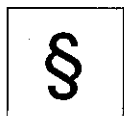
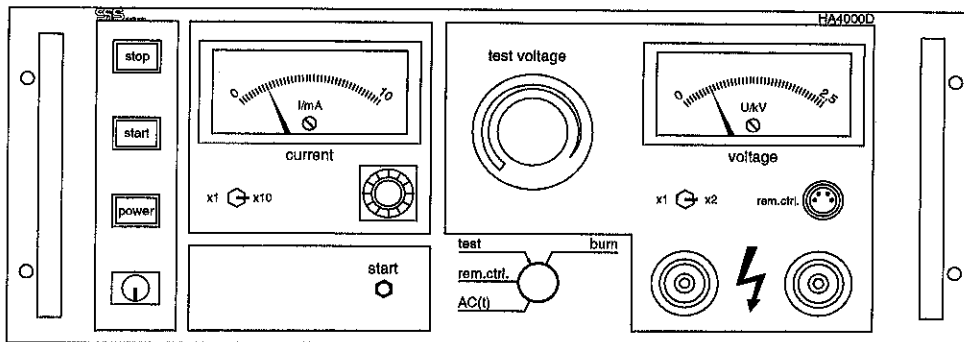


Operating Manual

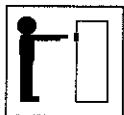
for high voltage tester HA4000D



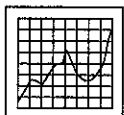
Liability Chapter 1



For your safety Chapter 2



Operation Chapter 3



Technical data Chapter 4



Appendix Chapter 5



Personnel in charge of and responsible for these tests have to read and must have comprehended the operating instructions, especially the chapter under the heading "For your Safety"!

On page 3.7 please find an **abridged operating instruction** for a quick start. This abridged operating instruction can be placed near the test station. And only after this operating manual has been completely read and understood, may you use the abridged version.

Please enter below

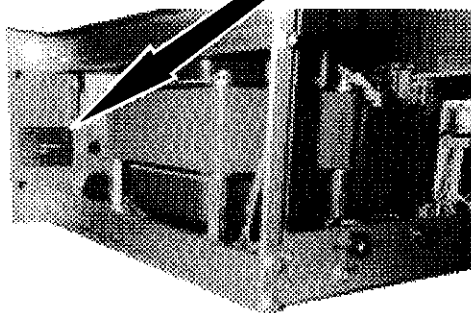
Serial Number

of your high voltage tester
for possible guarantee claims
or further inquiries:

--	--	--	--	--	--	--	--

There is no guarantee on testers without the original serial number!

Please find serial number here



Edition 02/1994

This operating manual must be treated confidentially.

Only authorized personnel are entitled to use same.

A third party's access to same will entail liability for damages.

All rights, including translations, are reserved. No part of this operating manual can be reproduced, or by means of electronic systems be processed, duplicated or circulated without written consent by SPS electronic GmbH.



You are liable in case of negligent operation!

- The high voltage testers are constructed and tested acc. to the latest technical standards and are, therefore, highly reliable. Yet it can be dangerous if the testers are not being operated properly.



Therefore, please take your time reading this operating manual!

- Liability for the correct operation of the high voltage tester HA4000D will be transferred in any case to the owner or operator should the tester be serviced or repaired inexpertly by personnel not authorized by SPS electronic GmbH to do so or if the tester is being operated contrary to its actual purpose (pl. see paragraph on "Operating Specifications", page 2.4).
- The operator is obliged to use the high voltage tester HA4000D only if in perfect condition.
- SPS electronic GmbH is liable to the extent of the guarantee obligations quoted on the confirmation of order, all further claims are excluded.
- In view of the continuous development and improvement of our products we reserve the right to technical changes at all times. Any such changes, errors and/or misprints do not entitle to claims for damages.
- Original SPS electronic GmbH parts and accessories are to be used exclusively.
- SPS electronic GmbH cannot be held liable for damages caused by neglecting the instructions of this operating manual. Guarantee and liability terms of the sales and delivery conditions of SPS electronic GmbH remain in force, i.e. are not affected or changed by the above given information.

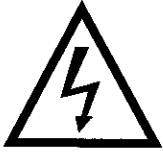
SPS electronic GmbH
Blätteräcker 18
D - 74523 Schwäbisch Hall - Sulzdorf

Telephone: (7907) 878-0
Service: (7907) 878-29
Telefax: (7907) 1770

Contents - Chapter 2

Operating safety symbols	2.1
Safety instructions and regulations	2.2
Executing tests	2.2
Qualification in personnel	2.2
Organizational requirements.....	2.2
Technical requirements	2.3
Operating specifications	2.4
Safety equipment.....	2.4

Operating Safety Symbols



This symbol warns of dangerous electric voltage with danger to life and body of persons.

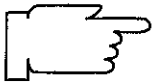
Please observe these instructions and be especially careful in such cases.

In addition to these operating instructions all the generally accepted instructions on safety and accident prevention must be adhered to.



This symbol warns of danger to life and body of persons.

Please observe these instructions and be especially careful in these cases, too.



This symbol will give you further important information.

Safety Instructions



Caution - danger of life!

- Pull power plug before opening tester.
- Never repair or bridge fuses or other component parts necessary for safety.

■ The testing

Tests can only be started after **all** safety requirements have been fulfilled and same have been checked by the operator in charge of the test.

■ Qualification in personnel

Only qualified and in electronics trained personnel who have the responsibility and dependability to recognize possible dangers are able and to be entrusted with the tests. They have to know the generally approved accident prevention regulations and must also know, the generally approved engineering regulations (please find a summary of the important regulations and standards in the annex).

Please observe safety regulations (VDE) if operating with high voltage!

■ Organizational requirements

A test station, equipped with high voltage tester HA4000D can only be operated if a supervising electrician is present.

All personnel, except those directly engaged in the tests, should have left the test station which is marked and limited by means of danger signs and warning lights, as soon as the high voltage tester HA4000D is being prepared for connection.

All defects or damages on the tester, on technical equipment and on test installations have to be reported immediately to the supervisor in charge. The test operation has to be stopped until defects and damages have been repaired or removed.

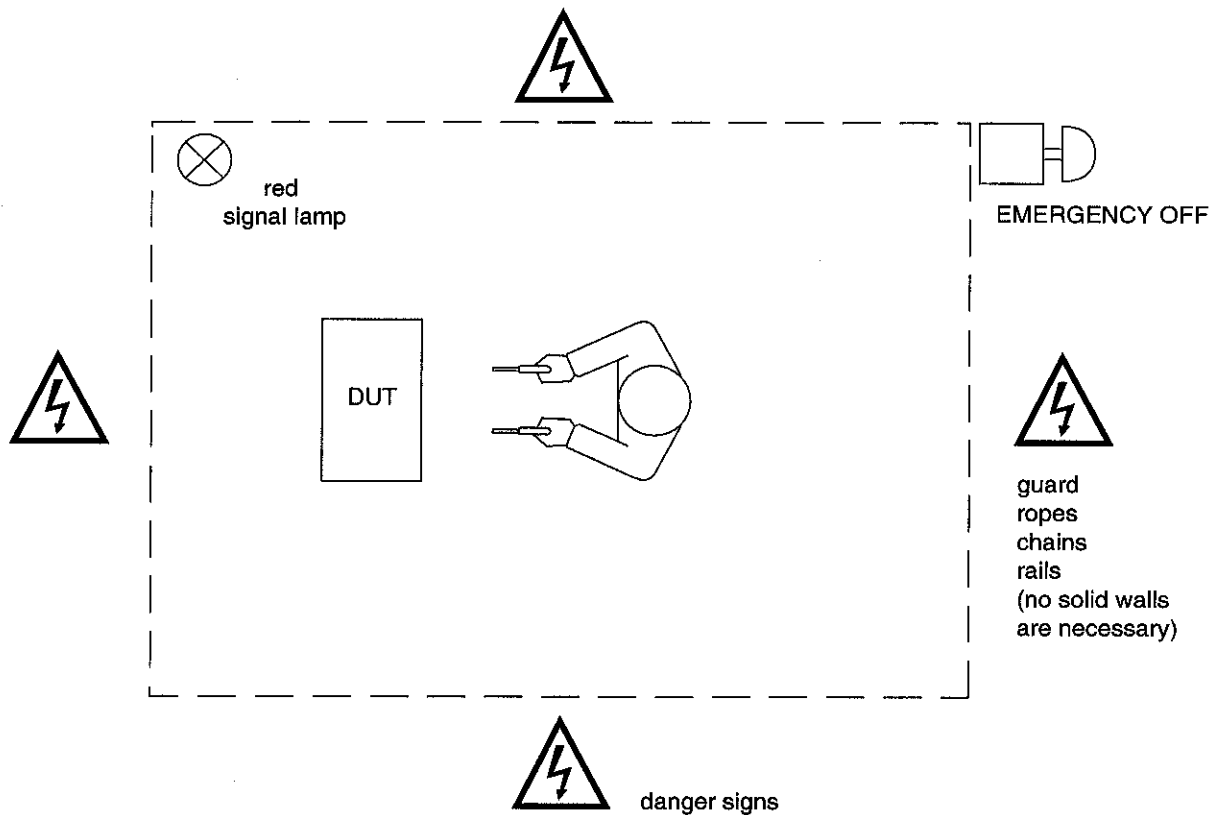
This operating manual has to be kept close to the tester so that it is within easy reach of the operator **at any time**.

Safety Instructions (continuation)

■ Technical requirements

Setup of a test station without positive protection against electric shock hazard¹
 (excerpt from the memorandum on accident prevention, copy 4/89, of the trade association of precision mechanics and electrical engineering, Köln.)

with test prods



Tidiness of the test station has to be guaranteed by means of respective instructions and regular supervision!

¹ Test stations without positive protection against electric shock hazard are test stations where parts of test objects or active parts of a test installation are not completely protected against direct contact during a test.

Operating Specifications

■ Application possibilities

The high voltage tester HA4000D has been designed for testing air and leakage paths in electrical devices and installations. The rating of these paths can be effected acc. to VDE 0110- resp. IEC 384-recommendations.

Further application possibilities:

- In laboratories and production -
- As potential free power source (secondary, potential free measuring of voltage and current) -
- As a leakage current meter (VDE 0413) -
- In some cases, especially when testing electronic assemblies, it is not possible to connect or disconnect the voltage immediately. If the voltage has to be increased continuously to a set value, a run-up device of the HA8000 / HA8010 / HA9000 series or the D.C. testing device HA6010D should be used.



The high voltage tester HA4000D has to be operated acc. to this operating manual. Any other use means a violation of the regulations. The manufacturer cannot be made liable for any defects or damages resulting thereof; such a risk is carried exclusively by the operator or user.

Permissible only after having checked with SPS electronic GmbH:

- Electric coupling to equipment not mentioned in this operating manual.

Safety equipment

- Potential free voltage
- Transformer and instrument transformer w/double insulation
- Dual status indicator
- External set of warning lights possible
- Two switching on states
- Integrated buzzer
- Two independent breaking circuits
- Shock-proof connection sockets

Contents - Chapter 3

Before Putting into Operation 3.1

Operating controls

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Start of operation

Abridged operating instructions	3.7
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Switching on of device	3.9
Preselection of current range	3.10
Preselection of voltage range	3.10
Preselection of tripping current	3.10
Preselection of test voltage	3.11
Preselection of operating mode	3.11
Preselection of test time	3.12
Connection of DUT	3.13
Start of test period	3.13
Testing with high voltage	3.14
Switching off of device	3.14
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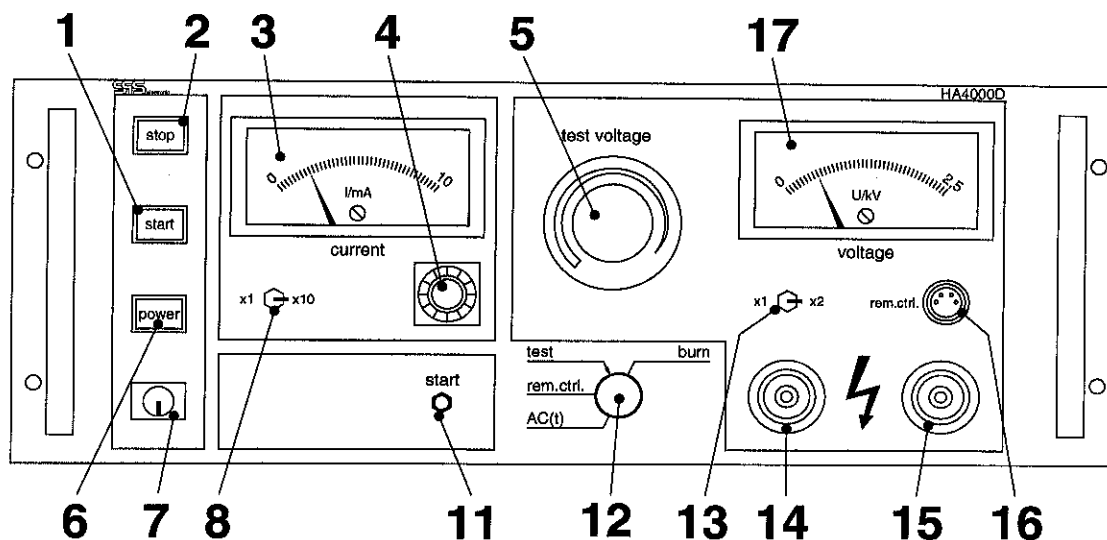
Before Putting into Operation



Remember!

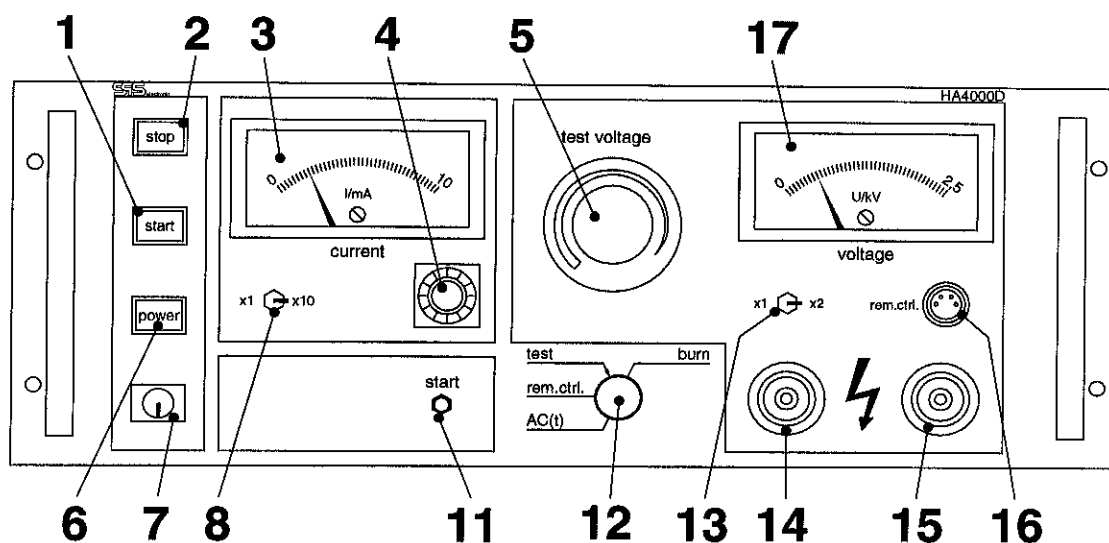
You are responsible for safety in the operating area of the high voltage tester. Therefore, please pay close attention to chapter 2 “For your Safety” and inform everybody operating in this area respectively.

Operating controls - Front



Pos.	Description	Function
1	key "start"	to make ready for operation.
2	key "stop"	interrupts high voltage generation via two separate circuits; in addition, this key serves as a kind of emergency switch . <u>Automatic interruption:</u> As soon as the current limit (1 mA - 100 mA) set on potentiometer (4) is exceeded.
3	display unit "current"	display of obtained current values in mA.
4	potentiometer	Setting of tripping current (1 mA - 100 mA). The tripping current must exceed the limit value of the set range by 10% , i. e. in toggle switch position " x1 " at least 1 mA , in position " x10 " at least 10 mA
5	control knob "test voltage"	preselection of test voltage (0 - 5 kV).
6	key "power"	to switch on tester.
7	key switch (power)	protection against unauthorized operation.
8	Toggle switch x1/x10	To change the range of the tripping current and the display unit (3). <u>Switch position range</u> x1 0 mA - 10 mA x10 0 mA - 100 mA

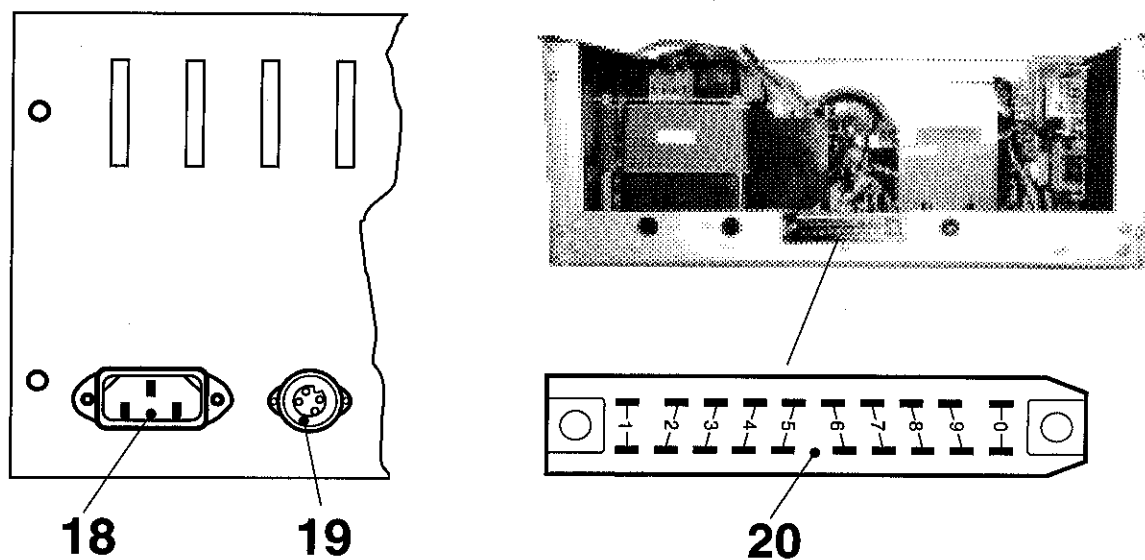
Operating controls - Front



Pos.	Description	Function
11	push button "start"	start of test cycle, in which high-voltage is produced.
12	Operating-mode selector switch	Setting of operating mode.
13	Toggle switch x1/x2	To change range of display unit (17). <u>Switch position range</u> x1 0 kV - 2.5 kV x2 0 kV - 5 kV
14	high voltage connection	connection socket for test pistol
15	high voltage connection	connection socket for test pistol
16	phono socket "rem.ctrl"	connection socket for foot switch or test hood (for pin configuration please see page 4.10).
17	Display unit "voltage"	Display of obtained voltage values in kV. By using a semi-conductor relay and real voltage measurement directly at the output, a residual voltage will remain in usage with the time base.

Operating Controls - Back

In connection with housing - accessories EH 1904-h



Pos.	Description	Function
18	cold appliance socket	power supply (230 V / 50 Hz).
19	warning light connection socket	connection possibility for external warning light set (accessories WL 22) (for pin configuration please see page 4.6).
20	low voltage interface (beneath plug-in back panel)	connection possibility for automatic operation (for pin configuration please see page 4.4).

Operating Controls - Accessories

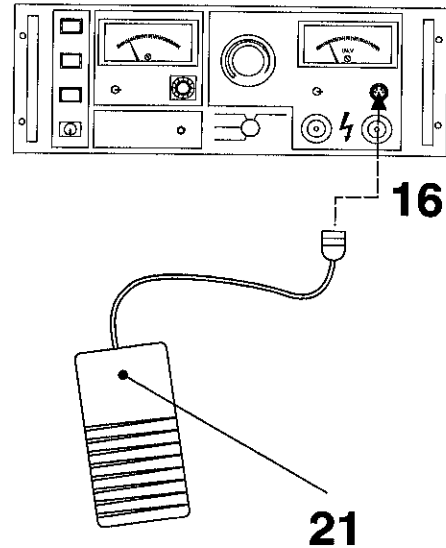
Foot switch (21)

Type: FS 01-5

Connection: to phono socket
"rem.ctrl." (16)

Function: to start tester
in operating modes:
"AC (t)"
"rem.ctrl"

For pin configuration please see page 4.7



External warning light set (22)

Type: WL 22

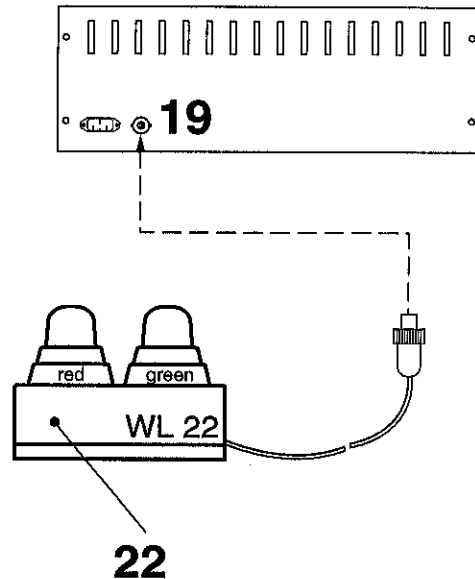


Caution - danger of life!
**Connection via supply
voltage (230 V)**

Connection: to warning light
socket (19)

Function: display of
operating condition

For pin configuration please see page 4.6



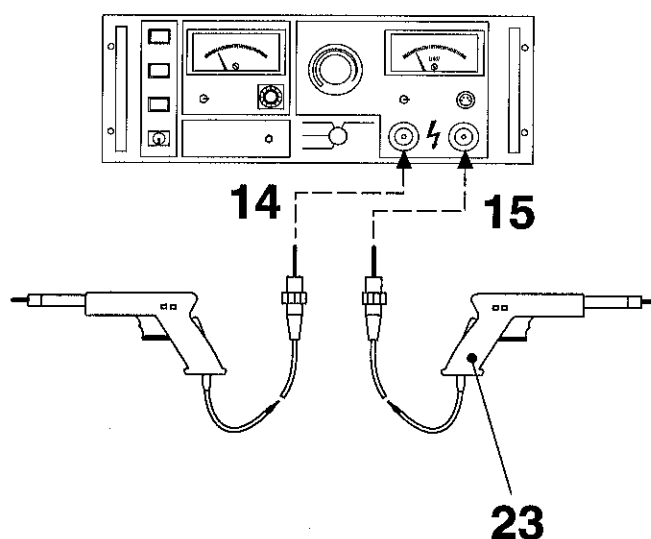
Operating Controls - Accessories

Test pistols (23)

Type: SP 02

Connection: to both high voltage sockets (14, 15)

Function: transmission of test voltage to DUT



Test hood (24)

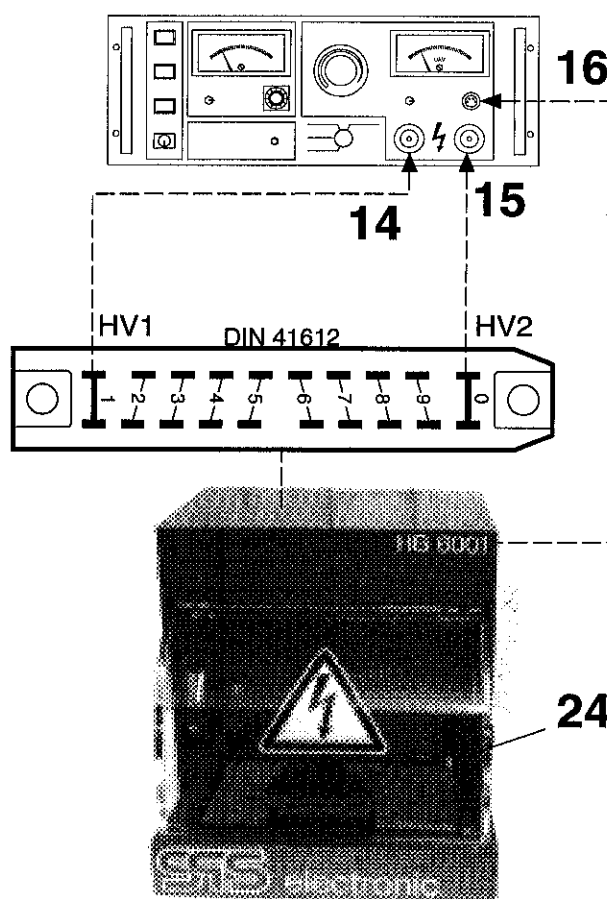
Type: HB 6011-S

Connection: **test voltage**
to both high voltage sockets (14, 15)

control line
to phono socket
"rem.ctrl." (16)

Connection of DUT is made in test hood
via connection rail acc. to DIN 41612
or via 4 mm laboratory sockets

Function: for direct operation with
a maximum in protection
for test operators



Abridged operating instructions for a quick start (HA4000D)

Apply this abridged instruction version only if and when the general operating instructions have been read and understood, as well!



Connect device by means of power cable to the cold-appliance socket (18) (page 3.8)				
Connect accessories (page 3.5)				
Switch on device by means of "key switch" (7), "power" switch (6) and the "start" switch (1) (page 3.9)				
Turn operating-mode selector switch (12) to "test" position				
Select voltage range by means of toggle switch "x1/x2" (13) and set test voltage by means of control knob (5). Select current range by means of toggle switch "x1/x10" and set tripping current by means of potentiometer (4) (from page 3.10 on)				
Set requested operating mode by means of operating-mode selector switch (12) (page 3.11)				
"AC (t)" Time-limited test with A.C. (page 3.17)	"test" Test without time limit (page 3.15)	"burn" Trouble-shooting with high current and high voltage (page 3.18)	"rem.ctrl" Test with remote control (page 3.16)	
Connect foot-actuated switch or test hood. (if requested; page 3.5 and 3.6)				
Pre-select test time on multi-functional relay (9) (page 3.12)				
Connect test piece (page 3.13)				
Start test time by means of touch switch "start", or by means of foot-actuated switch or by closing the test hood (page 3.13)				Test start: Start by means of foot- actuated switch (21), plug-in interface (20) or phono connector "rem.ctrl"

**Remember!**

You are responsible for safety in the working area of the high voltage tester. Therefore, please pay close attention to chapter 2 "For your Safety" and inform all other operators in this area respectively.

To connect device

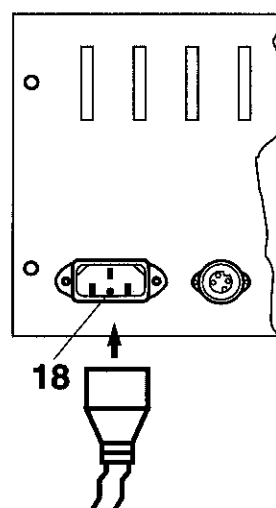
Power supply

- via power plug



Please be cautious when operating with electric current - there always exists danger of life!

- Connect supply cable - to cold appliance socket (18) (on housing back panel) and to
- supply socket with 230 V / 50 Hz



To switch on device

- turn key switch (7) to right
- press key "power" (6)

When

- key switch (7) and key "power" (6) have been pressed

then

- yellow signal light of key "power" (6) and
- green signal light of key "start" (1) as well as
- green light of external warning light set (22) (accessories) will light

besides

- an acoustical warning sounds indicating that high-voltage is not yet available. This is to avoid testing without voltage
- press key "start" (1)

and

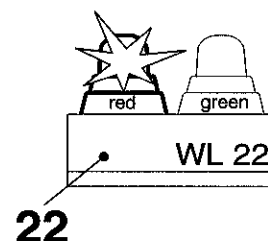
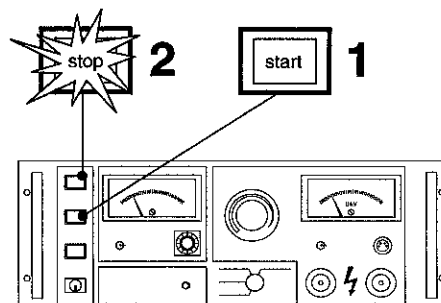
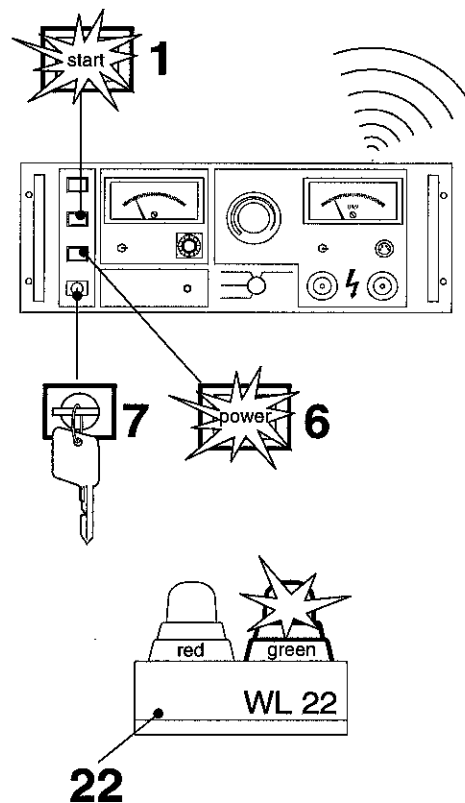
- green signal light of key "start" (1) will go out

then

- red signal light of key "stop" (2)
- as well as red light of external warning light set (22) (accessories) will light



The high-voltage testing device is now generating high voltage!



Preselection of current range

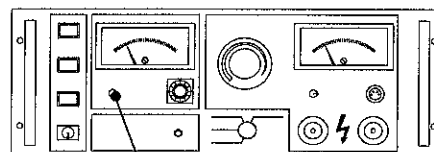
- Set toggle switch "x1/x10" (8) to the desired measuring range:

x1 = 0 - 10 mA

x10 = 0 - 100 mA



In the operating mode "burn" the range must be set to "x10". To protect the device, this setting is done automatically.

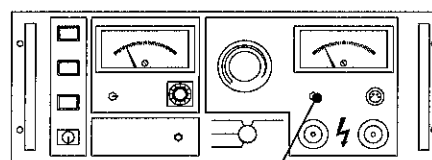


Preselection of voltage range

- Set toggle switch "x1/x2" (13) to the desired measuring range:

x1 = 0 - 2.5 kV

x2 = 0 - 5 kV

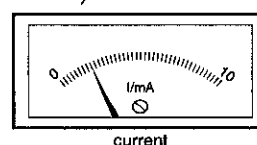
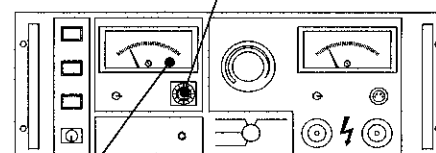
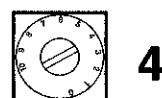


Preselection of tripping current

- Set tripping current by means of potentiometer (4).




The tripping current must exceed the limit value of the set test range by 10%, i. e. with toggle switch position "x1" by at least 1 mA in position "x10" by at least 10 mA





3

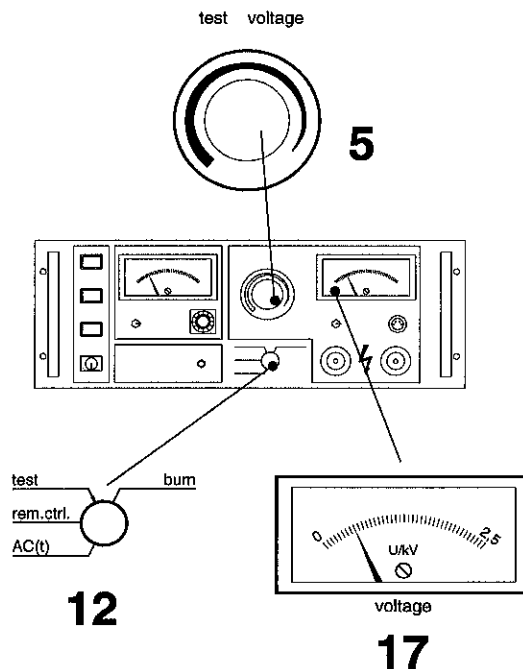
Preselection of test voltage

- Turn operating-mode selector switch (12) to "test" position.
- Control knob "test voltage" (5) is used to set the desired test voltage.

 The test voltage must exceed the limit value of the set test range by **10%**, i. e. with toggle switch position "x1" by at least **0.25 kV** in position "x2" by at least **0.5 kV**


 The "voltage" (17) indicated on the display unit shows the set test voltage.

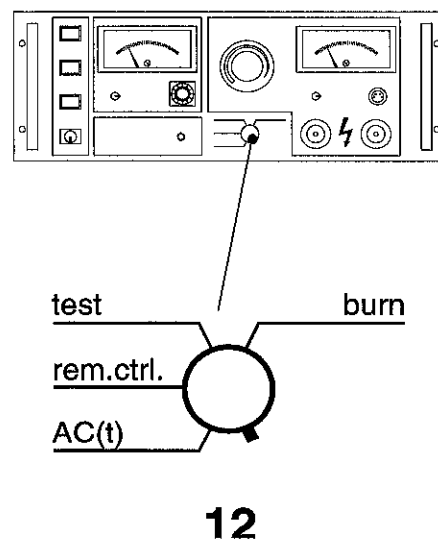
 As the test voltage depends on the mains voltage, the correct high-voltage value should be checked regularly.



Preselection of operating mode

- Set operating-mode selector switch (12) by turning it to the desired operating mode.

 The individual operating modes are described from page 3.16.

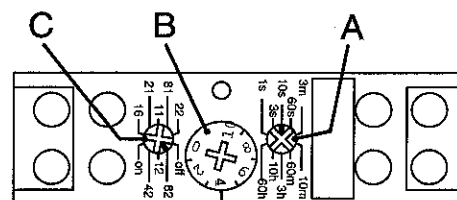


Preselection of test time

- The test time is set at 3 seconds in the factory.
- To change the test time the plug-in unit must be pulled out of the housing.



**Pull the mains plug
before opening the device.**



9

- The test time can be set on the multi-functional relay (9) which is at the rear in the center.
- Screw (A) is turned to set the time base (range end value).
- Screw (B) serves to set the exact test time. The test time is set as shown in the example below.

Example:

If screw (A) is set at 60 seconds and screw (B) at 4, the preselected test time is 24 seconds.

- Screw (C) serves to select the functional mode of the relay. It is set at 82 (pulse forming) and should never be changed.

Connection of DUT

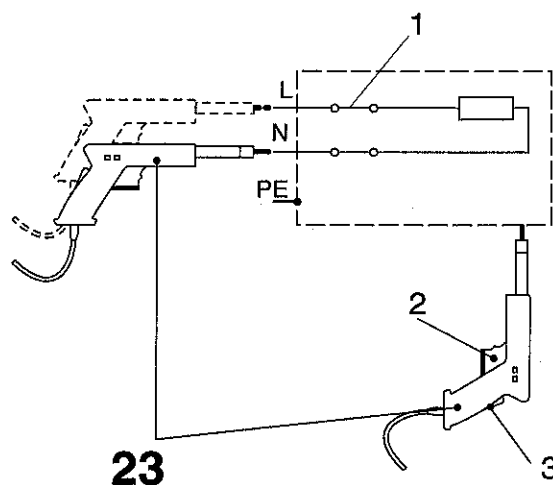


In the operating modes "test" and "burn" high-voltage is transferred as soon as the test pistols are connected!



In case there is a **power switch (1)** on the DUT, this has to be closed!

- Extend test prods of high voltage test pistols (23) - by means of simultaneously pressing both safety buttons (2 and 3)
- Connect DUT via high voltage test pistols (23).

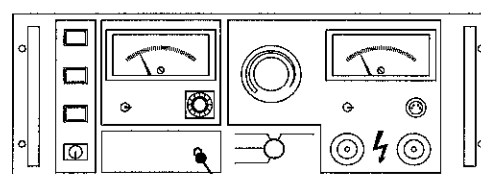



Start time base

- Press push button "start" (11)
- or
- the connected foot-actuated switch (21)
- or close test hood (24)
- or control the device by means of the remote control via the low-voltage interface (20) or the phono connector "rem.ctrl" (16).



The pre-set test time now counts down.



11  start

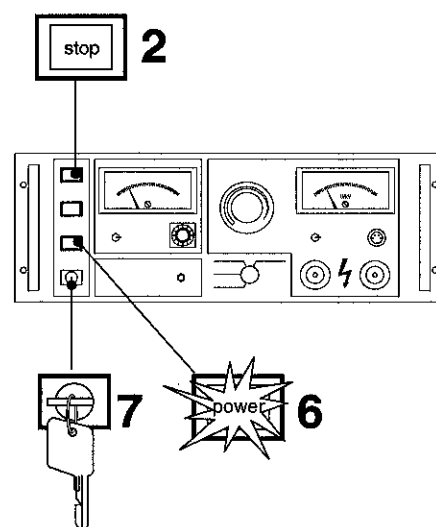
Testing with high voltage

High voltage can be produced with the high voltage tester provided that:

- power supply voltage is available
- key switch (7) is turned on
- key "power" (power supply) (6) is turned on
- key "start" (1) is pressed
- Test current (tripping value) exceeds limit value of set range by 10%

Switching off of tester

- press key "stop" (2),
- press key "power" (power supply) (6) -
- turn key switch (7) left -
- pull power plug from power socket.



Operating modes

1. "test"

Allows non-destructive testing because the high-voltage is switched off by an electronic circuit breaker (two separate circuits) as soon as a fault current (exceeding of set current limit) has occurred.

The response of the circuit breaker causes

sounding

- of an audible alarm

extinguishing

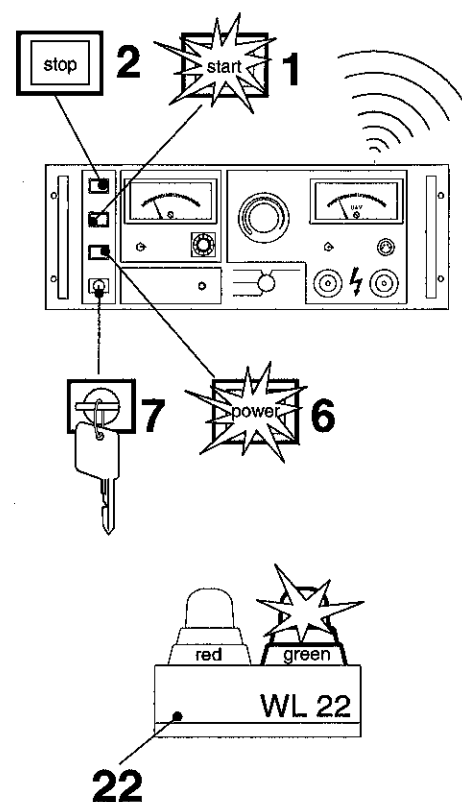
- of the red control lamp in the key "stop" (2)
- as well as the red lamp of the external warning lamp set (22) (accessories)

lighting-up

- of the yellow control lamp in the key "power" (6), and
- the green control lamp in the key "start" (1), as well as
- the green lamp of the external warning lamp set (22) (accessories).

Prepare device for new operation by:

- removal of load (removal of test prods)
- pressing the key "start" (1).



Operating modes

2. "rem.ctrl"

Also permits a non-destructive testing as in the "test" operating mode, however, in this operating mode the device is remote-controlled via the low-voltage interface (20) at the rear side or via the phono connector "rem.ctrl" (16) on the front panel.

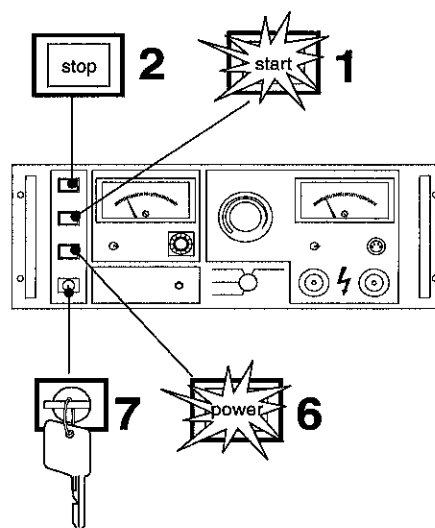
The response of the electronic circuit breaker causes

extinguishing

- of the red signal lamp of the key "stop" (2)
- and of the red lamp of the external warning lamp set (22) (accessories)

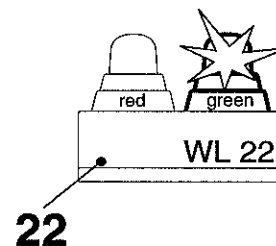
lighting-up

- of the yellow signal lamp of the key "power" (6), and
- of the green signal lamp of the key "start" (1), as well as
- of the green lamp of the external warning lamp set (22) (accessories)



Prepare device for new operation by:

- removing the load (removal of test prods) and by
- pressing the key "start" (1).



Operating modes

3. "AC (t)"

Also permits a non-destructive testing as in the "test" operating mode, however, testing is possible over a specified time.

The test voltage is switched off when:

- the test time has expired or
- the electronic circuit breaker responds (exceeding of pre-set current limit).

The response of the electronic circuit breaker causes

sounding of

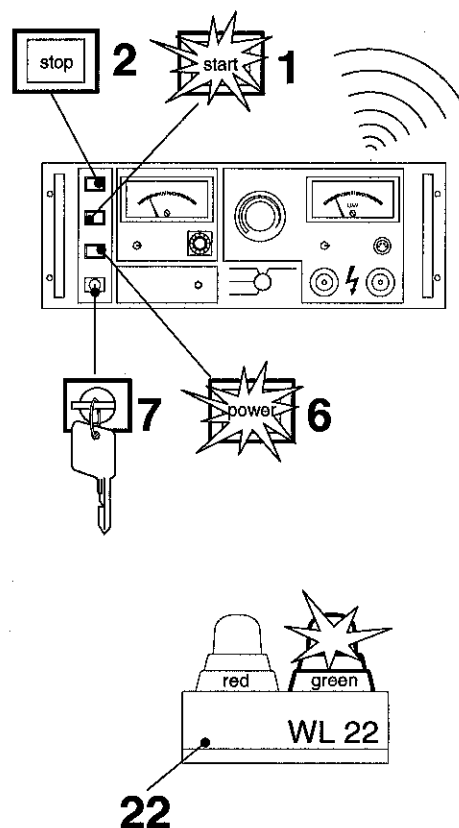
- an audible alarm

extinguishing

- of the red signal lamp of the key "stop" (2)
- as well as of the red lamp of external warning lamp set (22) (accessories)

lighting-up

- of the yellow signal lamp of the key "power" (6) and
- of the green signal lamp of the key "start" (1) as well as
- of the green lamp of the external warning lamp set (22) (accessories)



Prepare device for new operation by:

- removing the load (removal of the test prods) and by
- pressing the key "start" (1)
- or the possibilities mentioned under "start time base" (page 3.13).

Operating modes

4. "burn"



Caution!

Maximum test time for operating mode "burn" is 3 minutes.

If an error has to be located it is, more often than not, advisable to connect a high current with a high voltage.

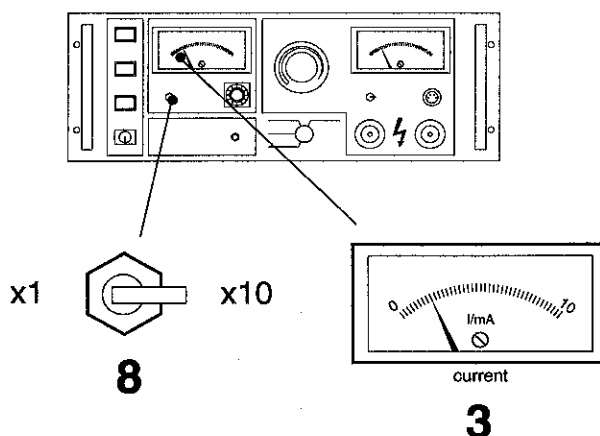
The current is limited to 200 mA max.



In this operating mode the audible warning signal and the electronic circuit breaker are switched off. A short time rating of 1 kVA is available.



In the operating mode "burn" the range must be set to "x10". To protect the device this setting is done automatically.



During the testing

- the current can be observed on the display unit "current" (3).

Contents - Chapter 4

Measurements, weights and performance data	4.1
Fuses	4.3
Interface configuration	4.4
Plug-in interface	4.4
Warning light connection	4.6
Phono socket "rem. ctrl."	4.7
High voltage sockets	4.8

Measurements, Weights and Performance Data

Measurements

width: 464 mm
 depth: 310 mm
 height: 177 mm (= 19" / 4 HU)


Weight

gross: 211 N (approx. 21.5 kg)

Measurement voltage

range 1: 0 – 2.5 kV_{eff}
 scale 105 degrees
 class 1.5
 potential free

range 2: 0 – 5 kV_{eff}
 scale 105 degrees
 class 1.5
 potential free

 The measuring range is automatically changed with the voltage range.

Power supply

voltage: 230 V ± 10%
 frequency: 50 Hz – 60 Hz
 capacity: 1.1 kW max.
 fuse: 6.3 A slow

safety class I


Generation of current

range 1: 0 – 10 mA_{eff}
 range 2: 0 – 100 mA_{eff}
 "burn": max. 200 mA_{eff}

Measurement current

range 1: 0 – 10 mA_{eff}
 scale 105 degrees
 class 1.5
 potential free

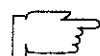
range 2: 0 – 100 mA_{eff}
 scale 105 degrees
 class 1.5
 potential free

 The measuring range changes automatically.

Measurements, Weights and Performance Data

Output voltage

range 1: 0 – 2.5 kV_{eff}
range 2: 0 – 5 kV_{eff}
distortion: < 5 %
frequency: 50 Hz - 60 Hz



potential free to housing
and mains

Time base

range: 1 sec. - 60 hours

Other characteristics

- separate display for current and voltage
- fault evaluation and control for automatic application

Fuses



Caution - Danger of Life!
Pull power plug before opening tester.

Device fuses



comply with DIN (5x20) und
 and trigger only in case of
 faulty operation.

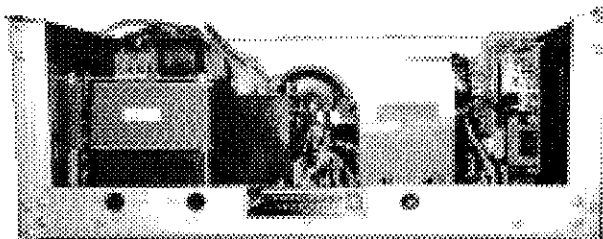
main fuse: 6.3 A slow
 external warning
 lamp red: 230 V / 1 A slow

external warning
 lamp green: 230 V / 1 A slow



in case of failure:
 - high voltage decreases
 - tester cannot be operated
 any more.

Device fuses are on the back panel of
 the plug-in board, to the right of the low
 voltage interface (20-pole DIN socket).



Electronic circuit breakers

range 1: 1 mA – 10 mA_{eff}
 range 2: 10 mA – 100 mA_{eff}



infinitely adjustable

Selector switches

electronic circuit breakers in operation
 in case of switch in position:

- Remote control "rem.ctrl"
- "test", "AC (t)"

electronic circuit breakers not in
 operation in case of switch in position:

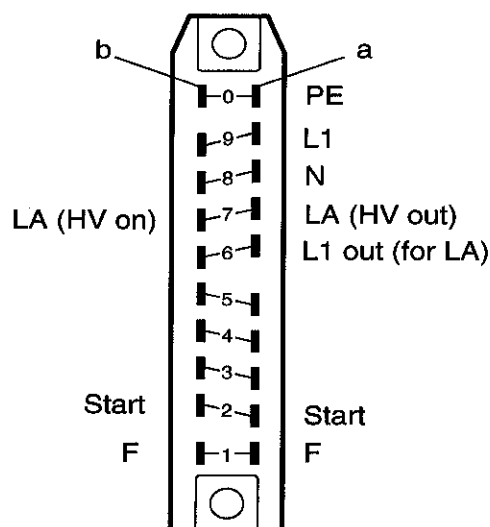
- "burn" (current limited!)


Interface Configuration

1. Plug-in interface

design acc. to DIN 41622 (20-pole)

pos. 20



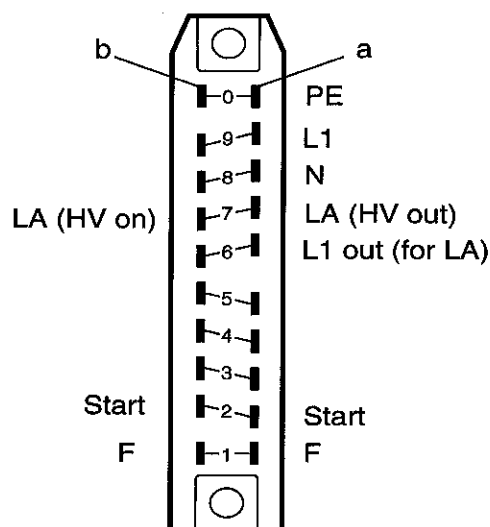
Description	Configuration
PE [a0]	protective wire connection
L1 [a9]	power supply phase (230 VAC \pm 10% 4 A max.)
N [a8]	zero conductor of power supply
LA (HV out) [a7]	connection for warning lights (green). <u>Technical data:</u> voltage: 230 V power supply current: 0.1 A max. - fused in tester
L1 out [a6]	reference potential for warning lights [LA (HV on) / LA (HV out)]  Caution - power supply phase Danger of life due to electric voltage! on back of housing (accessories EH 1904-h) there is a 4-pole (3 + PE) round socket (please see page 4.6).

Interface Configuration

Plug-in interface (continuation)

design acc. to DIN 41622 (20-pole)

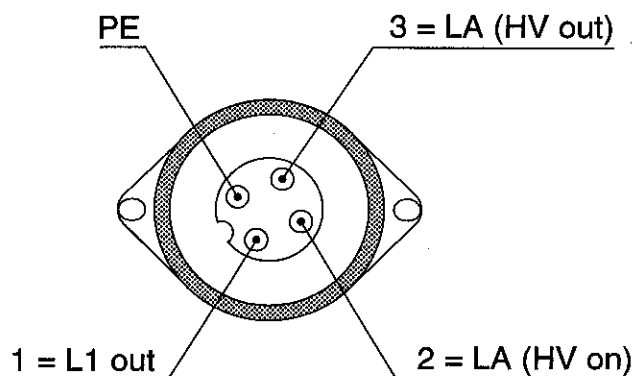
pos. 20



Description	Configuration
Start [a2]...[b2]	<p>Start of the high-voltage testing device by bridging the signal start [a2] against start [b2] in the operating mode:</p> <p>- rem.ctrl</p> <p><u>Technical data:</u></p> <p>U_{in}: 12 V</p> <p>tolerance: max. $\pm 20\%$</p> <p>ripple: max. $\pm 20\%$</p> <p>current: max. 15 mA</p> <p>reference potential: GN</p>
F [a1]..[b1]	<p>These two connections are entirely potential free. They are bridged in case of a high-voltage fault.</p> <p><u>Technical data:</u></p> <p>U_{max}: 40 V DC</p> <p>I_{max}: 50 mA DC</p>
LA (HV on)..[b7]	<p>connection for warning lights (red) - fused in tester</p> <p><u>Technical data:</u></p> <p>voltage: 230 V power supply</p> <p>current: 0.1 A max.</p>

Interface Configuration

2. Warning light connection (in housing - accessories EH 1904-h) pos. 19



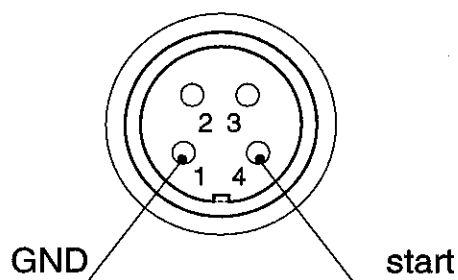
Caution - Danger of Life!
Connection via supply voltage (230 V)

PIN	Description	Configuration
1	L1 out	reference potential for warning lights [LA (HV on) / LA (HV out)]
2	LA (HV on)	connection for warning lights (red). <u>Technical data:</u> voltage: 230 V power supply current: 0.1 A max. - fused in tester
3	LA (HV out)	connection for warning lights (green). <u>Technical data:</u> voltage: 230 V power supply current: 0.1 A max. - fused in tester
PE	PE	protective wire connection

Interface configuration

3. Phono socket "rem.ctrl."

pos. 16

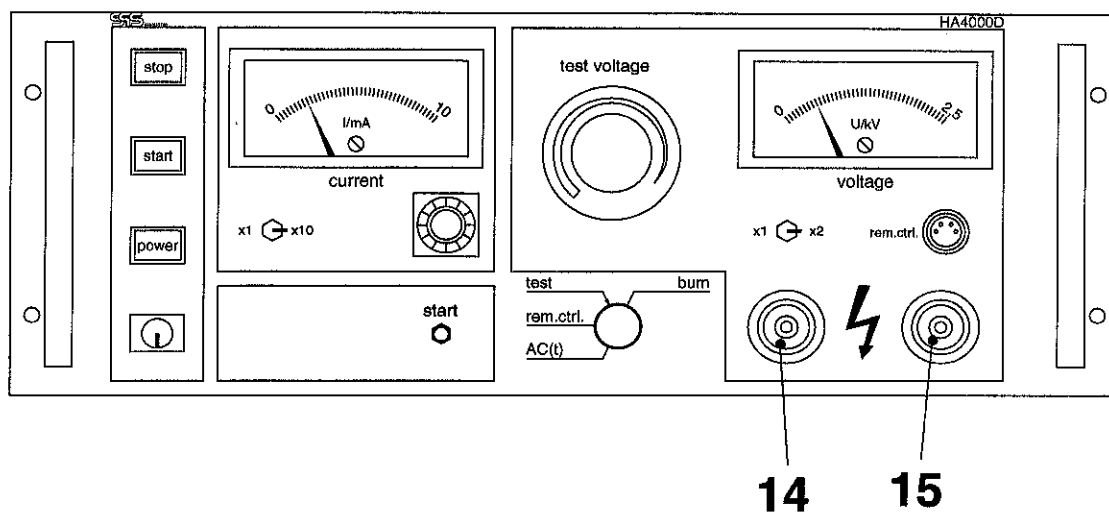


PIN	Description	Configuration
1	GND	reference potential; this connection is potential free .
4	start "test time"	start of time base via foot switch or test hood.

The start occurs by bridging against GND.

Interface configuration

4. High voltage sockets



Contents - Chapter 5

Address for Service	5.1
Replacement Parts	5.1
HA Series at a Glance	5.3
Accessories	5.3
Important Regulations and Standards	5.4
Guarantee Terms	5.5

Service Address

SPS electronic GmbH
Blätteräcker 18
D - 74523 Schwäbisch Hall - Sulzdorf

Telephone: (7907) 878-0
Service: (7907) 878-29
Telefax: (7907) 1770

Replacement Parts

When ordering replacement parts, the following information has to be submitted:

- Device designation high-voltage testing device HA4000D
- Article no.
- Article designation
- Desired quantity

Art. No.	Article	Model	Quantity in device	Priority	Delivery time	Minimum quantity of order
800 190	Plug-in housing	EH 1904-h	–	3	4	1
890 035	Cable connector plug-in unit	BU 20-n	–	3	4	1
890 032	Cable plug rem.ctrl	ST 04-p	–	3	4	1
890 010	Test pistols (pair)	SP 02	–	3	4	1
890 030	High-voltage connector	BU 02	2	3	4	1
890 011	Warning lamp set	WL 22	–	3	4	1
890 012	Warning sign	WS 01	–	3	4	1
890 014	Foot-actuated switch	FS 01-5	–	3	4	1
890 042	Cable plug for warning lamp	ST 04-r	–	3	4	1
890 168	High voltage transducer	Wdl 201	1	2	4	1
850 020	High voltage transformer 500 VA	HA 50	1	2	4	1
850 000	Variable-ratio transformer 2A	230 V	1	2	4	1
850 011	Throttle	DR 1b	1	2	4	1

Replacement Parts

Art. No.	Article	Model	Quantity in device	Priority	Delivery time	Minimum quantity of order
840 150	Potentiometer (ceramic)	10k/lin.	1	2	4	1
840 074	Analog instrument 10 V (DC)	2.5 kV	1	2	4	1
840 071	Analog instrument 10 V (DC)	10 mA	1	2	4	1
820 090	Resistor	5k6/4W	1	2	4	5
840 008	Selector switch	6xEIN	1	2	4	1
840 013	Key switch	2xEIN, 1xremovable	1	2	4	1
840 020	Switch	1xEIN Rafi	1	2	4	1
840 023	Switch	1xUM	2	2	4	1
840 019	Button	1xEIN Rafi	2	2	4	1
840 018	Bulb	30 V	1	1	2	5
840 016	Bulb	12 V	2	1	2	5
820 466	Safety fuse 5x20	1At	3	1	2	10
820 472	Safety fuse 5x20	6.3At	1	1	2	10
860 042	Semi-conductor relay	10 A	1	2	4	1
860 046	Multi-functional relay	KE69	1	2	4	1

HA Series at a Glance

Model	Design	Equipment
HA4000D	19" / 4 HU	<p>Basic unit with the operating modes:</p> <ul style="list-style-type: none"> - "test" - "rem.ctrl" remote control - "AC (t)" - "burn" <p>Infinitely variable voltage setting within the range from 2500 V (AC) to 5000 V (AC)</p> <p>Infinitely variable setting of the tripping current within the range from 10 mA (AC) to 100 mA (AC)</p> <p>Display units for current and voltage</p>

Accessories	
No.	Description
EH 1904-h 19"/4HU	plug-in housing
SP 02	test pistol
WL 22	external warning light set
FS 01-5	foot switch
GW 1916	device trolley
HB 6011-5	test hood
KE 01	PVC enclosure chain, per meter
WS 01	danger sign
AP 01	poles for enclosure

Important Regulations and Standards

Safety Regulations	"General Safety Regulations" (VBG 1)
Safety Regulations	"Electrical Systems and Production Facilities" (VBG 4)
Safety Regulations	"First Aid" (VBG 109)
DIN VDE 0101	"Regulations for Installation of Power Plants with Rated Voltages of more than 1 kV"
DIN VDE 0104	"Test Installations with voltages of more than 1 kV"
DIN VDE 0105 part 1	"Regulations for the operation of Power Plants - General Safety Regulations"
DIN VDE 0106 part 1	"Protection against Electric Shock. Classification of Electrical and Electronical Production Facilities"
DIN 40 008 part 3	"Safety Labels for Electrical Engineering; Danger Signs and Supplementary Labels"
DIN 40 050	"IP-Protective Systems; Contact-, Foreign Matter- and Water-Protection for Electrical Production Facilities"

Guarantee Terms

■ **Guarantee validity**

12 months after delivery.

■ **Guarantee claims can only be accepted provided that**

1. The high voltage tester HA 4000D tester has to be operated by qualified personnel of the client.
2. Checks must be executed annually and properly (by SPS electronic GmbH).
3. Faulty or worn out parts must be replaced at once. Safety rules prohibit operation with any such parts.
4. Faulty parts with a guarantee claim have to be presented to SPS electronic GmbH for checking.
5. Any occurring faults must be reported immediately to SPS electronic GmbH.
6. The connecting lines leading to the high voltage tester HA 4000D must be installed properly before starting operation (these operations are excluded from the delivery conditions).

■ **Begin of guarantee**

Guarantee will begin on the date stated in the delivery note of the tester.

■ **Guarantee services**

SPS electronic GmbH guarantees that the high voltage tester HA 4000D will function properly, that it has been produced with care and by qualified personnel and that only materials of high quality have been used.

All parts will be replaced free of charge which, within the validity period of the guarantee, become faulty or useless due to inadequate materials, production faults or faulty design.

■ **Excluded from guarantee**

1. Damages due to circumstances beyond our control, mainly improper handling or local conditions.
2. Damages to testers from which the serial number has been removed, destroyed or manipulated.
3. Parts that wear easily like fuses, signal lamps, etc.