

Operating Instructions

High Voltage Testing Sets

PGK 110/5 HB

PGK 150/5 HB



Guide to this Operating Instruction

Observe
info signs!



For fast finding of important information the corresponding text passages are marked with symbols (symbols not stated here are self-explaining).



More and special information concerning the respective subject are available from BAUR.



Important unit information!
In any case, read carefully!



Important information text.

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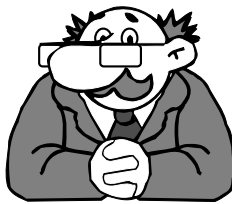
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Subject to modification!

In the interest of our customers we reserve the rights for modifications due to technical progress. Illustrations, descriptions and delivery content are therefore not binding.

Preface



This operating instruction contains all information necessary for the correct handling and use of the high voltage testing sets PGK 110/5 HB and PGK 150/5 HB. Before using the high voltage testing sets, please read carefully this Operating Instruction.

If you have any question, please contact directly



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or refer to your nearest BAUR representative.

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Fax +43 / 55 22 / 49 41 3

Safety Precautions



Please read now and
avoid damage and injury later!

- The PGK 110/5 HB and PGK 150/5 HB is built in accordance with today's state of engineering and is safe to operate. Individual components and the finished unit are inspected continually by our qualified staff within the framework of our Quality Assurance Provisions. Each unit is subjected to thorough testing prior to shipment.
-

Safety Precautions, Continued

- It is imperative to every person who is involved with the installation, start-up, operation and maintenance to have read and understood the complete Operating Instruction.
- It is the responsibility of the customer to ensure that only authorized persons may be allowed to use the high voltage testing sets PGK HB.

Only authorized personnel!

The user

- is qualified and properly instructed and has the necessary experience.
- knows the relevant standards, accident prevention rules and operating conditions.
- is able to carry out the necessary operations and is aware of the possible dangers involved.
- must immediately inform his superior about any conditions of the unit that could affect safety.

Use the PGK 110/5 HB and PGK 150/5 HB unit as directed!

The high voltage testing sets are to be applied exclusively for voltage proof testing of electrical equipment.

The local safety and accident prevention requirements are always applicable to the operation of the PGK 110/5 HB and PGK 150/5 HB unit.

Warranty



At the customer's **written request** we undertake to repair or replace at our discretion and as quickly as possible all parts that become faulty or useless as the demonstrable results of poor material, faulty design or defective execution.

We bear the costs for repairs and replaced parts, exclusive transportation of the goods, packing and insurance.

12 month warranty time

The **12 month** warranty time starts with delivery.

We shall bear the costs of any faulty parts requiring replacement, but not the costs of transport to us and back to the customer, not the costs of packing and insurance! We shall not be liable for any damage resulting from normal wear and tear, improper handling, non-observance of Operating Instruction and safety requirements. We shall also refuse to accept any liability if the customer carries out repairs or changes to the unit himself or has others carry out them!

The warranty does not cover damage in transit, batteries, fuses and any readjustments in accordance with the Operating Instruction!

We draw attention in addition to the "**General Terms of Sales and Delivery**" of.



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1. Product-Information

Overview

This section contains all necessary information about the High Voltage Testing Sets PGK HB.

This section contains the following subjects:

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Design and function	1-2
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General view
PGK 110/5 HB



Design and Function:

-
- Design
- The PGK HB instruments are designed as two-part High Voltage Testing Sets.
- Operating unit with all indicating/operating elements, with power supply and safety devices.
 - High Voltage unit as oil-filled housing with High Voltage transformer with the choice of a rectifier bar for half-wave rectification or a resistance bar as a damping resistor. The corona protection hood is used as oil expansion tank.
-

High Voltage generation

Generation of high voltage is carried out by a H.V. transformer supplied by an variable transformer. During D.C. operation a half-wave rectifier is connected after the H.V. transformer. By turning the half-wave rectifier the polarity of the output voltage can be changed. The capacity of the test object acts as smoothing capacitor. During A.C. operation, a damping resistor is connected to the H.V. circuit instead of the half-wave rectifier.



The H.V. units of the PGK HB instruments are equipped with a potential grading ring which can also be used as carrying ring. The instruments may be not operated without this potential grading ring.

Operating ranges

Depending on the load by the test object and the voltage set, the PGK HB instruments are operating in one of the two operating ranges Continuous Operation and Short-time Operation.

Continuous operation:

Within this operating range, from no-load to nominal rating up to cut off load the instrument can be loaded continuously.

Short-time operation:

Within this operating range from cut off load to short circuit the instrument switches current-limiting lamps into the primary circuit of the H.V. transformer in order to reduce the thermal load of the instrument. The current-limiting lamps can also be shorted to get higher power for short time operation. Additionally, as a protection against overload the overcurrent protection switch (5) with its thermal and magnetic tripping characteristic is tripped after a specific period terminating operation. The time until tripping depends on load and takes from seconds (during short-circuit) to hours (at maximum load).

mA - meter The mA-meter is connected into the H.V. circuit on earth side.

D.C. operation:

The mA-meter shows the arithmetic mean value of the output current.

A.C. operation:

The rectification value of the A.C. is measured by the instrument. However, the display shows the appropriate rms value. That's why there can be deviations of the displayed value from the true rms value if the measured current is not sinusoidal. During no-load the mA-meter shows the current which flows via the self-capacitance of the H.V. transformer. Must be considered during measurements on test objects.

kV - meter The kV-meter is connected to a tapping of the H.V. winding and is current-compensated. The compensation is balancing the voltage drop at the internal resistance of the test instrument.

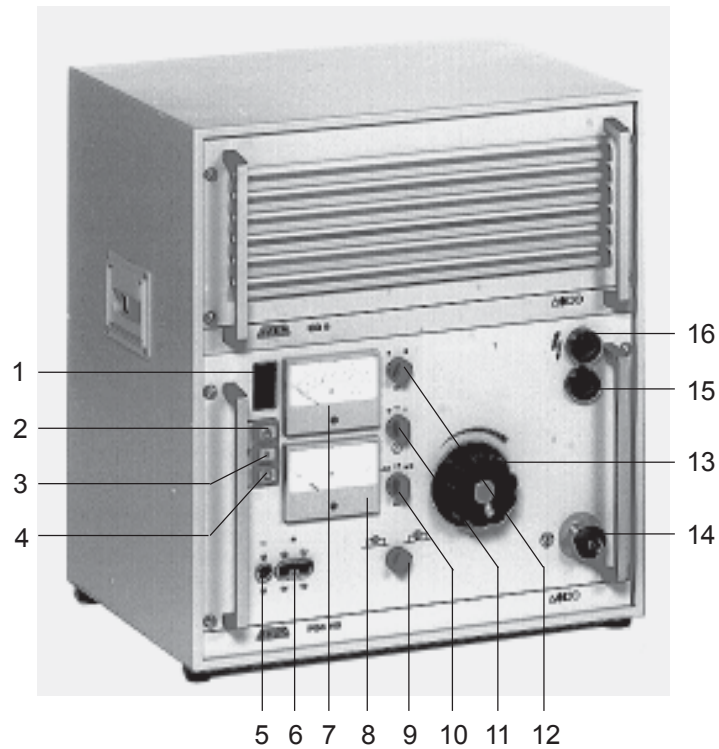
D.C. operation:

The kV-meter shows the peak value of the output voltage. If the self-capacitance of the test object is very low it is possible that the insulation current of the test object results in a high ripple. In this case, note that the displayed value and the arithmetic mean value of the test voltage can be clearly different.

Display during A.C. operation:

As with the mA-meter the kV-meter also measures the rectification value and displays the rms value.

Display and operating elements



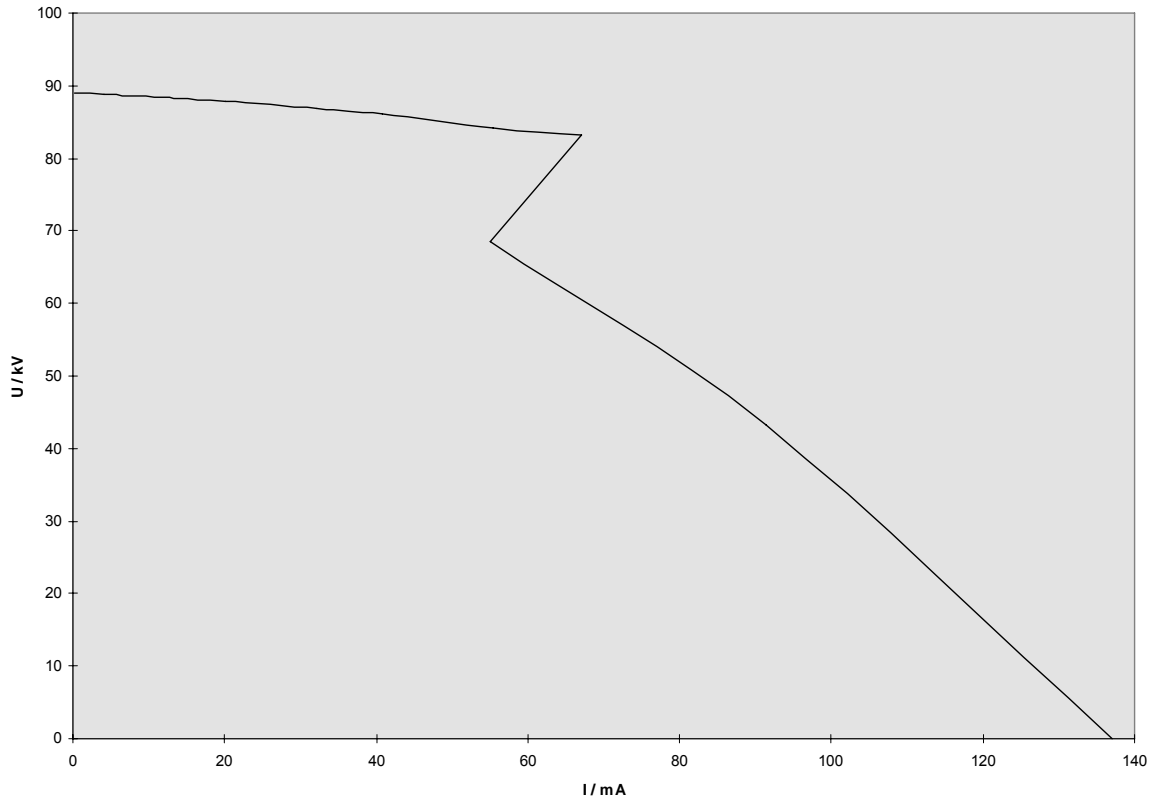
- 1 **Mains switch**
- 2 **Pushbutton „Ready to switch on“** (⏻)
- 3 **Pushbutton „High Voltage On“** (I) with pilot lamp (clearing of H.V.)
- 4 **Pushbutton „High Voltage Off“** (⊖)
- 5 **Overcurrent safety switch** with thermal and magnetic tripping within the primary circuit of the H.V. transformer
- 6 **Overcurrent safety switch** with thermal and magnetic tripping at the mains input
- 7 **Voltmeter** for display of output voltage in kV
- 8 **Amperemeter** for display of output current in mA
- 9 **Short-circuit-switch** for short-circuiting the current limiting lamps
- 10 **Measuring range switch** for amperemeter
- 11 **Selector switch for operating mode** (+ / ~ / -)
- 12 **Measuring range switch** for voltmeter
- 13 **Variable transformer** for setting the output voltage
- 14 **Lockabel Emergency off momentary contact switch**
- 15 **Indicator lamp, green**
- 16 **Indicator lamp, red**

Technical Data

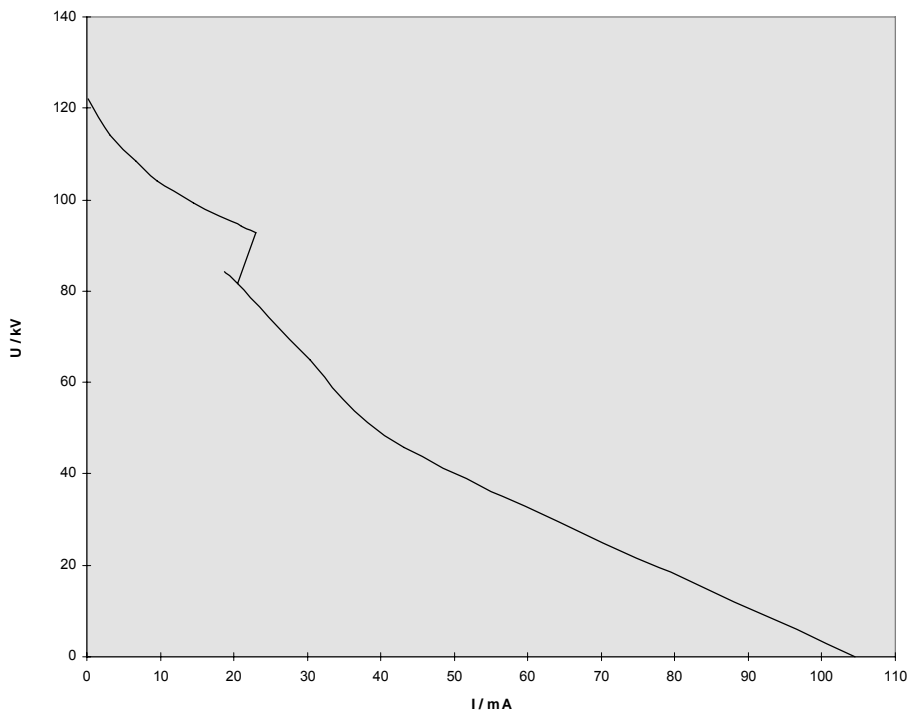
	PGK 110/5 HB	PGK 150/5 HB	Unit
Mains voltage	230	230	V ~
Mains frequency	45-60	45-60	Hz
Power consumption at nominal working point	5750	5750	VA
Max. power consumption (in short-circuit operation)	11700	11700	VA
Power output at nominal working point AC/DC	2060	2160	VA/W
Max. output voltage ACeff/DC in no-load	89/122	115/156	kV
Output voltage ACeff/DC at nominal working point	83/94	109/116	kV
Max. output current ACeff/DC at short-circuit	137/104	108/77	mA
Accuracy of kV-meter	2,5	2,5	%
Accuracy of mA-meter	2,5	2,5	%
Dimensions of operating unit housing (W x H x D)	502 x 553 x 390	502 x 553 x 390	mm
Dimensions of H.V. unit (height / diameter)	1320/640	1530/640	mm
Relative humidity	not condensing	not condensing	
Ambient temperature	working: 0...+45° C	storage: -20...+60° C	
Weight of operating unit	51	51	kg
Weight of H.V. unit	162	180	kg

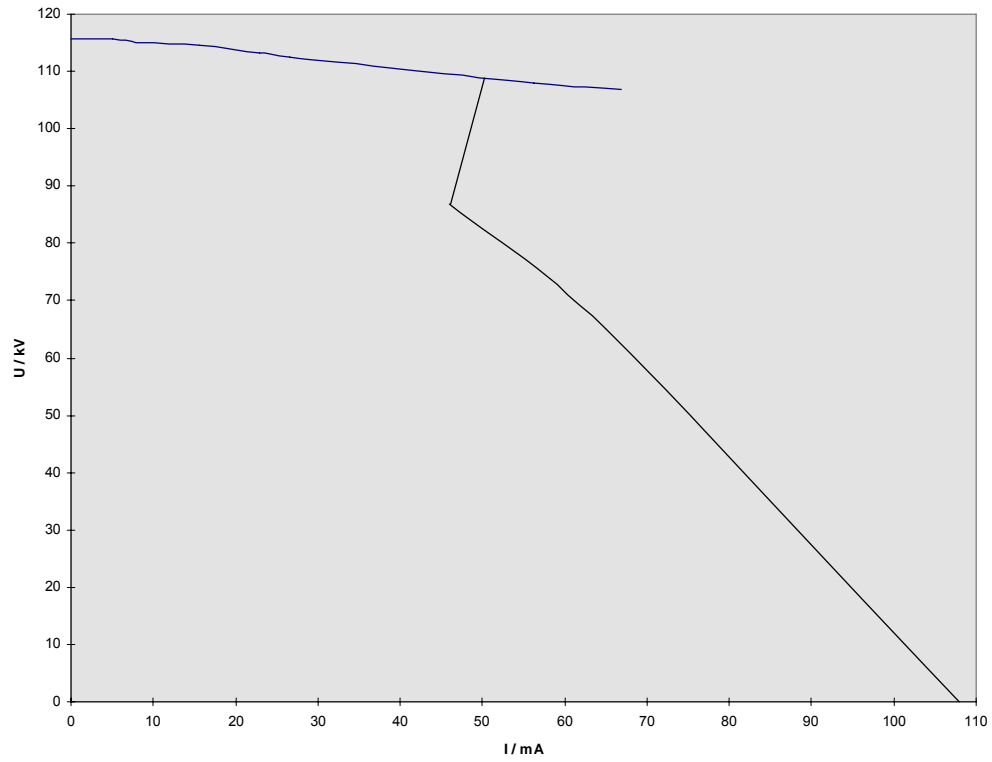
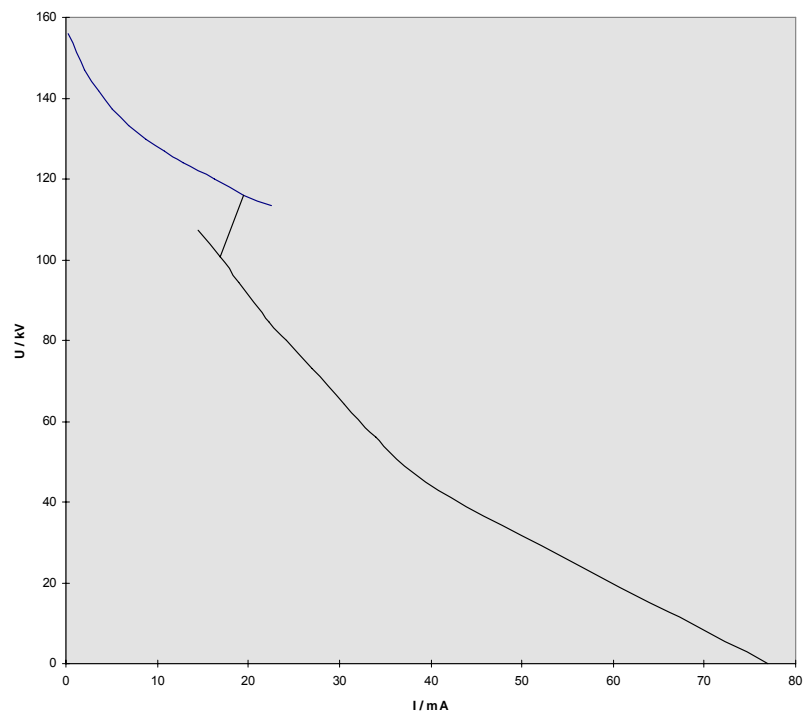
PGK output load curves

Load curve PGK 110/5 HB AC



Load curve PGK 110/5 HB DC



Load curve PGK 150/5 HB AC

Load curve PGK 150/5 HB DC


2. Packing and Shipping

The Test Sets are shipped in robust shipping containers on wooden pallets. If the instruments are not used immediately, always keep in the shipping container and store in dry rooms!

The H.V. unit may only be transported and operated vertically. It is important that the tube is not bended so when packing in shipping containers it may not be used as a support. For securing the H.V. unit mounting holes are in the base plate. Additionally, the H.V. unit can be also fasten to the potential grading ring. Please note that the corona protection hood is not a solid part but a hollow body filled partly with oil which must be protected against impacts and collisions.

Damage during transport

Complains concerning damages should be made to us without delay, using a standard transport damage claims form.

Confirmation of visible damage should immediately be obtained from the carrier. The extent and probable cause of the damage should be stated.

If damage is discovered during unpacking, contact the responsible transportation company immediately. Request a written loss assessment and make them responsible for the damage!

We also refer to the 'General Terms of Sales and Delivery' of:



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3. Placing into Operation

Overview

In this section you will find all necessary information to put the High Voltage Testing Sets PGK 110/5 HB and 150/5 HB into operation.

This section contains the following subjects:

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Prepare test	3-2
Switch on	3-3
Switch off	3-4
EMERGENCY OFF	3-4
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Connect to earth

It is absolutely necessary to connect the H.V. unit to earth and to the test object via one of the two earthing screws on the base plate.

The earth lead should be as short as possible and must have a low impedance (min. cross-section of 4 mm², copper).

Prepare test

- Isolate all connections from the test object, secure against repeated switch-on and make sure that zero voltage condition exists.
 - **Insulate nearby items which are under voltage.**
 - ⇒ It must be assured that nearby items under voltage do not result in breakovers or breakdowns, due to applying the test voltage to the test object.
 - Insert rectification resp. resistor bar according to the desired operating mode.
 - Connect operating unit and H.V. unit.
 - Install H.V. connection to the test object.
 - Connect instrument to mains according to specifications on type plate.
 - Turn variable transformer (13) to the left position.
 - Set measuring range selector switch for the kV-meter (12) to „II“.
 - Set measuring range selector switch for the mA-meter (10) to the highest range in order to avoid damage to the instrument. Short overloads (breakdowns and short-circuits at the test object) are no danger to the mA-meter if ten times the value of the relevant measuring range is not exceeded.
 - Turn mode selector switch (11) to selected operating mode („+“, „-“ or „-“).
 - Put short-circuit-switch (9) into left position (max. power output) or into right position (limited power output) according to the desired short-time operation mode.
-



Before going into operation, local safety requirements and safety precautions for the protection against direct or indirect contact of live parts have to be met accordingly!

Switch on

- Switch on instrument with mains switch (1)
- The instrument is in operating condition "READY FOR OPERATION"
 - ⇒ the green indicator lamp (15) is illuminated
- Press pushbutton "**Ready to switch on**" (2). In case the overcurrent protection switch (5) has tripped, a buzzing sound occurs during depression of the "Ready to switch on" pushbutton. Instrument goes into operating condition "READY TO SWITCH ON" only if
 - ⇒ the EMERGENCY-OFF pushbutton switch is not depressed,
 - ⇒ the overcurrent protection switch (5) has not been tripped.

The instrument is in operating condition "READY TO SWITCH ON"

- ⇒ the green indicator lamp (15) is out,
- ⇒ the red indicator lamp (16) is illuminated.

- Press pushbutton "High Voltage On" I (3)

The high voltage transformer will be connected to the mains voltage only, if


- ⇒ the variable transformer is in its left position (neutral position)
- ⇒ the shorting bar of the discharge unit (option) is fully open.

The instrument is in operating condition "IN OPERATION"

- ⇒ the pilot lamp "In operation" I of the pushbutton switch (3) is illuminated.

- Adjust to desired voltage using the variable transformer (13).

Switch off

-
- Turn back variable transformer (13) to its left position.
 - Press pushbutton "High voltage off"  (4)
 - The instrument returns into the operating condition „READY FOR OPERATION“. The high voltage transformer is disconnected from the supply voltage
 - ⇒ the pilot lamp "IN OPERATION" of pushbutton I (3) is out
 - ⇒ the red indicator lamp (16) is out
 - ⇒ the green indicator lamp (15) is illuminated
 - ⇒ the shorting bar of the discharge unit (option) affects the High Voltage output of the instrument and discharges the connected capacities via the discharge resistor.
 - Switch off with mains switch.
-

Discharge, Connect to earth, Short out



Because High Voltage measuring is not carried out directly at the High Voltage output no more voltage is shown on the kV-meter after switching off the instrument although the test object could be charged to full voltage! Before cancelling the safety precautions, it is essential that all live parts must be discharged, earthed and shorted!


Discharge test object with discharge bar

see table on page 5-3 / Discharge bar



Use discharge bar suitable to the particular instrument and note that different discharge times must be met depending on test object capacity and the discharge bar used.

EMERGENCY STOP

-
- Press EMERGENCY-OFF momentary contact switch (14).
 - The instrument returns to the operating condition „READY FOR OPERATION“. The high voltage transformer will be isolated from the supply voltage.
 - ⇒ the indicator lamp "In operation" I of pushbutton switch (3) is out
 - ⇒ the red indicator lamp (16) is out
 - ⇒ the green indicator lamp (15) is illuminated
 - The instrument can only be placed in the operating condition „READY TO SWITCH ON“  by pressing the pushbutton switch (2) „Ready to switch on“ if the EMERGENCY OFF momentary contact switch has been unlocked with the key.
 - By pressing the EMERGENCY OFF momentary contact switch and taking out the key, unauthorized use of the instrument can be prevented.
-

Change operating mode of instrument

Change mode of operating unit Turn mode selector switch (11) into desired position (+ / ~ / -)

- Change mode of High Voltage unit
- Unscrew knurled screw on H.V. output.
 - Loosen threaded insert with screwed-on rectifier bar (resistor bar) using supplied spanner.
 - Slowly pull out bar (the oil should be dripped off from the bar).
 - Unscrew threaded insert from bar.
 - Screw on threaded insert to desired bar (with rectifier bar on the side of desired polarity).
 - ⇒ The resistor bar is marked on one end with "~" (front end of screw plug)
 - ⇒ The rectifier bar is marked on the ends with "+" and "-"
 - ⇒ If negative H.V. should be want the "-" mark must be on top (at the H.V. output)
 - Clean bar with dry (or slightly dampened in petroleum ether) and fuzz-free clothes.
 - Slowly insert cleaned bar into the tube.



When operating mode is changed very frequently, it must be observed that always so much insulating oil is within the tube that the bar is immersed in the oil up to the top metal cap. The instrument is filled with insulating oil Technol US 4000 by the manufacturer (see Maintenance).

4. Servicing / Maintenance

Overview

In this section you will find all necessary information regarding servicing and maintenance of the High Voltage Testing Sets PGK 110/5 HB and PGK 150/5 HB.

This section contains the following subjects:

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Fuse	4-2

General

- In order to avoid leakage currents or creeping discharges at the tube or cone of the High Voltage unit it must be kept clean. For this purpose, use only fuzz-free clothes dampened in petroleum ether.
- From time to time, check function of limiter lamps in the operating unit. This can be easily carried out in short-circuit operation by slowly increasing the voltage at the variable transformer until lamps light up.
- Oil for refilling around the rectifier or resistor bar is available from BAUR.



- **0.8lt insulation oil Technol US 4000
ID no. 471-716**

Fuse

Designation	Value	Dimension	Ident.No.	Remarks
F1, F2	0,16 AT	Ø 5 x 20 mm	563-005	Mains transformer, primary
F3, F4	2 AF	Ø 5 x 20 mm	563-020	+ 12V control
F5, F6	3,15 AT	Ø 5 x 20 mm	563-021	Discharge unit (option)
F10	32 AT			
F11 PGK 110/5 HB PGK 150/5 HB	25 A	High voltage transformer, primary		

5. Options, Accessories and Ordering Information


Overview

In this section you will find all necessary information regarding options and accessories available for the High Voltage Testing Sets PGK 110/5 HB and PGK 150/5 HB.

This section contains the following subjects:

Subject	Page
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Options

Discharge unit	For PGK HB instruments an automatic discharge unit is available consisting of a short-circuit bar activated by a rotary magnet and a discharge resistor connected in series between test object and test instrument. Control is accomplished via the operating unit. By pressing pushbutton 'Ready to switch on'  (2) the short-circuit bar is moved away from the corona protection hood. Reaching the end position is monitored. When the instrument is back in operating condition 'READY FOR OPERATION' a short-circuit bar is moved to the corona protection hood by a spring. A discharge resistor is responsible for discharging the connected capacitances.
Folding tripod	As additional accessory a folding tripod can be supplied. It makes operation of the instrument easier if no working table is available. Working height is approx. 90cm.
Transport case	In order to make shipping of the PGK HB Sets to the customers easier a transport case is available.
Moving frame	For the H.V. units a moving frame with big steering rollers can be supplied.

Accessories

The PGK HB instruments are supplied with the accessories specified below. The rectifier bar is in the H.V. unit when supplied and the instrument is in the operating mode 'negative D.C.'.

Rectifier bar (option with PGK 260)

The rectifier bar supplied with the instrument is used for protecting the instrument against transient voltages and high currents in case of short-circuit during A.C. operation.

PGK unit	110/5 HB	150/5 HB
Resistance value	4,5 kOhm	6 kOhm
Tolerance	± 10 %	± 10 %

Spanner for replacing rectifier / resistor bar

Is used for loosening the threaded insert when changing the operating mode of the instrument. It is a cylindrical spanner which is inserted into the two holes in the threaded insert.

Discharge bar

For discharging capacitive test objects during D.C. operation the discharge bars ES 110 and ES 150 are used.

PGK unit	110/5 HB	150/5 HB
Discharge bar	ES 110	ES 150
max. permissible voltage	120 kV	180 kV
max. permissible discharge energy	18.000 Ws	27.000 Ws
Time between 2 discharges	10 min.	10 min.

Earth lead

As earth connection between H.V. unit and test object a flexible copper earth lead with a length of 3 m and a cross-section of 6 mm² is supplied. On both ends cable lugs are attached with a hole diameter of 8,5 mm.

Mains supply	The PGK HB instruments are supplied with a plugable mains supply cable with a 2,5 mm ² cross-section and with a length of 2,5 m. The mains supply cable is delivered without mains plug.
Connection H.V. / Operating unit	Connecting lead between H.V. and operating unit is 5 m long and is connected with lockable connectors on both sides.
High Voltage connecting leads	A High Voltage insulated wire with a length of 2,5 m and a cross-section of 1,5 mm ² is used as High Voltage connecting lead. The instrument side is equipped with a cable lug with hole diam. 8,5 mm and the test object side is equipped with an alligator clip.

Ordering information PGK 110/5 HB

		Mains voltage	
		220V-240V	110V-120V
Item supplied	H.V. Test Set PGK 110/5 HB with accessories		
	Operating unit	470-471	470-471
	High Voltage unit	470-461	470-761
	Discharge bar ES 110; 18 kW	411-511	411-511
	Earth lead, 3 m	460-462	460-462
	High Voltage connection, 2,5 m with alligator clip	460-477	460-477
	Spanner for replacing rectifier / resistor bar	460-459	460-459
	Rectifier bar (built in)	470-574	470-574
	Resistor bar fo A.C. operation	470-575	470-575
	autotransformer		472-096
Options	Moving frame H.V. unit	470-583	
	Folding tripod for 19" units, working height approx. 90 cm	411-515	
	Automatic discharge device EM 110, 45 kW	470-623	
	Emergency Off unit with signal lamps, 25 m	471-219	
	Emergency Off unit with signal lamps, 50 m	470-809	
	Transport case for operating unit	471-177	
	Transport case for High Voltage unit	471-175	

Ordering information PGK 150/5 HB

		Mains voltage	
		220V-240V	110V-120V
Item supplied	H.V. Test Set PGK 150/5 HB with accessories		
	Operating unit	470-036	470-036
	High Voltage unit	470-048	470-048
	Discharge bar ES 150	411-512	411-112
	Earth lead, 3 m	460-462	460-462
	High Voltage connection, 2,5 m with alligator clip	460-477	460-477
	Spanner for replacing rectifier / resistor bar	460-459	460-459
	Rectifier bar (built in)	470-455	470-455
	Resistor bar fo A.C. operation	470-456	470-456
	autotransformer		472-096
Options	Moving frame H. V. unit	470-583	
	Folding tripod for 19" units, working height approx. 90 cm	411-515	
	Automatic discharge device EM 150, 45kW	470-625	
	Emergency Off unit with signal lamps, 25 m	471-219	
	Emergency Off unit with signal lamps, 50 m	470-809	
	Transport case for operating unit	471-177	
	Transport case for High Voltage unit	471-176	

