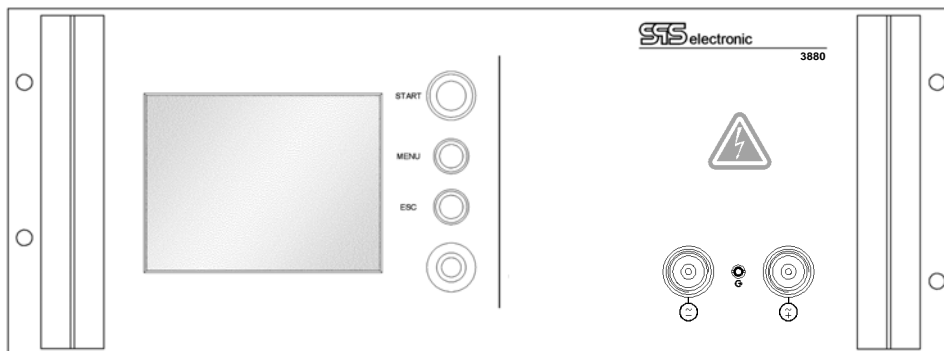
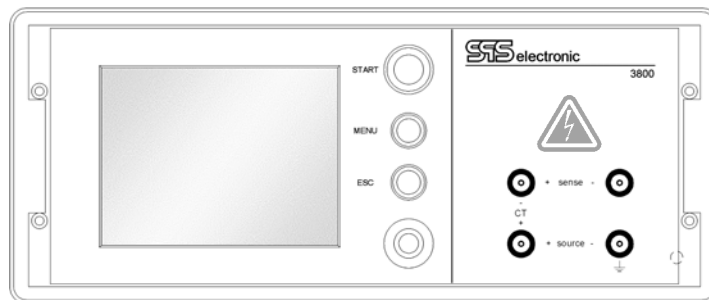


Operating Manual

Insulation and High Voltage Tester Series IL 3800 / IL 3880

Date: 10 Sep 2007



Series:	IL 3800 / IL 3880
Serial number:	
Year of construction:	

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Table of Contents

1	General Information	7
1.1	Information on this operating manual	7
1.2	Requirements for the operation of this device	9
1.2.1	Regulations for application	9
1.2.2	Product liability	9
1.3	General safety regulations	10
1.3.1	Obligations of the operator	10
1.3.2	Operating instructions for personnel	10
1.3.3	Information on further publications	11
2	Description	12
2.1	Device functions	12
2.2	Technical data	13
2.3	Set-up of device	15
2.3.1	Front	15
2.3.2	Rear	16
2.4	Extensions, options and accessories	18
2.4.1	Device options	18
2.4.2	Standard accessories	18
2.4.3	Optional accessories	18
3	Putting into operation	19
3.1	Requirements	19
3.2	Connection of device	19
3.3	Initial switching on of device	20
3.3.1	Reconnection of device	20
3.4	Switching off of device	21
3.5	Connection of DUT	21
4	Operation	22
4.1	Explanation of operating elements	23
4.2	Structure of menu	24
4.2.1	Basic structure of screen	24
4.2.2	The main menu	24
4.2.3	Menu "Test Programmes": Outline	25
4.2.4	Menu "Single Test": Outline	26
4.2.5	Menu "System Parameter": Outline	27
4.3	Operation of screen menus	28
4.3.1	Entry of letters and numbers	28
4.3.2	Application of a keyboard	28

5	System menu: Setting of system parameters	31
5.1	General information	31
5.2	Setting of language	31
5.3	Setting of operating mode	31
5.3.1	Operating mode manual	32
5.3.2	Operating mode Digital	32
5.3.3	Operating mode automatic	33
5.3.4	Operating mode Ethernet	33
5.4	System time / setting of date	33
5.5	Setting of signal sounds	33
5.5.1	Buzzer	33
5.5.2	Acknowledgement sound	33
5.6	Info	34
5.6.1	Version	34
5.6.2	Info-text	34
5.7	Measurement technique and graphic display	34
5.7.1	Measurement	34
5.7.2	Measuring value display	35
5.8	Setting of password	36
5.9	Setting of interface parameter	37
5.9.1	Ethernet	37
5.10	Safety - Selection of start control	38
5.11	Printer - Setting of printer format	39
5.11.1	Printer format	39
5.11.2	Headline and footnote	39
5.11.3	Interfaces	39
5.11.4	Serial number	39
5.12	Maintenance – calibration and service test	39
6	Creation of test programmes	40
6.1	General information	40
6.2	Explanation of action menu	40
6.2.1	Load	41
6.2.2	New	41
6.2.3	Edit	41
6.2.4	Cut	41
6.2.5	Copy	41
6.2.6	Insert	42
6.2.7	Edit Macros	42
6.2.8	Save	42
6.2.9	Relocation of a test programme or of a test step	43
6.2.10	Printing of test programme	43
6.3	Editing test programmes and test parameters	44
6.3.1	General information	44
6.3.2	Common parameters and programme settings	45
6.3.3	Continuity test (DG)	46

6.3.4	Insulation test (I2)	47
6.3.5	High voltage test (H2)	48
6.3.6	I/O-test	49
6.3.7	Text step / visual test	51
6.4	Using macros in test programmes	52
6.4.1	Overview	52
6.4.2	Creating and editing macros	52
6.4.3	Inserting macros in test programmes	53
6.4.4	Editing macros within test programmes	53
7	Performing tests in manual operation	54
7.1	General information	54
7.1.1	Preparations ahead of test operation	54
7.2	Quick menu in test operation	55
7.2.1	"Load Prog"	55
7.2.2	Statistics	55
7.2.3	Tester	55
7.2.4	Printing	55
7.3	Test programme process	56
7.3.1	Outline	56
7.4	Changing of test programme	57
7.5	Statistics	57
7.6	Test results and test protocol	58
7.6.1	Readout of result on display	58
7.6.2	Printer protocolling	58
8	External control: operating modes Remote, Digital, Ethernet	59
8.1	Operating mode Remote	59
8.1.1	General information	59
8.1.2	Selection of Remote operation	59
8.1.3	Remote operation escape	59
8.2	Operating mode Digital	60
8.2.1	General information	60
8.2.2	Selection of Digital operation	60
8.2.3	Digital operation escape	60
8.2.4	Digital programme selection	61
8.2.5	I/O-test in digital operation	61
8.3	Operating mode Ethernet	62
8.3.1	General information	62
8.3.2	Selection of Ethernet operation	63
8.3.3	Ethernet operation escape	63
9	Service and function inspection	64
9.1	Service	64
9.2	Function check	64
9.2.1	Automatic test	64
9.2.2	Dummy test	64

Annex	65
A Remote Control	65
A-1 General.....	65
A-2 Syntax description	65
A-3 Globale Commands.....	66
A-4 Local commands	68
A-5 Status and error parameters	74
B Interface Configuration	77
B-1 External I/O Interface X6.....	77
B-2 Serial RS-232 Interface X1	80
B-3 Serial CAN Interface X2	81
B-4 Second external I/O Interface X13 (only LG 3880 G)	82
B-5 Rear panel connector for test voltages	83
C LAN Operation – Setup and Procedure	84
C-1 LAN Operation.....	84
C-2 WLAN Operation	85
D Test Protocol Examples	89
D-1 Format „page“	89
D-2 Format „Condensed“	90
D-3 Format „endless“	91
D-4 Format „line“	91
E Description of Test Methods	92
E-1 Continuity Test.....	92
E-2 Insulation Test.....	92
E-3 High Voltage Test	92
F Terms of warranty	93

1 General Information

1.1 Information on this operating manual

This operating manual is part of the technical documentation for the safety tester *IL 3800* of *SPS electronic GmbH*.

This operating manual contains all the information on how to operate this device properly, safely and economically, how to prevent dangerous situations, how to reduce repair costs and downtimes and how to prolong the service life of these devices.

Should you, while perusing this operating manual, find any misprints, any information you do not understand or which are incorrect please do not hesitate to inform *SPS electronic GmbH* about same.

Structure

This operating manual is divided into nine chapters and one annex.

The annex contains additional information.

The headline shows you which chapter you are reading.

In the middle of the footnote you will find the type of the device and at the end of the line the page number.

Pictographs and Symbols

- **Warnings** are characterized by warning triangles with danger symbol and warn of dangers which can lead to personal injury and/or material damage:



General Warning




Danger caused by electric current or voltage

- **Information** on same are characterized by the Information Pictograph and give advice or additional information:



You can order accessories directly from *SPS electronic GmbH*.

- **Continuations** of contextual paragraphs on the next page are characterized by the symbol  on the right-hand margin.



... *Pictographs and symbols*

Enumerations are characterized by the symbol „●“.

Example: ● Protective conductor test (PE-test)
● Insulation test (IS-test)

Operations are divided into consecutively numbered sequences of operations.

Example: 1. Switch on mains switch
2. Push key F2 (< Prgr >)

Results are characterized by the symbol „↑“

Example: ↑ LC-display indicates current programme number.

1.2 Requirements for the operation of this device

1.2.1 Regulations for application

The tester must be in an operational and reliable condition.

Only personnel having completely read and understood this operating manual and who are authorized skilled electricians or who have been instructed in electrical engineering are allowed to perform any operations with and at the testers.

The tester is not to be operated if or for:

- operations are performed which are not specified in this operating manual or which have not been recommended by *SPS electronic GmbH* concerning installation, operation, maintenance and service.
- unauthorized alterations and/or repairs
- dismantling and/or avoiding of safety devices
- use of components, tools, additional installations, supplements and working material which have not been approved or recommended by *SPS electronic GmbH*
- building in of spare parts which are not original *SPS electronic GmbH* spare parts or of spare parts from suppliers not recommended by *SPS electronic GmbH*

1.2.2 Product liability

The testers have been produced, adjusted and tested according to the state of the art and the approved safety requirements.

The devices comply with the conditions agreed upon by contract of the confirmation of order concerning execution, single parts and accessories selection.

SPS electronic GmbH will be liable for errors or omissions to the extent of the guarantee liabilities of the confirmation of order.

Applicable are the general conditions of delivery of the Central Association of Electrical Engineering and the Electronics Industry, registered association (ZVEI).

The contents of this operating manual is in compliance with the condition of the tester on the date when same was drawn up.

Subject to change are technical alterations because of further developments and improvements of these products by *SPS electronic GmbH*.

Liability claims can therefore not be derived from the contents of this operating manual (data, descriptions, graphs, misprints, etc.).

Errors and omissions excepted!

***SPS electronic GmbH* will only be liable in case of application of the testers according to regulations (pl. see 1.2.1).
If those regulations have not been applied the operator is solely responsible for risks of hazard to body and life of the user or a third party and impairments of the tester and other material assets!**



1.3 General safety regulations

This safety tester IL 3800 has been manufactured according to the state of the art at the time of its delivery.

Nevertheless the tester is not without hazards if it is applied by untrained personnel, applied improperly or not applied according to regulations.



In addition to this operating manual the generally applicable legal regulations and other binding instructions concerning safety regulations, regulations for preventing accidents and regulations for the protection of the environment must be adhered to.

1.3.1 Obligations of the operator

- The tester is only to be operated according to regulations and in operational condition (pl. see chapter 1.2.1)
- Protective and safety devices, locking devices and couplings, etc. have to be inspected by an expert at least once a year.
- A protocol on the test results has to be drawn up in form of a **test report** same has to be retained.
- Instructions on operations with or at a machine or installation as to hazards to health and/or life of persons are obligatory.
- Persons who operate with or at an *IL 3800* have to confirm by their signature to have read and comprehended this operating manual especially in regard to the operating instructions.
- Dangerous zones resulting from the integration of the tester into a system or a device have to be located by the operator and safeguarded against.

When assembling or installing devices, systems or items of equipment of different manufacturers or suppliers and after modifications by company or service personnel where changes within the electric equipment were made the operator has, before putting into operation, to perform a precise inspection according to the accident prevention regulations VBG 4 in compliance with the individually applicable rules of electrical engineering.

1.3.2 Operating instructions for personnel

- Operating instructions, general instructions and regulations are part of the tester and have to be accessible, readable and complete for all those who operate with or at the IL 3800.
- Before operating with or at the IL 3800 questions have to be answered or uncertainties have to be explained by the personnel in charge.
- Any operations with or at the IL 3800 may only be performed by workers skilled in electrical engineering or trained in electronic engineering and who have been given instructions for such operations and thus been authorized by the operator..
- Trainees and persons under 18 years of age may only operate the IL 3800 when a skilled electrician is in charge.
- Adjustments, service and inspections have to be performed according to the instructions specified and according to schedule.

1.3.3 Information on further publications

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 Teil 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

You can order or buy literature giving information on above regulations and specifications from or at

- **Laws/Regulations**
Booktrade
or
Carl Heymanns Verlag KG, Luxemburger Straße 449, 50939 Köln/Cologne
- **Accident Prevention Regulations**
Trade Association
or
Carl Heymanns Verlag KG, Luxemburger Straße 449, 50939 Köln/Cologne
- **Trade Association Directives, Safety Regulations and Leaflets**
Trade Association
or
Carl Heymanns Verlag KG, Luxemburger Straße 449, 50939 Köln/Cologne
- **DIN Standards**
Beuth Verlag GmbH, Burggrafenstraße 6, 10787 Berlin
- **VDE Regulations**
VDE-Verlag GmbH, Bismarckstraße 33, 10625 Berlin

2 Description

If not specified otherwise all specifications apply to the device types of series IL 3800 as well as for the respective device type of series IL 3880.

2.1 Device functions

You can perform safety tests at electric devices according to standard test regulations (EN, IEC, VDE etc.) with the safety tester IL 3800.

Below tests can be performed:

	IL 3800F IL 3880F	IL 3880G
Continuity test, 24 V DC with current measurement between the connections L / N	●	●
Insulation test 3000 / 4000 V DC, programmable for measurement of resistance between PE and L + N	up to 3000 V DC	up to 4000 V DC
High voltage test 3000 / 4000 V DC, programmable for checking the electric strength between PE and L + N	up to 3000 V DC	up to 4000 V DC

A description of the test methods is given in the annex.

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

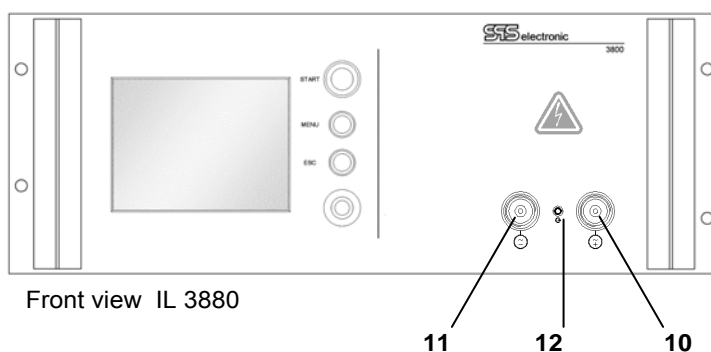
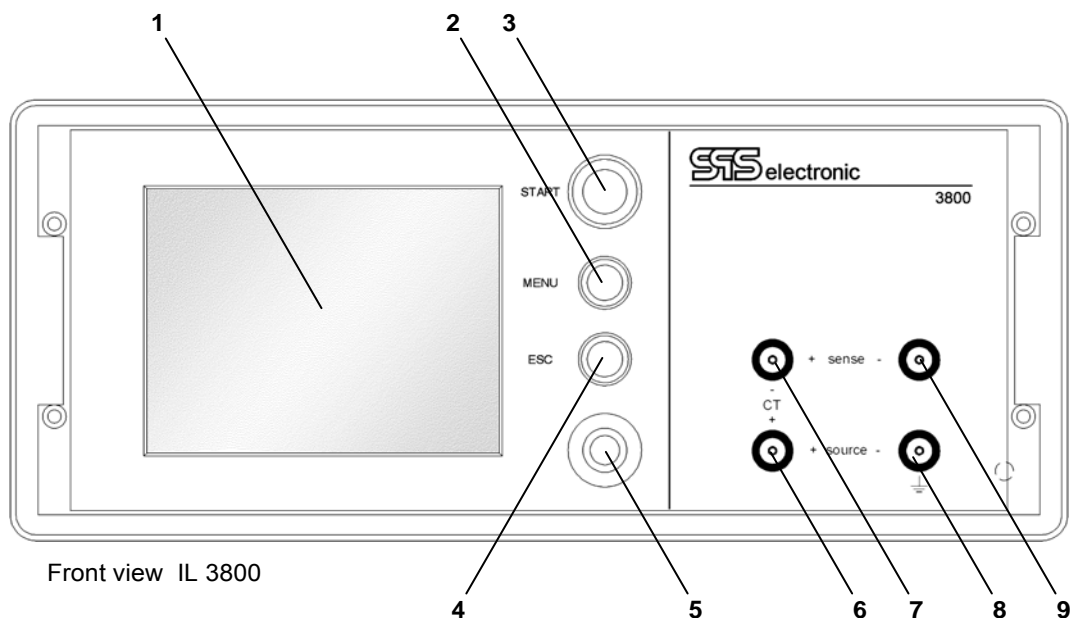
2.2 Technical data

Measurements and weights			
● width / depth / height	IL 3800F:	ca. 380 / 360 / 220 mm (14" / 3 HU)	
	IL 3880F/G:	ca. 490 / 460 / 220 mm (19" / 4 HU)	
● weight	IL 3800F:	ca. 100 N (10,0 kg)	
	IL 3880F/G:	ca. 120 N (12,0 kg)	
Ambient			
● temperature	operation:	15 °C – 40 °C	
	storage:	5 °C – 60 °C	
● air humidity	max. 70% (uncondensing)		
Connection data			
● power supply	230 V / 50 Hz (115 V / 60 Hz optional)		
● power input	max. 2300 VA		
Operating data			
● DG-test (continuity test)			
- test voltage	24V DC ± 2%		
- thresholds	programmable		
- measuring range	up to 600 mA DC (short circuit)		
	range 0 up to 600 mA	resolution 1 mA	accuracy 1,5% of MBE ± 1 mA
● IS-test (insulation test)			
- test voltage	IL 3800F : 100 up to 3000 V DC, programmable IL 3880G : 100 up to 4000 V DC, programmable		
- thresholds	programmable		
- short circuit current	< 10 mA DC		
- measuring ranges	IL3800F : 1500 MΩ max (0.5 MΩ/V) IL3880G : 2000 MΩ max (0.5 MΩ/V)		
	range (IL 3800 F) 0.25 up to 1500 MΩ, U≤3000V (IL 3880 G) 0.25 up to 2000 MΩ, U≤4000V	resolution 0.25 MΩ 0.25 MΩ	accuracy Accuracy is a result of the actual ranges for current and voltage: current: 0.4% final value ± 1% actual value range: 200µA, 2mA & 4mA (autorange) voltage: 0.4% final value ± 1% actual value range: series F=3000V; series G=4000V
● HV-test (high voltage test)			
- test voltage	IL 3800F : 100 up to 3000 V DC, programmable IL 3800G : 100 up to 4000 V DC, programmable		
- thresholds	programmable		
- short circuit current	<10 mA DC		
- measuring range	IL 3800F, IL 3880G: 0 up to 4 mA DC		
	range 200 µA / 2 mA / 4 mA	resolution meas.display: 1 µA min/max thresh: 10 µA	- autorange -

● I/O test	
- Inputs 1 – 8	Input voltage: 20 VDC – 28 VDC Input resistance: 4.7 kOhm
- Outputs 1 – 8	Output voltage: corresponding to input voltage applied to PIN 20 and 21, 10 – 28 VDC Output current: max. 200 mA per output potential free to test voltage and internal supply, short-circuit proof
● Accuracy and tolerance (HV and IS Test, for IL3800 F, IL3880 G)	
- output voltage	reproducibility between 100V and 3000/4000V: ± 2% of nominal value
- voltage display	above 100V: 0.4% of max. value ± 1% of actual value
- current display	0.4% of max. value ± 1% of actual value
Features	
<ul style="list-style-type: none"> ● IL3800 F: 14" / 3 HU (housing), with integrated LC-colour display IL3880 F/G: 19" / 4 HU (plug-in), with integrated LC-colour display ● RS-232 – interface for printer connection or remote control ● menu-driven test programme creation 	

2.3 Set-up of device

2.3.1 Front



- 1 LC colour display
- 2 operating key „MENU“ – *calls Quick-Menu*
- 3 operating key „START“ – *starts test*
- 4 operating key „ESC“ – *escape from an action, change into the superior menu*
- 5 operating element: navigation wheel and key – *navigation in menus, changing of parameters*

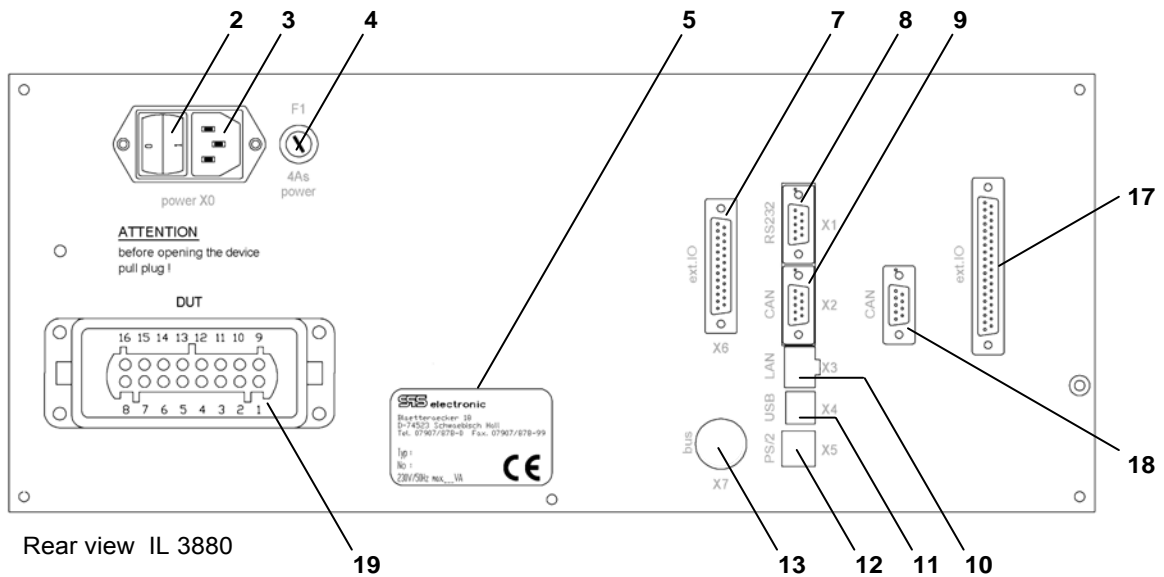
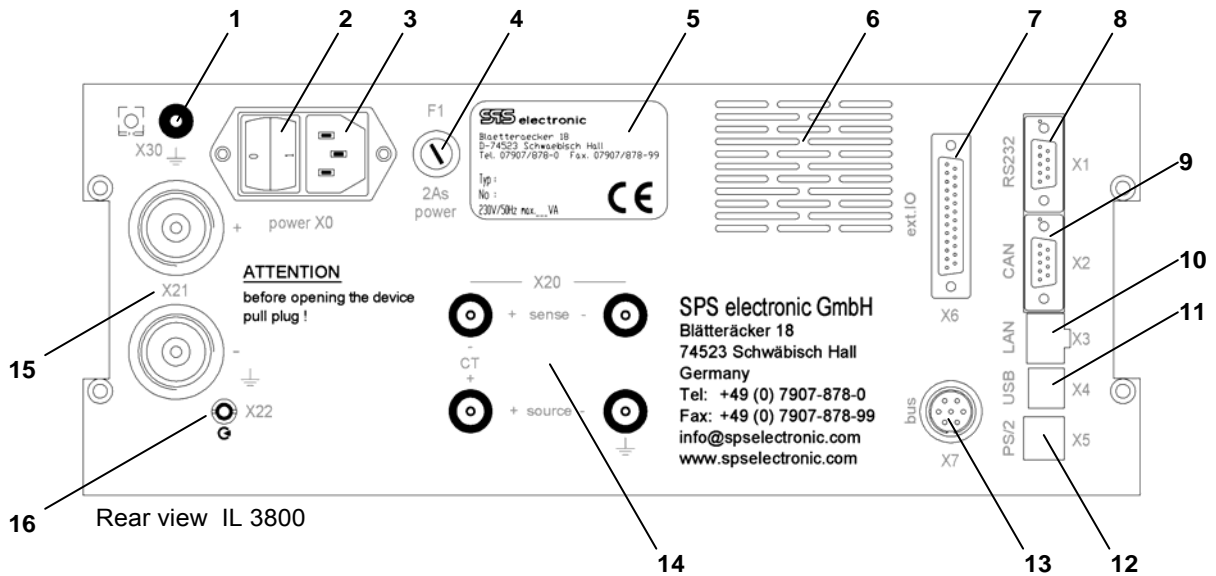
Only for series 3800:

- 6 terminal: test voltage pos.
- 7 terminal: sense voltage pos.
- 8 terminal: test voltage neg.
- 9 terminal: sense voltage neg.

Only for series 3880:

- 10,11 terminals for connection of high voltage pistols (10: pos. / 11: neg.)
- 12 socket for signal line (for high voltage pistols with integrated start key)

2.3.2 Rear



Legend

- 1 earth connection (X30) ¹⁾
- 2 power switch for switching device on and off
- 3 cold equipment socket for power supply cable (X0)
- 4 main fuse (F1) (2A, slow-acting)
- 5 type label with
 - address of manufacturer
 - name of device (type)
 - serial number (no.)
 - max. power input at 230 V / 50 Hz in VA
 - CE mark
- 6 ventilation grid – keep absolutely free of obstruction! ¹⁾
- 7 I/O interface (X6)
- 8 RS232 interface (X1) : serial interface for connection of printer or PC
- 9 CAN interface (X2) : CAN-bus for device extensions
- 10 LAN connection (X3) : Ethernet-connection (10BaseT)
- 11 USB connection (X4) : interface for connection of PC (USB 1.1)
- 12 PS/2 connection (X5) : interface for connection of keyboard
- 13 interface I²C-Bus (X7) : internal device bus
- 14 terminals for test and sense voltages (X20) ¹⁾ (same allocation as front terminals)
- 15 terminals for connection of high voltage pistols (X21) ¹⁾
- 16 socket for signal line (X22) ¹⁾ (for high voltage pistols with integrated start key)
- 17 I/O interface²⁾ : additional interface, in connection with (18)
- 18 CAN interface²⁾ : is coupled to (9) to control (17)
- 19 industrial plug and socket connection³⁾ : interface for test adapter or external test voltage supply

¹⁾ only for series 3800

²⁾ only for series 3880

³⁾ only for series 3880 / with system extension RA 3880

2.4 Extensions, options and accessories

2.4.1 Device options

Safety tester IL 3800 is also available with below optional specifications:

- power supply 115 V / 60 Hz

2.4.2 Standard accessories

Included are below standard accessories for this device. If required these accessories can, of course, also be ordered separately.

- power cable
- interface cable RS-232
- test protocol according to ISO 9001
- operating manual of the device (i.e. this document)

2.4.3 Optional accessories

- supporting handle AG38
- printer DK23
- test dummies, various types
- software *3800DAT*
 - PC-supported test operation with creating, editing, executing and administrating of test programmes at PC
- software *3800NET*
 - network connected test operation with several devices and one PC as central server, with data bank linkage
- software *3800NETLIGHT*
 - network connected test operation with several devices and one PC as central server

3 Putting into operation

3.1 Requirements

Tester *IL 3800* as well as all of the electric connections and lines must be in operational and reliable condition.

Tester may only be operated by an authorized and skilled electrician or someone with such training and who is in charge at the time.

The General Safety Regulations (pl. see chapter 1.3) and the generally applicable legal rules as well as other binding directives for industrial safety, for accident prevention and for the protection of the environment have to be adhered to and persons staying in the area of operation must be informed respectively.



There is danger to life caused by electric current or voltage in case of handling electric installations inappropriately!



3.2 Connection of device

1. switch off, if necessary, power switch at tester
2. plug power cable of tester into cold equipment socket (X0) at back of device
3. connect power cable to power supply (230 V / 50 Hz, other values optional)
4. connect test probe to socket (Pos.6) at front of device
5. If provided for connect external devices to interfaces:
 - operating console to I/O - interface (X7) at back
 - printer to RS 232 - interface (X1) at back
 - PC to RS 232 - interface (X1) or USB-interface (X4) at back

3.3 Initial switching on of device

The IL 3800 is switched on at the back of the device (Pos.1).

After switching on the device passes an automatic test. Below display appears:

```

Power on self test
Initialize hardware      OK
Reading of test programmes  OK

OK

Storage for programmes: 1,2% occupied
THIS IS THE INFO-TEXT
Next calibration: 1.1.2004

```

The IL 3800 checks first the internal hardware and after that reads the stored test programmes from the internal read-only-memory into the main memory.



The result of these two steps has to be „OK“. If not, please switch off the device and switch it on again after a short interruption. If the error continues to exist then the hardware is defect and you should contact the SPS-customer service.

Below information will be displayed in the lower half of the screen after the automatic test:

- remaining free memory for test programmes
- freely selectable information text (pl. see chapters 5.6)
- date of next device calibration due

3.3.1 Reconnection of device

After switching on device is again in the operating mode in which it was when last switched off:

State when switching off	State after switching on again
operating mode „Manual“	Loaded is the test programme which was active last. If no test programmes have yet been created the IL 3800 will display the menu selection message.
operating mode „Remote“	After the automatic test the device returns to the remote mode and awaits instructions via the active remote interface X1 or X6. (escape with key „ESC“)
operating mode „Digital“	After the automatic test the device immediately returns into digital operation and awaits signals on X6 (ext. I/O). (escape with key „ESC“)
operating mode „Link“	As in „Manual“ the programme which was loaded last will be loaded anew. However, the operating mode „Link“ is still active.
operating mode „Ethernet“	After the automatic test the device immediately returns into the Ethernet operation and awaits signals on X3 (LAN). (escape with key „ESC“)

3.4 Switching off of device

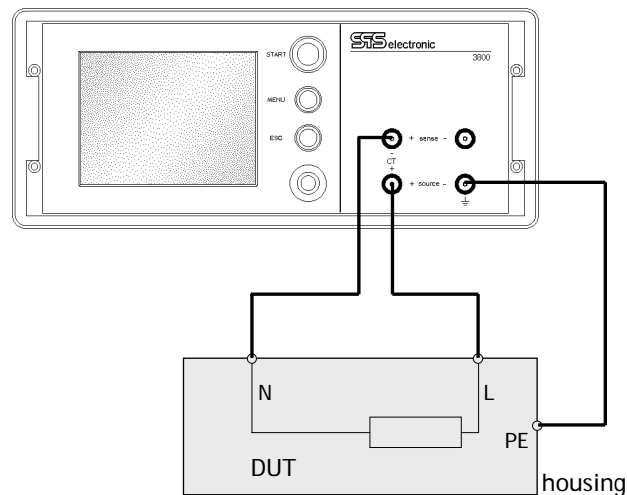
The safety tester IL 3800 is switched off by means of the power switch at the back of the device.
 If you operate in the menu „Test Programmes“ to create new programmes or to alter existing ones then all of the alterations must be stored before switching off! (pl. see chapter 6.2.8)

In case of tests with high voltage (IS- and HV-test) the DUT has to remain connected until a test result is displayed. At the end of the test time the DUT is discharged. If the IL 3800 is switched off prematurely the DUT cannot be discharged!

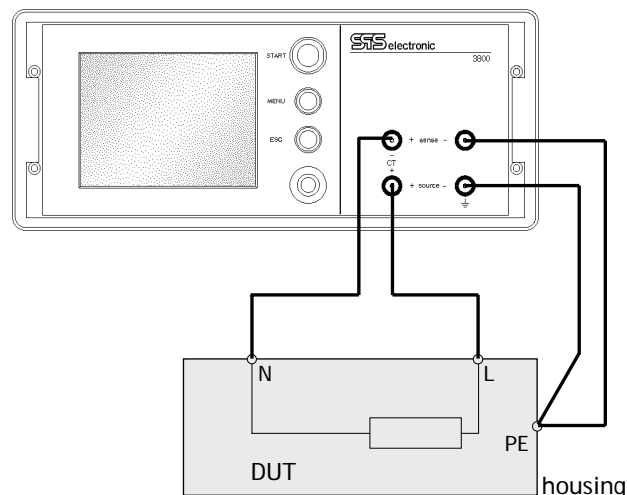


3.5 Connection of DUT

Connection scheme for 2-wire operation:

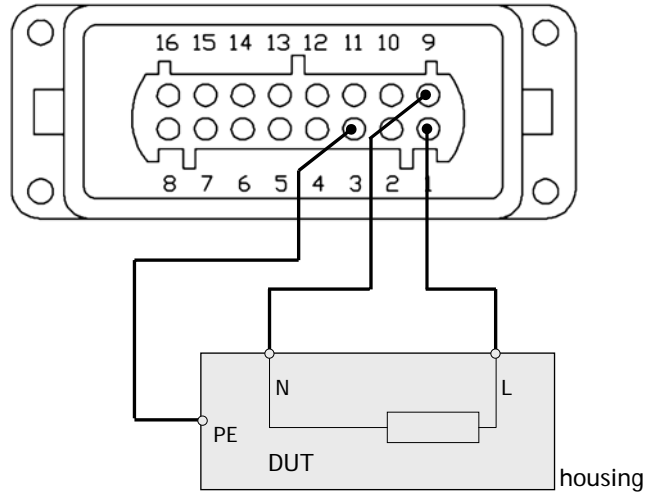


Connection scheme for 4-wire operation:

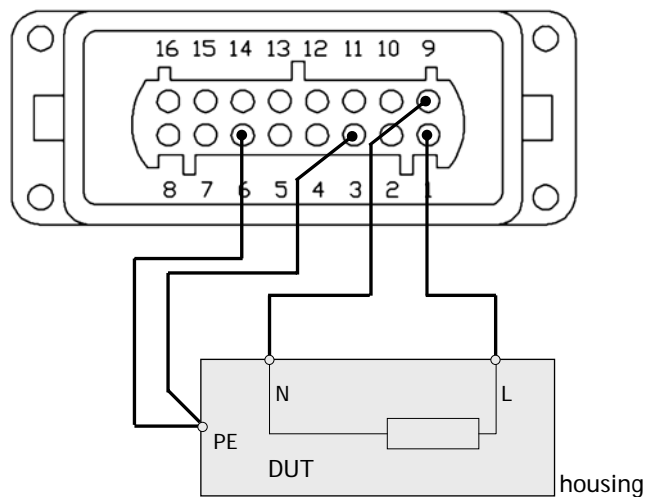


Connection of DUT using rear panel interface:

IL 3880: Connection scheme for 2-wire operation:



IL 3880: Connection scheme for 4-wire operation:

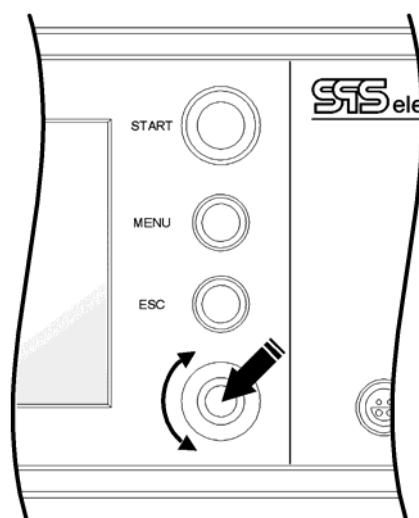


4 Operation

4.1 Explanation of operating elements

The safety tester IL 3800 is operated most simply by means of the operating elements at the front of the device.

The central element is the handwheel with which almost all operations are performed. The handwheel cannot only be turned but also be pushed to actuate an operation.



Operating element	Function
-------------------	----------

key START	Starts a test programme or a single test
-----------	--

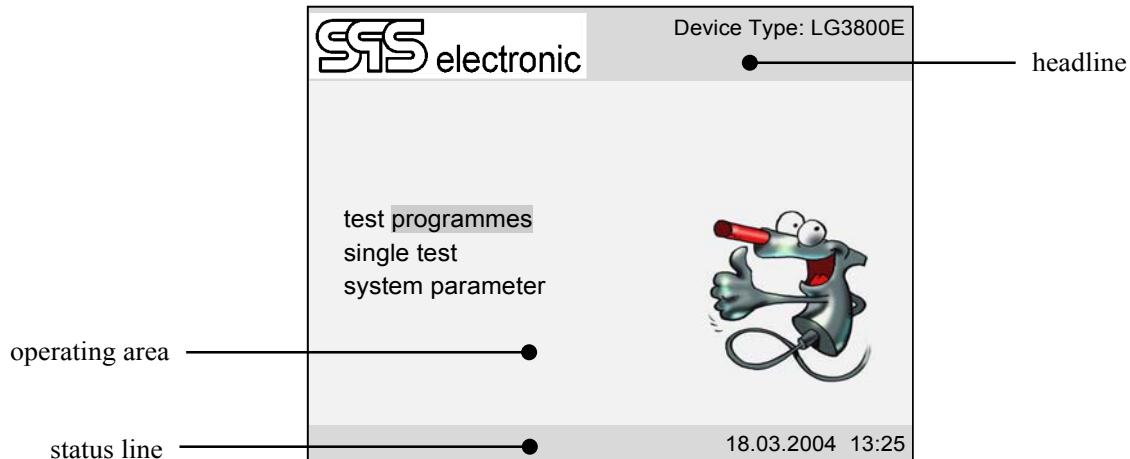
key MENU	Displays a quick-menu in the status line to allow quick access to important functions
----------	---

key ESC	Escapes from current operation – e.g. a current test, input of a parameter, etc. Serves also for a quick change into the superior menu
---------	---

handwheel	With the handwheel movements through the various screen menus, input of parameters and the actuation of operations are performed
-----------	--

4.2 Structure of menu

4.2.1 Basic structure of screen



- The *headline* displays the exact type and the variant of the DUT.
- The *status line* shows the time and the current date as a standard. "Quick-Menu" can be displayed in this line in test mode.
- All of the other operations are carried out in *operating area*: creation of programmes, test operation and display of results, etc.

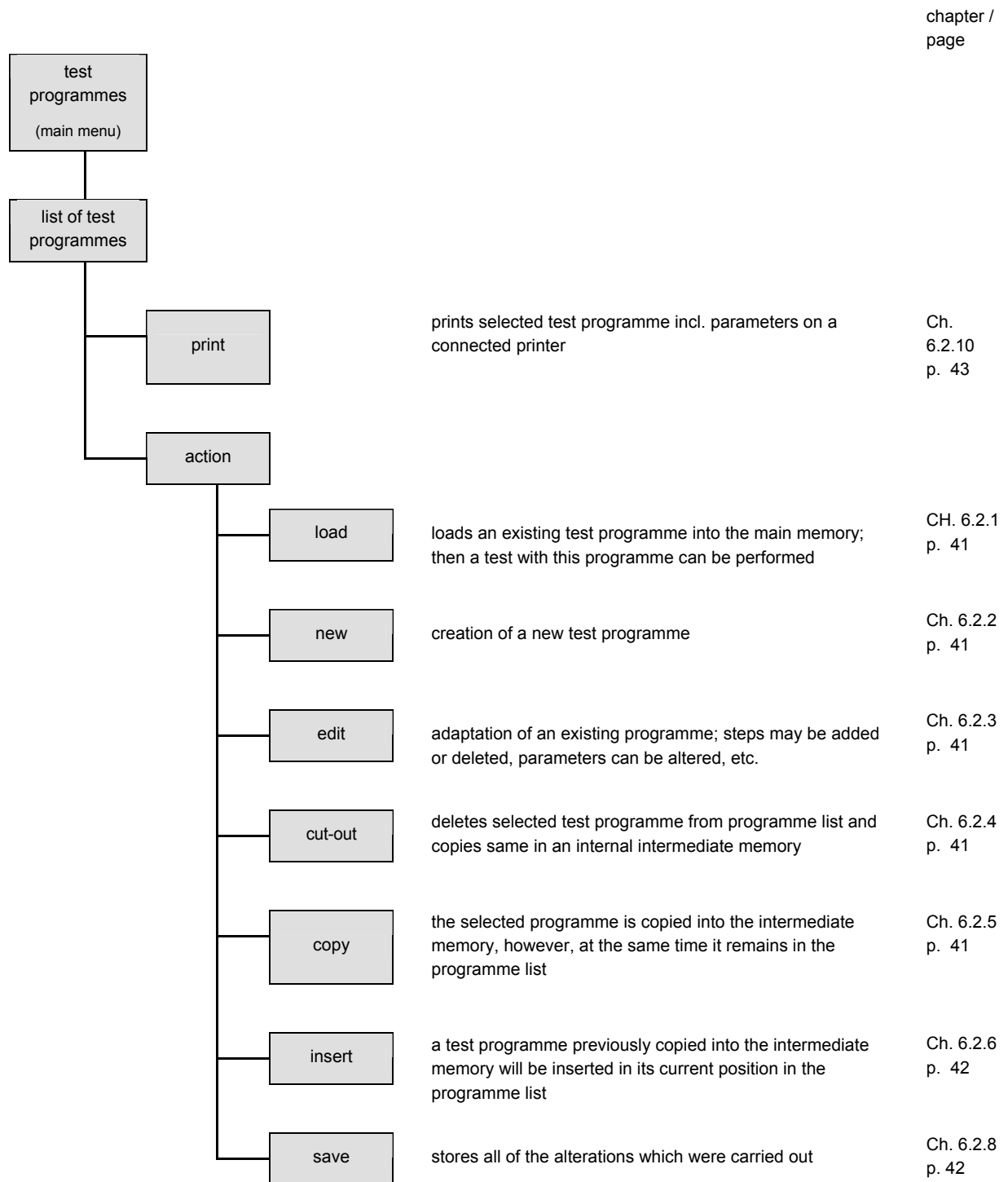
4.2.2 The main menu

All of the functions of the IL 3800 can be reached via the main menu and, if necessary, be altered.

The main menu offers access to below three groups:

- **Test programmes** This is the central menu of the IL 3800:
 - From here regular test operation are performed with test programmes created previously.
 - Here test programmes can be created, altered and administered.
Each test programme can consist of any sequence of single tests and can be provided with a specific name.
- **Single test** Single tests can be performed directly via this menu without having to first programme a test programme.
This function is especially suited for the setting-up operation, or e.g. for special tests, as single tests with varying parameters can be performed especially quickly and easily.
- **System parameter** Here all system parameters of the IL 3800 can be adapted:
Language of operating surface, operating mode of device, parameter of external interface, passwords, etc.

4.2.3 Menu "Test Programmes": Outline



4.2.4 Menu "Single Test": Outline

		chapter / page
single test (main menu)		
continuity test	adjustment of test parameters for continuity test	Ch. 6.3.2, p. 45
insulation test	adjustment of test parameters for insulation test	Ch. 6.3.4, p. 47
HV-test	adjustment of test parameters for high voltage test	Ch. 6.3.5, p. 47
I/O-test	adjustment of test parameters for I/O-test	Ch. 6.3.6, p. 49
return	abandon menu „single test“ → return to main menu	

4.2.5 Menu "System Parameter": Outline

		chapter / page
system parameter (main menu)		
language	<ul style="list-style-type: none"> • German • English • French • Italian • Spanish • Dutch 	Ch. 5.2, p. 31
operating mode	<ul style="list-style-type: none"> • manual • digital • automatic • Link-operation • Ethernet 	Ch. 5.3, p. 31
system time / date	<ul style="list-style-type: none"> • date • time 	Ch. 5.4, p. 33
signal sounds	<ul style="list-style-type: none"> • buzzer – (off / silent) • acknowledgement sound – (off / on) 	Ch. 5.5, p. 33
info	<ul style="list-style-type: none"> • version: firmware-version and device type • infotext: you can select any information text 	Ch. 5.6, p. 34
measurements		Ch. 5.7, p. 34
measurement value display	<ul style="list-style-type: none"> • off • digital • Bar graph • cursor • X / Y 	
password	<ul style="list-style-type: none"> • programme password • menu password • service password 	Ch. 5.8, p. 36
interfaces	<ul style="list-style-type: none"> • RS-232 • USB • Ethernet 	Ch. 5.9, p. 37
safety	<ul style="list-style-type: none"> • start key • key • test pistol • 2-hand • hood 	Ch. 5.10, p. 38
printer	<ul style="list-style-type: none"> • print format (narrow / page / endless / line) • headline (any text) • footnote (any text) • serial number (no / yes / upward) 	Ch. 5.11, p. 39
service	<ul style="list-style-type: none"> • calibration • service 	Ch. 5.12, p. 39

4.3 Operation of screen menus

All screen menus contain different elements of which one each has a yellow background and same is the currently active element. By *turning* the handwheel you go to the next or previous element respectively. The selected element is activated by pushing the navigation wheel.

4.3.1 Entry of letters and numbers

For several actions the user has to enter numbers and/or letters, e.g. when assigning a name for a test programme or when entering the password.

Below screen mask is displayed then:

```

MY TEX█-----
ABCDEF GHIJKL MNOPQ
RSTUVW█XYZ 0123456
789 ←↵

```

In the lower part of the mask all characters which are available for entry are displayed.

Above same the entered text is displayed. Unassigned areas are displayed by the character "█".

By turning the wheel the requested character is selected and entered by pushing the wheel. If characters are to be deleted the symbol "←" has to be selected and activated.

To end a text entry you either enter the character "↵" or push key ESC.

4.3.2 Application of a keyboard

To further facilitate the operation a standard PC-keyboard (PS/2) can be connected to the IL 3800.

The application of a keyboard is especially useful then when texts are to be entered frequently like e.g. commentaries on test performance or serial numbers of DUTs.

Connection to tester

PS/2–plug of PC-keyboard is connected to socket **X5** at the back of the device.

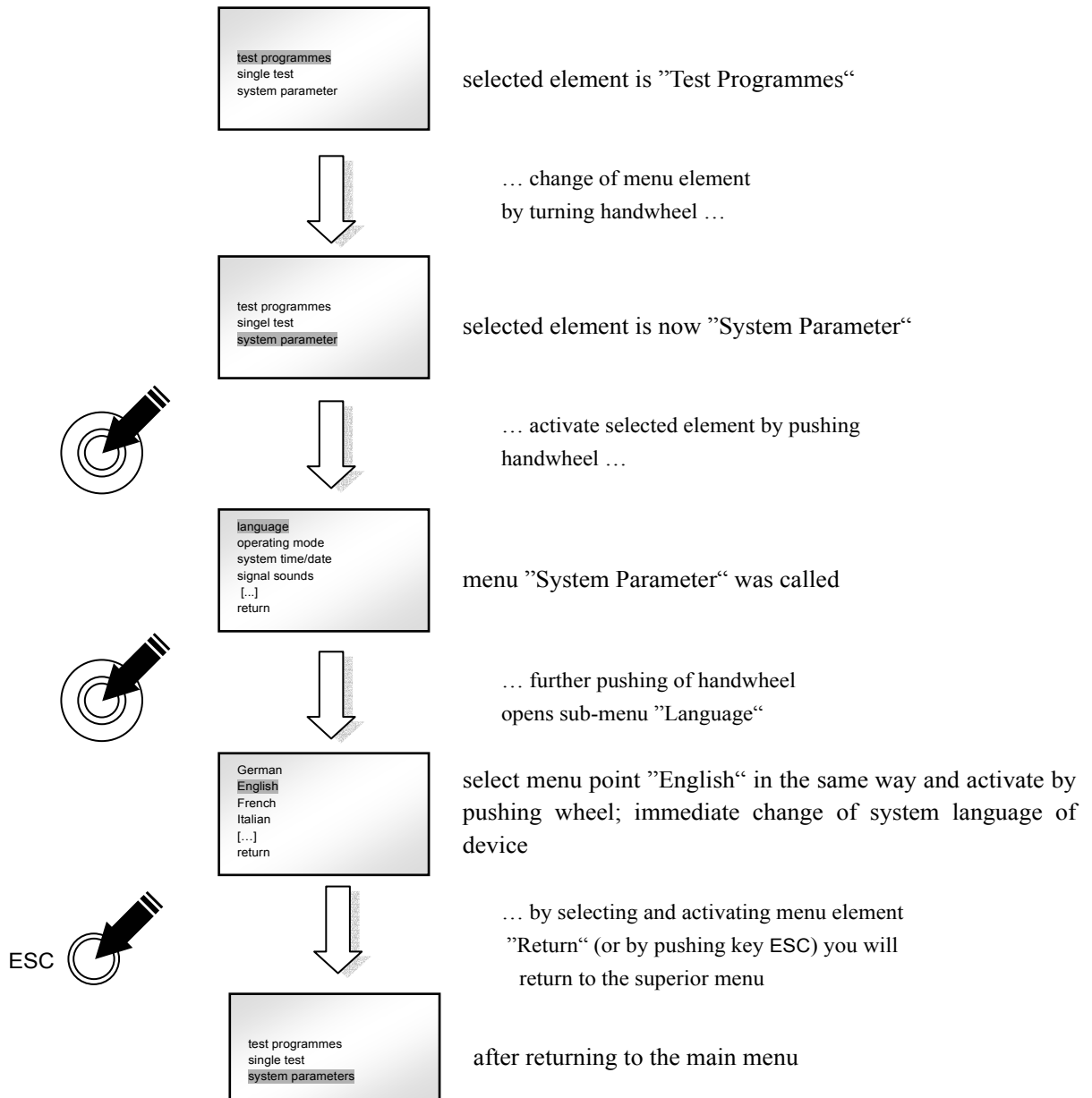
Keyboard functions

Key(s)	Function	Corresponds to
A...Z and 1...0	with these keys letters and numbers can be entered directly	—
Cursorblock (← ↑ ↓ →)	with same the selection mark is moved within a screen	turning of handwheel
ENTER (↵)	selection of elements of display mask	pushing of handwheel
ESCAPE (Esc)	escape from an action	ESC–key

Application example:

In this example, proceeding from the main menu, below steps are carried out:

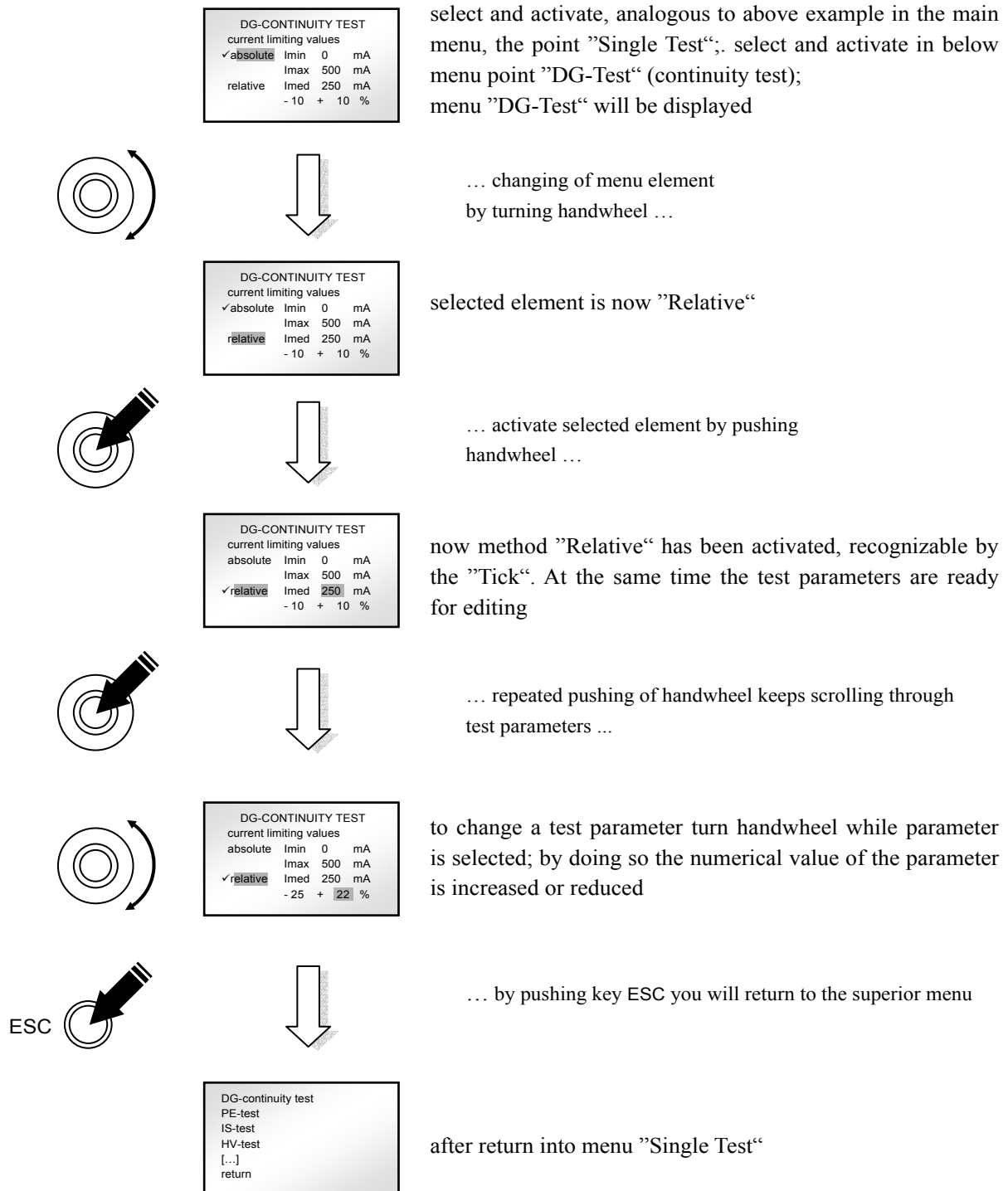
Change into system parameter menu, alteration of system language from German into English, return to main menu



Application example:

In this example below steps are carried out:

Change into single test menu, selection of continuity test (DG), alteration of limiting values from absolute to relative measurement, return to main menu



5 System menu: Setting of system parameters

5.1 General information

In the area of system parameters important basic settings on all functions of the IL 3800 are defined.

On below pages you will find explanations on the options of all system parameters.

To guarantee a correct and safe test operation, the "System Parameter" area should be made absolutely inaccessible by password to unauthorized persons.
Please observe the information on the application of the password in chapter 5.8, p.36.



5.2 Setting of language

With this parameter you can change the system language of the **operating panel**.

After having selected a language with the handwheel all screen dialogues when acknowledged by means of pressure on the hand wheel will be switched immediately to the new language.

The available languages are:

- **German**
- **English**
- **French**
- **Italian**
- **Spanish**
- **Dutch**

5.3 Setting of operating mode

With same you can switch over between the different operating modes of the device:

- **Manual** *Regular, manual test operation with single tests or with test programmes*
- **Digital** *Test programme selection and start/stop functions are performed in digital test operation via digital interface X6 („ext. I/O“). (pl. see chapter 8.2, p. 60.)*
- **Automatic** *In automatic operation the tester is remote-controlled by a connected PC via interface X1 (RS-232) or X4 (USB). (Pl. see chapter 8.1, p. 59.)*
- **Ethernet** *In Ethernet operation device is integrated into a local network (LAN) and the test programmes and results are administered by a central server.
(Pl. see chapter 8.3, p. 62.)*

5.3.1 Operating mode manual

If you select mode *Manual* as operating mode then a dialogue screen will appear on which further options for this operating mode can be defined:

- **Activate** *If an other operating mode than "Manual" was set before then this option must be selected to activate the operating mode "Manual".*
- **Digital output** *If "Digital Output" is **activated** (default option) then all 8 inputs and all 8 outputs of digital I/O-interface X6 are available for test step "I/O-Test".*
*If "Digital Output" is **not activated** then outputs 1–4 of I/O-interface are used for hardware status signals. For test step "I/O-Test" only outputs 5–8 (and all of the inputs) will be available then.*
(pl. see also chapter 6.3.6, p. 49, and annex B-1)

5.3.2 Operating mode Digital

Even after having selected operating mode "Digital" a dialogue screen will appear with further options for this operating mode:

- **Activate** *If an other operating mode than "Digital" was set before then this option has to be selected to activate operating mode "Digital".*
- **Programme selection** *If option "Programme Selection" is activated then the digital operation will start immediately after option "Start" has been activated and the tester is waiting to receive a programme coding via interface X6 .*
If "Programme Selection" is not activated then the IL 3800 will at first remain in the operating mode set before and will only shift into digital operation as soon as a test programme has been loaded manually.
- **Acknowledgement** *With this option you can set how to perform an ERROR test in digital operation.*
*If "Acknowledgement" has **not** been activated the next test will be immediately started by a start signal EXT_START on X6.*
*If "Acknowledgement" has been **activated** then an erroneous test has to be acknowledged first via EXT_ACK before the next test can be started via EXT_START.*
- **Display mode** *Shifting between "Quick" and "Regular" display mode. To accelerate the test process only the measuring values during the test are, not the final test result, displayed in mode "Quick".*

Information:

If "Acknowledgement" for the digital mode is activated then the acknowledgement of an ERROR test result will also be requested in the manual test mode.

5.3.3 Operating mode automatic

After selecting operating mode automatic a menu will be displayed in which the interface applicable for automatic operation can be selected (RS-232, USB, or Ethernet).

After selection of menu "Activate" IL 3800 switches to automatic operation and is waiting for commands via selected interface.

(pl. see chapter 8.1, p. 59)

5.3.4 Operating mode Ethernet

There are no further options to operating mode Ethernet. After selection of this option and activation of menu "Activate" the IL 3800 switches immediately into network operation and is waiting for a product barcode to be read in. (pl. see 8.3, p. 62)

Before applying operating mode "Ethernet" the Ethernet parameters (pl. see 5.9.1, p. 37) have to be adapted to the conditions of the local network. If these parameters have not been configured correctly, communication between tester and the central server cannot be effected!



5.4 System time / setting of date

If required system date and system time of device can be set here.

5.5 Setting of signal sounds

5.5.1 Buzzer

With this parameter you can set the signal sound of your device which will sound at the end of the test if the test result is ERROR.

Below settings are available:

- **Off** *The buzzer is de-activated, no signal will sound at the end of the test.*
- **On** *After an ERROR test a warning signal will sound*

5.5.2 Acknowledgement sound

As feedback a signal will sound regularly with each push on the handwheel. This signal sound can be turned on or off as required.

Available parameters:

- **Off** *No acknowledgement sound when pushing key at device*
- **On** *Each push of the key will be acknowledged with a signal sound*

5.6 Info

5.6.1 Version

For your information below device data will be displayed:

- revision number of firmware of device
- type of device and – its variant / version
- capacity (filling) level of programme storage
- date on which device should be calibrated next

5.6.2 Info-text

A general info-text can be entered here. When switching on the device this text will be displayed during the initializing phase and can be opened by selecting this menu during the operation in process.

This function can e.g. be used to identify different devices which were programmed with different setups.

This info-text can maximally consist of 30 characters.

For input of this information text please see information on page 28.

5.7 Measurement technique and graphic display

5.7.1 Measurement

In this parameter group, settings regarding voltage measurement and voltage ramp can be changed.

These settings are related to insulation and high voltage testing only.

Available parameters in „wire“ group:

- **2-wire** *Conventional measuring technique, with voltage supply by two lines. Here, voltage drops proportional to line length must be taken into account.*
- **4-wire** *Measurement during HV-DC, HV-AC and IS tests are performed using 4-wire-technique, i.e. two lines are current-carrying (source), and the two other lines are used for currentless voltage measurement (sense).*

This setting does not apply to Insulation Test: this one is always performed in 2-wire-technique. (See note p. 47)

Available parameters in „ramp“ group:

- **Ramp on** *When testing with high voltage, the test voltage is applied "smooth" by means of a voltage ramp. At a test's end, voltage ramp is used, too.*
- **Ramp off** *Voltage ramping is not used. Full test voltage is switched on and off directly.*

5.7.2 Measuring value display

In this menu you can select how to display the measuring values established during a test on the colour display.

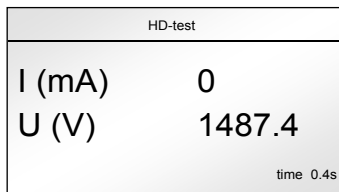
The available display methods are:

- **Off**

With this setting the measuring values of the test are not displayed.

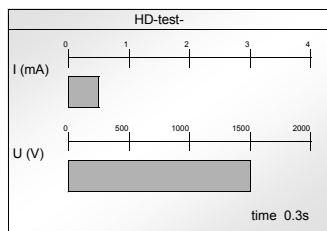
There will only be the evaluation PASS/FAIL after the end of the test process.

- **Digital**



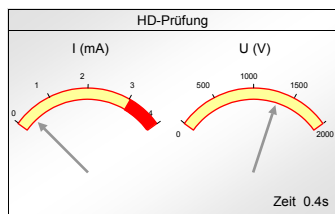
Measuring values are only displayed numerically.

- **Bargraph**



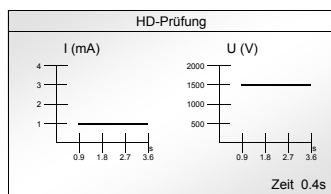
Measuring values are displayed as horizontal bargraph.

- **Needle**



Measuring value display is modelled on analogue circular instruments.

- **X/Y**



This measuring value display is shown in a line graph in a Cartesian dot-frequency diagramme in which the measuring values are plotted via the time.

5.8 Setting of password

Via the password setting access to the different functions of the device can be limited.

Available parameters:

- **Program password** *With same, the possibility to alter existing test programmes can be limited.
The input of the programme password is essential to edit existing programmes or to create new programmes.
Without knowledge of the programme password you can only test with the currently existent programmes.*
- **Menu password** *With same, access to the menu "System Parameter" can be protected.
Without knowledge of the menu password there is no access to the "System Parameter" and any alterations there will not be possible.*
- **Service password** *With this password the service area of the device is protected.
The service area should only be used by SPS electronic GmbH technicians or with their instructions!*
- **Macro password** *With this password the macro editor of the device is protected.*

The input of the password is carried out as explained in "Input of Characters" on page 28.

If a password is to be reassigned the current password has to be entered first – for confirmation of authority – before assigning the new one. Without knowledge of the current password an alteration will not be possible.

It will be possible to annul the respective password function by assigning a "blank" password. In this case there will be no password query in the respective area until a new password has been assigned.

The passwords can consist of up to 15 characters.

Attention:

Once after an area has been accessed by entering the correct password this area will be accessible **until the device is switched off and then switched on again!**

This means that if e.g. a person in charge alters the system parameter during a test operation (for which the menu password has to be entered) then the device should under any circumstances be switched off after the alteration has been carried out and then it should be switched on again! If not then the area "System Parameter" were to remain accessible and unauthorized alterations would be possible.



On delivery the programme and menu password are not activated.

After putting into operation of the device the passwords should be reassigned to avoid unauthorized operation.

5.9 Setting of interface parameter

In this menu the operating parameters of the rear interfaces for the remote operation can be set:

- **RS-232** *The parameters of the RS-232 interface are fixed at : 9600 Baud, 8 Data-Bit, 1 Stop-Bit, no parity. Alterations are not possible.*
- **USB** *The USB-interface is operated in slave-mode. There are no parameters to be set.*
- **Ethernet** *The Ethernet-interface is usually applied for integration of the device into the networks, however the remote operation can also be carried out via this interface.*

When selecting interface “RS-232“ or “USB“ the change-over to the respective interface is immediate, no further settings can be carried out.

When selecting interface “Ethernet“ a further menu opens in which the interface parameters for network operation are determined:

5.9.1 Ethernet

- **Own IP** *„Address“ of tester in the network, format „xxx.xxx.xxx.xxx“. This IP has to be assigned to each tester locally and has to be non-recurrent in the network.*
- **Server IP** *„Address“ of central server, format „xxx.xxx.xxx.xxx“.*
- **Server-port** *Determines “Channel“ of the server via which the tester communicates with same.*
- **Gateway** *If there are more than one network connected in the local Ethernet via a gateway then the IP of the gateway must be entered here (format „xxx.xxx.xxx.xxx“)*
- **Mask** *When applying sub networks it must be communicated via this mask which parts of the IP-address contain the network-ID (identification: “255“) and which contain the host-ID (identification: “0“. (default: 255.255.255.0)*
- **Device ID** *Here an unmistakable identification of the local tester (character string, max. 15 characters) is assigned as e.g. “Tester conveyor belt 1“*
- **Timeout** *Maximum period of time in seconds (after the device has transmitted a barcode to the server), within which an answer from the server has to be received before an ERROR message can be displayed and the contact trial is cancelled.*
- **Light** *When selecting option “Light“ the test operation is performed with the locally stored programmes of the tester; the server will only receive the results.
If not then the test operation is performed with the programmes stored on the server which are loaded into the tester at the beginning of the test via the network.*

5.10 Safety - Selection of start control

Via the safety options it is specified which kind of safety control is to be applied.

Available parameters:

- **Start key** Test process is started via “Start“ key of the tester
- **Key** Test process is started via an external start key
- **Test pistol** Test process is started via the connected HV-test pistols
- **2-Hand** Test process is started via a 2-hand operation
- **Hood** Test process is started via the signal of a test hood
- **FT start signal** Test process is started via the signal of a test hood

During test operation a respective message is displayed after starting an insulation or high voltage test step (e.g. ”push start key“ or ”activate 2-hand operation“). The test step will only start if the request has been complied with, e.i. if the electric circuit is closed via the respective safety control.

To do so the option “Protective Circuit“ has to be activated in test steps IS or HV. If the option “SK” is not activated in the test step the test will start immediately.

There are two setting possibilities for the protective circuit in test steps HV and IS:

- Impulse** – Test will start after closing protective circuit once.
- Duration** – Protective circuit has to remain closed during the complete duration of the test until the test result will be displayed. Premature release of contact will lead to abortion of the test step with the result **ERROR**.

Information:

If safety control “**Hood**“ is set the test will be started via the closing signal of the test hood and there will be no second request.

5.11 Printer - Setting of printer format

Here the settings for the protocolling of the test results on a printer are determined.

The output will always be carried out via the RS-232 interface X1. The interface is operated with below fixed settings: 9600 Baud, 8 Data-Bits, 1 Stop-Bit, no parity.

Examples for the different printer formats can be found in annex D – "Test Protocol Examples".

5.11.1 Printer format

The available options are:

- **Narrow** *The protocol is reduced in width to ½-DIN-A4.*
- **Page** *The protocol is printed in standard DIN-A4 format with form feed.*
- **Endless** *The protocol is printed in DIN-A4 format without form feed.*
- **Line** *Only a minimal protocol is printed with only one line per test.*

5.11.2 Headline and footnote

Here any text which is to be printed on each page of the protocol as headline or footnote can be entered.

Each text can consist of up to 30 characters.

For input of text please see the information on page 28.

5.11.3 Interfaces

Here the interface via which the printer is to be connected is selected (RS-232).

5.11.4 Serial number

Here the settings of the serial number function for the printer protocolling are carried out.

Serial numbers can consist of numbers between 1-digit to 10-digit, they can only consist of figures (no letters).

Available parameters:

- **No** *There are no serial numbers in the protocol.*
- **Yes** *Before each test the entry of a serial number is requested.*
- **Run-up** *The serial number is automatically run up with each test start by "1".
After having selected option "run-up" a display appears into which the requested start serial number can be entered.*

5.12 Maintenance – calibration and service test

Attention:

This area must only be used by SPS electronic service technicians or under direct assistance! False settings can lead to a destruction of the device!

6 Creation of test programmes

6.1 General information

Due to the functionality of the test programmes of the IL 3800 complex test processes can be realized comfortably. Administration and organisation of various programmes for different DUT types can be carried out without problems.

It is also possible to create and use macros in test programmes. Hereby it is possible to define one's own "building blocks" of test steps, which later can be inserted into programmes as needed. This eases, for example, the programme creation when the I/O-interface is queried, and the monitoring requires the same or similar steps to be done several times.

The created test programmes are filed internally in a non-volatile memory and remain filed even if the device is completely cut off from power supply.

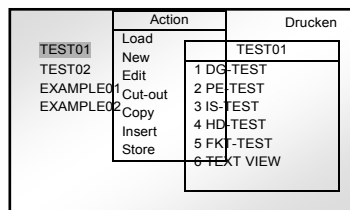
To operate with test programmes you select the entry "test programmes" in the main menu.

6.2 Explanation of action menu

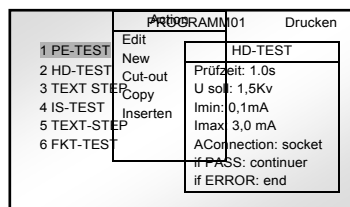
When operating with test programmes, i.e. if new test programmes are created or existing ones are to be altered, the existing data will always be displayed list form.

To carry out an alteration, whether in the list of all existing test programmes or within a specific test programme, you select the element to be altered and push the handwheel. Now the **action menu** opens. From this menu you select the action to be carried out.

Example 1 – action menu in programme list:



Example 2 – action menu within a test programme:



On the following pages the single actions are explained.

6.2.1 Load

Available: only test programme list

To carry out tests with an existing programme it needs to be *loaded* first. By doing so the selected test programme is loaded from the internal read-only memory (ROM) into the working storage.

After loading a test programme the respective screen for test operation is displayed. Then you can start the test operation with key START at the device or at the test probe.

6.2.2 New

Available: test programme list and programme editor

- If you select the action “New“ from the test programme list, then a new still blank test programme is created and inserted into the test programme list which can then be edited as requested.
First a dialogue is displayed into which you enter a name for the new test programme (please see information on page 28). After input and acknowledgement of name you automatically go to mode “Edit“ (pl.see below) and the new, still blank test programme is displayed.
- If calling-up from the programme editor a new test step will be inserted into the currently opened test programme. Now you will see a list with all the available test steps from which you select the requested test step. Then you go automatically to the editing mode to set the single parameters for the new test step.

Information: With the action “New“ the new test programme or the new test step is inserted after the before marked element.

6.2.3 Edit

Available: test programme list and programme editor

If you select the action “Edit“ then the selected test programme or the selected test step will open for operation. You can then insert or delete new test steps or alter test parameters of existing test steps.

6.2.4 Cut

Available: test programme list and programme editor

With action “Cut-out“ the selected element (either a complete test programme in the programme list or a test step in a test programme) is cut out from the displayed list.

However, at the same time, it is copied into an internal buffer so that a later application of this element will remain possible (please see 6.2.9: relocation)

6.2.5 Copy

Available: test programme list and programme editor

Action “Copy“ copies the selected element into the internal buffer, too, it remains, however, in the displayed list.

The alternating application of “Copy“ and “Insert“ (pl. see below) will enable you to duplicate test steps or complete test programmes quickly and easily.

6.2.6 Insert

Available: *test programme list and programme editor*

If you select the action “Insert“ then a test step (or test programme) copied or cut-out before will be inserted behind the position of the element you have just marked.

Information: If by copying and inserting within the programme list a complete test programme is duplicated a new programme name has to be assigned for “Insert“ (several programmes with the same name are not possible).
This limitation does not exist when duplicating a test step within a programme: several test steps with the same name are possible.

6.2.7 Edit Macros

Available: *only test programme list*

When selecting this action, the device switches to the macro-editor. Here one can create new macros and edit existing ones. (See chap. 6.4)

6.2.8 Save

Available: *only test programme list*

After having created a new programme and after having edited an existing programme the alterations in this action menu which have been carried out have to be *stored*. The altered data will then be written permanently into the internal read-only memory (ROM).

If the device is switched off before the storing process then the before carried out alterations will be lost.

Information: If on abandoning the editor unstored alterations still exist the device will inform you and inquire if the alterations are to be stored:

Drucken	
TEST01	TEST01
TEST01	TEST01
BEISPIEL01	2 PE-PRÜFUNG
BEISPIEL02	3 IS-PRÜFUNG
Yes	4 HD-PRÜFUNG
	5 FKT-PRÜFUNG
	6 TEXTSICHT

Therefore to inadvertently not store alterations carried out before is impossible.

ATTENTION: During storing process the device must under no circumstances be switched off or the power supply cut off! All test programmes can be lost then and the memory become useless!

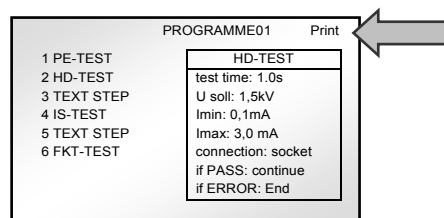
6.2.9 Relocation of a test programme or of a test step

If, within a programme, you wish to relocate a test programme or a test step to another position you proceed as follows:

1. Mark the element to be relocated
2. Action menu → “Cut“
3. Mark the new position of the element to be relocated
4. Action menu → “Insert“. (The cut-out element will be inserted behind the marked element.)

6.2.10 Printing of test programme

If you want to print a test programme including all the test steps and their parameters then you select the element “Print“ with the handwheel in the test programme list or within an opened programme which is to be edited and start the print process by pushing on the wheel:

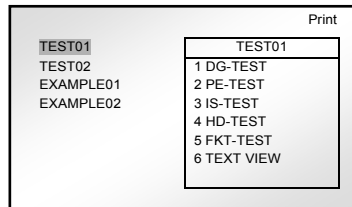


To perform above a serial printer must be connected to the RS232-interface and same has to be switched on (there is no request for both by the IL 3800). In addition the interface configuration in the system parameters must **not** be set “RS232“.

6.3 Editing test programmes and test parameters

6.3.1 General information

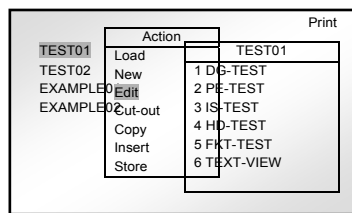
After selecting menu “Test Programmes“ from the main menu below programme list is displayed:



On the left side of the window you will see a list with the names of all test programmes stored.

On the right side the test steps of the programme which are marked in the list are displayed. Within a programme all test steps are numbered consecutively.

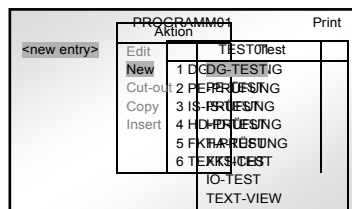
To edit a test programme you first mark the requested programme and then push the handwheel. The action menu from which you select the action “Edit“ opens:



If, however, a completely new test programme is to be created you select the action “New“. It does not matter then which programme was marked when calling the action menu: a new, blank test programme will be created in any case.

When creating a new test programme the request to enter a name for the programme will be made first. A *specific* name must be assigned here: Several test programmes with the same name cannot be managed parallel!

Now you can insert the required test steps via the action “New“ into the test programme just created:



After inserting a new test step or selection of an existing test step for editing you automatically go to an editor window in which all parameters of the respective test step can be set as required.

On the following pages the parameters of all test steps will be explained.

6.3.2 Common parameters and programme settings

Common to all test steps are the lines “If Pass“ and “If Error“ on the right side of the test parameter menu:

PROGRAMMUNG		Drucken
1 DG-Prüfung	Brenzwerte	Ergebnis -> Weiter
2 PE-Prüfung	Imin	01 DG-Prüfung zu Schritt
3 IS-Prüfung	I max	2 PE-Prüfung
4 HD-Prüfung	I med	3 IS-Prüfung
5 Textsicht	- 10 +	4 HD-Prüfung
		5 IS-Prüfung
		6 TEXTSICHT
		Wiederholen

Via these two lines you can establish how to continue the test process, if the respective test steps end either with the result “Pass” or ”Error”:

- Continue Test process is continued with next test step of programme.
- Go to step ## You go to test step no. „##“ and continue the test process from there.
- End Test process is ended, no further test steps are carried out.
- Repeat If the test step ends with ”Error“, a dialogue is displayed requesting if this test step is to be repeated.
If on repeating an error-free result is achieved the test step will be rated as “PASS“.

Printer protocolling

For each test programme you can determine individually its printer protocol, i.e. if you want the protocol to be created “always” or merely in case of “Pass” or “Error”.

This setting is carried out via entry “Print” when a test programme was opened for editing and will be stored together with the programme.

(Compare 6.2.10, “Printing of test programme“)

6.3.3 Continuity test (DG)

With the continuity test a voltage of 24 VDC, current limited to max. 500 mA is applied between connections **L** and **N** of the DUT, and the flowing current (up to 500 mA) is measured now.

If current values between I_{\min} and I_{\max} are measured, the DUT has passed the test.

In case of current values lower (than) I_{\min} or higher (than) I_{\max} , DUT has failed the test.

With below you can test:

- Has DUT been switched on?
- Is there an internal short-circuit at DUT?

DG-PRÜFUNG	
Strom Grenzwerte	
✓ Absolut	Imin: 0 mA Imax: 500 mA
Relativ:	Imed: 250 mA - 10 + 10 %
Bei Gut: ✓ Weiter gehe zu Schritt Ende	
Bei Fehler: Weiter gehe zu Schritt ✓ Ende Wiederholen	

Explanation of test parameters for continuity test:

• Absolute	Selection of current measurement with absolute values	(✓ / -)
○ I min	Required minimum current for test result PASS	(0 – 500 mA)
○ I max	Tolerable maximum current for test result PASS	(0 – 500 mA)
• Relative	Selection of current measurement with relative values	(✓ / -)
○ med	Preset value for required average value of current	(0 - 500 mA)
○ Tolerance –	Highest tolerable drop below average value	(0 - 100 %)
○ Tolerance +	Highest tolerable surpassing of average value	(0 - 100 %)

Information:

- 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 current is no longer controlled, i.e. if there is continuity (no matter e.g. if 5 mA or even 2 A), the result will be PASS.

6.3.4 Insulation test (I2)

With the insulation test the test voltage is applied between connections **(L+N)** and **PE**. If the DUT is sufficiently insulated, no component current flows back via its PE-cable. The resistance between L+N and PE should therefore be as high as possible.

The insulation test can be carried out with an adjustable voltage ramp, provided that same is supported by the type of the tester.

IS-PRÜFUNG		
Prüfzeit:	1.0 s	Bei Gut: ✓Weiter gehe zu Schritt Ende
Rampenzeit:	1.0 s	
Rampe Start	1000 V	Bei Fehler: Weiter gehe zu Schritt ✓Ende
U soll:	1000 V	
R min:	5.00 MOhm	Wiederholen
I(Rampe):	0.00 mA	
✓ Rampe runter	Fehler normal	
Anschluß:	Steckdose	
Schutzkreis:	Aus	

Explanation of test parameters for insulation test:

• Test time	Preset value for duration of test (without ramp)	(0.1 – 999.9 s)
• Ramp time	Duration of time for voltage ramp when starting test	(0.0 – 999.9 s)
• Ramp Start	Initial value for voltage with voltage ramp	(100 – 3000 V)
• U nom	Preset value for test voltage	(100 – 3000 V)
• R min	Required minimum resistance for PASS-result	(0.25 – 1500.00 MOhm)
• Ramp down	Selection of a dropping voltage ramp at the end of test	(✓ / –)
• I min (Ramp)	Required minimum current during voltage ramp	(0.0 – 3.9 mA)
• Error	Method of current control during voltage ramp (<i>see p. 69</i>)	(norm/extra/MBE)
• SK	Selection how the external protective circuit is queried	(off/hold/imp)

Note:

The Insulation Test is always performed in 2-wire-technique, regardless of the system parameter settings. Therefore, the DUT has to be connected in 2-wire-technique, too. Otherwise, the measuring module's inner resistance of 100 MOhm would be included in the measured section.

6.3.5 High voltage test (H2)

The high voltage test tests the electric strength between current-carrying cables L and N and protective conductor PE (or other connections).

In case of insufficient or damaged electric strength of the DUT an arc-over will occur.

The high voltage test can be carried out with an adjustable voltage ramp provided that same is supported by the type of the tester.

HD-PRÜFUNG	
Prüfzeit: 1.0 s	Bei Gut: ✓Weiter gehe zu Schritt Ende
Rampenzeit: 1.0 s	
Rampe Start 1000V	Bei Fehler: Weiter gehe zu Schritt ✓Ende Wiederholen
U soll: 1000V	
Strom: 0.00 mA - 3.00 mA	
ARC detection: 0 %	
✓Rampe runter Fehler normal	
I(Rampe): 0.00 - 3.00 mA	
Anschluß: Steckdose	
Schutzkreis: Aus	

Explanation of test parameters for high voltage test:

• Test time	Preset value for duration of test (without ramp)	(0.1 – 999.9 s)
• Ramp time ¹⁾	Duration of time for voltage ramp when starting test	(0.0 – 999.9 s)
• Ramp St. ¹⁾	Initial value for voltage with voltage ramp	(100 – 3000 V)
• U max/soll ²⁾	Preset value for test voltage	(100 – 3000 V)
• I min	Required minimum test current for PASS result	(0.0 – 3.9 mA)
• I max	Tolerable maximum test current for PASS result	(0.1 – 3.9 mA)
• Ramp down ¹⁾	Selection of a dropping voltage ramp at end of test	(✓ / –)
• Error	Method of current control during voltage ramp (<i>see p. 72</i>)	(norm/extra/MBE)
• I min (Ramp) ¹⁾	Required minimum current during voltage ramp	(0.0 – 3.9 mA)
• ARC detection ¹⁾	Responsivity of detection for voltage arc-over	(0 – 100 %)
• Connection ³⁾	Method of DUT contacting	(socket/probe/SK2)
• SK	Selection whether external protective circuit is to be queried	(✓ / –)

6.3.6 I/O-test

By means of the I/O-test it is possible to transmit signals on the I/O-interface or to read incoming signals.

This way external systems can be controlled or the test process can be controlled dependent on the condition of external systems by branching via the “If-Pass / If-Error” - conditions depending on the read-out result.

IO-PRÜFUNG	
✓ Digitale Eingänge Abfrage <input type="text" value="X X X X X X X X"/> Prüfzeit: 1.0 s	Bei Gut: ✓ Weiter gehe zu Schritt Ende
Digitale Ausgänge Ausgabe <input type="text" value="X X X X X X X X"/> Verzögerung: 1.0 s	Bei Fehler: Weiter gehe zu Schritt ✓ Ende Wiederholen

Explanation of test parameters for I/O-test:

• Digital inputs	Configuration to read signals via I/O-interface	(✓ / -)
○ Inquiry	Indicates the awaited bit combination on reading	(0/1/X)
○ Test time	Space of time via which the signal input is read	(0.1 – 999.9 s)
• Digital outputs	Configuration to set outputs of I/O-interface	(✓ / -)
○ Output statement	States which outputs are to be set or deleted	(0/1/X)
○ Delay	Waiting time from call-up of step to setting of signals	(0.1-999.9 s)

Information:

- Only if in *System Parameters* under *operating mode* → *Manal* option ”digital output“ has been **deactivated**, all eight in- and outputs are available for the I/O-test!
 If ”digital output“ is **activated**, the I/O-interface for standard status signals and control signals is applied and not all in- and outputs will be available. (pl. compare next page and annex).
- For each in- or output “0“, ”1“, or ”X“ can be specified:
 - 0 – Signal must be (read) ”low“ or will be set (written) on ”low“
 - 1 – Signal must be (read) ”high“ or will be set (written) on ”high“
 - X – Signal condition is ignored (read) or remains unchanged (written)
- When **reading** the specified bit combination must be read exactly from the digital inputs to achieve the test result PASS. Inputs specified with ”X“ will be ignored.
- After starting test step the space of time of [test time] is awaited. If by process end of test time the specified bit combination has not been achieved, the test result will be ERROR.
- When **setting** signal outputs all outputs specified with “0“ are set on “low“ and those specified with ”1“ are set on ”high“. The status of outputs specified with ”X“ will remain unchanged.
- After starting the test step the outputs are set immediately. Then you wait for the space of time [delay] before ending the test step and the next one is started. This can be applied if parts of the controlled external systems will need a certain space of time to convert the signals received.

Availability of digital in- and outputs for I/O-step

Mode "Manual", "digital output" = YES	Mode "Manual", "digital output" = NO	Mode "Digital", "Programme selection" = NO	Modus "Digital", "Programme selection" = YES
output 1	output 1	output 1	output 1
output 2	output 2	output 2	output 2
output 3	output 3	output 3	output 3
output 4	output 4	output 4	output 4
output 5	output 5	output 5	output 5
output 6	output 6	output 6	output 6
output 7	output 7	output 7	output 7
output 8	output 8	output 8	output 8
input 1	input 1	input 1	input 1
input 2	input 2	input 2	input 2
input 3	input 3	input 3	input 3
input 4	input 4	input 4	input 4
input 5	input 5	input 5	input 5
input 6	input 6	input 6	input 6
input 7	input 7	input 7	input 7
input 8	input 8	input 8	input 8

Explanations:

- The in- and outputs marked in dark must not be applied for the I/O-step: their condition must be considered, because of different assignment, as "undefined".
- If in case of test steps IS or HV option "protective circuit" is activated, another input for this function is assigned (adjustable under *System Parameter* → *Safety*), and is thus not applicable for the I/O-test.
- In Remote-operation the I/O-test does not exist as individual test step, in this case the inputs are read via requests INP? or INPW? and set via request SET. Here, too, the input is not applicable if the protective circuit function is applied for the IS- and/or HV-test (via requests CONF:xx:SKTYP and CONF:xx:SKINP).

6.3.7 Text step / visual test

This test step can be carried out in two different methods: as *Text Step* or as *Visual Test*.

This text step can, for example, be used to give instructions to the operator: "Connect DUT now!".

In case of the visual test the PASS/ERROR result will depend on the visual judgement of the operator.

TEXTSICHT	
Text: <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;">DIES IST DER FRAGE-TEXT</div>	Bei Gut: <input checked="" type="checkbox"/> Weiter gehe zu Schritt Ende
Schrittart: <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> <input checked="" type="checkbox"/> Info <input type="checkbox"/> Sichtpruef. </div>	Bei Fehler: Weiter gehe zu Schritt <input checked="" type="checkbox"/> Ende Wiederholen
Prüfaussage: <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;"> <input checked="" type="checkbox"/> Ja=gut, Nein=Fehler <input type="checkbox"/> Nein=gut, Ja=Fehler </div>	

Explanation of test parameters for text step:

• Text	Entry of inquiry or information text	(max. 30 characters)
• Step method	Selection of test method:	
○ Info	The indicated text is displayed to the operator and can only be acknowledged with OK. There is <u>no</u> test result PASS or ERROR.	(✓ / -)
○ Visual test	The indicated inquiry is displayed to the operator and can be answered by YES or NO. Depending on the answer the result of the step will be PASS or ERROR.	(✓ / -)
• Test statement	With this option the logics can be changed over for answer evaluation in order to be able to also evaluate „inverse“ question logically: "Is the DUT red hot?" → "No" ⇒ test result PASS.	
○ Yes = pass, No = error		
○ No = pass, Yes = error		

There is no umlaut or any special character available.

6.4 Using macros in test programmes

6.4.1 Overview

The term „macro“ is used for groups of test steps that are managed as one unity each, and have their own name assigned. During the process of creating or editing test programmes, these macros are used the same way as normal test steps are.

In a sense, macros could be seen as „mini test programmes“, since they consist of one or several test steps just as a normal test programmes do.

The difference is that macros are used to prepare „building blocks“, which later can be used to create complex test programmes very easily by just putting together the needed „blocks“.

Example:

A high voltage test in conjunction with I/O-interface control is used frequently. Before and after the high voltage test, always the same I/O-test steps must be performed to send or read control signals to or from the I/O-interface.

If macros were not available, for each test program one would have to insert the needed I/O-steps one by one and to configure each of them individually, or to copy/paste all single steps from a reference programme.

By means of the macro functionality, the effort becomes much smaller. One single time, an according macro step is created: (schematic example)

```
*ExampleMacro
- I/O-step( [read status] )
- I/O-step( [set signal s] )
- High voltage test
- I/O-step( [reset signal s] )
- I/O-step( [read status] )
```

and is stored in the device with an appropriate name. In future, if this combination of test steps is needed, one will simply insert the macro „*ExampleMacro“ into the test programme, and is done.

There is no limit for the number of macros that can be stored. Stored macros are itemised in a separate list, similar to the test programme list.

6.4.2 Creating and editing macros

The creation of a new macro is done in a similar way as for test programmes:

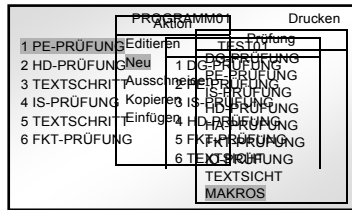
programme editor → *action menu* → „*edit macros*“

After this, the list of macros is shown instead of the list of test programmes. Now one can create new or delete old macros, insert test steps into macros, change the parameters of test steps within macros, etc.

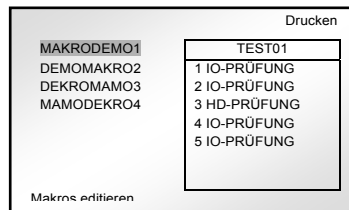
All these operations are done in the same way as described in 6.3 – *Editing test programmes and test parameters*.

6.4.3 Inserting macros in test programmes

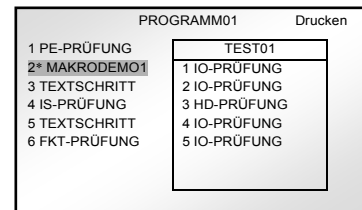
After the needed macros have been created, they can be inserted in test programmes just as if they were „normal“ test steps. The only difference is that the selection is made from an additional list:



Choosing „new – macros“ ...



... selection of the needed macro ...



... after confirming the selection.

Within the program listing, macro steps are indicated by an asterisk (*) after the test step number:

```

1 PE TEST
2* MACRODEMO1
3 TEXT STEP
.
.

```

6.4.4 Editing macros within test programmes

After a macro step has been inserted into a test programme, the parameters of the test steps included in the macro can still be edited. This is done in the usual way by selecting the macro step and choosing „edit“ from the action menu.

Restrictions:

- Once a macro has been put into a test programme, it is not possible to delete test steps from it, or to add new test steps to it.
For this reason, the operations *copy/cut/past* are not available, too.
- The test step „I/O test“ can not be edited at all.
(This restriction deals for reliable reproduction of hardware controlling tasks through macro steps.)

7 Performing tests in manual operation

7.1 General information

In manual operation tests can be performed in two different methods:

1. Testing with pre-set test programmes
2. Single test operation

Test operation with test programmes is the recommended mode for serial test operation. You can carry out complex sequences of test steps or you can keep statistics on the results, print protocols, etc.

The single test operation is suitable for performing single tests with changing test parameters quickly and easily in sequence. To be able to find, for a new type of DUT, the appropriate test parameter to create a new test programme, the single step operation can be recommended.

Further possibilities for single DUTs could e.g. be special tests or tests for error finding – to create a programme for this purpose alone would be too time-consuming.

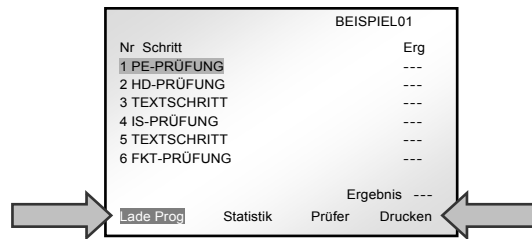
7.1.1 Preparations ahead of test operation

Before starting a test operation all the relevant basic settings should have been carried out. Especially

- display of measurement results → chapter 5.7.2, p. 35
- printer protocol settings → chapter 5.11, p. 39f.
- creation of test programmes → chapter 6, p. 40ff.

7.2 Quick menu in test operation

If IL 3800 is in test mode "Testing" (i.e. if a test programme has been loaded from the programme list) the Quick menu can be displayed via the operating key MENU. Same provides further functions to organize the test process:



7.2.1 "Load Prog"

By activating menu element "Load Prog" the programme list opens. Here you select the required test programme with the handwheel and load it via the "Load" request of the context menu into the storage. Now you can test with the new programme. (pl. compare chapter 6.2.1, p. 41)

7.2.2 Statistics

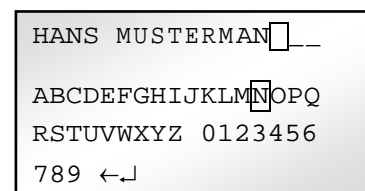
For each test programme an internal statistics is kept about the test results. Via this menu the statistics can be read or deleted.

Please see also chapter 7.5, p. 57.

7.2.3 Tester

Here can – and should – the name of the person performing the tests be entered.

After selection of the menu the regular text entry dialogue is displayed into which, as explained under 4.3.1, the name is entered:



Information:

- The name of the tester entered here will appear in all test protocols later on.
- The once entered tester name remains valid until either a new name is entered or the IL 3800 is switched off and on again.
- After entry the name of the tester will be constantly displayed in the status line:



7.2.4 Printing

By selecting this menu the currently loaded test programme is written out on a connected printer. The data output is carried out immediately, there will be no further messages or acknowledgements.

7.3 Test programme process

7.3.1 Outline

- **Loading of test programme**

After loading a programme the programme outline will be displayed:

BEISPIEL01	
Nr Schritt	Erg
1 PE-PRÜFUNG	---
2 HD-PRÜFUNG	---
3 TEXTSCHRITT	---
4 IS-PRÜFUNG	---
5 TEXTSCHRITT	---
6 FKT-PRÜFUNG	---
Ergebnis ---	
Prüfer HANS MUSTERMANN	17.07.2004 15:36

- **Start of test**

The test start is carried out according to set start control. Pre-set is the START key of the IL 3800.

- **Test step process**

The test steps are consecutively carried out with their programmed parameters.

Depending on test step and set start control the single steps will start automatically or when contacting DUT or after activating start control.

While one test step is in process the current measuring values are displayed.

- **Test step result**

If one test step ends with PASS, the next step will start immediately.

If one test step ends with ERROR, the test process is stopped (if under "if Error" of the respective step nothing else was specified)

- **Test result**

If all test steps resulted in PASS, the complete test result is PASS.

The programme will be started again with the 1. test step.

If the test step result was ERROR, the complete test result is ERROR.

The test process is stopped and the faulty step is displayed:

BEISPIEL01	
Nr Schritt	Erg
1 PE-PRÜFUNG	OK
2 HD-PRÜFUNG	OK
3 TEXTSCHRITT	OK
4 IS-PRÜFUNG	NOK
5 TEXTSCHRITT	---
6 FKT-PRÜFUNG	---
Ergebnis NOK	
Prüfer HANS MUSTERMANN	17.07.2004 15:36

In the manual test mode you can now either

- start again the next test with START or
- examine the measuring values of the test process (pl. see 7.6.1, p. 58)

In digital operation the faulty test must possibly first be acknowledged by an EXT_ACK signal before being able to start the following test process with EXT_START.

This will depend on the setting "Acknowledgement" in *System Parameter* → *Operating Mode* → *Digital*.

7.4 Changing of test programme

In order to be able to continue the test process with another test programme below steps have to be carried out:

0. (Test process of current programme has to be finished)
1. Activate MENU key
2. Activate menu element "Load Prg"
3. Selection of requested programme from list
4. Action menu → "Load"

The new test programme is now loaded and the test operation can be continued with this programme.

7.5 Statistics

An internal statistics is kept for each test programme. In the statistics the results of all individual steps as well as all of the total results of the individual test programme are protocolled.

The statistics module can be called up via MENU → "Statistics".

The PASS results (OK) and ERROR results (NOK) are counted for each single test step of the respective programme, counted are also the total results of the test programme.

With menu "Print" the statistics can be written out by a printer.

Via entry "Delete" the statistics can be deleted, i.e. all values can be set back to zero.

BEISPIEL01		
Nr Schritt	OK	NOK
1 PE-PRÜFUNG	7	0
2 HD-PRÜFUNG	7	0
3 TEXTSCHRITT	7	0
4 IS-PRÜFUNG	7	0
5 TEXTSCHRITT	6	1
6 FKT-PRÜFUNG	6	0
Prg Ergebnis	6	1
Drucken	Löschen	

Information:

- The statistics is constantly actualized in the background during the test process. It doesn't have to be stored or activated.
- If a new test programme is created by "copying" or "cutting out" first another programme and same is then inserted somewhere else, the existing statistics will **not also** be copied. The newly inserted programme will start again with a "blank" statistics.
- To set the statistics of an existing test programme back to zero this programme will have to be "cut-out" first and then "inserted" again.

7.6 Test results and test protocol

The results of tests or the measurement values of single test steps can be read in two different ways:

- On the display of the tester
The result is always displayed on the device display in compressed form. And only the results of the respectively most recent programme process can be read.
- On the print-out of a connected protocol printer
The printer protocolling supplies a detailed result protocol of all tests performed.

7.6.1 Readout of result on display

The measurement results of the most recent test process can be read on the device display. To do so the IL 3800 must come to a stop, i.e. the device either waits for acknowledgement after a faulty test or a test was stopped by the operator.

If you select now a test step from the programme outline (please see p. 56 below) by handwheel the results of this test step will be displayed in a new window:

BEISPIEL01				
Prüfschritt: 2				
HD TEST				
	min	max	Ist	Erg
I	0.00mA	3.00mA	1.37mA	OK
U	1500.00V	2000.00V	2376.50V	NOK
Prüfer HANS MUSTERMANN			17.07.2004 15:36	

With key ESC you will return to the programme outline. Now measurement values of other test steps can be examined or, after required acknowledgement, the test operation can be continued.

7.6.2 Printer protocolling

Protocolling on a printer will supply detailed data on all test steps performed.

If a printer is connected to RS-232 interface **X1** and switched on the protocolling will be automatic.

Four different formattings for the printer protocol are available:

- **Narrow** The protocol is printed in reduced width, e.g. for roll paper.
- **Page** The protocol is formatted to DIN A4 page size, with a headline and a footnote on each page.
- **Endless** The protocol is formatted as in “Page“, however without form feed and without footnote. Same is suitable for endless roll paper as well as for other than A4 paper lengths if the form feed is controlled by the printer.
- **Line** This only creates a minimal protocol with only one line per test.

The required formatting can be set with *System Parameter* → *Printer* → *Print Format*.

8 External control: operating modes Remote, Digital, Ethernet

The application possibilities of our tester IL 3800 are not limited to manual tests. By means of operating modes "Remote" and "Digital" the IL 3800 can also be applied for automated or remote-controlled test operations.

8.1 Operating mode Remote

8.1.1 General information

In Remote operation the tester is controlled completely via digital command sequences. The advantage of this control method is that you do not absolutely depend on rigid processes of the preset test methods. It is, on the contrary, possible to use and control all functions of the IL 3800 independently. You can especially realize control circuits in the sense of "Measure, Control, Adjust" via the remote controlling device. Same will allow also its operation in very specific application situations in which the possibilities of pre-confected test processes are not always sufficient.

The test programmes stored in the device will not be applied in this mode. The current system parameters at this moment remain valid can, however, if required, be passed over with respective commands.

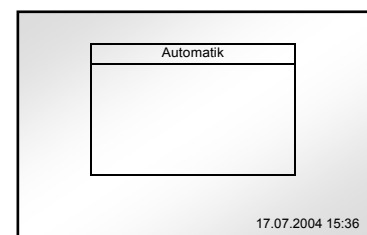
Communication is carried out via the rear interfaces (RS-232, USB, Ethernet). The command sequences are transmitted in ASCII code. The remote control is carried out best via a PC or also e.g. via memory programmable controls (SPS).

8.1.2 Selection of Remote operation

Setting device to operating mode "Remote": (pl. compare p. 27)

Main menu → *System parameter* → *operating mode* → "Automatic"

As soon as operating mode "Automatic" has been acknowledged, IL 3800 is in Remote operation and this operating mode will be displayed:



Manual operation is no longer possible. The device now awaits commands via the active interface and can be controlled by means of the commands explained in annex A – Remote Control.

8.1.3 Remote operation escape

In activated automatic operation the device remains in this operating mode even after switching off and on again.

To leave this remote operating mode you have to push key **ESC** on the front panel of the tester longer (approx. for 3 seconds). Then the device has returned to the manual mode.

The longer activation of **ESC** is necessary to prevent an unintentional quitting of the Remote operation.

8.2 Operating mode Digital

8.2.1 General information

Operating mode "Digital" is the second possibility to operate the IL 3800 automatically.

In this mode the test operation is carried out by means of pre-created test programmes as in manual operation. Selection of test programme and start of test process is performed via signals on the I/O-interface **X6**.

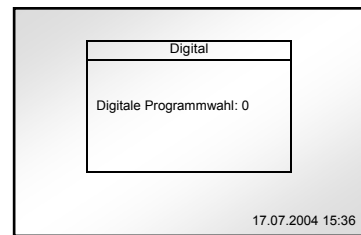
This way you do not need to rely on a fixed sequence of test steps or test programmes but you are able to keep the test process flexible at any time. Another possibility would e.g. be to perform the operation of the daily test operation completely via external operating units in case the tester has to be positioned in areas not easily reachable.

8.2.2 Selection of Digital operation

Setting device to operating mode "Digital": (pl. compare p. 27)

Main menu → *System parameter* → *Operating mode* → "Digital"

As soon as operating mode "Digital" has been acknowledged the IL 3800 is in digital operation and this operating mode will be displayed:



Manual operation is no longer possible. The device awaits now digital programme codes and the start signal via interface **X6** („ext. I/O“)

8.2.3 Digital operation escape

In activated digital operation the device remains in this operating mode even after switching off and on again.

To escape this digital operating mode you have to push key **ESC** on the front panel of the tester longer (approx. for 3 seconds). Then the device has returned to the manual mode.

The longer activation of **ESC** is necessary to prevent an unintentional quitting of the digital operation.

8.2.4 Digital programme selection

In digital operation the test programme is determined via the 4 Bit of PINs 11-14 of interface **X6** which is started by the start signal on PIN 18.

You can select 16 different programmes with the number of the test programme resulting from its place in the programme memory. The Offset is determined by the 4 inputs $2^0 - 2^3$ same is added to the 1. programme. (Pl see annex, p. ff.).

As soon as signal EXT_START on PIN18 is given, the programme specified by the inputs 1 - 4 is loaded and started.

Information:

The digital programme selection is only possible if the entry “*Programme Selection*“ in *operating mode* → *Digital* has been activated before. If this entry has not been activated, then the test programme can only be loaded manually.

By deactivating the digital programme selection the inputs 1 - 4 on interface X6 can additionally be used for control tasks by means of test step ”I/O-test“.

8.2.5 I/O-test in digital operation

In digital operation the I/O-interface X6 is only available within limits:

- the inputs 6 and 8 are always used for the signals ACK (acknowledgement) or START
- the inputs 1–4 are always used for the digital programme selection (if not deactivated)
- the outputs 1–4 are always used for the status signals.

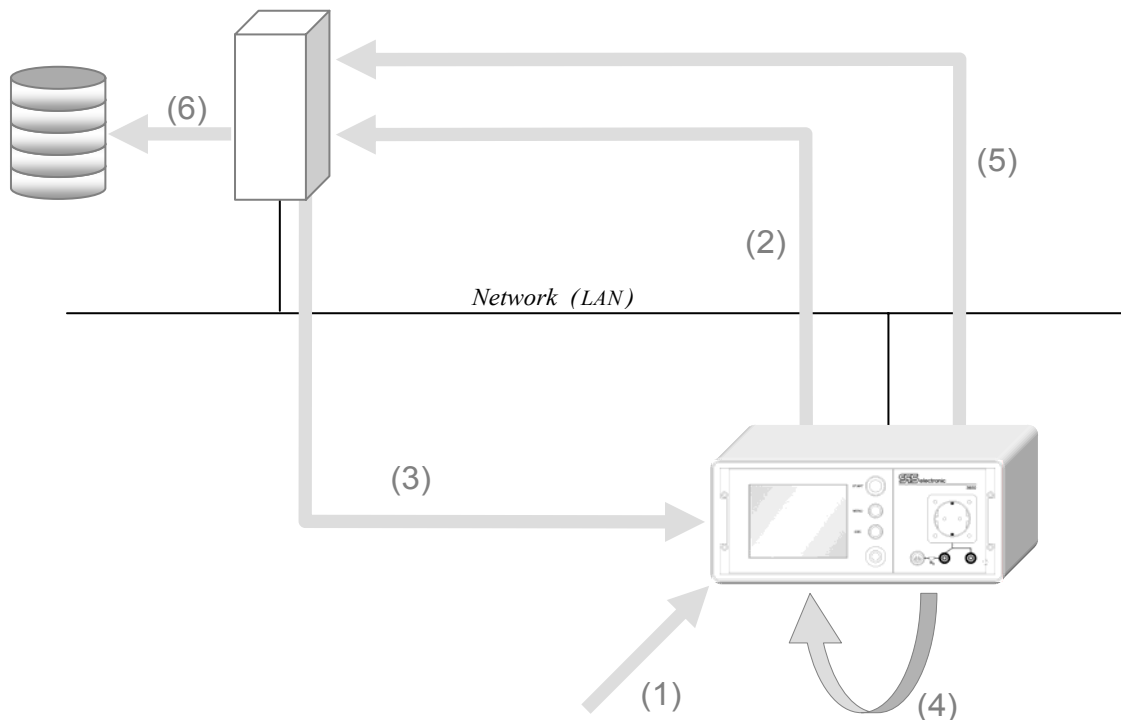
Therefore in digital operation only outputs 5–8 and inputs 5+7 or 1–5+7 are available.
(Please also see table p. 49)

8.3 Operating mode Ethernet

8.3.1 General information

In operating mode "Ethernet" it is possible to include any number of testers into the network in which the test operation is administered by a central server-PC.

Function principle of network operation:



Process of a test:

Mode: NET 3800

- (1) read-in of Barcode
- (2) Barcode is transmitted to server
- (3) Server loads the suitable test programme into the tester
- (4) Performance of test
- (5) Test result is transmitted to server
- (6) Server administers test result (databank)

Mode: NET 3800 LIGHT

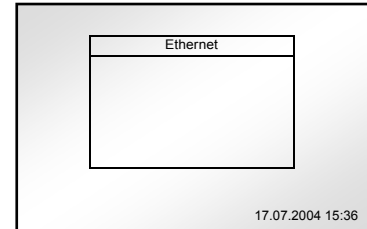
- (1) Read-in of Barcode
- (2) Device evaluates Barcode automatically
- (3) Device loads the suitable test programme from its own programme memory
- (4) Performance of test
- (5) Test result is transmitted to server
- (6) Server administers test result (databank)

8.3.2 Selection of Ethernet operation

Setting device to operating mode "Ethernet": (pl. compare p. 27)

Main menu → *System parameter* → *Operating mode* → "Ethernet"

As soon as operating mode "Ethernet" has been acknowledged the IL 3800 is in network operation and this operating mode will be displayed:



Manual operation is no longer possible. The device awaits the entry of a Barcode per Barcode scanner to start a test cycle.

8.3.3 Ethernet operation escape

In activated network operation the device remains in this operating mode even after switching off and on again.

To escape operating mode "Ethernet" key **ESC** on the front panel of the tester has to be pushed longer (approx. for 3 seconds). The device has now returned to the manual mode.

The longer activation of **ESC** is necessary to prevent an unintentional quitting of the network operation.

9 Service and function inspection

9.1 Service

Our safety tester IL 3800 is maintenance-free.



Pull power plug before opening device!

SPS electronic GmbH recommends to return the devices of series IL 3800 **for inspection once a year** to guarantee the accuracy of the measurement values.

If on inspection defects are detected the device has to be re-calibrated by *SPS electronic GmbH*.

9.2 Function check

9.2.1 Automatic test

Insulation and High Voltage Tester IL 3800 performs an automatic test of the internal functions (pl. see p. 20) each time it is switched on.

The result of this automatic test has to be "OK". If not, please switch off the device and switch it on again after a short pause. If the error remains it is due to a hardware defect and you should contact the SPS customer service.

9.2.2 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.

Annex

A Remote Control

A-1 General

RS-232 parameter: 9600 baud, no parity, 8 bits, 1 stop bit
 Line terminator: All commands and answers are finished with <LF> (= line feed).

A-2 Syntax description

Command format

[command]<LF> maximal length 40 characters, terminated with <LF>

Answer format

[answer]<LF>

Commands

*[global command] permanently available command
 [local command] Structure dependant command, availability depending on device variant and device status (i.e. actual position during test run)

Global and local comands

[execute command] controls testing device directly.
 [configuration command]<SP>[parameter] sets device parameters (<SP> = space)
 [data request command]? Reads a value from the device. All configuration commands (CONF: XX: ...) also allow reading back by “?”.

Format of parameters

[string value] May contain any character, except <LF> and „ ; “,
 String length is limited to 40 characters max.
 [numerical int. value] Simple integer value, as for i.e. “number of digital input”, etc.
 [numerical real value] Fixed format NNN.N (leading zeroes may be omitted), as used i.e. for all time based values (test time, ramp time, pass time).
 Floating point format N.NNE+/-NN
 Used for parameters and measured values of voltage, current, resistance, etc. For these values, basic units are used.

A-3 Globale Commands

- *IDN? Reads the device identification (device type, firmware version)
Answer example: LG3800E, Ver. 1.0.2, 09.09.2004<LF>
- *VER? Reads the command version (version ID). The answer is in range 0-65535.
Answer example: 911<LF>
(See table "Available Tests" below for list of available values of "Version ID".)
- *EXT? Reads the configuration of device extension unit. Answer is a string of 10 characters. Default answer is "0000000000" = no extension.
Answer example: 0000000000<LF>
0000100000<LF>

position	meaning	value = 0	value = 1	value = 2
1-4	EW3301 units	always 0		
5	16 I/O unit	no extension unit	extension present	
6 - 10	reserviert	always 0		

- *MOD? Reads the actual operating mode of the device. Value is in range 0-255.
Answer example: 5<LF>
(See "Status and error parameters")
- *STA? Reads the status register describing the current activity while the device is performing a test . Value is in range 0-255.
Answer example: 3<LF>
(See "Status and error parameters")
- *ERR? Reads the first saved (i.e. the oldest) error from error queue, and removes it from queue. Error number (range: 0 – 255) and error description are separated by ,, , “. The error queue can safe a maximum of 10 errors. If the queue is full, the error „200,Queue Overflow“ is saved on last position of the queue.
Answer example: 0, No error<LF>
(See "Status and error parameters")
- *CEQ Clears all errors from the error queue.
- *CLS Clears status register, error queue, input and output buffers for serial communication. Breaks any running test and puts the device in idle state. Parameters set by commands CONF remain, however type and result of last test are cleared. Does not change *LLO status.

- *RST** Resets the device to power on conditions. It's the same as the *CLS command, however all test parameters are set back to default values, too.
Moreover, *LLO status is set to „0“ (default value).
- *LLO / *LLO?** Disables the possibility to abort a test by the ESC key, resp. reads its current status.
Possible answers: 0 = abort enabled, 1 = abort disabled
- *INP <digital input>?** Reads the status of digital inputs. The external digital inputs are in range 1-8, the internal are in range 9-16. Possible answers are „0“ (= off) or „1“ (= on). The value for <digital input> must be in format NN, i.e. a 2-digit integer value.
Answer example: 0<LF>
Some internal digital inputs are used to read the status of standard control elements:
09 = button START on front panel
10 = start button on test probe (for PW test),
start button of HV pistols in HV test (for HA38xx)
11 = button DEVICE ON (for S38xx and KT38xx)
12 = button DEVICE NOT-AUS (for KT38xx)
(More values can be added during device series development.)
- *INPW?** Reads all inputs (external 1-8 and internal 9-16) and puts the result in a variable (type 'word', range 0 - 65535).
Answer example: 1030<LF>
Result evaluation: 1030 (dec) = 1000000110 (bin)
⇒ ext. inputs 2, 3 and 11 are „on“, all others are „off“
Notice: The older command SYST:IO:INP? should be replaced by this command and deleted.
- *SET <RRR>; <SSS>** Sets or clears signals at external digital outputs (outputs 1-8).
RRR is an 8-bit decimal number from 000 to 255. By combining the corresp. binary value through logical AND the masked outputs are resetted.
SSS is an 8-bit decimal number from 000 to 255. By combining the corresponding binary value through logical OR the masked outputs are set.
Examples: *SET 255;000 clears all outputs
*SET 000;255 sets all outputs
*SET 000;004 sets output No. 3
Notice: The older command SYST:IO:SET <RRR>;<SSS> should be replaced by this command and deleted.

A-4 Local commands

MEAS? Reads the actually performed test type. If no test is performed at the time of reading, the answer is „??“.

Continuity Test (CT)

MEAS: CT Starts the continuity test (CT).

READ: CT: CURR? Reads the actual value of current . Result is in [A].

Insulation Test (I1)

CONF: I 1: TIME <test time>|? Sets the test time: range 0.1 - 999.0, default 5.0 [s].

CONF: I 1: RES: 5M|50M|? Sets the measuring range to 5 M Ω or 50 M Ω , default 5 M Ω .

CONF: I 1: CON: SOCK|PROB|? Selects the connection type of tested device:
SOCK – socket (for devices of safety class 1), default
PROB – test probe

CONF: I 1: SKTYP: OFF|IMP|HOLD|? Selects the starting mode:
OFF – test starts immediately
IMP – test is started by an impulse applied to the digital input defined by SKI NP (see below), default
HOLD – test is started by a signal on the defined digital input. Signal must apply during the whole test.

CONF: I 1: SKI NP <input nr.>|? Safety contact: specifies the number of the digital input by which the command SKTYP checks safety contact's status.
<input nr.> is in range 1-16 (1-8 = external inputs, 9-16 = internal inputs).

CONF: I 1: DEF Resets all parameters for the Insulation Test (I1) to their default values.

MEAS: I 1 Starts the Insulation Test (I1) with a fixed voltage of 500 V DC.

READ: I 1: VOLT? Reads the actual value of real voltage. Result is in [V].

READ: I 1: CURR? Reads the actual value of real current. Result is in [A].

READ: I 1: RES? Reads the actual value of real resistance. Result in [Ω]

Insulation Test (I2)

CONF: I 2: TIME <test time> ?	Sets the test time: range 0.1 - 999.0, default 5.0 [s].
CONF: I 2: RAMP <ramp time> ?	Sets the time of voltage ramp at the beginning and (optionally) at the end of a test: range 0.0 - 999.0, default 1.0 [s].
CONF: I 2: RDWN: ON OFF ?	Chooses whether to use the ramp-down feature or not: OFF – voltage ramp at test's end disabled (default) ON – voltage ramp at test's end enabled
CONF: I 2: USTART <U start> ?	Sets the starting (resp. ending) value for the voltage ramp at a test's beginning (resp. ending). General range is 0 - 6000, default 0 [V]. However this value must be smaller than or equal to <U nom>.
CONF: I 2: VOLT <U nom.> ?	Sets the nominal test voltage: general range is 100-6000, default 500 [V]. The real upper limit is either 3000, 4000 or 6000 V, depending on the device variant.
CONF: I 2: RES: 5M 50M ?	Sets the resistance measuring range to 5 MΩ or 50 MΩ. Default value is 5 MΩ.
CONF: I 2: RERR: EXTRA MBE ?	Sets the method of current checking during (start) voltage ramp: EXTRA – Device doesn't check real current at all (can be done externally, e.g. by a PC), default MBE – the maximally allowed ramp current is determined by HV generator's upper limit (either 2, 4 or 10 mA, depending on device type). The measured current is compared with the max. possible value; if the latter is reached, the test is aborted with error status=130.
CONF: I 2: CON: SOCK PROB SK2 ?	Sets the method of DUT connection: SOCK – socket (for devices of safety class 1), default PROB – test probe SK2 – socket (for devices of safety class 2) <i>Mode SK2 is available only in some devices (see the list GerätespezMenü.xls).</i>
CONF: I 2: SKTYP: OFF IMP HOLD ?	Sets the starting mode: OFF – test starts immediately IMP – test is started by an impulse applied to the digital input defined by SK1 NP (see below), default HOLD – test is started by a signal on the defined digital input. Signal must apply during the whole test.
CONF: I 2: SK1 NP <input nr.> ?	Safety contact: specifies the number of the digital input by which the command SKTYP checks safety contact's status. <input nr.> is in range 1-16 (1-8 = external inputs, 9-16 = internal inputs).
CONF: I 2: DEF	Resets all parameters for Insulation Test (I2) to their default values.

MEAS: I 2	Starts the Insulation Test (I2).
READ: I 2: VOLT?	Reads the actual value of real voltage. Result is in [V].
READ: I 2: CURR?	Reads the actual value of real current. Result is in [A].
READ: I 2: RES?	Reads the actual value of real resistance. Result in [Ω].

High Voltage Test (H1)

CONF: H1: TIME <test time> ?	Sets the test time: range 0.1 - 999.0, default 5.0 [s].
CONF: H1: CON: SOCK PROB ?	Selects the connection type of tested device: SOCK – socket (for devices of safety class 1), default PROB – test probe
CONF: H1: TMODE: TEST BURN NEND ?	Sets the test method: TEST – normal test, default BURN – test mode „burn“ (test ends with expiration of <test time>) NEND – testing without any time limit (test has to be aborted explicitly)
CONF: H1: SKTYP: OFF IMP HOLD ?	Selects the starting mode: OFF – test starts immediately IMP – test is started by an impulse applied to the digital input defined by SKI NP (see below), default HOLD – test is started by a signal on the defined digital input. Signal must apply during the whole test.
CONF: H1: SKI NP <input nr.> ?	Safety contact: specifies the number of the digital input by which the command SKTYP checks the status of safety contact. <input nr.> is in range 1-16 (1-8 = external inputs, 9-16 = internal inputs).
CONF: H1: DEF	Resets all parameters for the High Voltage Test (H1) to their default values.
MEAS: H1	Starts the High Voltage Test (H1) with a fixed voltage of 1500 V DC.
READ: H1: VOLT?	Reads the actual value of real voltage. Result is in [V].
READ: H1: CURR?	Reads the actual value of real current. Result is in [A].

High Voltage Test (H2)

CONF: H2: TIME <test time> ?	Sets the test time: range 0.1 - 999.0, default 5.0 [s].
CONF: H2: RAMP <ramp time> ?	Sets the time of voltage ramp at the beginning and (optionally) at the end of a test: range 0.0 - 999.0, default 1.0 [s].
CONF: H2: RDWN: ON OFF ?	Chooses whether to use the ramp-down feature or not: OFF - voltage ramp at test's end disabled (default) ON - voltage ramp at test's end enabled
CONF: H2: USTART <U start> ?	Sets the starting (resp. ending) value for the voltage ramp at a test's beginning (resp. ending). General range is 0 - 6000, default 0 [V]. However this value must be smaller than or equal to <U nom>.
CONF: H2: UNOM <U nom.> ?	Sets the nominal test voltage: general range is 100-6000, default 500 [V]. The real upper limit is either 3000, 4000 or 6000 V, depending on the device variant.
CONF: H2: I MAX <I max.> ?	Sets the upper limit for real current during the test. Throughout the test, the measured current is constantly compared with this value. If the measured value exceeds the limit, the test is aborted with error status = 130. The upper limit depends on the device type, resp. on the used type of generator (2, 4 or 10 mA). Min. value = 0 A, default value = maximum generator current. Value is specified in [A].
CONF: H2: I RMIN <I min.> ?	Sets the lower limit for real current during the starting ramp (not used during ending ramp). During the ramp, the measured current is compared with this value. If the measure is below the threshold, the test is aborted with error status = 136. The upper limit depends on the device type, resp. on the used type of generator (2, 4 or 10 mA). Min. value = 0 A, default value = 0 A. Value is specified in [A]. If this parameter is set to 0, or if the parameter RERR is set to EXTRA, the checking of minimal current is disabled.
CONF: H2: I RMAX <I max.> ?	Sets the upper limit for real current during ramp, if parameter RERR is set to EXTRA. The current measured during ramp-up and ramp-down is compared to this value. If the threshold is exceeded, the test is aborted with error status = 130. The maximum upper limit depends on the device type, resp. the used generator (2, 4 or 10 mA). Min. value = 0 A, default value = max. generator current This value is specified in [A].

- CONF: H2: RERR: NORM|EXTRA|MBE|? Specifies how to check current during ramp:
- NORM – Real current during ramp up and down is checked against IMAX (same limit as during test time), default
 - EXTRA – The extra value IRMAX is used as upper limit during ramp up and down. Also the lower limit IRMIN is checked (only during ramp up), if it is set greater than zero.
 - MBE – The maximum allowed current for ramp-up is same as the generator's upper limit (2, 4 or 10 mA, depending on device type). During ramp-down, IMAX is used as upper limit. If the thresholds are exceeded, test is aborted with status = 130.
- CONF: H2: ARC <param. >|? Sets the maximal allowed signal disturbance. The value specifies the percentage (%) of tolerance in relation to the nominal voltage or maximum current.
- The details of parameter use will be specified later and than it will be added in devices.
- CONF: H2: CON: SOCK|PROB|SK2|? Sets the method of DUT connection:
- SOCK – socket (for devices of safety class 1), default
 - PROB – test probe
 - SK2 – socket (for devices of safety class 2)
- Mode SK2 is available only in some devices (see the list GerätespezMenü.xls).
- CONF: H2: METH: SOUR|SENS|? Sets the method of voltage measurement:
- SOUR – 2-wire method
 - SENS – 4-wire method, default
- This command is available only in IL3800 devices.
- CONF: H2: TMODE: TEST|BURN|NEND|? Selects the starting mode:
- TEST – normal test, default
 - BURN – test mode „burn“ (test ends with expiration of <test time>)
 - NEND – testing without any time limit (test has to be aborted explicitly)
- CONF: H2: SKTYP: OFF|IMP|HOLD|? Wählt den Startmodus:
- OFF – test starts immediately
 - IMP – test is started by an impulse applied to the digital input defined by SKI NP (see below), default
 - HOLD – test is started by a signal on the defined digital input. Signal must apply during the whole test.
- CONF: H2: SKI NP <i nput nr. >|? Safety contact: specifies the number of the digital input by which the command SKTYP checks the status of safety contact. <input nr.> is in range 1-16 (1-8 = external inputs, 9-16 = internal inputs).

CONF: H2: DEF	Resets all parameters for the High Voltage Test (H2) to their default values.
MEAS: H2	Starts the High Voltage Test (H2).
READ: H2: UGEN?	Reads the value of output voltage from generator (source value). When 2-wire-method is selected, this command returns the same value as READ:H2:VOLT? Result is in [V]. <i>This command is available only in IL3800 devices.</i>
READ: H2: VOLT?	Reads the actual value of real voltage. Result is in [V].
READ: H2: CURR?	Reads the actual value of real current. Result is in [A].

DISP Commands

DI SP: ROW1 <text>	Shows the text <text> in the specified row of the device-displays. The text string must be enclosed in quotation marks ("). Maximum string length is 20 characters. A string of zero length ("") will clear the specified display row.
DI SP: ROW2 <text>	
DI SP: ROW3 <text>	
DI SP: ROW4 <text>	
DI SP: CLS	Clears all rows of the device display.

SYST Commands

SYST: HALT	Aborts any running test.
SYST: PASS: ON OFF	Switches the green signal lamp on/off, or shows/clears the green PASS rectangle on the display.
SYST: FAIL: ON OFF	Switches the red signal lamp on/off, or shows/clears the red FAIL rectangle on the display.
SYST: BEEP: SOFT LOUD	Activates the buzzer for 100ms. ("SOFT" is only available for series 3300 and 2200 devices.)

A-5 Status and error parameters

Command Version

Depending on the type variant, devices IL 3800 have a different range of test functions.

By means of the command *VER? one can read the „Version ID“, indicating the exact device type.

Device type	Version ID	Continuity Test	Protective Wire Test	Insulation Test	High Voltage Test	Function Test	Visual Test (1)	Digital inputs (2)	Digital outputs (3)
IL3800F	920	CT		I2	H2	—	(VT)	(RI)	(SO)
IL3880G	921	CT		I2	H2	—	(VT)	(RI)	(SO)

- (1) Visual Test is done directly by remote PC, through test steps „Text Visual Test“ and „Picture Visual Test“.
- (2), (3) Digital Input and Output steps are realized through the global commands *INP, *INPW und *SET.

Device mode (operating mode)

Describes the operating mode the device actually is in.

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

Bit position	B7	B6	B5	B4	B3	B2	B1	B0
Meaning	<u>Control type</u>			<u>Communication</u>		<u>Remote mode</u>		

	Hex ¹⁾	bin	Dez ¹⁾
<u>Control type</u>			
Manual	\$00	000 XX XXX	0
Automatic	\$20	001 XX XXX	32
Digital	\$40	010 XX XXX	64
<u>Communication</u> ²⁾			
RS-232	\$00	XXX 00 XXX	0
IEEE-488	\$08	XXX 01 XXX	8
<u>Remote mode</u> ²⁾			
Test is running	\$00	XXX XX 000	0
Programmes exchange	\$01	XXX XX 001	1
Results exchange	\$02	XXX XX 010	2

¹⁾ The decimal and hexadecimal values represent the sum of the relevant bit block.

²⁾ „Communication“ and „Remote mode“ are only relevant in operating mode „automatic“.

Status register

At every moment, the status register contains a bit pattern describing the current device activity.

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

Bit position	B7	B6	B5	B4	B3	B2	B1	B0
Meaning	Activity				Test end			

Zustand	hex	bin	dez
Activity			
Idle state	\$00	0000 0000	0
Test starts	\$10	0001 0000	16
Test preparing	\$20	0010 0000	32
Ramp up *	\$30	0011 0000	48
Measuring	\$60	0110 0000	96
Ramp down *	\$50	0101 0000	80
Test ending	\$40	0100 0000	64
Test finished	\$80	1000 0000	128
Test end			
STOP button	\$81	1000 0001	129
HV test – high current	\$82	1000 0010	130
PW test – start timeout	\$83	1000 0011	131
PW test – disconnected	\$84	1000 0100	132
SK – safety control released	\$85	1000 0101	133
<i>LC-Test – high current</i>	<i>\$86</i>	<i>1000 0110</i>	<i>134</i>
<i>Extension failed</i>	<i>\$87</i>	<i>1000 0111</i>	<i>135</i>
HV-Test – low current	\$88	1000 1000	136
After SYST:HALT	\$8F	1000 1111	143
<i>* only if supported by device variant</i>			

'Test end type' bits has meaning only if it is set the 'Activity' bits to 'Test finished'.

'HW breaks' bits are contains detailed information why test was interrupted from device.

- "stop button" - pressed the stop button on the device.
- "HV test - high current" - measured current is higher than maximal current in Insulation Test I2, I3 or in High Voltage Test H2 or H3. Current limit is sent to device on the test begging.
- "PW test - start timeout" occurs in the Protective Wire Test when the nominal current does not appear in 5 seconds after test start.
- "PW test - disconnected" occurs in the Protective Wire Test immediately when the measuring current was broken during the test.
- "SK control released" - the safety contact was released during test (if parameter SKTYP was set to HOLD).
- "LC test - high current" occurs in the Leakage Current Test (available only with EW3301 extension unit) immediately when the measured current exceeds the maximal limit sent to device before test start. It used only in 3300 series.
- "extension failed" occurs in device with extension when extension was switched off or when the communication with it does not work. It used only in 3300 series.
- "HV test - low current" occurs in High Voltage Test H2, H3 if it is activated the checking of the minimal current during the ramp up and the real current is less than min. value sent to device (parameter IRMIN).
- "After SYST:HALT" - the test was broken by command SYST:HALT from remote PC.

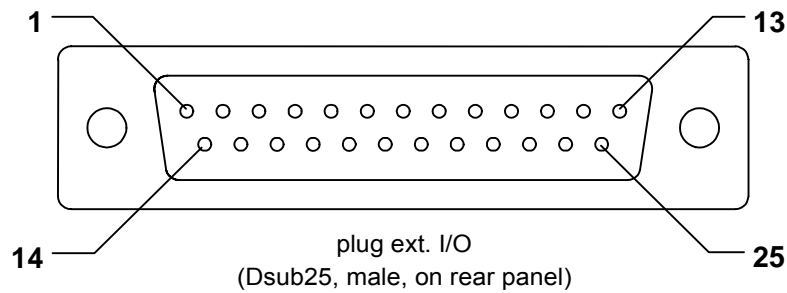
Error status

Below table shows the explanations for the error codes that can be read from the error queue by means of the command *ERR? :

Number	Error description
200	Queue overflow
0	No error
2	Missing end character
3	Wrong command
4	Wrong MEAS parameter
5	Wrong CONF parameter
6	Wrong SYST parameter
7	Wrong READ parameter
8	Wrong DISP parameter
9	Unable to start measurement

B Interface Configuration

B-1 External I/O Interface X6



PIN	description	configuration
1	output 1	EXT_PASS
2	output 2	EXT_FAIL
3	output 3	EXT_BUZZER
4	output 4	EXT_TEST (active during complete test)
5	output 5	<i>not used</i>
6	output 6	<i>not used</i>
7	output 7	<i>not used</i>
8	output 8	<i>not used</i>
9	analog input ¹⁾	
10	—	<i>not used</i>
11	input 1	4 bit program selection (2 ⁰)
12	input 2	4 bit program selection (2 ¹)
13	input 3	4 bit program selection (2 ²)
14	input 4	4 bit program selection (2 ³)
15	input 5	<i>not used</i>
16	input 6	EXT_ACK
17	input 7	<i>not used</i>
18	input 8	EXT_START
19	—	<i>not used</i>
20	+24 V DC	ext. voltage against ground ²⁾
21	+24 V DC	ext. Voltage against ground ²⁾
22	—	<i>not used</i>
23	—	<i>not used</i>
24	GNS	ground
25	GNS	ground

¹⁾ potential separated from internal supply

²⁾ has to be fed in from external

Description of most important signals on I/O interface:

Inputs:

- 6 EXT_ACK - interrupts a running test
- accepts a faulty measurement
- 8 EXT_START - starts a test run
- repeats test after a faulty measurement
- 1-4 4 bit program selection - deals for remotely selecting the test program.

The 4 bit of digital program selection specify the test program to be activated by the start signal .

A total of 16 different programs can be addressed, where the number of a program equals to the program's position in the list of test programs. The 4 inputs $2^0 - 2^3$ specify the offset added to the first program.

Example:

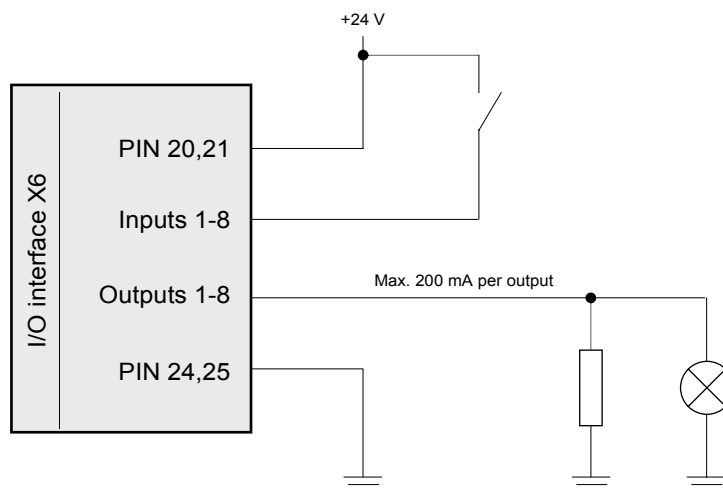
$$2^0 = 0 ; 2^1 = 1 ; 2^2 = 1 ; 2^3 = 0 \Rightarrow 0 + 2 + 4 + 0 = 6$$

Here, the 6th program from the list is selected, loaded and run.

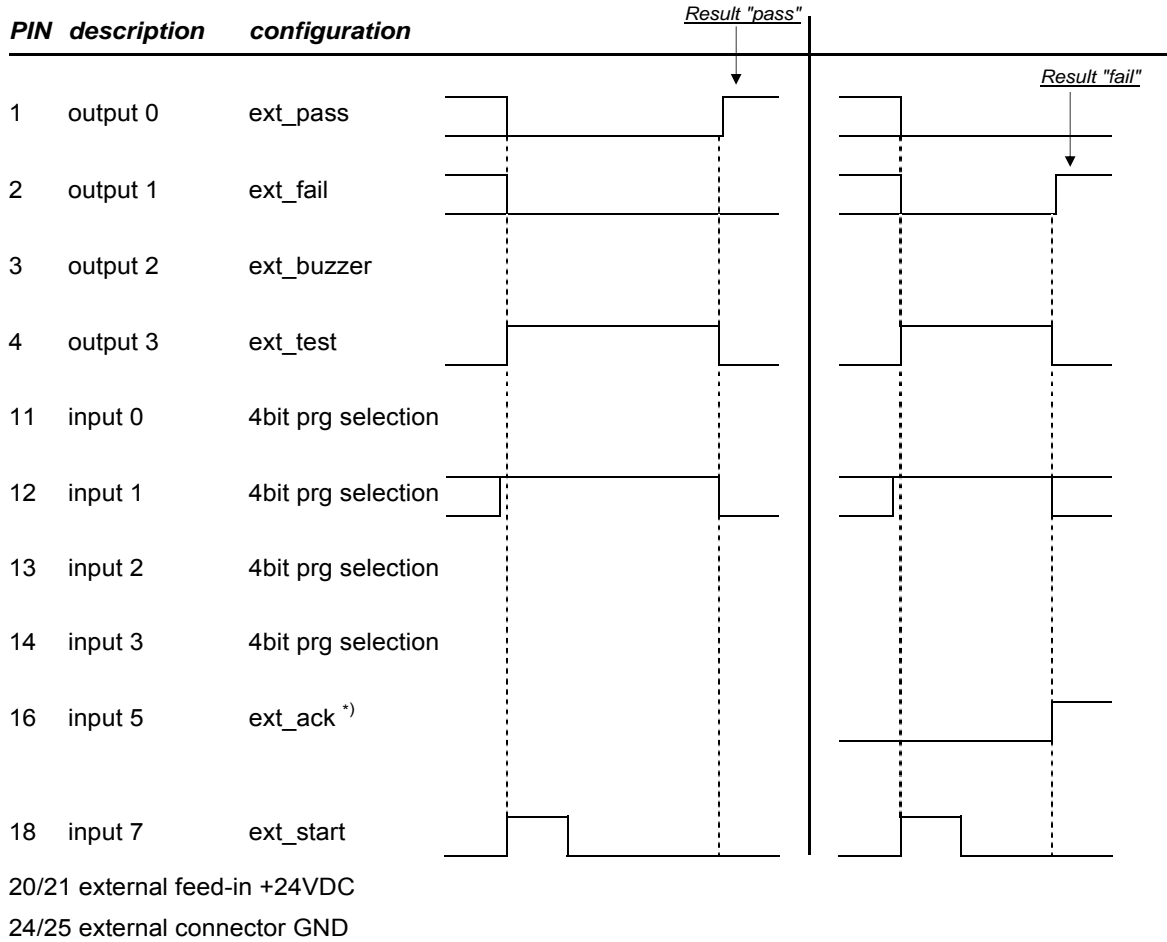
Outputs:

- 1 EXT_PASS - is set when a test result "pass" is achieved, stays active until EXT_TEST is set again.
- 2 EXT_FAIL - is set when a test result "fail" is achieved, stays active until EXT_TEST is set again.
- 3 EXT_BUZZER - is set same as the device's built-in buzzer
- 4 EXT_TEST - is set together with the first start signal, stays active during whole test run.

Basic circuit for I/O interface X6:



Digital Control over the Interface „Ext. I/O“



To repeat a faulty test step, one must

- Give no signal ACK but a new signal START *or*
- Set signal START to "low" and then to "high" again

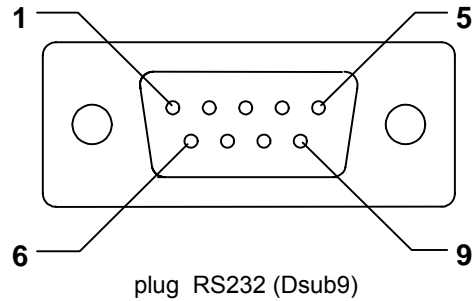
In order to be detected, the impulses for ACK and START must have a minimum duration of 50 ms.

*) In the system parameters, it can be configured if faulty tests have to be quitted by a signal ACK.

When this option is set, in case of a faulty test the following message appears:

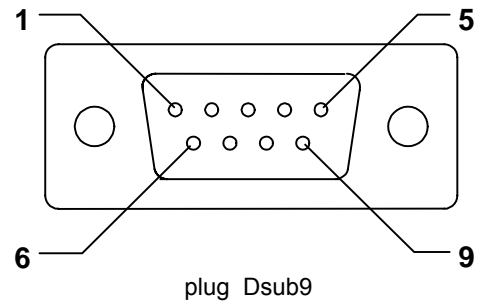
Waiting for external **QUIT**

B-2 Serial RS-232 Interface X1



PIN	description	configuration
1	—	<i>not used</i>
2	RxD	Receive Data
3	TxD	Transmit Data
4	—	<i>not used</i>
5	mass	Reference potential of serial interface
6	Boot	Must not be used! (reserved for firmware updating)
7	—	<i>not used</i>
8	RST	Must not be used! (reserved for firmware updating)
9	—	<i>not used</i>

Interface configuration: 9600 baud, 8 data bits, 1 stopbit, no parity.

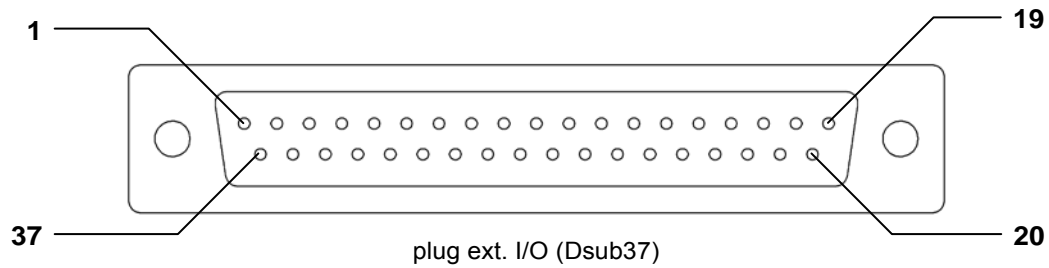
B-3 Serial CAN Interface X2

This interface is exclusively used for communication with a second I/O interface (for IL3880G, or when using a system expansion unit).

It is not available for user's purposes.

In case the device is equipped with a second I/O-Interface (X13), there is also a second CAN interface present (X12).

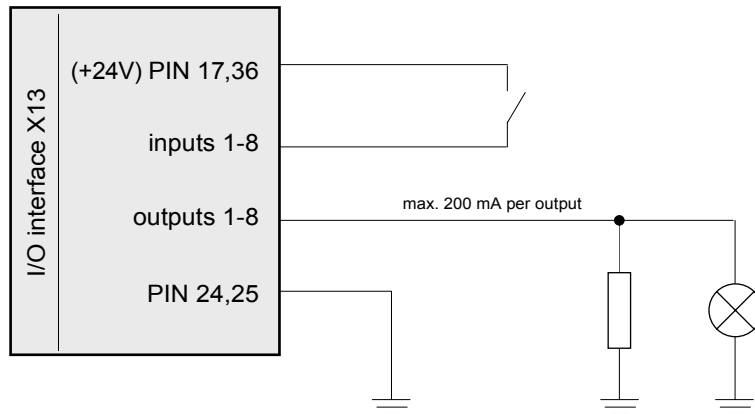
B-4 Second external I/O Interface X13 (only LG 3880 G)



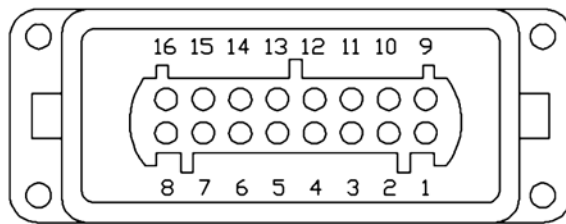
PIN	Bezeichnung	Belegung
1	output 1	<i>not used</i>
2	output 3	<i>not used</i>
3	output 5	<i>not used</i>
4	output 7	<i>not used</i>
5	output 9	<i>not used</i>
6	output 11	<i>not used</i>
7	output 13	<i>not used</i>
8	output 15	<i>not used</i>
9	input 1	<i>not used</i>
10	input 3	<i>not used</i>
11	input 5	<i>not used</i>
12	input 7	<i>not used</i>
13	input 9	<i>not used</i>
14	input 11	<i>not used</i>
15	input 13	<i>not used</i>
16	input 15	<i>not used</i>
17	+24 V DC	voltage against mass ^{*)}
18	Gnex	
19	Gnex	
20	output 2	<i>not used</i>
21	output 4	<i>not used</i>
22	output 6	<i>not used</i>
23	output 8	<i>not used</i>
24	output 10	<i>not used</i>
25	output 12	<i>not used</i>
26	output 14	<i>not used</i>
27	output 16	<i>not used</i>
28	input 2	<i>not used</i>
29	input 4	<i>not used</i>
30	input 6	<i>not used</i>
31	input 8	<i>not used</i>
32	input 10	<i>not used</i>
33	input 12	<i>not used</i>
34	input 14	<i>not used</i>
35	input 16	<i>not used</i>
36	+24 V DC	voltage against mass ^{*)}
37	GNex	

^{*)} internally generated (not needed to be fed in externally)

Basic circuit for interface X13:



B-5 Rear panel connector for test voltages (only LG 3880 G)



industrial socket, 16-pole

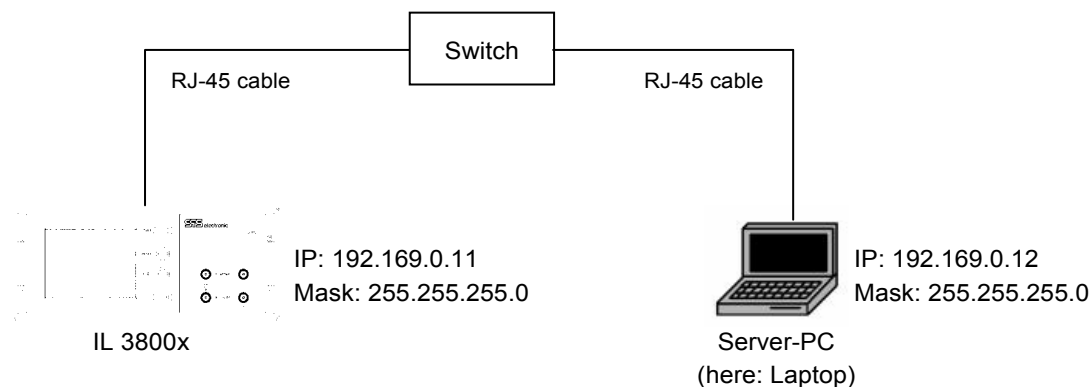
PIN	description	configuration
1	l	source+ (positive pole of High Voltage) / line (+) for Continuity Test
2	—	not used
3	pe	source- (negative pole of High Voltage)
4	pe	source- (to PIN3)
5	—	not used
6	pe'	sense- (4-wire technique: measurment of HV-)
7	—	not used
8	(start*)	not used
9	n	sense+ (4-wire technique: measurment of HV+) / line (-) for Continuity Test
10	—	not used
11	(probe')	not used
12	—	not used
13	(probe)	not used
14	(probe)	not used
15	—	not used
16	(start)	not used

C LAN Operation – Setup and Procedure

C-1 LAN Operation

Setup

(Addresses are examples)



Description

The device IL3800x is connected to the server PC via a LAN-Switch and RJ-45 cables.

The IL 3800x has to be configured in

Main menu → System parameters → Interfaces → Ethernet

Local IP: **192.169.0.11** (IP address of the tester)
 Server IP: **192.169.0.12** (server IP address. If there's already one allocated, that one can be used.)
 Server port: **23**
 Gateway: **192.169.0.12** (same IP as server IP)
 Mask: **255.255.255.0**

The server PC gets configured with IP address **192.169.0.12** and mask **255.255.255.0**.

All assigned static IP addresses must be located in the same subnet.

In case that devices are located in different subnets, a gateway has to be configured, that connects the different subnets.

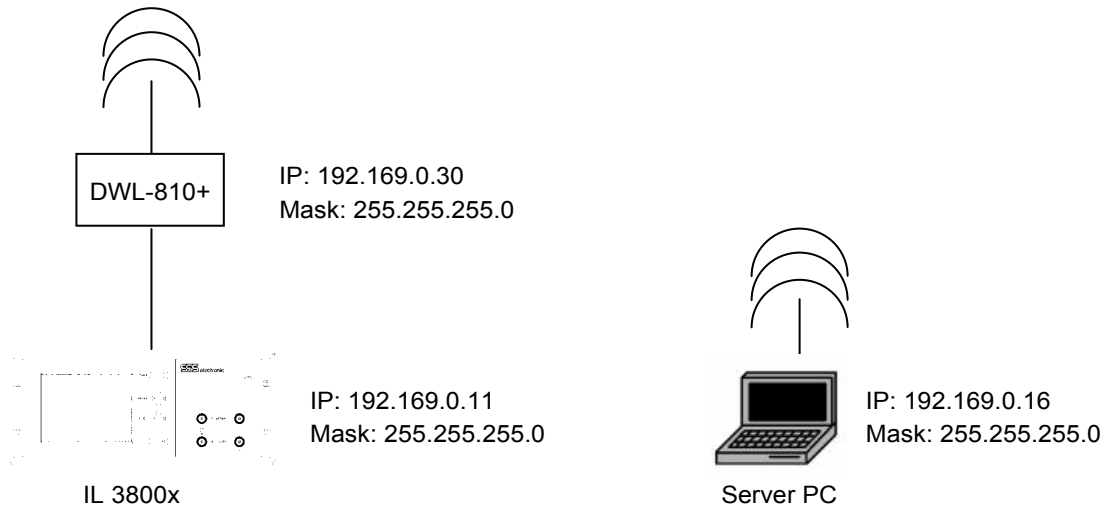
Test procedure

- The application DAT3332 is started on the server PC, and a custom test programme is created. This test programme then is saved as e.g. "Test.prg" in the PRG folder of the 3800NET software.
- Start the application 3800NET. Call "Tools" → "Productlist". By "Add..." a new article number or name is created (here: "ISO"). Then click on "search" and load the formerly created "Test.prg". Confirm with "OK".
- The device LG3800x has to be set to operating mode "Ethernet":
 Main menu → System parameters → operating mode → Ethernet → "activate"
 ⇒ After activation, the connection to the server PC is established.
- At the IL3800, a request for "ISO" is made (e.g. by barcode) The device sends the request to the server.
- Server sends the needed programme back to the device. After reception, the LG3800x starts the test.
- After test has finished, the LG3800 sends the test results to the server PC. There, the results are stored in the specified data base.

C-2 WLAN Operation

I. Setup (Ad-Hoc Operation)

(Addresses are examples)



Description

The device IL 3800x is connected to a WLAN converter (e.g. DWL-810+) via an RJ-45 cable.

The IL 3800x has to be configured in

Main Menu → System parameters → Interfaces → Ethernet

Local IP: **192.169.0.11**
 Server IP: **192.169.0.16**
 Server port: **23**
 Gateway: **192.169.0.16** (selbe IP wie Server-IP)
 Mask: **255.255.255.0**

- The DWL-810+ gets configured with IP address **192.169.0.30** and mask **255.255.255.0**.
- The server PC gets configured with IP address **192.169.0.16** and mask **255.255.255.0 (WLAN)**.

All assigned static IP addresses must be located in the same subnet.

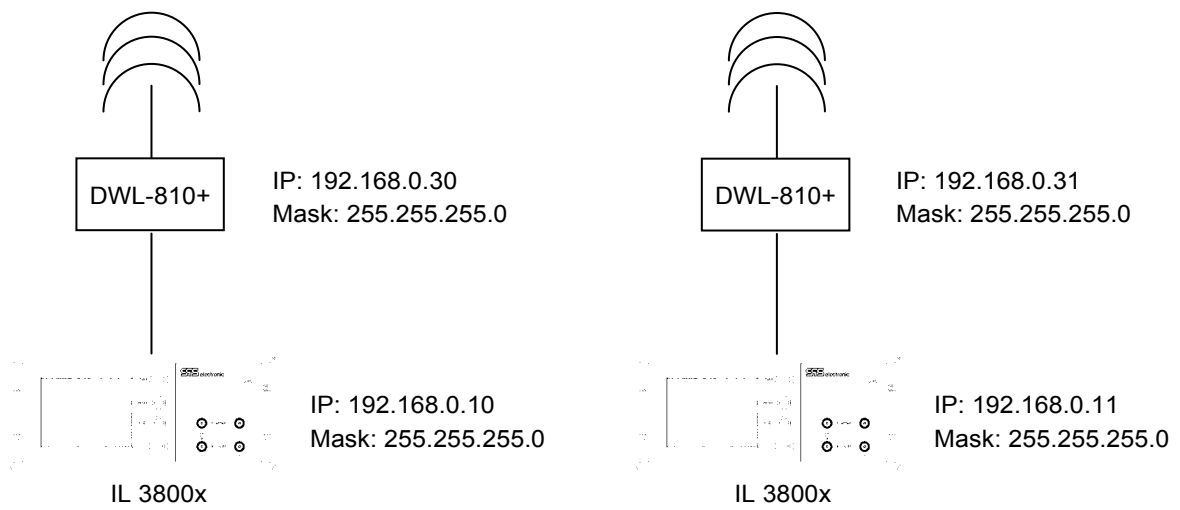
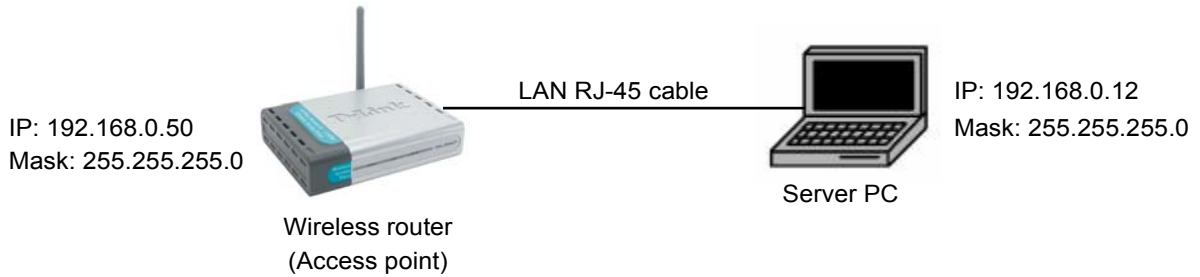
If the server PC uses an external WLAN adapter, then the adapter must be configured with its own IP address, different from the server's IP address. In the ethernet configuration of the IL3800 device, one has to enter the IP address of the adapter, not the server's one.

Test procedure

- The application 3332DAT is started on the server PC, and a custom test programme is created. This test programme then is saved as e.g. "Test.prg" in the PRG folder of the 3800NET software.
The path to the folders of 3800NET is set as follows:
In the 3332DAT software, go to:
Options / Environment / Pathnames
There, in the first line, the path to "test program folder (*.prg)" must be set to
C:\Program files\SPS electronic\3800net\PRG\
After having made this setting, all test programmes created with 3332DAT's program editor will be saved in the PRG folder of 3800NET.
- Start the application 3800NET. Call „Tools“ → „Productlist“. By means of „add“, create a new article number or name (here: ISO). Then press "Browse..." and select the previously created test programme (here: "Test.prg").
Confirm with "OK".
- The IL 3800x has to be set to operating mode "Ethernet" by
Main menu → System parameters → Operating mode → Ethernet → "aktivate"
⇒ After activation, the connection to the server PC is established.
- At the IL3800x, a request for "ISO" is made (e.g. by barcode). The device sends the request to the server.
- Server sends the needed programme back to the device. After reception, the IL3800x starts the test.
- After test has finished, the IL3800x sends the test results to the server PC. There, the results are stored in the specified data base.

II. Setup (Infrastructure operation)

(Addresses are examples)



Description

Each IL 3800x is connected to a WLAN converter (e.g. DWL-810+) via RJ-45 cable.
All devices IL 3800x must be configured in

Main menu → System parameters → Interfaces → Ethernet

as follows:

IL 3800x 1:	IL 3800x 2:	IL 3800x 3:
Local IP: 192.168.0.10	Local IP: 192.168.0.11	Local IP: 192.168.0.13
Server IP: 192.168.0.12	Server IP: 192.168.0.12	Server IP: 192.168.0.12
Server port: 23	Server port: 23	Server port: 23
Gateway: 192.168.0.50 (IP of access point)	Gateway: 192.168.0.50 (IP of access point)	Gateway: 192.168.0.50 (IP of access point)
Mask: 255.255.255.0	Mask: 255.255.255.0	Mask: 255.255.255.0
DWL-810+	DWL-810+	DWL-810+
IP address: 192.168.0.30	IP address: 192.168.0.31	IP address: 192.168.0.33
Mask: 255.255.255.0	Mask: 255.255.255.0	Mask: 255.255.255.0

etc.

The server PC gets configured with IP address **192.168.0.12** and mask **255.255.255.0 (LAN)**.

The access point (DWL-2000AP+) gets configured with IP address **192.168.0.50** and mask **255.255.255.0**.

All assigned static IP addresses must be located in the same subnet.

The adapters DWL-810+ must be configured for infrastructure operation, and to an existing „Remote AP-MAC“.

Test procedure is the same as described in ad-hoc operation.

D Test Protocol Examples

D-1 Format „page“

```

DIES IST DIE KOPFZEILE
SN:1234567890
Programm : BEISPIEL01          Datum: 16.08.2004
-----
Pruefer  : MUSTERMANN

-----
DG-PRÜFUNG  U= 24 VDC  Imin= 0 mA  Imax= 80 mA
Uhrzeit   |   Strom   |           |   Fehler   | Resultat
-----
: 15:12:32 |   0 mA    |           |   ----    |   OK

PE-PRÜFUNG  t= 05.0 s  I = 10 AAC  Umax= 12 VAC
            Pruefung nach EN 60335
            Rmin= 0 mOhm  Rmax = 200 mOhm
Uhrzeit   |   Strom   | Widerst.  |   Fehler   | Resultat
-----
: 15:12:34 | 00.00 AAC | 129 mOhm  |   ----    |   OK

IS-Testparameter  t= 5.0 s  U= 500 VDC  Rmin= 5.00 MOhm
Uhrzeit   |           | Widerst.  |   Fehler   | Resultat
-----
: 15:12:39 |           | 50.0 MOhm |   ----    |   OK

HD-PRÜFUNG  t= 5.0 s  U= 1500 VDC  Imax= 3.0 mA
Uhrzeit   |   Strom   | Spannung  |   Fehler   | Resultat
-----
: 15:12:44 | 0.12 mA  | 1.49 kV   |   ----    |   OK

FKT-PRÜFUNG  t= 5.0 s  tg= 1.00 s  Imin= 0.00 A  Imax= 2.00 A
Uhrzeit   |   Strom   | Analog    |   Fehler   | Resultat
-----
: 15:12:50 | 00.2 mA  |           |   ----    |   OK

IO-PRÜFUNG  t= 15.0 s  Input
Uhrzeit   |   Maske   | Eingang   |           | Resultat
-----
: 15:12:55 | 01001101 | 01001101 |           | NOK

TEXTSICHT
Uhrzeit   |           |           |           | Resultat
-----
: 15:13:11 | DIES IST DER FRAGETEXT |           |   OK

-----
15:13:17                                     gesamt:   NOK
-----
DIES IST DIE FUSSZEILE
    
```

D-2 Format „Condensed“

```

DIES IST DIE KOPFZEILE
SN:1234567890
Programm : BEISPIEL01
Datum: 16.08.2004
-----
Pruefer   : MUSTERMANN
-----
DG-PRÜFUNG  U= 24 VDC
  Imin= 0 mA  Imax= 80 mA
  Uhrzeit | Strom |          | Resultat
-----
: 15:12:32 | 0 mA  |          | OK
-----
PE-PRÜFUNG  t= 05.0 s
  I = 10 AAC  Umax= 12 VAC
  Pruefung nach EN 60335
  Rmin= 0 mOhm  Rmax = 200 mOhm
  Uhrzeit | Strom | Widerst. | Resultat
-----
: 15:12:34 | 0.00 AAC | 129 mOhm | OK
-----
IS-Testparameter  t= 5.0 s
  U= 500 VDC  Rmin= 5.00 MOhm
  Uhrzeit |          | Widerst. | Resultat
-----
: 15:12:39 |          | 50.0 MOhm | OK
-----
HD-PRÜFUNG  t= 5.0 s
  U= 1500 VDC  Imax= 3.0 mA
  Uhrzeit | Strom | Spannung | Resultat
-----
: 15:12:44 | 0.12 mA | 1.49 kV | OK
-----
FKT-PRÜFUNG  t= 5.0 s  tg= 1.00 s
  Imin= 0.00 A  Imax= 2.00 A
  Uhrzeit | Strom | Analog | Resultat
-----
: 15:12:50 | 00.2 mA |          | OK
-----
IO-PRÜFUNG  t= 15.0 s  Input
  Uhrzeit | Maske | Eingang | Resultat
-----
: 15:12:55 | 01001101 | 01001101 | NOK
-----
TEXTSICHT
  Uhrzeit |          |          | Resultat
-----
: 15:13:11 | DIES IST DER FRAG |          | OK
-----
          15:13:17          gesamt:  NOK
-----
DIES IST DIE FUSSZEILE

```

← ½ DIN-A4 (DIN-A5)

D-3 Format „endless“

This format is the same as format „page“, however no footer is printed, and no form feed is done.

D-4 Format „line“

```

DIES IST DIE KOPFZEILE
Programm : BEISPIEL01
Datum: 16.08.2004
-----
Pruefer : MUSTERMANN
1234567890 IS-PRÜFUNG: GUT      HD-PRÜFUNG: GUT      TEXTSICHT: GUT
           FKT-PRÜFUNG: GUT      DG-PRÜFUNG: GUT
           EINGANGSTEST: FEHLER  IO-PRÜFUNG: GUT

DIES IST DIE KOPFZEILE
Programm : BEISPIEL01
Datum: 16.08.2004
-----
Pruefer : MUSTERMANN
1234567891 IS-PRÜFUNG: GUT      HD-PRÜFUNG: GUT      TEXTSICHT: GUT
           FKT-PRÜFUNG: GUT      DG-PRÜFUNG: GUT
           EINGANGSTEST: GUT      IO-PRÜFUNG: GUT

DIES IST DIE KOPFZEILE
Programm : BEISPIEL01
Datum: 16.08.2004
-----
Pruefer : MUSTERMANN
1234567892 DG-PRÜFUNG: GUT      PE-PRÜFUNG: GUT      IS-PRÜFUNG: GUT
           HD-PRÜFUNG: GUT      FKT-PRÜFUNG: GUT      IO-PRÜFUNG: GUT
           TEXTSICHT: GUT
    
```

E Description of Test Methods

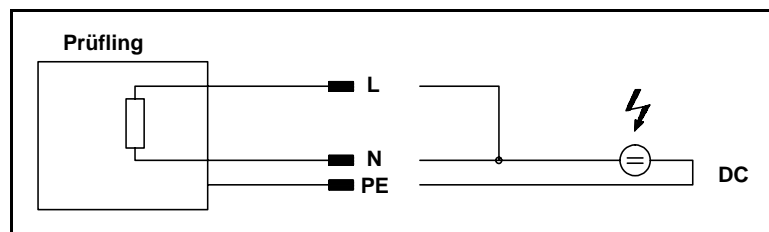
E-1 Continuity Test

To ascertain that the DUT is both switched on and contacted correctly, the current of a current limited 24V / 0.6A direct current source is measured between L and N.

The current which appears during measurement depends on the internal resistance of the DUT and can only be determined with the test system.

E-2 Insulation Test

The insulation resistance between current-carrying lines and the protective wire is measured by means of the insulation test. The test voltage and max. short circuit current depend on the type of testing device being used.

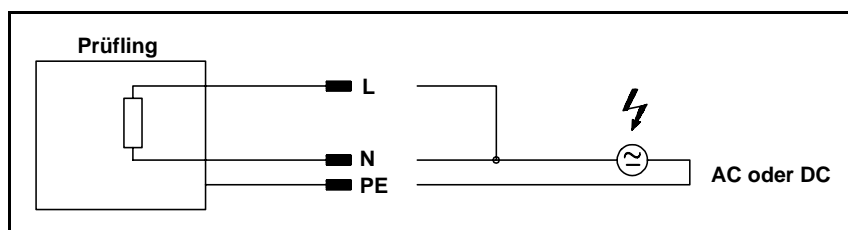


Basic circuit for Insulation Test

E-3 High Voltage Test

The high voltage test DC tests the electric strength between current-carrying lines and the protective wire (or between HV-pistol / test probe and protective wire resp.) (bzw. zwischen HV-Pistole/Prüfsonde und Schutzleiter). If supported by the device type, the VH-AC test can be performed with a programmed voltage ramp.

If DUT's insulation is damaged or insufficient, an arc-over will occur.



Basic circuit for high voltage test

F Terms of warranty

1. Warranty period

The warranty period is 12 months after delivery.

2. Conditions for a guarantee claim

- The Insulation and High Voltage Tester IL 3800 must have been put into operation by qualified personnel at the customer's.
- Inspections must be carried out regularly (once a year) and thoroughly (by SPS electronic GmbH).
- Defective or worn parts have to be replaced immediately. The operation of such parts is forbidden for reasons of safety.
- Defective parts, subject to guarantee claims, have to be sent to SPS electronic GmbH for inspection.
- Defects occurred must be reported to SPS electronic GmbH immediately.

3. Beginning of warranty period

Warranty period starts with the date of delivery note.

4. Guaranteeing

SPS electronic GmbH guarantees a good function of the test device, a conscientious and professional design and manufacture as well as the use of high-quality material.

All parts are being replaced free of charge if parts became defective or useless during the guarantee period due to the use of inadequate material, manufacturing faults or an imperfect engineering.

5. Excluded from guarantee

- Damages due to outside influences, above all because of handling malpractices or of local conditions.
- Damages at devices from which the serial number has been removed, destroyed or falsified.
- Wear parts, such as fuses, signal bulbs, etc.

Your notes

Your notes

Your notes

Your notes