

SCHAFNER

**MANUAL
INTERFERENCE SIMULATOR**

**BEDIENUNGSANLEITUNG
STÖRSIMULATOR**

NSG 200E

Valuetronics International, Inc.
1-800-552-8258
MASTER COPY

EMC



1

2

3

4

5

6
7
8
9
10

1. GENERAL

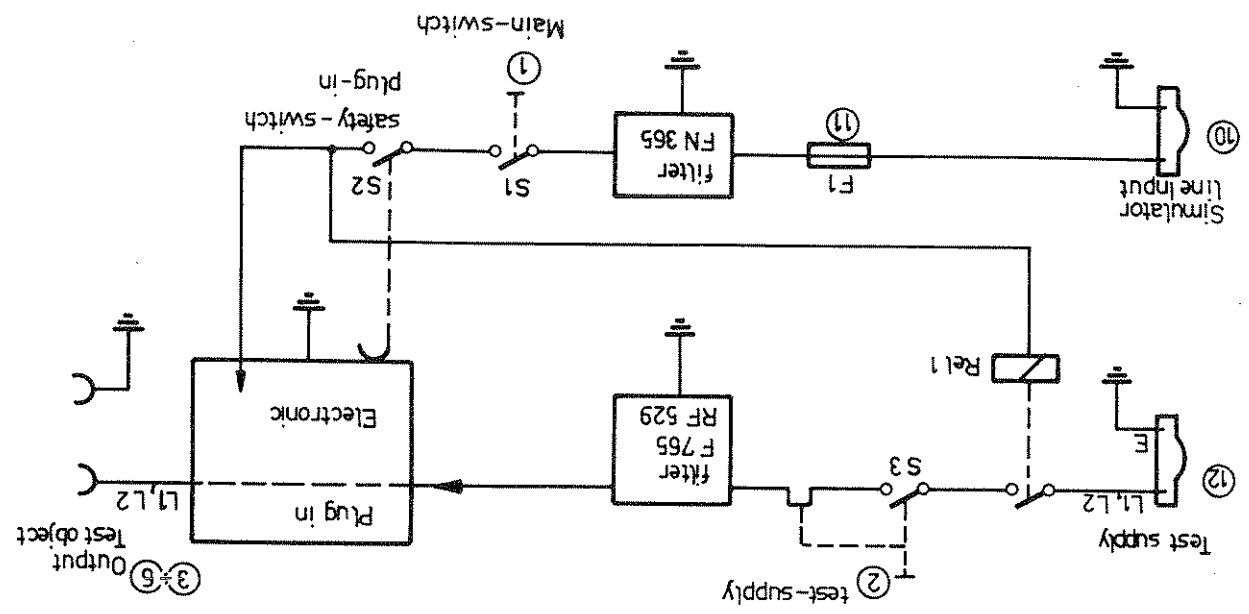
1.1 Introduction

The NSG 200 Plug-in system was developed to simulate the various disturbances, as they occur in practice on AC or DC line supplies. With the aid of interference simulators, components and equipment can be reliably tested on their susceptibility to interference. This makes it possible to take precautionary measures during equipment or component development. Further the system can be used in quality assurance control or equipment acceptance tests.

The system consists of a basic unit and a number of plug-in modules, which cover most types of interference (mainly standardised pulses). This construction permits a continuous evolution to meet latest findings in interference techniques and newly issued standards with minimum effort.

A summary of the units available is shown on page A 1.

1.2 Description



The basic unit MSG 200 E contains all the components required to operate the plug-ins, in particular, mains filter, mains switch as well as protection and safety elements. The electrical circuit is divided between supply electronics for the plug-in (SIMULATOR LINE) and that for the test object (TEST SUPPLY).

The input "SIMULATOR LINE INPUT" supplies all functions via the main switch as well as via the plug-in safety switch to the plug-in unit. When the plug-in is withdrawn the supply plug to the module is automatically no longer under tension. This input may only be used at the voltage corresponding to that of the plug-in.

The 'TEST SUPPLY INPUT' feeds the test object via the over-current protecting relay and the safety relay. The permitted voltages and currents are given in the technical data. The safety relay interrupts this input under the following conditions:

- main switch off
- plug-in removed
- no voltage on

'SIMULATOR LINE INPUT'

This relay ensures that an increased leakage current can only flow when both supply cables are connected, i.e. doubly connected earth line. The neon lamps light up at L1 and L2 output as soon as the respective line has an AC voltage > 80V above earth. They are used in general to differentiate between phase and neutral lines.

The line filters at the supply inputs are dimensioned to roughly suppress the interference. The leakage current in the 'SIMULATOR LINE INPUT' is limited to values < 0,5mA, at 'TEST SUPPLY INPUT' however an earth leakage current up to 10mA can occur.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1.3 Differences from NSG 200 C / D

The NSG 200 E replaces NSG 200 C / D. In applications it is fully compatible with all older plug-ins, i.e. they can be used in NSG 200 E and further new plug-ins will operate in NSG 200 C / D. The NSG 200 E exhibits many new safety features and handling improvements. Thus in all cases the test object must be supplied

via the 'external' input (test object supply).

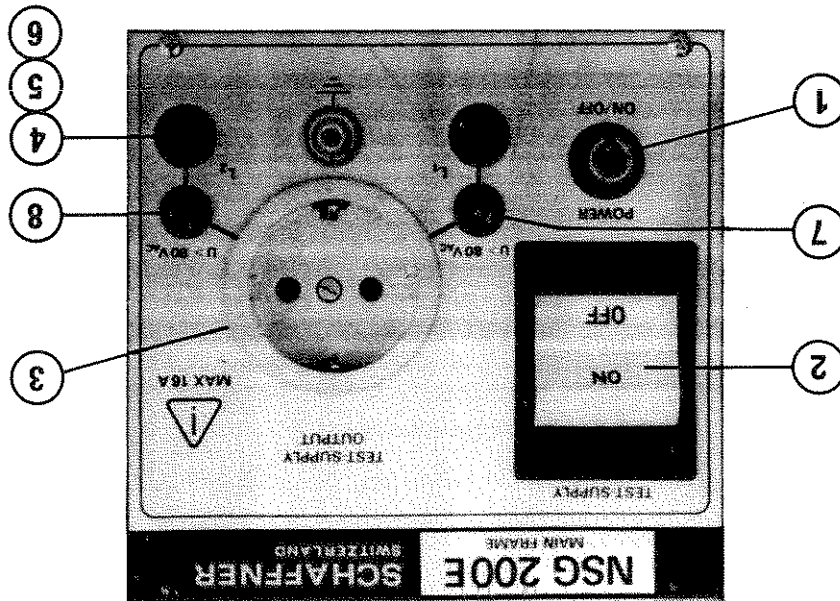
The change-over 'internal ON' - 'external - ON' is discontinued, but the supply to the test object can be switched separately. The positions of the phase and neutral are no longer fixed and monitored via the combination lamp 'Terminal N live or fuse', but the neon lamps ⑦ + ⑧ indicate which line has an AC voltage greater than 80V above earth.

When using the NSG 222 plug-in with a supply voltage of 100-240V to the test object attention should be given so that the phase is on the right i.e. the r.h. neon lamp ⑧ should light up.

Thereby L1 corresponds to the neutral and L2 to the phase. Lamps ⑦ + ⑧ light up only when both the main switch ① and the test object switch ② are switched on and both inputs are connected to the mains. They indicate directly the voltage on the test object.

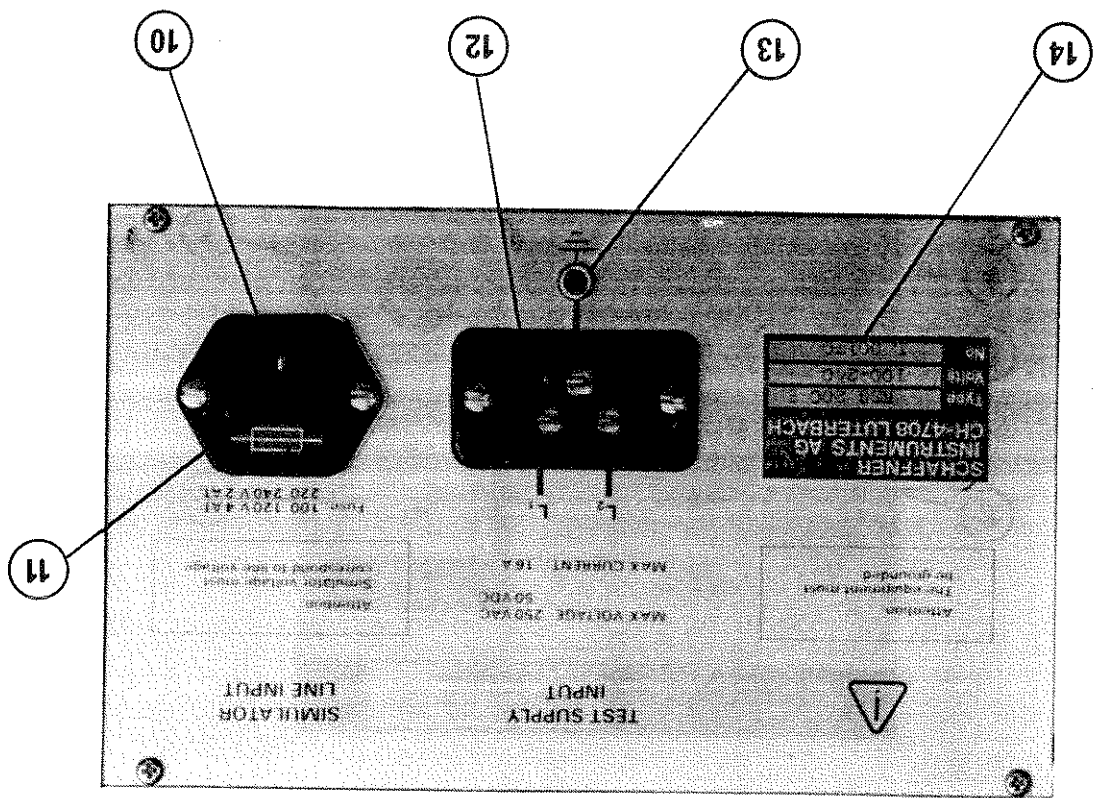
2. OPERATING CONTROLS

2.1 Front panel



- ① Main switch with optical indicator
- ② Switches the simulator as well as the test supply
- ③ Two pole 'ON - OFF' switch with thermal current overload (16A) for test supply
- ④ Connecting socket with superposed interference for the test object (not in operation for all plug-ins).
- ⑤ Output socket in parallel with ③ to connect test object with banana plugs (L1, L2 correspond to the connections on test supply plug ⑫).
- ⑦ Neon lamp: lights up when an AC voltage greater than 80V is present between L 1 and earth.
- ⑧ Neon lamp: lights up when an AC voltage greater than 80V is present between L 2 and earth.

2.2 Rear panel



- ⑩ Mains input to simulator supply (compulsory protection earth)
- ⑪ Mains fuse for simulator supply (100 / 120 V max 4A, 200 / 240 V max 2A)
- ⑫ Supply connection for test object (compulsory protection earth)
- ⑬ Earth socket
- ⑭ Type label and serial number

3. OPERATING INSTRUCTIONS

3.1 Safety

The equipment is built according to protection class I. Under certain operating conditions earth leakage currents up to 10mA occur.

Caution!

- The unit must always be operated with a protection earth.
- To ensure adequate safety by a protection earth connection, a protection line must also be connected on the supply to the test object (2 earths).

- THIS EQUIPMENT AND ALL THE ACCESSORIES DESCRIBED THEREIN OPERATE AT HIGH VOLTAGE. IMPROPER HANDLING AND IGNORING INSTRUCTIONS IS DANGEROUS: ONLY TRAINED PERSONNEL SHOULD WORK WITH THE UNITS, EQUIPMENT COVER MUST NOT BE REMOVED, COMPONENT REPLACEMENT AND INTERNAL ADJUSTMENTS MUST BE CARRIED OUT BY QUALIFIED PERSONNEL.
- The equipment is only for indoor use.

The simulator supply (plug ⑩) may be fitted with a 10mA error current protection switch.
 The test object supply (plug ⑫) may be fitted with a $\geq 30mA$ error current protection switch.

In the NSG 200 E many new safety features have been incorporated. These are the following, viz:

- Test object connection with standard safety contact socket or MC safety banana plugs.
- The supply to simulator and test object are separate.
- Supply to test object is dual pole switched and fused.
- Forced double earthing due to separate 3 pole plugs for the test object and the simulator supplies.
- Plug to plug-in module is interrupted by microswitch, when plug-in removed.
- Switch with mechanical position indicator.
- Phase and neutral line indicator.

3.2 Initial operation

1 Check if the plug-in is set to the mains voltage to be used, and if the correct fuse is inserted.

2 Fit plug-in.

3 Connect plug-in supply on socket ⑩ with the mains. Ensure that a reliable protection earth line is present.

4 Connect test object supply to socket ⑫. Until finally installed the protection line must be separately fed to plug-in line supply, i.e. extension cables with line distributors should not be used.

5 Switch off test object switch ②.

6 Check that the current consumption of the test object does not exceed 16A.

7 Connect test object depending on plug-in, either to plug in, or to NSG 200 E.

8 Adjust settings on plug-in as in handbook for the plug-in.

9 Switch on unit with main switch ①.

10 The test object can be switched on and off as required with switch ②.

3.3 Informations concerning the plug-ins

NSG 203 A: - Dimensioned for AC voltage operation only

- The frequency of the supply must correspond to the frequency already set on the NSG 203 A

NSG 204 : - The mains leakage current is < 0,75mA with this plug-in as long as no voltage is connected to socket ⑫. Thus no second protection line connection is necessary. The sockets ③ - ⑤ have no voltage on them.

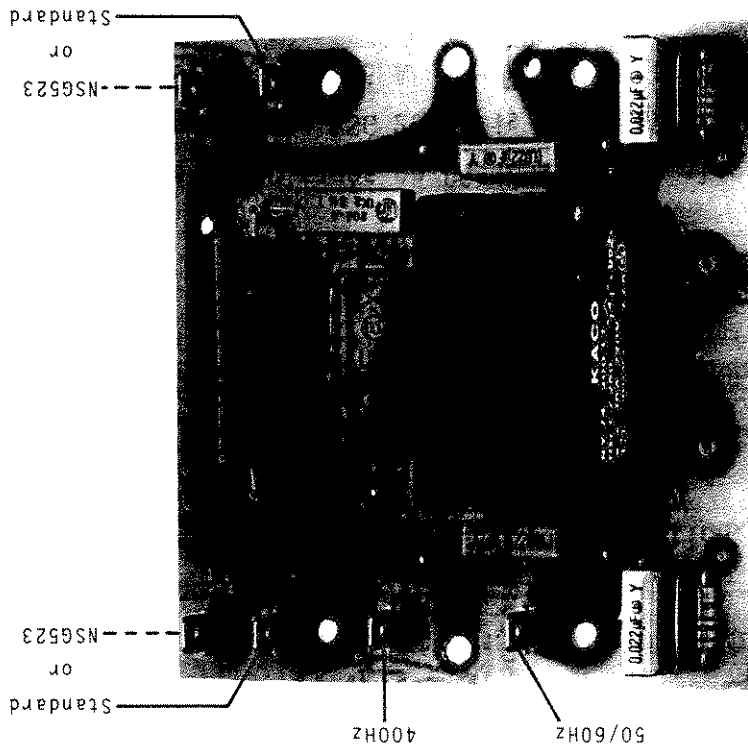
NSG 222 : - The socket N of the plug-in corresponds to line L1 of the NSG 200 E, the socket P corresponds to line L2.

The lamps ⑦ and ⑧ show the phase orientation only when both switches ① and ② are switched on. When lamp ⑧ lights the phase is connected to socket P.

- NSG 224 : - The delay time (warm-up time of thyatron) when the plug-in is switched on, commences when switch (1) is operated. When the test object is switched on or off with switch (2) no delay occurs.

- NSG 226 : - When this plug-in is used the mains leakage current is < 0,75mA, as long as socket (12) has no voltage on it. Thus a second protection line is not necessary.

- NSG 523 : - For operation with NSG 223 symmetrical mode, the connections which must be separated, are no longer on top of the print board but r.h. upper side and r.h. under side. To fix the faston connectors, free faston tabs are available on the printed board.



3.4 Applications

Table of contents

- 3.4.1 Supply : > 60HZ to 400HZ
- 3.4.2 Supply : DC voltage
- 3.4.3 Interference on all 3 lines (Asym II)
- 3.4.4 Test set-up
- 3.4.5 Suppression of the interference generator
- 3.4.6 Effect of the mains matching network on the test object

3.4.1 Supply > 60Hz

When using supplies to the test object with frequencies > 60Hz, the 5µF suppression capacitor must be switched out, since the imaginary power demand will be too large. However it must be noted that when making symmetrical tests with the NSG 223 considerable interference currents can still flow back to the supply source.

Procedure to switch out 5µF capacitor:

1 Isolate NSG 200 E completely from mains supply.

2 Remove the 4 screws from the cover.

3 Pull the cover out towards the rear.

4 Change the faston plugs on the print board from the 50/60Hz

tabs to the 400Hz tabs (without printed circuit). (Diagram: 6.3. Pos. J7)

5 Replace cover again from the rear.

6 Screw the 4 cover fixing screws back into position.

If later the unit is to be used on the mains supply, the connections must be changed again to 50/60Hz.

3.4.2 DC supply

Coupling interference voltages on DC supplies is also possible. The nominal voltage of the NSG 200 E is in this case:

up to 24V 16 A

up to 48V 8 A

In so far that every switching (main switch ①, test object supply ②, simulator supply interruption, withdrawal of plug-in, over current release of ②, pulling out plugs etc.) is avoided, then a nominal voltage up to 400V 16A is permitted.

Attention: If these instructions are ignored then the appropriate switching component will be burnt out!

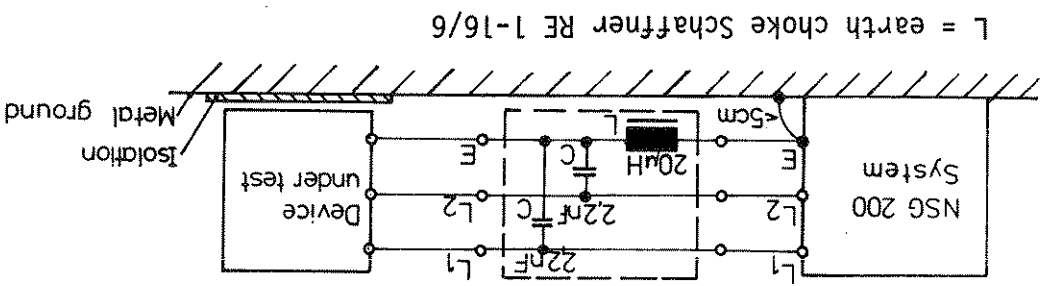
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99

3.4.3 Interference voltage on all 3 lines

Frequently mains interference gets into the equipments and systems, not as is assumed in general via the phase and neutral lines, but via the earth line. This type of coupling can be simulated directly with the NSG 422 and is known as asymmetrical interference II. With a small additional circuit this can also be realised with the NSG 200 system.

Test set-up

NSG 200 system



L = Protection line choke
 Schaffner RE 1-16/6
 C = 2,2nF Y Type interference
 suppression condenser

This test set-up is only for fast pulses with a half time value of less than 150ns.

3.4.4 Test set-up

In order to achieve good reproducibility of the test, the following points must be observed

- 1 The position of the interference generator, test object, mains feed as well as the possible earth plane are to be defined.

- 2 The length of the connecting cable between test object and the interference simulator should correspond to the actual length of the test object (fixed cable) or normalised at 80 cm.

- 3 It should be noted that even the thickest earth connections for measurement purposes for the high frequency components of the interference pulses exhibit an impedance of up to $5\Omega/\text{cm}$. This can be counteracted by using metal tables and metal strips as reference earth.

3.4.5 Suppressing the interference simulator

The NSG 200 interference simulator system is roughly suppressed on the mains side without the test object connected (according to VDE 0875 Limit G). Depending on the test object connection and the impedance the interference voltage can increase. A considerable interference radiation from the cable to the object can occur, which could interfere with neighbouring systems or radio reception.

The following measures can be considered:

- 1 Build test set-up in a Faraday cage.
- 2 Build test set-up as far as possible from the receiving equipment, calculator etc. and in the lower floors of a building (cellar).
- 3 Build an improvised Faraday cage.

The interference voltage on the mains side can only be reduced by using high value Y condensers and not with current compensated choke filters. Attention must be given, however to the resulting high leakage current.

The suppression condensers Rifa type PME 271M660 2 x 0,6 µF can be mounted in the following ways:

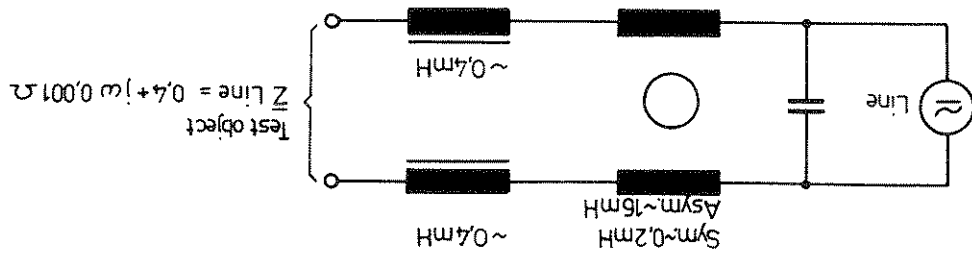
- 1 In the wall socket or connector block at power line connection NSG 200 E
- 2 In the NSG 200 E on the print board instead of the 22 nF condensers above and below the relay. The holes are already bored in the print board.

ATTENTION:

The equipment housing must in addition be earthed before the mains connection (earth leakage current up to 70mA!).

3.4.6 Effect of mains matching network on the test object

The supply to the test object must be decoupled with series chokes. The corresponding block diagram is shown in Fig.



Test objects with a high rate of current change $\frac{di}{dt}$, are subject to interference caused by themselves (rectifiers with C-charge, thyristors). The impedance of matching network must also be taken into account when testing at low voltage or with 400 Hz.

3.5 Adapter cable for connecting test object

The NSG 200 E has a Schuko socket 16A as well as 4mm Multi Contact safety laboratory sockets.

The following special adapters are available:

SL 402-221 for Swiss type 13 (only 10A)

SL 402-223 for Britain (only 13A)

SL 402-080 for USA plug type NEMA 5 - 15

SL 402-222 for France type 530 19

ATTENTION:

In order that the phase is on the right on the above adapters the following must be observed:

Connect adapter so that the red plug is on the socket where the lamp lights up.

4. TECHNICAL DATA

4.1 Simulator supply

Voltage : 100 ÷ 120V / 220 ÷ 240V

Frequency : 50/60HZ

Current : 100 ÷ 240V 4A

220 ÷ 240V 2A

Line : Cold equipment plug

Connection: (IEC - 320/VI, CEE - 22/VI, DIN 49457B)

Fuse : 4AF or 2AF fast fuse 5 x 20 mm

main switch: 2 pole with hooded indicator

4.2 Test object supply

Voltage : AC 50/60Hz : 12V ÷ 240V max 16A
 400Hz : 24V ÷ 240V max 6A 1)
 DC : 5V ÷ 50V max 16A 2)

1) Switching to 400Hz operation see 3.4.1
 2) Exceptions see 3.4.2

Internal impedance : $Z = 0.4 + j\omega 0.0012$
 Voltage drop : AC 50/60Hz at 16A : approx 9V
 AC 400Hz at 6A : approx 15V
 DC at 16A : approx 7V

Indicator lamps to display line voltage > 80VAC

Input connector : 3 pole 16A instrument plug
 Protection : Thermal over current switch - 2 pole, 16A
 Earth leakage current : up to 10mA at 220V 50Hz

4.3 Dimensions

Weight : 10,5 kg
 Width : 437mm (19" plug-in)
 Height : 150mm (without feet 133mm = 3 HE)
 Depth : 345mm (without handles 305mm)
 23,1 lb
 17,21"
 5,91"
 13,58"

Also available as 19" plug-in with flanges (option SC 402-198).



5. ACCESSORIES

5.1 Included parts

ORDER NUMBER	COUNTRY	PLUG TYPE	ACCESSORIES
NSG 200 E-01	D/S/NL/I/E/N/SF	Schuko	-mains cable SL 402-187 -test cable SL 402-228 -mains cable SL 402-188 -test cable SL 402-224 -adapter SL 402-221 -mains cable SL 402-187 Type 530 19
NSG 200 E-02	CH	Type 13 SEV 10A	-test cable SL 402-228 -mains cable SL 402-188 -test cable SL 402-224 -adapter SL 402-221 -mains cable SL 402-187 Type 530 19
NSG 200 E-03	F / B	Type 530 19	-test cable SL 402-228 -adapter SL 402-221 -mains cable SL 402-187 Type 530 19
NSG 200 E-04	USA / CAN	UL 498/13	-test cable SL 402-226 -adapter SL 402-080 -mains cable SL 402-269 -test cable SL 402-266 -adapter SL 402-223 -mains cable SL 402-033 -test cable SL 402-226 -adapter SL 402-227
NSG 200 E-05	GB	Type BS 1363 13A	-test cable SL 402-266 -mains cable SL 402-269 -test cable SL 402-266 -adapter SL 402-223 -mains cable SL 402-033 -test cable SL 402-226 -adapter SL 402-227
NSG 200 E-06	all other countr.	without plug	-test cable SL 402-226 -adapter SL 402-227

Fuse set 1 pc 5x20mm 2A Fast

1 pc 5x20mm 4A Fast

SL 402-267

5.2 Options

Rack mounting flange

16A IEC connector with 2m cable 3x2,5 mm²

SL 402-198

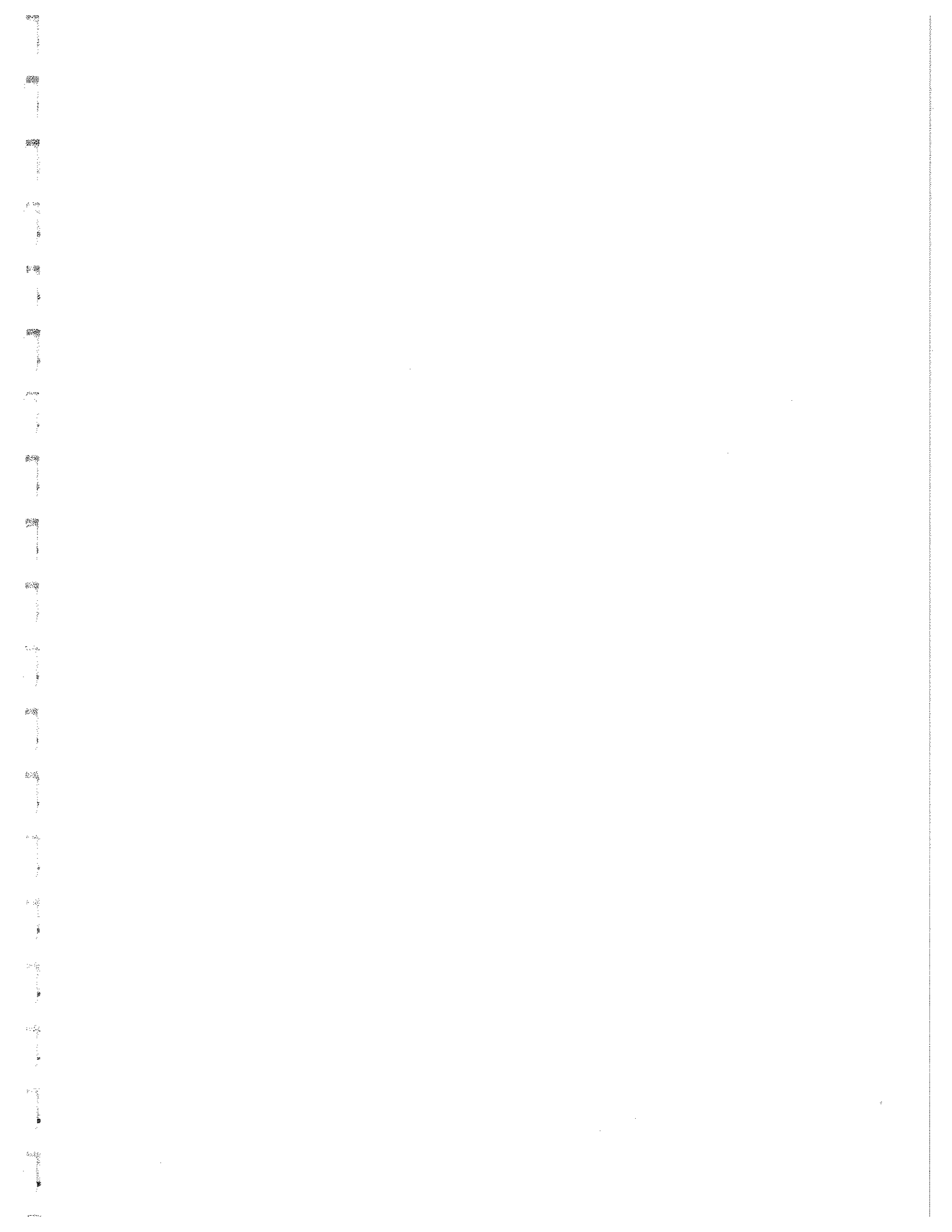
MC - banana safety plug set

3 pcs: red, black and yellow-green

SL 402-227

Adapter for monitoring 1000:1 for pulse- and line measurements by means of an oscilloscope

SL 402-251



6. MAINTENANCE

6.1 Service

This equipment does not require special servicing. Hits for assembling the rack mounting flanges:

The upper and lower black cover strips must be carefully pressed out from the inside. The fixing screws are then exposed which secure the corner and longer sections. The cover strips can be mounted again using a piece of plastic or wood pressed against them.

6.2 Spare parts

Pos. Part	Order Nr.	Manufacturer
1. mains switch	140-251	Schadow / ITT
2. over current switch	145- 525 530	ETA
3. micro switch	141-502	div
4. relay	147-205	Kaco RY 74-200L
5. neon lamp	162-531	Rafi
6. double choke	402-212	Schaffner
7. rod core choke	4.31.424	Schaffner
8. plug-in plug	150-871	
9. condenser 5µF	120-023	Bosch 0607 314 077
10. condenser 0,6µF	120-434	Rifa
11. condenser 0,022µF	120-416	Rifa
12. PTC resistor	114-703	Stiemens Q 63100P2390-L890
13. handle flange	66-120-23	Elma
14. feet with floor plate	30-853-61	Elma
15. cover plate	30-953-6	Elma

Attention:

At the plug-ins manufactured before March 1982 the following may be observed.

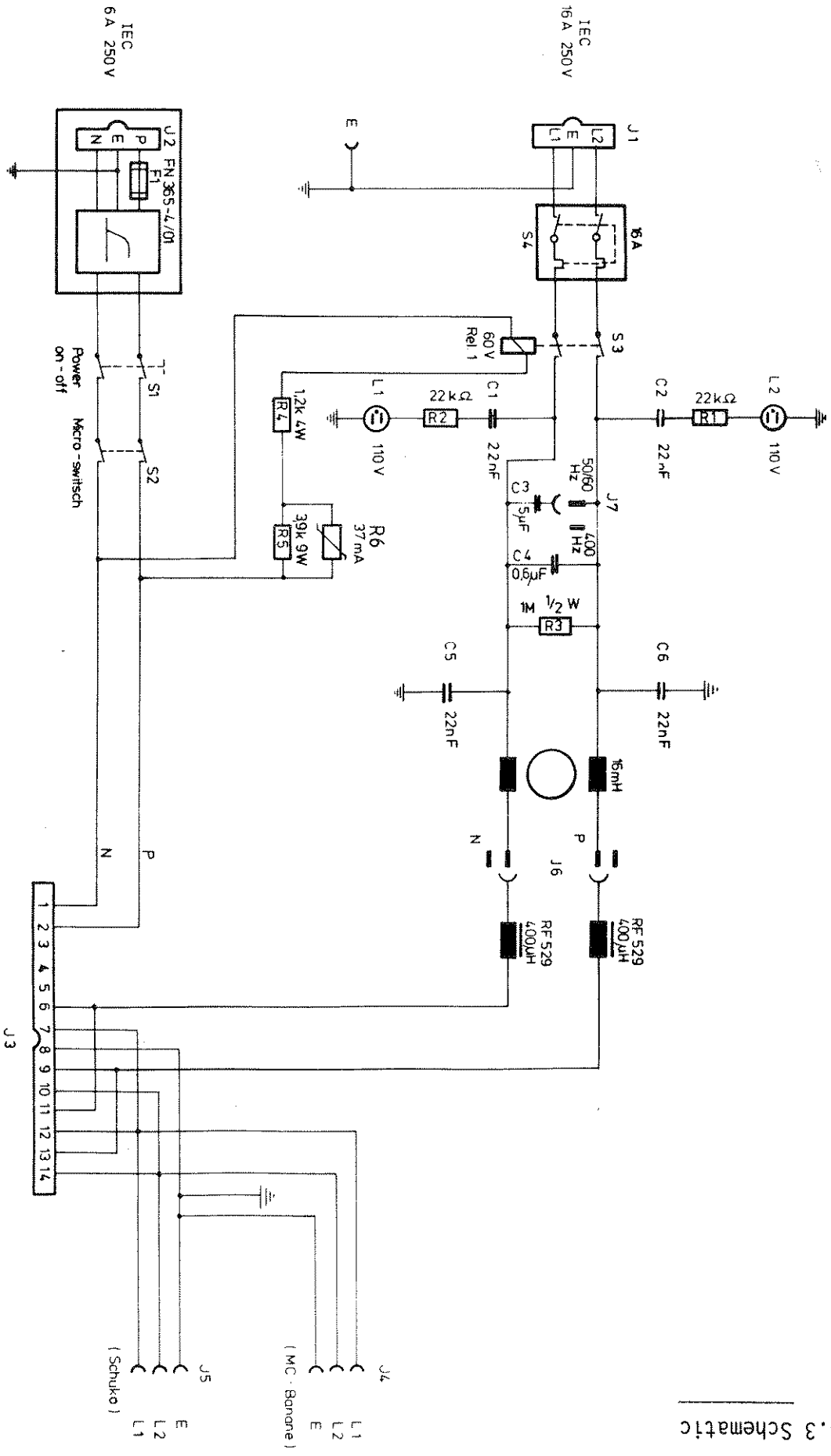
Problem: The simulator cannot be switched on, relay in NSG 200 E doesn't react.

Cause: The position of the plug-in plug shows a too large tolerance.

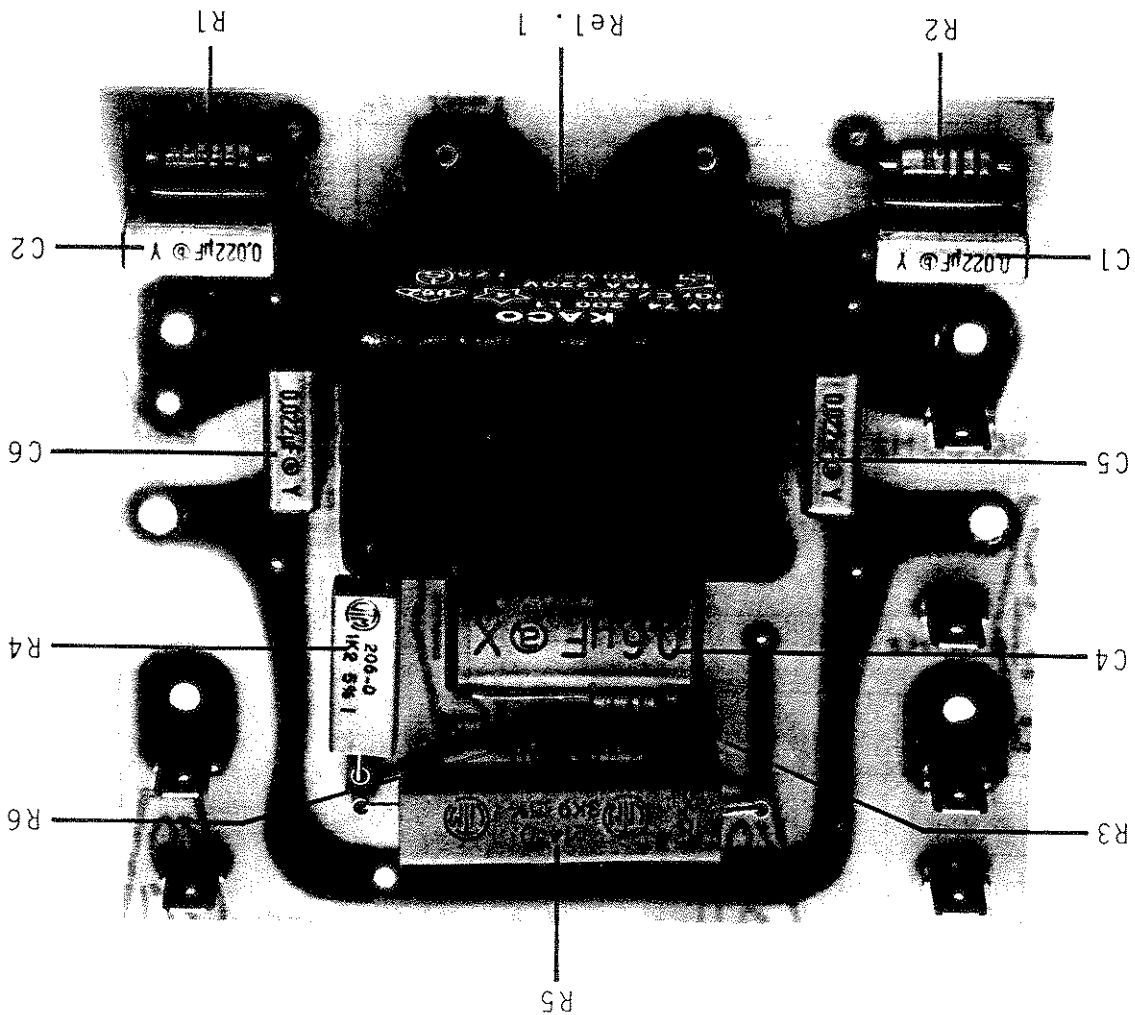
Repair: 1. Plug-in. Unscrew the fixing screws of the plug fixing angle, press the plug backwards, refix the screws.

2. If 1. doesn't help, the switch in the NSG 200 E should be adjusted.
 - detach the two power supply cables.
 - unscrew the cover screws, pull the cover to the back.
 - unscrew slightly the fixing screws of the u-switch and press the switch a little forwards. Refix screws.
 - Close cover.

6.3 Schematic

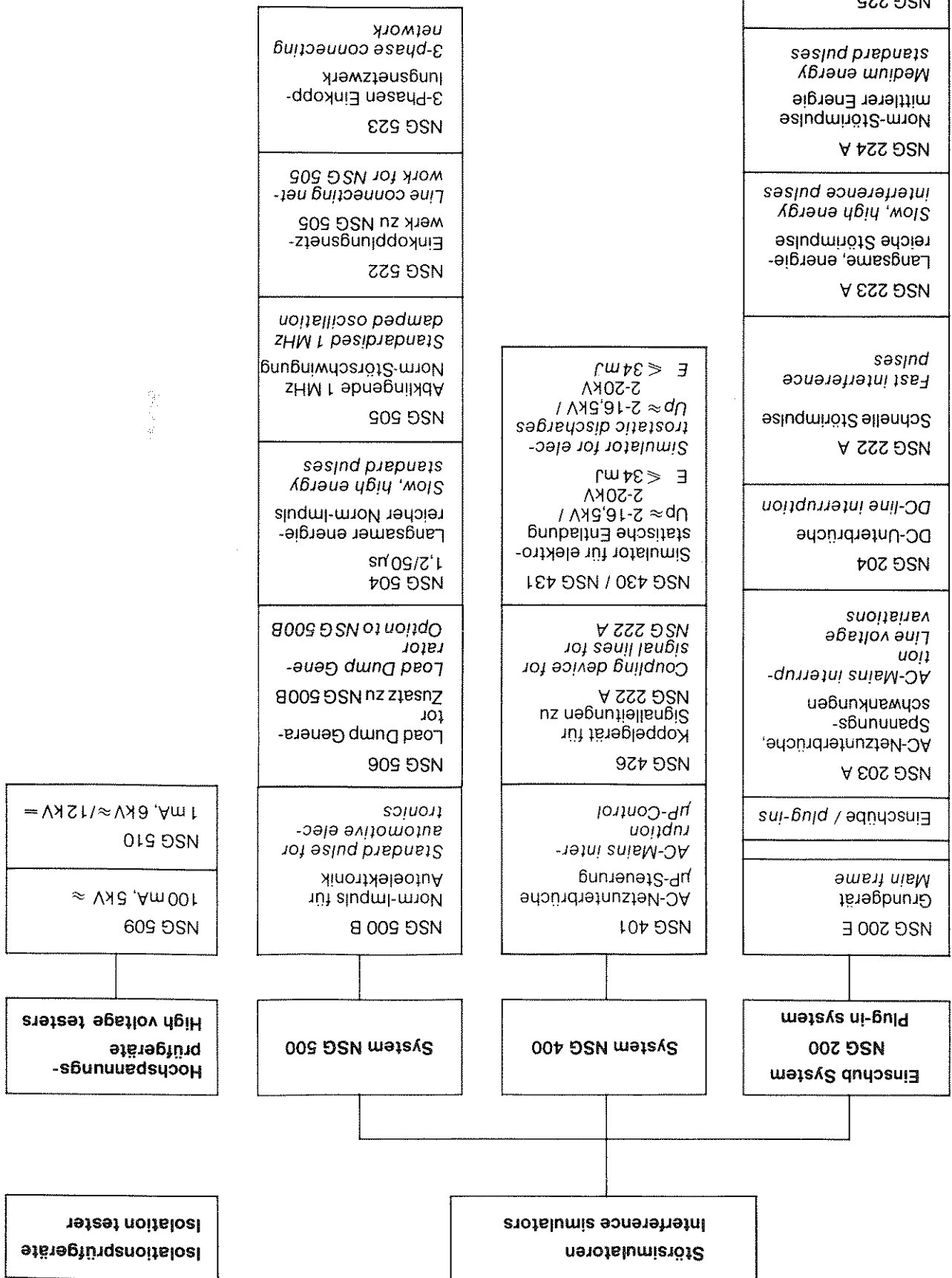


6.3 Schematic



6.4 Component Layout

Summary of products



Produkteübersicht

Summary of products

Produkteübersicht

Netzteilfilter
Line distributor with EMI filter

<p>Serie FR 61-64 2-stufiges Netzteilfilter mit Dämpfung 1 Dose, 3A 2-stage mains distribution filter with earth line choke and high attenuation (S) 1 socket, 3A (S)</p>	<p>Serie FR 111-114 2-stufiges Netzteilfilter mit Erdleiterdrossel und hoher Dämpfung 3 Dosen, 6A 2-stage mains distribution filter with earth line choke and high attenuation (S) 3 sockets, 6A (S)</p>	<p>Serie FR 211-214 3-stufiges Netzteilfilter mit Erdleiterdrossel 4 - 6 Dosen, 10A 3-stage mains distribution filter with earth line choke 4 - 6 sockets, 10A</p>	<p>Serie FR 301-304 Netzteilfilterste mit Netz- und Absorptionfilter 3 Dosen, 6A Distribution strip with line interference and absorption filter 3 sockets, 6A (S)</p>	<p>Serie FR 311-314 Netzteilfilterste mit Netzfilter und Erdleiterdrossel 4 Dosen, 6A Distribution strip with mains filter and earth line choke 4 sockets, 6A</p>	<p>Serie FR 401-405 Netzteilfilter-Filterschub für 19" Rack Systeme Distribution filter plug-in for 19" Rack systems</p>
---	--	--	--	---	--