCDs with 30 mA with indication of tripping time
- reduction of the ISO testing voltage to 250 V / 500 V
- mains operating mode: protective conductor current/contact current by means of differential current/direct 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 14)




ST 725
050317: with socket of type CH




Scope of delivery




Measuring adapter MA 4 (active/passive) (044162)



NEW!



PT 2
(10225404)



Measuring adapter MA 1-16 (044140), MA 1-32 (044141) (active) only for ST 725

## Appliance Tester

| | BENNING ST 725 |
|---|---|
| **display** | graphic display |
| **protective conductor resistance ($R_{PE}$)** | 0.05 Ω - 20 Ω |
| **insulation resistance ($R_{INSU}$)** | 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** | $R_{PE}$, $R_{ISO}$, 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 |
| **measured value memory** | 999 storage locations |
| **interfaces** | micro USB for PC, PS/2 for printer BENNING PT 2 |

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

| | BENNING ST 725 |
|---|---|
| **scope of delivery** | carrying case, test cable with alligator clip, mains connection cable, appliance cable, batteries, micro USB data cable, download software |
| **item no.** | 050316 |

## Optional accessories

| | item no. |
|---|---|
| **measuring adapter BENNING MA 4** for active and passive testing of single-/three-phase loads (page 9) | 044162 |
| **measuring adapter for appliances with 3-pin/5-pin CEE connector** | |
| **measuring adapter BENNING MA 1-16,** 5-pin, active | 044140 |
| **measuring adapter BENNING MA 1-32,** 5-pin, active | 044141 |
| **portable log printer BENNING PT 2** incl. serial PS/2 data cable | 10225404 |
| **roll of thermographic paper for PT 2** (20 pieces) | 10225407 |

**See page 14 for further accessories**

# Appliance Tester in compliance with EN 50678, EN 50699

*mobile and network-independent testing of electrical appliances*

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

- testing in compliance with EN 50678 and EN 50699
- 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 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
050315: with socket of type CH




Scope of delivery



CM 9-1
(044682)

## Appliance Tester

| | BENNING ST 710 |
|---|---|
| **display** | graphic display |
| **protective conductor resistance ($R_{PE}$)** | 0.05 Ω - 20 Ω |
| **insulation resistance ($R_{ISO}$)** | 0.1 MΩ - 20 MΩ (500 V DC) |
| **protective conductor current/contact current by means of alternative leakage current measurement method ($I_{EA}$)** | 0.1 mA - 20 mA |
| **line test** | $R_{PE}$, $R_{ISO}$, short–circuit test and continuity test of phase conductor (L) and neutral conductor (N) |
| **voltage** | 50 V - 270 V |
| **scope of delivery** | carrying case, test cable with alligator clip, appliance cable, batteries |
| **item no.** | 050308 |

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

## Optional accessories

| | item no. |
|---|---|
| **TRUE RMS leakage current clamp BENNING CM 9-1**<br>for the measurement of differential current, protective conductor current and load current of single-phase and three-phase loads. With multimeter functions (see page 10, 56) | 044682 |
| **TRUE RMS leakage current clamp BENNING CM 9-2**<br>for the measurement of differential current, protective conductor current and load current of single-phase and three-phase loads. With Bluetooth® function and App (see page 56). | 044685 |
| **measuring adapters for TRUE RMS leakage current clamps** | |
| **single-phase**, shock-proof plug/coupling | 044131 |
| **three-phase**, 16 A CEE-CEE, 5-pin | 044127 |
| **three-phase**, 32 A CEE-CEE, 5-pin | 044128 |

**See page 14 for further accessories**

# Accessories for Appliance Tester

*safe – functional – indispensable*

| | Description | Product data | Item no. | ST 760+ / ST 755+ | ST 725 | ST 710 |
|---|---|---|---|---|---|---|
| **Measuring adapter for single-phase and three-phase loads** | | | | | | |
|  | **BENNING MA 4 measuring adapter,** 16 A + 32 A CEE 5-pin, 16 A CEE 3-pin (active and passive testing of single-phase/three-phase loads and CEE extension cables), testing of three-phase welding equipment, also suitable for third-party devices that actively connect a mains voltage of 230 V | RPE, RINSU, IPE/ICONT with alternative leakage, differential and direct current measuring method | 044162 | • | • | |
|  | **16 A mains connection cable to the BENNING MA 4** 16 A/ 400 V CEE plug - 32 A/ 400 V CEE coupling, length: 1 m | accessoires for BENNING MA 4 | 044163 | • | • | |
|  | **Measuring adapter BENNING MA 3,** 16 A/32 A CEE 5-pin, 16 A CEE (testing of CEE extensions cables and passive testing 1-/3-phase loads, 16 A CEE 3-pin (active testing) | RPE, RINSU, IPE/ICONT (for three-phase loads only with alternative leakage current measurement method) extension cables with functional test/phase sequence test | 044159 | • | • | |
|  | **Measuring adapter triple** 16 A/32 A CEE 5-pin, 16 A CEE 3-pin (passive testing with L1-L2-L3 bridged) | RPE, RINSU, IPE/ICONT by means of alternative leakage current measurement method for three-phase loads | 044147 | • | • | • |
| **Measuring adapter for three-phase loads** | | | | | | |
|  | **Measuring adapter BENNING MA 2-16,** 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, RINSU, IPE/ICONT. by means of alternative leakage current/differential current/direct measurement method | 044160 | • | | |
|  | **Measuring adapter BENNING MA 1-16,** 16 A CEE 5-pin (active testing under operating conditions) | RPE, IPE by means of direct measurement method | 044140 | | • | |
| | **Measuring adapter BENNING MA 1-32,** 32 A CEE 5-pin (active testing under operating conditions) | RPE, IPE by means of direct measurement method | 044141 | | • | |
|  | **Measuring adapter 16 A CEE 5-pin** (passive testing with L1-L2-L3 bridged) | RPE, RINSU, IPE/ICONT. by means of alternative leakage current measurement method | 044122 | • | • | • |
| | **Measuring adapter 32 A CEE 5-pin** (passive testing with L1-L2-L3 bridged) | RPE, RINSU, IPE/ICONT. by means of alternative leakage current measurement method | 044123 | • | • | • |
| **Measuring adapter for single-phase loads** | | | | | | |
|  | **Measuring adapter 16 A CEE 3-pin** (passive testing) | RPE, RINSU, IPE, ICONT. | 044143 | • | • | • |
| | **Measuring adapter 32 A CEE 3-pin** (passive testing) | RPE, RINSU, IPE, ICONT. | 044144 | • | • | • |
|  | **Measuring adapter 4 mm stackable safety plug** on shock-proof plug | RPE, RINSU, IPE, ICONT. | 044142 | | • | • |
| **Test cable / brush probe** | | | | | | |
|  | **5 m test cable** (2-pin) with 4 mm test probe | RPE, RINSU, ICONT. | 10154024 | • | | |
| | **2 m test cable** (2-pin) with 4 mm test probe | RPE, RINSU, ICONT. | 10150829 | • | | |
|  | **4 mm brush probe** for gentle contacting of accessible conductive parts, such as sensitive metal surfaces and rotating/vibrating parts, e. g. drill chucks, orbital sanders, etc. | 4 mm safety jack for connecting the test probe of the appliance tester, length: 185 mm, brush length/diameter: 60 mm/20 mm | 10217861 | • | • | • |
| **Hard case** | | | | | | |
|  | **Robust hard case** 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 | | • | • |
| **Ceramic fuse** | | | | | | |
|  * | **16 A fuses** packaging unit 10 pieces | fast-acting, rated current 16 A, breaking capacity 500 A, rated voltage 250 V, dimensions 5 x 20 mm | 10019440 | | • | |

* figure similar

# Installation Tester - testing of stationary electrical installations

## *safety testing in compliance with the standard IEC 60364*

BENNING installation testers allow easy operation and excel due to clear functional and menu structures.

The BENNING IT 130/ IT 115 supports electricians in evaluating the measured values.

Accessories for the BENNING IT 130 include a PC software which is intended for logging and the creation of reports. Up to 1800 measurements can be managed in a structure comprising four levels.





The low-impedance and insulating resistance instruments BENNING IT 101 / IT 100 are used for troubleshooting and fault analysis in electrical systems of any kind. It is often used to equip service specialists in industrial and modern automotive engineering.

The BENNING IT 105 meets all requirements for standard installation tests and is popular with providers of facility management and building service providers.





Measuring the earth loop resistance by means of the BENNING CM E1 without using rods is the ideal solution for measuring earthing resistances in multiply earthed earthing systems.

# TRUE RMS Installation Testers

*testing of electrical systems in compliance with the standards*

## BENNING IT 130, IT 115
## 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

## 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 130-200 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 115




TRUE RMS

Scope of delivery



## TRUE RMS Installation Testers

| | BENNING IT 130 | BENNING IT 115 |
|---|---|---|
| **display** | graphic display (illuminated) | |
| **low-impedance resistance (± 200 mA) / continuity (7 mA)** | 0.01 Ω - 2000 Ω | |
| **insulation resistance (50/100/250/500/1000V)** | 10 kΩ - 1000 MΩ | |
| **line impedance (L-N/L-L) / voltage drop (ΔU)** | 0.01 Ω - 10 kΩ | |
| **loop impedance (L-PE)** | 0.01 Ω - 10 kΩ | |
| **short-circuit current ($I_{SE}$)** | 0.01 A - 200 kA | |
| **RCD testing** | AC/A/F/B/B+/EV/MI | AC/A/F |
| **earth resistance (3-wire-method)** | yes, via 044113 | |
| **phase sequence** | • | |
| **voltage (TRUE RMS), frequency** | 1 V - 550 V, 14 Hz - 500 Hz | |
| **current (TRUE RMS)** | 0.1 mA - 300 A AC/DC via 044038 | |
| **luminous intensity** | 0.01 lux - 20 klux via 044111 | |
| **measured value memory** | up to 1800 | |
| **interfaces** | USB, RS 232 | |
| **logging software** | • | |
| **item no.** | 044103 | 044104 |

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

*optional accessories*

## Logging software BENNING PC-Win IT 130-200

- 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 test certificates
- fully fledged, executable without any time limit and comprehensive

## Features IT 130, IT 115

- 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

## BENNING CC 3

- AC/DC current clamp adapter is intended for measuring a load current up to 300 A (only BENNING IT 130).

## Earthing set

- to determine the earth resistance at main earthing systems, lightning arresters and local earth connections.

## "Commander" test plug

- for shock-proof socket, with “PASS”/”FAIL” indication by means of green/red LED, “TEST”/”MEM” key and bright LED measuring point illumination.

## BENNING TA 5

- 40 m cable reel, ideal for low-impedance measurements.

## BENNING Luxmeter type B

- allows measurements of the luminous intensity for planning and testing interior and exterior lighting systems (only BENNING IT 130).

“Commander” probe tip*
(044155)





Test report



„Commander“ test plug
(044149)

Earthing set
(044113)



Luxmeter type B
(044111)



AC/DC current clamp adapter CC 3
(044038)



40 m measuring cable TA 5
(044039)



## Scope of delivery

| | BENNING IT 130 | BENNING IT 115 |
|---|---|---|
| **Scope of delivery** | padded carrying case, test cable with shock-proof plug, universal three-wire test cable, set of test probes/ alligator clips, carrying strap, rechargeable storage batteries (6x NiMh AA), charger, calibration certificate | |
| | „Commander“ probe tip (switchable with TEST key), RS 232 PS/2, USB interface cable, batteries (2x AAA), PC software (via download link) | - |

## Optional accessories for IT 130 / IT 115

| | item no. |
|---|---|
| **earthing set** for earthing measurement, 2 earth rods, 3 test cables (2 x 20 m, 1 x 4.5 m) | 044113 |
| **“Commander” test plug** for shock-proof socket, with “PASS”/”FAIL” indication via of green/red LED,“TEST”/“MEM“ key, bright LED measuring point illumination | 044149 |
| **“Commander” probe tip** for shock-proof socket, with “PASS”/”FAIL” indication via green/red LED, “TEST”/“MEM“ key, bright LED measuring point illumination (included in the scope of delivery of the BENNING IT 130) | 044155 |
| **BENNING Luxemeter type B** adapter, measuring range 0.01 lx - 20 klx, accuracy 5 % (only BENNING IT 130) | 044111 |
| **barcode scanner** with PS/2 connector. For identifying the measuring point and renaming the storage location (only BENNING IT 130) | 009371 |
| **measuring adapter for testing 5-pin CEE sockets** (see page 22)<br>• **BENNING TA 7-16,** 16 A 6h 3P+N+PE<br>• **BENNING TA 7-32,** 32 A 6h 3P+N+PE<br>• **BENNING TA 7-63,** 63 A 6h 3P+N+PE+Pilot | 044040<br>044041<br>044042 |

**See page 22 for further accessories**

# Installation Tester

*unbeatable price/performance ratio*

## BENNING IT 105
## Multifunction Installation Tester

Easy and efficiently tests of electrical installations after construction, modification or as periodic inspection according to IEC 60364

- low-impedance resistance of the 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) (tripping current, tripping time))
- voltage, frequency measurement (up to 440 V) and phase sequence testing
- delivery incl. calibration certificate

## Features

- unbeatable price/performance ratio
- easy operation, all measuring functions can be selected directly by means of a rotary switch
- large LC display with illumination
- 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 measuring leads up to 10 Ω

IT 105




Scope of delivery






TA 5
(044039)

## Installation Tester

| | BENNINT IT 105 |
|---|---|
| **display** | graphic display (illuminated) |
| **low-impedance resistance** | 0.15 Ω - 199 Ω |
| **insulation resistance** | 200 kΩ - 199 MΩ |
| **line impedance** | 0.2 Ω – 1999 Ω |
| **loop impedance** | 0.2 Ω – 1999 Ω |
| **short-circuit current** | up to 26 kA |
| **RCD testing** | tripping time ( ½x, 1x, 5x IΔN, AUTO)<br>tripping current (ramp) |
| **testing current** | sinusoidal (AC), pulsating (A)<br>10/30/100/300/500 mA |
| **phase sequence** | • |
| **voltage, frequency** | 1 V - 440 V, 45 Hz - 65 Hz |
| **item no.** | 044105 |

**See page 22 for further accessorie**

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

## Scope of delivery

| | BENNING IT 105 |
|---|---|
| **Scope of delivery** | hard-top case, test probe with „TEST“ key, set of measuring leads/ alligator clips, test cable with shock-proof plug, carrying strap, batteries (6 x 1.5 V LR6/ type AA), calibration certificate |

## Optional accessories

| | Art.-Nr. |
|---|---|
| **BENNING TA 5**<br>40 m measuring lead with rewinder and wrist strap, for the measurement of protective and bonding conductors, connection Ø 4 mm test socket/plug | 044039 |

# Insulation and Resistance Measuring Device

*tracking down insulation and earth faults*

NEW!

## 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 ⚠ 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 100
### Insulation and Resistance Measuring Device

- measurement of the insulating resistance with testing voltages of 50 V, 100 V, 250 V, 500 V and 1000 V
- automatic prevention of the test in case of external voltage
- measurement of polarization index (PI) and dielectric absorption rate (DAR)
- resistance measurement with a testing current of 200 mA for testing protective conductor connections with null balance of the measuring leads
- test function for checking the internal fuse
- compact and convenient housing design
- including case, set of measuring leads and measuring probes, alligator clips, rubber protective frame and batteries

IT 101




TRUE RMS
CAT IV 600 V

Scope of delivery




IT 100




CAT IV 600 V

Scope of delivery



## Insulation and Resistance Measuring Devices

| | BENNING IT 101 | BENNING IT 100 |
|---|---|---|
| **indicating range** | 4000 digit (illuminated) with bar graph | 9999 (illuminated) |
| **low-impedance resistance** | 0.01 Ω - 40 Ω | 0.01 Ω - 60 Ω |
| **insulation resistance** | 50 kΩ - 20 GΩ | 300 kΩ - 20 GΩ |
| **resistance** | 0.01 Ω - 40 kΩ | 0.1 Ω - 600 kΩ |
| **voltage (AC/DC)** | 0.1 V - 600 V AC TRUE RMS/DC | 0.1 V - 600 V |
| **supplementary function** | leakage current, polarization index (PI), dielectric absorption rate (DAR), automatic discharge function, null balance of the measuring leads | polarization index (PI), dielectric absorption rate (DAR), automatic discharge function, null balance of the measuring leads, integrated fuse test, test locking in case of external voltage |
| **measured value memory** | 500 measuring results | – |
| **measuring method** | TRUE RMS | RMS |
| **measuring category** | CAT IV 600 V | CAT IV 600 V |
| **item no.** | 044033 | 044107 |

**See page 22 for further accessorie**

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

# Earth Measuring Clamp

*for earth loop resistance and leakage current measurement*

## BENNING CM E1
## Earth Measuring Clamp for earth loop resistance and leakage current measurement

An adequate and effective earth connection is an important prerequisite for the correct functioning and safety of electrical installations.
The correct condition of an earth connection must be determined by inspection and measurement after each installation, modification and within the framework of periodic inspection of electrical installations and must be compared with the specified values.
Measuring the earth loop resistance by means of the BENNING CM E1 without using rods is the ideal solution for measuring earthing resistances in multiply earthed earthing systems.

- earth loop resistance measurement in multiply earthed earthing systems (IEC 61557-5)
- measurement of leakage and load currents using the TRUE RMS measuring method

## Benefits

- significant time saving and reduced effort compared to conventional measuring methods
- no need to disconnect the earth connection to be tested (often difficult due to corrosion), no need to set probes and auxiliary earth electrodes (difficult in built-up areas)
- safe both for the testing personnel and the electrical installation (earthing is maintained during measurement)
- no malfunctions of the installation due to disconnection of the earth connection

## A wide range of applications

Such as e. g. equipment/system earthing connections of buildings, industrial plants, transformer stations as well as earth connections in the field of lightning protection, street lighting, mobile communications, wind power and overhead line networks of electric utility companies

CM E1




TRUE RMS



Scope of delivery



Measuring the earth loop resistance of an installation's earth connection



Measuring the system earthing connection of an industrial power distribution system

## Earth Measuring Clamp

| | BENNING CM E1 |
|---|---|
| **indicating range** | 9999 with main and secondary display |
| **basic accuracy** | 1.5 % |
| **earth loop resistance** | 0.025 Ω - 1500 Ω |
| **leakage current AC** | 300 µA - 1000 mA |
| **load current AC** | 200 mA - 35 A |
| **supplementary function** | adjustable upper and lower alarm limit, automatic calibration during start-up, reference resistance loop for self-test |
| **memory function** | HOLD |
| **Data Log function** | 116 measured values ((interval 1s - 255 s) |
| **measuring method** | TRUE RMS |
| **clamp opening** | 38 mm |
| **measuring category** | CAT III 300 V |
| **item no.** | 044684 |

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

## Scope of delivery

| | BENNING CM E1 |
|---|---|
| **Scope of delivery** | hard-top case, reference resistance loop (0.474 Ω, 0.5 Ω, 10 Ω, 100 Ω) for self-test and battery (LR 61) |

# Effective, efficient and safe measurement of earth resistances

*the ideal solution*

## Features

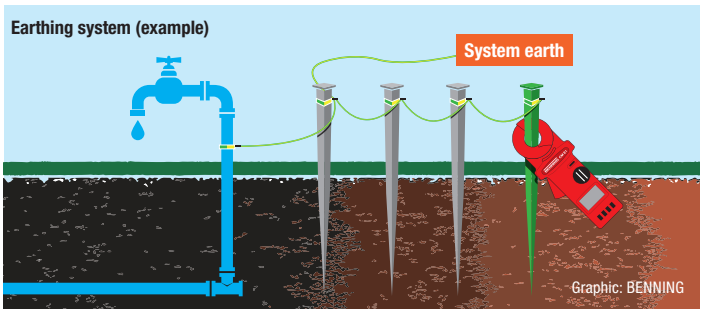
- optical and acoustic alarm function in case of earthing resistances being out of range
- large measuring clamp diameter of 38 mm
- measured value memory and data logger with adjustable measuring interval
- automatic calibration during start-up
- APO function (Auto-Power-Off) for battery saving (can be disabled))

## Tip

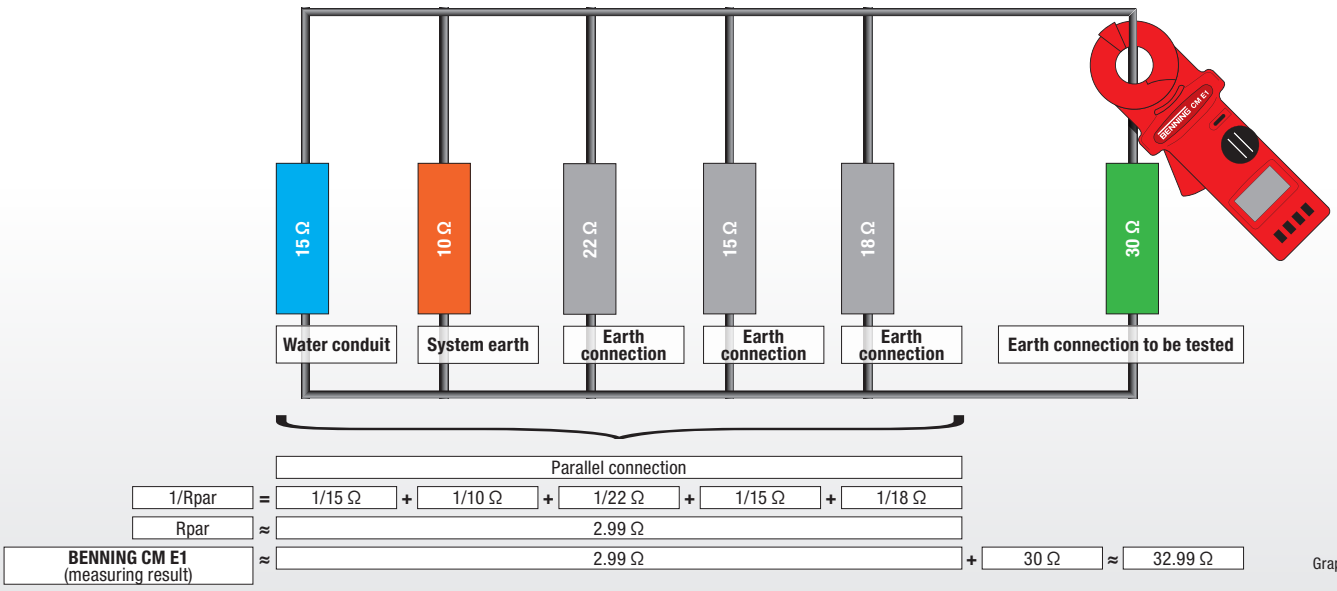
To measure a single earth electrode without a parallel earth connection, a temporary connection can be made to an existing earth connection, or a single earth rod can be set to create the required measuring loop.

## Functional principle

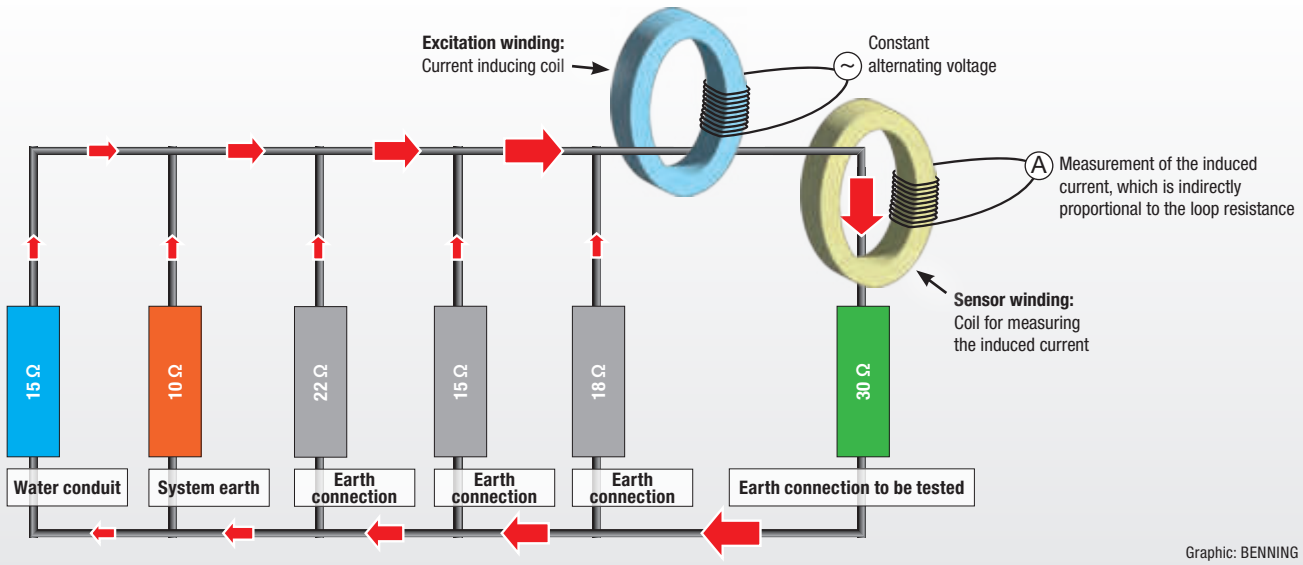
- The measuring clamp has an excitation winding and a sensor winding
- The excitation winding induces a current flow in the clamped earthing conductor via a constant AC voltage U (f = 3.333 kHz)
- The sensor winding measures the induced current flow
- The BENNING CM E1 measures (calculates) the resistance of the entire earth loop (Rs = U/I)




**Equivalent circuit**



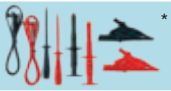

Graphic: BENNING




Graphic: BENNING

# Accessories for Insulation and Resistance Measuring Device/ Installation Testers

*professional accessories*

| | Description | Product data | Item no. | IT 130 | IT 115 | IT 105 | IT 101 | IT 100 |
|---|---|---|---|---|---|---|---|---|
| **Hard case/stand-by case** | | | | | | | | |
|  | **Robust hard case**<br>dimensions 375 x 190 x 250 mm | 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. | 10198412 | • | • | • | • | • |
|  | **Stand-by case size M**<br>dimensions: 240 x 180 x 70 mm | made of hard-wearing nylon fabric | 010913 | | | | • | • |
| **Measuring accessories** | | | | | | | | |
|  * | **BENNING TA 3**<br>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, alligator clips | 044126 | | | | • | • |
|  | **BENNING TA 4**<br>magnetic holder, three pieces | For attachment of multimeters to switching cabinets, machine and system parts. Consisting of: magnetic holder, adapter and belt | 044120 | | | | • | |
|  | **BENNING TA 5**<br>40 m measuring cable | with practical winder and strap, for the measurement of protective and bonding conductors, connection Ø 4 mm test socket/plug | 044039 | • | • | • | • | • |
|  | **Ø 4 mm safety measuring leads with 2 mm measuring tip,** 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 | | | | • | • |
|  | **Ø 4 mm safety measuring leads with 4 mm measuring tip,** 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 | | | | • | • |
|  | **earthing set**<br>for earthing measurement | three-wire measung method. Consisting of:<br>2 earth rods, 3 test cables (2 x 20 m, 1 x 4.5 m) | 044113 | • | • | | | |
|  | **CEE measuring adapter 16 A CEE 5-pin** | for measurement of voltage/phase-sequence (rotary field), frequency | 044148 | • | • | | | |
|  | **"Commander" test plug**<br>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 | • | • | | | |
|  | **"Commander" probe tip**<br>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 | • | • | | | |
| **CEE Measuring Adapter** | | | | | | | | |
|  | **BENNING TA 7-16**<br>~ 16 A 6h 3P+N+PE | for testing of 5-pin CEE sockets, easy and safe contacting without having to open the CEE sockets, coloured measuring jacks with unambiguous conductor assignment, universally applicable due to 4 mm safety measuring jacks, supported measurements/tests: Rlow, Riso, Zloop, Zline, RCD test, voltage and phase sequence testing | 044040 | • | • | • | • | • |
| | **BENNING TA 7-32**<br>~ 32 A 6h 3P+N+PE | | 044041 | • | • | • | • | • |
| | **BENNING TA 7-63**<br>~ 63 A 6h 3P+N+PE, additional 2 mm safety measuring jack for the pilot contact on 63 A CEE sockets | | 044042 | • | • | • | • | • |
| **Current Clamp Adapters** | | | | | | | | |
|  | **BENNING CC 3**<br>AC/DC current clamp adapter | basic accuracy: 1 % - 2 %<br>current: 0.2 A - 300 A AC/DC<br>output: 1 mV/10 mV AC/DC per 1 A AC/DC | 044038 | • | | | | |
|  | **BENNING CFlex 1**<br>AC current transformer | basic accuracy: 3 %<br>current: 0.3 A - 3000 A AC<br>output: 100 mV/10 mV/1 mV AC per 1 A AC | 044068 | • | | | | |
| **Ceramic fuse** | | | | | | | | |
|  * | **315 mA fuses**<br>packaging unit 10 pieces | superfast-acting (FF), breaking capacity 10 kA, rated voltage 1000 V, dimensions 6.3 x 32 mm | 757213 | | | | • | • |
|  * | **315 mA fuses**<br>packaging unit 10 pieces | F1, medium slow-acting (M), rated voltage 250 V, dimensions 5 x 20 mm | 757211 | • | • | | | |
|  * | **1,6 A fuses**<br>packaging unit 10 pieces | superfast-acting (FF), breaking capacity 30 kA, rated voltage 1000 V, dimensions 6.3 x 32 mm | 10194027 | | | • | | |

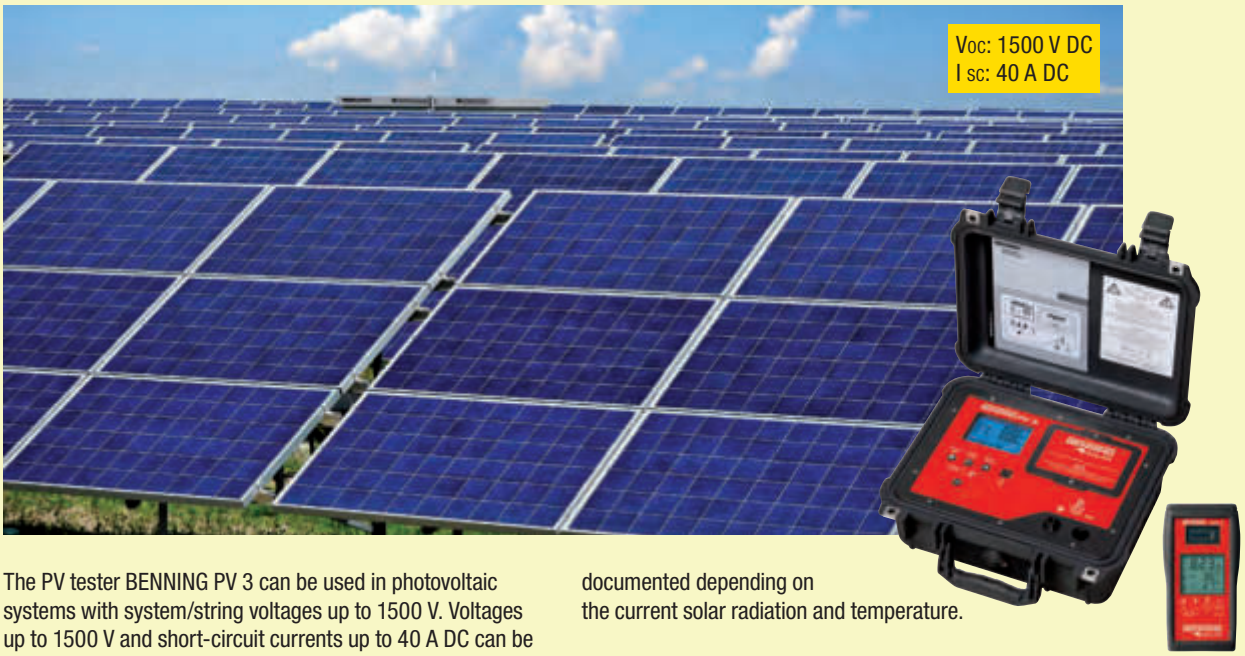
* figure similar

# Installation Tester for photovoltaic systems and curve tracer

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




The photovoltaic installation testers by BENNING are the ideal solution for quick and professional testing of PV systems. The BENNING PV 2 SET for installation testing in compliance with EN 62446 also offers curve measurement in compliance with EN 61829 and corresponding documentation by means of the software BENNING Solar Manager.




The PV tester BENNING PV 3 can be used in photovoltaic systems with system/string voltages up to 1500 V. Voltages up to 1500 V and short-circuit currents up to 40 A DC can be documented depending on the current solar radiation and temperature.

# Installation Tester for photovoltaic systems

*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 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 $R_{ISO}$
- 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

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

- testing in compliance with EN 62446 and 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 $R_{ISO}$ testing
- separate $R_{ISO}$ 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)

PV 1-1




PV 2




PV 2 SET




## Installation Tester for PV systems

| | BENNING PV 1-1 | BENNING PV 2 |
|---|---|---|
| **display** | graphic display (illuminated) | |
| **protective conductor resistance ($R_{PE}$)** | 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 ($R_{ISO}$)** | 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, $R_{ISO}$ | +/-, Uo/s, Is/c, $R_{ISO}$ |
| **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 (via BENNING CC 3) | |
| **insolation** | 100 W/m² – 1250 W/m² (via BENNING SUN 2) | |
| **PV module/ambient temperature** | -30 °C – +125 °C (via BENNING SUN 2) | |
| **voltage (2-pin)** | 30 V – 440 V AC/DC | |
| **measured value memory** | 200 | 999 |
| **interfaces** | USB/radio | USB/radio/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, micro USB cable | |
| | - | demo version of PC software BENNING SOLAR Manager |

## SET offer

| BENNING PV 2 SET | |
|---|---|
| BENNING PV 2 | item no. 050427 |
| BENNING SUN 2 | |
| PC software BENNING SOLAR Manager | |
| Bag with neck strap PV | |

## 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 28 for further accessories**

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

# Insolation and Temperature Measuring Instrument

*professional accessories, PC software and free app*

## BENNING SUN 2
## Insolation and Temperature Measuring Instrument

- insolation measurement (W/m²) 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®

SUN 2

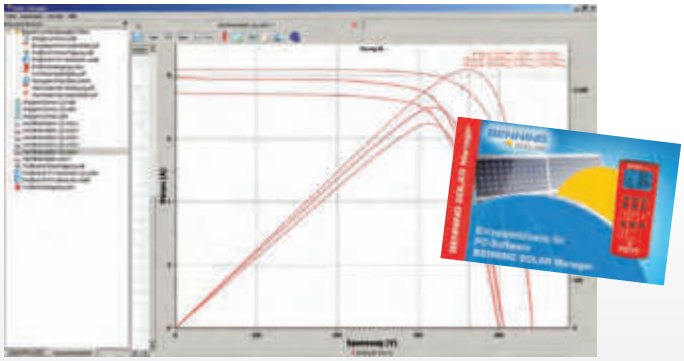



Wireless transmission up to 30 m



Insolation, inclinometer and compass bearing

PC software SOLAR Manager (050423)



App BENNING PV Link

GET IT ON Google Play

## Insolation and temperature measuring instrument

| | BENNING SUN 2 |
|---|---|
| **insolation** | 100 W/m² – 1250 W/m² |
| **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/m² 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 via download link |
| **item no.** | 050420 |

**See page 28 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 28) | 050424 | recommended | recommended |
| **PV module holder (SUN 2)** (see page 28) | 050425 | recommended | recommended |
| **AC/DC current clamp adapter BENNING CC 3** (see page 28) | 044038 | recommended | recommended |
| **40 m measuring lead BENNING TA 5** (see page 28) | 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 |

# Tester for photovoltaic systems

*testing of solar parks, power plants and large installations with 1500 V technology*

## BENNING PV 3
## PV Tester for PV systems with 1500 V technology

Rational testing of solar parks, power plants and large installations

- efficient - open-circuit voltage measurement for modern 1500 V DC systems
- powerful - short-circuit current measurement at PV strings up to 40 A DC
- safe – contacting by means of PV connectors

## 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/m²) and PV module temperature and ambient temperature (°C) by means of BENNING SUN 2 (optional)

## Features

- automatic test procedure (+/-, Vo/c, Is/c) with reverse polarity protection (incl. W/m², °C with integrated SUN 2)
- 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
- 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
- large LC display with illumination
- optimum transport and storage protection (IP 64)

PV 3




SUN 2 (optional)

Scope of delivery



## Tester for PV systems

| | BENNING PV 3 |
|---|---|
| **display** | graphic display (illuminated) |
| **polarity test** | automatic |
| **open-circuit voltage (Uo/c)** | 5 V - 1500 V DC |
| **resolution/accuracy** | max. 0.1 V/ ± (0.5 % + 2 digit) |
| **short-circuit current (Is/c)** | 0.5 A - 40 A DC (max. 45 kW) |
| **resolution/accuracy** | max. 0.01 A/ ± (1 % + 2 digit) |
| **insolation** | 100 W/m² – 1250 W/m² (via BENNING SUN 2) |
| **PV module/ambient temperature** | -30 °C - +125 °C (via BENNING SUN 2) |
| **measured value memory** | 999 |
| **interfaces** | USB type B |
| **batteries** | 3 x 3.7 V 18650 lithium-ion batteries |
| **dimensions/weight** | 340 x 300 x 152 mm/approx. 5 kg |
| **protection class** | IP 40 (open), IP 64 (closed) |
| **item no.** | 050428 |

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

## Scope of delivery

| | BENNING PV 3 |
|---|---|
| **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 |

## Optional accessories

| | Art.-Nr. |
|---|---|
| **BENNING SUN 2** insolation and temperature measuring instrument (see page 25) | 050420 |
| **Temperature sensor (suction cup)** suitable for BENNING SUN 2 (see page 28) | 050424 |
| **PV module holder** suitable for BENNING SUN 2 (see page 28) | 050425 |

# TRUE RMS Digital Current Clamp and Digital Multimeter

*safe voltage measurement up to 1500 V AC/ 2000 V DC via BENNING TA PV*

## BENNING CM 10-PV
### Digital Current Clamp Meter for photovoltaic systems and applications with high voltages

- current measurement up to 600 A AC/DC with max. 10 mA resolution
- microampere and temperature measuring range for HVAC technology
- INRUSH function for measuring inrush currents
- measuring input for flexible current transformer BENNING CFlex 1 (044068) up to 3000 A AC (optional)
- non-slip and break-proof SoftGrip housing

## BENNING MM 10-PV
### Digital Multimeter for photovoltaic systems and applications with high voltages

- universally applicable with 10 A current measuring range
- LC display with bargraph indication for the detection of measuring trends
- rubber holster with magnetic hanger
- compact design for one-hand operation

## Common features of BENNING CM 10-PV, MM 10-PV

- safe voltage measurement up to 1500 V AC/ 2000 V DC via TA PV
- data logger, memory function and Bluetooth® Low Energy 4.0 interface
- app “BENNING MM-CM Link” for download, storage and sharing measured values via smartphone/ tablet
- low-pass filter (HFR) for measurements at pulsed motor drives
- Volt sensor for non-contact signalling of phase voltages and cable breaks in lines (red LED)
- continuity test and single-pole phase test via buzzer and red LED
- delivery including case, batteries, measuring leads, measuring adapter TA PV, alligator clips and wire temperature sensor




## TRUE RMS Digital Current Clamp/ Multimeter

| | BENNING CM 10-PV | BENNING MM 10-PV |
|---|---|---|
| **indicating range** | 6000 (illuminated) | 6000 (illuminated) with bar graph |
| **basic accuracy** | 1.0 % | 0.5 % |
| **AC voltage** | 0.1 V - 1000 V (1500 V via TA PV) | 0.1 mV - 1000 V (1500 V via TA PV) |
| **DC voltage** | 0.1 mV - 1000 V (2000 V via TA PV) | 0.1 mV - 1000 V (2000 V via TA PV) |
| **AC current** | 0.1 µA - 4000 µA, 10 mA - 600 A | 1 mA - 10 A |
| **DC current** | 0.1 µA - 4000 µA, 10 mA - 600 A | 1 mA - 10 A |
| **resistance** | 0.1 Ω - 600 kΩ | 0.01 Ω - 40 MΩ |
| **continuity/diode** | • / • | • / • |
| **frequency** | 0.01 Hz - 10 kHz | 0.01 Hz - 100 kHz |
| **capacity** | 0.1 µF - 1 mF | 1 nF - 10 mF |
| **temperature** | -40 °C up to 400 °C | -40 °C up to 400 °C |
| **volt sensor** | • | • |
| **interface** | Bluetooth® | Bluetooth® |
| **software** | app (IOS, Android) | app (IOS, Android) |
| **filter function** | HFR filter (800 Hz) | HFR filter (800 Hz) |
| **memory** | HOLD, MIN/MAX, INRUSH, ZERO | HOLD, MAX/MIN, REL, SAVE |
| **data log function** | 4000 measuring values (interval: 1 s - 60 s) | 4000 measuring values (interval: 1 s - 60 s) |
| **measuring method** | TRUE RMS | TRUE RMS |
| **clamp opening** | 37 mm | – |
| **measuring category** | CAT IV 600 V | CAT IV 600 V |
| **item no.** | 044683 | 044089 |

**See page 28, 48, 60 for further accessories**

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

# Accessories for Testers for PV- Systems

*professional accessories*

| | Description | Product data | Item no. | PV 1-1 | PV 2 | SUN 2 | PV 2 SET | CM 10-PV | MM 10-PV |
|---|---|---|---|---|---|---|---|---|---|
| **PC software** | | | | | | | | | |
|  | **BENNING SOLAR Manager** | 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 | | • | | | | |
| **Current Clamp Adapter** | | | | | | | | | |
|  | **BENNING CC 3**<br>AC/DC current clamp adapter | For DC operating currents and AC currents up to 40 A.<br>Basic accuracy : 1 % - 2 % | 044038 | • | • | | • | | • |
| **Stand-by cases** | | | | | | | | | |
|  | **Stand-by case size S**<br>dimensions: 220 x 110 x 50 mm | with belt loop on the back, made of hard-wearing nylon fabric | 010912 | | | • | | | • |
|  | **Bag with neck strap for PV**<br>dimensions: 280 x 135 x 50 mm<br>(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 | • | • | | | | |
| **Hard case** | | | | | | | | | |
|  | **Robust hard case**<br>dimensions 375 x 190 x 250 mm | 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. | 10198412 | • | • | • | • | • | • |
| **Measuring accessories** | | | | | | | | | |
|  * | **BENNING TA 1**<br>alligator clips, two pieces | Ø 4 mm plug-in technology, red/black, professional equipment,<br>CAT III 1000 V | 044124 | • | • | | • | • | • |
|  * | **BENNING TA 2**<br>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, alligator clips CAT III 1000 V | 044125 | • | • | | • | • | • |
|  * | **BENNING TA 3**<br>set of measuring leads, eight pieces | Ø 4 mm plug-in technology, red/black, professional equipment,<br>CAT III 1000 V, consting of:<br>measuring leads (silicone), test probes (slender measuring tip), claw clamps, alligator clips | 044126 | • | • | | • | • | • |
|  | **BENNING TA 5**<br>40 m measuring cable | with practical winder and strap, for the measurement of protective and bonding conductors, connection Ø 4 mm test socket/plug | 044039 | • | • | | • | | |
|  | **BENNING TA PV (4 mm)**<br>measuring adapter | For safe DC and AC voltage measurement up to 1500 V AC/ 2000 V DC.<br>Measuring category: 1000 V CAT III, 600 V CAT IV (with protective cap), 1000 V AC CAT II/ 1500 V DC CAT II (without protective cap). Length 1.4 m. Incl. protective caps CAT III/ IV | 10217846 | | | | | • | • |
| **Temperature sensor** | | | | | | | | | |
|  | **Temperature sensor**<br>with suction cup | For attachment of the module temperature sensor to the module back<br>Contact sensor version. Cable length 2 m | 050424 | | | • | | | |
| **PV module holder** | | | | | | | | | |
|  | **PV module holder** | For safe attachment of the SUN 2 to the PV module | 050425 | | | • | | | |
| **Ceramic fuse** | | | | | | | | | |
|  * | **500 mA fuses**<br>packaging unit 10 pieces | fast-acting, breaking capacity 1 kA, rated voltage 1000 V,<br>dimensions 6.3 x 32 mm | 749771 | • | • | | • | | |

* figure similar

# Voltage Tester and Continuity Tester

## *Socket Tester and Phase Sequence Indicator*

- DUSPOL® Voltage Tester – the original since 1948
- PROFIPOL®+ Voltage Tester – a plus in functionality
- BENNING CM 1-4 Multifunctional Tester with digital and LED display
- 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
- BENNING VT 2 non-contact phase indicator and magnetic field tester

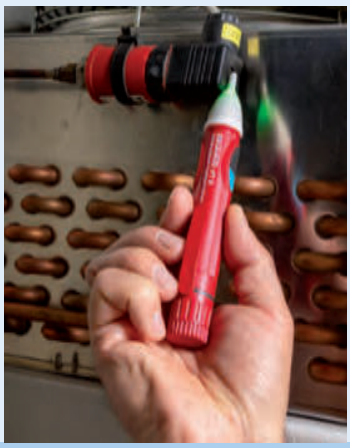














# DUSPOL® Voltage Testers

*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) 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® 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 conductingstate voltage indication

**8** load connection via push buttons

FI/RCD

**9** vibrating alert in the test handle

VIBRATION

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

IP65




DUSPOL® expert

1000 V AC/DC

CAT IV 600 V



DUSPOL® analog

1000 V AC/DC

CAT IV 600 V



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

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

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

# DUSPOL® Voltage Testers – the testers with the VDE mark of conformity

BENNING

*DUSPOL® the original by BENNING*

## 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 and polarity test

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

- LED step indicator from 50 V even in case of empty batteries
- 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
- delivery including batteries

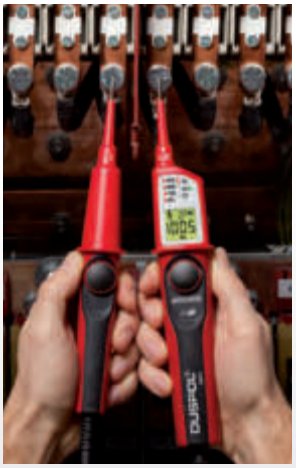
## Additionally for DUSPOL® digital:

- 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

## A wide range of applications

Ideal for voltage tests

- in photovoltaic systems and wind power plants
- in hybrid vehicles
- of high system voltages in industrial applications
- in service and crafts



Testing an AC voltage of 1000 V in an industrial power distribution system



Testing the high DC voltage of a HV electric vehicle

**Set offer:**
Set DUSPOL® digital with premium case



DUSPOL® digital SET
item no. 050264

## Voltage and Continuity Tester

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

**See page 36 for further accessories**

# Multifunctional measuring instrument

*for numerous applications*

## BENNING CM 1-4
## Multifunctional Current Clamp with numerous functions and features of typical voltage testers

For precise and safe measurements using the TRUE RMS measuring method such as measuring current, voltage and much more in electrical installations and the electrical industry. With the open current measuring clamp, currents can be measured even in inaccessible places.

- current measurement up to 200 A AC (TRUE RMS) using the open current measuring clamp, even at inaccessible measuring points
- voltage measurement up to 1000 V AC/DC with LED step indicator
- LED step indicator: 12, 50, 120, 230, 400, 690, 1000 V
- phase sequence test by means of green LEDs (clockwise/counter-clockwise)
- single-pole external conductor test (phase) via red LED
- continuity test via buzzer and red LED
- polarity test via +/- LED

## Features

- robust and ergonomic ABS housing with rubberised grip area and measuring probe holder as well as open current measuring clamp
- LC display and LED step indicator
- voltage measurement with/without acoustic signal
- memory function HOLD
- highest measuring category CAT IV 600

## Benefits

- combination of numerous measuring functions in one device
- voltage tester functions such as phase sequence test, single-pole phase test, continuity test, polarity test
- LED step indicator from 12 V up to 1000 V AC/DC
- voltage display from 50 V - no batteries required
- one-hand operation for voltage measurement at sockets (19 mm)
- LED measuring point illumination
- incl. a wide range of accessories

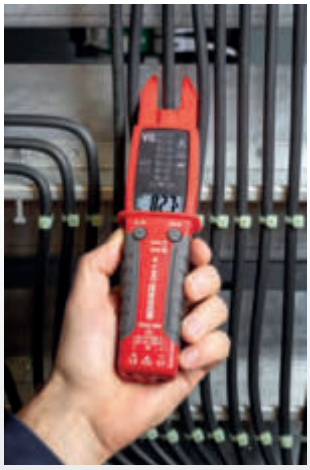


CM 1-4

Belt holster

TRUE RMS

CAT IV 600 V



AC current measurement



Voltage measurement and phase sequence test



One-hand operation for voltage measurement

## Multifunctional Current Clamp

| | BENNING CM 1-4 |
|---|---|
| **indicating range** | 9999 (illuminated)/ LED |
| **basic accuracy** | 1% |
| **AC voltage** | 6 V - 1000 V |
| **DC voltage** | 6 V - 1000 V |
| **AC current** | 0.1 A - 200 A |
| **resistance** | 1 Ω - 50 kΩ |
| **continuity test** | acoustic / LED |
| **phase sequence test** | green LED (right/left) |
| **single-pole external conductor test** | LED (red) |
| **polarity test** | LED (+/-) |
| **memory function** | HOLD |
| **measuring method** | TRUE RMS |
| **clamp opening** | 16 mm |
| **measuring point illumination** | LED |
| **measuring category** | CAT IV 600 V |
| **protection class** | IP 54 |
| **item no.** | 044686 |

## Scope of delivery

| | BENNING CM 1-4 |
|---|---|
| **scope of delivery** | belt holster, measuring leads, protective caps, contact tip extensions, batteries (2 x 1.5 type AAA) |

**See page 60 for further accessories**

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

# PROFIPOL®+ a plus in functionality

*Socket Tester with contact sensor*

## PROFIPOL®+
## Voltage and Continuity Tester in 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)
- delivery including batteries

## 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
- compact dimensions: 80 x 72 x 78 mm with lower weight (70 g)

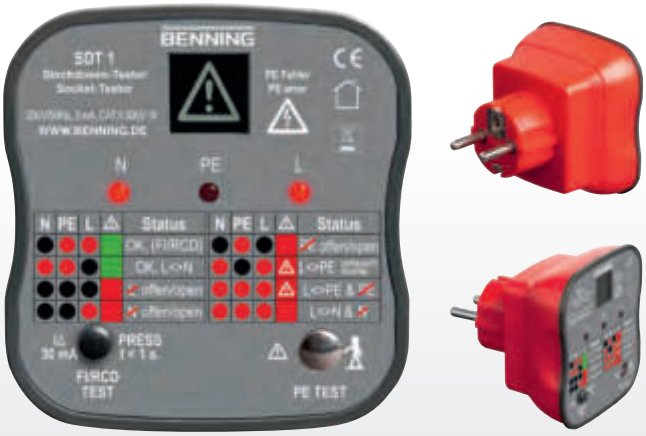
PROFIPOL® +

690 V AC/DC

CAT III 600 V



SDT 1




## Voltage and Continuity Tester

| | PROFIPOL® + |
|---|---|
| **indication** | LED |
| **voltage range** | 12 V - 690 V AC/DC |
| **acoustic and visual continuity test** | buzzer + yellow LED<br>0 - 100 kΩ |
| **single-pole external conductor test** | red “lightning” LED |
| **polarity test** | LED (+/-) |
| **cable break detector** | yellow LED |
| **protection class** | IP 54 |
| **item no.** | 020023 |

**See page 36 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** | Ub < 50 V AC to earth |
| **RCD testing current** | $I_{\Delta N}$ approx. 30 mA |
| **power supply** | via test object<br>(no batteries required) |
| **safety** | IEC/EN 61010-1, IEC/EN 61010-2-033 |
| **measuring category** | CAT II 300 V |
| **item no.** | 020053 |

# Professional Continuity Tester

## *Phase Sequence Indicator for three-phase mains*

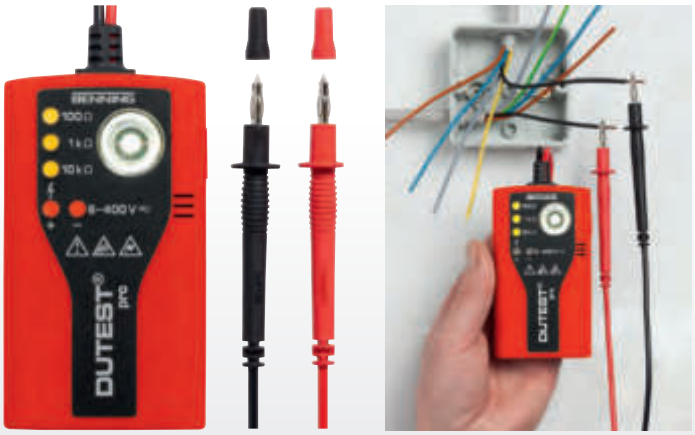
### DUTEST® pro
### Continuity and Line Tester for testing high-impedance and low-impedance resistances

- continuity and semiconductor test by means of LEDs and loud buzzer
- visual indication by means of three LED steps: 0 - 100 Ω/1 kΩ/10 kΩ
- acoustic indication via buzzer up to approx. 100 Ω
- external-voltage indication: 6 V to 400 V AC/DC (LEDs/ buzzer)
- polarity test, single-pole external conductor test (phase)
- 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

### 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

DUTEST® pro




TRITEST® pro




## 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 36 for further accessories**

## Phase Sequence Indicator

| | TRITEST® pro |
|---|---|
| **indication** | 4 x red, 1 x green LEDs |
| **phase sequence indication** | green/red LED for clockwise/counter-clockwise phase sequence |
| **voltage range** | 400 V - 500 V AC |
| **frequency range** | 50 Hz - 60 Hz |
| **luminous LED torch** | yes, single-level |
| **safety** | IEC/EN 61010-1, IEC/EN 61557-1, IEC/EN 61557-7 |
| **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/test probes, alligator clip |
| **item no.** | 020052 |

# Non-contact Phase/Phase Sequence and Magnetic Field Tester

BENNING

*quick & easy testing*

## TRITEST® easy Phase and Phase Sequence Tester

- easy phase sequence testing in three-phase mains by means of green/red LED probe tip (clockwise/counter-clockwise)

## BENNING VT 2 Phase and Magnetic Field Tester NEW!

- very reliable phase testing on various shock-proof and CEE sockets
- testing of solenoid valves in pneumatic and hydraulic systems, heating systems, pumps as well as relays in vehicles, machines, devices and control systems (green LED probe tip)
- testing of permanent, AC-induced and DC-induced magnetic fields
- high sensitivity for 12 V voltage range can be activated via the push-button

## BENNING VT 1 Phase Tester

- quick and non-contact phase testing

## Common features of the non-contact phase tester

- non-contact testing, no contact to the electrical conductor required
- phase testing of sockets, distribution boxes, switches and lamps (by means of LED probe tip and buzzer)
- testing insulated lines (cable reel, chains of lights) of cable breaks
- the flashing frequency of the LED probe tip as well as the frequency of the acoustic signal increase with the voltage applied increasing as well
- capacitive measuring method requires no current flow
- battery compartment can be opened easily via robust screw cap
- impact and break-proof ABS housing with pen clip

TRITEST® easy



CAT IV 600 V



Phase sequence testing
green = clockwise

VT 2



CAT IV 600 V



Testing a solenoid valve

VT 1



CAT IV 600 V



Phase test in junction boxes

## Non-contact Phase, Phase Sequence and Magnetic Field Tester

| | TRITEST® easy | BENNING VT 2 | BENNING VT 1 |
|---|---|---|---|
| **indication** | green/red LED probe tip/buzzer | | red LED probe tip/buzzer |
| **voltage range** | 200 V - 1000 V AC | 12 V - 1000 V AC | 200 V - 1000 V AC |
| **single-pole external conductor test** | red LED probe tip flashing/buzzer | | |
| **phase sequence indication** | • (right/left) | – | – |
| **magnetic field test** | – | • | – |
| **cable break detector** | • | • | • |
| **measuring category** | CAT IV 600 V, CAT III 1000 V | | |
| **batteries** | 2 x 1.5 V batteries of type AAA (LR03) | | |
| **scope of delivery** | incl. batteries, pen clip | | |
| **dimensions** | 153 x 25 x 20 mm | 153 x 25 x 20 mm | 153 x 22 x 18 mm |
| **weight** | 40 g | 40 g | 40 g |
| **item no.** | 020051 | 044055 | 020054 |

**See page 36 for further accessories**

# Accessories for Testers

*functional and indispensable*

| | Description | Product data | Item no. | DUSPOL® | PROFIPOL®+ | SDT 1 | DUTEST® pro | TRITEST® pro | TRITEST® easy | VT 2 | VT 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hard case / stand-by cases** | | | | | | | | | | | |
|  | **Robust hard case** 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 | • | • | • | • | • | • | • | • |
|  | **Premium case DUSPOL®**<br>Hard Case, dimensions:<br>330 x 105 x 65 mm<br>High protection despite low weight | With handle, counter-rotating zipper (outside), padded mesh pocket with zipper, flexible fastening loops with Velcro. | 010914 | • | • | | | | | | |
|  | **Stand-by case DUSPOL®**<br>dimensions:<br>330 x 100 x 60 mm | With belt loop on the back, made of hard-wearing nylon fabric | 010911 | • | • | | | | | | |
|  | **Stand-by case size S**<br>dimensions:<br>220 x 110 x 50 mm | With belt loop on the back, made of hard-wearing nylon fabric | 010912 | | | | • | • | • | • | • |
| **Test probe cap** | | | | | | | | | | | |
| <br>figure 1:1 | **4 mm test probe cap (GS 38)**<br>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 | • | • | | | | | | |

BENNING

# Digital Multimeter with safety and function without any compromises

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

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

- BENNING MM 12 — with data logger, Bluetooth®, PC software and app
- BENNING MM 10-PV — for photovoltaic systems and applications with 1500 V AC/ 2000 V DC
- BENNING MM 10-1 — with microampere measuring range for HVAC
- BENNING MM 7-2, MM 6-2 — maximum safety thanks to highest measuring category

**Digital Multimeter with proven quality and technology:**

- BENNING MM 2/MM 3 — precise current measuring ranges of 200 µA up to 20 A
- BENNING MM P3 — a variety of function in pocket size












# Digital Multimeter

## *technical data*

| Type BENNING | MM 12 | MM 10-PV | MM 10-1 | MM 7-2 | MM 7-1 | MM 6-2 |
|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| **Display** | | | | | | |
| **indicating range** | 4 000 / 40 000 | 6 000 | 6 000 | 60 000 | 6 000 | 6 000 |
| **bar graph** | • | • | • | • | • | • |
| **backlight** | • | • | • | • | • | • |
| **Measuring functions** | | | | | | |
| **basic accuracy** | 0.5 % | 0.5 % | 0.5 % | 0.03 % | 0.08 % | 0.5 % |
| **measuring method** | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS |
| **AC voltage** | 10 µV - 1000 V | 100 µV - 1000 V (1500 V via TA PV) | 100 µV - 1000 V | 10 µV - 1000 V | 10 µV - 1000 V | 100 µV - 1000 V |
| **DC voltage** | 10 µV - 1000 V | 100 µV - 1000 V (2000 V via TA PV) | 100 µV - 1000 V | 10 µV - 1000 V | 10 µV - 1000 V | 100 µV - 1000 V |
| **AC current** | 10 µA - 10 A | 1 mA - 10 A | 0.1 µA - 400 mA | 0.01 µA - 10 A | 10 µA - 10 A | 20 mA - 10 A |
| **DC current** | 10 µA - 10 A | 1 mA - 10 A | 0.1 µA - 400 mA | 0.01 µA - 10 A | 10 µA - 10 A | 1 mA - 10 A |
| **resistance** | 0.1 Ω - 40 MΩ | 0.1 Ω - 40 MΩ | 0.1 Ω - 40 MΩ | 0.01 Ω - 60 MΩ | 0.1 Ω - 40 MΩ | 0.1 Ω - 40 MΩ |
| **frequency** | 0.1 Hz - 100 kHz | 0.01 Hz - 100 kHz | 0.01 Hz - 100 kHz | 0.001 Hz - 1 MHz | 0.01 Hz - 100 kHz | 0.01 Hz - 100 kHz |
| **capacity** | 0.01 nF - 40 mF | 1 nF - 10 mF | 1 nF - 10 mF | 0.01 nF - 10 mF | 1 nF - 10 mF | 1 nF - 10 mF |
| **temperature** | -200 °C up to +1200 °C | -40 °C up to +400 °C | -40 °C up to +400 °C | -200 °C bis +1090 °C | -40 °C up to +400 °C | – |
| **continuity/diode** | • / • | • / • | • / • | • / • | • / • | • / • |
| **indication (continuity)** | buzzer | buzzer / red LED | buzzer / red LED | buzzer / LCD | buzzer / LCD | buzzer / red LED |
| **volt sensor (single-pole external conductor test / cable break detector)** | • | • | • | • | • | • |
| **Features** | | | | | | |
| **interface** | Bluetooth®, USB | Bluetooth® | Bluetooth® | – | – | – |
| **software** | PC-SW, App (IOS, Android) | App (IOS, Android) | App (IOS, Android) | – | – | – |
| **filter function** | HFR filter (800 Hz) | HFR filter (800 Hz) | HFR filter (800 Hz) | HFR filter (1000 Hz) | – | – |
| **measuring range switching** | automatic / manual | automatic | automatic | automatic / manual | automatic | automatic/ manual |
| **Auto Power Off** | • | • | • | • | • | • |
| **low battery indication** | • | • | • | • | • | • |
| **Data HOLD** | • | • | • | • | • | • |
| **MAX / MIN / AVG** | • / • / • | • / • / – | • / • / – | • / • / • | • / • / – | – / – / – |
| **PEAK** | • | – | – | • | – | • |
| **AutoV / LoZ** | • / • | – | • / • | • / • | • / • | • |
| **relative value function (REL)** | • | • | • | • | – | • |
| **level measurement (dB/dBm)** | • | – | – | – | – | – |
| **memory MEM** | 1 000 measuring values (A-SAVE, SAVE) | – | – | – | – | – |
| **Data Log function** | 40 000 measuring values (interval: 1s - 600 s) | 4 000 measuring values (interval: 1s - 600 s) | 4 000 measuring values (interval: 1s - 600 s) | – | – | – |
| **measuring category** | CAT IV 600 V CAT III 1000 V | CAT IV 600 V CAT III 1000 V | CAT IV 600 V CAT III 1000 V | CAT IV 600 V CAT III 1000 V | CAT IV 600 V CAT III 1000 V | CAT IV 600 V CAT III 1000 V |
| **Scope of delivery** | | | | | | |
| **carrying case / batteries** | • / • | • / • | • / • | • / • | • / • | • / • |
| **fuse** | • | • | • | • | • | • |
| **measuring leads / TA PV** | • / – | • / • | • / – | • / – | • / – | • / – |
| **alligator clips** | – | • | – | – | – | – |
| **rubber holster with magnetic hanger** | • / – | • / – | • / – | • / – | • / – | • / • |
| **magnetic hanger** | • | – | – | – | – | – |
| **wire temperature sensor (K)** | • | • | • | • | • | – |
| **PC software / USB data cable** | • | – | – | – | – | – |
| **operating manual** | • | • | • | • | • | • |
| **calibration certificate** | • | – | – | – | – | – |
| **Generally** | | | | | | |
| **dimensions** | 206 x 94 x 54 | 163 x 82 x 50 | 163 x 82 x 50 | 193 x 89 x 51 | 190 x 94 x 48 | 163 x 82 x 50 |
| **weight** | 640 g | 425 g | 425 g | 420 g | 460 g | 410 g |
| **item no.** | 044088 | 044089 | 044687 | 044690 | 044085 | 044087 |
| **catalogue page** | **44** | **27, 44** | **44** | **40 - 43** | **45** | **45** |

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

* incl. rubber holster

|  MM 5-2 |  MM 5-1 |  MM 4 |  MM 3 |  MM 2 |  MM 1 |  MM 1-3 |  MM 1-2 |  MM P3 |
|---|---|---|---|---|---|---|---|---|
| 6 000 | 6 000 | 4 200 | 2 000 | 2 000 | 3 200 | 2 000 | 2 000 | 5 000 |
| – | – | – | – | – | • | – | – | – |
| • | • | – | – | – | – | – | – | – |
| 0.5 % | 0.5 % | 0.5 % | 0.5 % | 0.5 % | 0.5 % | 0.5 % | 0.5 % | 0.6 % |
| TRUE RMS | TRUE RMS | RMS | RMS | RMS | RMS | RMS | RMS | RMS |
| 100 µV - 600 V | 100 µV - 600 V | 1 mV - 600 V | 100 µV - 600 V | 100 µV - 750 V | 1 mV - 600 V | 100 µV - 750 V | 100 µV - 750 V | 100 µV - 600 V |
| 100 µV - 600 V | 100 µV - 600 V | 1 mV - 600 V | 100 µV - 600 V | 100 µV - 1000 V | 100 µV - 600 V | 100 µV - 1000 V | 100 µV - 1000 V | 100 µV - 600 V |
| 20 mA - 10 A | – | 0,1 A - 300 A | 0.1 µA - 20 A | 0.1 µA - 20 A | – | 1 mA - 10 A | 1 mA - 10 A | – |
| 0.1 µA - 10 A | – | – | 0.1 µA - 20 A | 0.1 µA - 20 A | 0.1 µA - 3.2 mA | 1 mA - 10 A | 1 mA - 10 A | – |
| 0.1 Ω - 40 MΩ | 0.1 Ω - 40 MΩ | 0.1 Ω - 42 MΩ | 0.1 Ω - 20 MΩ | 0.1 Ω - 20 MΩ | 0.1 Ω - 32 MΩ | 0.1 Ω - 20 MΩ | 0.1 Ω - 20 MΩ | 0.1 Ω - 40 MΩ |
| 0.01 Hz - 50 kHz | 0.01 Hz - 50 kHz | – | 1 Hz - 200 kHz | – | – | 1 Hz - 20 MHz | 1 Hz - 20 MHz | 1 mHz - 5 MHz |
| 0.01 nF - 1 mF | 0.01 nF - 1 mF | – | 1 pF - 200 µF | – | – | 1 pF - 2 mF | 1 pF - 2 mF | 10 pF - 100 µF |
| -40 °C up to +400 °C | – | – | – | – | – | -20 °C up to +800 °C | – | – |
| • / • | • / • | • / • | • / • | • / • | • / • | • / • | • / • | • / • |
| buzzer / red LED | buzzer / red LED | – | – | – | – | buzzer / red LED | buzzer / red LED | – |
| • | • | – | – | – | – | • | • | – |
| – | – | – | – | – | – | – | – | – |
| – | – | – | – | – | – | – | – | – |
| – | – | – | – | – | – | – | – | – |
| automatic | automatic | automatic/ manual | manual | manual | automatic/ manual | automatic/ manual | automatic/ manual | automatic/ manual |
| • | • | • | • | • | • | • | • | • |
| • | • | • | • | • | • | • | • | • |
| • | • | • | - | - | • | • | • | • |
| – / – / – | – / – / – | – / – / – | – / – / – | – / – / – | – / – / – | • / • / – | • / • / – | – / – / – |
| • | • | – | – | – | – | – | – | – |
| – | – | – | – | – | – | – | – | – |
| • | • | – | – | – | – | – | – | – |
| – | – | – | – | – | – | – | – | – |
| – | – | – | – | – | – | – | – | – |
| – | – | – | – | – | – | – | – | – |
| CAT IV 300 V<br>CAT III 600 V | CAT IV 300 V<br>CAT III 600 V | CAT III 300 V<br>CAT II 600 V | CAT III 300 V<br>CAT II 600 V | CAT III 600 V<br>CAT II 1000 V | CAT III 600 V | CAT III 600 V<br>CAT II 1000 V | CAT III 600 V<br>CAT II 1000 V | CAT III 300 V<br>CAT II 600 V |
| • / • | • / • | • / • | • / • | • / • | • / • | • / • | • / • | • / • |
| • | – | – | • | • | – | • | • | – |
| • / – | • / – | • / – | • / – | • / – | • / – | • / – | • / – | • / – |
| – | – | – | – | – | – | – | – | – |
| • / • | • / • | – / – | • / – | • / – | • / – | – / – | – / – | – / – |
| – | – | – | – | – | – | – | – | – |
| • | – | – | – | – | – | • | – | – |
| – | – | – | – | – | – | – | – | – |
| • | • | • | • | • | • | • | • | • |
| – | – | – | – | – | – | – | – | – |
| 150 x 77 x 44 | 150 x 77 x 44 | 225 x 77 x 35 | 192 x 95 x 50 | 192 x 95 x 50 | 165 x 80 x 36 | 156 x 74 x 44 | 156 x 74 x 44 | 132 x 86 x 19 |
| 310 g | 310 g | 230 g | 550 g | 550 g | 310 g | 320 g | 320 g | 130 g |
| 044071 | 044070 | 044073 | 044029 | 044028 | 044027 | 044083 | 044082 | 044084 |
| **45** | **45** | **48** | **48** | **48** | **48** | **49** | **49** | **49** |

BENNING

# MM 7-2

TRUE RMS Digital Multimeter

NEW!

## Top performance quality and safety

### BENNING MM 7-2
### TRUE RMS Digital Multimeter with AutoV, LoZ function and low-pass filter (HFR)

- ergonomic 2-component housing for increased grip and impact resistance
- TRUE RMS measuring method (AC and AC+DC) for measuring non-linear signals
- „AutoV“ function for automatic AC/DC switch-over and measuring range selection
- LoZ voltage measurement with low input impedance (> 2 kΩ) to suppress reactive voltages
- quick continuity test with optical and acoustic indication (< 100 µs)
- jack control with warning (visual/acoustic) to protect against operating errors
- delivery including silicone measuring leads with 2 mm and 4 mm measuring probe (gold-plated) and carrying case

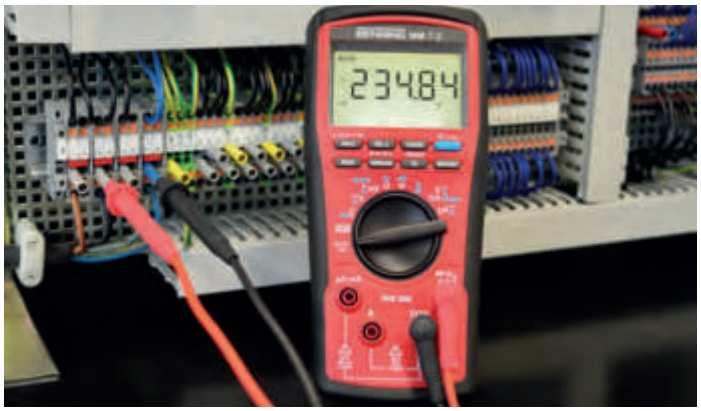





INFO

# TRUE RMS Digital Multimeter

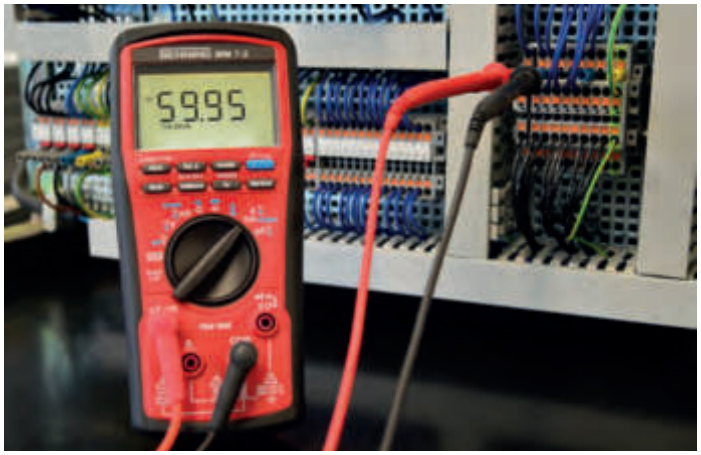
*integrated protective rubber holster for increased grip and impact resistance*




mains voltage measurement with AutoV and LoZ function




duty cycle measurement of the CP control signal of a wall box




measurement of the 4 mA to 20 mA current loop signal in process technology




scope of delivery

## BENNING MM 7-2
## TRUE RMS Digital Multimeter with AutoV, LoZ function and low-pass filter (HFR)

### Application:

The new TRUE RMS digital multimeter in an ergonomic and rubber-coated 2K housing is suited for the most challenging measuring tasks in electrical trade, industry, service and HVAC technology.

- **Electrical trade:**
  - LoZ voltage measurement with low input impedance (> 2 kΩ) to suppress reactive voltages
  - measurement of the CP control signal (duty cycle/amplitude) of EV charging stations (wall boxes) for electric vehicles (requires the BENNING EV 3-2 test adapter, item no. 044169 and adapter BNC - 4 mm jack, item no. 10231627)
- **Industry:**
  - TRUE RMS voltage and frequency measurement for frequency converter drives and loads with superimposed harmonics
  - measurement of the 4 mA to 20 mA current loop signal in process technology
- **Service:**
  - AutoV function with automatic switching (AC/ DC) and measuring range selection for quick troubleshooting
  - visual and acoustic continuity test with fast response time (< 100 µs) for localising defective components, cable breaks and loose terminals
- **HVAC technology:**
  - µA measuring range for measurements on flame sensors (ionisation current) and measurement of the sacrificial anode current (mA) of hot water storage tanks
  - measurement of temperature and exhaust gas temperature in heating, ventilation and air conditioning systems (HVAC)

### Measuring functions:

- TRUE RMS voltage (1000 V) and current measurement (10 A, 20 A for 30 s)
- resistance (60 MΩ), capacity (10 mF), frequency (1 MHz), duty cyle (%), 4 mA - 20 mA current loop (%), temperature measurement (°C, °F)
- continuity, diode test and “Voltsensor” function (non-contact and single-pole phase testing)

### Features:

- backlit digital display with a resolution of 60,000 digits
- TRUE RMS measurement (AC and AC+DC)
- MIN/MAX/average and quick PEAK recording (250 µs)
- quick continuity test (< 100 µs) with optical and acoustic indication
- jack control (visual/acoustic) in the µA/mA and A ranges with warning in case of operating errors (fuse protection)
- display HOLD and Auto-HOLD when the measured value is stable
- scope of delivery:
  digital multimeter with integrated protective rubber holster, carrying case, high-quality silicone measuring leads with gold-plated 2 mm and 4 mm measuring probe (screw-on type), wire temperature sensor and batteries

# The new benchmark in measuring technology

*outstanding quality, safety and price/performance ratio*

**REL Δ**
relative measurement for offset compensation

**VoltSense (Voltsensor)**
non-contact and single-pole phase testing with 2 sensitivity levels

**AUTO-RANGE**
automatic measuring range selection for increased ease of use

**HOLD/ A-HOLD**
manual and automatic storage of the display value for convenient reading

**PEAK**
quick memory of MAX/ MIN peak value (250 µs) for current and voltage (APO disabled)

**Resistance/ continuity (·ıı)) / ☼)**
max. resolution 0.01 Ω up to 60 MΩ visual and acoustic signal with fast response time (< 100 µs)

**Logic level Hz/ %**
frequency and duty cycle measurement of logic signals

**mV DC, AC, AC+DC**
0.01 V resolution (600 mV measuring range)

**V DC, AC+DC**
0.03 % basic accuracy VDC (max.)

**V AC/ HFR**
connectable low-pass filter for measurements on frequency converters and for measuring noisy signals

**AutoV**
automatic AC+DC switch-over and measuring range selection

**LoZ function**
low input impedance (> 2 kΩ) to suppress reactive voltages

**Jack control (optical/ acoustic)**
warning in case of incorrect measuring range selection to protect the fuses

**Silicone measuring leads with 2 mm and 4 mm measuring probe**
highly flexible measuring lead with gold-plated measuring probe (reducing oxidation) for reliable contacting




original size



**Robust and ergonomic housing**
with integrated protective rubber holster, rear stand and measuring lead holder

**APO (Auto Power OFF)**
automatic switch-off ("APO") after 30 min. for extended battery lifetime (can be disabled)

**Large LC display with 60 000 digit**
resolution and illumination, rate: 5/ s

**RANGE**
Automatic and manual measuring range selection

**Analogue bar graph**
for the detection of measuring trends, rate: 50 /s

**Function / ☼**
Funktionsanwahl und Display-beleuchtung (APO 16 Min.)

**Hz**
measurement of noisy mains frequencies

**MIN / MAX**
memory of MIN/ MAX/ AVG measurement value (APO disabled)

**4 mA - 20 mA DC current loop measurement** (%) for process signals

**mA/ A DC, AC, AC+DC**
for precise current measurement (TRUE RMS)

**µA DC, AC, AC+DC**
measurement of low currents, e.g. ionisation current of a gas heating system (HVAC technology)

**Temperature**
via K type sensor in °C and °F

**Capacity/ diode**
measurement of capacitors up to 10 mF, visual and acoustic diode testing

**Safety**
EN 61010-1, EN 61010-2-033

**CAT IV 600 V/ CAT III 1000 V**
transient protection up to 8 kV (1.2/50 µs)

**TRUE RMS AC, AC+DC**
TRUE RMS measuring method for non-sinusoidal signals

**1 kV HBC fuses with high breaking capacity**
20 kA@1000 V, F 11 A
30 kA@1000 V, F 0.4 A

# TRUE RMS Digital Multimeter

BENNING

## *technical data*

| | | BENNING MM 7-2 |
|---|---|---|
| **DC voltage** | range | 600.00 mV, 6.0000 V, 60.000 V, 600.00 V, 1000.0 V |
| | max. accuracy | ± (0.03 % + 2 digit) |
| | max. resolution | 0.01 mV |
| **AC, AC+DC voltage** | range | 600.00 mV, 6.0000 V, 60.000 V, 600.00 V, 1000.0 V |
| | max. accuracy | ± (0.5 % + 30 digit) @ 50 Hz ~ 60 Hz |
| | max. resolution | 0.01 mV |
| **DC current** | range | 600.00 µA, 6000.0 µA, 60.000 mA, 600.00 mA, 6.000 A, 10.000 A |
| | max. accuracy | ± (0.075 % + 20 digit) |
| | max. resolution | 0.01 µA |
| **AC, AC+DC current** | range | 600.00 µA, 6000.0 µA, 60.000 mA, 600.00 mA, 6.000 A, 10.000 A |
| | max. accuracy | ± (0.9 % + 20 digit) @ 40 Hz ~ 3 kHz |
| | max. resolution | 0.01 µA |
| **resistance** | range | 600.00 Ω, 6.000 kΩ, 60.000 kΩ, 600.00 kΩ, 6.0000 MΩ, 60.000 MΩ |
| | max. accuracy | ± (0.085 % + 4 digit) |
| | max. resolution | 0.01 Ω |
| **capacity** | range | 10.00 nF, 100.0 nF, 1000 nF, 10.00 µF, 1.000 mF, 10.00 mF |
| | max. accuracy | ± (1 % + 2 digit) |
| | max. resolution | 0.01 nF |
| **frequency (mains level)** | range | 10.000 Hz ~ max. 50.00 kHz (U/ V), 10.000 Hz ~ max. 5.0000 kHz (I/ A) |
| | max. accuracy | ± (0.05 % + 5 digit) |
| | max. resolution | 0.001 Hz |
| **frequency (logic level)** | range | 5.000 Hz ~ 1.0000 MHz (U/ V) |
| | max. accuracy | ± (0.002 % + 4 digit) |
| | max. resolution | 0.001 Hz |
| **duty cycle** | range | 0.10 % - 99.99 % |
| | max. accuracy | ± (3 digit per kHz + 2 digit) |
| | max. resolution | 0.01 % |
| **temperature** | range | - 200 °C ~ 1090 °C, - 328,0 °F ~ 1994 °F |
| | max. accuracy | ± (1.0 % + 1.0 °C), ± (1.0 % + 1.8°F) |
| | max. resolution | 0.1 °C, 0.1 °F |
| **4 mA - 20 mA DC current loop** | range | 0 % (4 mA) ~ 100 % (20 mA) |
| **continuity test** | range | < 100 Ω ~ 400 Ω (optical and acoustic indication), response time < 100 µs |
| **diode test** | range | 3.0000 V (optical and acoustic indication) |
| **VoltSensor (voltage indicator)** | non-contact | approx. 230 V, electric field measurement, 2 sensitivity levels |
| | via measuring lead | approx. 230 V, single-pole measurement via measuring lead, 2 sensitivity levels |
| **indication** | digital | 5 digit, 60,000 digits, max. measuring rate 5/ s |
| | analogue bar graph | 30 segments, measuring rate 50/ s |
| **diagnosis and data HOLD functions** | MIN/ MAX/ AVG | minimum, maximum and average value memory |
| | PEAK/ REL Δ | peak value memory (MIN/MAX), (250 µs)/ relative value measurement ~ |
| | HOLD/ A-HOLD | measuring value memory, manual/automatic memory |
| **measuring method** | TRUE RMS | TRUE RMS measuring method AC, AC +DC |
| **low-pass filter** | HFR | high-frequency suppression of interfering signals |
| **jack control** | µA/ mA, A input | visual and acoustic alert in case of incorrect measuring range selection |
| **safety** | | EN 61010-1, EN 61010-2-033, EN 61010-031 |
| **measuring category** | | CAT IV 600 V, CAT III 1000 V |
| **power supply** | | 3 x 1.5 V micro batteries (AAA/ IEC LR03), 150 h without illumination |
| **dimensions/weight** | | 193 x 89 x 51 mm/ 420 g |
| **Item no.** | | 044690 |

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

# TRUE RMS Digital Multimeter

*with data logger, Bluetooth® and free app*

## BENNING MM 12
### TRUE RMS Logging Multimeter for professional use

- large digital display with secondary display and bargraph indication
- AUTO SAVE function, storage without key operation
- TRUE RMS measuring method (AC, AC+DC)
- optical PC interface with USB cable
- including PC software, alligator clips and calibration certificate

## BENNING MM 10-PV
### For photovoltaic systems and for applications with high voltages

- safe voltage measurement up to 1500 V AC/ 2000 V DC via measuring adapter TA PV
- universally applicable with 10 A current measuring range
- continuity test and single-pole phase test via buzzer and red LED

## BENNING MM 10-1
### For HVAC and for service use in harsh environments

- microampere measuring range for testing flame sensors and sacrificial anodes of heating systems/water storage tanks
- continuity test and single-pole phase test via buzzer and red LED

## Common features BENNING MM 12, MM 10-PV, MM 10-1

- data logger, memory function and Bluetooth® Low Energy 4.0 interface
- app “BENNING MM-CM Link” for download, storage and sharing measured values via smartphone/ tablet
- low-pass filter (HFR) for measurements at pulsed motor drives
- “AutoV” and “LoZ” function for automatic AC/DC voltage and to suppress reactive voltages (MM 12/MM 10-1)
- Volt sensor for non-contact signalling of phase voltages and cable breaks in lines via red LED (MM 10-PV/MM 10-1)
- delivery including case, rubber holster, wire temperature sensor, batteries, measuring leads. MM 10-PV additional with measuring adapter TA PV and alligator clips

App Store Google Play



MM 12



TRUE RMS | CAT IV 600 V

MM 10-PV

volt sensor



TRUE RMS | CAT IV 600 V

MM 10-1

volt sensor



TRUE RMS | CAT IV 600 V

## TRUE RMS Digital Multimeter

| | BENNING MM 12 | BENNING MM 10-PV | BENNING MM 10-1 |
|---|---|---|---|
| **indicating range** | 40000 (illuminated) with bar graph | 6000 (illuminated) with bar graph | 6000 (illuminated) with bar graph |
| **basic accuracy** | 0.5 % | 0,5 % | 0.5 % |
| **AC voltage** | 10 µV - 1000 V | 0.1 mV - 1000 V (1500 V via TA PV) | 0.1 mV - 1000 V |
| **DC voltage** | 10 µV - 1000 V | 0.1 mV - 1000 V (2000 V via TA PV) | 0.1 mV - 1000 V |
| **AC current** | 10 µA - 10 A | 1 mA - 10 A | 0.1 µA - 400 mA |
| **DC current** | 10 µA - 10 A | 1 mA - 10 A | 0.1 µA - 400 mA |
| **resistance** | 0.1 Ω - 40 MΩ | 0.01 Ω - 40 MΩ | 0.01 Ω - 40 MΩ |
| **continuity/diode** | • / • | • / • | • / • |
| **frequency** | 0.1 Hz - 100 kHz | 0.01 Hz - 100 kHz | 0.01 Hz - 100 kHz |
| **capacity** | 0.01 nF - 40 mF | 1 nF - 10 mF | 1 nF - 10 mF |
| **temperature** | -200 °C up to 1200 °C | -40 °C up to 400 °C | -40 °C up to 400 °C |
| **volt sensor** | - | • | • |
| **interface** | Bluetooth®, USB | Bluetooth® | Bluetooth® |
| **software** | PC software, app (IOS, Android) | app (IOS, Android) | app (IOS, Android) |
| **filter function** | HFR filter (800 Hz) | HFR filter (800 Hz) | HFR filter (800 Hz) |
| **memory** | 1000 measuring values, HOLD, PEAK, MAX/MIN | HOLD, MAX/MIN, REL, SAVE | HOLD, MAX/MIN, REL, SAVE |
| **data log function** | 40000 measuring values (interval: 1 s - 600 s) | 4000 measuring values (interval: 1 s - 60 s) | 4000 measuring values (interval: 1 s - 60 s) |
| **measuring method** | TRUE RMS | TRUE RMS | TRUE RMS |
| **measuring category** | CAT IV 600 V | CAT IV 600 V | CAT IV 600 V |
| **item no.** | 044088 | 044089 | 044687 |

**See page 50 for further accessories**

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

# TRUE RMS Digital Multimeter

BENNING

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

## BENNING MM 7-1
## 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 signalises 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 6-2
## 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 and measuring leads

## BENNING MM 5-2, MM 5-1
## 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 (LCD/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)

MM 7-1




MM 6-2




MM 5-2




MM 5-1




## TRUE RMS Digital Multimeter

| | BENNING MM 7-1 | BENNING MM 6-2 | BENNING MM 5-2 | BENNING MM 5-1 |
|---|---|---|---|---|
| **indicating range** | 6000 (illuminated) with bar graph | 6000 (illuminated) with bar graph | 6000 (illuminated) | 6000 (illuminated) |
| **basic accuracy** | 0.08 % | 0.5 % | 0.5 % | 0.5 % |
| **AC voltage** | 10 µV - 1000 V | 100 µV - 1000 V | 100 µV - 600 V | 100 µV - 600 V |
| **DC voltage** | 10 µV - 1000 V | 100 µV - 1000 V | 100 µV - 600 V | 100 µV - 600 V |
| **AC current** | 10 µA - 10 A | 20 mA - 10 A | 20 mA - 10 A | – |
| **DC current** | 10 µA - 10 A | 1 mA - 10 A | 0.1 µA - 10 A | – |
| **resistance** | 0.1 Ω - 40 MΩ | 0.1 Ω - 40 MΩ | 0.1 Ω - 40 MΩ | 0.1 Ω - 40 MΩ |
| **continuity/diode** | • / • | • / • | • / • | • / • |
| **frequency** | 0.01 Hz - 100 kHz | 0.01 Hz - 100 kHz | 0.01 Hz - 50 kHz | 0.01 Hz - 50 kHz |
| **capacity** | 1 nF - 10 mF | 1 nF - 10 mF | 0.01 nF - 1 mF | 0.01 nF - 1 mF |
| **temperature** | -40 °C up to +400 °C | – | -40 °C up to +400 °C | – |
| **volt sensor** | • | • | • | • |
| **interface** | – | – | – | – |
| **software** | – | – | – | – |
| **filter function** | – | – | – | – |
| **memory** | HOLD, MAX/MIN, PEAK | HOLD, PEAK, REL | HOLD, PEAK | HOLD, PEAK |
| **Data Log function** | – | – | – | – |
| **measuring method** | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS |
| **measuring category** | CAT IV 600 V | CAT IV 600 V | CAT III 600 V | CAT III 600 V |
| **item no.** | 044085 | 044087 | 044071 | 044070 |

**See page 50 for further accessories**

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

BENNING

NEW!

# MM 2-1, MM 2-2, MM 2-3

TRUE RMS Digital Multimeter Series




## The new entry-level class of professional measuring equipment

### TRUE RMS digital multimeter series with an excellent price/performance ratio

- TRUE RMS measuring method for measuring non-linear signals
- robust protective rubber holster for increased grip and impact resistance
- ergonomic housing with large display and illumination
- MIN/MAX/AVG recording, HOLD storage
- jack control with warning (visual/acoustic) to protect against operating errors (fuseprotection)
- delivery including silicone high-quality measuring leads with 2 mm and 4 mm measuring probe (gold-plated) and carrying case

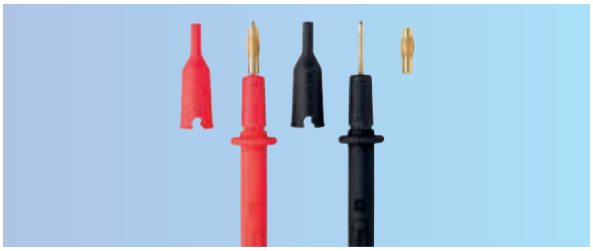


INFO

# TRUE RMS Digital Multimeter Series

BENNING

*robust integrated protective rubber holster for increased grip and impact resistance*



silicone measuring leads with gold-plated measuring probe
(2 mm fixed and 4 mm screw-on type)




scope of delivery BENNING MM 2-3

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

### Measuring functions:

- TRUE RMS voltage measurement (1000 V AC/DC) with max accuracy of 0.2 %
- resistance (60 MΩ) and frequency measurement (50 kHz)
- continuity and diode test (visual/ acoustic)
- "Voltsensor" function for non-contact and single-pole phase testing

**Additionally for MM 2-2, MM 2-3:**

- TRUE RMS current measurement (10 A AC/ DC) protected by a 1 kV HBC fuse
- capacity measurement (10 mF)

**Additionally for MM 2-3:**

- temperature measurement (-40 °C up to +400 °C) incl. temperature sensor

### Features:

- backlit digital display with a resolution of 6,000 digits
- precise TRUE RMS measurement
- MIN/MAX/average and relative value measurement (REL)
- quick continuity test (< 15 ms) with visual and acoustic indication
- jack control (visual/acoustic) in the A ranges with warning in case of operating errors (fuse protection)
- display HOLD (storage of the current measured value)
- automatic and manual measuring range selection (RANGE)
- all ranges with overload protection up to 1000 V
- compact and ergonomic housing for one-hand operation
- scope of delivery:
  - digital multimeter with robust protective rubber holster,
  - high-quality silicone measuring leads with gold-plated 2 mm and 4 mm measuring probe
  - wire temperature sensor (MM 2-3), carrying case and batteries

| ranges / functions | MM 2-1 | MM 2-2 | MM 2-3 |
|---|---|---|---|
| voltage AC/DC | 60.00 mV, 600.0 mV, 6.000 V, 60.00 V, 600.0 V, 1000 V | | |
| current AC/DC | – | 6.000 A, 10.00 A (by means of a 1 kV high breaking capacity fuse) | |
| resistance | 600.0 Ω, 6.000 kΩ, 60.00 kΩ, 600.0 kΩ, 6.000 MΩ, 60.00 MΩ | | |
| frequency | 10.00 Hz - max. 50.00 kHz (voltage), 50.00 Hz – 1.00 kHz (current) | | |
| capacity | – | 20.00 nF, 200.0 nF, 2000 nF, 20.00 µF, 200.0 µF, 2000 µF, 10.00 mF | |
| temperature | – | – | -40 °C ~ +400 °C |
| continuity test | < 30 Ω - 480 Ω (visual and acoustic indication), response time < 15 ms | | |
| diode test | 3,000 V (visual and acoustic indication) | | |
| VoltSensor | non-contact phase testing (electric field measurement), 2 sensitivity levels | | |
| | single-pole phase testing via measuring lead, 2 sensitivity levels | | |
| indication | 3 5/6 digit, 60,000 digits, max. measuring rate 5/s, illuminated | | |
| diagnosis and data HOLD functions | MIN/MAX/AVG: minimum, maximum and average value memory | | |
| | REL Δ: relative value measurement | | |
| | HOLD: manual memory | | |
| measuring method | TRUE RMS measuring method | | |
| jack control (A input) | visual and acoustic alert in case of incorrect measuring range selection (fuse protection) | | |
| safety | EN 61010-1, EN 61010-2-033, EN 61010-031 | | |
| measuring category | CAT IV 300 V, CAT III 600 V, CAT II 1000 V | | |
| power supply | 2 x 1.5 V micro batteries (AAA/ IEC LR03), battery life approx. 190 h without background lighting | | |
| dimensions/weight | 161 x 80 x 50 mm/ 334 g | | |
| item no. | 044691 | 044692 | 044693 |

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

# Digital Multimeter

*safety and functional diversity without any compromises*

## 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 measurement up to 300 A AC via attachable current clamp adapter (max. clamp opening 30 mm)
- delivery including case, batteries, measuring accessories (consisting of measuring lead, measuring probes, alligator clips (item no. 044119))

## BENNING MM 3, MM 2 and MM 1

### Quality that convinces

- basic measuring for current, voltage, resistance, capacity, frequency, continuity and diode test
- precise current measuring ranges (200 µA 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

MM 4



MM 3




MM 2




MM 1




## Digital Multimeter

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

**See page 50 for further accessories**

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

# Digital Multimeter

*reliable and precise in each and every situation*

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

### With volt sensor function

- extremely compact housing type
- the integrated Volt sensor signalises phase voltages by means of an acoustic signal and a red LED signal
- 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)

## BENNING MM P3

### Pocket-size

- 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

MM 1-3




MM 1-2




MM 1-1




MM P3



## Digital Multimeter

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

**See page 50 for further accessories**

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

# Accessories for Digital Multimeter

*safe – functional – indispensable*

| | Description | Product data | Item no. | MM 12 | MM 10-PV | MM 10-1 | MM 7-2 | MM 7-1 | MM 6-2 | MM 5-2 | MM 5-1 | MM 4 | MM 3 | MM 2 | MM 1 | MM 1-3 | MM 1-2 | MM 1-1 | MM P3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Current Clamp Adapters** | | | | | | | | | | | | | | | | | | | |
|  | **BENNING CFlex 1**<br>AC current transformer | basic accuracy: 3 %<br>current: 0.3 A - 3000 A AC<br>output: 100 mV/10 mV/1 mV AC per 1 A AC | 044068 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
|  | **BENNING CC 3**<br>AC/DC current clamp adapter | basic accuracy: 1 % - 2 %<br>current: 0.2 A - 300 A AC/DC<br>output: 1 mV/10 mV AC/DC per 1 A AC/DC | 044038 | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | |
|  | **BENNING CC** 1<br>AC current clamp adapter | basic accuracy: 1.9 %<br>current: 1 A - 400 A AC<br>output: 1 mV AC per 1 A AC | 044037 | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | |
| **Hard case / stand-by cases** | | | | | | | | | | | | | | | | | | | |
|  | **Robust hard case** 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 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|  | **Stand-by case size S**<br>dimensions: 220 x 110 x 50 mm | with belt loop on the back, made of hard-wearing nylon fabric | 010912 | | • | • | | | • | • | • | | | | • | • | • | • | |
|  | **Stand-by case size M**<br>dimensions: 240 x 180 x 70 mm | made of hard-wearing nylon fabric | 010913 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
| **Measuring accessories** | | | | | | | | | | | | | | | | | | | |
|  | **BENNING TA 1**<br>alligator clips, two pieces | Ø 4 mm plug-in technology, red/black, professional equipment, CAT III 1000 V | 044124 | • | • | • | • | • | • | • | • | | • | • | • | • | • | • | |
|  | **BENNING TA 2**<br>set of measuring leads, six pieces | Ø 4 mm plug-in technology, red/black, professional equipment, consisting of:<br>measuring leads (silicone) CAT III 1000 V,<br>test probes (Ø 4 mm measuring tip) CAT II 1000 V,<br>alligator clips CAT III 1000 V | 044125 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
|  | **BENNING TA 3**<br>set of measuring leads, eight pieces | Ø 4 mm plug-in technology, red/black, professional equipment, CAT III 1000 V, consting of:<br>measuring leads (silicone), test probes (slender measuring tip), claw clamps, alligator clips | 044126 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
|  | **BENNING TA 4**<br>magnetic holder, three pieces | For attachment of multimeters to switching cabinets, machine and system parts. Consisting of:<br>magnetic holder, adapter and belt | 044120 | • | | | • | • | | | | | • | • | • | • | • | • | |
|  | **Ø 4 mm safety measuring leads with 2 mm measuring tip,** 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 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
|  | **Ø 4 mm safety measuring leads with 4 mm measuring tip,** 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 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | |
|  | **Temperature probe, type K, insertion probe** (V4A steel tube) | For flexible substances, liquids, gases and air. Measuring range: - 196 °C up to + 800 °C | 044121 | • | • | • | • | • | | • | | | | | | • | | | |
| **Ceramic fuse** | | | | | | | | | | | | | | | | | | | |
|  | **440 mA fuses**<br>packaging unit 10 pieces | fast-acting, breaking capacity 10 kA,<br>rated voltage 1000 V, dimensions 10 x 35 mm | 10016655 | • | | • | • | • | | | | | | | | | | | |
|  | **1 A fuses**<br>packaging unit 10 pieces | fast-acting, rated current 1 A, rated voltage 500 V, dimensions 6.3 x 32 mm | 749669 | | | | | | | | | | • | • | | | | | |
|  | **10 A fuses**<br>packaging unit 10 pieces | fast-acting, rated current 10 A,<br>breaking capacity 50 kA, rated voltage 600 V,<br>dimensions 10 x 38 mm | 748263 | | | | | | | | | | | | | • | • | | |
|  | **11 A fuses**<br>packaging unit 10 pieces | fast-acting, rated current 11 A,<br>breaking capacity 20 kA, rated voltage 1000 V,<br>dimensions 10 x 38 mm | 10218772 | • | • | | • | • | • | | | | | | | | | | |
|  | **15 A fuses**<br>packaging unit 10 pieces | fast-acting, rated current 15 A,<br>breaking capacity 50 kA, rated voltage 600 V,<br>dimensions 10.3 x 38.1 mm | 10149447 | | | | | | | • | | | | | | | | | |
|  | **16 A fuses**<br>packaging unit 10 pieces | fast-acting, rated current 16 A, rated voltage 500 V, dimensions 6.3 x 32 mm | 749770 | | | | | | | | | | • | • | | | | | |

* figure similar

# Digital Current Clamp Multimeter for AC/DC current

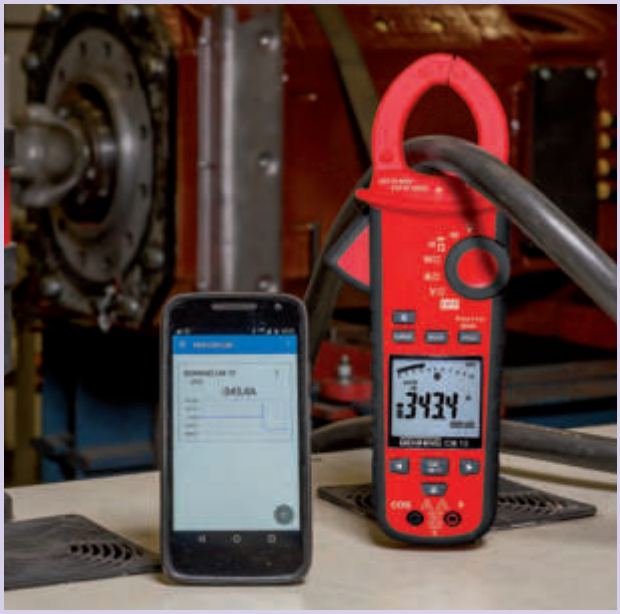
*TRUE RMS measuring method to satisfy highest demands on accuracy*

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

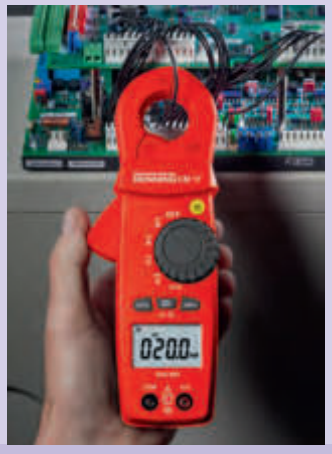
- BENNING CM 12 — power current clamp multimeter with data logger, Bluetooth® and app
- BENNING CM 10-PV — for photovoltaic systems and applications with 1500 V AC/ 2000 V DC
- BENNING CM E1 — earth measuring clamp for earth loop resistance and leakage current measurement
- BENNING CM 1-4 — multifunctional current clamp with digital and LED display
- BENNING CM 2-1 — universally applicable for various applications

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

- BENNING CM 11 — for process signals, automotive engineering and intrusion alarm systems
- BENNING CM 9 series — for measurement of leakage currents and differential currents











# Digital Current Clamp Meters

## *technical data*

| Type BENNING | CM 12 | CM 10-PV | CM 10-1 | CM E1 | CM 7 | CM 5-1 | CM 11 | CM 9-1 |
|---|---|---|---|---|---|---|---|---|
|  | | | | | | | | |
| **Display** | | | | | | | | |
| **indicating range** | 9 999 | 6 000 | 6 000 | 9 999 | 4 000 | 9 999 | 6 000 | 6 000 |
| **LCD / LED / bar graph** | • / – / • | • / – / – | • / – / – | • / – / – | • / – / • | • / – / – | • / – / – | • / – / – |
| **backlight / measuring point illumination** | • / – | • / • | • / • | – / – | • / – | • / – | • / – | • / – |
| **Measuring functions** | | | | | | | | |
| **basic accuracy** | 1 % | 1 % | 1 % | 1.5 % | 0.7 % | 0.9 % | 1 % | 1 % |
| **measuring method** | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS |
| **AC voltage** | 10 mV - 1000 V | 100 mV - 1000 V (1500 V via TA PV) | 100 mV - 1000 V | – | 100 mV - 750 V | 1.3 V - 750 V | 10 mV - 600 V | 10 mV - 600 V |
| **DC voltage** | 10 mV - 1000 V | 100 µV - 1000 V (2000 V via TA PV) | 100 mV - 1000 V | – | 100 mV - 1000 V | 0.7 V - 1000 V | 10 mV - 600 V | 10 mV - 600 V |
| **AC current** | 10 mA - 600 A | 0.1 µA - 4000 µA 10 mA - 600 A | 10 mA - 1500 A | 0.3 mA - 35 A | 100 mA - 1000 A | 0.9 A - 600 A | 100 µA - 20 A | 1 µA - 60 A |
| **DC current** | 10 mA - 600 A | 0.1 µA - 4000 µA 10 mA - 600 A | 10 mA - 1500 A | – | 100 mA - 1000 A | 0.9 A - 600 A | 100 µA - 10 A | – |
| **current AC + DC** | • | • | • | – | • | • | • | – |
| **fault current (leakage)** | – | • (0.1 µA) | – | • (0.3 mA) | – | – | • (0.1 mA) | • (1 µA) |
| **resistance** | 0.1 Ω - 100 kΩ | 0.1 Ω - 600 kΩ | 0.1 Ω - 600 kΩ | RE lus: 0.025 Ω - 1500 Ω | 0.1 Ω - 400 Ω | 1 Ω - 10 kΩ | 0.1 Ω - 600 kΩ | 0.1 Ω - 600 kΩ |
| **frequency / capacity** | • / • | • / • | • / • | – / – | • / – | – / – | – / – | – / – |
| **effective power / (cos φ)** | 1 W - 600 kW / • | – / – | – / – | – / – | – / – | – / – | – / – | – / – |
| **inrush current / THD** | • / • | • / – | • / – | – / – | – / – | – / – | – / – | – / – |
| **stand-by current / process signals** | – / – | – / – | – / – | – / – | – / – | – / – | • / • | – / – |
| **temperature** | – | -40 °C up to 400 °C | – | – | – | – | – | – |
| **continuity (buzzer) / diode** | • / • | • / • | • / • | – / – | • / – | • / • | • / – | • / – |
| **phase-sequence test** | • | – | – | – | – | – | – | – |
| **external conductor / polarity test** | – / – | – / – | – / – | – / – | – / – | – / – | – / – | – / – |
| **volt sensor** | • | • | • | – | – | – | – | – |
| **Features** | | | | | | | | |
| **interface / software** | Bluetooth® / App | Bluetooth® / App | Bluetooth® / App | – / – | – / – | – / – | – / – | – / – |
| **filter function** | HFR (1000 Hz) | HFR (800 Hz) | HFR (800 Hz) | – | – | – | – | HFR (1 kHz), LPF (40 Hz - 70 Hz) |
| **measuring range switching** | automatic/ manual | automatic | automatic | automatic | automatic | automatic | automatic/ manual | automatic |
| **Auto Power Off** | • | • | • | • | • | • | • | • |
| **low battery indication** | • | • | • | • | • | • | • | • |
| **Data HOLD / MAX / MIN / AVG** | • / • / • / • | • / • / • / – | • / • / • / – | • / – / – / – | • / • / • / – | • / – / – / – | • / • / • / – | – / – / – / – |
| **PEAK / REL** | • / – | – / – | – / – | – / – | • / – | – / – | – / – | • / – |
| **null balance ZERO (A DC)** | – | • | • | – | • | • | • | • |
| **measuring input for CFlex 1** | • | • | • | – | – | – | – | – |
| **AutoV / LoZ** | – / – | – / – | • / • | – / – | – / – | – / • | – / – | – / – |
| **memory MEM** | 1 000 measuring values (A-SAVE) | – | – | – | – | – | – | – |
| **Data Log function** | 9 999 measuring values (interval: 1s - 600 s) | 4 000 measuring values (interval: 1s - 60 s) | 4 000 measuring values (interval: 1s - 60 s) | 116 measuring values (interval: 1s - 255s) | – | – | – | – |
| **clamp opening** | 33 mm | 37 mm | 42 mm | 38 mm | 53 mm | 35 mm | 23 mm | 23 mm |
| **measuring category** | CAT IV 600 V CAT III 1000 V | CAT IV 600 V CAT III 1000 V | CAT IV 600 V CAT III 1000 V | CAT III 300 V | CAT IV 600 V CAT III 1000 V | CAT IV 600 V CAT III 1000 V | CAT IV 300 V CAT III 600 V | CAT IV 300 V CAT III 600 V |
| **Generally** | | | | | | | | |
| **dimensions** | 243 x 103 x 55 | 240 x 86 x 48 | 254 x 86 x 48 | 276 x 100 x 47 | 275 x 105 x 51 | 215 x 85 x 51 | 206 x 76 x 34 | 210 x 76 x 34 |
| **weight** | 540 g | 445 g | 490 g | 750 g | 534 g | 360 g | 262 g | 296 g |
| **special features** | power current clamp for power analysis in single-phase, three-phase and DC mains | microampere/ temperature measuring range for HVAC, non-slip/ break-proof SoftGrip housing | large current measurement range up to 1500 A AC/DC, non-slip/ break-proof SoftGrip housing | earth measuring clamp for earth loop resistance/ leakage, load current measurement | large clamp opening for clamping large conductor cross-sections/busbars | autotest, non-slip/ break-proof SoftGrip housing | ideal for trouble-shooting, fire and intrusion alarm systems | leakage current clamp with multimeter functions |
| **item no.** | 044680 | 044683 | 044688 | 044684 | 044059 | 044066 | 044067 | 044682 |
| **catalogue page** | **54** | **27, 54** | **54** | **55** | **55** | **55** | **56** | **56** |

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

| | CM 9-2 | CM 1-4 | NEW! CM 2-1 | CM 2 | CM P2 | CM P1 | CM 1-3 | CM 1-2 | CM 1-1 | CFlex 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |
| | 6 000 | 9 999 | 4 000 | 4 000 | 4 200 | 4 200 | 2 000 | 2 000 | 2 000 | 6 000 |
| | • / – / – | • / • / – | • / – / – | • / – / – | • / – / – | • / – / – | • / – / – | • / – / – | • / – / – | • / – / – |
| | • / • | • / • | • / – | – / – | • / – | • / – | – / – | – / – | – / – | • / – |
| | 1 % | 1 % | 0.5 % | 0.5 % | 2 % | 2 % | 1 % | 1 % | 2 % | 3 % |
| | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS | RMS | RMS | RMS | TRUE RMS |
| | – | 6 V - 1000 V | 100 µV - 600 V | 1 mV - 600 V | – | – | 100 mV - 750 V | 100 mV - 600 V | – | – |
| | – | 6 V - 1000 V | 100 µV - 600 V | 100 µV - 600 V | – | – | 100 mV - 1000 V | 100 mV - 600 V | – | – |
| | 1 µA - 60 A | 100 mA - 200 A | 10 mA - 400 A | 100 mA - 300 A | 10 mA - 400 A | 10 mA - 400 A | 100 mA - 200 A | 100 mA - 400 A | 10 mA - 400 A | 100 mA - 3000 A |
| | – | – | 10 mA - 400 A | 10 mA - 300 A | 10 mA - 400 A | – | – | – | – | – |
| | – | – | • | • | • | – | – | – | – | – |
| | • (1 µA) | – | – | – | – | – | – | – | – | – |
| | – | 1 Ω - 50 kΩ | 0.1 Ω - 40 MΩ | 0.1 Ω - 40 MΩ | – | – | 0.1 Ω - 20 MΩ | 0.1 Ω - 20 MΩ | – | – |
| | – / – | – / – | • / • | – / – | – / – | – / – | – / – | – / – | – / – | – / – |
| | – / – | – / – | – / – | – / – | – / – | – / – | – / – | – / – | – / – | – / – |
| | – / – | – / – | – / – | – / – | • / – | • / – | – / – | – / – | – / – | – / – |
| | – / – | – / – | – / – | – / – | – / – | – / – | – / – | – / – | – / – | – / – |
| | – | – | – | – | – | – | – | – | – | – |
| | – / – | • / – | • / • | • / – | – / – | – / – | • / • | • / – | – / – | – / – |
| | – | • | – | – | – | – | – | – | – | – |
| | – / – | • / • | – / – | – / – | – / – | – / – | – / – | – / – | – / – | – / – |
| | – | – | • | – | • | • | • | – | – | – |
| | Bluetooth® / App | – / – | – / – | – / – | – / – | – / – | – / – | – / – | – / – | – / – |
| | HFR (1 kHz), LPF (50 Hz - 60 Hz) | – | HFR (800 Hz) | – | LPF (160 Hz) | LPF (160 Hz) | – | – | – | – |
| | automatic | automatic | automatic | manuell | automatic | automatic | manuell | manuell | manuell | manuell |
| | • | • | • | • | • | • | • | • | • | • |
| | • | • | • | • | • | • | • | • | • | • |
| | • / • / • / – | • / – / – / – | • / • / • / – | • / • / – / – | • / – / – / – | • / – / – / – | • / – / – / – | • / – / – / – | • / • / – / – | • / • / • / – |
| | – / – | – / – | – / – | – / • | – / – | – / – | – / – | – / – | – / – | – / – |
| | – | – | • | • | • | – | – | – | – | – |
| | – | – | – | – | – | – | – | – | – | – |
| | – / – | – / – | • / • | – / – | – / – | – / – | – / – | – / – | – / – | – / – |
| | – | – | – | – | – | – | – | – | – | – |
| | – | – | – | – | – | – | – | – | – | – |
| | 40 mm | 16 mm | 27 mm | 25 mm | 23 mm | 23 mm | 16 mm | 30 mm | 30 mm | 160 mm |
| | CAT IV 300 V CAT III 600 V | CAT IV 600 V CAT III 1000 V | CAT IV 300 V CAT III 600 V | CAT III 300 V CAT II 600 V | CAT III 600 V | CAT III 600 V | CAT IV 600 V CAT III 1000 V | CAT III 600 V | CAT III 600 V | CAT IV 600 V |
| | 230 x 100 x 46 | 220 x 57 x 35 | 188 x 56 x 28 | 192 x 66 x 27 | 149 x 59 x 28 | 149 x 59 x 28 | 190 x 60 x 40 | 190 x 70 x 38 | 180 x 70 x 42 | 120 x 70 x 26 |
| | 450 g | 200 g | 225 g | 205 g | 140 g | 140 g | 265 g | 225 g | 200 g | 286 g |
| | leakage current clamp with Bluetooth® and app | multifunctional current clamp with various measuring and voltage tester functions, one-hand operation | for various applications | for various applications | mini AC/DC current clamp in pocket size for precise measurements of load currents | mini AC current clamp in pocket size for precise measurements of load currents | open current clamp head, slim design | compact design | compact design | flexible AC current transformers for narrow measuring points, large cable cross-sections |
| | 044685 | 044686 | 044689 | 044035 | 044679 | 044678 | 044063 | 044062 | 044061 | 044069 |
| | **56** | **32, 57** | **57** | **57** | **57** | **57** | **58** | **58** | **58** | **59** |

# TRUE RMS Digital Current Clamp Meters

*with data logger, Bluetooth® and free app*

## BENNING CM 12
### Power measurement in single-phase and three-phase loads

- AC/DC effective power (W), power factor (cos ϕ) and harmonic measurement (THD) for evaluation of the mains quality
- bipolar phase sequence test (L1-L2-L3)

## BENNING CM 10-PV
### For photovoltaic systems and HVAC

- safe voltage measurement up to 1500 V AC/ 2000 V DC via measuring adapter TA PV
- microampere and temperature measuring range for HVAC

## BENNING CM 10-1
### For professional service use

- precise current measurement up to 1500 A AC/DC
- "AutoV" function with low input impedance (LoZ) to suppress reactive voltages

## Common features BENNING CM 12, CM 10-PV, CM 10-1

- data logger, memory function and Bluetooth® Low Energy 4.0 interface
- app "BENNING MM-CM Link" for download, storage and sharing measured values via smartphone/ tablet
- INRUSH function for measuring inrush currents (motors etc.)
- low-pass filter (HFR high-frequency suppression) for measurements at pulsed motor drives
- measuring input for flexible current transformer BENNING CFlex 1 (044068) up to 3000 A AC (optional)
- Volt sensor for non-contact signalling of phase voltages and cable breaks in lines via red LED
- non-slip and break-proof SoftGrip housing
- delivery including case, batteries, measuring leads, CM 10-PV additional with measuring adapter TA PV, alligator clips and wire temperature sensor

App Store Google Play



CM 12 volt sensor



TRUE RMS | CAT IV 600 V

CM 10-PV volt sensor



TRUE RMS | CAT IV 600 V

CM 10-1 volt sensor



TRUE RMS | CAT IV 600 V

## TRUE RMS Digital Current Clamp Meters

| | BENNING CM 12 | BENNING CM 10-PV | BENNING CM 10-1 |
|---|---|---|---|
| **indicating range** | 9999 (illuminated) with bar graph | 6000 (illuminated) | 6000 (illuminated) |
| **basic accuracy** | 1 % | 1 % | 1 % |
| **AC voltage** | 10 mV - 1000 V | 0.1 V - 1000 V (1500 V via TA PV) | 0.1 V - 1000 V (AutoV+LoZ) |
| **DC voltage** | 10 mV - 1000 V | 0.1 mV - 1000 V (2000 V via TA PV) | 0.1 mV - 1000 V (AutoV+LoZ) |
| **AC current** | 10 mA - 600 A | 0.1 µA - 4000 µA, 10 mA - 600 A | 10 mA - 1500 A |
| **DC current** | 10 mA - 600 A | 0.1 µA - 4000 µA, 10 mA - 600 A | 10 mA - 1500 A |
| **resistance** | 0.1 Ω - 100 kΩ | 0.01 Ω - 600 kΩ | 0.01 Ω - 600 kΩ |
| **continuity/diode** | • / • | • / • | • / • |
| **frequency** | 0.01 Hz - 10 kHz | 0.01 Hz - 10 kHz | 0.01 Hz - 10 kHz |
| **capacity** | 1 nF - 4 mF | 1 µF - 1 mF | 1 µF - 1 mF |
| **effective power / (cos φ)** | 1 W - 600 kW / • | – / – | – / – |
| **temperature** | – | -40 °Cup to 400 °C | – |
| **volt sensor** | • | • | • |
| **interface** | Bluetooth® | Bluetooth® | Bluetooth® |
| **software** | app (IOS, Android) | app (IOS, Android) | app (IOS, Android) |
| **filter function** | HFR filter (1000 Hz) | HFR filter (800 Hz) | HFR filter (800 Hz) |
| **memory** | 1000 measuring values, HOLD, PEAK, MAX/MIN, AVG | HOLD, MIN/MAX, INRUSH, ZERO | HOLD, MIN/MAX, INRUSH, ZERO |
| **data log function** | 9999 measuring values (interval: 1 s - 600 s) | 4000 measuring values (interval: 1 s - 60 s) | 4000 measuring values (interval: 1 s - 60 s) |
| **measuring method** | TRUE RMS | TRUE RMS | TRUE RMS |
| **clamp opening** | 33 mm | 37 mm | 42 mm |
| **measuring category** | CAT IV 600 V | CAT IV 600 V | CAT IV 600 V |
| **item no.** | 044680 | 044683 | 044688 |

**See page 60 for further accessories**

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

# TRUE RMS Earth Measuring Clamp and Digital Current Clamp Meters

*innovative, proven and powerful*

## BENNING CM E1
### TRUE RMS Earth Measuring Clamp for earth loop resistance and leakage current measurement

- earth loop resistance measurement $R_E$ in multiply earthed earthing systems
- no need to disconnect the earthing conductor or to set earth rods and probes
- optical and acoustic alarm function in case of excessive earthing resistances
- measurement of leakage and load currents using the TRUE RMS measuring method
- large measuring clamp diameter of 38 mm
- measured value memory for 116 measured values
- supplied in a hard-top case with reference resistance loop

## BENNING CM 7
### Up to 1000 A AC/DC TRUE RMS

- safe current measurement up to 1000 A AC/DC with TRUE RMS measuring method
- highest measuring category CAT IV 600 V for highest safety
- clamp opening up to 53 mm for clamping large conductor cross-sections/busbars
- illuminated LC display with bargraph indication for the detection of measuring trends
- delivery including case, battery and measuring leads

## BENNING CM 5-1
### With automatic function and single-button operation

- safe current measurement max. up to 600 A AC/DC
- highest measuring category CAT IV 600 V
- automatic function (V AC/DC, A AC/DC, Ω) and measuring range selection
- safe and easy operation – measuring errors due to incorrect measuring range selection are excluded
- low input impedance (LoZ) to suppress reactive voltages
- non-slip and break-proof SoftGrip housing
- LC display with light sensor and background lighting
- delivery including case, battery and measuring leads

CM E1




TRUE RMS

CM 7




TRUE RMS | CAT IV 600 V

CM 5-1




TRUE RMS | CAT IV 600 V

Further information see page 20, 21

## TRUE RMS Earth Measuring Clamp, Digital Current Clamp Meters

| | BENNING CM E1 | BENNING CM 7 | BENNING CM 5-1 |
|---|---|---|---|
| **indicating range** | 9999 | 4000 (illuminated) with bar graph | 9999 (illuminated) |
| **basic accuracy** | 1.5 % | 0.7 % | 0.9 % |
| **AC voltage** | – | 0.1 V - 750 V | 1.3 V - 750 V |
| **DC voltage** | – | 0.1 V - 1000 V | 0.7 V - 1000 V |
| **AC current** | 0.3 mA - 35 A | 0.1 A - 1000 A | 0.9 A - 600 A |
| **DC current** | – | 0.1 A - 1000 A | 0.9 A - 600 A |
| **resistance** | $R_E$-lus 0.025 Ω - 1500 Ω | 0.1 Ω - 400 Ω | 1 Ω - 10 kΩ |
| **continuity/diode** | – / – | • / – | • / • |
| **frequency** | – | 1 Hz - 400 kHz | – |
| **capacity** | – | – | – |
| **effective power / (cos φ)** | – / – | – / – | – / – |
| **temperature** | – | – | – |
| **volt sensor** | – | – | – |
| **interface** | – | – | – |
| **software** | – | – | – |
| **filter function** | – | – | – |
| **memory** | HOLD, REC (116 measuring values) | HOLD, MAX/MIN, PEAK, ZERO | HOLD, ZERO |
| **data log function** | 116 measuring values | – | – |
| **measuring method** | TRUE RMS | TRUE RMS | TRUE RMS |
| **clamp opening** | 38 mm | 53 mm | 35 mm |
| **measuring category** | CAT III 300 V | CAT IV 600 V | CAT IV 600 V |
| **item no.** | 044684 | 044059 | 044066 |

**See page 60 for further accessories**

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

# TRUE RMS high-precision and leakage current clamps

*to satisfy highest demands on accuracy*

## BENNING CM 11
### AC/DC Current Clamp with a resolution of 0.1 mA and multimeter functions

- precise AC/DC current measurement
- ideal for troubleshooting in electrical installations, devices, automotive engineering, control systems (4 to 20 mA process signals) as well as in fire and intrusion alarm systems
- multifunctional use for voltage (600 V), resistance measurements (600 kΩ) and continuity test
- compact dimensions with a clamp opening of 23 mm
- delivery including case, batteries and measuring leads

## BENNING CM 9-1
### Leakage Current Clamp with a resolution of 1 µ A AC and multimeter functions

- universally applicable for current (60 A AC), voltage (600 V), resistance measurement (600 kΩ) and continuity test
- LPF low-pass filter (40 Hz to 70 Hz) to suppress high-frequency interfering signals

## BENNING CM 9-2
### Leakage Current Clamp with a resolution of 1 µ A AC, Bluetooth® function and app

- Bluetooth® Low Energy 4.0 interface and app for indication, storage and sharing measured values via smartphone/ tablet
- LPF low-pass filter (50 Hz to 60 Hz) to suppress high-frequency interfering signals

## Common features BENNING CM 9-1, CM 9-2

- measurements of leakage, differential an protective conductor currents in electrical systems (IEC 60364), devices and machines (EN 60204-1)
- defined protection against magnetic fields in compliance with EN 61557-13, class 2
- device filter (1 kHz) in compliance to EN 61557-16 for testing electrical appliances
- delivery including case, batteries and measuring leads (except CM 9-2)

CM 11



TRUE RMS

CM 9-1



TRUE RMS
Leakage



measuring adapter (044131)
for CM 9-1 / CM 9-2



measuring adapter (44127/044128)
for CM 9-1 / CM 9-2

CM 9-2



TRUE RMS
Leakage

App Store

Google Play



## TRUE RMS high-precision and leakage current clamps

| | BENNING CM 11 | BENNING CM 9-1 | BENNING CM 9-2 |
|---|---|---|---|
| **indicating range** | 6000 (illuminated) | 6000 (illuminated) | 6000 (illuminated) |
| **basic accuracy** | 1 % | 1 % | 1 % |
| **AC voltage** | 10 mV - 600 V | 10 mV - 600 V | – |
| **DC voltage** | 10 mV - 600 V | 10 mV - 600 V | – |
| **AC current** | 0.1 mA - 20 A | 1 µA - 60 A | 1 µA - 60 A |
| **DC current** | 0.1 mA - 10 A | – | – |
| **resistance** | 0.1 Ω - 600 kΩ | 0.1 Ω - 600 kΩ | – |
| **continuity/diode** | • / – | • / – | – / – |
| **frequency** | – | – | – |
| **capacity** | – | – | – |
| **effective power / (cos φ)** | – / – | – / – | – / – |
| **temperature** | – | – | – |
| **volt sensor** | – | – | – |
| **interface** | – | – | Bluetooth® |
| **software** | – | – | app (IOS, Android) |
| **filter function** | – | device- (1 kHz), low pass filter (40 Hz - 70 Hz) | device- (1 kHz), low pass filter (50 Hz - 60 Hz), without filter |
| **memory** | HOLD, MIN/MAX, ZERO | HOLD, PEAK, ZERO | HOLD, MAX/MIN |
| **data log function** | – | – | – |
| **measuring method** | TRUE RMS | TRUE RMS | TRUE RMS |
| **clamp opening** | 23 mm | 23 mm | 40 mm |
| **measuring category** | CAT IV 600 V | CAT IV 600 V | CAT IV 600 V |
| **item no.** | 044067 | 044682 | 044685 |

**See page 10, 60 for further accessories**

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

# TRUE RMS Digital Current Clamp Meter

*to satisfy highest demands on accuracy*

## BENNING CM 1-4
## Multifunctional Current Clamp with digital and LED display

- current measurement up to 200 A AC via open current clamp
- voltage measurement up to 1000 V AC/DC (with/without acoustic signal), no batteries required from 50 V
- LED step indicator: 12, 50, 120, 230, 400, 690, 1000 V
- phase sequence test by means of green LEDs (right/left)
- single-pole external conductor test (phase) via red LED
- continuity test via buzzer and red LED
- polarity test via +/- LED
- one-hand operation for voltage measurement at sockets (19 mm)
- LED measuring point illumination
- incl. belt holster, measuring accessories, batteries
- further informations on page 32

## BENNING CM 2-1 and CM 2
## For various applications

- safe and non-contact measuring of high currents
- AC/DC current measurement up to 400 A (CM 2-1), 300 A (CM 2)
- measurement of low currents (automotive, photovoltaics, industry)
- measuring inputs for voltage, resistance, continuity test as well as frequency, capacity (CM 2-1)
- “AutoV” function with low input impedance (LoZ)
- Volt sensor (NCV) for non-contact signaling of phase voltages (LCD) (CM 2-1)
- delivery including case, batteries, measuring leads

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

- precise measurements of load currents 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) to suppress high-frequency pulses at pulsed motor drives
- Volt sensor (NCV) for non-contact signaling of phase voltages (buzzer/LCD)
- delivery including case and batteries

CM 1-4



TRUE RMS
CAT IV 600 V

CM 2-1 NEW!



TRUE RMS

CM 2



TRUE RMS

CM P2

volt sensor



TRUE RMS

CM P1

volt sensor



TRUE RMS

## TRUE RMS Digital Current Clamp Meters

| | BENNING CM 1-4 | BENNING CM 2-1 | BENNING CM 2 | BENNING CM P2 | BENNING CM P1 |
|---|---|---|---|---|---|
| **indicating range** | 9999 (illuminated)/LED | 4000 (illuminated) | 4000 | 4200 (illuminated) | 4200 (illuminated) |
| **basic accuracy** | 1 % | 0.5 % | 0.5 % | 2 % | 2 % |
| **AC voltage** | 6 V - 1000 V | 100 µV - 600 V | 1 mV - 600 V | – | – |
| **DC voltage** | 6 V - 1000 V | 100 µV - 600 V | 0.1 mV - 600 V | – | – |
| **AC current** | 0.1 A - 200 A | 10 mA - 400 A | 100 mA - 300 A | 0.01 A - 400 A | 0.01 A - 400 A |
| **DC current** | – | 10 mA - 400 A | 10 mA - 300 A | 0.01 A - 400 A | – |
| **resistance** | 1 Ω - 50 kΩ | 0.1 Ω - 40 MΩ | 0.1 Ω - 40 MΩ | – | – |
| **continuity/diode** | • / – | • / • | • / – | – / – | – / – |
| **frequency** | – | 0.01 Hz - 50 kHz | – | – | – |
| **capacity** | – | 1 nF - 10 mF | – | – | – |
| **effective power / (cos φ)** | – / – | – / – | – / – | – / – | – / – |
| **temperature** | – | – | – | – | – |
| **volt sensor** | – | • | – | • | • |
| **interface** | – | – | – | – | – |
| **software** | – | – | – | – | – |
| **filter function** | – | HFR (800 Hz) | – | LPF (160 Hz) | LPF (160 Hz) |
| **memory** | HOLD | HOLD, MAX/MIN | HOLD, MAX, ZERO | HOLD, INRUSH, ZERO | HOLD, INRUSH |
| **data log function** | – | – | – | – | – |
| **measuring method** | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS | TRUE RMS |
| **clamp opening** | 16 mm | 27 mm | 25 mm | 23 mm | 23 mm |
| **measuring category** | CAT IV 600 V | CAT IV 300 V | CAT III 300 V | CAT III 600 V | CAT III 600 V |
| **item no.** | 044686 | 044689 | 044035 | 044679 | 044678 |

**See page 60 for further accessories**

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

# Digital Current Clamps

*for AC current*

## BENNING CM 1-3
## With Volt sensor function

- safe AC current measurement with open current clamp head up to max. 200 A AC
- measuring inputs for voltage, resistance, continuity and diode test
- integrated volt sensor signalises phase voltages by means of an acoustic signal and a red LED signal
- localizes cable breaks and defective lamps in exposed cables (cable reel, light chains) via the feeding side of the phase
- delivery including case, batteries and measuring leads

## BENNING CM 1-2 and CM 1-1
## In compact design

- safe current measurement up to 400 A AC
- maximum resolution of 10 mA in the 20 A measuring range (CM 1-1)
- measuring inputs for voltage, resistance and continuity test (CM 1-2)
- compact dimensions with a clamp opening of 30 mm
- delivery including case, battery/ batteries as well as measuring leads (CM 1-2)

CM 1-3




CM 1-2



CM 1-1



## Digital Current Clamp Meters

| | BENNING CM 1-3 | BENNING CM 1-2 | BENNING CM 1-1 |
|---|---|---|---|
| **indicating range** | 2000 | 2000 | 2000 |
| **basic accuracy** | 1 % | 1 % | 2 % |
| **AC voltage** | 0.1 V - 750 V | 0.1 V - 600 V | – |
| **DC voltage** | 0.1 V - 1000 V | 0.1 V - 600 V | – |
| **AC current** | 100 mA - 200 A | 100 mA - 400 A | 10 mA - 400 A |
| **DC current** | – | – | – |
| **resistance** | 0.1 Ω - 20 MΩ | 0.1 Ω - 20 MΩ | – |
| **continuity/diode** | • / • | • / – | – / – |
| **frequency** | – | 1 Hz - 400 kHz | – |
| **capacity** | – | – | – |
| **effective power / (cos φ)** | – / – | – / – | – / – |
| **temperature** | – | – | – |
| **volt sensor** | • | – | – |
| **interface** | – | – | – |
| **software** | – | – | – |
| **filter function** | – | – | – |
| **memory** | HOLD | HOLD | HOLD, MAX |
| **data log function** | – | – | – |
| **measuring method** | RMS | RMS | RMS |
| **clamp opening** | 16 mm | 30 mm | 30 mm |
| **measuring category** | CAT V 600 V | CAT III 600 V | CAT III 600 V |
| **item no.** | 044063 | 044062 | 044061 |

**See page 60 for further accessories**

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

# Flexible Current Transformers

## *AC/DC and AC Current Clamp Adapters*

### BENNING CFlex 2, CFlex 1
### Flexible AC Current Transformers up to 3000 A AC

- 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

### BENNING CC 3 and CC 1
### AC/DC and AC Current Clamp Adapters

- safe AC current measurement max. up to 400 A
- connection via 4 mm safety measuring leads
- delivery including case and measuring leads as well as battery (CC 3)




CFlex 2

CFlex 1
suitable for:
see page
22, 50, 60



CC 3
output: 1 mV/10 mV AC/DC per 1 A AC/DC
suitable for: see page 22, 28, 50



CC 1
output: 1 mV AC per 1 A AC
suitable for: see page 50

TRUE RMS
CAT IV 600 V

## Current Transformers and Current Clamp Adapters

| | BENNING CFlex 2 | BENNING CFlex 1 | BENNING CC 3 | BENNING CC 1 |
|---|---|---|---|---|
| **indicating range** | 6000 (illuminated) | – | – | – |
| **basic accuracy** | 3 % | 3 % | 1 % - 3 % | 1.9 % |
| **AC voltage** | – | – | – | – |
| **DC voltage** | – | – | – | – |
| **AC current** | 0.1 A - 3000 A | 0.3 A - 3000 A | 0.2 A - 300 A | 1 A - 400 A |
| **DC current** | – | – | 0.2 A - 300 A | – |
| **resistance** | – | – | – | – |
| **continuity/diode** | – / – | – / – | – / – | – / – |
| **frequency** | – | – | – | – |
| **capacity** | – | – | – | – |
| **effective power / (cos φ)** | – / – | – / – | – / – | – / – |
| **temperature** | – | – | – | – |
| **volt sensor** | – | – | – | – |
| **interface** | – | – | – | – |
| **software** | – | – | – | – |
| **filter function** | – | – | – | – |
| **memory** | HOLD, MIN/MAX | – | – | – |
| **data log function** | – | – | – | – |
| **measuring method** | TRUE RMS | – | – | – |
| **clamp opening** | 160 mm | 160 mm | 21 mm | 30 mm |
| **measuring category** | CAT IV 600 V | CAT III 600 V | CAT III 600 V | CAT III 300 V |
| **item no.** | 044069 | 044068 | 044038 | 044037 |

**See page 60 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. | CM 12 | CM 10-PV | CM 10-1 | CM E1 | CM 7 | CM 5-1 | CM 11 | CM 9-1 | CM 9-2 | CM 1-4 | CM 2-1 | CM 2 | CM P2 | CM P1 | CM 1-3 | CM 1-2 | CM 1-1 | CFlex 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AC current transformer** | | | | | | | | | | | | | | | | | | | | | |
|  | **BENNING CFlex 1**<br>AC current transformer | basic accuracy: 3 %<br>current: 0.3 A - 3000 A AC<br>output: 100 mV/10 mV/1 mV AC per 1 A AC | 044068 | • | • | • | | • | • | • | • | | | • | • | | | • | • | | |
| **Hard case / stand-by cases** | | | | | | | | | | | | | | | | | | | | | |
|  | **Robust hard case**<br>dimensions 375 x 190 x 250 mm | 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 | 10198412 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
|  | **Stand-by case size S**<br>dimensions: 220 x 110 x 50 mm | with belt loop on the back,<br>made of hard-wearing nylon fabric | 010912 | | | | | | • | • | • | | | • | • | • | • | • | • | • | |
|  | **Stand-by case size M**<br>dimensions: 240 x 180 x 70 mm | made of hard-wearing nylon fabric | 010913 | | | | | | • | • | • | • | • | • | • | • | • | • | • | • | • |
|  | **Belt holster**<br>dimensions:<br>190 x 80 x 40 mm | Practical belt holster with Velcro fasteners for attaching the measuring instrument, for attachment to the belt. Made of hard-wearing nylon fabric | 10217845 | | | | | | | | | | • | | | | | | | | |
| **Measuring accessories** | | | | | | | | | | | | | | | | | | | | | |
|  | **BENNING TA 1**<br>alligator clips, two pieces | Ø 4 mm plug-in technology, red/black, professional equipment, CAT III 1000 V | 044124 | • | • | • | | • | • | • | • | | • | • | • | | | • | • | | |
|  | **BENNING TA 2**<br>set of measuring leads,<br>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, alligator clips CAT III 1000 V | 044125 | • | • | • | | • | • | • | • | | • | • | • | | | • | • | | |
|  | **BENNING TA 3**<br>set of measuring leads,<br>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, alligator clips | 044126 | • | • | • | | • | • | • | • | | • | • | • | | | • | • | | |
|  | **Ø 4 mm safety measuring leads with 2 mm measuring tip,** 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 | • | • | • | | • | • | • | • | | • | • | • | | | • | • | | |
|  | **Ø 4 mm safety measuring leads with 4 mm measuring tip,** 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 | • | • | • | | • | • | • | • | | • | • | • | | | • | • | | |
|  | **BENNING TA PV**<br>measuring adapter | For safe DC and AC voltage measurement up to 1500 V AC/ 2000 V DC. Measuring category: 1000 V CAT III, 600 V CAT IV (with protective cap), 1000 V AC CAT II/ 1500 V DC CAT II (without protective cap). Length 1.4 m. Incl. protective caps CAT III/ IV | 10217846 | | • | | | | | | | | | | | | | | | | |
|  | **Set of measuring leads**<br>seven pieces | Ø 4 mm measuring leads, red/ black, length = 1.40 m, with 2 mm measuring probe. CAT IV 600 V / CAT III 1000 V (with protective caps), CAT II 1000 V (without protective caps), CAT II 1000 V (with 4 mm Ø contact tip extension). Contact tip protection to protect against injuries, attached to the black measuring lead. Set of protective caps (CAT III/ IV) red/black, to reduce the length of the uninsulated part of the contact tips. Set of 4 mm Ø contact tip extensions (CAT II) | 10217842 | | | | | | | | | | • | | | | | | | | |
|  | **Temperature probe, type K, insertion probe** (V4A steel tube) | For flexible substances, liquids, gases and air. Measuring range: - 196 °C up to + 800 °C | 044121 | | • | | | | | | | | | | | | | | | | |

* figure similar

BENNING

# LD 40 + LD 60

Laser Distance Meter

NEW!




## compact and multifunctional

- Length measurement up to 40 m / 60 m
- Area calculation
- Volume calculation
- Indirect height measurement
- Continuous measurement
- Selection of reference plane
- Selection of measuring units




Additionally for BENNING LD 60:

- Stake-out function
- Digital level
- Digital circular level
- Automatically rotating display
- Measured value memory for 50 measured values
- Colour display




INFO

# Laser Distance Meter

*compact and multifunctional*










## BENNING LD 60 and LD 40
## Laser Distance Meter

### Application:

- Quick and easy measurement of rooms
- Determination of material requirements (e. g. cables, floor coverings, paint, etc.)
- Determination of volumes (e. g. tank volume, planning of air conditioning systems, room to be ventilated, etc.)
- Continuous measurement to determine a specific distance to a plane
- Calculation of heights that cannot be measured directly
- Adjustable reference plane for measurement between two surfaces or from an edge

### Additionally with LD 600:

- Staking out distances into equal sections for wallpapers and the like
- Level and protractor for aligning beams, profiles and pipes.
- Circular level for checking surfaces for horizontality
- Automatically rotating display for measurements on walls
- Determination of heights from a distance (e. g. of windows on upper floors)



scope of delivery LD 60

### Technical data

| | BENNING LD 40 | BENNING LD 60 |
|---|---|---|
| **measuring range** | 0.05 … 40 m | 0.05 … 60 m |
| **measuring accuracy** | ± 3 mm | ± 1.5 mm |
| **protection class** | IP 54 | |
| **laser type** | 650 nm, Class II, <1 mW | |
| **measuring speed** | 0.5 seconds | |
| **dimensions (l x w x h)** | 98 x 36 x 23 mm | 105 x 48 x 21mm |
| **weight** | 76 g | 84 g |
| **item no.** | 050500 | 050501 |

# Demonstration cases for practice-oriented application

BENNING

*recommendation of the workshop equipment*

## BENNING DB 1
### Demonstration Case for testing and measuring of primary quantities of electrical engineering

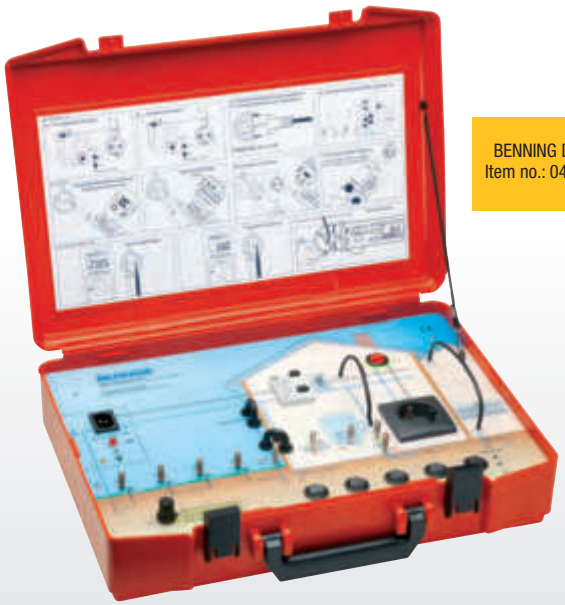
- suited for teaching and education purposes, training courses and product presentations



BENNING DB 1
Item no.: 044132

## 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 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 |
|---|---|---|---|---|
| **For enterprises of electrical engineer-craft according to Electricity Association** | | | | |
| two-pole voltage tester | IEC/EN 61243-2 | DUSPOL® analog<br>item no. 050261 | DUSPOL® expert<br>item no. 050262 | DUSPOL® digital<br>item no. 050263 |
| voltage (min. 600 V) and current meter (min. 15 A) | IEC/EN 61010-1<br>IEC/EN 61010-2-033 | MM 2<br>item no. 044028 | MM 6-2 + CC 1<br>item no. 044087 + 044037 | MM 12 + CC 1<br>item no. 044088 + 044037 |
| current clamp meter | IEC/EN 61010-1<br>IEC/EN 61010-2-032 | CM P2<br>item no. 044679 | CM 2-1<br>item no. 044689 | CM 12<br>item no. 044680 |
| insulation tester | IEC/EN 61557-2 | IT 101<br>item no. 044033 | IT 105<br>item no. 044105<br>or<br>IT 115<br>item no. 044104 | IT 130<br>item no. 044103 |
| loop ohmmeter | IEC/EN 61557-3 | IT 105<br>item no. 044105 | | |
| resistance measuring device | IEC/EN 61557-4 | IT 101<br>item no. 044033 | | |
| earthing measuring device | IEC/EN 61557-5 | CM E1<br>item no. 044684 | earthing set for IT 115<br>item no. 044113 | earthing set for IT 130<br>item no. 044113 |
| RCD meter | IEC/EN 61557-6 | IT 105<br>item no. 044105 | IT 115<br>item no. 044104 | IT 130<br>item no. 044103 |
| phase sequence indicator | IEC/EN 61557-7 | TRITEST® pro<br>item no. 020052 | | |
| instrument for testing electrical equipment (EN 50678, EN 50699) | IEC/EN 61557-16 | ST 725<br>item no. 050316 | ST 755+<br>item no. 050332 | ST 760+<br>item no. 050334 |
| instrument for testing medical electrical equipment (IEC 62353) | IEC/EN 61557-16 | | | |
| measuring device for testing arc welding equipment (IEC 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<br>IEC/EN 61010-1<br>IEC/EN 61010-2-032 | CM 9-1<br>item no. 044682 | CM 9-2<br>item no. 044685 | CM 9-1<br>item no. 044682 or<br>CM 9-2<br>item no. 044685 |
| mA current clamp for measuring signal currents (4 to 20 mA DC), troubleshooting in electrical installations | IEC/EN 61010-1<br>IEC/EN 61010-2-032 | CM 11<br>item no. 044067 | CM 11<br>item no. 044067 | CM 11<br>item no. 044067 |
| continuity tester | IEC/EN 61010-1 | DUTEST® pro<br>item no. 050156 | DUTEST® pro<br>item no. 050156 | DUTEST® pro<br>item no. 050156 |
| illumination sensor | | | | Luxmeter type B for IT 130<br>item no. 044111 |



784331.42 GB 06/2022 Subject to technical changes.

BENNING

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