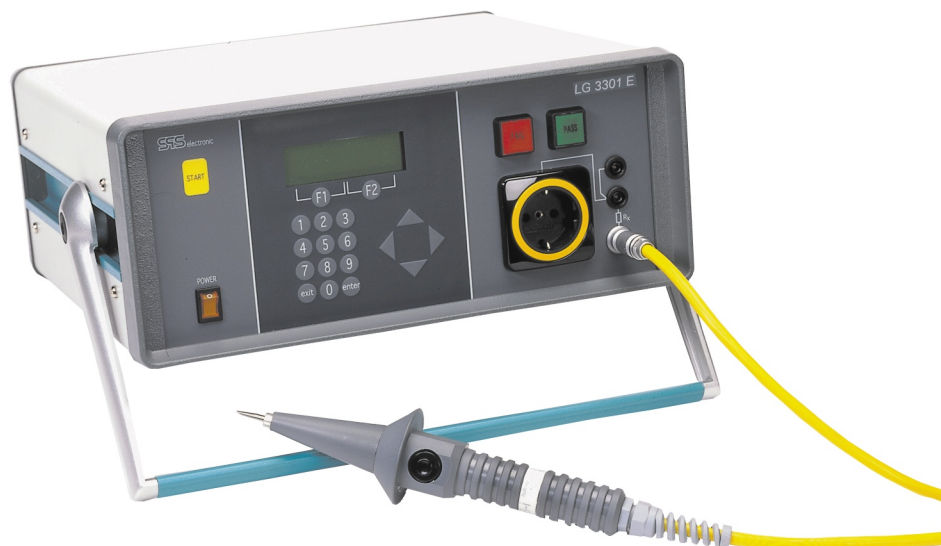


Operating Manual

Compact Tester Series LG 3301

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1 General Information

1.1 Information on this manual

This operating manual is part of the technical documentation for the Compact Tester **LG 3301** of *SPS electronic GmbH*.

In this operating manual you will find all the information on how to operate this tester properly, safely and economically, how to prevent danger, how to reduce repair costs and downtimes as well as how to increase the tester's service life.

Should you, while reading this manual, find misprints, information you don't understand or wrong information, please don't hesitate to inform *SPS electronic GmbH* respectively.

Contents

In this operating manual you will find three chapters and one appendix. You will find additional information in the appendix.

The headline will show you which chapter you are reading. The bottom line will show you the type of device in the middle, and on the right-hand side the page number.

Piktograms and symbols

- **Warnings** are symbolized by warning triangles with danger symbol, they warn of possible personal injury and/or damage to property.



General Warning




Dangerous electric current or voltage

- **Pointers** are symbolized by the information pictogram and give recommendations or additional information.



You can order all of these accessories directly from *SPS electronic GmbH*.

- **Continuations** of coherent sections on the next page are indicated by the symbol  in the lower right corner of a page.



... PIKTOGRAMS AND SYMBOLS

More than one operation is symbolized by ●

- example: ● protective wire test (PE-test)
● insulation test (IS-Test)

Consecutive operations are numbered step by step.

- example: 1. switch on power switch
2. press key F2 (< Prgnr >)

results are symbolized by ⇒

- example: ⇒ LC-display shows current program number.

1.2 Requirements for operation of device

1.2.1 Operating specifications

The tester *LG 3301* must be reliable and perform properly.

Operation of the tester is not allowed if:

- the tester is not assembled, operated, maintained and serviced according to this manual or as recommended by *SPS electronic GmbH* respectively
- it is modified and/or repaired without authorization
- it is disassembled and/or safety equipment is disregarded
- components, tools, auxiliary equipment and/or means, and/or fuel, coolants and lubricants which have not been approved or recommended by *SPS electronic GmbH* are being used
- replacement parts which are not original *SPS electronic GmbH* ones or which are not supplied by a supplier recommended by *SPS electronic GmbH* are being built in

1.2.2 Product liability

Series *3301* testers are manufactured, adjusted/calibrated and tested according to the latest and approved technical and safety regulations.

The testers comply in design and in the selection of component parts and accessories with the terms agreed upon in the order confirmation.

SPS electronic GmbH will be liable for errors or failures/omissions to the extent of the obligations guaranteed in the order confirmation.

The terms of guarantee and liability of the *SPS electronic GmbH* sales and delivery conditions are applicable.

The contents of this operating manual complies with the condition of this tester at time of issue of this manual.

SPS electronic GmbH products are subject to change due to continuous development and improvement.

No liability claims can be made on the grounds of the contents of this manual (e.g. data, specifications, diagrams/charts, misprints, etc.).

Errors and omissions excepted!

***SPS electronic GmbH* will only be liable if the tester *LG 3301* has been operated or used properly (pl. see 1.2.1).
If the testers are not operated or used properly the operator will be solely responsible for endangering life and limb of the user or a third party and for damaging the device and other property as well!**



1.3 General instructions and regulations on safety

The Compact Tester *LG 3301* is produced in compliance with the technical requirements at time of delivery.

Nevertheless, there can occur dangerous situations in connection with the tester if not operated properly by trained personnel or if used inexpertly or against regulations.



Further to this manual the generally applicable legal regulations and other binding directives in regard to safety on the job, to accident prevention and to environmental protection must be observed.

1.3.1 User's responsibility

- Only when **performing properly and reliably** the tester must be operated (pl. see 1.2.1)
- Equipment for protection and safety, locking devices and couplings, etc. must be checked by a technical expert at least once a year.
The test results must be recorded in a **test certificate** and they must be kept in a file.
- **Instruction is compulsory** when operating, in any way, a machine or an equipment which may endanger the health and/or life of persons.
- People operating in any way an *S 3301* must acknowledge with their signature that they read and understood this operation manual, especially the paragraph on instructions and regulations on safety.
- Dangerous areas resulting from **incorporating** the tester into a system or device must be located and secured by the user/operator.
- When setting up or installing devices, systems or production facilities of different manufacturers or suppliers as well as after modifications by company or service personnel whereby electrical equipment is manipulated, the operator must, before starting the operation, conduct a precise check according to the accident prevention regulations VBG 4 and in compliance with the appropriate electro-technical regulations respectively.

1.3.2 Personnel

- Operating manual, instructions and regulations are an essential part of the tester and must, at all times, be within easy reach of all the persons operating in any way an *LG 3301* tester.
- Before starting to operate an *LG 3301* tester questions concerning their proper operation have to be answered by or discussed with the personnel in charge.
- Trainees and persons under the age of 18 shall only operate an *LG 3301* when supervised by trained personnel, like electricians and/or technical engineers.
- Adjustments/calibrations, maintenance and inspections have to be executed in time and according to specifications.

1.3.3 Safety equipment

The externally feeded voltage for the function test is **not** safeguarded by the device! Therefore, in accordance to EN 50191, the feeded voltage **must** be safeguarded **externally** by appropriate means (fault-current circuit breaker, emergency-stop button, isolating transformer, o.s.) !



1.3.4 Information on additional literature

For the protection of persons the trade associations and unions have published below literature:

- DIN EN 50191 Installation and Operation of Electrical Installations
- DIN EN 50274 Protection against Electric Shock –
Protection against unintended direct contact of dangerous active parts
- DIN 40 008 part 3 Safety Signs for Electrical Engineering;
Warning Signs and Additional Signs
- DIN 40 050 IP-Protective System, Protection against Contact, Foreign Matter and
Water for Production Equipment
- DIN 57100 Specifications for the Installation of Power Plants with Nominal
Voltages of up to 1000 V



2 Hardware Description

The devices LG3801 and LG3881 are safety current limited acc. to EN 50 191, and are not equipped with a hardware safety circuit.

2.1 Device functions

With the Compact Tester **LG 3301**, safety tests for electrical devices according standardized test regulations (EN, IEC, VDE etc.) can be performed.

Below tests can be performed:

	LG 3301D	LG 3301E	LG 3301K
Continuity test, 22 V DC for current measurement between connections L / N	●	●	●
Protective wire test, 10 – 30 A AC for measurement of the resistance between PE-conductor and housing	●	●	●
Insulation test, 500 V DC for measurement of resistance between PE and L+N	●	●	●
High voltage test 1500 / 2200 V DC, fixed voltage for checking the electric strength between PE and L + N	—	1500 V DC	2200 V DC
Function test for current consumption measurement with specified nominal voltage	via ext. supply, up to 300 V / 4 A (optionally up to 16 A)		

The standard type of these devices is designed as a stand alone for the operator.

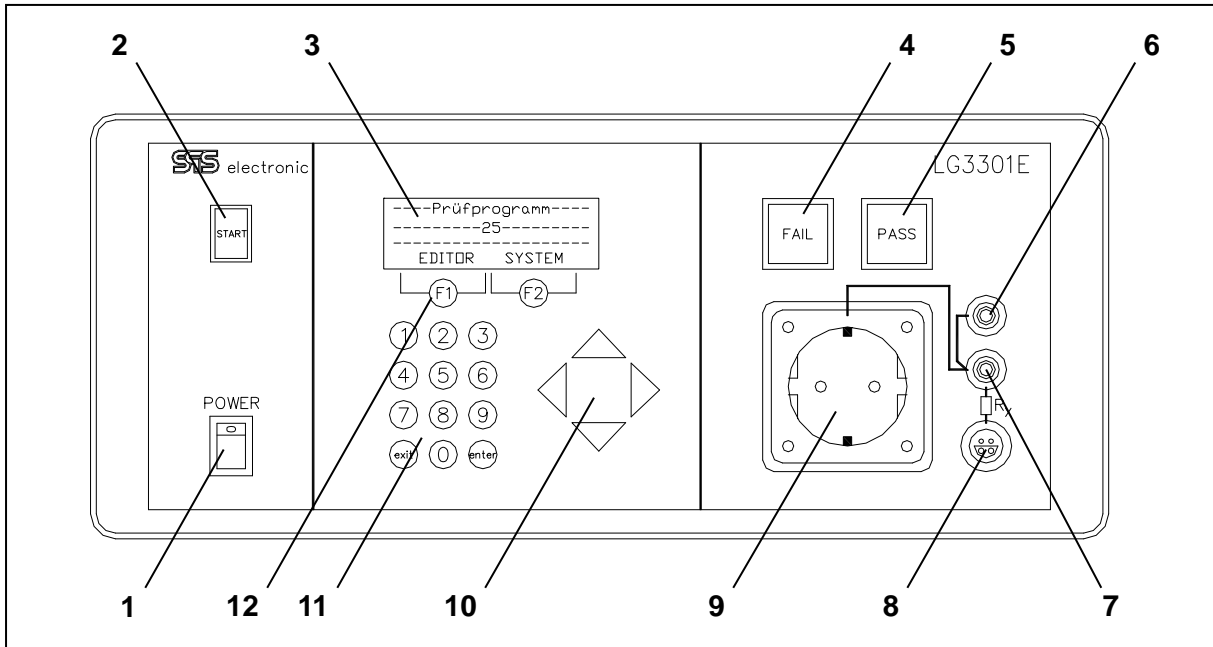
2.2 Technical data

Dimensions and weight			
• width / depth/ height	LG 3301D/E: approx. 380 / 360 / 150 mm (14" / 3 HU) LG 3301K: approx. 490 / 360 / 180 mm (19" / 4 HU)		
• weight	LG 3301 D/E: approx. 130 N (13.0 kg) LG 3301 K: approx. 150 N (15.0 kg)		
Environmental conditions			
• Temperature	operating: 15 °C – 40 °C non-operating: 5 °C – 60 °C		
• Humidity	max. 70% (not condensating)		
Connection specifications			
power supply	230 V ± 10% / 50 Hz (115 V / 60 Hz optional)		
power consumption	max. 2300 VA		
Operating specifications			
• Continuity test			
- test voltage	22V DC ± 2%		
- thresholds	programmable		
- measuring range	up to 500 mA DC (short circuit)		
	range	resolution	precision
	0 up to 500 mA	1 mA	1.5% of meas. value ± 1 mA
• Protective wire test			
- test current	programmable from 10 up to 30 A AC		
- thresholds	programmable		
- measuring range	up to 500 mΩ (VDE 0700 / EN 60 335-1)		
	range	resolution	precision
	0 up to 500 mΩ	1 mΩ	1.5% of max. range value ± 1 mΩ
	Typically achieved max. measurements: 20 A : 500 mΩ 25 A : 400 mΩ 30 A : 300 mΩ		
• Insulation test			
- test voltage	500 V DC (Tolerance: 500 – 510 V)		
- thresholds	programmable		
- short circuit current	< 10 mA DC		
- measuring range	5 MΩ and 50 MΩ		
	range	resolution	precision
	0.25 up to 5 MΩ	0.1 MΩ	2.5% of max. range value
	5 up to 50 MΩ	0.5 MΩ	5% of max. range value

● High voltage test DC (only LG3301E and LG3301K)			
- test voltage	LG 3301E: 1500 VDC (Tolerance: 1490 – 1530 V) LG 3301K: 2200 VDC (Tolerance: 2180 – 2244 V)		
- thresholds	programmable		
- short-circuit current	<10 mA DC		
- measuring range	0 up to 4 mA DC (LG 3301K: 0 - 3 mA DC)		
	range	resolution	precision
	0.1 up to 4 mA	0.01 mA	1.5% of max. range value
● Function test			
- test voltage	external, up to 300 V AC		
- thresholds	programmable		
- measuring range	standard: 0– 4 AAC optional: 0–10 0–16 AAC		
	range	resolution	precision
	0 up to 4 A	0.01 A	1.5% of max. value
	0 up to 10 A	0.1 A	1.5% of max. value
	0 up to 16 A	0.1 A	1.5% of max. value

2.3 Design and Functions

2.3.1 Front panel

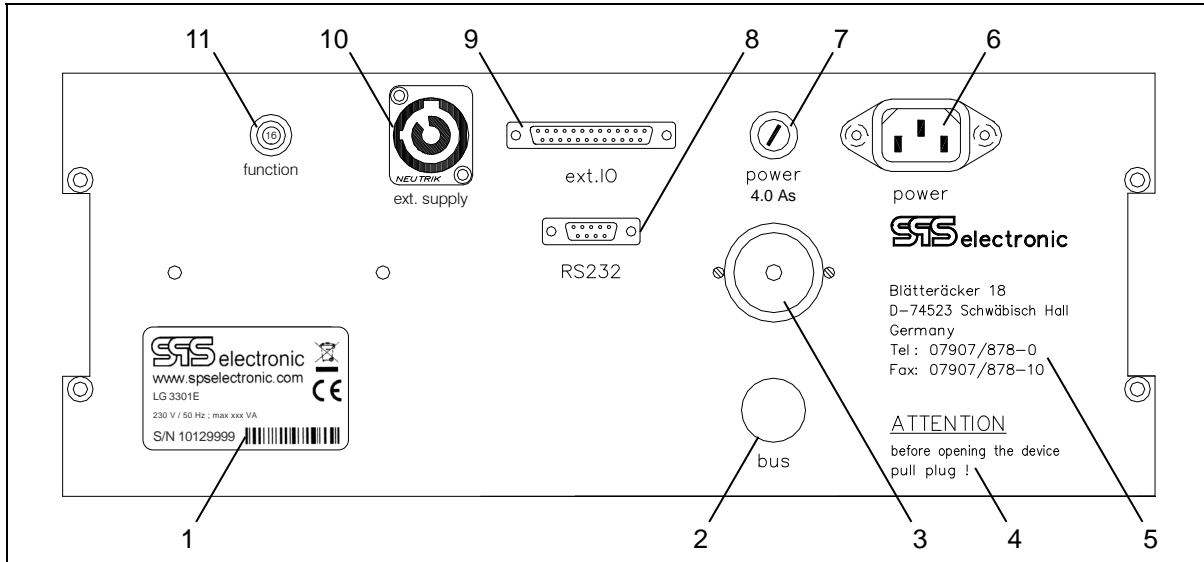


Front panel of LG 3301

- 1 Mains switch to switch device on or off
- 2 Key START to perform test run acc. to active programm
- 3 LC-display
- 4 red light fail
lights up if test failed or DUT did not pass test
- 5 green light pass
lights up if DUT passed test
- 6 socket for PE sense line
- 7 socket for PE source line
- 8 socket to connect a test probe
- 9 Schuko-socket to connect DUT
- 10 cursor keys for selections
- 11 number keys for inputs
- 12 exit key (= F1), enter key (= F2)

2.3.2 Rear panel

Devices LG 3301 D and LG 3301 E :



Rear panel of **LG 3301D + LG 3301E**

1 Type label with

- address of manufacturer
- device designation (type)
- serial number (no)
- max. power consumption at 230 V / 50 Hz in VA
- CE mark

2 Not occupied

3 Buzzer

4 Safety instruction:

*ATTENTION
before opening device
pull plug!*

5 Address of manufacturer

6 Cold appliance socket for power cable

7 Main Fuse

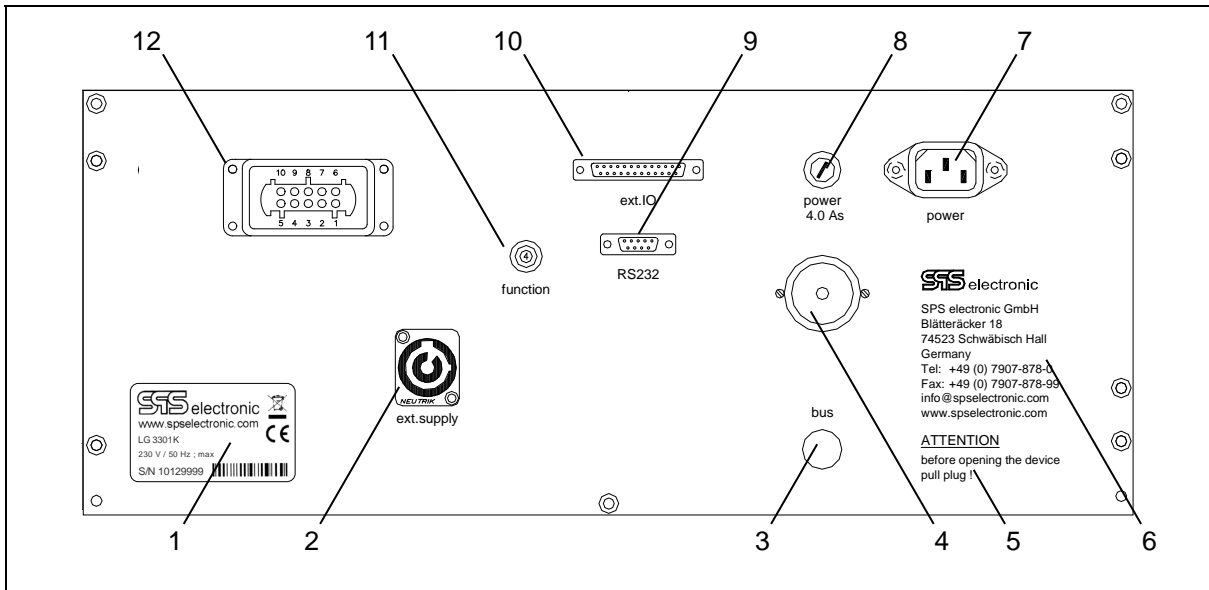
8 RS 232 - interface for connection of printer or PC

9 I/O – interface

10 External voltage connector

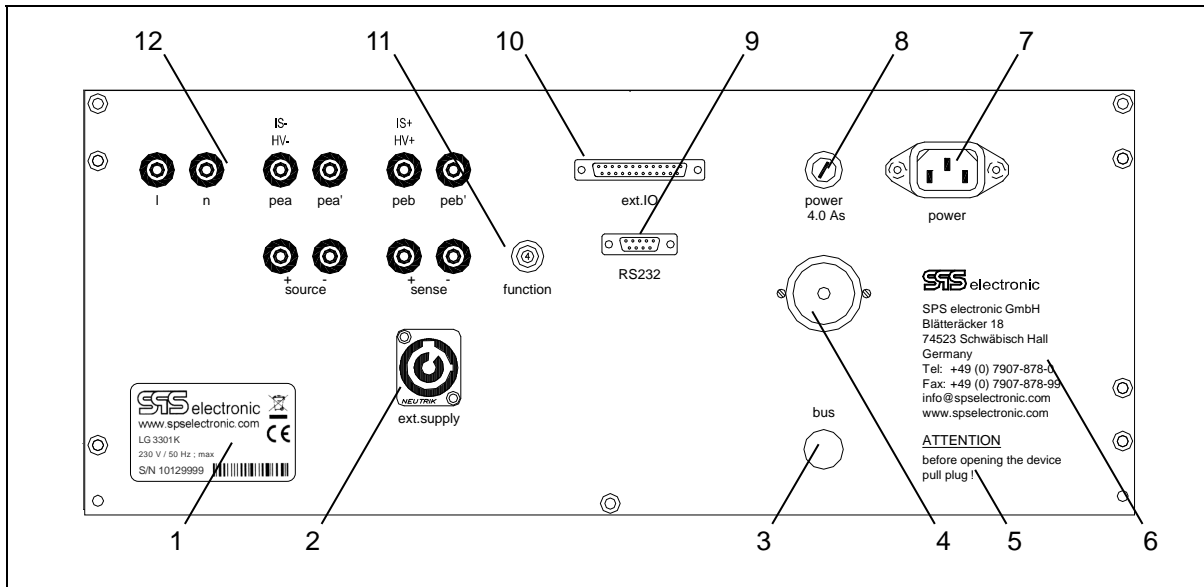
11 Fuse FT-test

Device LG 3301 K (standard):



Rear panel LG 3301K

- 1 Type label with
 - address of manufacturer
 - device designation (type)
 - serial number (no)
 - max. power consumption at 230 V / 50 Hz in VA
 - CE mark
- 2 Feed-in for external voltage (function test)
- 3 Not occupied
- 4 Buzzer
- 5 Safety instruction:
 - ATTENTION*
 - before opening device*
 - pull plug!*
- 6 Address of manufacturer
- 7 Cold appliance socket for power cable
- 8 Main Fuse
- 9 RS 232 - interface for connection of printer or PC
- 10 I/O – interface
- 11 Fuse for function test
- 12 Industrial socket for connection of test adapter

Device LG 3301 K (model variant):


Rear panel LG 3301K (model variant)

1 Type label with

- address of manufacturer
- device designation (type)
- serial number (no)
- max. power consumption at 230 V / 50 Hz in VA
- CE mark

2 Feed-in for external voltage (function test)

3 Not occupied

4 Buzzer

5 Safety instruction:

*ATTENTION
before opening device
pull plug!*

6 Address of manufacturer

7 Cold appliance socket for power cable

8 Main Fuse

9 RS 232 - interface for connection of printer or PC

10 I/O – interface

11 Fuse for function test

12 Labor sockets for connection of measuring lines

3 Operation

3.1 Start of Operation

3.1.1 Requirements

The lighting tester *LG 3301* as well as all the electrical connections and cables must function and perform properly and reliably.
The generally applicable safety regulations (pl. see paragraph 1.3) and the generally valid legal regulations as well as any other applicable and valid regulations as to safety on-the-job, accident prevention and environmental protection have to be observed and persons working in such an area, have to be instructed respectively.



There is danger of life caused by electric current or voltage if not dealing properly with electrical systems!



If a function test is performed with the *LG 3301* the supply function voltage has to be protected by an external fault-current circuit breaker!



3.1.2 Installation of test station

- 1st choose a level, clean and dry base for your test station
- 2nd if necessary turn off power switch (key switch) at tester
- 3rd plug power cable at the back of tester into cold appliance socket and connect to power supply
4. connecting test probe

3.1.3 Connecting DUT


Connect power connection of DUT to the tester:

- to the standard socket in the front panel
- or*
- to the socket or lab sockets at connector desk (expansion)

3.2 Changing of program settings



To find your way through the program, below symbols will be used:

-  function of LCD display
-  input

Displays on LCD appear in `typewriter` characters



**For entry of letters, numbers and special characters with number keys
(needed when entering name of program):**

- with key ① 1 character forward
- with key ④ 1 character backward
- with key ② 5 characters forward
- with key ⑤ 5 characters backward
- with key ③ 10 characters forward
- with key ⑥ 10 characters backward

With the cursor keys the cursor can be moved to a position in the program name to enter characters.

Basic display will appear after switching on of tester:



```
Pr.01    NONAME
with <START> to test

< menu > < prgno >
```



After pressing key F1 (< menu >), menu password has to be entered. (depends on the setting »password« in *system parameter*)

Display of parameter groups:



```
→ test parameter
   system parameter
```

1st select parameter group:

-  with cursor keys, set arrow (→) to the desired parameter group
-  acknowledge selection with F2 (< select >)

2nd have parameter of a parameter group displayed or changed:

- for changing of test parameter pl. see p. 22ff
- for changing of system parameter pl. see p. 19

3.2.1 Programming individual test programs

The lighting testers *LG 3301* can store up to 50 different testing programs.

Delivered devices contain the default test program on program number 1, called "Noname". It contains all available tests with their default values.

The program numbers 2 to 50 are deactivated since all "test time" parameters are set to 0.0s.

To arrange an individual test program, proceed the following steps:

1. Set the tester back to basic display:
 - switch the device off and on, or press <F1> several times
2. choose the desired number of test program (1-50) :
 - press <F2> (Prgno.)
 - enter the desired number of test program with number or cursor keys
 - acknowledge your selection with <F2>
3. to upset the test parameters:
 - with cursor keys, scroll to the test to be changed
 - please see chapter 3.3, page 24ff. for a detailed description of all test parameters
 - if you wish a test to be skipped, set *TEST TIME* to 0.0

Every change in a test program will be saved immediately by pressing <F2> (<OK>).

In case you made silly changes and wish to reset parameters to former status, simply press <F1> (<CANCEL>)


3.2.2 Changing of system parameters

After having preselected the parameter group *system parameter*, you can select a function (pl. see paragraph 3.2). To change it:


1stgo to *system parameter* with cursor keys and select with F2 (< select >)


2nd changing of presetting:

 LANGUAGE ###


 press F2 (< select >)


 German

 English

 select desired language with cursor keys and acknowledge with F2 (< OK >)
all the displays will be switched automatically to the chosen language


 OPERATING MODE ###

 press F2 (< select >)


 manual




digital (*program selection via external I/O*)


automatic (*remote control via PC to RS 232 interface*)




 preselect operating mode with cursor keys and acknowledge selection with F2 (< OK >)


... CHANGING OF SYSTEM PARAMETERS




-  SYSTEM TIME ##:##


 -  press F2 (< select >)
 -  08:00
 -  enter time (hours : minutes) with numeric keys and acknowledge with F2 (< OK >).




-  SYSTEM DATE ##.##.####


 -  press F2 (< select >)
 -  01.01.2010
 -  enter date (day.month.year) with numeric keys and acknowledge with F2 (<OK>)




-  BUZZER ###


 -  press F2 (< select >)
 -  soft
 - loud
 - off
 -  select volume with cursor keys and acknowledge selection with F2 (< OK >)






-  PRINT FORMAT ###

 -  press F2 (< select >)
 -  condensed *(print test protocols with format 40 characters per line)*
 - page *(print test protocol page by page)*
 - endless *(print test protocol continuously)*
 - line *(minimum protokol: prints only test results [GOOD / BAD])*
 - data logger *(compact version for a data logger)*
 -  select printer format with cursor keys and acknowledge with F2 (< OK >)
(for examples for above formats, pl. see appendix)






-  PROTOCOL ###


 -  press F2 (< select >)
 -  never *(do not print test results)*
 - pass *(print test results only when test was passed)*
 - error *(print test results only when test was not passed)*
 - always *(print results after each test)*
 -  select protocol setting with cursor keys and acknowledge with F2 (< OK >)





-  PASSWORD ###


 -  press F2 (< select >)
 -  proppassword *(access to program selection permitted)*
 - menupassword *(access to preset programs permitted)*
 -  select password type with cursor keys and acknowledge with F2 (< select >)
 -  password please:
 -  enter current password with numeric keys
(for devices to be delivered the password is 0000 [deactivated])




... CHANGING OF SYSTEM PARAMETERS

-  new password?
 -  press F2 (< select >)
 -  enter new password with numeric keys
 -  store password?
 -  press F2 (< select >)
- ⇒ the new password is stored and activated (if other than 0000)




 SPECIAL FUNCTIONS

-  press F2 (< select >)
-  Multistart [YES/NO] - *(Chooses whether the Motor Stop function is available for usage (see Appendix A-3))*
-  PE-Res.Offset [000-500 mΩ] - *(The chosen value is subtracted from all PW-measureings, to compensate the influence of measuring lines)*
-  DAT3800 Lizenze [Password/No] *(To enter the license password of DAT3800)*

 SERIAL NUMBER ###

-  press F2 (< select >)
-  yes *requesting input of a serial number before each test (up to 20 characters from 0 to 9 possible)*
-  no *no serial number*

 HEADING LINE ###

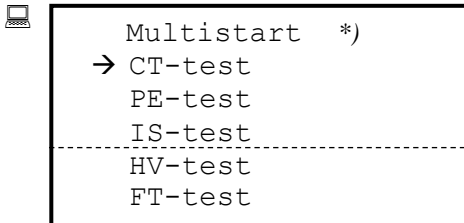
-  press F2 (< select >)
-  enter heading line (up to 40 characters) with cursor keys (pl. see hint at p.18)
-  acknowledge input with F2 (< OK >)

Serial number and heading line are only required for print-out.



3.2.3 Changing of test parameters

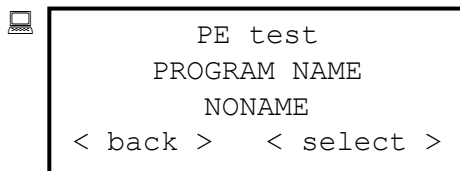
After having preselected the parameter group `test parameter`, you can select a test function: (pl. see paragraph 3.2)



*) the entry "Multistart" is only visible with `Multistart = YES` in the system parameters.

1st select test function :

- ☞ with cursor keys, set arrow (→) to the desired parameter group
- ☞ acknowledge selection with F2 (<select>)



(first test parameter)

2nd select test parameter:

- ☞ go to desired test parameter with cursor keys
- ☞ acknowledge selection with F2 (<select>)

For a detailed description of the test parameters, please see paragraph 3.3, page 24ff.

The "Multistart" testing mode

If the option `Multistart = YES` has been set in *System parameter / Special functions*, then the testparameter menu will offer the additional option "Multistart" (see figure above).

By setting of `Multistart = 2/3/4` it is possible to excute several tests one after another.

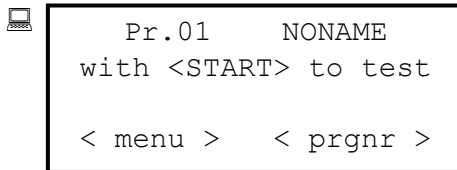
The default value for this parameter is "1" (normal operation without multistart).

For a detailed description of the multistart functionality, please see annex A-3 Multistart .

3.3 Executing tests

1. If provided for, switch on external devices (control desk, PC, printer)
2. Switch on power switch (key switch) at tester
 ⇒ tester initializes itself automatically.
 after about five seconds basic display will appear

Basic display after switching on of tester:



```

Pr.01      NONAME
with <START> to test

< menu >  < prgnr >
  
```

3. Select one of below functions:
 - **Executing test with preset program**
 (the program number is displayed)
 - ☞ press key START
 - ☞ enter serial number if necessary
 (depending on system parameter `serial number`, pl. see paragraph 3.2.2)
 ⇒ test is started
 - ☞ for individual test steps press key START if necessary
 (during HV-AC-test, START-button has to be hold all the way through test time)
 - **Loading of a different program**
 - ☞ press F2 to select < prgno >
 - ☞ enter program password (if active)
 - ☞ enter desired program number
 - ☞ press F2 (< OK >)
 ⇒ program will be loaded

or

 - ☞ change step by step with cursor keys
 ⇒ program will be loaded
 - **Changing of program settings**
 - ☞ press F1 to select < menu >
 - ☞ enter menu password (if active)
 - ☞ for changing of preset programs pl. see paragraph 3.3, page 24ff.

3.3.1 Continuity test

For the continuity test 22 V DC are applied between the connections **L** and **N**, the current flowing (up to 500 mA) is being measured.

If there are values of current **between** I_{\min} and I_{\max} , DUT **passed** the continuity test.

Green light *pass* will light up.

If there are values of current **smaller than** I_{\min} or **larger than** I_{\max} , DUT **failed** continuity test, i.e. DUT is not contacted or its insulation is insufficient

Red light *fail* will light up.



The testing voltage of the CT test is not stabilized, and may vary depending on load.

Proceeding

After having chosen the parameter group `test parameter` (see p.18) you'll have to choose the test funktion `PE test`:

- ☞ with cursor keys, set arrow (\rightarrow) to `PE test`
- ☞ acknowledge selection with F2 (`< select >`)



```

PE test
PROGRAM NAME
NONAME
< back >  < select >

```

(first test parameter)

Selection of test parameter:

- ☞ go to desired test parameter with cursor keys
- ☞ acknowledge selection with F2 (`< select >`)

Test parameters of CT test

- ☞ PROGRAM NAME ###
 - ☞ enter program name with numeric keys (pl. see hint on p.18)
 - ☞ acknowledge input with F2 (`< OK >`)
- ☞ EXECUTE
 - yes (*execute continuity test between L and N [for 1 sec]*)
 - no (*no continuity test*)
 - ☞ acknowledge input with F2 (`< OK >`)
- ☞ min. current ### mA
 - ☞ enter numeric value (000 – 500) with cursor or numeric keys
 - ☞ acknowledge input with F2 (`< OK >`)
- ☞ max. current ### mA
 - ☞ enter numeric value (000 – 500) with cursor or numeric keys
 - ☞ acknowledge input with F2 (`< OK >`)



In case of preset value of $I_{\max} \leq 499$ mA this value must not be surpassed.
 In case of preset value of $I_{\max} = 500$ mA the max. current is no longer monitored, i.e. if there is continuity (no matter e.g. if 5 mA or even 2 A), the result will be PASS.

3.3.2 Protective Wire Test

The protective wire test measures the resistance between PE (earthing) and housing of DUT. The resistance has to be as small as possible. Otherwise contact between PE and housing is insufficient.

If there are values of resistance **between R_{min} and $R_{max} \leq 500 \text{ m}\Omega$** , DUT **passed** protective wire test, i.e. DUT is earthed acc. to regulations.
Green light *pass* will light up.

If there are values of resistance **smaller than R_{min} or larger than R_{max}** , DUT **failed** protective wire test, i.e. its earthing is insufficient.
Red light *fail* will light up.

To skip the protective wire test, set the parameter *NUMBER = 00* .

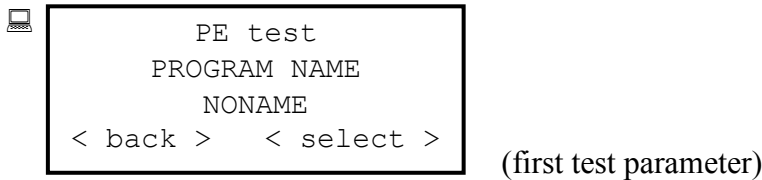
When assembling various systems the earthing at the connection points can be interrupted so that for example the sides of the housing are sufficiently earthed, however the back of the housing is not sufficiently earthed.



Proceeding

After having chosen the parameter group *test parameter* (see p.18) you'll have to choose the test funktion *PE test*:

- ☞ with cursor keys, set arrow (\rightarrow) to *PE test*
- ☞ acknowledge selection with F2 (< select >)



Selection of test parameter:

- ☞ go to desired test parameter with cursor keys
- ☞ acknowledge selection with F2 (< select >)

Test parameters of PE test

- ☞ PROGRAM NAME ###
 - ☞ enter program name with numeric keys (pl. see hint on p.18)
 - ☞ acknowledge input with F2 (< OK >)
- ☞ NUMBER ##
 - ☞ enter numeric value (from 00 to 99) with cursor or numeric keys
 - ☞ acknowledge input with F2 (< OK >)

... TEST PARAMETER PE TEST

- [] TEST TIME ##.# s
 - ☞ enter numeric value (00.0 – 99.9) with cursor or numeric keys
 - ☞ acknowledge input with F2 (< OK >)
- [] START MODE
 - manual *(with key START)*
 - automatic *(when contacting DUT with test probe)*
 - ☞ selection of desired start mode
 - ☞ acknowledge selection with F2 (< OK >)
- [] CURRENT ## AAC
 - ☞ enter numeric value (10 – 30) with cursor or numeric keys
 - ☞ acknowledge input with F2 (< OK >)
- [] TEST METHOD
 - RESISTANCE
 - VOTAGE DROP
 - ☞ choose the desired method with cursor keys
 - ☞ acknowledge selection with F2 (< OK >)

PE test "resistance" method:

- [] MAX. NO-LOAD VOLTAGE
 - 12 VAC
 - ☞ enter desired no-load voltage
 - ☞ acknowledge selection with F2 (< OK >)
- [] MIN.RESISTANCE ### mΩ
 - ☞ enter numeric value within measuring range (from 0 to 499)
 - ☞ acknowledge input with F2 (< OK >)
- [] MAX.RESISTANCE ### mΩ
 - ☞ enter numeric value within measuring range (from 1 to 500)
 - ☞ acknowledge input with F2 (< OK >)

PE test "voltagedrop" method:

- [] CROSS SECTION #.# qmm
 - all *(same cross section of a line for all test steps)*
 - individual *(determine cross sections of a line for individual test steps)*

☞ enter desired function

- when selecting `all` change cross section of a line with cursor keys ▲ and ▼
- when selecting `individual` select one test step each resp. with cursor keys ▲ and ▼ and change cross section of a line each resp. with cursor keys ◀ and ▶.

3.3.3 Insulation Test

For the insulation test the connections L and N are bridged and voltage against PE is applied. If DUT is sufficiently insulated, no partial current will flow back via its PE-line.

If there are values of resistance **larger than R_{min}** , DUT **passed** insulation test, i.e. DUT is insulated acc. to regulations.

Green light *pass* will light up.

If there are values of resistance **smaller than R_{min}** DUT **failed** insulation test, i.e. its insulation is insufficient.

Red light *fail* will light up.

At the end of an IS test, the DUT is automatically discharged to $U < 50$ V. The pass / fail lights will light up only after the dischargement. With very high-capacity DUTs this may take up to 5 sec. maximally; usually the dischargement takes one, seldom two seconds.



Switching of measuring range:

Switching the measuring range between 5 MOhm and 50 MOhm is achieved by specifying the "R min" parameter:

- $R_{min} \leq 5 \text{ MOhm} \Rightarrow \text{range } 5 \text{ MOhm}$
- $R_{min} > 5 \text{ MOhm} \Rightarrow \text{range } 50 \text{ MOhm}$

Proceeding

After having chosen the parameter group `test parameter` (see p.18) you'll have to choose the test funktion `IS test`:

- ☞ with cursor keys, set arrow (\rightarrow) to `IS test`
- ☞ acknowledge selection with F2 (`< select >`)

```




IS test
PROGRAM NAME
NONAME
< back >  < select >
    
```




(first test parameter)




Selection of test parameter:




- ☞ go to desired test parameter with cursor keys
- ☞ acknowledge selection with F2 (`< select >`)


Test parameters of IS test:




-  PROGRAM NAME ###
 -  enter program name with numeric keys (pl. see hint on p.18)
 -  acknowledge input with F2 (< OK >)

-  TEST TIME ##.# s
 -  enter numeric value (00.0 – 60.0) with cursor or numeric keys
 -  acknowledge input with F2 (< OK >)

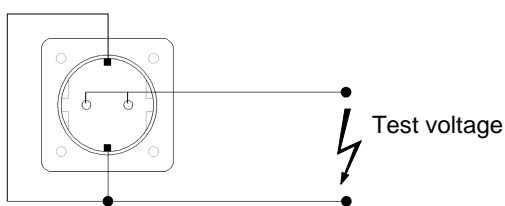
-  1x at socket
 - yes *(before testing with probe, perform one test at socket)*
 - no *(start immediatly testing with probe)*
 -  select desired mode
 -  acknowledge selection with F2 (<OK>)

-  NUMBER ##
 -  enter numeric value with cursor or numeric keys (from 00 to 99)
(in reference to IS tests with test probe)
 -  acknowledge input with F2 (< OK >)

-  VOLTAGE 500 V
(for IS test, test voltage is predetermined)

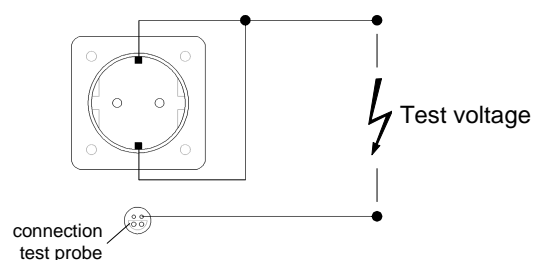
-  THRESHOLD Rmin ##.## MΩ
 -  enter numeric value with cursor or numeric keys (from 00.25 to 50.00)
 -  acknowledge input with F2 (< OK >)

Principle of voltage application for "Test at socket":



This type of connection is applicable for devices of "protection class I" (device is equipped with a protective conductor connection), if all parts of the device are accessible via a mains connection.

Principle of voltage application for "Test with probe":



This connection type has to be applied for devices of "protection class I" if not all parts of the device are accessible via a mains connection, e.g. if parts of the device are disconnected from power supply via switch or relay and same cannot be closed for the test. In this case the DUT has to be connected via a socket, too, contacting of disconnected areas of device is carried out manually via test probe.

3.3.4 High voltage test DC

For the high voltage test the connections L and N are bridged and voltage is applied against PE. If DUT is sufficiently insulated, no partial current will flow back via its PE-line.

If there are values of current **smaller than I_{max}** , DUT **passed** the high voltage test.

Green light *pass* will light up.

If there are values of current **larger than I_{max}** , DUT **failed** high voltage test, i.e. its insulation is insufficient

Red light *fail* will light up.

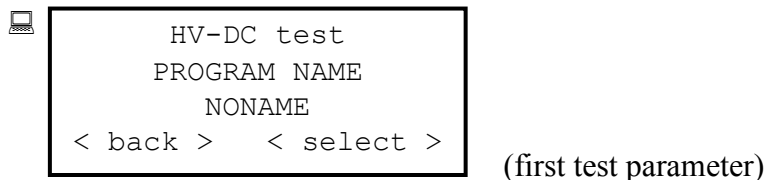
At the end of an HV test, the DUT is automatically discharged to $U < 50$ V. The pass / fail lights will light up only after the dischargement. With very high-capacity DUTs this may take up to 5 sec. maximally; usually the dischargement takes less than one, seldom two seconds.



Proceeding

After having chosen the parameter group `test parameter` (see paragraph 3.2) you'll have to choose the test funktion `HV-DC test`:

- ☞ with cursor keys, set arrow (\rightarrow) to `HV-DC test`
- ☞ acknowledge selection with F2 (`< select >`)



Selection of test parameter:

- ☞ go to desired test parameter with cursor keys
- ☞ acknowledge selection with F2 (`< select >`)

Test parameters of HV-DC test

- ☞ PROGRAM NAME ###
 - ☞ enter program name with numeric keys (pl. see hint on p.18)
 - ☞ acknowledge input with F2 (`< OK >`)
- ☞ TEST TIME ##.# s
 - ☞ enter numeric value (00.0 – 99.9) with cursor or numeric keys
 - ☞ acknowledge input with F2 (`< OK >`)

... TEST PARAMETER HV-DC TEST

- ☒ 1x at socket
 - yes *(before testing with probe, perform one test at socket)*
 - no *(start immediately testing with probe)*
- ☞ select desired mode
- ☞ acknowledge selection with F2 (<OK>)
- ☒ NUMBER ## (probe)
 - ☞ enter numeric value with cursor or numeric keys (from 00 to 99)
(in reference to HV tests with test probe)
 - ☞ acknowledge input with F2 (< OK >)
- ☒ VOLTAGE 1500 V *(LG3301E = 1500V, LG3301K = 2200V)*
(for HV-DC test, test voltage is predetermined)
- ☒ max. CURRENT #.# mA
 - ☞ enter numeric value (from 0.0 to 4.0) with cursor or numeric keys
(LG3301E: 0.1 to 3.9 / LG3301K: 0.1 to 2.9)
 - ☞ acknowledge input with F2 (< OK >)

3.3.5 Function test

The function voltage has to be fed in externally, via the socket "ext supply" on the device rear panel.

For the function test an alternating voltage between **L** and **N** is applied and alternating current (up to 4 AAC) is being measured. (*Optionally available: range 0-10 AAC, or 0-16 AAC*)

If there are values of current **between** I_{min} and I_{max} measured continuously longer than the preset pass time, DUT **passed** the function test.

Green light *pass* will light up.

If the pass time is not reached DUT failed the function test.

Red light *fail* will light up.

To skip the function test, set the parameter *Number = 00* .



Proceeding

After having chosen the parameter group `test parameter`, you'll have to choose the test funktion `FT test`:

- ☞ with cursor keys, set arrow (\rightarrow) to `FT test`
- ☞ acknowledge selection with F2 (`< select >`)

```

FT test
PROGRAM NAME
NONAME
< back >  < select >
    
```

(first test parameter)

Selection of test parameter:

- ☞ go to desired test parameter with cursor keys
- ☞ acknowledge selection with F2 (`< select >`)

Test parameters of FT-Test

PROGRAM NAME ###

- ☞ enter program name with numeric keys (pl. see hint on p. 18)
- ☞ acknowledge input with F2 (`< OK >`)

NUMBER #

- ☞ enter numeric value (from 0 to 4) with cursor or numeric keys (hereby one can perform up to 4 consecutive tests with different parameters.)
- ☞ acknowledge input with F2 (`< OK >`)




START MODE FT




- manual (with *START* key)
- with adapter (start signal has to be applied during entire test)
- immediately (test starts after last test)
- with test hood (start signal [ext. I/O] has to be applied statically)




... TEST PARAMETER FT-TEST




For each step the next 5 parameters are repeated.




NN – step number (1 to 4)

-  TEST TIME NN ###.# s
 -  enter numeric value with cursor or numeric keys (from 00.0 to 999.9)
 -  acknowledge input with F2 (< OK >)

-  PASS TIME NN ##.# s
 -  enter numeric value with cursor or numeric keys (from 00.0 to 999.9)
 -  acknowledge input with F2 (< OK >)

-  min. CURRENT NN ##.# AAC
 -  enter numeric value with cursor or numeric keys (from 00.0 to 04.0 / 10.0 / 16.0)
 -  acknowledge input with F2 (< OK >)

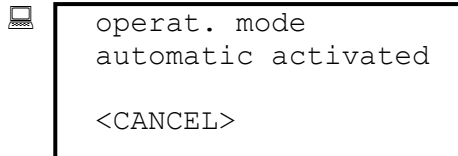
-  max. CURRENT NN ##.# AAC
 -  enter numeric value with cursor or numeric keys (from 00.0 to 04.0 / 10.0 / 16.0)
 -  acknowledge input with F2 (< OK >)

-  VOLTAGE NN ### VAC (*has no influence on the test, voltage is fixed by the external feed.-in. The value given here is used in the printer protocoll.*)
 -  enter numeric value with cursor or numeric keys (from 000 to 400)
 -  acknowledge input with F2 (< OK >)

3.4 Remote control via RS 232

1st From system parameter (see 3.2.2, p.19) select OPERATING MODE automatic

A message appears on display:



⇒ the device is now in remote mode and remains in this mode also after powering the device off and on

To leave this mode:

☞ press F1 (<CANCEL>) for about 3 sec *and*

☞ turn power switch off and on

⇒ tester initializes itself.

2nd The tester can be controlled by commands described in the following chapter.

3rd The evaluation of measuring results (pass, fail) is up to the user (PC). (However, if during HV-AC-test I_{max} is exceeded, an error will occur.)

Below please find description and syntax of commands for data exchange between tester **LG 3301** and PC. Data exchange is made via serial interface.

3.4.1 Syntax

- command format
[command]<LF> max. length 40 characters
- answer format
[answer]<LF>
- commands
 - *[global command] permanently available command
 - [local command] command depending on structure which can only be executed under certain conditions
- global and local commands

[execute command]	controls tester directly
[configuration command]<SP>[parameter]	sets device parameter
[data request command]?	expects a value

3.4.2 Global Commands

- *IDN? verifies device identification
example for answer: S3001, Ver. 1.07, 07.07.1999<LF>
- *VER? verifies version of device control
example for answer: 600<LF>
- *MOD? verifies current device mode
example for answer: 5<LF>
- *STA? reads status register
example for answer: 3<LF>
- *LLO<status> Enables or disables the possibility of test abort by the button F1 on the device keyboard, according to the value of *status*:
0 = enable abort
1 = disable abort (active until power off)
- *LLO? queries if status is locked or unlocked
example for answer: 0<LF> unlocked
1<LF> locked
- *INP<digital input>? Reads the status of digital input.
Possible answers are: 0 = off, 1 = on.
Digital input format ist NN (always 2 digits).
example for answer: 0<LF>
Standard digital inputs:
- | | |
|---------------------------------------|----|
| DEVICE ON | 16 |
| INT_START (PE test probe) | 13 |
| EXT_START (2-hand control, test hood) | 08 |
| EXT_ACK | 06 |
- *ERR? reads first (oldest) stored error from error queue and deletes it there
error-ID and description are divided by » , «
error queue is a first-in, first-out (FIFO) and can store maximally 10 errors
if error buffer is full, then error »200,Queue Overflow« will be stored on the last position
example for error: 0, No error<LF>
- *CEQ clears all errors from error queue.
- *CLS clears status register and error queue as well as input and output buffer for serial communication.
Breaks the testing (if running) and puts device in idle state.
The parameters set by commands CONF remain but the type of latest test and ist result are cleared.
- *RST returns the device to the power-on startup conditions.
It is the same as *CLS command but all test parameters are set on their default values.

3.4.3 Local Commands

● CONF group

Continuity test

There is not any parameter to set. Test time is fixed to one second.

Protective wire test

CONF:PW:TIME<test time>	sets test time: range 0.1 – 99.9; default 5.0 [s]
CONF:PW:TIME?	queries currently set test time
CONF:PW:CURR<test current>	sets test current: range 10 – 30; default 10 [A]
CONF:PW:CURR?	queries currently set test current
CONF:PW:MODE:OFF MAN AUTO	sets type of starting mode, whereby OFF = start immediately with default values MAN = manual start with START key AUTO = start automatically (test with low current)
CONF:PW:MODE?	queries currently set starting mode
CONF:PW:DEF	sets all parameters for protective wire test to their default values: 5.0 s, 10 A, OFF

Insulation test

CONF:IT:TIME<test time>	sets test time: range 0.1 – 99.9; default 5.0 [s]
CONF:IT:TIME?	queries currently set test time
CONF:IT:RES:5M 50M	sets resistance range at 5M Ω or 50 M Ω , default 5 M Ω
CONF:IT:RES?	queries currently set resistance range
CONF:IT:CON:SOCK PROB REAR	selects how to connect DUT: SOCK = socket (automatic start), <i>default</i> PROB = test probe (start with START key) REAR = test probe (automatic start)
CONF:IT:CON?	queries current connection of tested device
CONF:IT:DEF	sets all parameters for insulation test on their default values: 5 s, 5M, SOCK

High voltage test DC

CONF:HD:TIME<test time>	sets test time: range 0.1 – 99.9; default 5.0 [s]
CONF:HD:TIME?	queries currently set test time
CONF:HD:CON:SOCK PROB REAR	selects how to connect DUT: SOCK = socket (automatic start), <i>default</i> PROB = test probe (start with START key) REAR = test probe (automatic start)
CONF:HD:CON?	queries current connection of tested device
CONF:HD:DEF	sets all parameters for DC-high voltage test at their default values: 5 s, SOCK

Function test

CONF:FT:TIME<test time>	sets test time: range 0.1 – 99.9; default 5.0 [s]
CONF:FT:TIME?	queries currently set test time
CONF:FT:DEF	sets test time at their default value: 5 s

- **MEAS group**

MEAS:CT	starts continuity test
MEAS:PW	starts protective wire test
MEAS:IT	starts insulation test
MEAS:HD	starts high voltage test DC
MEAS:FT	starts function test
MEAS?	queries currently set test method

- **READ group**

Continuity test

READ:CT:CURR? expects value for test current, result is in [A]

Protective wire test

READ:PW:CURR? expects value for test current, result is in [A]

READ:PW:VOLT? expects value for voltage drop (voltage related to current 10 A) result is in [V]

READ:PW:RES? expects resistance value. result is in [mΩ]

Insulation test

READ:IT:CURR? expects value for current, result in [μA]

READ:IT:VOLT? expects value for voltage, result [V]

READ:IT:RES? expects resistance value, result in [MΩ]

High voltage test DC

READ:HD:VOLT? expects value for voltage, result in [kV]

READ:HD:CURR? expects value for current, result in [mA]

Function test

READ:FT:CURR? expects value for current, result is in [A]

- **SYST group**

SYST:HALT interrupts testing

SYST:PASS:ON|OFF green signal light is switched on or off

SYST:FAIL:ON|OFF red signal light is switched on or off

SYST:BEEP:SOFT|LOUD buzzer is switched on to either soft or loud volume for 100 ms

3.4.4 Status and error parameters

- **Command version** (controlling variant)

Device constant including which commands are supported by tester.

The one hundred (in future also the one thousand) digit positions characterizes the basic model, the other two positions are planned for variants. The value list will be updated when a new variant is being executed.

This value can be read by the command `*VER?`.

- 230 – LG 3301D, basic model
- 330 – LG 3301E
- 331 – LG 3301K

- **Device mode**

Characterizes the current operating mode of tester. The value is in range 0-255 (unsigned shortint type in C-language)

This value can be read by the command `*MOD?`.

Bit position	B7	B6	B5	B4	B3	B2	B1	B0
Meaning	operating mode			data exchange		remote status		
Operating mode	manual			automatic		digital		
Bits B7 – B6 – B5	000 (0)			001 (32)		010 (64)		
Data exchange	RS-232			IEEE-488				
Bits B4 – B3	00 (0)			01 (8)				
remote status	testing			program exchange		result exchange		
Bits B2 – B1 – B0	000 (0)			001 (1)		010 (2)		

Data exchange and remote status are only relevant in operating mode »automatic«

- **Status register**

Characterizes the current activity when the device performs a testing.

This value can be read by the command *STA?.

Bit position	B7	B6	B5	B4	B3	B2	B1	B0
Meaning	<u>activity</u>				<u>test end</u>			

Status	hex	bin	dec
<u>Activity</u>			
idle state	\$00	0000 0000	0
test starting	\$10	0001 0000	16
test preparing	\$20	0010 0000	32
rampe up *	\$30	0011 0000	48
measuring	\$60	0110 0000	96
rampe down *	\$50	0101 0000	80
test ending	\$40	0100 0000	64
test finished	\$80	1000 0000	128
<u>Test end</u>			
STOP button	\$81	1000 0001	129
HA-test – high current	\$82	1000 0010	130
PW-test – start timeout	\$83	1000 0011	131
PW-test – disconnected	\$84	1000 0100	132
2-hand-control released	\$85	1000 0101	133
after SYST:HALT	\$8F	1000 1111	143
<i>* only when supported by device variant</i>			

... STATUS AND ERROR PARAMETERS

Error messages

They describe errors in command syntax or of their wrong use as well as device depending errors. The value is in range 0-255 (unsigned shortint type in C-language).

Number	Description
200	Queue overflow
0	No error
1	Invalid start character
2	Invalid end character
3	Invalid command
4	Invalid MEAS parameter
5	Invalid CONF parameter
6	Invalid SYST parameter
7	Invalid READ parameter
8	
9	Unable to start measurement

3.5 Error display

3.5.1 Error messages on LC display

Error messages are not displayed in plain text on the LCD.

Exceptions:

- time exceeded!
if DUT was not contacted during PE test for more than 5 seconds
- ## NN-test FAIL
if DUT failed current (##) test during PE, IS, or HV test (NN)
 - ☞ repeat with F2 (< REPEAT >) or key START
 - ☞ accept with F1 (< END >) and continue

3.6 Maintenance and function check

3.6.1 Maintenance

The test device *LG 3301* needs no serving.

Pull plug before opening housing!



SPS electronic GmbH recommends to return series 3301 devices **for an annual check** to guarantee the accuracy of calibration/measured values.

Should defects be detected when checking those testers, then the device in question has to be recalibrated by *SPS electronic GmbH*.

3.6.2 Function check

Dummy test

To check the functions of the tester, or if you suspect there is a malfunction, you should perform a dummy test at regular intervals:

To do so, please perform insulation or high voltage tests with your device at:

- one or several DUTs which will, under no circumstances, pass these tests
and
- at DUTs for which measurement results are available which have been determined in some other way.
or
- at a suitable test dummy with which simulations of PASS or ERROR situations can be carried out.

Please compare the results of the different measurements afterwards.

If the measurements both result in PASS and ERROR then your device functions optimally.

Appendix

A Special functions

A-1 Program 0

(only in operating mode manual)



```

please go with key
START to PE-TEST

<END>    <CONTINUE>

```

If the number of tests to be executed is unknown, then the test can, in the current test mode, be repeated with program 0 until you

- end with option <END>
- or*
- select another test mode with option <CONTINUE>.

To select the cross section of line for PE test according EN 60 204, the cursor keys or external inputs can be used.

A-2 Digital program selection

In system parameter the operating mode *digitally* can be selected (pl. see 3.2.2). In this operating mode the test program is preselected via the digital interface *ext. IO* (Dsub25) at the back by coding the inputs 0 bis 3 binarily:

Pin-no. at Dsub25	14	13	12	11	<i>(pl. see next page)</i>
associated input	3	2	1	0	

	coding				corresponding to test program no.	
	<i>1 means: there is voltage of 24 V*</i> <i>0 means: there is no voltage 24 V*</i>	0	0	0	0	0
0		0	0	1	1	
0		0	1	0	2	
0		0	1	1	3	
0		1	0	0	4	
⋮						⋮
1		1	1	1	1	15

*24 V : unfiltered voltage (please see PIN configuration ext. IO-interface)

A-3 Multistart tests

Often it can be useful to process several test programs one after another automatically.

Conceivable uses would be e.g. to let a DUT be tested with different voltage levels or to test different wirings over a test hood.

For this purpose the function "multistart" has been integrated in the Compact Tester **LG 3301**.

To activate the multistart function:

1. in the parameter group *system parameter / special menu*, set the parameter *multistart* to YES
2. in the parameter group *test parameter / multistart*, select the desired value

Multistart works as follows:

- After switching on the device, at first the last runned test program will be performed.
- After finishing this program, the next program in the device's memory (program number + 1) will be run ...
- etc. ...

This means, if in the last session the program no. n was active, then

- Multistart 1 will run only program number n
- Multistart 4 will run the programs n to $n+3$ one after another
- Multistart 2 and 3 accordingly



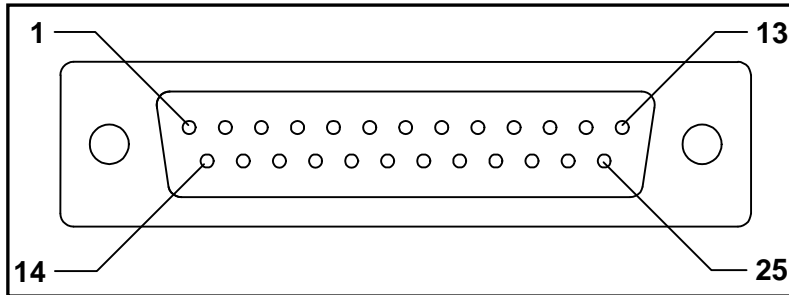
According to the chosen multistart program the corresponding output of the external I/O-interface will be set automatically.

In order to successfully use the multistart-functionality, the following conditions must be met:

1. System parameter **operating mode = manual** (not automatik, not digital)
2. "n" must be "1" or greater. I.e. the last active program must not have been "program 0".

B Interface Configuration

B-1 PIN configuration for external IO-interface



plug ext. I/O (Dsub25)

PIN	description	configuration
1	output 0	EXT_PASS
2	output 1	EXT_ERROR
3	output 2	EXT_BUZZER
4	output 3	EXT_TEST (active during complete test)
5	output 4	<i>(can be used in combination with DAT3800 software)</i>
6	output 5	<i>(can be used in combination with DAT3800 software)</i>
7	output 6	<i>(can be used in combination with DAT3800 software)</i>
8	output 7	<i>(can be used in combination with DAT3800 software)</i>
9		not used
10		not used
11	input 0	1 sqmm cross section selection / 4 bit-program selection
12	input 1	1,5 sqmm cross section selection / 4 bit-program selection
13	input 2	2,5 sqmm cross section selection / 4 bit-program selection
14	input 3	4,5 sqmm cross section selection / 4 bit-program selection
15	input 4	6 sqmm cross section selection
16	input 5	EXT_ACK
17	input 6	EXT_SWITCH
18	input 7	EXT_START
19		not used
20	+ 24V DC	Feed-in external voltage against mass
21	+ 24V DC	Feed-in external voltage against mass
22		not used
23		not used
24	GND	mass
25	GND	mass

Description of most important signals of I/O interface:Inputs:

- 1 EXT_ACK (input 5)
 - interrupts running tests
 - accepts a faulty measurement

- 2 EXT_SWITCH (input 6)
 - to be applied for switching between the cross sections for PE test (method "voltage drop") for program 00.

- 3 EXT_START (input 7)
 - starts the test
 - repeats a faulty measurement
 - during HV-AC test always applied

Outputs:

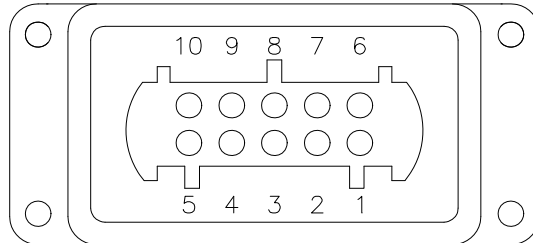
- 1 EXT_PASS (output 0)
 - setting same as *pass*-light

- 2 EXT_ERROR (output 1)
 - setting same as *fail*-light

- 3 EXT_BUZZER (output 2)
 - setting same as built-in buffer

- 4 EXT_TEST
 - to be set after first start signal and stays active during entire test

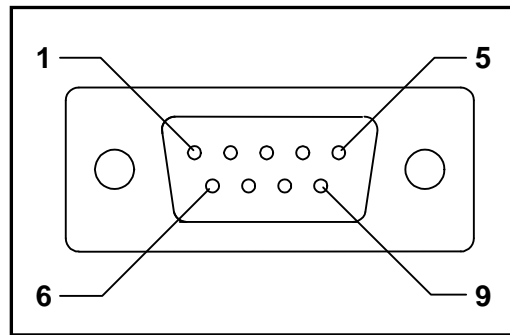
B-2 X1: Rear socket for test adapter (only LG3301K)



10-pole Industrial Socket

PIN	Description	Configuration
1	l	Phase: l-wire (to socket/frontpanel)
2	pea	connection for PE of DUT
3	peb	connection for measuring line peb (PE-,IS-,HVDC-test) (to test probe)
4	pea	connection for measuring line pea (PE-,IS-,HVDC-test) (to test probe)
5	—	—
6	n	phase: neutral wire (to socket/frontpanel)
7	pea'	connection for sensor of measuring line pea' (PE test) (to test probe)
8	peb'	connection for sensor of measuring line (PE test) (to test probe)
9	peb	connection for the measuring line (PE-,IS-,HVDC-test) (to test probe)
10	—	—

B-3 PIN configuration for serial printers and remote interface COM1

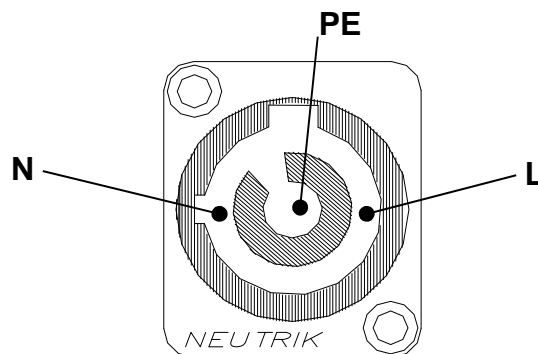


plug RS232 (Dsub9)

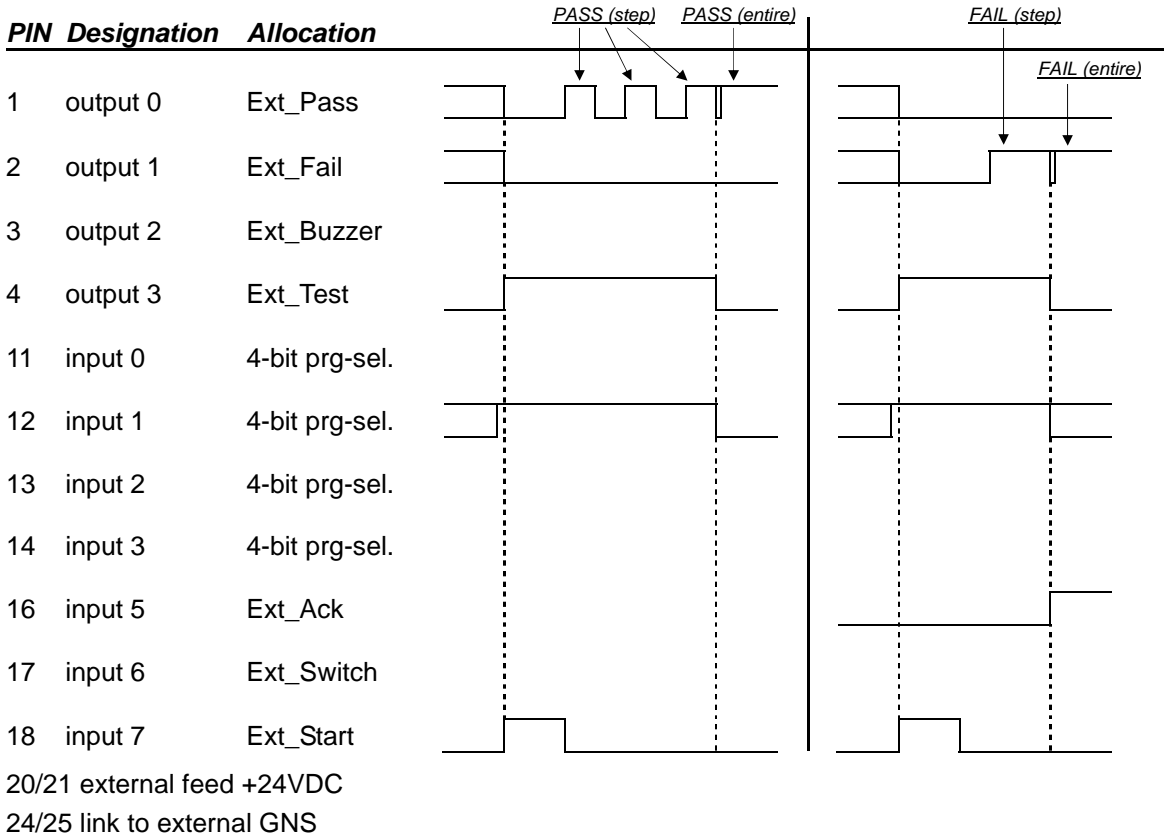
<i>PIN</i>	<i>description</i>	<i>configuration</i>
1	-	not used
2	RxD	receive data
3	TxD	transmit data
4	-	not used
5	mass	reference potential of serial interface
6	-	not used
7	-	not used
8	-	not used
9	-	not used

Interface setting: 9600 baud, 8 data, 1 stopbit, no parity

B-4 PIN configuration for external voltage connector



C Digital control over the interface »ext. I/O«



To repeat a test step, one must

- give no signal ACK and a new signal START

In order to be detected, the impulses for ACK and START must have a minimum period of 50 ms.

D Information on programming and program run

D-1 Order of tests in manual or digital mode:

- DG - test
- PE - test
- IS - test
- HV-DC - test
- FT - test

D-2 Miscellaneous

- Protocol print-outs and issuing of audible signals take time after each test step. If protocols and audible signals are not needed, please adjust system parameters:

```

PROTOCOL → never
BUZZER   → off
  
```

- For digital control a bad result can also be accepted with EXT_ACK. With new start signal the last step is repeated.
- If no min. current (approx. 0.6 A) is flowing after start of **PE-Test** (DUT not contacted or faulty) the current ramp is not built up. If the set current is not reached within 5 sec the error message »time exceeded« is displayed.

During **auto start** test is initiated if a min current (approx. 0.6 A) flows and ends if DUT is not contacted anymore. The waiting state is cancelled by pressing F1.

- The lights *pass* and *fail* appear after each test step and display always the partial results. The lights go out if a new test step is performed.

E Protocolling of test results

Only in output formats `page` and `endless` will the cause of error be printed in the protocol.

The meanings are:

for all types of test	
U.BREAK	test was aborted by operator

for PE-test	
time	time exceeded (DUT was not contacted within five seconds)
<Isoll	falling below nominal value for current
<Rmin	resistance smaller than R_{min}
>Rmax	resistance larger than R_{max}
>Uzul	tolerance of voltage drop for selected cross section of a line was exceeded

for IS-test	
<Rmin	resistance smaller than R_{min}
<Usoll	falling below nominal value for test voltage
Usense	voltage measuring faulty

for HV-DC test	
>Imax	max. value for current exceeded
<Usoll	falling below nominal value for test voltage
Usense	voltage measuring faulty

EG-Konformitätserklärung

EC Declaration of Conformity

Wir / we :

SPS electronic GmbH
Steuerungs- und Prüfsysteme
Blätteräcker 18
D-74523 Schwäbisch Hall

erklären hiermit, dass das nachfolgend genannte Gerät den einschlägigen grundlegenden Sicherheitsforderungen der EG-Richtlinie entspricht.

declare, that the following unit complies with all essential safety requirements of the EC Directive.

Geräteart: Kompakttester
Description of device: Compact Tester

Typ / Type : LG 3301 D/E/K

EG Richtlinien / EC Directives:

- EG Maschinenrichtlinie 98/392/EWG mit Änderungen
EC Directive for machinery 98/392/EEC with amendments
- EG Niederspannungsrichtlinie 2006/95/EC
EC Directive for low voltage 2006/95/EC
- EG Richtlinie Elektromagnetische Verträglichkeit 2004/108/EC mit Änderungen
EC Directive electromagnetic compatibility 2004/108/EC with amendments

Angewandte harmonisierte Normen:
Applicable harmonized standards:

- EN 61 000-3-2; EN 61 000-3-3; EN 55 014-1; EN 55 014-2; EN 50 191

Angewandte nationale Normen und technische Spezifikationen:
Applicable national standards and technical specifications:

19.12.2007

Datum / date:

SPS electronic
SPS electronic GmbH
Blätteräcker 18 • 74523 Schwäbisch Hall-Sulzdorf
Telefon 0 79 07 / 878-0 • Fax 0 79 07 / 878-99

Unterschrift / Sign:

Dieser Konformitätserklärung unterliegt grundsätzlich nur das von uns gelieferte oder in Betrieb genommene Gerät. Für Änderungen und Erweiterungen ist der Betreiber verantwortlich und damit für die Sicherstellung der Übereinstimmung der veränderten Anlage mit der betreffenden EG-Richtlinie.

Subject to this declaration of conformity is the device as supplied or placed into operation by us. The operator is responsible for subsequent alterations and extensions, and therefore has to ensure the altered unit complies with the corresponding EC directives.