Operating Manual
"BENNING PV Link" App

==

Table of contents

1. Registration

After having started the "BENNING PV Link" app for the first time, you can create a user name. Please observe that the user name used will be stated in the PDF test report as the test person and will be shown in the "Tested by:" field. You can change the user name in the settings at any time.
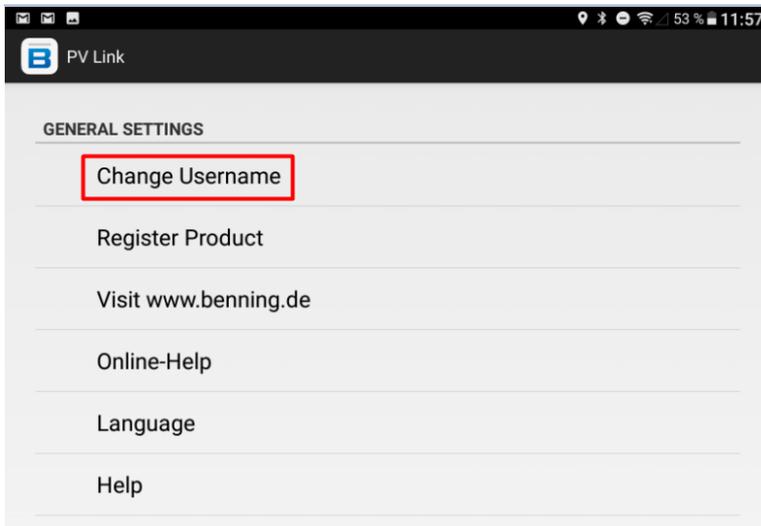
Use the "Register Product" button to register your BENNING PV 2 on the BENNING homepage. Register your BENNING PV 2 and benefit from our information service and our 24/7 service hotline.

Phone: +49 (0) 2871/93 - 555

2. Start screen

To familiarize with the functions of the app, the start screen includes two example measurements. All measurement data that have been read and stored are displayed in this list of measurement data.

Via the start screen, you can read new measurement data from the BENNING PV 2, filter or sort measurement data, delete all existing measurement data and make various settings.

Tap an individual measurement data record to open the measurement data and view the curves. If you want to select or delete a measurement data record, tap and hold an individual measurement data record and a pop-up window appears.

Add to Bookmarks

Delete

2.1 Functional elements

Read new measurement data – Reading new measurement data from the BENNING PV 2

Filter measurement data – Possible criteria: All, Passed, Failed and Bookmarks

Sort measurement data – Sorting measurement data by string ID or site name

Delete existing measurement data – All existing measurement data will be deleted

Help (operating manual), settings

3. Reading new measurement data

Tap the ➕ icon on the start screen to read a new measurement data record (I-V curve). A new view with the following tabs opens:
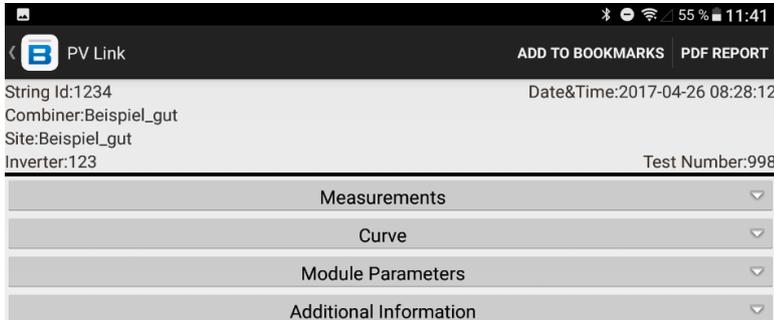
- Measurements
- Curve
- Module Parameters
- Additional Information

Chapter 4 explains how to transfer data via NFC between the BENNING PV 2 and your Android device. In the following, the functions of the individual tabs are described.

3.1 Measurements tab

The following abbreviations are used in the Measurements tab:

	Measured	STC	Nominal
Voc:	60.7V	63.92V	64.8V
Isc:	3.82A	4.84A	4.89A
Vmpp:	49.44V	52.4V	53.7V
Impp:	3.42A	4.34A	4.36A
Pmpp:	169.1W	227.24W	234.13W

Pass Criteria: 5%

	Measured	
Irr:	788.7	W/m²
Tcell:	44.95	°C
Ambient Temperature:	24.68	°C
Fill Factor:	71.88	%
Irr Change:	0	%

Measured:	Measured value
STC:	Measured value converted to standard test conditions (STC: 1000 W/m^2, 25 °C)
Nominal:	Nominal module data according to the datasheet
Voc:	Open-circuit voltage
Isc:	Short-circuit current
Vmpp:	Voltage at the MPP
Impp:	Current at the MPP
Pmpp:	Power at the MPP
MPP:	Maximum Power Point

The conversion of the measured values ("Measured" column) to the values under standard test conditions (STC) is done automatically in the "STC" column. If no measured values are available for insolation and temperature, standard test conditions (STC: 1000 W/m^2, 25 °C) shall serve as a basis. It is also possible to enter the insolation and temperature values into the corresponding fields later.

As soon as a PV module has been selected from the PV module database (see Module Parameters tab), the nominal module data are taken over into the "Nominal" column.

Pass criteria:

By means of the pass criteria (1 % - 10 %) you can define a percentage stating by how many percent the STC values may deviate from the nominal module data. Depending on whether the STC values fulfill the pass criteria or not, the measured values are highlighted in green or red color.

3.2 Curve tab

The Curve tab opens automatically as soon as the measurement data have been read from the BENNING PV 2. Without any measurement data, the tab cannot be opened.
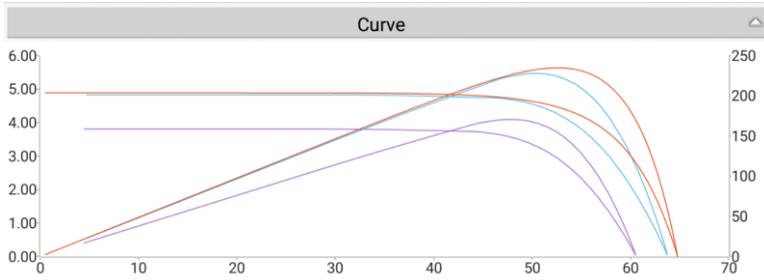
To change to the full screen mode, tap any point in the curve diagram.

In full screen mode, it is possible to show or hide individual curves via colored buttons.

Color	Curves:
- Purple:	Meas (measured values)
- Blue:	STC (measured values converted to STC)
- Red:	Nom (nominal module data according to datasheet)
- Green:	I-V curves
- Yellow:	Power curves

For a more detailed examination, you can pinch and zoom to enlarge a curve section and display individual current/voltage values by tapping the curve.

Examples:
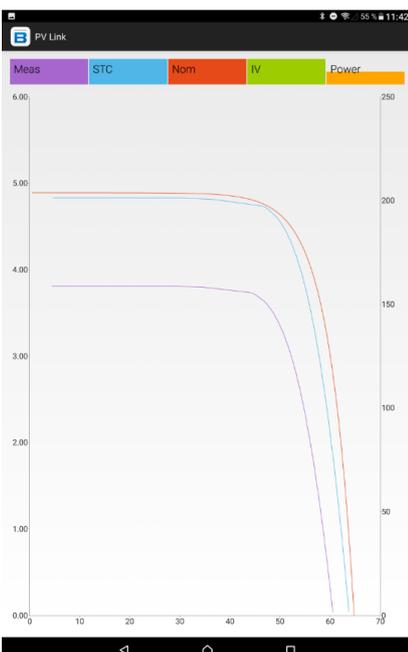
I-V curve   Power curve   I-V curve and power curve
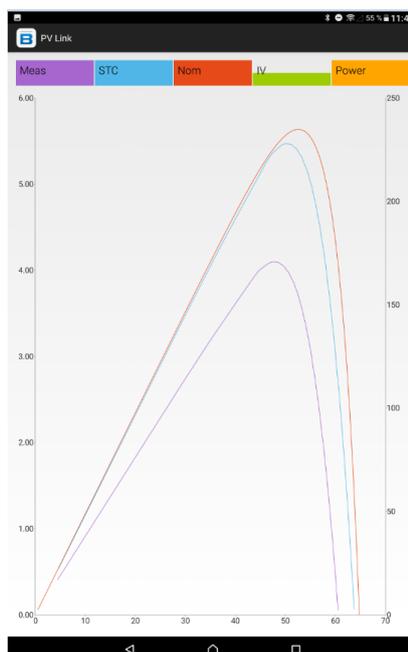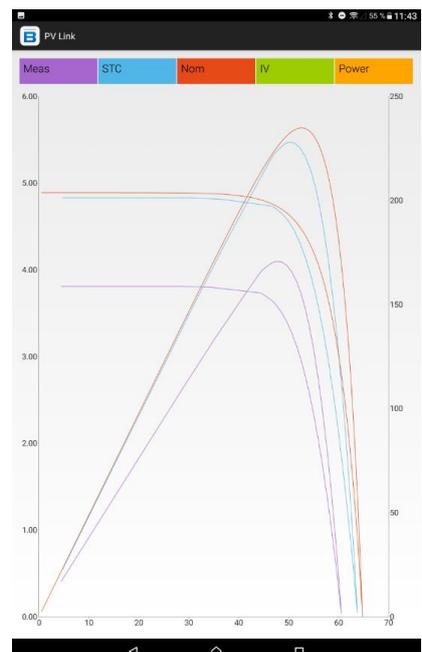
3.3 Module Parameters tab

The "BENNING PV Link" app includes a module database with more than 16.000 different PV modules.

Search for the respective PV module by entering the manufacturer or the model designation in the search field. All matches will be listed. Tap the corresponding PV module to open the module parameters of the manufacturer.

Module Parameters	△
Module:	
Enter module name here.	
Module Information	
Voc:	V
Isc:	A
Vmpp:	V
Impp:	A
Alpha:	
Delta:	
Beta:	
Number of Modules:	

Voc: Open-circuit voltage

Isc: Short-circuit current

Vmpp: Voltage at the MPP

Impp: Current at the MPP

Temperature coefficient (TC):

Alpha: TC short-circuit current (A/°C)

Beta: TC open-circuit voltage (V/°C)

Delta: Anderson-Delta coefficient

Source: Datasheet or laboratory

Note on the delta coefficient: If the delta value is not known (the field remains empty), the program uses the default value of 0.1, which is typical for most PV modules.

Monocrystalline: 0.085, multicrystalline (poly): 0.110, thin film: 0.063

If you manually change the module parameters of an opened PV module by entry, save the PV module in the module database under another name. Please enter the number of existing PV modules belonging to the tested PV string into the last line.

Module Parameters	△
Module:	
Solar STP080	
Module Information	
Voc:	21.6	V
Isc:	4.89	A
Vmpp:	17.9	V
Impp:	4.36	A
Alpha:	0.0	
Delta:	0.085	
Beta:	-0.1	
Number of Modules:	3	
Additional Information	▽

As soon as you read new measurement data from the BENNING PV 2, you can directly access the PV module last used to speed up selection.

Do you want to use the last selected module?	
Last Module was: Solar STP080	
No	Yes

3.4 Additional Information tab
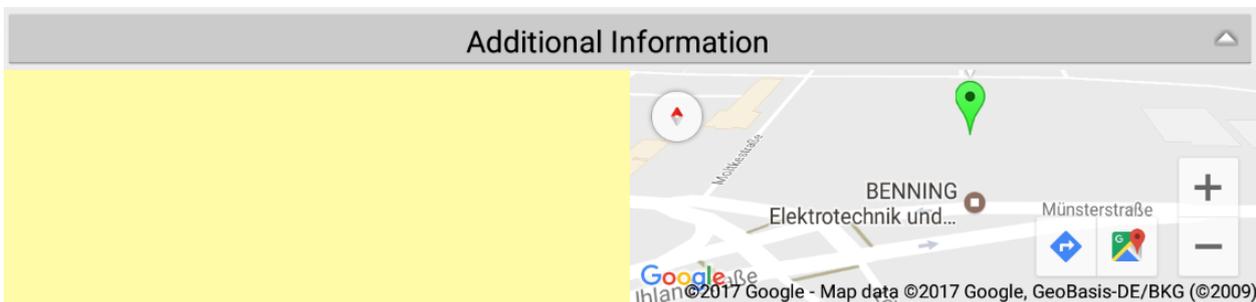
With GPS tracking being enabled, the current location of your Android device will be stored automatically in the measurement data during the storage process.

By means of the camera icon, you can add an addition photo to the measurement. Thus, you can document e. g. shading, damaged PV modules/lines of the PV system etc.

3.5 Storing measurement data

As soon as new measurement data have been read from the BENNING PV 2, a disk icon appears at the bottom of the display. Tap the disk icon to store the measurement data. An input field opens where the measuring point can be described unambiguously. The Test Number field, for example, can be used to assign the storage location number of the BENNING PV 2 to the read measurement data.

Save Result?

String Id: 123

Combiner:

Inverter:

Site:

Test Number:

Cancel	Save

4. NFC data transfer

The BENNING PV 2 is provided with a wireless NFC interface (Near Field Communication) to transfer an I-V curve to an NFC-capable Android device (smartphone, tablet computer). The NFC chip required for this functionality is located under the NFC logo on the top of the BENNING PV 2 housing. For information on the position of the NFC antenna of your Android device, please refer to the corresponding manual.

4.1 Enabling NFC and GPS for Android devices

Enable the NFC function (Near Field Communication) of your Android device first to allow data transfer to the BENNING PV 2. In addition, enable the GPS tracking function of your Android device to take over the measurement location automatically in the measuring data.

4.2 Reading measured data from the BENNING PV 2
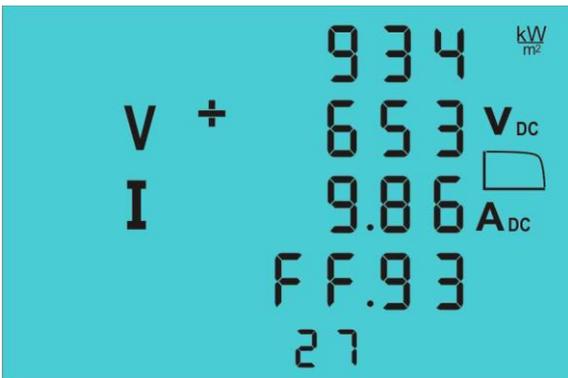
Data transfer can be carried out either directly after measurement or later.

At the end of an I-V curve measurement, the I-V curve is written to the NFC chip automatically. The "NFC" icon is briefly shown on the LC display.

As an alternative, it is also possible to call a storage location from the measured value memory of the BENNING PV 2 via the ⌷ key (RECALL). Please observe that the curve data are written to the NFC chip once the ⌶ key has been actuated. The "NFC" icon is briefly shown on the LC display.
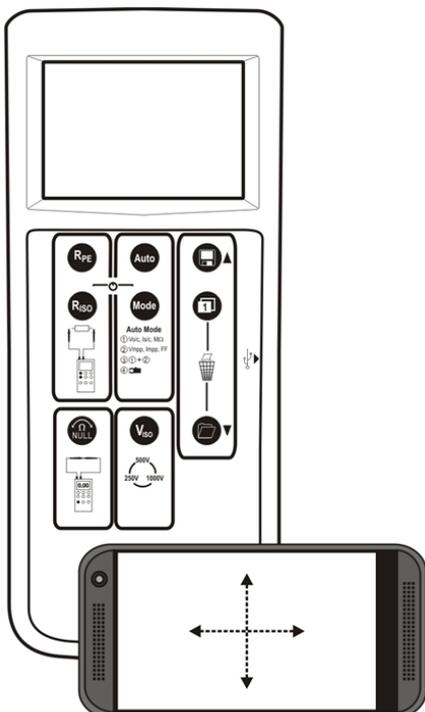
As soon as the "NFC" icon disappears, hold the NFC antenna of your Android device as close and still as possible over the NFC logo on the top of the BENNING PV 2 housing. As soon as the data transfer is complete, the I-V curve will be displayed on your Android device.

If the I-V curve is not displayed, please refer the following notes in data transfer.

Notes on data transfer:

- Protective pouches or covers of your Android device might affect data transfer. Remove them before transferring data, if necessary.
- In the settings of your Android device, disable Android Beam, Samsung Beam or other beams. The setting might affect NFC data transfer.
- Do not hold the Android device over the NFC logo as soon as the "NFC" icon is shown on the LC display. Transfer might be impaired.
- If you do not know from the respective manual where the NFC antenna of your Android device is located, slowly move the Android device over the surface of the BENNING PV 2 to establish a connection. Some Android device use the NFC logo on the housing surface to locate the NFC antenna, whereas in other devices, the NFC antenna is located within the battery area.

Possible error messages:

- "Phone lost NFC signal during test, remove phone and then try again. Ensure mode 2 or 3 is selected and switch screen has been pressed."
  This error message appears if the Android device has been moved during the transfer.
- "Unable to read data, remove phone and then try again. Ensure mode 2 or 3 is selected and switch screen has been pressed."
  This error message appears if the measurement data could not be read correctly.

5. Creating a PDF test report

This function offers the possibility of creating a simple PDF test report containing the measured data currently opened.

To do this, tap the PDF Report icon in the header and export the file. Depending on the functions of your Android device, you can store the file or send it via e-mail.

Name of export file.

20170509_115455_BenningPVLink

| Cancel | Export |

Record of Test

String Id:	1234	Combiner:	Beispiel_gut
Site:	Beispiel_gut	Inverter:	123
GPS: LAT: 55.0340488 LNG: -1.4641625		Tester:	Benning PV Tester
Module: Solar STP080		Number of Modules:	3

Test Results:

	Measured	STC	Nominal		Measured	
Voc	60.7V	63.92V	64.8V	Irr	788.7	W/m²
Isc	3.82A	4.84A	4.99A	Tcell	44.95	°C
Vmpp	49.44V	52.4V	59.7V	Ambient Temperature:	24.68	°C
Impp	3.42A	4.34A	4.36A	Fill Factor:	71.88	%
Pmpp	169.1W	227.04W	234.13W	Irr Change	0	%

STC Curve
Measured Curve
Nominal Curve

Issued on:2017-04-26 08:28:12
Tested by:Frank

Printed from BENNING PV Link

6. Settings

Tap the ⚙ icon on the start screen to open the settings.
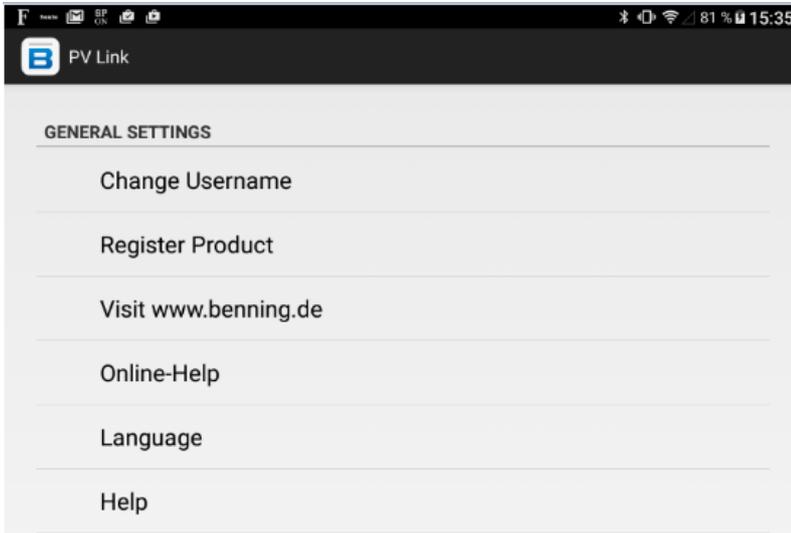
You can make the following settings:

- Changing the name of the user/ test person
- Registering the BENNING PV 2
- Opens the www.benning.de website
- Opens the online help of the website
- Selecting the app language
- Opens the PDF operating manual

BENNING

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