ENGLISH
DHV0088 Rev02

PD Family

PD30-E | PDTD60-2 | PDTD90-2 | PDTD120-2 | PDTD200-2

User Manual

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1 Forward

Purpose

This user manual serves to ensure the proper use of the b2 Suite Software, a program designed for the management of Partial Discharge systems (PD30-E, PD60-2, PDTD60-2, PD90-2. PDTD90-2, PDTD120-2) . The b2 Suite communicates with the units via Bluetooth .

1.1 Regarding this Document

Target Users

This operating manual is designed to inform various user groups. The scope and depth of the information provided may not be appropriate for all users. However, it is important that all users familiarize themselves with this document in full. The following is a guideline indicating the most significant information as a function of the user's responsibilities.

User	Responsibilities	Focus
Operator	• To connect the equipment • To carry out manual or pre-programmed test sequence • To verify validity of application • To adjust instrument settings • To program automatic test sequences in accordance with particular testing standards	**All** Sections Particular focus on all **safety** messages
Producement, Management	• To assure that the workplace is safe and has all required equipment • To assure that operators are qualified technicians • To assure that operators fulfil their responsibilities	Particular focus on **safety** messages and information regarding **general** product description.

Safekeeping

NOTICE

This manual should always be on hand when using one of the PD test instrument with the b2 Suite.

1.2 Documentation Conventions

The following explain the symbols, and safety messages found in this document. The employment of safety symbols and signal words are according to the American National Standards Institute standard ANSI Z535.6 „Product Safety Signs and Labels“.

Safety Messages

Danger

CAUTION

Indicates a hazardous situation which if not avoided will result in death or serious injury.

Warning

WARNING

Indicates a hazardous situation which if not avoided could result in death or serious injury.

Caution

CAUTION

Indicates a hazardous situation which if not avoided could result in minor or moderate injury.

Notice

NOTICE

Indicates suggested practices to protect equipment and property.

Symbols

Yellow triangle, framed in black: Used to indicate a potential hazard.
Only used in conjunction with description of the possible hazard!
Detailed symbol may correspond to this specific hazard.

Red outlined circle with red diagonal line: Used to indicate forbidden practices.
The described handling practice must not be carried out!

Blue circle with white exclamation mark: Used to indicate recommended precautionary measures or a situation that can lead to property damage.

1.3 Legal Considerations

Warranty

b2 provides a one-year warranty from the original purchase date of instrument for all necessary parts and labour. This warranty is void in the event of abuse, incorrect operation or use, unauthorized modification or repairs, or failure to perform the specified maintenance as indicated in this operation manual. This warranty does not include normal consumable items such as lamps, paper rolls, printer ribbons, batteries or other auxiliary items.
This warranty and our liability are limited to replacing or repairing defective equipment, at our discretion. Equipment that is returned to b2 must be packed in original packaging. All shipped items must be prepaid and insured. No other warranties are expressed or implied.

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NOTICE

The information presented in this instruction manual is believed to be accurate and correct for the intended use of this product. Should this instrument be used for other applications and purposes not covered herein, please contact b2 to validate its suitability.
This manual, all of its contents and the instrumentsspecifications are subject to change without notice.

Your opinion matters!

Your comments and suggestions are of value. We are dedicated to supporting your needs. Offering you optimal documentation is part of our promise of quality.
Improvement suggestions regarding this manual may be sent to: **info@b2hv.at**
Thank you for your feedback!

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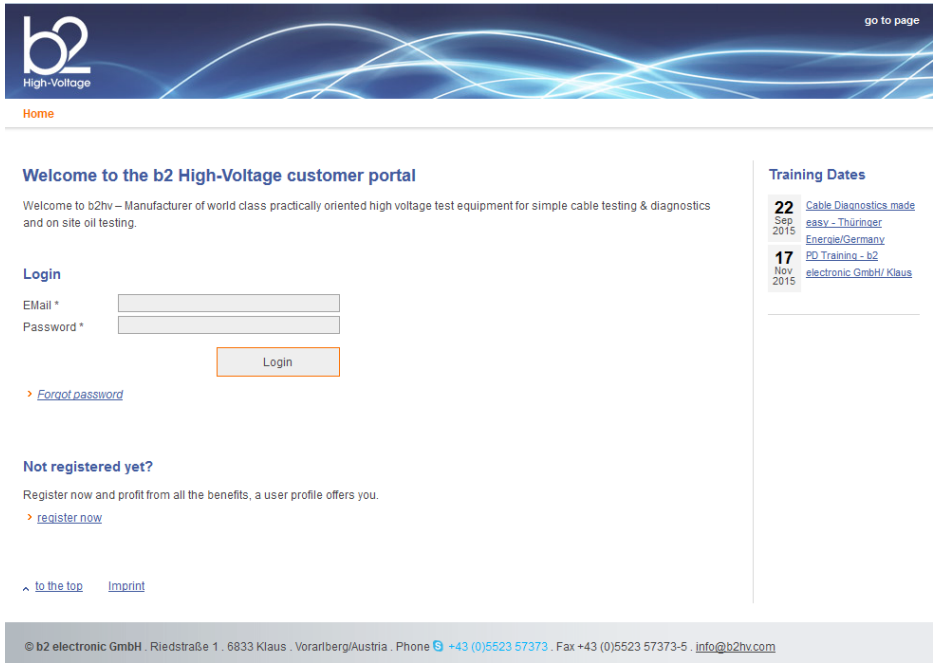


2 Safety

Safety is **priority**! Respect all **safety information**; only use the PD with the b2 Suite for **appropriate applications** and ensure that operators possess the required **operator qualifications**

2.1 General Safety

NOTICE

Operation Manual
Before carrying out any high voltage test with this instrument, read this Operating Manual in its entirety.

2.2 Work Safety

DANGER

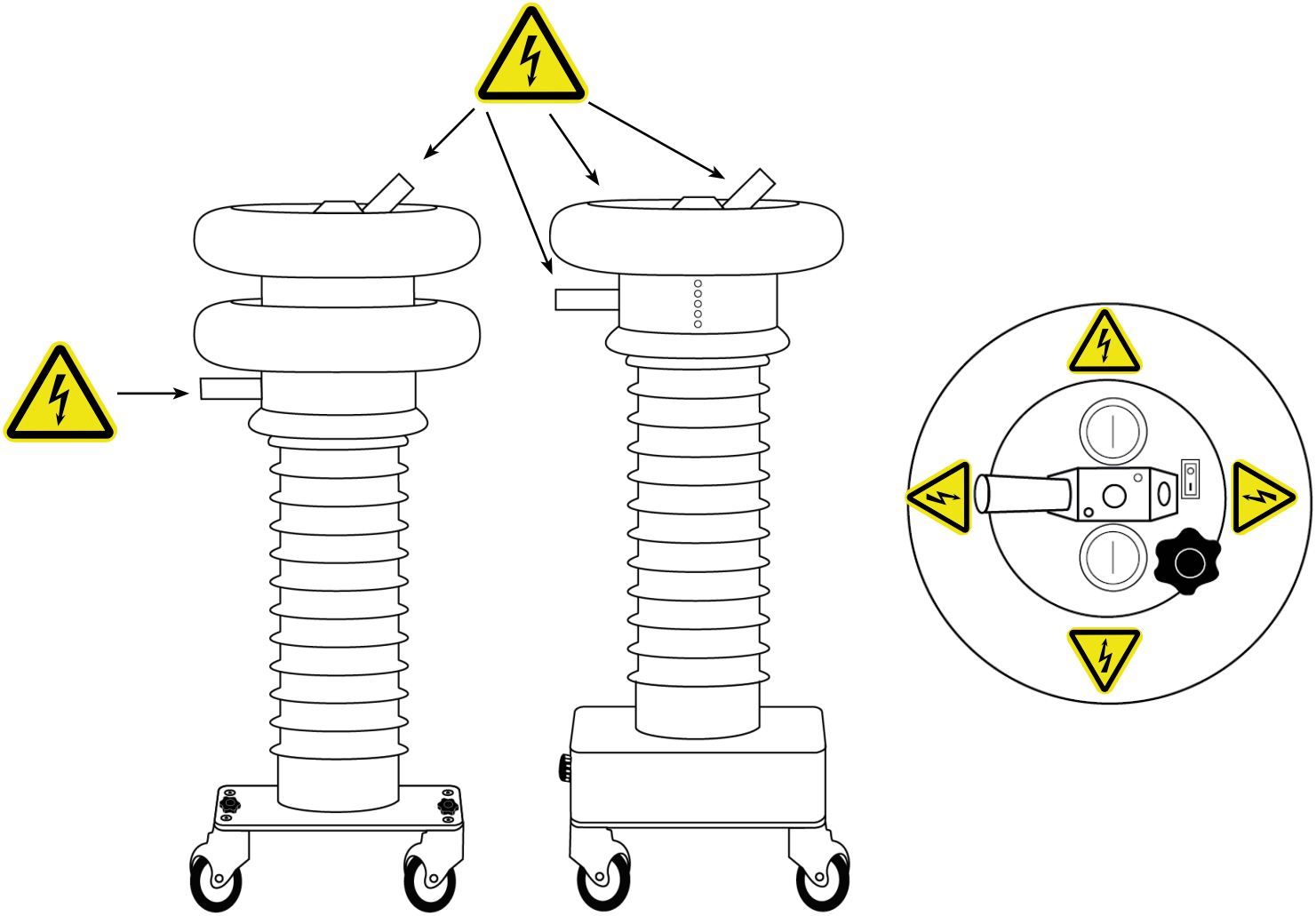
Electric Shock Hazard
Never assume that equipment is safe to handle without using the necessary safety equipment and earthing procedures.

- All procedures must comply with local safety regulations
- Always treat exposed connectors and conductors as potential electric shock hazards.
- DUT must be earthed, de-energized and isolated from all power sources.
- All auxiliary electrical apparatus such as switchgear, surge arresters etc. must be isolated from the test power source and the DUT.
- All cables and connectors must be inspected for damage before use. Damaged equipment must not be used.
- Earth connections must be made first and removed last!
- DUT must be discharged and earthed before disconnecting the test lead.
- Avoid testing alone. In the event of an emergency another person's presence may be essential.
- Don't touch the PD during the test and before you didn't have grounded the DUT and the filter.
- The metal frame is under High Voltage during High Voltage Test

DANGER

Don’t touch the PD during the test and before you didn’t have grounded the DUT and the filter.

The whole PD unit is under High Voltage during High Voltage Test!



DANGER

Authorized Personnel Only
The test area must be secured to keep non-qualified personnel off the premises!

- Signs must warn all persons of the high voltage test area.
- Only qualified electrical technicians should have access to the test area.
- Other persons must be accompanied by qualified electrical technicians and must be informed of the risks involved.

WARNING

Radiation Hazard
Testing vacuum bottles, above their voltage rating, with DC can produce dangerous X-rays.

NOTICE

Equipment Handling
DUT must have clean connections.
Test instruments must only be repaired or modified by authorized b2 personnel.

NOTICE

If required according to local safety regulations
Wear high voltage gloves when handling high voltage cables and equipment.

2.3 Appropriate Applications

The b2 PD test instrument is designed to perform high voltage insulation testing of various types of highly capacitive loads.

Appropriate DUTs

DUT Type	Examples
Cables	• Extruded cables (e.g. XLPE) • Laminated cables (e.g. PILC) • Insulated cables
Other highly capacitive loads	• Generators • Switchgear • Transformers • Rotating machines • Insulators • Bushings

Appropriate Measurements

Measurement	Examples
Diagnostics	• Phase position of discharges indicated • Scope display sine wave superimposed • PD mapping actual locations of partial discharges • Locates sites using TDR principles • Voltage measurement circuit

NOTICE

Other Applications
Before proceeding, contact b2 to validate appropriate use!

2.4 Operator Qualifications

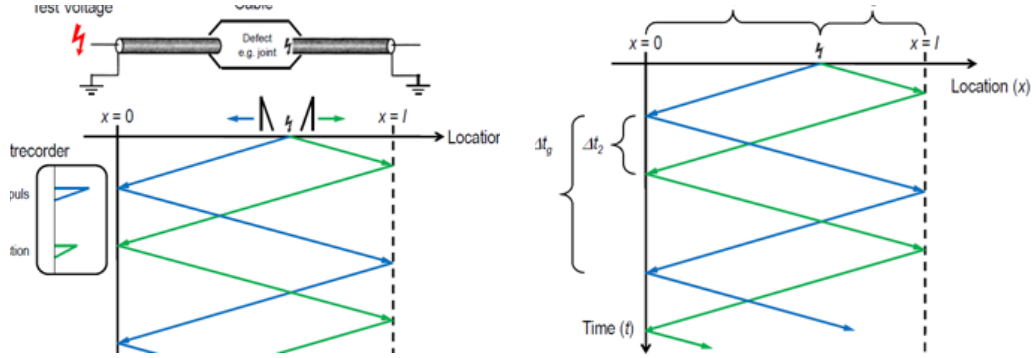
HVA/PD operators must be **qualified electrical technicians!** Proof of necessary qualifications for working in high voltage domain is mandatory. It is highly recommended that operators have completed an emergency rescue training program.

3 General Description

3.1 PD Basics

A long high voltage cable behaves as a wave guide. The cable has a conductor, a dielectric and a coaxial neutral (Screen copper tape or lead) which forms an ideal wave guide. The dielectric creates a large capacitor. The longer the cable, the more of these capacitors are in parallel. These PD waves travel down the wave guide – one PD wave to the one end of the cable and the other PD pulse to the opposite end. If we now place a capturing device – a coupling capacitor and a Digital Storage Oscilloscope at the one end, it is possible to view the “time of flight” of these PD pulses.

The above echogram is displayed by the Transientrecorder (b2 Suite). The 1st PD pulse (emanating from the PD source) arrives first at the coupling unit (see pulse marked 1st whilst the 2nd pulse travels to the far end, travels the full length of the cable and arrives at the coupling unit (see pulse marked 2nd). The 1st pulse reflects out of the coupling unit and travels to the far end and reflects back hence 3rd pulse. Δt2 is therefore the time differences between these two incoming pulses and the time to the PD source from the far end. If we now know the velocity of propagation of the PD pulse in the cable we can calculate the distance to the PD source (Dist = Velocity x time)



Illustrations from Dr. Daniel Pepper

Unfortunately on very long cables the subsequent reflections may be attenuated to such an extent that they are not visible.
Joint / splices also attenuate these pulses.
PILC cables have a greater attenuation on these traveling PD waves than that of a similar XLPE cable. If the returning pulse (2nd) is not visible it is not possible to do a location. The 1st pulse only indicates that there is a discharge on the cable.
By examining the rise times of the calibration pulse and this PD pulse it is possible to determine if it is from the near end termination or not.

3.2 Partial Discharge Unit

The b2 electronic GmbH high voltage Test System PDTD-2 offers both portable and built-in solutions for diagnostics of medium voltage cables, rotating machines and transformers.

Diagnostics of medium and high voltage cables provides the opportunity for early detection of vulnerabilities, allowing preventative maintenance work to be carried out before the cable fails in service. Partial Discharge diagnostics (PD) allows a precise analysis of cables and their joints and terminations. Tan Delta diagnostics (TD) allows a clear statement about the overall dielectric condition of aged polymeric cables and especially any damage by so-called “water trees”.

With PDTD-2 - VLF testing, PD diagnostics and TD diagnostics can be carried out simultaneously!

b2 electronic Diagnostics System PDTD-2 provides a pure sinusoidal output voltage with extremely stable frequencies. This is a pre-condition of direct comparison of PD and TD diagnostics results across cables of different lengths. The characteristics at ever-changing frequencies and varying output voltage waveforms provide no basis for reliable comparisons. For the 0.1 Hz diagnosis with true sinusoidal output voltages, various standards (such as IEEE400.2-2013,..) provide clear guidelines and procedures.

3.3 Technical Specifications

		PD30-E	PD60-2	PD90-2	PD120-2
Article number		SH5027	SH5030	SH5032	SH5035
Operating voltage	sinusoidal	24 kV_{rms}, 34 kV_{peak}	44 kV_{rms}, 60 kV_{peak}	64 kV_{rms}, 90 kV_{peak}	85 kV_{rms}, 120 kV_{peak}
	frequency	0.01-0.1 Hz in steps of 0.01 Hz default: 0.1 Hz (auto frequency)			
Rated current		1 A			
HV coupling capacitor	capacitance	~ 1 nF			
	dimensions (mm)	L 300 x H 486 x W 250	L 300 x H 880 x W 250	L 300 x H 880 x W 250	L 300 x H 880 x W 250
	weight	29 kg	17.2 kg	21.2 kg	24.7 kg
HV filter	capacitance	4 nF	~ 1 nF	1 nF	2.4 nF
	dimensions (mm)	one-piece	L 300 x H 720 x W 250	L 300 x H 770 x W 250	L 300x H 790 x W 250
	weight	one-piece	15 kg	32 kg	33 kg
Velocity range (v/2)		10-150 m/µs			
Measuring range		100 km			
PD background level		< 10 pC			
PD localization	accuracy	1 %			
PD resolution		0.1 pC, 0.1 m			
Sample rate		200 MS/s			
Bandwith		100 MHz, analog filter			
Signal amplification		0-52 dB (1 channel) , 0-72 dB (2 channel)			
Environment		temperature: storage -20°C to + 65°C, operating -5°C to + 45°C			

		PDTD60-2	PDTD90-2	PDTD120-2	PDTD200-2
Article Number		SH5031	SH5033	SH5034	SH5037
Operating Voltage	sinusoidal	44 kV_{rms}, 60 kV_{peak}	64 kV_{rms}, 90 kV_{peak}	85 kV_{rms}, 120 kV_{peak}	141 kV_{rms}, 200 kV_{peak}
	frequency	0.01-0.1 Hz in steps of 0.01 Hz default: 0.1 Hz (auto frequency)			
Rated current		1 A			
HV Coupling Capacitor	capacitance	~ 1 nF			0.75 nF
	dimensions (mm)	L 330 x H 730 x W 280	L 330 x H 870 x W 280	L 330 x H 870 x W 280	L 660 x H 178 x W 660
	weight	20.7 kg	24.7 kg	24,7 kg	90 kg
HV Filter	capacitance	~1nF	1 nF	~1nF	0.75 nF
	dimensions (mm)	L 300 x H 720 x W 280	L 300 x H 720 x W 280	L 300x H 820 x W 280	L 660 x H 178 x W 660
	weight	19.9 kg	19.9 kg	34 kg	90 kg
Velocity range (v/2)		10-150 m/µs			
Measuring range		100 km			
PD background level		< 10 pC			
PD localization	accuracy	1 %			
PD resolution		0.1 pC, 0.1 m			
Sample rate		200 MS/s			
Bandwith		100 MHz, analog filter			
Signal amplification		0-52 dB (1 channel) , 0-72 dB (2 channel)			
Environment		temperature: storage -20°C to + 65°C, operating -5°C to + 45°C			

TAN DELTA

Output Voltage	sinusoidal	44 kV_{rms}, 60 kV_{peak}	64 kV_{rms}, 90 kV_{peak}	85 kV_{rms}, 120 kV_{peak}	141 kV_{rms}, 200 kV_{peak}
	frequency	0.1 Hz, 0.01 to 0.1 Hz			
Measuring range		0.1×10^{-3}-999×10^{-3}			
Tan Delta Measurement	resolution	1×10^{-5}			
	accuracy	$\pm 1 \times 10^{-4}$			
Load range		500 pF to 10 µF			1 nF to 10 µF

3.4 Materials - Shipment Content

PD Standard Accessories

These items will be included in the scope of deliver of every PD unit (PD30-E, PD60-2, PDTD60-2, PD90-2, PDTD90-2, PD120-2 and PDTD120-2). The [1] marking aticles that are country specific.

Cables and its accessories (earthing cables, communication cables, connection cables, clamps)

Art. No.	Item	Picture	pcs	Art. No.	Item	Picture	pcs
GH0550	PDTD MC14 DUT Test Lead 100 kV 0.7 m MC14		1	GH0580	Red Clamp 600 A with MC14 mm Socket		1
GH0551	PDTD MC14 DUT Test Lead 100 kV 1.6 m MC14		1	GH0581	PD Impedance 3,9 kOhm MC Male - MC Female (not with HVA54-5)		1
GH0567	PDTD MC14 DUT Test Lead 100 kV 0.3 m MC14		1	KES0105	Angle Bracket Connector 14 mm		1
GH0586	PD60-CC USB Lead 10 m		1	KES0209	MC14 Socket Connection for Corona Shield		1
GH0624	Opto Converter USB-LWL-RS232		1	KES0274	Ground Connection Screw Clamp (G-clamp)		1
GH0690	Earth Lead 2 m 16 mm² flat transparent MC14/M8		1	KMD0081	Corona Shield Two-Part, Min. Clearance Distance = 10 mm		2
GH1009	Earth Lead 5 m 16 mm² flat transparent M6/Clamp		1	XKEK0001[1]	Power Cord EF/C13 10 A 3 m black		1

Software

GH0900	b2 Suite Software v1.8		1	GS0003	b2 Suite Dongle Complete (Basic, PD and TD Diagnostics)		2

Calibrator with accessories

Art. No.	Item	Picture	pcs
GH5728	PDC1 Calibrator 10 pC-10 nC		1
KEB0008	Battery 9 V Lithium 1200 mAh U9VL-J-P UltraLife		1
KEK0091	BNC Lead to 4 mm Plug Red & Black		1
KES0021	Dolphin Clip 32 A 4 mm Jack Red		1
KES0022	Dolphin Clip 32 A 4 mm Jack Red		1
KMSO0085	BNC Plug Protection Cover		1
WE0006	Offset Screwdriver Torx Tx10		1

Manuals and Documents

KDD0030	USB Pen Flash Drive		1
DHV0048	b2 Suite Software Manual (English)		1
DHV0047	Calibration Certificate		2
DHV0073	PDC1 PDC2 Manual (English)		1
DHV0088	PD Manual (English)		1

PD30-E Accessories

Cables

Art. No.	Item	Picture	pcs
GH0808	HVA34 HV Test Lead 75 kV PD 5 m MC14		1

Transport cases

Art. No.	Item	Picture	pcs
VKR0032	PD30-E Transport Case 682 x 510 x 355 mm incl. Inlay		1
VKR0034	PD30-E Case Black 560 x 355 x 234 mm		1

PD60-2 Accessories

Cables

Art. No.	Item	Picture	pcs
GH0801	HVA60 HV Test Lead 75 kV PD 5 m MC14		1
GH0830	Earth Lead 0.5 m 16 mm² flat transparent MC14/MC14		1

Transport cases

Art. No.	Item	Picture	pcs
VKR0030	PD60-2 Transport Case CC 737 x 457 x 349 mm		1
VKR0031	PD60-2 Transport Case Filter 737 x 457 x 349 mm incl. Inlay		1

PD90-2 Accessories

Cables

Art. No.	Item	Picture	pcs
GH0830	Earth Lead 0.5 m 16 mm² flat transparent MC14/MC14		1
GH1010	Earth Lead 5 m 16 mm² flat transparent MC14/Clamp		1

Transport cases

Art. No.	Item	Picture	pcs
VKR0031	PD60-2 Transport Case Filter 737 x 457 x 349 mm incl. Inlay		1
VKR0035	PDTD90-2 CC Transport Case incl. Inlay		1

PD120-2 Accessories

Cables

Art. No.	Item	Picture	pcs
GH0830	Earth Lead 0.5 m 16 mm² flat transparent MC14/MC14		1

Art. No.	Item	Picture	pcs
GH1010	Earth Lead 5 m 16 mm² flat transparent MC14/Clamp		1

Transport cases

VKR0035	PDTD90-2 CC Transport Case incl. Inlay		1

VKR0041	PD120-2 Filter Transport Case Black incl. Inlay		1

PDTD60-2 Accessories

Cables

GH0801	HVA60 HV Test Lead 75 kV PD 5 m MC14		1

GH0830	Earth Lead 0.5 m 16 mm² flat transparent MC14/MC14		1

TD Accessories

KDG0013	Bluetooth USB Adapter 100 m		1
KN0009	Charger for Rechargeable Battery		1

KEB0006	REchargeable battery Mono D, Ni-MH 1,2 V/10000 mAh2		1
M0022	Battery 1,5 V 20700 mAH Size D Mono		2

Transport cases

VKR0030	PD60-2 Transport Case CC 737 x 457 x 349 mm		1

VKR0031	PD60-2 Transport Case Filter 737 x 457 x 349 mm incl. Inlay		1

PDTD90-2 Accessories

Cables

Art. No.	Item	Picture	pcs	Art. No.	Item	Picture	pcs
GH0830	Earth Lead 0.5 m 16 mm² flat transparent MC14/MC14		1	GH1010	Earth Lead 5 m 16 mm² flat transparent MC14/Clamp		1

TD Accessories

KDG0013	Bluetooth USB Adapter 100 m		1	KEB0006	REchargeable battery Mono D, Ni-MH 1,2 V/10000 mAh2		1
KN0009	Charger for Rechargeable Battery		1	M0022	Battery 1,5 V 20700 mAH Size D Mono		2

Transport cases

VKR0031	PD60-2 Transport Case Filter 737 x 457 x 349 mm incl. Inlay		1	VKR0035	PDTD90-2 CC Transport Case incl. Inlay		1

PDTD120-2 Accessories

Cables

GH0830	Earth Lead 0.5 m 16 mm² flat transparent MC14/MC14		1	GH1010	Earth Lead 5 m 16 mm² flat transparent MC14/Clamp		1

TD Accessories

KDG0013	Bluetooth USB Adapter 100 m		1	KEB0006	REchargeable battery Mono D, Ni-MH 1,2 V/10000 mAh2		1
KN0009	Charger for Rechargeable Battery		1	M0022	Battery 1,5 V 20700 mAH Size D Mono		2

Transport cases

Art. No.	Item	Picture	pcs	Art. No.	Item	Picture	pcs
VKR0035	PDTD90-2 CC Transport Case incl. Inlay		1	VKR0041	PD120-2 Filter Transport Case Black incl. Inlay		1

PDTD200-2 Accessories

The following items are included in the PD200-2 Accessories

GH0586	PD60-CC USB Lead 10m		1	GH0837	HVA200 Short Circuit Lead MC14-M6		1
GH0825	PDTD DUT Aluflex Connection 0.45 - 1.6m MC 14mm - MC 14mm		1	GH0838	Earth Lead 1m 16mm² flat transparent M6/M6		1
GH0828	PD & TD Flexible Aluminium DUT Connection Lead 0.45 m-1.6 m		1	GH0839	Earth Lead 5m 16mm² flat transparent M6/M8		1
KES0274	Ground Connection Screw Clamp (G-clamp)		1	XKEK0001	Power Cord		1
KES0283	MC Socket B14AR-N with Shortend 13 mm Thread		1				

TD Accessories

BG0020	Corona Ring for DUT		1	KEB0006	Battery rech.Ansmann Akku Mono D, Ni-MH 1,2 V / 1000 mAh Blister, 2 pcs		1
KN0009	Charger for Rechargeable Battery (Ansmann Powerline 5 LCD)		1	KDG013	Bluetooth USB Adapter 100 m		1

Calibrator with accessories

Art. No.	Item	Picture	pcs
GH5728	PDC1 Calibrator 10 pC-10 nC		1
KEB0008	Battery 9 V Lithium 1200 mAh U9VL-J-P UltraLife		1
KEK0091	BNC Lead to 4 mm Plug Red & Black		1
KES0021	Dolphin Clip 32 A 4 mm Jack Red		1

Art. No.	Item	Picture	pcs
KES0022	Dolphin Clip 32 A 4 mm Jack Red		1
KMSO0085	BNC Plug Protection Cover		1
WE0006	Offset Screwdriver Torx Tx10		1

Manuals and Documents

Art. No.	Item	Picture	pcs
KDD0016	USB Pen Flash Drive		1
DHV0048	b2 Suite Software Manual (English)		1
DHV0047	Calibration Certificate		2

Art. No.	Item	Picture	pcs
DHV0073	PDC1 PDC2 Manual (English)		1
DHV0088	PD Manual (English)		1

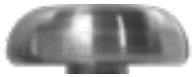
Software

Art. No.	Item	Picture	pcs
GH0900	b2 Suite Software v1.8		1

Art. No.	Item	Picture	pcs
GS0003	b2 Suite Dongle Complete (Basic, PD and TD Diagnostics)		2

3.5 Accessory (Optional)

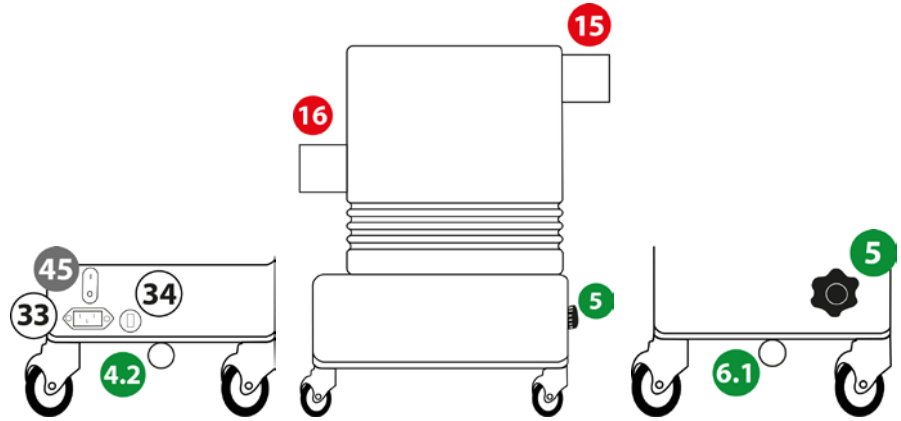
These Accessories aren't included in scope of supply of the PD-Systems. These positions are only available on order.
For enquiries please contact your local distributor or b2 electronic GmbH.

Art. No.	Item	Picture
GH0574	PD90 MC14 DUT Test Lead 100 kV TD 50 m Reel MC14	
	Adaptor for 30 kVSF6 Device Coupling connector Typ CC36-360 – MC 14 mm	
KMD0474	Corona Bell single piece	
GH0628 GH0629	Discharge Stick 30 kV 6000 r 4 kJ 750 mm Discharge Stick 60 kV 12 kR 8 kJ 1100 mm	

Art. No.	Item	Picture
SE0010	Test adaptor 10/20 kV l=950 mm for SF6 800TRA-M16	
SE0008	Test adaptor 10/20 kV l=460 mm for SF6 RSTI-68TRL	
KMD0521 KMD0522 KMD0523	Corona shield two-part, min. clearance distance = 20 mm min. clearance distance = 25 mm min. clearance distance = 30 mm	

3.6 Design & Construction

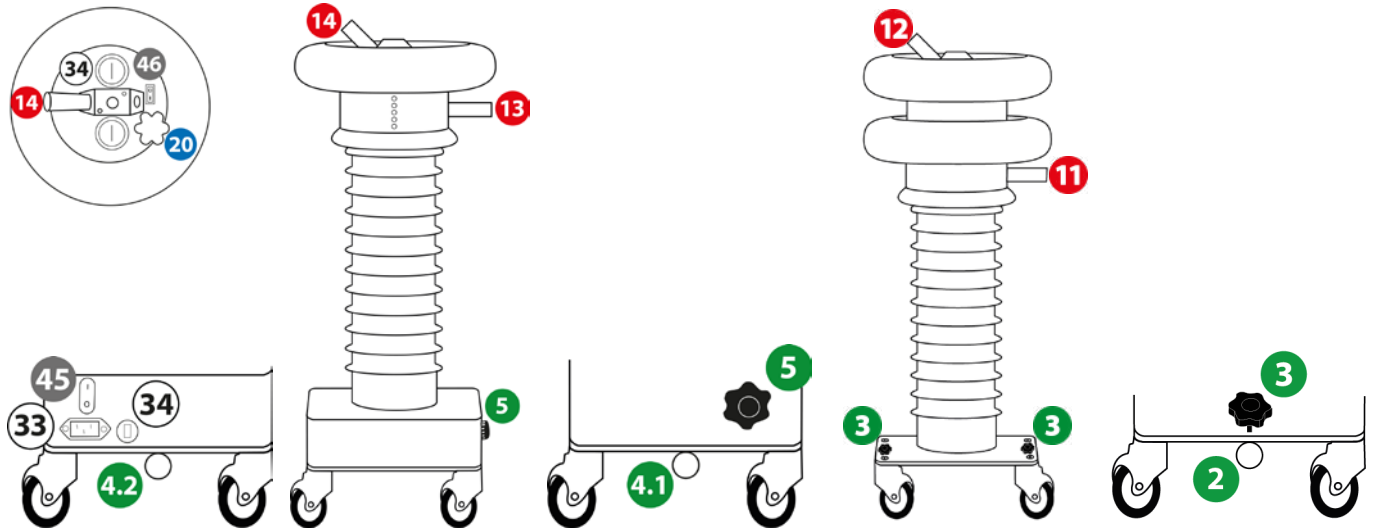
PD30-E



PDTD60-2 / PDTD90-2 / PDTD120-2

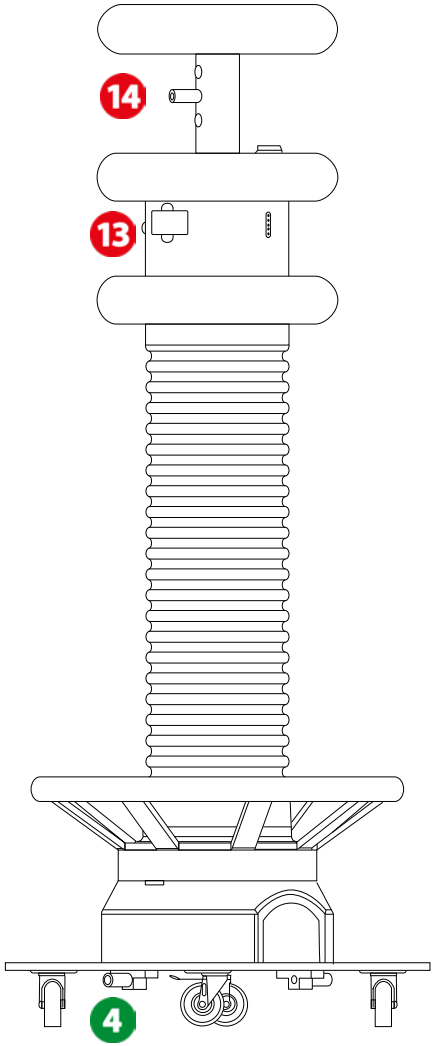
PDTD-2 CC

PD-2 Filter

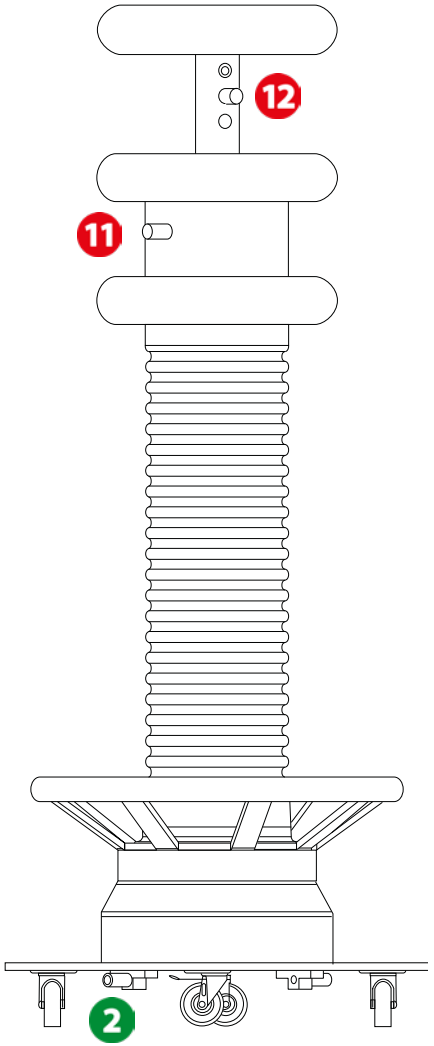


PDTD200-2

CC

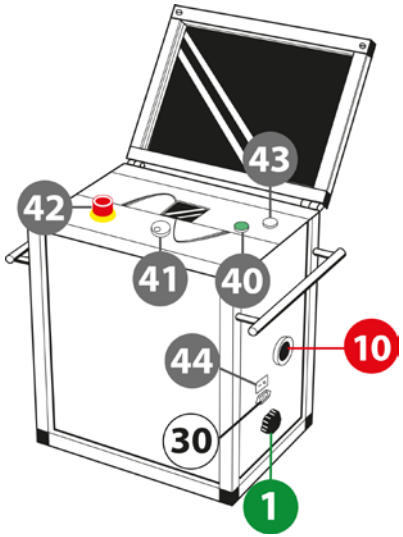


Filter

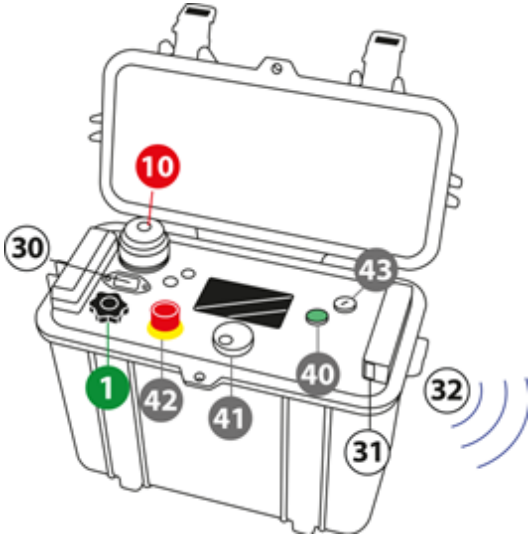


HVA

HVA Family 1st Generation (HVA34 | HVA60 | HVA90 | HVA120 | HVA54-5)

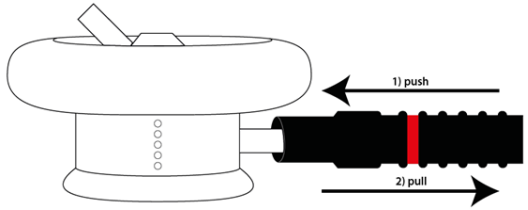


HVA - smart VLF (HVA28TD, HVA45TD)



PC

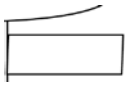
MC Contact



The MC-Locking system (AR) operates on the „push-pull“ principle.
It is selflocking when connected. Disconnection is effected by an axially displaceable coupling ring: first push, then pull to disconnect.

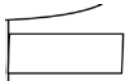
3.7 Layout & Cable Connection - Overview

EART CONNECTIONS

Nr.	Picture	Name	Description
1		HVA earthing connection	Earth connection of HVA Test Set (main earth)
2		PD-2 Filter earthing connection	PD-2 Filter earth via 14 mm MC contact (recommended) same earth potential as 3
3		PD-2 Filter earthing connection	Earth connection of PD-2 Filters same earth potential as 2
4		PD-2 CC earthing connection	PD-2 CC earth via 14mm MC contact (recommended) same earth potential as 5 also 4.1 and 4.2
5		PD-2 CC/ PD30-E earthing connection	Earth connection of PD-2 CC / PD30-E same earth potential as PD-2 CC 5 or 6 PD30-E
6		PD30-E earthing connection	PD-2 CC earth via 14mm MC contact (recommended) same earth potential as 5 also 6.2
7		HV Cable earthing connection	HV cable earth connection via clamp 7.1 also 7.2 and
9		DUT earthing	DUT earth connection
10		HV output connector HVA	Serves as connection point from the HVA to the PD-2 Filter / PD30-E via HV test lead. • Screw HV test lead into the HVA output connector
11		HV connector PD-2 Filter	Serves as connection point from the PD-2 Filter to the HVA or from Filter to PD-2 CC via HV test lead. • Plug HV test lead into the HV connector

HV CONNECTIONS

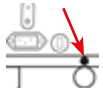
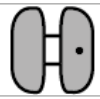
GUARD CONNECTIONS

Nr.	Picture	Name	Description
12		HV connector PD-2 Filter[1]	Serves as connection point from the PD-2 Filter to the PD-2 CC or from HVA to the PD-2 Filter via HV test lead. • Plug HV test lead into the HV connector
13		HV input connector PD-2 CC	Serves as connection point from thePD-2 CC to the PD-2 Filter via HV test lead. • Plug HV test lead into the HV output connector
14		HV output connector PD-2 CC	Serves as connection point from the PD-2CC to the DUT via HV test lead. • Plug HV test lead into the HV output connector
15		HV input connector PD30-E	Serves as connection point from the PD30-E to the HVA via HV test lead. • Plug HV test lead into the HV output connector
16		HV output connector PD30-E	Serves as connection point from the PD30-E to the DUT via HV test lead. • Plug HV test lead into the HV output connector
17		HV connection at DUT	Serves as connection point from the DUT to the HV test lead.
20		PD Guard Connection	Connection for Guard (leakage current detection and correction) on PD coupling capacitor
21		PD HV Cable – Guard Connection	Cable for Guard correction
22		Guard Connection on HV	HV connection for Guard cable (M6 thread in HV cable plug) if no leakage current correction needed

1 Can be used as input or output connector

COMMUNICATION

Nr.	Picture	Name	Description
30		HVA Power Supply Plug	Mains plug (power supply) on HVA
31		HVA28 USB	USB Port inside vent grasp
32		HVA Communication	Serial connection between PC&HVA (side panel)
33		PD Power Supply Plug	Mains plug (power supply) PD-2 CC/ PD30-E
34		PD-2 CC/PD30-E Communication	Plug for communication cable between PD-2CC / PD30-E and PC via USB cable
35		PD Battery	Battery compartment PDTD-2
36		HVA-USB Connection	PC-USB connection between HVA
37		b2 Dongle-USB Connection	PC-USB Dongle (Software dongle)
38		PD-USB Connection	PC-USB connection between PC&PD
39		PC-Bluetooth Communication	PC-USB Bluetooth Dongle

	Nr.	Picture	Name	Description
BUTTONS	40		HV switch ON /OF	Enables High Voltage on HVA
	41		Navigation knob	Enables user to select options and functions shown on display. • To scroll selection up or down -> Rotate • To enter selection -> Click (push in)
	42		Emergency OFF (stop)	Activates emergency shut down. Operation is only possible when Emergency OFF is deactivated. • To Activate Emergency Off -> Press in • To Deactivate Emergency Off -> Release latch and rotate
	43		HVA Key switch ON/OFF	Locks the unit to prevent against unauthorized use. • To disable unit -> Remove key from the OFF position • To reactivate unit -> Replace key and turn to ON position.
	44		HVA Main Switch ON/OFF	Activates/deactivates the HVA. This switch is a fuse with integrated magnetic auto-reset 10A. • To reset -> Turn the main switch OFF and then ON again
PDC CONNECTION	45		PD Main Switch ON/OFF	Activates/deactivates PD-2 CC & PD30-E If PD system is connected to power, switch can be left to “0”. (battery will be also charged automatically)
	46		TD Main Switch ON/OFF	Activates/deactivates TD unit from PDTD Diagnostic System. **Please Note:** TD measurement unit is battery operated no mains supply and no automatic charging of TD unit batteries
	50		PD-2 CC/PD30-E Calibrator Connection	Connection for calibrator
	51		DUT Calibrator Connection	Connection in corona shields to connect calibrator

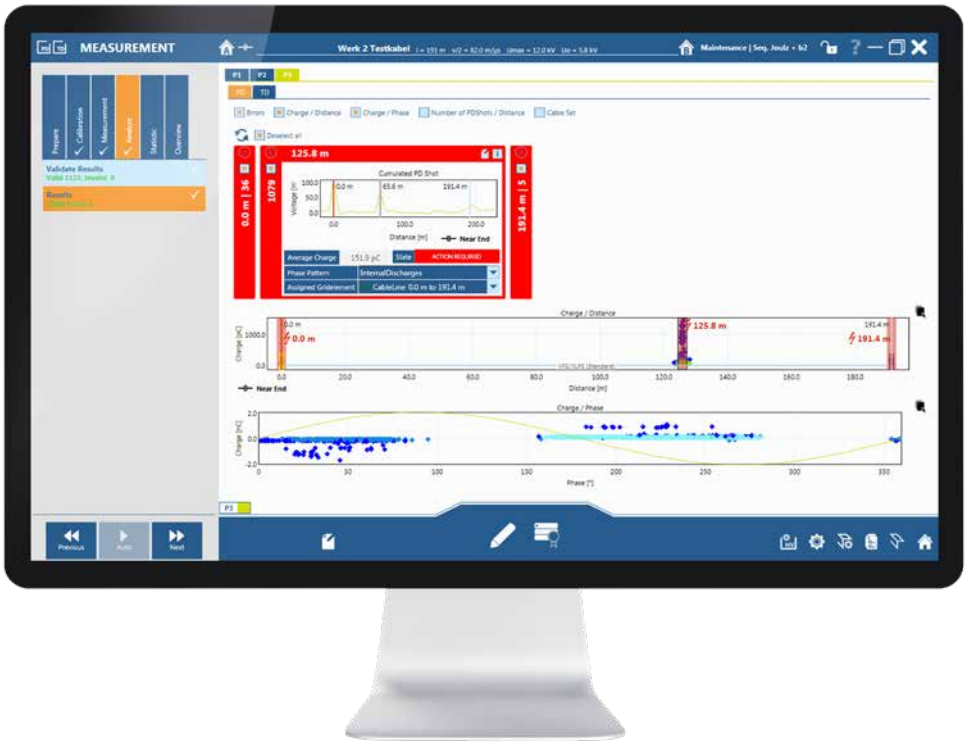
Nr.	Picture	Name	Description
60		Earth Connection Discharge Stick	Earth connection for Discharge Stick
61		Discharge Stick	Tip of Discharge Stick, resistors in serial to discharge energy
62		Discharge Stick	Hook of discharge for grounding (earthing) – direct short
A1		PD impedance 3,9kOhm; MC male - MC female	Additional PD Filter (from accessories)

3.8 PC Software

The PD has to be remote controlled via the PC Software „b2 Suite“.

For the communication between the HVA200 and the PC two cables are needed. The connection cable for the data transfer between the HVA200 measuring tower and the Control Box and a USB cable between the control box and the PC.

b2 Suite is capable to measure Tan Delta and Partial Discharge at the same time and automatically retrieves reports to the PC as a PDF document. Some settings like Date and Time can be synchronised for user convenience.
You can start and manage tests directly from the PC and a live status information is shown on the screen.



3.9 Operation Modes

The following describes the scope of each PD operation modes: Test Modes, Output Modes (Waveform) and Data Transfer Modes.

3.10 Test Modes

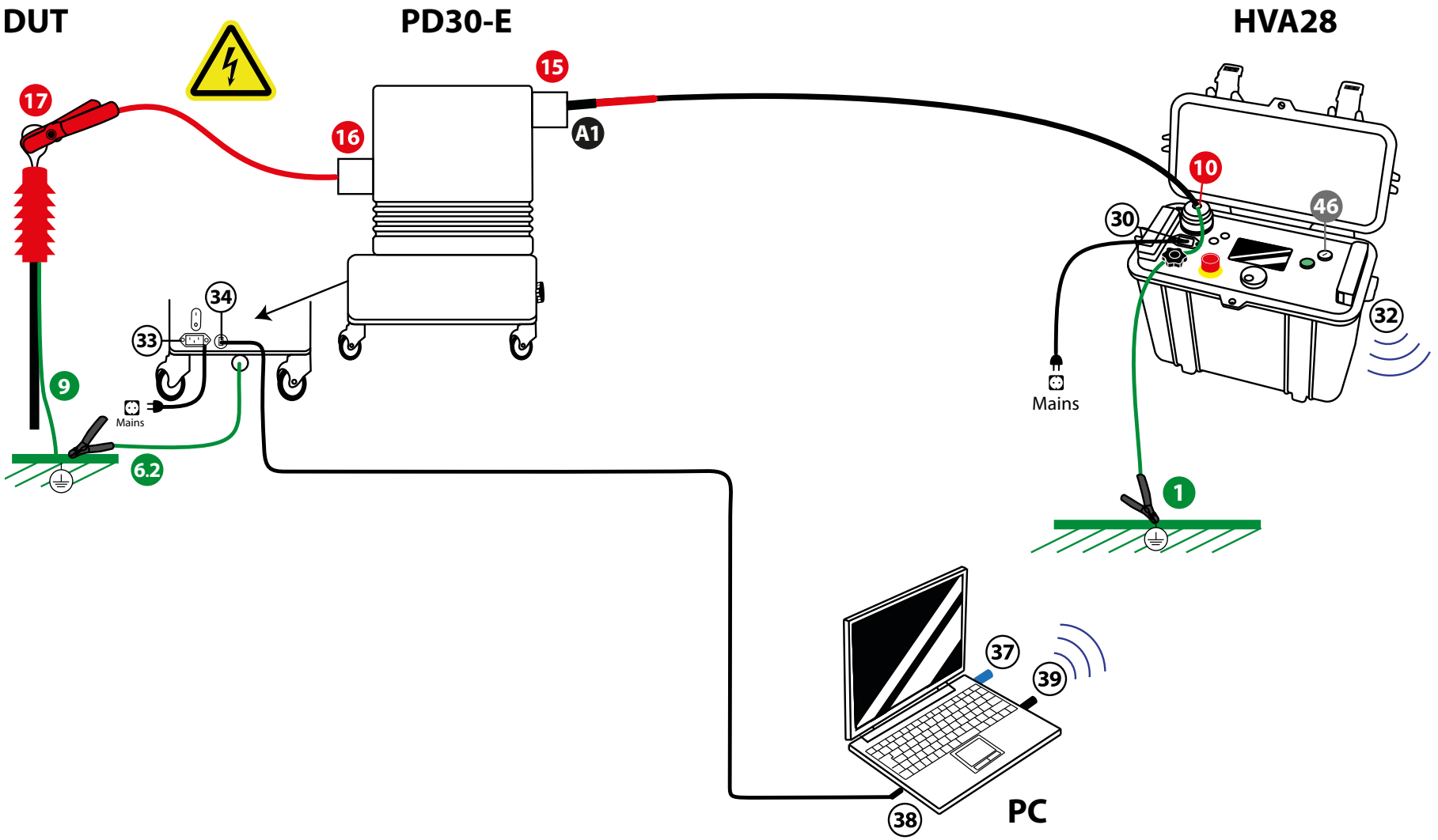
The PDTD units can be operated in “Manual” or “Automatic” mode (remote controlled with the b2 Suite Software).
For detailed procedure, see DHV0048 b2 Suite Manual.

3.11 Output Modes

AC (VLF) Symmetrical and load independent across full range
DC (plus or negative polarity)

4 PD Test Setup

4.1 PD30-E Test Setup -> PD Measurement



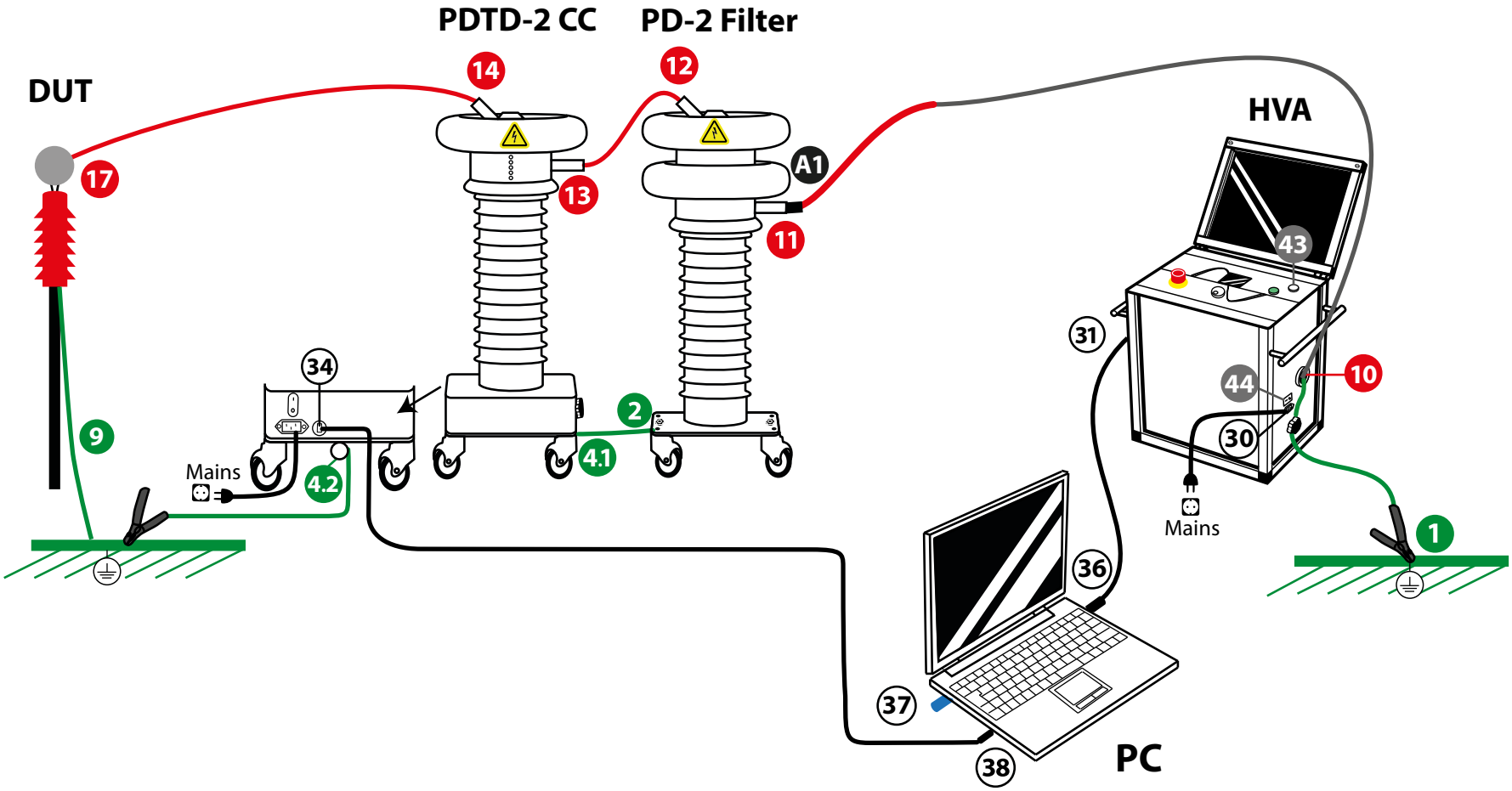
Step	Procedure (PD30-E Test Setup)	Art.Nr.
S1	Connect all earth cables • DUT (Device under Test) 9 • HVA 1 • PD30-E 6.2	GH0522 GH0576
S2	Connect HV cables • between HVA 10 and PD30-E 15 -> use PD impedance A1 • between PD30-E 16 and DUT 17 (as short as possible); above 10kV use Corona Shields (KMD0081)	GH0808&GH0581 GH0567[1]
S3	Connect Power Supply Plug • HVA 30 • PD30-E 33 (battery/mains); If PD is connected with power source battery is charging!	KEK0038 KEK0038
S4	Connect Communication Ports • between PC 38 and PD30-E 34 via USB Cable • between PC 32 and HVA 39 via Bluetooth (after unit is switched on) • Plug b2 Dongle 37 at PC for b2 Suite Software	GH0586 KDG0011 GH0900
S5	Verify Connections • Check that all cables are attached securely.	
S6	Turn key switch 46 to the “ON” position	

NOTICE

Establish secure earthing via connection 1
Connect HVA main earth lead first 1 and remove last!

[1] *for longer distance GH0550/ GH0551)*

4.2 PDTD-2 Setup -> PD Measurement



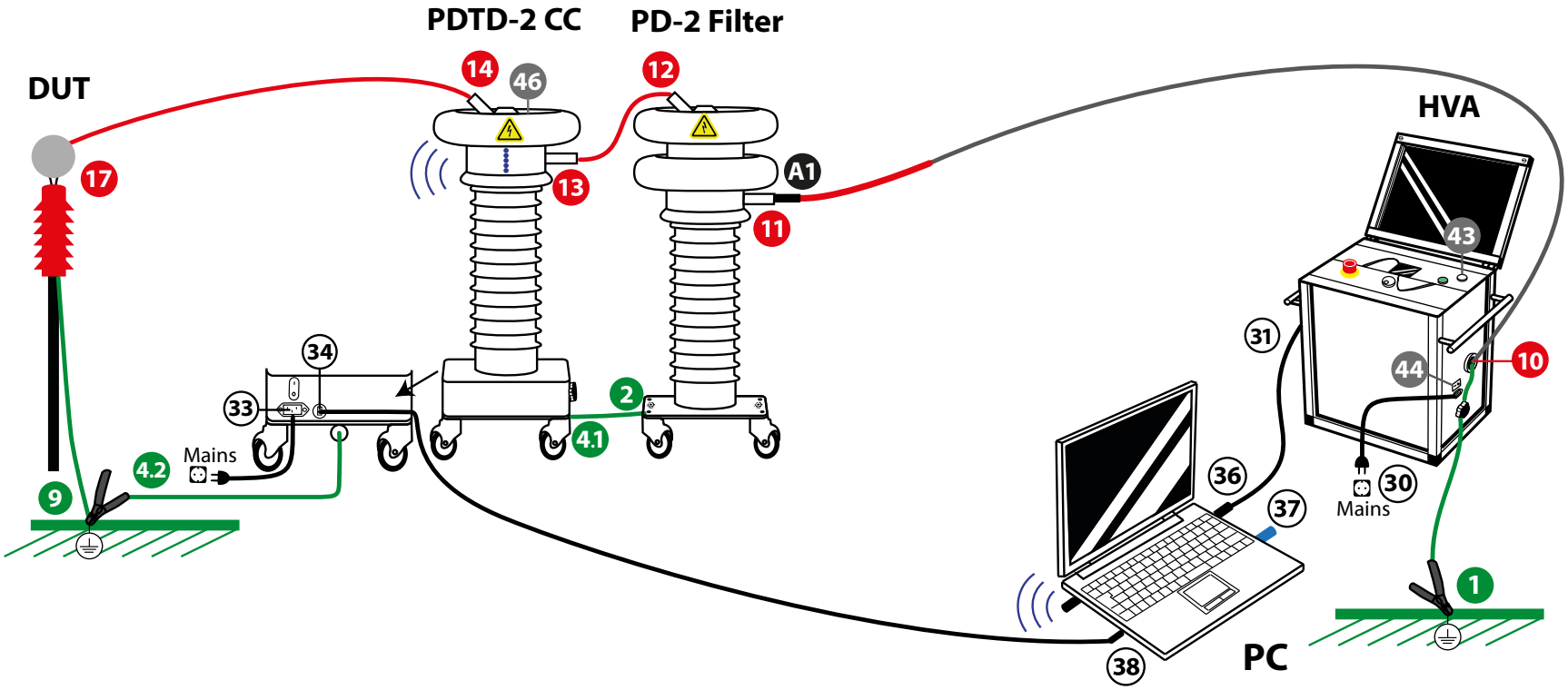
NOTICE

Establish secure earthing via connection 1
Connect HVA main earth lead first 1 and remove last!

Step	Procedure (PDTD-2 Test Setup - PD Measurement)	Art.Nr.
S1	Connect all earth cables • DUT (Device under Test) 9 • HVA 1 • between PD-2 Filter 2 and PD-2 CC 4.1 -> should be as short as possible - if possible use 4.2 for earthing • between PD-2 CC 4.2 and DUT 9 -> should be as short as possible and at the same point	 GH0522 GH0575 & GH0576 GH0576
S2	Connect HV cables • between HVA 10 and PD-2 Filter 11 -> use PD impedance[1] A1 • between PD-2 Filter 12 and PD-2 CC 13 • between PD-2 CC 14 and DUT 17 (connection should be as short as possible) use KES0209 MC socket connection and KMD0081 corona shield for connecting to DUT	 GH0801[3], GH0581 GH0567[2] GH0550[2] with KES0209&KMD0081
S3	Connect Power Supply Plug • HVA 30 • PD-2 33 (battery/mains); If PD is connected with power source battery is charging!	 KEK0038 KEK0038
S4	Connect Communication Ports • between PC 38 and PD-2 CC 34 via USB Cable • between PC 36 and HVA 31 via Opto Converter • Plug b2 Dongle 37 at PC for b2 Suite Software	 GH0586 KDG0011 GH0900
S5	Verify Connections • Check that all cables are attached securely.	
S6	Turn on all units • Turn “ON” HVA main switch 44 • Turn key switch from HVA 43 to the “ON” position • Turn “ON” PD main switch 45	

[1]except using HVA54-5, [2]for longer distance GH0550/ GH0551), [3]dependig on type of HVA

4.3 PDTD-2 Setup -> PD and TD Measurement



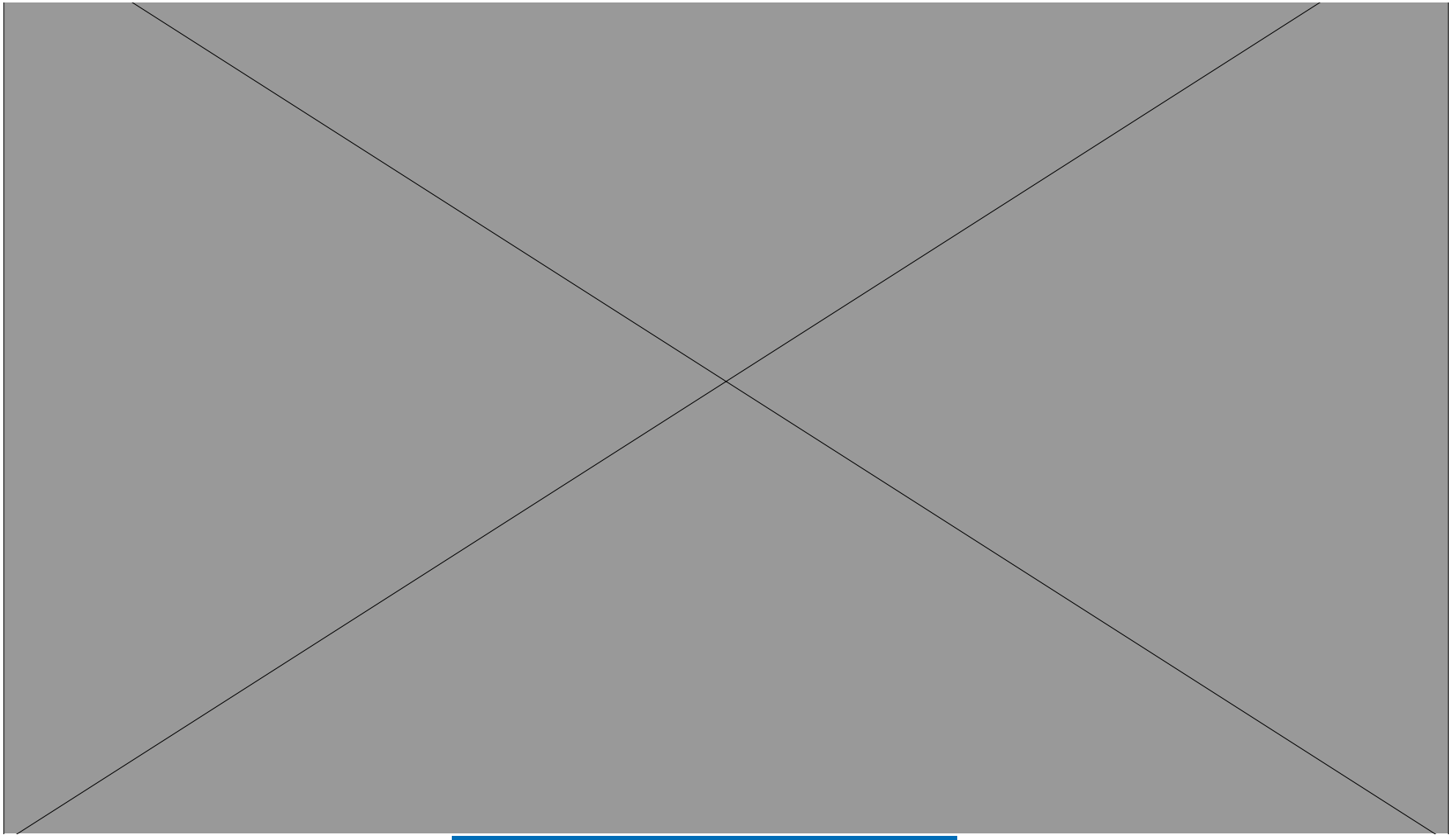
NOTICE

Establish secure earthing via connection 1
Connect HVA main earth lead first 1 and remove last!

Step	Procedure (PDTD-2 Test Setup - PD Measurement)	Art.Nr.
S1	Connect all earth cables • DUT (Device under Test) 9 • HVA 1 • between PD-2 Filter 2 and PD-2 CC 4.1 -> should be as short as possible - if possible use 4.2 for earthing • between PD-2 CC 4.2 and DUT 9 -> should be as short as possible and at the same point	 GH0522 GH0575 & GH0576 GH0576
S2	Connect HV cables • between HVA 10 and PD-2 Filter 11 -> use PD impedance[1] A1 • between PD-2 Filter 12 and PD-2 CC 13 • between PD-2 CC 14 and DUT 17 (connection should be as short as possible) use KES0209 MC socket connection and KMD0081 corona shield for connecting to DUT	 GH0801[3], GH0581 GH0567[2] GH0550[2] with KES0209&KMD0081
S3	Connect Power Supply Plug • HVA 30 • PD-2 33 (battery/mains); If PD is connected with power source battery is charging!	 KEK0038 KEK0038
S4	Connect Communication Ports • between PC 38 and PD-2 CC 34 via USB Cable • between PC 36 and HVA 31 via Opto Converter • Plug b2 Dongle 37 at PC for b2 Suite Software	 GH0586 KDG0011 GH0900
S5	Verify Connections • Check that all cables are attached securely.	
S6	Turn on all units • Turn “ON” HVA main switch 44 • Turn key switch from HVA 43 to the “ON” position • Turn “ON” PD main switch 45 • Turn “ON” TD main switch 46	

[1]except using HVA54-5, [2]for longer distance GH0550/ GH0551), [3]dependig on type of HVA

4.4 PDTD-2 Setup -> PD and TD Measurement with extension cable (and leakage current Correction)



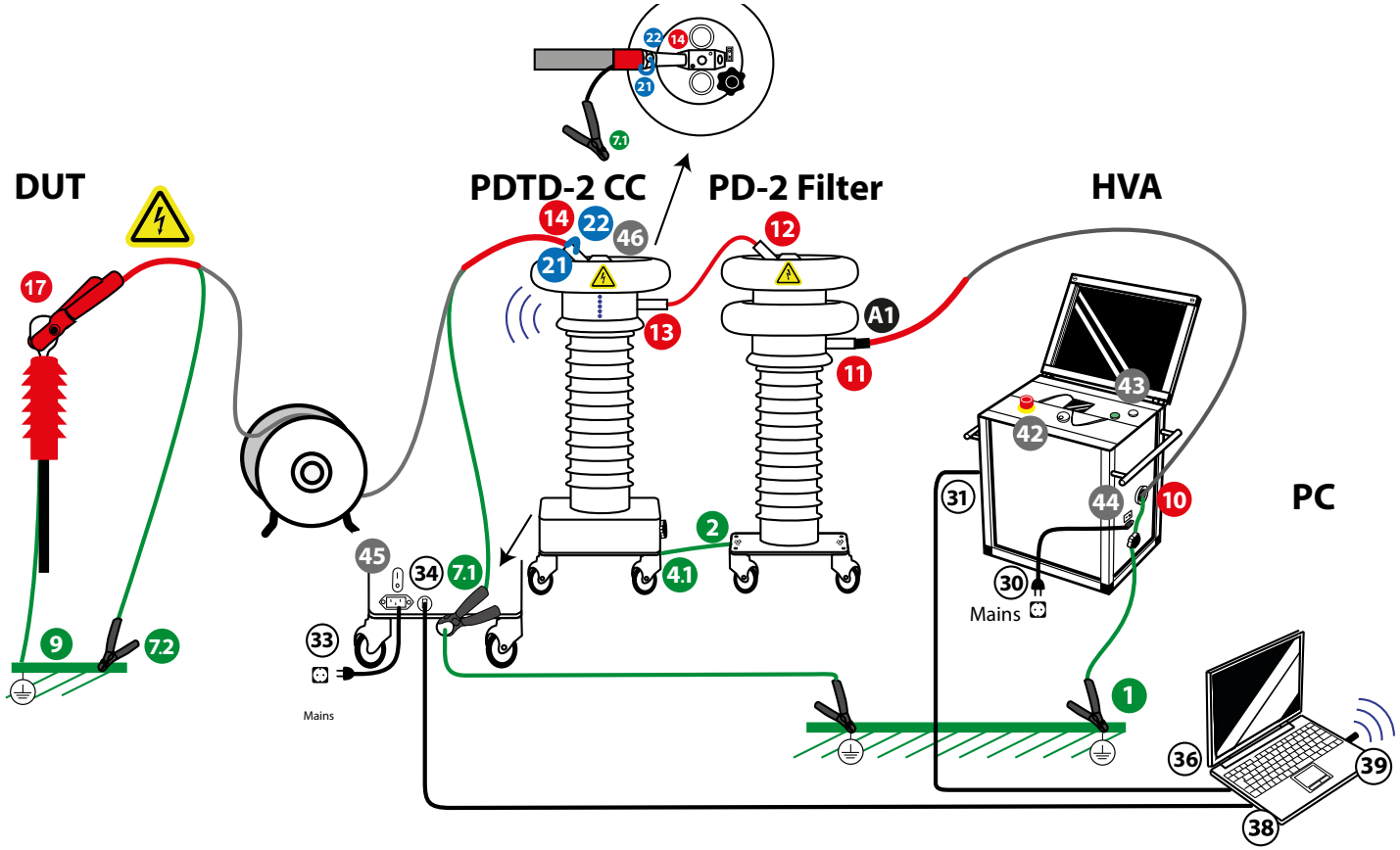
NOTICE

Establish secure earthing via connection 1
Connect HVA main earth lead first 1 and remove last!

Step	PDTD-2 Setup -> PD and TD Measurement with extension cable	Art.Nr.
S1	Connect all earth cables • DUT (Device under Test) 9 • HVA 1 • between PD-2 Filter 2 & PD-2 CC 4.1 - should be as short as possible - if possible use 4.2 for earthing • HV cable 7.1 and clamp it to MC contact at PD-2 CC 4.2	 GH0522 GH0575 & GH0576 GH0574
S2	Connect HV cables • between HVA 10 and PD-2 Filter 11 -> use PD impedance[1] A1 • between PD-2 Filter 12 and PD-2 CC 13 • between PD-2 CC 14 and DUT 17 (connection should be as short as possible) use KES0209 MC socket connection and KMD0081 corona shield for connecting to DUT	 GH0801[3], GH0581 GH0567[2] GH0550[2] with KES0209&KMD0081
S3	Connect guard cable • from HV cable 21 to PD-2 CC Guard Connection	 GH0574 /
S4	Connect Power Supply Plug • HVA 30 • PD-2 33 (battery/mains); If PD is connected with power source battery is charging!	 KEK0038 KEK0038
S5	Connect Communication Ports • between PC 38 and PD-2 CC 34 via USB Cable • between PC 36 and HVA 31 via Opto Converter • between PC 39 and TD via Bluetooth (Connection possible after TD unit switched on) • Plug b2 Dongle 37 at PC for b2 Suite Software	 GH0586 GH0624 KDG0011 GH0900
S6	Verify Connections • Check that all cables are attached securely.	
S7	Turn on all units • Turn “ON” HVA main switch 44 • Turn key switch from HVA 43 to the “ON” position • Turn “ON” PD main switch 45 • Turn “ON” TD main switch 46	

[1]except using HVA54-5, [2]for longer distance GH0550/ GH0551), [3]dependig on type of HVA

4.5 PDTD-2 Setup -> PD Measurement (no leakage current correction)



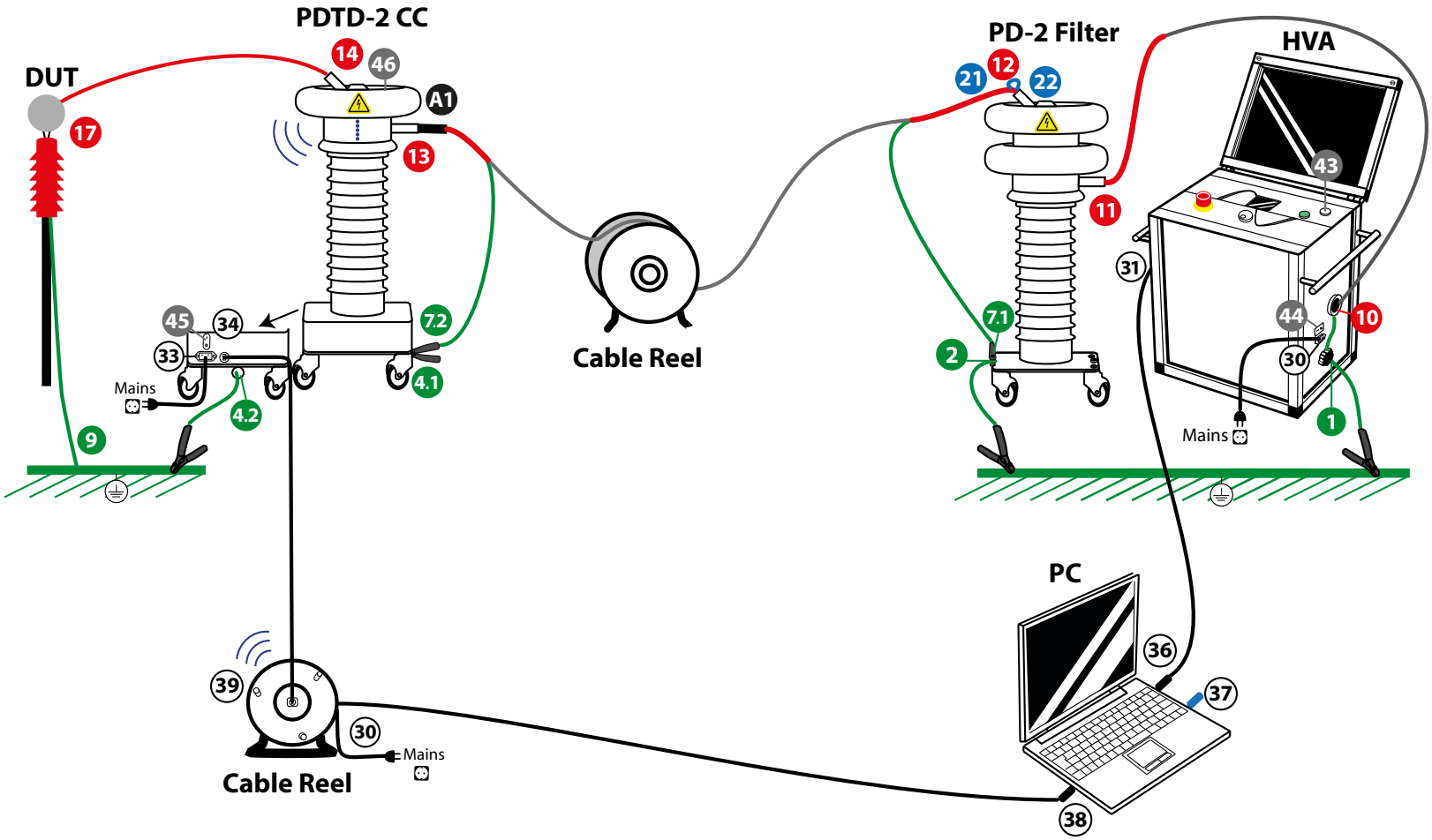
NOTICE

Establish secure earthing via connection 1
Connect HVA main earth lead first 1 and remove last!

Step	PDTD-2 Setup -> PD Measurement (no leakage current correction)	Art.Nr.
S1	Connect all earth cables	
	• DUT (Device under Test) 9	
	• HVA 1	GH0522
	• between PD-2 Filter 2 & PD-2 CC 4.1 - use PD60-2 4.2 for earthing	GH0575 & GH0576
	• HV cable 7.1 and clamp it to MC contact at PD-2 CC 4.2	GH0574
	• HV cable 7.2 ground it together with DUT 9 (distance as short as possible)	GH0574
S2	Connect HV cables	
	• between HVA 10 and PD-2 Filter 11 -> use PD impedance[1] A1	GH0801[3], GH0581
	• between PD-2 Filter 12 and PD-2 CC 13	GH0567[2] | GH0574[2]
	• between PD-2 CC 14 and DUT 17 use KES0209 MC socket connection and KMD0081 corona shield for connecting to DUT	KES0209&KMD0081
S3	Connect guard cable	
	• from HV cable 21 to HV 22 (srew on MC plug at HV cable)	GH0574
S4	Connect Power Supply Plug	
	• HVA 30	KEK0038
	• PD-2 33 (battery/mains); If PD is connected with power source battery is charging!	KEK0038
S5	Connect Communication Ports	
	• between PC 38 and PD-2 CC 34 via USB Cable	GH0586
	• between PC 36 and HVA 31 via Opto Converter	GH0624
	• between PC 39 and TD via Bluetooth (Connection possible after TD unit switched on)	KDG0011
	• Plug b2 Dongle 37 at PC for b2 Suite Software	GH0900
S6	Verify Connections	
	• Check that all cables are attached securely.	
S7	Turn on all units	
	• Turn “ON” HVA main switch 44	
	• Turn key switch from HVA 43 to the “ON” position	
	• Turn “ON” PD main switch 45	
	• Turn “ON” TD main switch 46	

[1]except using HVA54-5, [2]for longer distance GH0550/ GH0551), [3]dependig on type of HVA

4.6 PDTD-2 Setup -> PD Measurement – Extension between Filter and CC



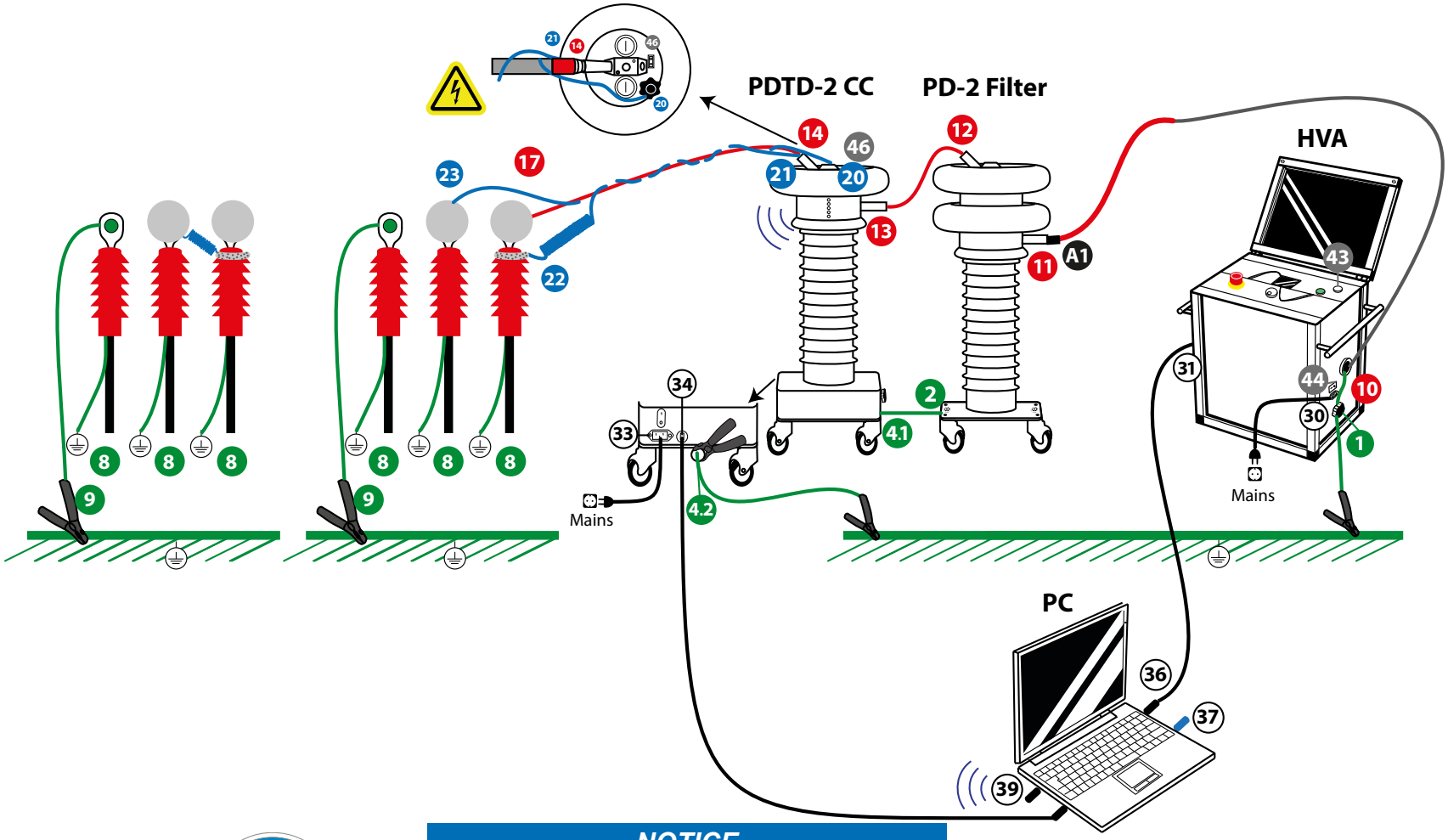
NOTICE

Establish secure earthing via connection 1
Connect HVA main earth lead first 1 and remove last!

Step	PDTD-2 Setup -> PD Measurement (no leakage current correction)	Art.Nr.
S1	Connect all earth cables • DUT (Device under Test) 9 • HVA 1 • PD-2 Filter 2 and HV Cable 7.1 and clamp it to MC contact at Filter • HV cable 7.2 to PD-2 CC 4.1 (MC contact) • PD-2 CC 4.2 and DUT 9 -> should be as short as possible and grounded at the same point	 GH0522 GH0576 & GH0574 GH0574 GH0576
S2	Connect HV cables • between HVA 10 and PD-2 Filter 11 • between PD-2 Filter 12 and PD-2 CC 13 use PD impedance[1] A1 between 12 and 13 • between PD-2 CC 14 and DUT 17 (connection should be as short as possible) use KES0209 MC socket connection and KMD0081 corona shield for connecting to DUT	 GH0801[3], GH0581 GH0574, GH581 GH0550[2] with KES0209&KMD0081
S3	Connect guard cable • from HV cable 21 to HV 22 (srew on MC plug at HV cable)	 GH0574
S4	Connect Power Supply Plug • HVA 30 • PD-2 33 (battery/mains); If PD is connected with power source battery is charging!	 KEK0038 KEK0038
S5	Connect Communication Ports • between PC 38 and PD-2 CC 34 via USB Cable • between PC 36 and HVA 31 via Opto Converter • between PC 39 and TD via Bluetooth (Connection possible after TD unit switched on) • Plug b2 Dongle 37 at PC for b2 Suite Software	 GH0555 GH0624 KDG0011 GH0900
S6	Verify Connections • Check that all cables are attached securely.	
S7	Turn on all units • Turn “ON” HVA main switch 44 • Turn key switch from HVA 43 to the “ON” position • Turn “ON” PD main switch 45 • Turn “ON” TD main switch 46	

[1]except using HVA54-5, [2]for longer distance GH0550/ GH0551), [3]dependig on type of HVA

4.7 PDTD-2 Setup -> PD Measurement - Using Guard Compensation



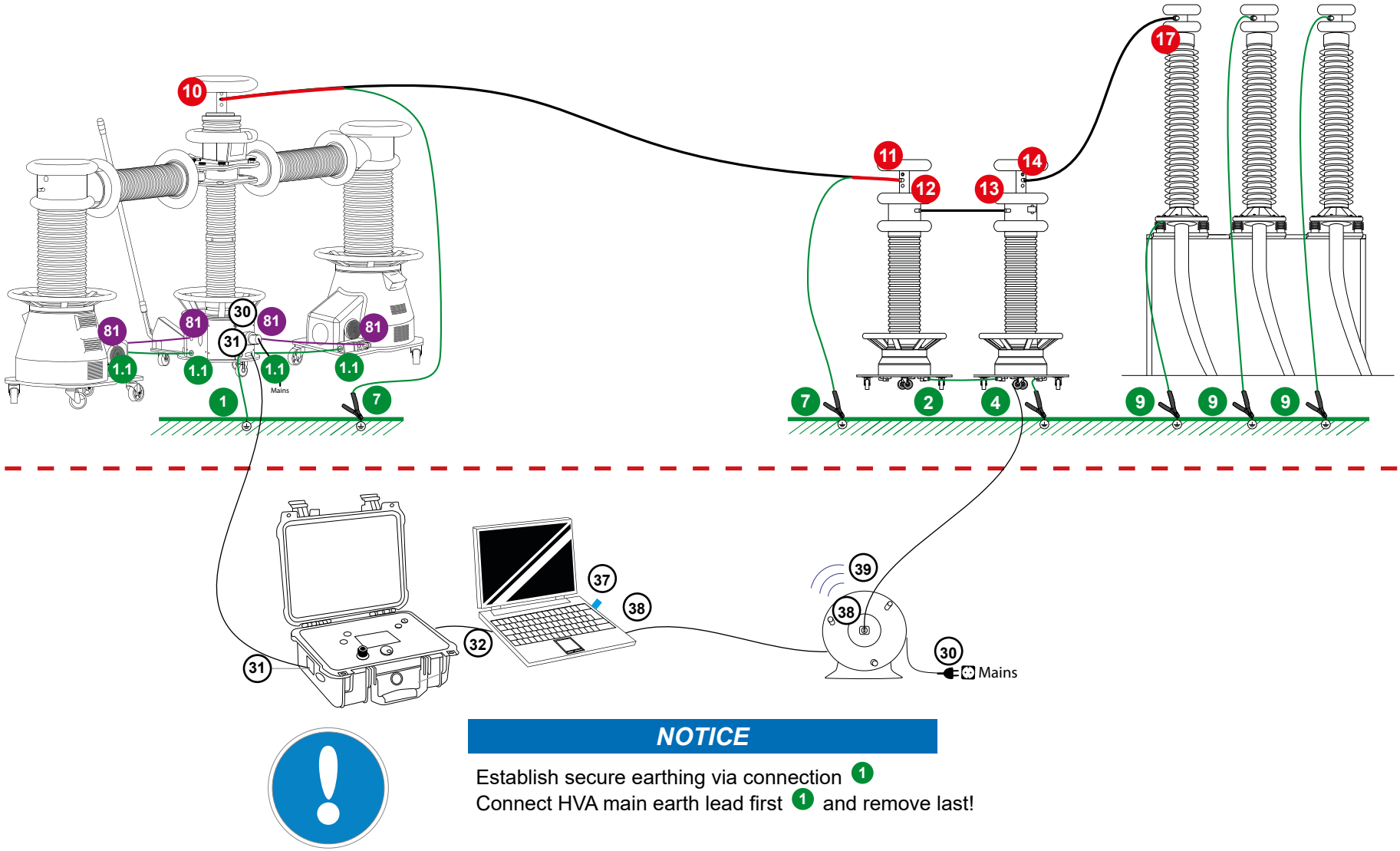
NOTICE

Establish secure earthing via connection 1
Connect HVA main earth lead first 1 and remove last!

Step	PDTD-2 Setup -> Using Guard Compensation	Art.Nr.
S1	Connect all earth cables • DUT (Device under Test) 8 9 • HVA 1 • between PD-2 Filter 2 & PD-2 CC 4.1 - should be as short as possible - if possible use 4.2 for earthing	 GH0522 GH0575 & GH0576 GH0574
S2	Connect HV cables • between HVA 10 and PD-2 Filter 11 -> use PD impedance[1] A1 • between PD-2 Filter 12 and PD-2 CC 13 • between PD-2 CC 14 and DUT 17 (connection should be as short as possible) use KES0209 MC socket connection and KMD0081 corona shield for connecting to DUT	 GH0801[3], GH0581 GH0567[2] GH0550[2] with KES0209&KMD0081
S3	Connect guard cable • from PDTD-2 CC 20 21 to DUT 22 23	 GH0574 KMSO0064
S4	Connect Power Supply Plug • HVA 30 • PD-2 33 (battery/mains); If PD is connected with power source battery is charging!	 KEK0038 KEK0038
S5	Connect Communication Ports • between PC 38 and PD-2 CC 34 via USB Cable • between PC 36 and HVA 31 via Opto Converter • between PC 39 and TD via Bluetooth (Connection possible after TD unit switched on) • Plug b2 Dongle 37 at PC for b2 Suite Software	 GH0586 GH0624 KDG0011 GH0900
S6	Verify Connections • Check that all cables are attached securely.	
S7	Turn on all units • Turn “ON” HVA main switch 44 • Turn key switch from HVA 43 to the “ON” position • Turn “ON” PD main switch 46	

[1]except using HVA54-5, [2]for longer distance GH0550/ GH0551), [3]dependig on type of HVA

4.8 PDTD200-2 Setup -> PD Measurement

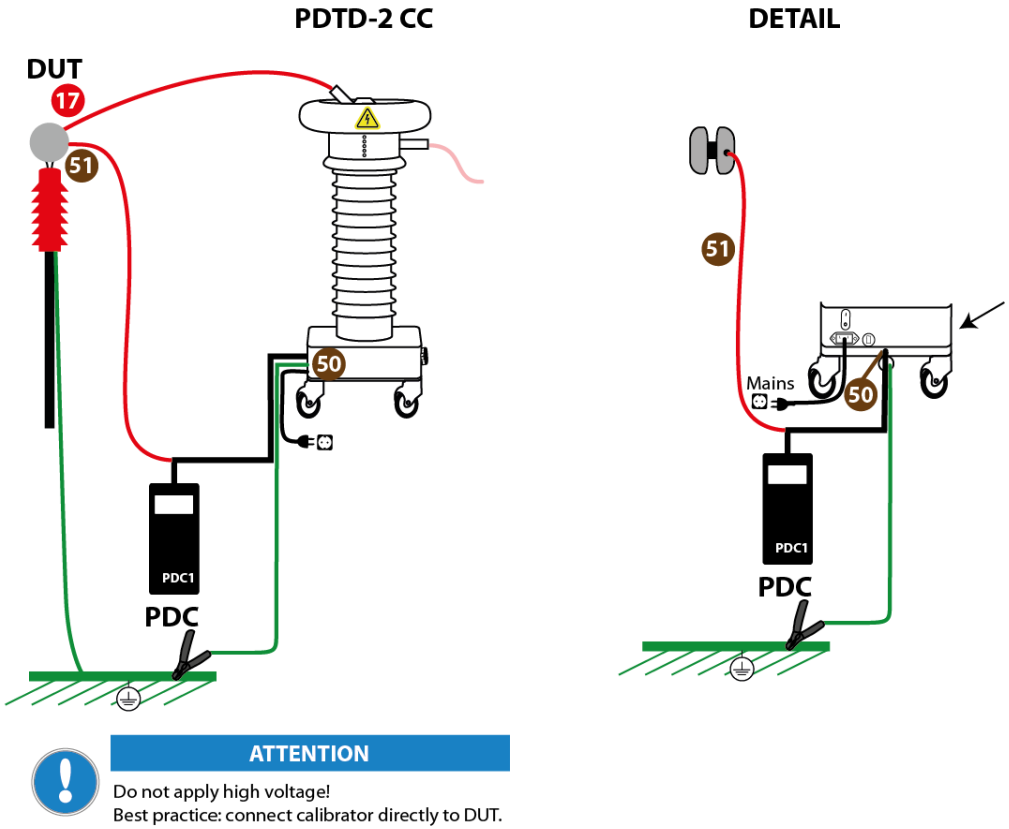


NOTICE

Establish secure earthing via connection 1
Connect HVA main earth lead first 1 and remove last!

Step	Procedure	Art.Nr.
S1	Connect earthing cables • DUT 9 • HVA 1 1.1 • between PD-2 Filter 2 & PD200-2 CC 4 - should be as short as possible	
S2	Connect HV cable connections • HV test lead between HVA 10 and PD200-2 Filter 11 • HV cable shield to earth 7 (only by HV Cable) • between PD200-2 Filter 12 and PD200-2 CC 13 • between PD200-2 CC 14 and DUT 17 (connection should be as short as possible.	
S3	Connect power suply plug • HVA 30 • PD-2 33 (battery/mains); If PD is connected with power source battery is charging!	
S4	Connect Communication Ports • between meassuring tower and both amplifier 81 (connection is for communication and power supply) • between measuring tower and control box 31 • between control box and PC 32 • at PC - b2 Suite Dongle 37 at PC for b2 Suite Software • between PC 39 and TD via Bluetooth (Connection possible after TD unit switched on) • between PD-CC and PC via USB cable 38 (on cable reel)	
S5	Verify Connections • Check that all cables are attached securely	
S6	Turn on all units • HVA200 Display 70 • Turn key switch 43 (on the Control Box) to the “ON” position	
S7	The HVA system automatically boots. • Control the HVA with the b2 Suite Software	

4.9 PD Calibrator Test Setup



ATTENTION

Do not apply high voltage!
Best practice: connect calibrator directly to DUT.

Step	PD Calibration Setup	Art.Nr.
S1	Connect PD Calibrator • between PD-2 CC 50 and DUT 51	GH0705 KEK0091

4.10 Disconnection Procedure

DANGER

Electric Shock Hazard
Never assume that equipment is safe to handle without using the necessary safety equipment and earthing procedures.

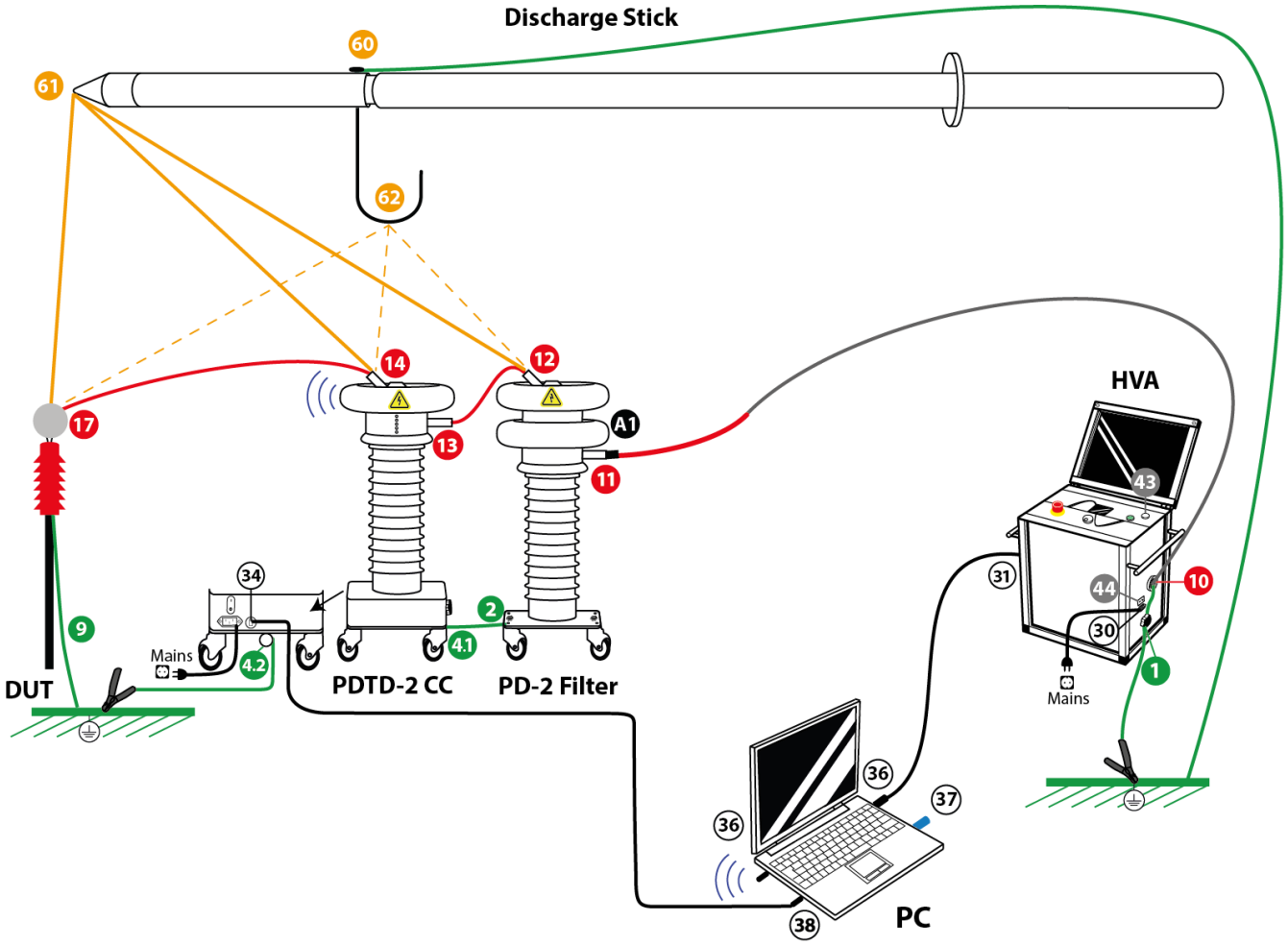
Disconnection procedures must comply with local safety regulations.

- **Before disconnecting test lead, DUT must be discharged and earthed.**
- **Earth connections must be removed last!**

Disconnection procedure should be performed in reverse order than connection procedure. Make sure that system and DUT is properly discharged and earthed (see procedure 7.1.1 using a discharge stick). Switch off systems (disconnect from voltage supply) and pull off the mains plugs. Disconnect all cables and earth wires lastly. Carefully examine the cable of possible damages and remove dirt if necessary. Establish a short-circuit connection to the coupling capacitor and the filter.

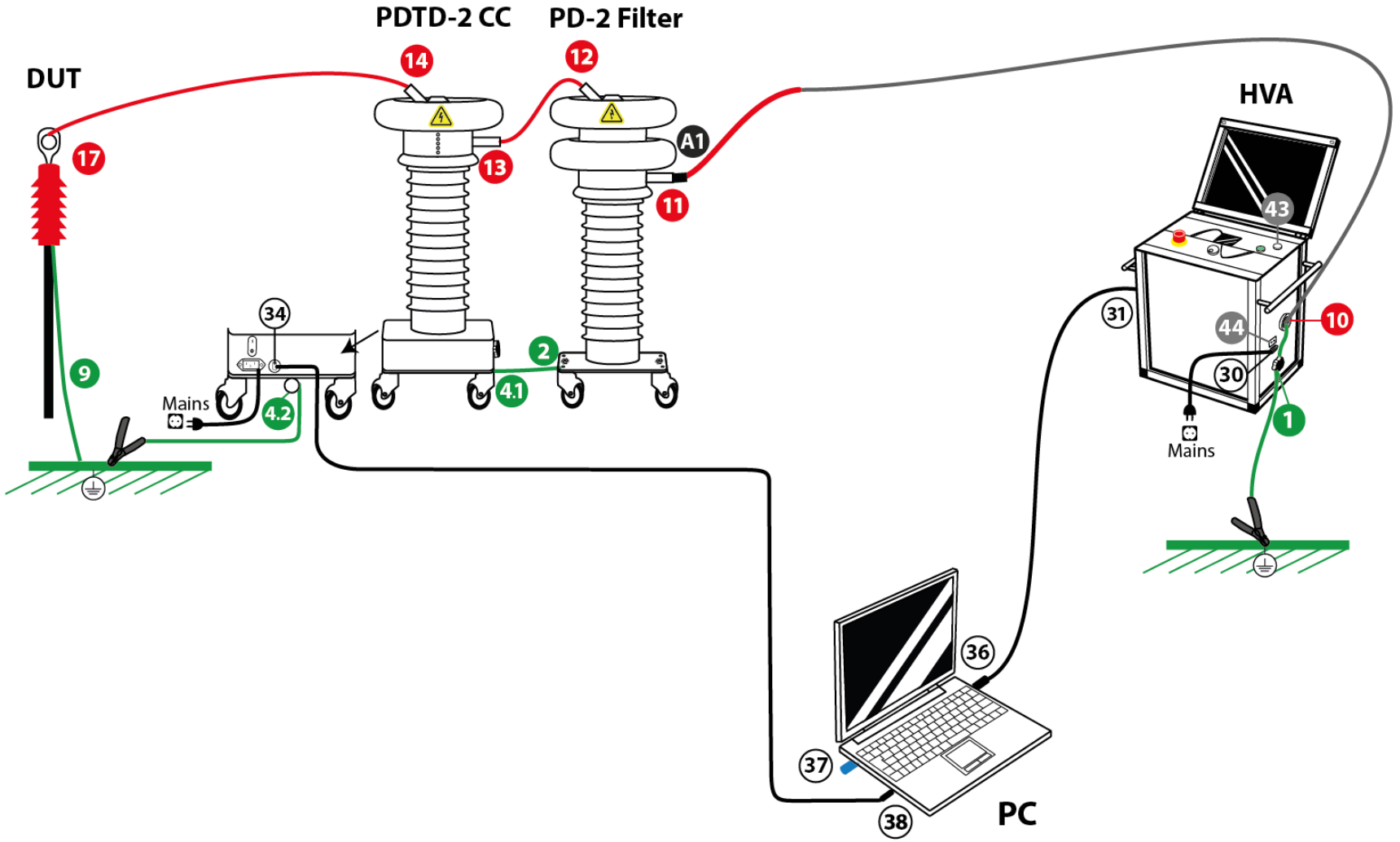
4.11 Disconnection Failure

In case of errors or failure due to a loss of power during testing, additional precaution is required. The HVA LED red light cannot indicate when residual voltage is less than 100V.
To guarantee that the residual voltage has dissipated before removing the test lead, the DUT must be de-energized using a discharge stick.



Step	PDTD-2 Disconnection with Failure	Art.Nr.
S1	Switch units OFF • HVA Emergency OFF 42 and HVA main switch 44 • Lock HVA in disabled state to prevent against unauthorized use: Turn Key switch 43 to OFF and remove Key • PD main switch 46	
S2	Verify correct function of discharge stick	
S3	Earth 60 and using discharge stick complying with local saety regulations • Discharge 61 and 62 DUT, PD-2 CC and PD-2 Filter using a discharge stick	
S4	Before disconnecting test lead, **wait** until residual voltage has dissipated. • Required wait time depends on the resistance of the discharge stick. Establish save : • Ground system by leaving discharge stick connected (direct short)	
S5	• Disconnect Test Lead between HVA 10 and PD-2 Filter 11 (and PD impedace 41) • Disconnect Test Lead between PD-2 Filter 12 and PD-2 CC 13 • Disconnect Test Lead between PD-2 CC 14 and DUT 17 use for the DUT Connection KES0209 MC socket connection and KMD0081 corona shield	GH0808,GH0581 GH0567[1] GH0550[1]
S6	• Disconnect power supply cable from HVA 30 • Disconnect power supply cable from PD-2 CC 33 (Battery/Mains) if it's connected.	KEK0038 KEK0038
S7	• Disconnect the USB cable between PC 38 and PD-2 CC 34 • Disconnect the Opto Converter between PC 31 and HVA 36 via Opto Converter • Unplug the b2 Dongle 37 from PC	GH0586 GH0624 GH0900
S8	Disconnect all Earth cables • Establish a short-circuit connection to the coupling capacitor and to the filter and make sure that the short-circuit connection remains also during transportation. • Disconnect HVA eathing cable 1 • Disconnect earthing cable between PD-2 Filter 2 and PD-2 CC 4.1 and ground 4.2. • Disconnect earthing cable from DUT 9	 GH0522 GH0575&GH0576 GH0576

4.12 PDTD-2 Disconnection -> PD Measurement



Step	PDTD-2 Disconnection	Art.Nr.
S1	Switch units OFF • HVA Emergency OFF 42 • HVA main switch 44 • Lock HVA in disabled state to prevent against unauthorized use: Turn Key switch 43 to OFF Position and remove Key • PD main switch 46	
S2	Disconnect power supply cables from power supply plug • Disconnect power supply cable from HVA 30 • Disconnect power supply cable from PD-2 CC 33 (Battery/Mains) if it's connected.	 KEK0038 KEK0038
S3	Disconnect Communication Ports • Disconnect the USB cable between PC 38 and PD-2 CC 34 • Disconnect the Opto Converter between PC 31 and HVA 36 via Opto Converter • Unplug the b2 Dongle 37 from PC	 GH0586 GH0624 GH0900
S4	Disconnect Test Lead • Disconnect Test Lead between HVA 10 and PD-2 Filter 11 (and PD impedace A1) • Disconnect Test Lead between PD-2 Filter 12 and PD-2 CC 13 • Disconnect Test Lead between PD-2 CC 14 and DUT 17 use for the DUT Connection KES0209 MC socket connection and KMD0081 corona shield	 GH0808,GH0581 GH0567[1] GH0550[1]
S5	Disconnect all Earth cables • Establish a short-circuit connection to the coupling capacitor and to the filter and make sure that the short-circuit connection remains also during transportation. • Disconnect HVA eathing cable 1 • Disconnect earthing cable between PD-2 Filter 2 and PD-2 CC 4.1 and ground 4.2. • Disconnect earthing cable from DUT 9	 GH0522 GH0575&GH0576 GH0576

5 Instrument Care

Cleaning

DANGER

Electric Shock Hazard!
Only clean the instrument when turned off!

HV Cable

Clean the HV Cable connection points, after use, before storing

PD Unit

Use a lint-free cloth and a mild detergent to clean the device, the connections and the cable. Do not use any corrosive, pungent or abrasive cleaning materials (no cellulose thinner or acetone). Do not clean with electrical devices water and do not allow any liquids to leak into the devices.
Notice: Maintenance of the system must be carried out only by authorised and qualified personnel. The user is liable for damages caused due to improper care or maintenance.

Storage

CAUTION

Instrument Damage
Do not store the PD System outdoors!
Keep the PD System away from liquids!

PD Systems should be stored indoors in the following environmental conditions:
- Temperature: -25°C to 70°C
- Humidity: 5-85% non condensing

Maintenance and Repairs

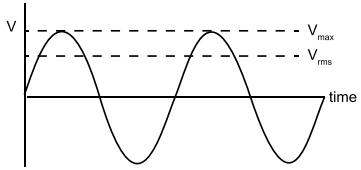
NOTICE

Authorized personnel only!
Repairs and maintenance should only be performed by authorized b2 personnel.

One yearly inspection by authorized b2 personnel is recommended

6 Glosary and Abbreviations

Term	Explanation
Arc	Self-maintained gas conduction for which most of the charge carriers are electrons supplied by primary- electron emission (source: IEC)
Auto Adjust Frequency “0.1 Hz/Auto”	Mode that maximizes output frequency to highest allowable value up to 0.1 Hz. • Greatest allowable frequency depends on the test load and test voltage applied • For loads greater than 0.5 µF, the instrument automatically reduces the frequency
DUT	Device under Test
Duty (continuous)	Load state in which the unit operates for an extended period. Continuous means: no limitation in operating time based on temperature limits
Fault	An unplanned occurrence or defect in an item which may result in one or more failures of the item itself or of other associated equipment (source: IEC)
Frequency [Hz]	Number of cycles per unit of time ; f=1/ Period (Time), units=Hz 1Hz = 1cycle / 1 second 0.1 Hz = 1cycle / 10 second , etc.
MWT	Monitored Withstand Test
HV	High Voltage: Voltage levels used in power distribution: • Medium Voltage: up to 36 kV • High Voltage: up to 110 kV • Extremely High Voltage: 220 kV, 380 kV or higher (according to IEC/International Electro-technical Vocabulary)

Term	Explanation
IEC	International Electrotechnical Commission
Peak value	Maximum Voltage = Vmax
RMS value	Root Mean Square voltage • Vrms = Vmax / √2 
To Short	Forcing the electric potential differences between two or more conductive parts to be equal to or close to zero (Infinite current flows in a short circuit)
To Trip	Opening the circuit (no current flows in open circuit)
SFL	Sheath Fault Location
ST	Sheath Test
TD	Tan Delta
TDTS	Tan Delta Time Stability (TD Temporal Stability)
DTD	Differential Tan Delta
VLF	Very Low Frequency • Typically between 0.01 -0.1 Hz

7 Declaration of Conformity

The PD units PD30-E, PDTD60-2, PDTD90-2, PDTD120-2, PDTD200-2 areCE certified and has met the following requirements of the European Council:

CE

Konformitätserklärung
EC-DECLARATION OF CONFORMITY

Die Firma: / The Company:
b2 electronic GmbH
Riedstraße 1
6833 Klaus
AUSTRIA

erklärt, dass das Produkt: / declares that the product: **PD30-E**

Verwendungszweck: / Intended purpose: **Partial Discharge Measuring System for Cable**

Das bezeichnete Produkt stimmt mit den Vorschriften folgender europäischer Richtlinien überein:
The indicated product is in correspondence with the following regulations of European Council:

	Nummer/ Kurztitel Number / Titel	Eingehaltene Vorschriften Observed regulations
✓	**EMC**	IEC6100-4-2 ESD Level 4 (8/15kV) IEC6100-4-4 Burst 4kV 5kHz EN55011
✓	**Safety**	EN60950 EN50191 EN61010-1

Aussteller / Issuer: **Leiter Qualitätssicherung** / Director Qualitymanagement

Ort, Datum / Place, Date: **Klaus, 2012-01-15**

Rudolf Blank

Diese Erklärungen bescheinigt die Überseinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the compliance with the indicated regulations, it doesn't guarantee attributes. Pay attention to the securitiy advices of the relevant product information.

Konformitätserklärung Nr.: / Declaration of Conformity	PD30-E 01-2012		Seite 1 von 1 / Page 1 of 1

CE

Konformitätserklärung
EC-DECLARATION OF CONFORMITY

Die Firma: / The Company:
b2 electronic GmbH
Riedstraße 1
6833 Klaus
AUSTRIA

erklärt, dass das Produkt: / declares that the product: **PD60-2 (PD60-CC + PD60-Filter)**

Verwendungszweck: / Intended purpose: **Partial Discharge Measuring System for Cable**

Das bezeichnete Produkt stimmt mit den Vorschriften folgender europäischer Richtlinien überein:
The indicated product is in correspondence with the following regulations of European Council:

	Nummer/ Kurztitel Number / Titel	Eingehaltene Vorschriften Observed regulations
✓	**EMC**	IEC6100-4-2 ESD Level 4 (8/15kV) IEC6100-4-4 Burst 4kV 5kHz EN55011
✓	**Safety**	EN60950 EN50191 EN61010-1

Aussteller / Issuer: **Leiter Qualitätssicherung** / Director Qualitymanagement

Ort, Datum / Place, Date: **Klaus, 2011-07-10**

Rudolf Blank

Diese Erklärungen bescheinigt die Überseinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the compliance with the indicated regulations, it doesn't guarantee attributes. Pay attention to the securitiy advices of the relevant product information.

Konformitätserklärung Nr.: Declaration of Conformity	PD60-2 07-2011		Seite 1 von 1 Page 1 of 1

CE

Konformitätserklärung
EC-DECLARATION OF CONFORMITY

Die Firma: / The Company:
b2 electronic GmbH
Riedstraße 1
6833 Klaus
AUSTRIA

erklärt, dass das Produkt: / declares that the product: **PD60-2 (PD60-CC + PD60-Filter), PD60-2 / TD**

Verwendungszweck: / Intended purpose: **Partial Discharge Measuring System for Cable (with TanDelta)**

Das bezeichnete Produkt stimmt mit den Vorschriften folgender europäischer Richtlinien überein:
The indicated product is in correspondence with the following regulations of European Council:

	Nummer/ Kurztitel Number / Titel	Eingehaltene Vorschriften Observed regulations
✓	**EMC**	IEC6100-4-2 ESD Level 4 (8/15kV) IEC6100-4-4 Burst 4kV 5kHz EN55011
✓	**Safety**	EN60950 EN50191 EN61010-1

Aussteller / Issuer: **Leiter Qualitätssicherung** / Director Qualitymanagement

Ort, Datum / Place, Date: **Klaus, 2011-07-10**

Rudolf Blank

Diese Erklärungen bescheinigt die Überseinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
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Konformitätserklärung Nr.: Declaration of Conformity	PD60-2 07-2011		Seite 1 von 1 Page 1 of 1

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Konformitätserklärung
EC-DECLARATION OF CONFORMITY

Die Firma: **b2 electronic GmbH**
The Company: **Riedstraße 1**
6833 Klaus
AUSTRIA

erklärt, dass das Produkt: **PDTD90-2 (PD90-CC + PD90-Filter)**
declares that the product:

Verwendungszweck: **Partial Discharge Measuring System for Cable (with TanDelta)**
Intended purpose:

Das bezeichnete Produkt stimmt mit den Vorschriften folgender europäischer Richtlinien überein:
The indicated product is in correspondence with the following regulations of European Council:

	Nummer/ Kurztitel Number / Titel	**Eingehaltene Vorschriften** Observed regulations
✓	**EMC**	IEC6100-4-2 ESD Level 4 (8/15kV) IEC6100-4-4 Burst 4kV 5kHz EN55011
✓	**Safety**	EN60950 EN50191 EN61010-1

Aussteller Issuer: **Leiter Qualitätssicherung** Director Qualitymanagement

Ort, Datum Place, Date: **Klaus, 2013-07-12**

Rudolf Blank

Diese Erklärungen bescheinigt die Überseinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the compliance with the indicated regulations, it doesn't guarantee attributes. Pay attention to the securitiy advices of the relevant product information.

Konformitätserklärung Nr.: Declaration of Conformity	PDTD90-2 07-2013		Seite 1 von 1 Page 1 of 1

CE

Konformitätserklärung
EC-DECLARATION OF CONFORMITY

Die Firma: b2 electronic GmbH
The Company: Riedstraße 1
6833 Klaus
AUSTRIA

erklärt, dass das Produkt: PDTD120-2 (PD120-CC + PD120-Filter)
declares that the product:

Verwendungszweck: Partial Discharge Measuring System for Cable (with TanDelta)
Intended purpose:

Das bezeichnete Produkt stimmt mit den Vorschriften folgender europäischer Richtlinien überein:
The indicated product is in correspondence with the following regulations of European Council:

	Nummer/ Kurztitel Number / Titel	**Eingehaltene Vorschriften** Observed regulations
✓	**EMC**	IEC6100-4-2 ESD Level 4 (8/15kV) IEC6100-4-4 Burst 4kV 5kHz EN55011
✓	**Safety**	EN60950 EN50191 EN61010-1

Aussteller Issuer: **Leiter Qualitätssicherung** Director Qualitymanagement

Ort, Datum Place, Date: **Klaus, 2014-07-14**

Rudolf Blank

Diese Erklärungen bescheinigt die Überseinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.
This declaration certifies the compliance with the indicated regulations, it doesn't guarantee attributes. Pay attention to the securitiy advices of the relevant product information.

Konformitätserklärung Nr.: Declaration of Conformity	PDTD120-2 07-2014		Seite 1 von 1 Page 1 of 1