Manual
for Operation

VDS 200 series

Voltage Drop Simulator pulses 2b, 4

- VDS 200N10, N15, N30 N50
- VDS 200N100, N150 N200

- VDS 200N30.1 N50.1
- VDS 200N100.1 N100.2 N100.3 N100.4 N100.5 N100.6
- VDS 200N150.1
- VDS 200N200.1 N200.2 N200.3 N200.4
- RDS 200N

Testing of electronic modules in 12V/24V or 42V supply systems.

The VDS 200Nx is a low frequency amplifier. It simulates the battery power supply of a vehicle and complex power supply distortions in the power range up to 12'000W. A lot of different waveforms are integrated as standard such as pulse 2b and pulse 4 required in ISO 7637.

- ISO 7637
- SAE J1113
- Manufacturer spec GM, Ford, Chrysler, BMW, VW, PSA, Renault, Fiat ....

EM TEST Switzerland GmbH
Sternenhofstrasse 15
4153 Reinach BL1
Switzerland

Phone : +41 61 717 91 91
Fax : +41 61 717 91 99

URL : http://www.emtest.com

Contents

1. Model Overview

1.1. VDS Models

Standard models

Model	Name till 2008	**voltage**	**current**	**Inrush**	**Sinus f max**
VDS 200N10	VDS 200B0	60V	I = 0A – 10A ± 10%	(15A 500ms)	50kHz
VDS 200N15	VDS 200B	60V	I = 0A – 15A ± 10%		50kHz
VDS 200N30	VDS 200B1	60V	I = 0A – 30A ± 10%	(70A 500ms)	50kHz
VDS 200N50	VDS 200B2	60V	I = 0A – 50A ± 10%	(100A 500ms)	30kHz
VDS 200N100	VDS 200B3	60V	I = 0A – 100A ± 10%	(150A 500ms)	30kHz
VDS 200N150	VDS 200NB4	60V	I = 0A – 150A ± 10%		30kHz
VDS 200N200	VDS 200B5	60V	I = 0A – 200A ± 10%		30kHz

VDS 200N10&15

VDS 200N30

VDS 200N50

VDS 200N100

VDS 200N150

VDS 200N200

Overvoltage protection (selectable max output Voltage 20, 30, 40 and 60V)

Special models

Special models have the index VDS200N200**.x**. The difference to standard models is the voltage and current ranges. The operation is the same as by the standard VDS equipment's. The maximum overcurrent trips at the rated current.

Model	voltage	current	Inrush		Sinusfunction f max
VDS 200N100.1	80V	I. = 0A- 100A ± 10%	150A	500ms	
VDS 200N100.3	30V	I. = 0A- 100A ± 10%	150A	500ms	
VDS 200N100.4	60V	I. = 0A- 100A ± 10%	150A	500ms	Overvoltage protection (selectable 20, 30, 40 and 60V)
VDS 200N100.5	60V	I. = 0A- 100A ± 10%	150A	500ms	Extra fast slope
VDS 200N150.1	60V	I. = 0A- 150A ± 10%	500A	200ms	
VDS 200N200.1	60V	I = 0A – 200A ± 10%	450A 750A 1000A	400ms 200ms 100ms	30kHz
VDS 200N200.2	30V	I = 0A – 200A ± 10%	2000A	500ms	1Hz – 20kHz 16Vpp 20kHz – 30kHz 10Vpp 30kHz – 50kHz 6Vpp
VDS 200N200.3	32V	I = 0A – 200A ± 10%	250A	500ms	
VDS 200N200.4	30V	I = 0A – 200A ± 10%	1000A	500ms	Up VDS 200B5 S1

VDS200N100.3

VDS 200N100.4

VDS 200N200.3

VDS 200N200.4

Special Models not listed in this list are customized versions. These devices have a Firmware version x.xxaxx**s**xx. Some parameters can differ to the specs of this manual. The rest of the operation is according to this manual.

Bipolar models

Model	voltage	current	inrush	sinus function f max
VDS 200N30.1	+30V, -5V	I = 0A – 50A ± 10%	150A 200ms	50kHz
	+60V, -5V	I = 0A – 30A ± 10%	90A 200ms	
VDS 200N50.1	+30V, -5V	I = 0A – 85A ± 10%	220A 200ms	50kHz
	+60V, -5V	I = 0A – 50A ± 10%	150A 200ms	
VDS 200N100.2	+40V, -5V	I = 0A – 100A ± 10%	500A <10ms (32V)	
VDS 200N100.6	+70V, -5V	I = 0A – 100A ± 10%	500A <10ms (15V)	

VDS 200N50.1

VDS 200N100.6

Display and setting of negative voltages

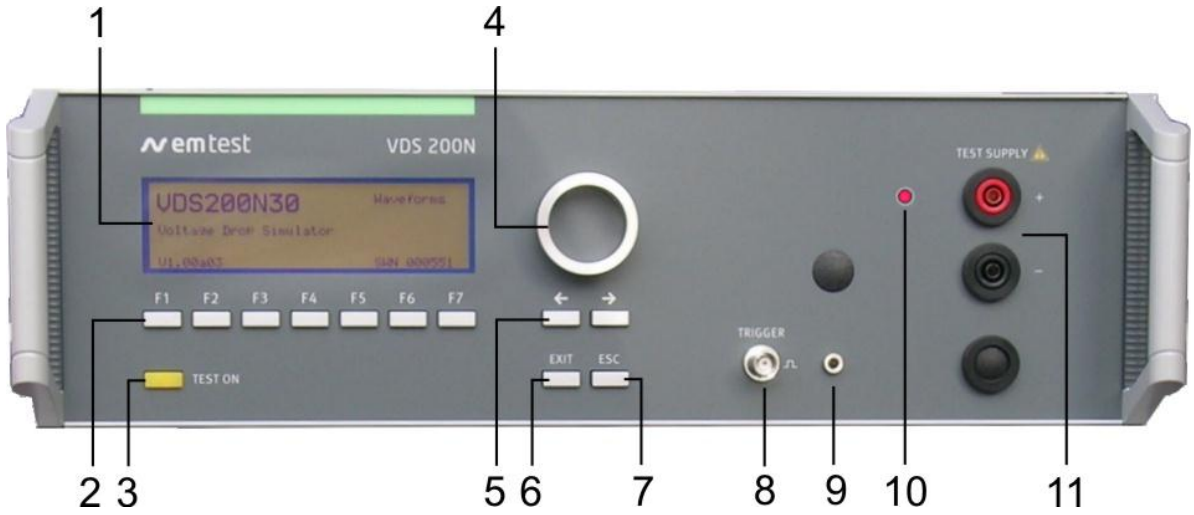
- The voltage indication in the display shows only positive output voltages. Negative voltages are not shown in the display.
- Negative voltages must be set with the iso.control software.

1.2. RDS Models

Model	voltage	current	inrush	sinus function f max
RDS 200N	16V	I = 0A – 10A ± 10%		5kHz

2. Operating Functions

2.1. Front view



1 Display
2 Function keys "F1..F7"
3 "TEST ON"
4 Knob (Inc/Dec)
5 Cursor keys "←" and "→"
6 EXIT
7 ESC
8 BNC CRO Trigger (for oscilloscope)
9 Earthplug for voltage probes
10 LED Power ON
11 DUT test supply output

1 Display
All functions and parameters are displayed (8 lines with max. 40 characters).

2 Function keys "F1 .. F7"
Parameters and functions, displayed in the lowest line, can be selected with the related function key.

3 Test On
By pressing the key "TEST ON" the test procedure is initiated with the preselected parameters. The yellow button is illuminated and indicates the Test ON status. After “Test OFF” or when no test is started, the output voltage and the current will be setted to zero.

4 Knob (Inc / Dec)
The knob increments or decrements test parameters with a numeric value or selects from a list of parameters.

5 Cursor keys
Parameters and functions can be changed on-line. The selection of these parameters is realized with the cursor moving to the left or to the right.

6 Exit
Pressing of the "EXIT" function will cause a reset of the firmware. This is only possible if no test routine is running.

7 ESC
When pressing the ESC button the user moves back one page in the menu.

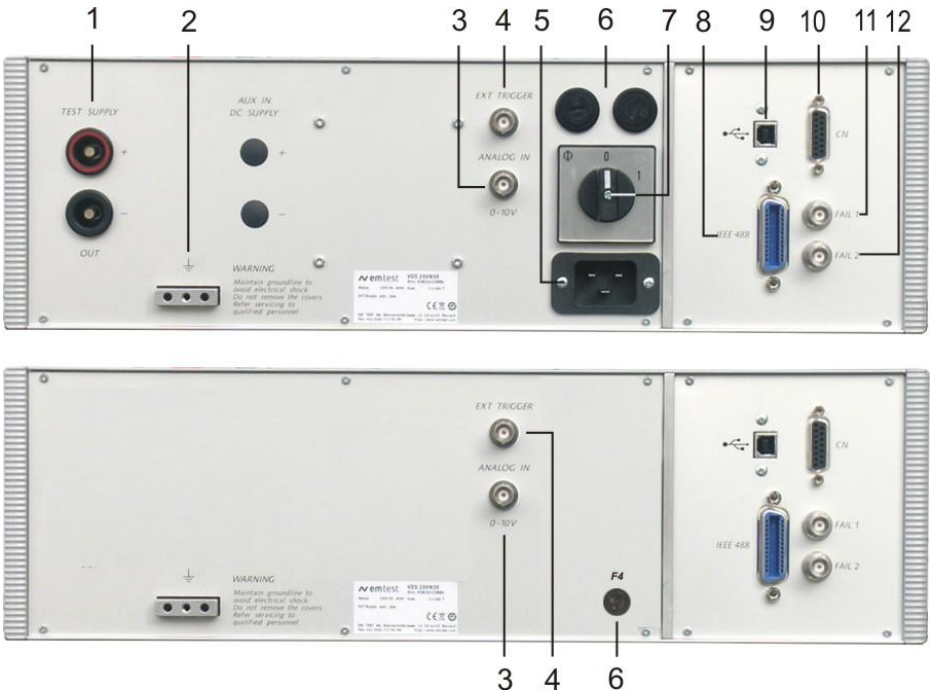
8 BNC CRO Trigger
At the BNC connector CRO TRIGGER a signal is available to trigger an oscilloscope.

9 Earth plug for voltage probes
During the verification this plug is the earth reference.

10 LED Power ON
This LED is on during the power on status.

11 EUT test supply
The EUT is powered via the safety laboratory plugs at the front panel of the simulator.

2.2. Rear view



1	EUT Test supply	**5**	Mains input	**9**	USB Interface
2	Reference earth connection	**6**	Fuses	**10**	CN connector not used
3	Analogue input 0 - 10V	**7**	Power On switch	**11**	Fail 1
4	External trigger	**8**	Parallel interface IEEE 488	**12**	Fail 2

1 Test supply output
At this output the generator can be loaded with the maximum current of 15A // 30A // 35A // 50A // 100A depending on the type of generator. This output is also used for the internal wiring in a complete rack system installation.

2 Reference earth connection
During immunity tests it may be useful to connect the simulator with reference earth plane of the test set-up. For complete rack installations all different test generators shall be grounded at this point.

3 Analogue input 0-10V
The internal amplifier can be controlled by an external signal generator. The operator therefore shall select the User Test Routines of the VDS part and start the menu Extern. The amplifier than is ready to be remote controlled.
The input signal range is 0-10V in the frequency range of 0-50kHz. The output power (EUT test supply) than would result in 0-30V or 0-60V and a nominal current depending on the type of instrument. The frequency range is 50kHz for up to 6Vpp and 25kHz for up to 16Vpp.

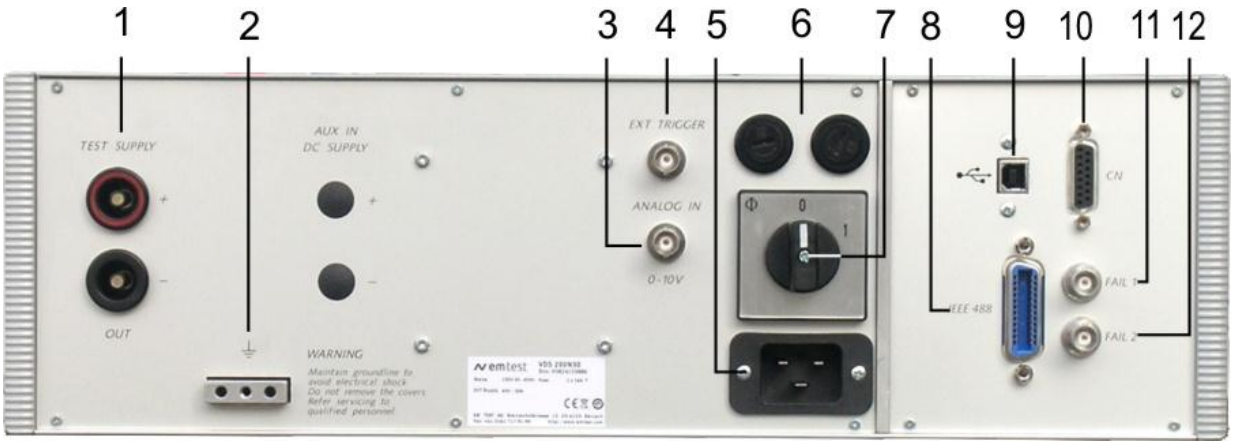
For Frequency >50kHz to 100kHz the VDS output voltage must be limited to max. 3Vpp. Therefore the analogue input signal must be limited to max. 0.7Vpp !

4 External trigger
One single event with preselected parameters can be released. Trigger level is 5-15V positive going.

5 Mains input
230V 16A input connector. This connector depends on the VDS model

6 Fuses
This fuses depends on the VDS model. F4 is the control fuse (2Aslow blow) for units with 3-phase supply.

7 Power On switch
230V system: The Power On switch includes also the power mains fuses (2 x 10A T) and filter unit.
115V system: The Power On switch, fuses and the filter unit are separated due to the higher currents.
For high current generators a 3phase power mains supply has to used.
For detailed technical data see chapter 5.5. General



1	EUT Test supply	**5**	Mains input	**9**	USB Interface
2	Reference earth connection	**6**	Fuses	**10**	CN connector not used
3	Analogue input 0 - 10V	**7**	Power On switch	**11**	Fail 1
4	External trigger	**8**	Parallel interface IEEE 488	**12**	Fail 2

8 Parallel interface IEEE 488 // GPIB
IEEE 488 interface with IEEE connector.

9 USB interface
USB interface “USB B” connector. For datatransfer a USB interface is available. The internal RS 232 interface is converted to USB standard. Therefore the user must set the same Baudrate in the device and control software. Using the USB interface the user can have emc problems during burst tests Our experiences says, that usually the computer USB port is disturbed by interference’s. Therefore a high quality USB cable (USB 2.0 standard) must be used.

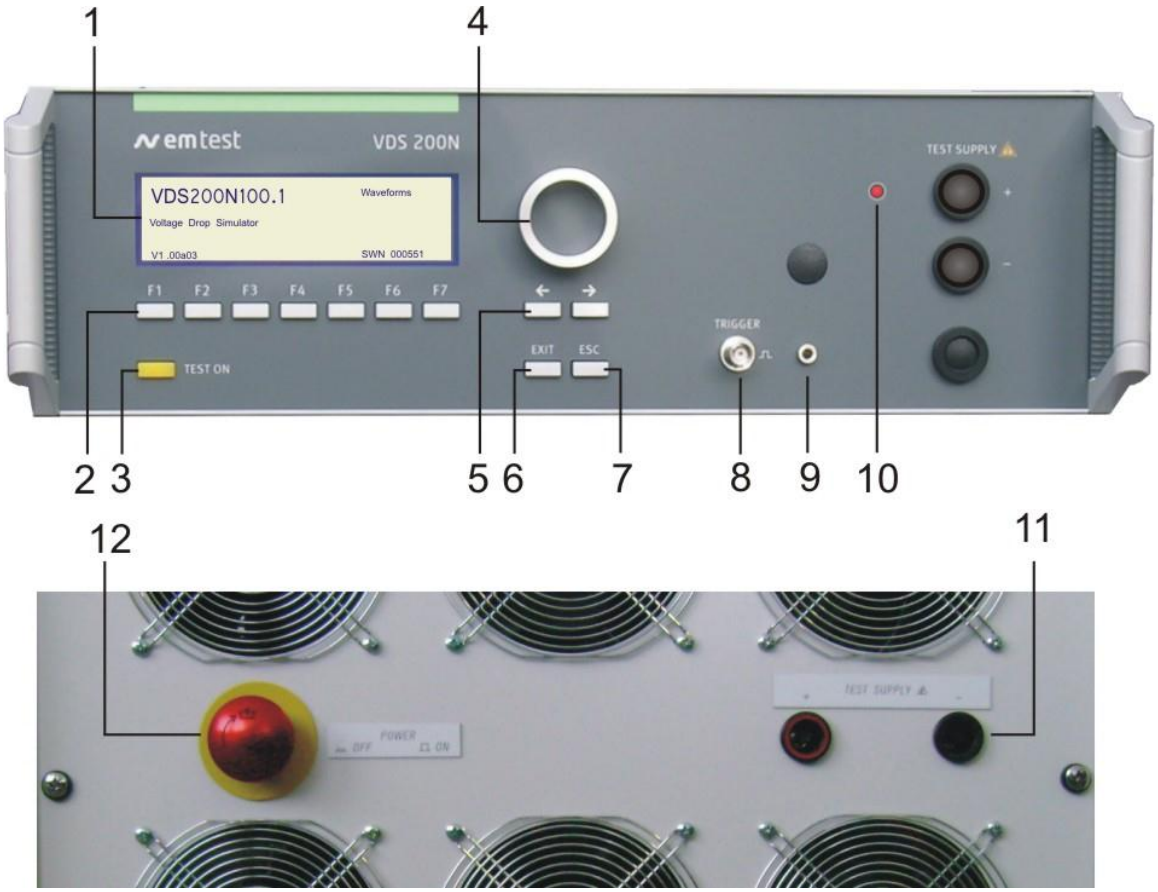
10 CN connector not used
Connector for control external devices not used in VDS200N series.

11 Fail detection FAIL 1 (TEST STOP)
The BNC input FAIL 1 can be used for failure detection at the EUT. If the input is set to ground (chassis) the VDS generator will be stopped and the actual test routine is paused. The test routine than can be stopped completely or can be continued at the break point.
A message of FAIL 1 is indicated in the LCD display as well as in the ISM software.

12 Fail detection FAIL 2 (TEST PAUSE)
The BNC input FAIL 2 can be used for failure detection at the EUT. If the input is set to ground (chassis) the actual test routine is paused as long as the low level signal is available at the FAIL 2 input.
With no longer set to ground signal the test procedure continues automatically.
A message of FAIL 2 is indicated in the LCD display as well as in the ISO.CONTROL software.

2.3. VDS200N100.1 operating elements

2.3.1. Front view VDS200N100.1



1 Display
2 Function keys "F1..F7"
3 "TEST ON"
4 Knob (Inc/Dec)
5 Cursor keys "←" and "→"
6 EXIT
7 ESC
8 BNC CRO Trigger (for oscilloscope)
9 Earthplug for voltage probes
10 LED Power ON
11 DUT test supply output
12 Emergency switch OFF

11 EUT test supply
The EUT is powered via the safety laboratory plugs at the front panel of the simulator.

12 Emergency Switch OFF
Switches off the DUT output. (for release the button turn before)

2.3.2. Rear view VDS200N100.1

12 Main Switch
13 Sense input
14 DUT Test supply output
15 Mains input CEE 3x400V 16A

12 Power On switch
The power on switch is a circuit breaker model Siemens 3RV10 21-1JA1 with overcurrent protection. For switch on the user has to put the switch in the illustrated position.

13 Sense input
Sense input for dc supply. (2x banana plug 4mm)

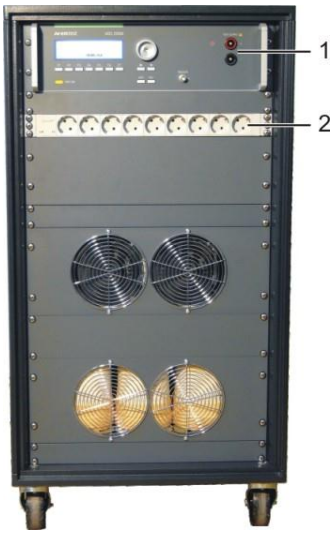
14 DUT Test supply output
At this 6mm output the generator can be loaded with the maximum This plugs are in parallel to the plugs “TEST SUPPLY” at the front side.

15 Mains CEE 3x400V 16A
3 x 400/ 50Hz 6kVA
CEE plug type Mennekes 2069
3x400/16A L1, L2, L3, N, PE

2.4. VDS 200N100.4 operating elements

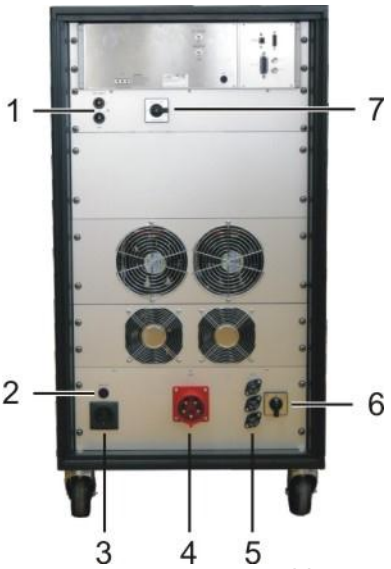
The VDS 200N100.4 includes an internal overvoltage protection selectable by a switch at the rear side. The protection levels are 20V, 30V, 40V and 60V. The overvoltage protection works as a crowbar, switches in a few µs and discharges the storage capacitor bank and switches off the charging rectifier.

Front side



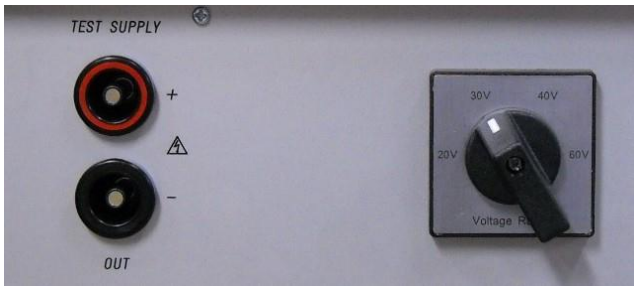
1 Power output frontside
2 Mains plug 230V fused on F4 total 16A

Rear side



1 Power output rear side
2 Fuse F4 for all mains output 16AT (6x32mm)
3 Mains 230V fused total 16A
4 Mains input 3 x 400 V ac
5 Fuse F1…F3 32A gG (10.3 x 38mm)
6 Main Switch
7 Overvoltage protection selector switch

2.4.1. Overvoltage protection VDS200N100.4



The overvoltage protection switch selects the following protection levels:

20.0V, 30.0V, 40.0V, 60.0V

The protection will switch off the output voltage and discharge the internal dc-capacitor bank. The protection is a hardware solution and independent of the controller.

2.5. VDS 200N100.6 operating elements

General operating elements

1 Autowave (optional control device)
2 VDS200 front for manual operating
3 Emergency button (turn for release)
4 DUT supply ,sense front
5 Rear panel (VDS and Autowave functions)
6 DUT supply , sense rear side
7 Protection switch power supply
8 Mains input 4x400V 32A

Operating elements rear side

A Control

VDS 200N100.1

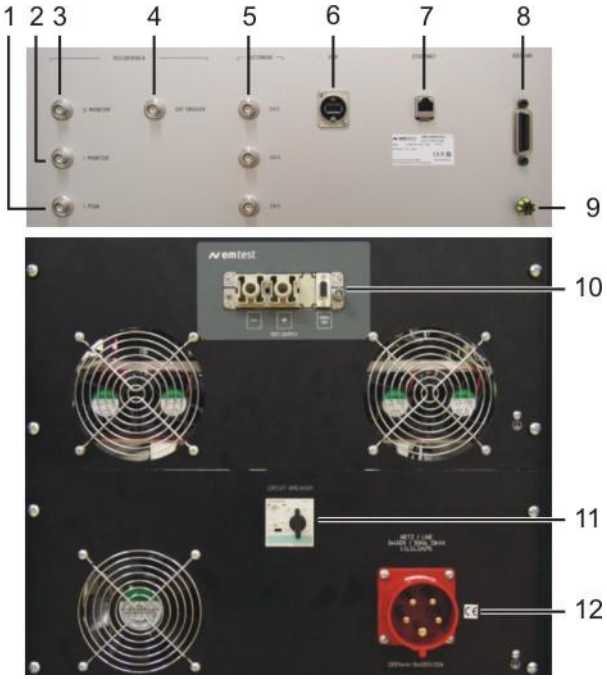
1	I Peak	1V = 50A
2	I Monitor	1V= 10A
3	U Monitor	1V= 10V
4	Ext Trigger	

Autowave

5 Analog output channels 2, 3, 4
6 USB interface
7 Ethernet interface
8 GPIB IEEE 488 interface

B VDS 200N100 power part

9 Earth connection
10 DUT supply , sense rear side
11 Protection switch power supply
12 Mains input 4x400V 32A

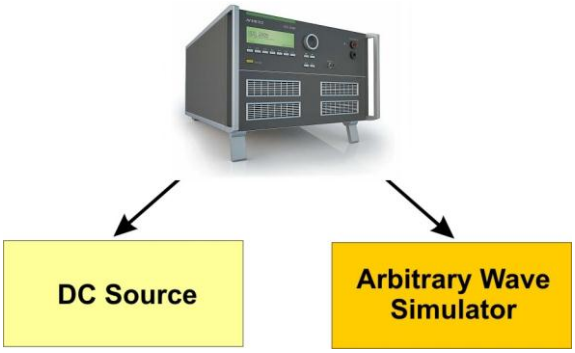


The description of the Autowave interface and plugs refer to the Autowave manual.

2.6. Safety with voltage setting

To ensure a safe operation of the DUT (Device Under Test) some restrictions in the operation of the instrument are built in. These restrictions are explained within this paragraph.

The VDS basically is divided into 2 different operation modes, which includes their individual test routines and supply voltage setting. The four different modes can be listed as follows:



DC Source (VDS Generator - User Test Routines - DC Source)
Within this mode the VDS is used as a simple DC power source in the range of 0-60V // 0-15A // 30A // 50A // 100A // 200A and an integrated current limiter.

Arbitrary Wave Simulator
Within this mode the VDS generates arbitrary waveforms and signals which are specified in different standards, such as pulse 4 of ISO 7637.

All these different test modes are changing generally the voltage supply setting of the generator in a different way. This would mean a certain risk for the operator to burn out the connected DUT by higher dc supply voltages as intended. Therefore it is decided to clearly separate the two test modes by the following structure listed :

1. DC source
When entering the Arbitrary Wave test mode the dc output voltage of the VDS 200 is automatically set to the nominal voltage of the DUT. The actual nominal voltage can be defined in the service menu under "Set-up".
When starting the related test routines the output voltage will be generated as per the setting shown up in the display for each individual test routine.

- The operator can accept this setting and start the test immediately .
- The operator can first change the parameters and than start the test.

When leaving the test mode DC source the output voltage is automatically reset to the nominal supply voltage of the DUT. The previous voltage setting will be stored in the test file.

2. Arbitrary Wave Simulator
When selecting the Arbitrary Wave mode the output voltage will be set automatically to the nominal voltage of the DUT. The actual nominal voltage can be defined in the service menu under "Set-up".
When starting the related test routines the output voltage will be generated as per the setting shown up in the display for each individual test routine.

- The operator can accept this setting and start the test immediately.
- The operator can first change the parameters and then start the test.

When leaving the test mode Arbitrary Wave Simulator the output voltage is automatically reset to 0V. The previous voltage test parameters will be stored and can be used for the next test.

The consequence of the structure is that between the different test modes

the DUT supply is automatically switched off.

3. Operation

3.1. Description of the menus

The simulator VDS 200 is operated by an easy menu control system. Seven function keys are available to select parameters and functions. All functions are indicated on the display; max. 8 lines and 40 characters.

The selected parameter is blinking and can be changed by turning the knob (incr./decr.).

←→ : The digit to be changed can be selected with the cursor (←→).

- Setted values are direct indicated on the screen.
- Status on the bottom lines shows the desired status after pressing the function key.

ESC : ESC will take you back to the previous level in the menu and set the displayed values. The latest settings are stored automatically and will be recalled when the menu is selected again.

EXIT : The firmware will reset to the main screen.

EM TEST
V D S 2 0 0 N 10 Waveforms
Voltage Drop Simulator
V 3.04 SWN: 001234

The serial number and the version number SWN are used for tractability reasons. These numbers are listed in the test reports and calibration certificates. These numbers also are listed within the test reports generated by the iso.control software

Start-up display example VDS 200N10

3.2. Main Menu

MAIN MENU

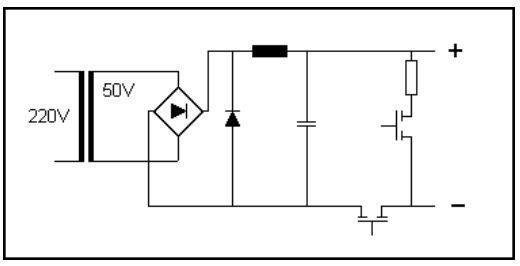
F1 : Wave Simulator

F7 : Service

F1 F2 F3 F4 F5 F6 F7

F1 Wave Simulator.

Within this part the internal low frequency high power amplifier together with the internal signal generator is used to generate arbitrary waveforms as required in different standards.



The operator can use the generator in this mode as a
- DC power supply source
- High power arbitrary wave generator with integrated test routines
- or simply as a Low Frequency Amplifier

The low frequency amplifier can be remote controlled by any external arbitrary generator. External generators shall be connected at the rear part of the equipment. Any waveform can be generated up to the upper bandwidth of the unit.

F7 Service

Set-up, self-test, addresses of EM Test can be selected and displayed.

3.2.1. Change of parameters

Easy and very fast operation of all standard functions of the equipment. The latest simulator settings are stored automatically and will be recalled when Quick Start is next selected.

Page 5 (Show parameters)

ISO Pulse 4					
Vb	=	12.0V	Va1	=	-7.0V
Va2	=	-3.0V	t1	=	0.2s
t6	=	5ms	t7	=	5ms
t8	=	5ms	tf	=	5ms
Va	=	13.5V	tri	=	Auto
I	=	30A			
Start		Change			

F1 F2 F3 F4 F5 F6 F7

Press **START** and the test routines begin to work.
Press **CHANGE** and the actual parameter can be changed.

Page 6 (Change of page 1/2)

ISO Pulse 4						
Vb:	0.0V	-	60.0V			
Vb	Va1	Va2	t1	t6	t7	
12.0	-7.0	-3.0	0.2	5	5	1/2

F1 F2 F3 F4 F5 F6 F7

Page 6 (Change of page 2/2)

ISO Pulse 4						
t8:	0.1 s	-	99.9 s			
t8	tf	Va	tri	I		
13.5	5	13.5	Auto	30		2/2

F1 F2 F3 F4 F5 F6 F7

The user can select the parameter to be changed with the related function key and change the value by turning the knob. The cursor allows the user to define the value of the digit to be changed (fast or slow change).

Pressing of the ESC button will bring the user back to the previous level from where the test can be restarted with new parameters.

Page 6 (Start)

ISO Pulse 4					
Vb	=	12.0V	Va1	=	-7.0V
Va2	=	-3.0V	t1	=	0.2s
t6	=	5ms	t7	=	5ms
t8	=	5ms	tf	=	5ms
Va	=	13.5V	tri	=	Auto
I	=	30A	I	=	3.5 A
Stop		Zoom	V	=	7.0 V

F1 F2 F3 F4 F5 F6 F7

After start the actual voltage and current measurements are displayed. All function keys except F2 (Man) within the manual trigger mode can stop the test routine. The latest setting will be displayed.

Pressing the key **F3** while the test is running, the display change to the **ZOOM** mode and is indicating the actual voltage and current measurement in big letters.

Page 6 (Stop)

ISO Pulse 4					
Vb	=	12.0V	Va1	=	-7.0V
Va2	=	-3.0V	t1	=	0.2s
t6	=	5ms	t7	=	5ms
t8	=	5ms	tf	=	5ms
Va	=	13.5V	tri	=	Auto
I	=	30A	I	=	3.5 A
Stop		Zoom	V	=	7.0 V

F1 F2 F3 F4 F5 F6 F7

By pressing any function key the **Start**, **Change** or **Continue** mode will come up in the display. F3 will continue the same test routine. Also the test time will continue running. If the user first selects **Start** or **Change**, the test will be stopped completely.

Start	Change	Cont.

F1 F2 F3 F4 F5 F6 F7

3.3. Wave Simulator

Page 2

Waveform Simulator

F1 : Standards
F2 : Functions
F3 : DC Power Supply

F1 F2 F3 F4 F5 F6 F7

Page 3

STANDARDS

F1 : ISO 7637
F2 : ISO 16750-2 or WD 03/2000-2
F3 : JASO

F1 F2 F3 F4 F5 F6 F7

Pages 4

ISO 7637
F1: Pulse 4
F2: Pulse 2b

ISO 16750-2 WD 03/2000-2
F1: Short voltage drop
F2: Slow decrease / increase
F3: Supply voltage profile
F4: Pulse 'Starting profile'
F5: Sweep
F6: Overvoltage Vmax

JASO
F1: Jaso

Page 3

FUNCTIONS

F1 : Sinus
F2 : Jumpstart
F3 : VDS Extern
F4 : Pulse 4 (GM 9105P)

F1 F2 F3 F4 F5 F6 F7

3.3.1. ISO 7637

3.3.1.1. Pulse 4 voltage drop

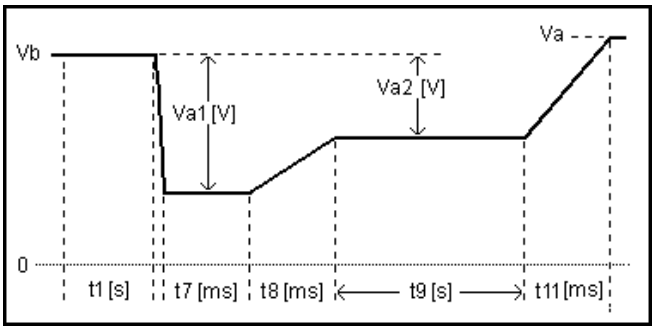
This pulse simulates supply voltage reduction caused by energizing the starter-motor circuits of internal combustion engines, excluding spikes associated with starting.

tf [Vb-Va1] < 5ms

Limits depends VDS voltage range

Input restrictions

0.0 V <= Vb + Va1 <= 30.0V (60.0V)
0.0 V <= Vb + Va2 <= 30.0V (60.0V)



Parameters:

Vb	0.0V	-	30.0V (60.0V)
Va1	- 30.0V (- 60.0V)	-	30.0V (+ 60.0V)
Va2	- 30.0V (- 60.0V)	-	30.0V (+ 60.0V)
t1	0.1s	-	99.9s
t7	5ms	-	999ms
t8	5ms	-	999ms
t9	0.1s	-	99.9s
t11	5ms	-	999ms
Va	0.0V	-	30.0V (+ 60.0V)
I	1A	-	30A (Imax)
tri	Auto / Manual		

3.3.1.2. Pulse 2b

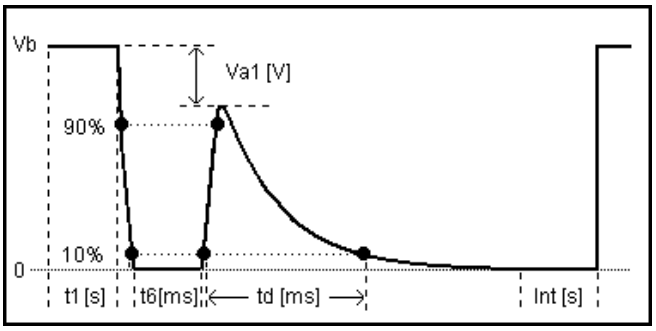
This pulse simulates transients from dc motors acting as generators after ignition is switched off.

tr, tf (10/90%) =1ms ± 50%

Limits depends VDS voltage range

Input restrictions

Va1 ≤ 0.0V
0.0 V ≤ Vb + Va1 ≤ 30.0V (60.0V)



Parameters:

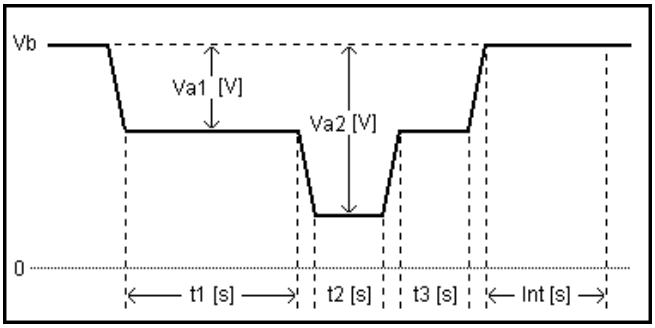
Vb	0.0V	-	30.0V (60.0V)
Va1	- 30.0V (- 60.0V)	-	0.0V
t1	0.1s	-	99.9s
t6	1ms	-	999ms
td	5ms	-	9999ms
int	0.1s	-	99.9s
n	1	-	30,000 / endl.
tri	Auto / Manual		
I	1A	-	30A (Imax)

3.3.2. ISO 16750-2 WD 03/2000-2

3.3.2.1. Short voltage drop

This test is to simulate the effect of a classical fuse actuation in another circuit.

tr, tf = < 10ms



Limits depends VDS voltage range

Input restrictions

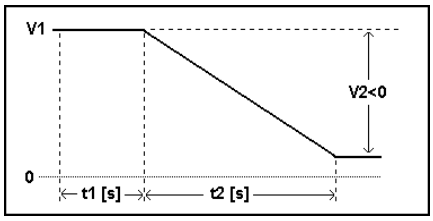
0.0 V ≤ Vb + Va1 ≤ 30.0V (60.0V)
0.0 V ≤ Vb + Va2 ≤ 30.0V (60.0V)

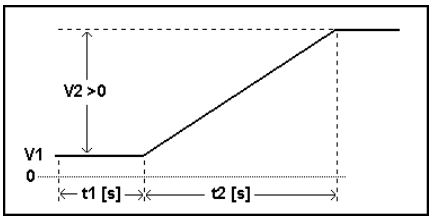
Parameters:

Vb	0.0V	-	30.0V (60.0V)
Va1	- 30.0V (- 60.0V)	-	30.0V (60.0V)
Va2	- 30.0V (- 60.0V)	-	30.0V (60.0V)
t1	0.1s	-	99.9s
t2	0.1s	-	99.9s
t3	0.1s	-	99.9s
int	0.1s	-	99.9s
n	1	-	30,000 / endl.
tri	Auto / Manual		
I	1A	-	30A (Imax)

3.3.2.2. Slow decrease / increase

This test is to simulate a gradual discharge and recharge of the battery.





Parameters:

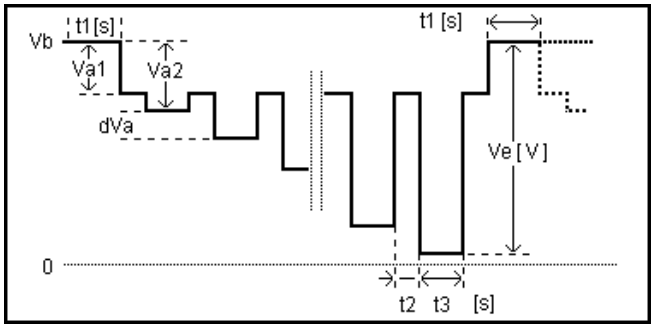
V1	0.0V	-	30.0V (60.0V)
V2	- 30.0V (- 60.0V)	-	30.0V (60.0V)
t1	0.1s	-	99.9s
t2	0.1s	-	9999.9s
I	1A	-	30A (Imax)

Remarks:

WD 03/2000-2 Voltage change rate = (3 ± 0.1) V per minute
ISO 16750-2 Voltage change rate = (0.5 ± 0.1) V per minute

3.3.2.3. Supply voltage profile

This test is to determine the reset behavior of the device under Test at different voltage drops. This test is applicable to equipment with reset function.



Parameters:

Vb	0.0V	-	30.0V (60.0V)
Va1	- 30.0V (- 60.0V)	-	30.0V (60.0V)
Va2	- 29.9V (- 59.9V)	-	30.0V (60.0V)
Ve	- 30.0V (- 60.0V)	-	30.0V (60.0V)
dVa	- 30.0V (- 60.0V)	-	30.0V (60.0V)
t1	0.1s	-	99.9s
t2	0.1s	-	99.9s
t3	0.1s	-	99.9s
n	1	-	30,000 / endl.
tri	Auto / Manual		
I	1A	-	30A (Imax)

3.3.2.4. Pulse 'Starting profile'

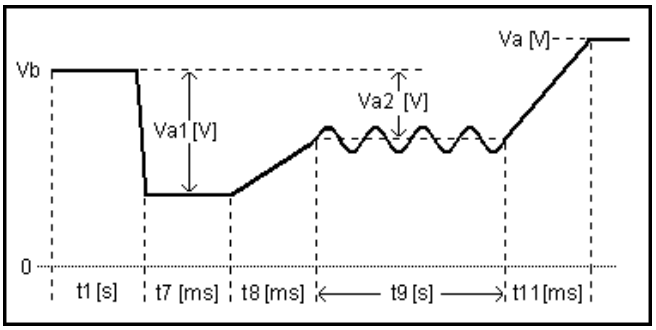
This test is simulate a motor startup including a possible ripple.

tr, tf = < 10ms
Ripple = 2Hz

Limits depends VDS voltage range

Input restrictions

0.0 V ≤ Vb + Va1 ≤ 30.0V (60.0V)
0.0 V ≤ Vb + Va2 ≤ 30.0V (60.0V)



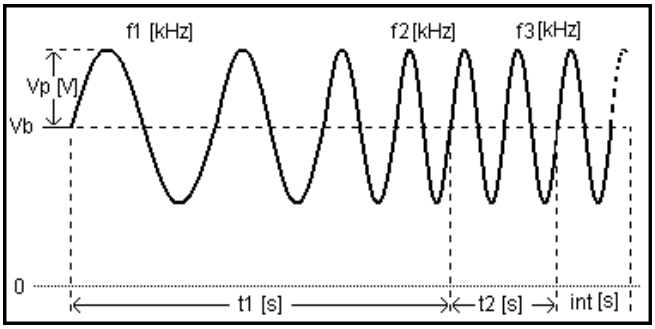
Parameters:

Vb	0.0V	-	30.0V (60.0V)
Va1	- 30.0V (- 60.0V)	-	30.0V (60.0V)
Va2	- 30.0V (- 60.0V)	-	30.0V (60.0V)
t1	0.1s	-	999ms
t7	5ms	-	999ms
t8	5ms	-	999ms
t9	0.5s	-	99.5s
t11	5ms	-	999ms
n	1	-	30,000 / endl.
tri	Auto / Manual		
I	1A	-	30A (Imax)

3.3.2.5. Sinus Sweep

This test simulates a residual a.c. on the dc supply

During Int f3 is applicated



Limitations

Vb + Vp <= 30.0V (60.0V)
Vb - Vp >= 0.0V

For frequency setting see the following limitations

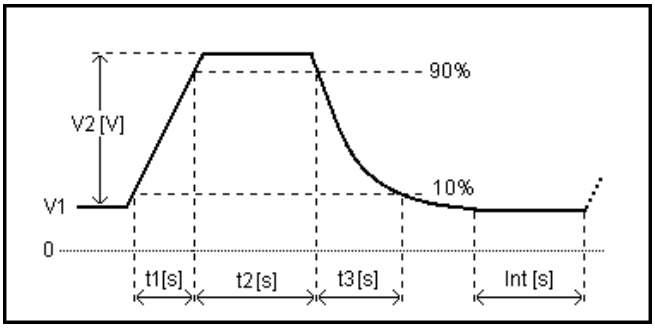
- **max 6Vpp up to the full 50kHz range**
- **max 16Vpp up to 25kHz**

Parameters:

Vb	0.0V	-	30.0V (60.0V)
Vp	0.0V	-	5.0V
f1	0.001Hz	-	50.000kHz
f2	0.001Hz	-	50.000kHz
f3	0.001Hz	-	50.000kHz
t1	0.1s	-	999.9s
t2	0.1s	-	999.9s
int	0s	-	999s
n	1	-	30,000 / endl.
tri	Auto / Manual		
I	1A	-	30A (Imax)

3.3.2.6. Overvoltage Vmax

This test simulates a high energy load dump pulse.



Limits depends VDS voltage range

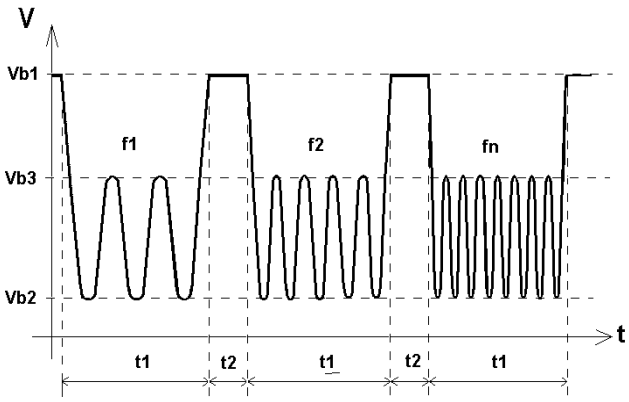
Input restrictions

0.0 V ≤ V1 + V2 ≤ 30.0V (60.0V)

Parameters:

V1	0.0V	-	30.0V (60.0V)
V2	0.0V	-	30.0V (60.0V)
t1	0.01s	-	999.99 s
t2	0.01s	-	999.99 s
t3	0.01s	-	999.99 s
int	0.1s	-	99.9s
n	1	-	30,000 / endl.
tri	Auto / Manual		
I	1A	-	30A (Imax)

3.3.3. Jaso Test 1



Limitations

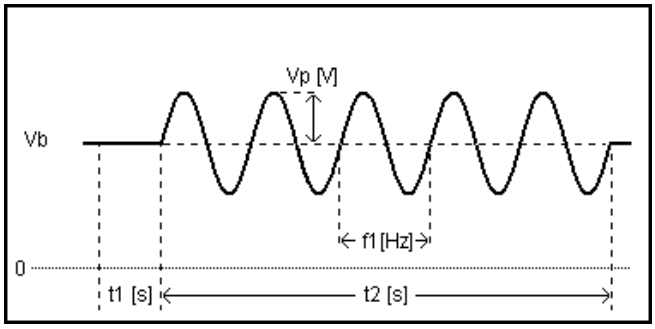
VB1 >= VB3 >= VB2 $F_n = \sqrt{2}\, F_{n-1}$
F1 <= Fn
T1 >= 1 / F1

Parameters:

Vb1	0.0V	-	30.0V (60.0V)
Vb2	0.0V	-	30.0V (60.0V)
Vb3	0.0V	-	30.0V (60.0V)
t1	0.1s	-	99.99 s
t2	0.1s	-	99.99 s
f1	0.1Hz	-	99.9 Hz
fn	0.1Hz	-	99.9 Hz
n	1	-	30,000 / endl.
tri	Auto / Manual		
I	1A	-	30A (Imax)

3.3.4. Functions

3.3.4.1. Sine wave



Limitations
Vn + Vp <= 30.0V (60.0V)
Vn - Vp >= 0.0V

For frequency setting see the following limitations
max 6Vpp up to the full 50kHz range
max 16Vpp up to 25kHz

Parameters:

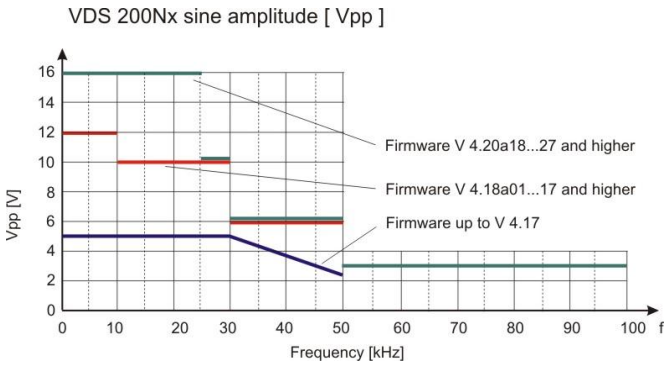
Vb	0.0V	-	30.0V (60.0V)	
Vp	0.25V	-	6.0V	
t1	0.1s	-	99.9s	
f1	0.001kHz	-	50.00kHz	f< 100Hz ± 1.2Hz
t2	1.0s	-	999.9s	
n	1	-	30'000 / endl.	
I	1.0A	-	15//30//50//100A	

Frequency behavior

Firmware from version 4.20a18...25 manufactured. 2007 or later
16Vpp up to 25kHz
10Vpp up to 30kHz
6Vpp up to 50kHz

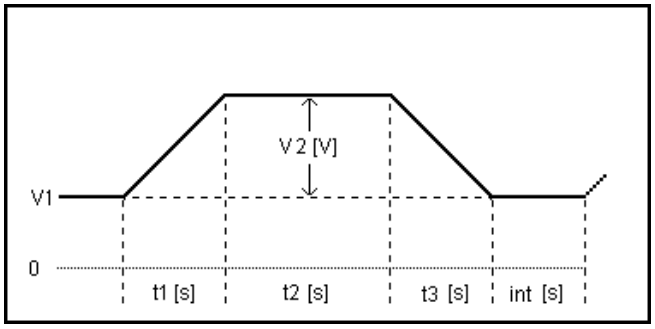
Firmware version 4.18a01...17 and higher
12Vpp up to 10kHz
10Vpp up to 30kHz
6Vpp up to 50kHz

Firmware up to version 4.17
5Vpp up to 30kHz
>30kHz linear decrease to 3.5V at 50kHz (see diagram)



For Frequency >50kHz to 100kHz the VDS output voltage must be limited to max. 3Vpp. Therefore the analogue input signal must be limited to max. 0.7Vpp !

3.3.4.2. Jump Start



Limitations

V1 + V1 <= 30.0V (60.0V)
V1 + V1 >= 0.0V

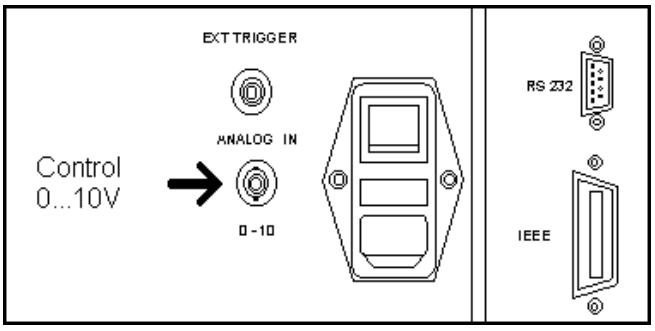
Parameters:

V1	0.0V	-	30.0V (60.0V)
V2	- 30.0V (- 60.0V)	-	30.0V (60.0V)
t1	0.01s	-	999.99s
t2	0.01s	-	999.99s
t3	0.01s	-	999.99s
int	0.1s	-	99.9s
n	1	-	30,000 / endl.
tri	Auto / Manual		
I	1A	-	30A (Imax)

3.3.4.3. VDS Extern via the analogue input

The power amplifier can be driven by an external control voltage (0 - 10V), e.g. from an external waveform generator. The maximum bandwidth is 50kHz for generators up to 35A output current. For higher currents the bandwidth is limited to 30kHz.

For this purpose the operator must select **VDS Extern** by pressing the related function key. The Extern mode is displayed and the unit can only be operated via the coaxial BNC input **ANALOG IN** at the rear part.

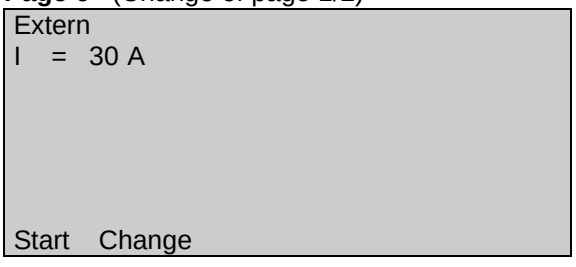


Parameters:

Input voltage at BNC input :0...10V dc

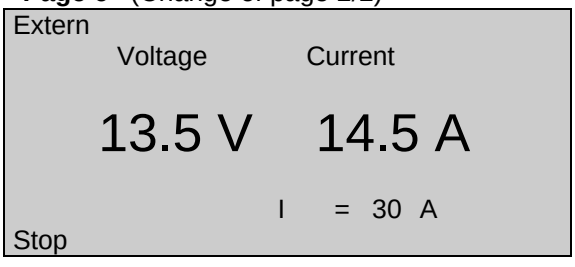
f max up to :	25kHz	up to 2.6Vpp
	30kHz	up to 1.6Vpp
	50kHz	up to 1.0Vpp

Page 6 (Change of page 1/2)



F1 F2 F3 F4 F5 F6 F7

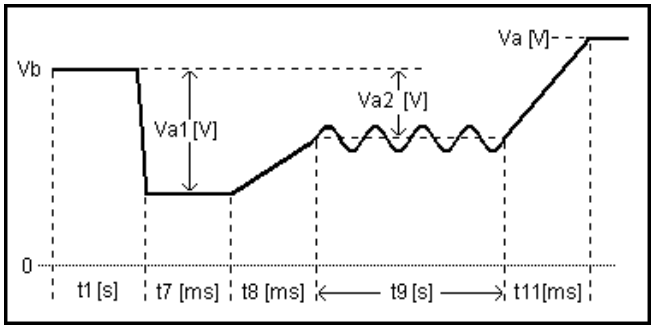
Page 6 (Change of page 2/2)



F1 F2 F3 F4 F5 F6 F7

3.3.4.4. Pulse 4 (GM 9105 P)

In addition to the ISO pulse 4 a 5Hz ripple of 1Vp-p is superimposed during t9 to Va.



tr, tf = < 10ms

Input restrictions

0.0 V ≤ Vb + Va1 ≤ 30.0V (60.0V)
0.0 V ≤ Vb + Va2 ≤ 30.0V (60.0V)

Parameters:

Vb	0.0V	-	30.0V (60.0V)
Va1	- 30.0V (- 60.0V)	-	30.0V (60.0V)
Va2	- 30.0V (- 60.0V)	-	30.0V (60.0V)
t1	0.1s	-	99.9s
t7	5ms	-	999ms
t8	5ms	-	999ms
t9	0.4s	-	99.8s
t11	5ms	-	999ms
tri	Auto / Manual		
I	1A	-	30A (Imax)

3.3.4.5. DC source

Page 3 (Show parameters)

```
DC POWER SUPPLY

Vb  =  13.5  V      -      I =  30.0A



Stop    Change
```

F1 F2 F3 F4 F5 F6 F7

The user can select the parameter to be changed with the related function key and change the value by turning the knob. Pressing of the ESC button will bring the user back to the previous level from where the test can be restarted with new parameters.

Page 4 (Change)

```
DC POWER SUPPLY


Vb  =  0.0  V -   30.0V or (60.0V)
I    =  1  A   -   15A // 30A // 50A // 100A

Vb      I
13.5    30
```

F1 F2 F3 F4 F5 F6 F7

Page 5 (Start)

```
DC POWER SUPPLY

Vb  =  13.5  V      -   I =  30.0A


                                I   =  5.8    A
Stop  ChangeZoom                U   =  13.4   V
```

F1 F2 F3 F4 F5 F6 F7

After Start the actual voltage and current values are displayed. All function keys. The latest setting will be displayed.

Pressing the key F3 while the test is running, the display is switched over to the **ZOOM** mode and is indicating the actual voltage and current measurement in zoomed letters.

The blinking value can be changed with the knob Inc/Dec. To select other values for change use the cursor keys.

3.4. Service

All service functions are indicated on the display.

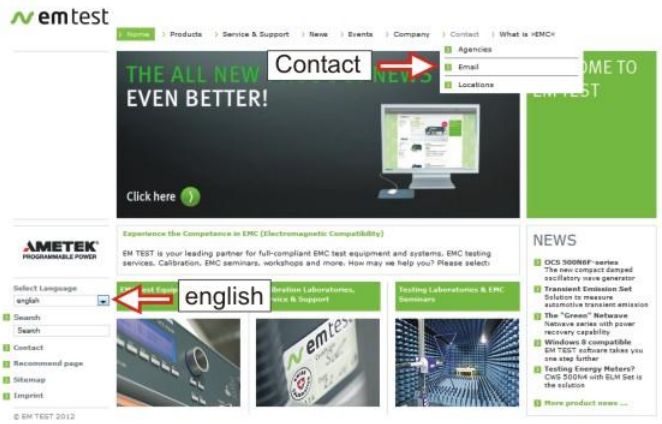
SERVICE
F1 : Addresses F2 : Selftest F3 : Setup

F1 F2 F3 F4 F5 F6 F7

Addresses

The addresses of the EM TEST (Switzerland) GmbH and the EM TEST GmbH in Germany are shown. The addresses of all EM TEST sales agencies are listed on the web site of EM Test under :

www.emtest.com



Selftest

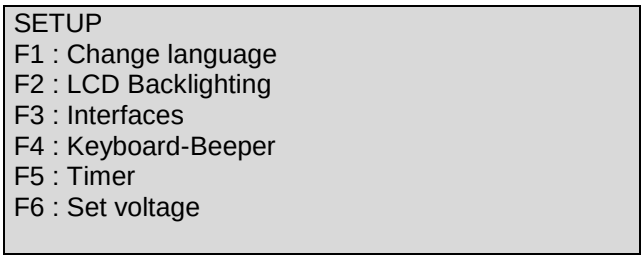
The operator can initialize a self test procedure to check the operation of the instrument. The software will clearly explain the selftest procedure.

Set-up

The operator can change the simulator setting as explained on the next chapter.

3.5. Setup

This menu helps the user to define the configuration of the VDS 200.



F1 Change language
The user can chose between two languages, German and English.

F2 LCD backlighting
With the use of F2 the backlighting can be switched ON or OFF. Additionally the AUTO-OFF function can be programmed to switch off the backlighting after a defined time when the equipment has not been in operation (1 - 30 min).

F3 Interfaces
This menu will help the user to define the status of the integrated serial and parallel interfaces, e.g. the baud rate of the RS 232 or the address of the IEEE interface.

F4 Keyboard beeper
F4 is the selector for the beeper On / Off mode.
The beeper is always on when a test routine is finished. To indicate that a running test is finished the beeper sounds 3 times.

F5 Timer
Pressing of F5 will show the total operating time of the test equipment.

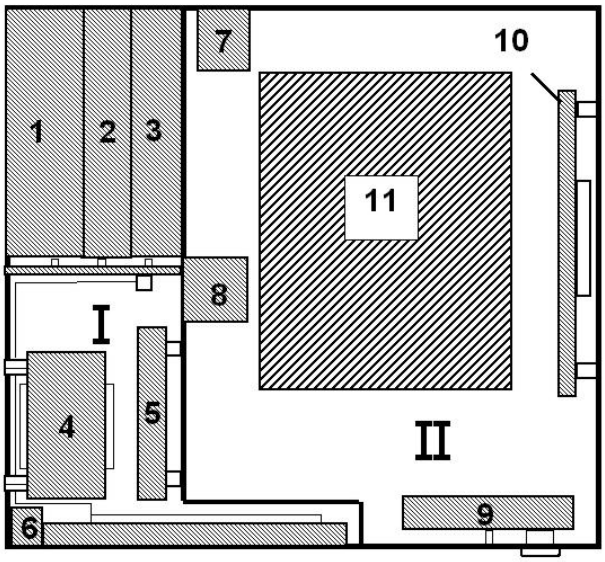
F6 Set voltage
Power On setting of the following parameters:

- F1: Vn Nominal supply voltage for the DUT. By selecting **Vn** in all voltage settings, the voltage in this Set voltage menu will be taken.
- F2: I Maximal current setting for the VDS 200 after power ON.

4. Test Equipment

4.1. Construction

The Voltage Drop Simulator VDS 200 is built in a 19" housing and is divided into two parts, the control unit and the power electronics. The 100A type is designed in a small rack on wheels.



I	Control unit	II	Power switches
1	Power supply	**7**	Power supply
2	Interface board	**8**	Current sensor
3	Processor board	**9**	Front-panel board
4	Transformer	**10**	Control for Amplifier
5	Filter board	**11**	Amplifier design depends on model
6	Keyboard / LCD display		

4.2. Control unit

The control unit is based on a microprocessor system and a driver board which includes a galvanic decoupling between the control unit and the power electronics. The firmware for controlling the system is stored in two EPROM's. The control unit is built up by 3 boards, the power supply, the micro-controller board and the interface board.

Power supply unit
The power supply unit supplies voltages of +/- 15V, + 5V, + 24V for all other modules of the simulator. The unit is fused on the back of the device in the power supply socket.

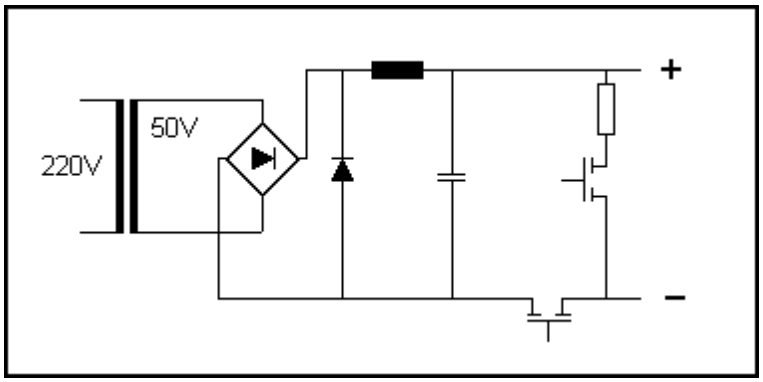
Micro-controller unit
This unit controls the entire functions of the power supply simulator and simultaneously organizes the data transfer via the serial RS 232 or parallel IEEE interface.
The desired test parameters are preselected via the function keys or the knob (incr./decr).

I / O Controller
All control parameters entered via the keyboard or the interfaces are interpreted by the I/O controller. In addition this print contains the control of the power electronics as well as the optical separation between control circuits and power electronic.

LED
Two LED's mounted on the front panel show if a channel is active or not. The LED of an active channel is lighted. During mode ΔV the LED display switches from one channel to the other.

4.3. Arbitrary Wave Simulator

The following diagram shows the principal layout of the amplifier. By controlling the semiconductor switches nearly any waveshape can be simulated.



The amplifier is used generally as a high power dc supply for feeding the equipment under test.

Additionally with the built in waveform generator arbitrary waveforms which are required in many standards can be generated, such as pulse 4 and pulse 2b of ISO, sine wave sweeps and so on.

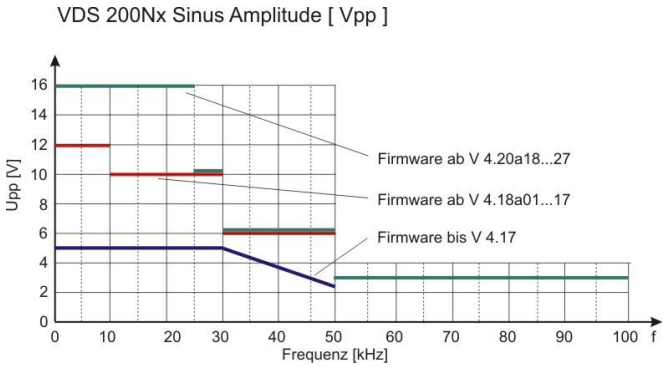
The unit can also be used as a high power amplifier up to 50kHz bandwidth, see the limitations. For this purpose the unit can be controlled by an external signal generator at the BNC input (0-10V). This input is located at the rear panel of the instrument.

Frequency behavior

Firmware from version 4.20a18...27 manufactured. 2007 or later
16Vpp up to 25kHz
10Vpp up to 30kHz
6Vpp up to 50kHz

Firmware version 4.18a01...17 and higher
12Vpp up to 10kHz
10Vpp up to 30kHz
6Vpp up to 50kHz

Firmware up to version 4.17
5Vpp up to 30kHz
>30kHz linear decrease to 3.5V at 50kHz (see diagram)



4.4. Fuses

The mains fuses of the VDS 200 generators up to 100A DUT current are located at the rear side of the unit. Depends of the fuse model you can replace it manually or with a screw driver tool.

Surface mount Fuse
Rating : 0.16A – 20A
Voltage : 250V ac
Dimension: 5mm x 20mm

Miniature Fuse
Rating : 0.5A – 32A
Voltage : 250V ac
Dimension: 6.3mm x 32mm
Breaking Capacity 200A – 10kA

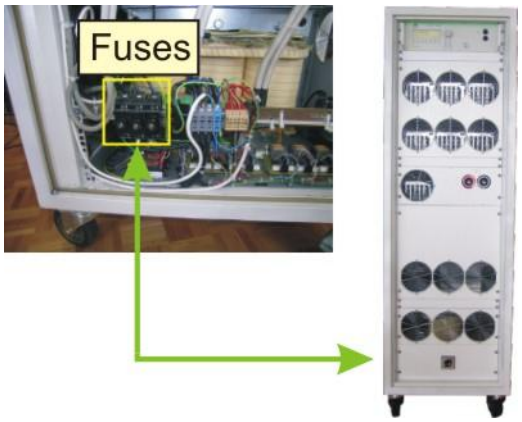
Miniature Fuse
Rating : 16A – 20A
Voltage : 400V ac
Dimension: 10.3mm x 38mm
Breaking Capacity : >100kA

Fuse NEOZED
Rating : 2 ..100A
Voltage: AC 400V / DC 250V
Dimension D02
Operating Class : gG

VDS 200 >100A

Larger VDS200 generators have the fuses at the left side. For access it is necessary to remove the coverage. The fuses are located at the lower part of the unit.

Fuse NEOZED
Rating : 2 ..100A
Voltage: AC 400V / DC 250V
Dimension D02
Operating Class : gG



4.5. Overvoltage protection

General

With the overvoltage protection the user can protect the output voltage in case of an unwanted overvoltage at the VDS200 output in case of wrong voltage setting or failure. The overvoltage protection is a hardware crow bar that will cut down the voltage output of the VDS 200 and shut down the output voltage.
The overvoltage protection is available at the following devices:

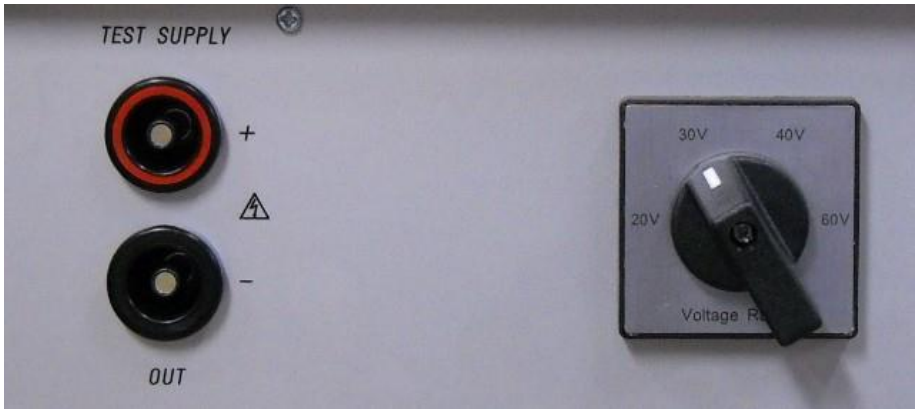
Device	Voltage setting
VDS200N100.4	Switch rear side
VDS 200N150 (option)	Jumper internal
VDS 200N200 (option)	Jumper internal

4.5.1. Protection voltage level setting

VDS 200N100.4

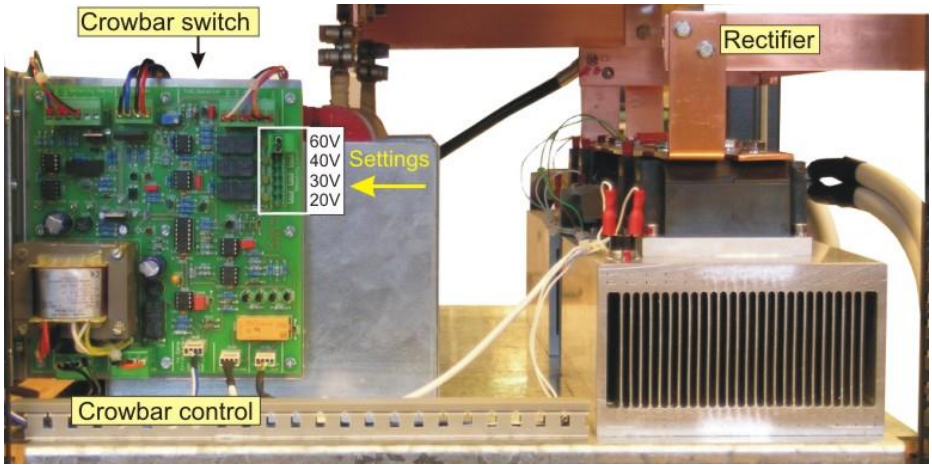
The overvoltage protection selector switch is located at the rear side of the VDS 200N100.4

The figure shows the switch position set to 30V protection level.



VDS 200N150 / VDS 200N200

To set the optional overvoltage protection, the user must open the frame and set jumper switch for the protection level.
The figure shows the position for jumper setting



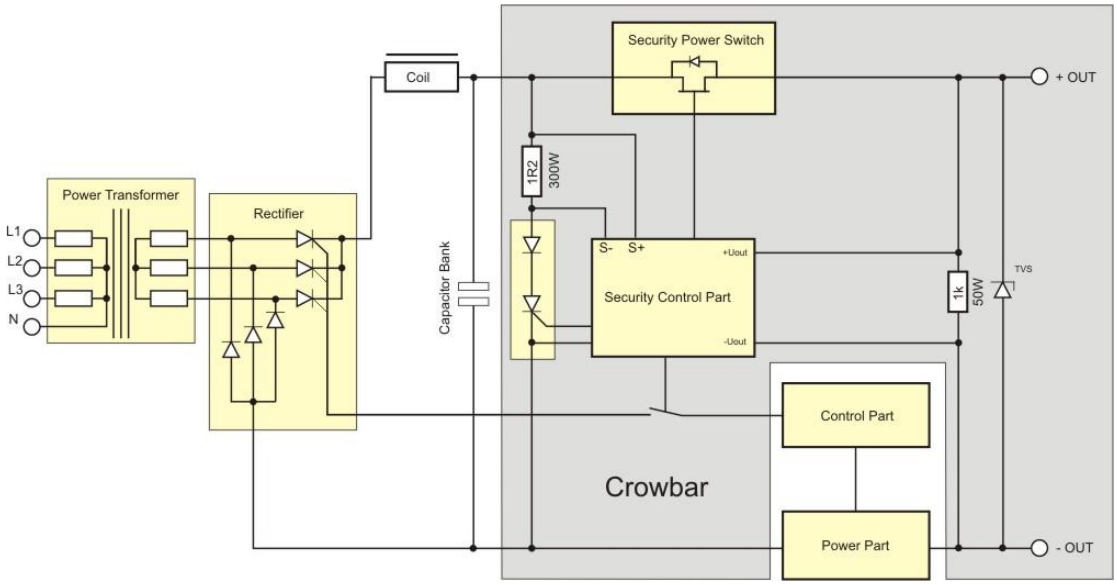
4.5.2. Function

The overvoltage protection consists of two parts:

Crowbar switch with the hardware.
A TVS diode will limit the max. overvoltage in the first µs till the security power switch will disconnect the DUT from the dc source. A crowbar switch will discharge the energy storage capacitor bank via a 1.2Ω resistor to zero.

Controller
An analogue controller controls the overvoltage protection independent.

Blockdiagram



General overview of the overvoltage protection

4.5.3. Protection levels

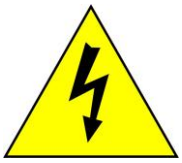
The overvoltage protection is manually selectable to the following protection levels

Level	Switch off level ± 5%	Max. overvoltage	Max. time [us] > level	Remark
60V	63V	95V	75us	Factory setting
40V	42V	75V	25us	
30V	31.5V	68V	25us	
20V	21V	55V	25us	

The factory setting is 60V if the user did not order another protection level.

4.5.4. Level settings by the user

The protection level factory setting is 60V. For change the protection level the user must proceed the following steps:



DANGER

The protection level setting must be done from people who are trained to work with electrical devices.

DO not touch the heat sink or electrical parts inside the VDS200. These elements can be under voltage during operation and even when the device is switched off (up up to 95Vdc).

1. Switch off the VDS200N; disconnect the main power supply over the night.
2. Open the rear side of the VDS200. The protection device is located in the lower part of the VDS
3. Power ON the VDS200N with no load and press Test ON button
4. Press button Test fail release on the crowbar control board. This will trip the overvoltage protection.
5. Switch OFF the VDS200
6. Change the bridge for level setting to the desired voltage level
7. Switch power on and check if the protection level is correct indicated with the LED
8. Increase manually the voltage for check the overvoltage is tripping.
9. Switch power off and close the Rack

Warning

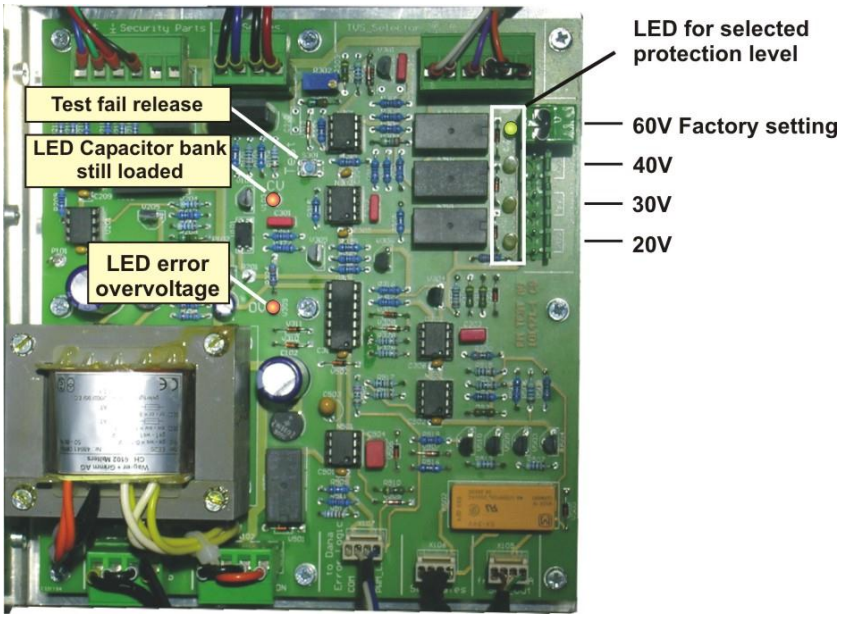
After switch OFF the VDS200N **do not touch any electric conducted parts** as long the two **LED on the printed circuit board are illuminated** (some few seconds).

Indication on the control board.

Test fail release button pressed will trip the overvoltage protection immediately.

LED Capacitor bank still loaded appears al long the capacitor voltage is higher than 2-5V after fail

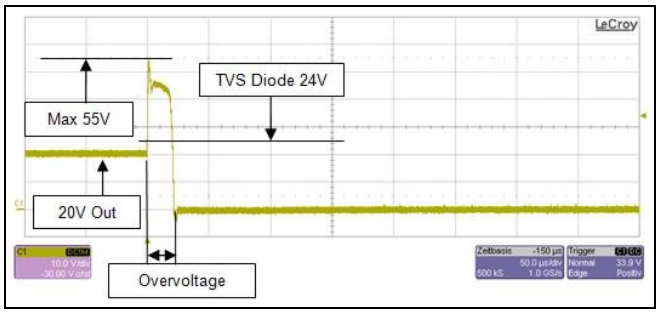
LED error overvoltage shows the overvoltage protection was activated. Switch off the VDS200. The same message appears on the LCD display if the VDS200. For release switch OFF / ON the VDS200N



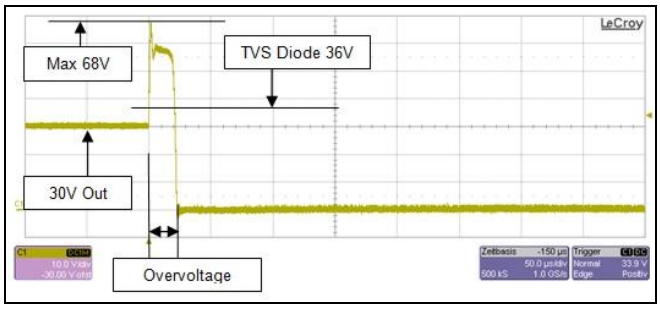
Control board for Crowbar protection

4.5.5. Typical protection behavior

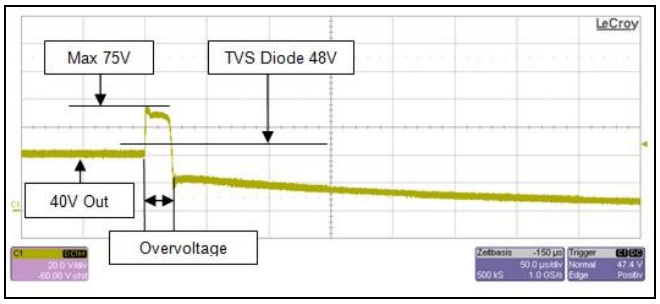
The following pictures show the typical behavior of the crowbar protection in case of an overvoltage.



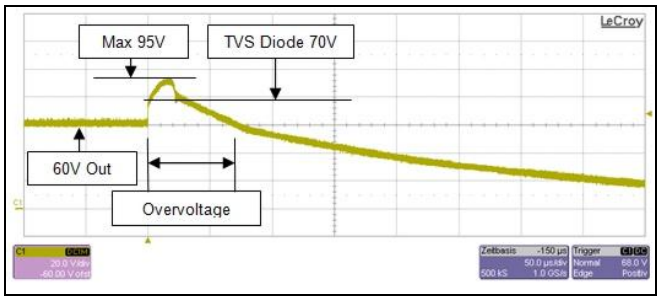
Protection level 20V



Protection level 30V



Protection level 40V



Protection level 60V

5. Technical Data

5.1. Test level

Voltage for VDS 200NXB		U = 0V - 60V ± 10%	with 0.1V steps setting
Output resolution		internal ADC 8 Bit : approx. 0.24V at range 0…60V	
Current	VDS 200N10	I = 0A – 10A ± 10%	
	VDS 200N15	I = 0A – 15A ± 10%	15A inrush
	VDS 200N30	I = 0A – 30A ± 10%	(70A 500ms)
	VDS 200N50	I = 0A – 50A ± 10%	(100A 500ms)
	VDS 200N100	I = 0A – 100A ± 10%	(150A 500ms)
	VDS 200N100.2	I = 0A – 100A ± 10%	(200A 200ms; 300A 100ms; 500A 10ms)
	VDS 200N100.3	I = 0A – 100A ± 10%	(150A 200ms) U = 0-30V
	VDS 200N100.4	I = 0A – 100A ± 10%	(150A 500ms) with overvoltage protection
	VDS 200N100.6	I = 0A – 100A ± 10%	(200A 200ms; 300A 100ms; 500A 10ms)
	VDS 200N150	I = 0A – 150A ± 10%	
	VDS 200N150.1	I = 0A – 150A ± 10%	(500A 200ms)
	VDS 200N200	I = 0A – 200A ± 10%	
	VDS 200N200.4	I = 0A – 200A ± 10%	(1000A 500ms) U = 0-30V
Pulses		as per test routines	
Source impedance		Zi = < 10mΩ	Zi = Ri dc ... 400Hz
Recovery time t_{rec}		t_{rec} = < 100µs	63% of max. excursion
Current limiter I_{limit}		I_{limit} = 0...Imax	with 1A steps
Voltage ripple U_r		U_r = < 0.2V peak to peak	

5.2. Trigger

Automatic	Auto release with preselected parameters
Manual	Manual release of a single event
Extern	External release by external trigger
Repetition rate	10ms - 99s
Drop out duration td	10µs to 9900ms
Dip duration	100s to 9900ms

5.3. Input/output

Test supply + / - output	Safety laboratory connectors at front panel High current connectors at rear panel
AUX IN	Safety laboratory connectors at rear panel
Analogue input	0 - 10V / 10kΩ / DC - 50kHz for I<30A max 30kHz can be achieved
External trigger input	5 - 15V TTL signal (BNC connector)
CRO trigger output	5V TTL signal (BNC connector)

5.4. Interfaces

Serial interface USB	Baudrate : Setting ; 1,200 to 19,200 Baud
Parallel interface	IEEE ; addresses 1 - 30

5.5. General

Dimensions	Device	HU Unit	Dimension H x W x D	Weight
	VDS 200N10,	6HU	28 x 45 x 40 cm	49 kg
	VDS 200N15,	6HU	28 x 45 x 40 cm	49 kg
	VDS 200N30	9HU	42 x 45 x 40 cm	69 kg
	VDS 200N50	12HU	55 x 45 x 50 cm	114 kg
	VDS 200N100	Minirack 15HU	85 x 55 x 60 cm	178 kg
	VDS 200N100.2	Minirack 25HU	120 x 55 x 60 cm	app 190 kg
	VDS 200N100.3	Minirack 15HU	85 x 55 x 60 cm	148 kg
	VDS 200N100.4	Minirack 20HU	107 x 55 x 60 cm	186 kg
	VDS 200N100.6	Rack 32HU	183 x 55 x 80 cm	301 kg
	VDS 200N150	Rack 35HU	195 x 60 x 80 cm	400 kg
	VDS 200N200	Rack 34HU	190 x 60 x 80 cm	450 kg
	VDS 200N200.1	Rack 34HU	196 x 60 x 80 cm	450 kg
	VDS 200N30.1	Minirack 12HU	55 x 45 x 50 cm	65 kg
	VDS 200N50.1	Minirack 20HU	112 x 55 x 60 cm	120 kg
	VDS 200N50.1 208V	Minirack 20HU	112 x 55 x 80 cm	175 kg
	VDS 200N200.3	Rack 25HU	129 x 55 x 80 cm	245 kg
	VDS 200N200.4	Rack 34HU	196 x 60 x 80 cm	425 kg

Power supply as ordered	Depends on model	
	Single phase supply :	115V / 208V / 230V 50/60Hz
	3 phase supply :	3x208V, 3x400V, 3x480V 50/60Hz
Fuses internal in VDS	All fuses slow blow type	

Modell / Line supply		100/115V	208V	230V	3x208V	3x400V	3x480V
VDS 200N10	60V 10A	**2x 16A**	2x 16A	**2x 16A**	-	-	-
VDS 200N15	60V 15A	**2x 16A**	2x 16A	**2x 16A**	-	-	-
VDS 200N30	60V 30A		**2x 16A**	**2x 16A**	-	-	-
VDS 200N50	60V 50A				**3x 16A**	**3x 16A**	
VDS 200N50.1	60V 50A				3x 16A		
VDS 200N100	60V 100A				**3 x 50A**	**3x 32A**	
VDS 200N100.2	40V 100A					3x 32A	
VDS 200N100.3	30V 100A			1x16A		3x 25A	
VDS 200N100.4	60V 100A					3x 32A	
VDS 200N100.6	70V1200A					3x 25A	
VDS 200N150	60V 150A					3x 32A	3x 25A
VDS 200N200	60V 200A					**3x 35A**	3x 32A
VDS 200N200.1	60V 200A					**3x 63A**	3x 63A
VDS 200N30.1	60V 30A				3x 16A	3x 16A	
VDS 200N50.1	60V 50A				3x 20A	3x 20A	
VDS 200N200.3	32V 200A					3x 63A	
VDS 200N200.4	30V 200A					3x 63A	

5.6. Test routines

Arbitrary Wave Generator

Standards	ISO 7637 F1: Pulse 4 F2: Pulse 2b ISO 16750-2 WD 03/2000-2 F1: Short voltage drop F2: Slow decrease / increase F3: Supply voltage profile F4: Pulse 'Starting profile' F5: Sweep F6: Overvoltage Vmax JASO F1: Jaso
Functions	F1 : Sinus F2 : Jumpstart F3 : VDS Extern F4 : Pulse 4 (GM 9105P)
DC Power Supply	Using as a dc power supply
Service	Addresses EM TEST AG Selftest set-up routines

5.7. Measurement

BNC connector CRO TRIGGER	trigger for oscilloscope positive ramp to +15V

5.8. Environmental conditions

Temperature	10 °C to 35 °C
Humidity	30 % to 70 %; non condensing
Atmospheric pressure	86 kPa (860 mbar) to 106 kPa (1,060 mbar)
Noise (VDS 200N200)	70 dB, Front side 1m distance in front of the ventilator at full load
Thermal dissipation loss	Max. 5 kW at full load

5.9. Special models

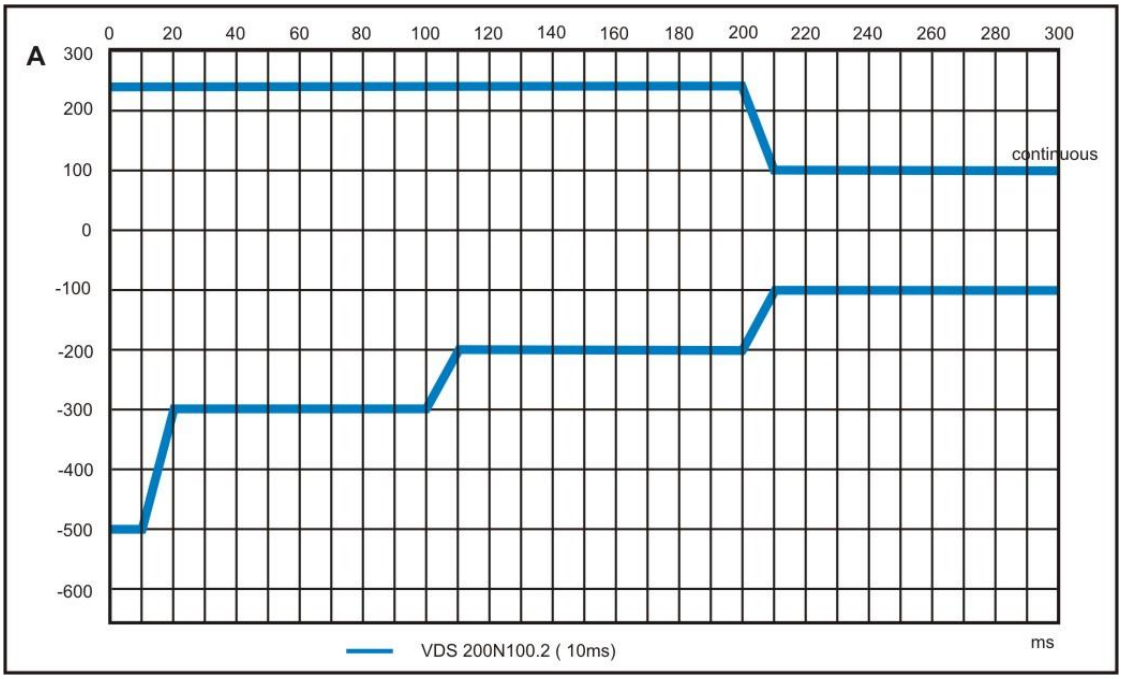
Special models have the index VDS200N nn.**X** . The difference to the standard models are the voltage and current ranges. The maximum overcurrent trips at the rated current. (see Chapter 1)

=> Not relevant data for the standards can be changed by the manufacturer <=

5.10. Technical data VDS 200N100.2

The VDS 200N100.2 has additional the following technical specifications:

Output voltage	U = -5 V - 40 V ± 10 %	Settings in 0.1V steps
Output resolution	internal ADC 8 Bit : approx. 0.24V at range 0…60V	
Current VDS 200N100.2	I = 0A – 100A ± 10%	(240A 200ms; 300A 100ms; 500A 10ms)
Voltage modulation	30kHz Modulation 12Vpp 50kHz Modulation 10Vpp	
Sink operating at DUT +32V	500A : 10ms 300A : 100ms 240A : 200ms 100A :continuous	
Power lost at 23± 5°C	P = (DUT-Voltage + countervoltage-Charge-C) x I 500A : (14V + 15V) x 500A = 29V x 500A = 14‘500W; 10ms 300A : (14V + 15V) x 300A = 29V x 300A = 8‘700W; 100ms 240A : (14V + 15V) x 240A = 29V x 240A = 6‘960W; 200ms 100A : (14V + 15V) x 100A = 29V x 100A = 2‘900W; continuous	
Pulses	as per test routines	
Risetime DC coupled	< 10µs (10% - 90%)	
Frequency range	DC .. 100kHz	
Source impedance	Zi = < 10mΩ	Zi = Ri dc ... 400Hz
Recovery time t_{rec}	t_{rec} = < 100µs	63% of max. excursion
Current limiter I_{limit}	I_{limit} = 0...Imax	with 1A steps
Voltage ripple U_r	U_r = < 0.2V peak to peak	



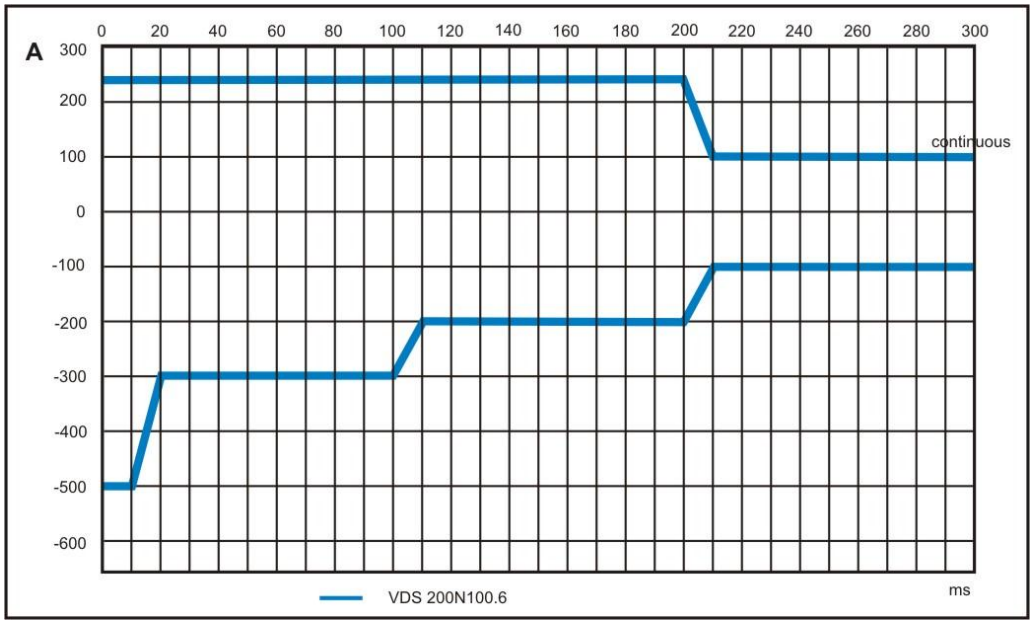
Dynamic current limitter VDS200N100.2

- The different ranges of the sink operatings are working with integrators. At max values the currenntwil be limited to 100A. If the max. integrated power is reached, the controller reduces to the nominal current of 100A
- If the current specs are exceed, the VDS 200N100.2(10ms) controlls back to the setted voltage.
- At overtemperature the device will switch off the output voltage.

5.11. Technical data VDS 200N100.6

The VDS 200N100.6 is a bipolar DC source with the following technical data:

Output voltage		U = -5 V to + 70 V ± 10 % Settings in 0.1V Steps
Output resolution		internal ADC 8 Bit : approx. 0.24V at range 0…60V
Current	VDS 200N100.6	I = 0A – 100A ± 10%
Voltage modulation		30kHz Modulation 12Vpp 50kHz Modulation 10Vpp
Sink operation		At DUT + 15V at DUT +48V 500A; 10ms 230A; 10ms 300A; 100ms 138A; 100ms 200A; 200ms 92A; 300ms 100A; continuous 46A: continuous
Power lost at 23± 5°C		P = (DUT-Voltage + countervoltage-Charge-C) x I 500A : (14V + 15V) x 500A = 29V x 500A = 14‘500W; 10ms 230A : (48V + 15V) x 230A = 63V x 230A = 14‘500W; 10ms 230A : (14V + 15V) x 300A = 29V x 230A = 8‘700W; 100ms 138A : (48V + 15V) x 138A = 63V x 138A = 8‘700W; 100ms 200A : (14V + 15V) x 200A = 29V x 200A = 5‘800W; 200ms 92A : (48V + 15V) x 928A = 63V x 92A = 5‘800W; 200ms 100A : (14V + 15V) x 100A = 29V x 100A = 2‘900W; continuous 46A : (14V + 15V) x 46A = 63V x 46A = 2‘900W; continuous
Risetime DC coupled		< 10µs (10% - 90%)
Frequency range		DC .. 100kHz
Cooling		Air cooling 3-stages
Mains Supply		3 x 400V 32A/phase
Weight		Approx. 230kG



Dynamic current limitter VDS200N100.6

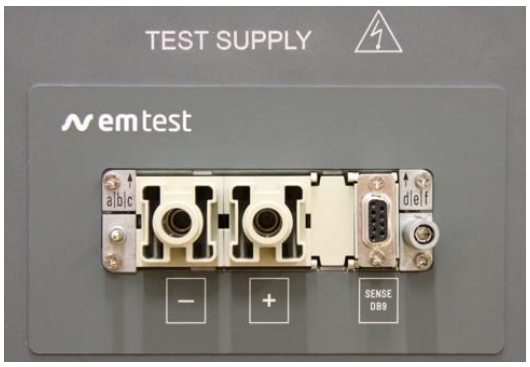
- The different ranges of the sink operatings are working with integrators. At max values the currenntwil be limited to 100A. If the max. integrated power is reached, the controller reduces to the nominal current of 100A
- If the current specs are exceed, the VDS 200N100.6(10ms) controlls back to the setted voltage.
- At overtemperature the device will switch off the output voltage.

5.11.1. DUT voltage limitation on DC output

The DB9 interface at the test supply output offers a limitation of the DC output voltage. The limitation is controlled by an external resistor connected to pin 7-8.

Pin DB9 Interface

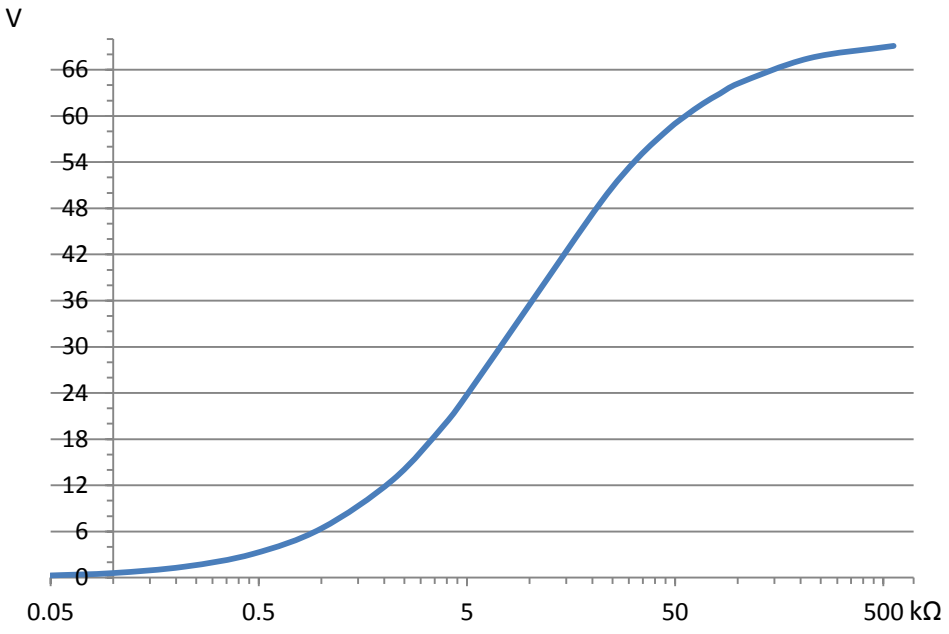
PIN	Function
1	Sense +
2	nc
3	nc
4	nc
5	Sense –
6	nc
7	Resistor for outputlimitation
8	Resistor for outputlimitation
9	nc



DC output with DB9 interface

Measuring Result DC Output limitation

Resistor (kΩ)	Output voltage (V)
0.05	0.29
0.10	0.6
0.22	1.43
0.47	3.1
1	6.4
2.2	12.7
3.9	19.9
5.1	24.1
10	35.5
22	48.8
33	54.5
47	58.4
56	60.0
68	61.6
82	62.9
100	64.2
220	67.5
560	69.1



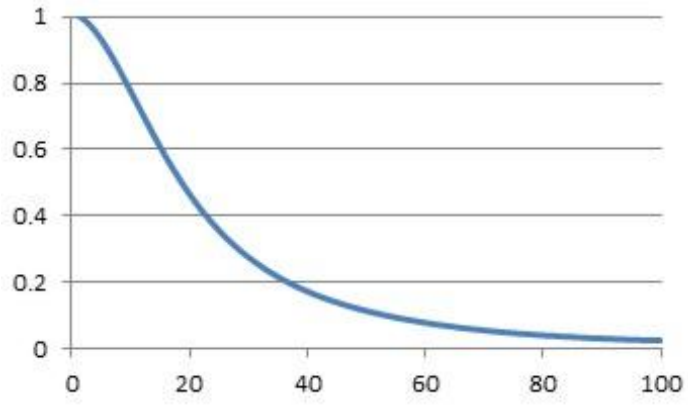
5.11.2. Voltage attenuation at sine ripple frequencies

Using an individual amplitude control with sine ripple, the user must compensate the attenuation of the amplifier frequency bandwidth. The table below shows the attenuator factor for frequencies range 1kHz to 100kHz.

The ripple voltage must respect the voltage limitation (see chapter 4.7)

Correction table for sine ripple 1kHz to100kHz

Frequency [kHz]	Attenuation	Frequency [kHz]	Attenuation	Frequency [kHz]	Attenuation	Frequency [kHz]	Attenuation
1	1.0044	26	0.3379	51	0.1099	76	0.0461
2	0.9924	27	0.3208	52	0.1059	77	0.0447
3	0.9759	28	0.3049	53	0.1017	78	0.0436
4	0.9554	29	0.2897	54	0.098	79	0.0422
5	0.9308	30	0.2756	55	0.0944	80	0.0409
6	0.9033	31	0.2624	56	0.091	81	0.0397
7	0.8737	32	0.2499	57	0.0876	82	0.0387
8	0.8420	33	0.2380	58	0.0846	83	0.0376
9	0.8087	34	0.2271	59	0.0816	84	0.0365
10	0.7748	35	0.2166	60	0.0785	85	0.0356
11	0.7409	36	0.2067	61	0.0757	86	0.0347
12	0.7067	37	0.1974	62	0.073	87	0.0337
13	0.6727	38	0.1888	63	0.0707	88	0.0328
14	0.6398	39	0.1806	64	0.0684	89	0.032
15	0.6076	40	0.1728	65	0.066	90	0.0313
16	0.5766	41	0.1654	66	0.0636	91	0.0304
17	0.5466	42	0.1583	67	0.0615	92	0.0295
18	0.5181	43	0.1519	68	0.0595	93	0.0289
19	0.4911	44	0.1456	69	0.0576	94	0.0282
20	0.4652	45	0.1397	70	0.0558	95	0.0275
21	0.4409	46	0.1340	71	0.054	96	0.027
22	0.4177	47	0.1287	72	0.0522	97	0.0264
23	0.3959	48	0.1237	73	0.0505	98	0.0259
24	0.3754	49	0.1189	74	0.0491	99	0.0255
25	0.3562	50	0.1142	75	0.0474	100	0.0249



Attenuation curve according the correction table

The amplitude at sine ripple is compensated in manual operation by the VDS 200N firmware.

6. Maintenance

6.1. General

The generator is absolutely maintenance-free by using a solid state semiconductor switch to generate the fast transients.

6.2. Test set-up

When setting up the test national and international regulations regarding human safety have to be guaranteed.

The test setup must be conform to the national and international regulations.

It is recommended to connect the simulator to the ground reference plane of the test set-up.

The generators of the series 200, UCS, LD, PFS, VDS and AutoWave, can be linked together to a fully automotive test set-up.

The set-up communicates via the IEEE/GPIB bus and is controlled by ISM ISO software. For setting up the system see the following figures:

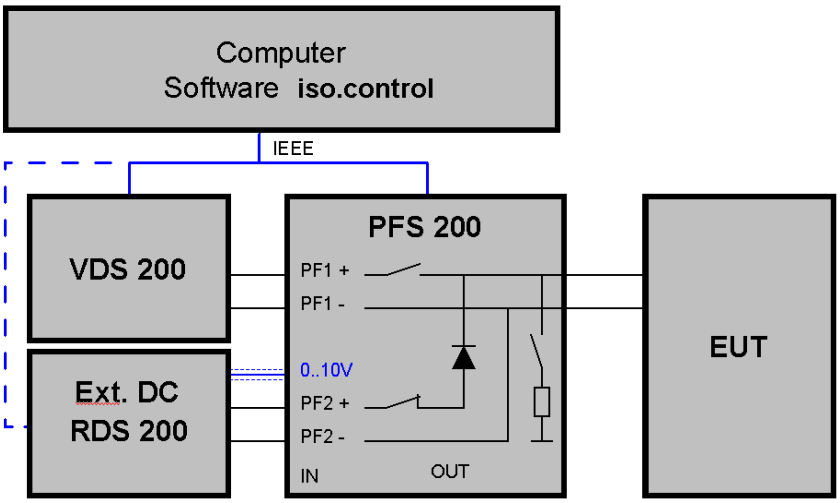
Each generator can be operated individual as a single equipment.

6.3. Test set-up with software iso.control

ATTENTION	**Working with iso.control please connect VDS 200B to the PF1 input of PFS 200B**

By using iso.control software :

- Connect VDS with PF1 input.
- Connect the external dc source (controlled from PFS 200) on input PF2. Connect the analogue output from PFS 200 to the external dc source.
- As external dc source we propose a VDS 200, RDS 200 or an other dc source with an analogue dc input for control.

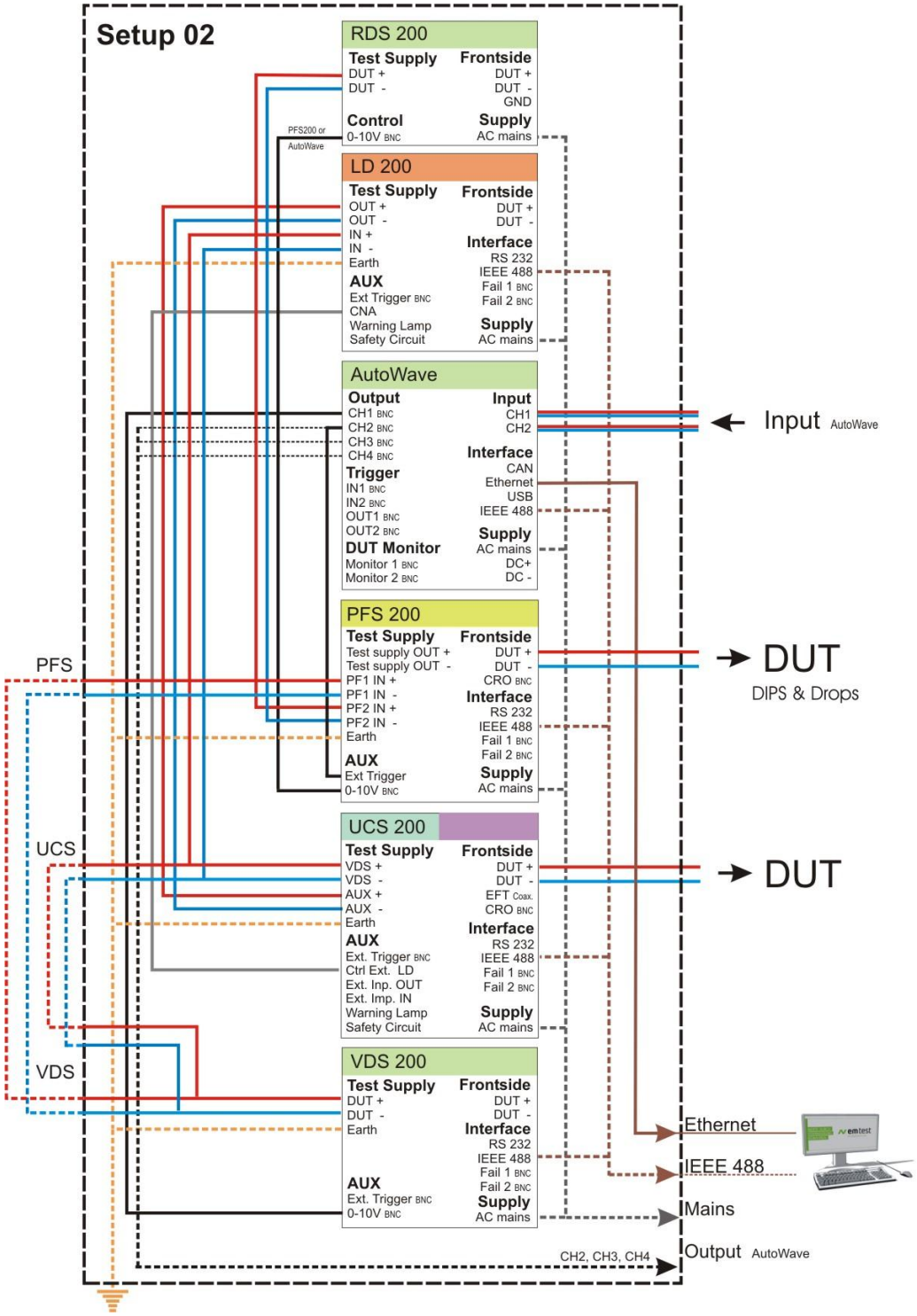


With this set-up all DIPS and DROP out tests are performed automatically with iso.control software.

6.4. Examples Test setup

Setup example with:

AutoWave
UCS 200N
VDS 200Nx
LD200N
PFS 200N
RDS 200N

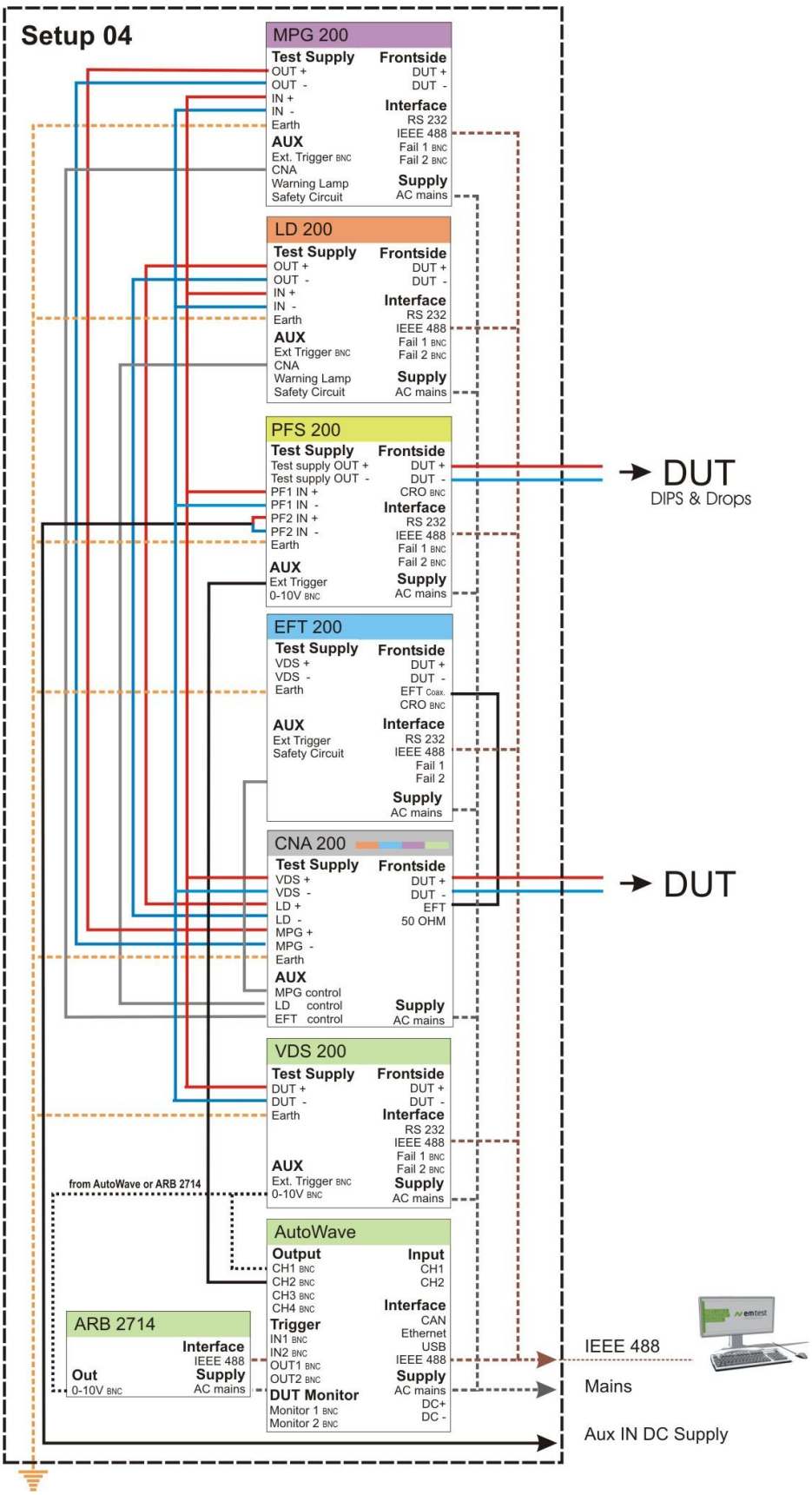


Note : Do never connect The PFS200N output 0-10V in parallel with any Autowave output. In this case the controlled DC source will deliver a wrong output signal. It is not allowed to connect two output sources in parallel.

Setup example with:

AutoWave (former ARB2714)

MPG 200
VDS 200Nx
LD 200
EFT 200
CNA 200



Note : Do never connect The PFS200N output 0-10V in parallel with any Autowave output. In this case the controlled DC source will deliver a wrong output signal. It is not allowed to connect two output sources in parallel.

6.5. Calibration and Verification

6.5.1. Factory calibration

Every EM TEST generator is entirely checked and calibrated as per international standard regulations before delivery. A calibration certificate is issued and delivered along with a list of the equipment used for the calibration proving the traceability of the measuring equipment. All auxiliary equipment and accessories are checked to our internal manufacturer guidelines.

The calibration certificate and the certificate of compliance (if available) show the date of calibration.

The EM Test equipment are calibrated in the factory and marked with a calibration mark. The used measuring instruments are traceable to the Swiss Federal Office of Metrology.
The calibration date is marked. The validity of the calibration is to the responsibility of the user's quality system. Neither the certificate of calibration nor the corresponding label mark any due date for re-calibration.

Example: Calibration mark

6.5.2. Guideline to determine the calibration period of EM Test instrumentation

Our International Service Departments and our QA Manager are frequently asked about the calibration interval of EM TEST equipment.

EM TEST doesn't know each customer's Quality Assurance Policy nor do we know how often the equipment is used and what kind of tests are performed during the life cycle of a test equipment. Only the customer knows all the details and therefore the customer needs to specify the calibration interval for his test equipment.

In reply to all these questions we like to approach this issue as follows :
EM TEST make use of a solid state semiconductor switch technique to generate high voltage transients. A precious advantage of this technique is the absolute lack of periodical maintenance effort. In consequence thereof a useful calibration period has to be defined based on two criteria :

- The first one is the customer's Quality Assurance Policy. Any existent internal regulation has to be applied at highest priority. In the absence of such internal regulation the utilization rate of the test equipment has to be taken into consideration.

- Based on the experience and observation collected over the years **EM TEST recommend a calibration interval of 1 year** for frequently used equipment. A 2-years calibration interval is considered sufficient for rarely used test generators in order to assure proper performance and compliance to the standard specifications.

6.5.3. Calibration of Accessories made by passive components only:

Passive components do not change their technical specification during storage. Consequently the measured values and the plots stay valid throughout the storage time. The date of shipment shall be considered as the date of calibration.

6.5.4. Periodically In-house verification

Please refer to the corresponding standard before carrying out a calibration or verification. The standard describes the procedure, the tolerances and the necessary auxiliary means. Suitable calibration adapters are needed. To compare the verification results, EM Test suggests to refer to the waveshape and values of the original calibration certificate.

All calibrations and verifications are always done without mains supply voltage connected to the coupling network input.

7. Delivery Groups

7.1. Basic equipment

- Simulator VDS 200...
- Power supply cable
- Set of safety laboratory cables
- Manual on memory stick
- Safety manual

Identical accessory parts are delivered only once if several devices are orders. The delivered packing list is in each case valid for the delivery.

7.2. Accessories and options

- **User software „iso.control“**
  - Test, analysis and documentation with windows (see separate documentation)
  - License version for testing according the most automotive standards
  - Report generator with export function to wordprocessor program.

- **AutoWave**
  - Arbitrary generator 16bit resolution 0...10V for external VDS control.
  - The AutoWave replaces the 8bit resolution of the internal VDS 200N controller.
  - AutoWave.control software for individual control of the AutoWave

8. Appendix

8.1. Declaration of CE-Conformity

Manufacturer :	**EM TEST Switzerland GmbH**
Address:	Sternenhofstr. 15 CH 4153 Reinach Switzerland

declares, that under is sole responsibility, the product's listed below, including all their options, are conformity with the applicable CE directives listed below using the relevant section of the following EC standards and other normative documents.

Product's name:	Voltage Drop Generator
Model Number(s)	VDS200N10, VDS200N15, VDS200N30, VDS 200N50, VDS 200N100, VDS 200N100.2, VDS 200N100.3, VDS 200N100.4, VDS 200N100.6 VDS200N150, VDS200N200, VDS 200N200.1, VDS 200N200.3, VDS 200N200.4 VDS 200N30.1, VDS200N50.1 RDS 200N

Low Voltage Directive 2014/35/EU

Standard to which conformity is declared:

EN 61010-1 : 2011	Safety requirements for electrical equipment for measurement, control, and laboratory use.

EMC Directive 2014/30/EU

Standard(s) to which conformity is declared:

EN 61326-1 : 2012	Electrical equipment for measurement, control and laboratory use Class A
EN 61000-3-2 : 2014	Limits for harmonic current emissions
EN 61000-3-3 : 2013	Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems.

	European representative	Manufacturer
	AMETEK CTS Germany GmbH	EM TEST (Switzerland) GmbH
	Lünenerstr. 211	Sternenhofstr. 15
	D 59174 Kamen	CH 4153 Reinach
	Tel: +49 (0) 2307 / 26070-0	Tel: +41 61-7179191
	Fax: +49 (0)2307 / 17050	Fax: +41 61-7179199
By	N. Holub General manager	A. Burger Design and Research
Place	Kamen, Germany	Reinach BL , Switzerland
Date	25. February 2016	25. February 2016

8.2. RDS 200N

The RDS 200N in combination with the AutoWave as an arbitrary generator can be used to test according to Ford ES-XW7T, test procedure CI 230, simultaneously onto a max 4 channel DUT. The RDS 200N includes a sink and can therefore also be used to generate arbitrary waves as required in different standards. It is also used as an external power supply needed for voltage dip testing.
The RDS 200N can only be used in combination with other generators of the series 200 or with an external signal source.

8.2.1. Frontside RDS 200N

1 Display
2 Voltage / Current LED
3 OV LED overvoltage (analog input)
4 OT LED overtemperature
5 EUT Test supply output

1 Display
Display of the output voltage and current

2 Voltage / Current LED
The color of the LED displays the following status
green Voltage control
red Current limiter is active, the output voltage is reduced.

3 LED OV (overvoltage)
The LED indicates an overvoltage of the analog input (0-10V DC)

4 LED OT (overtemperature)
The LED indicates an overtemperature of the device. The output voltage will be switched off.

5 EUT test supply
The EUT is powered via the safety laboratory plugs at the front panel of the simulator.
The maximum current at this output should not be greater than 16A.

6 GND connector
Ground connector for connect the reference earth.

8.2.2. Rearside RDS 200

1 Analogue input 0 - 10V
2 Test Supply output rearside
3 Connector
4 Power On switch with fuse

1 Analogue input 0-10V
The internal amplifier can be controlled by an external signal generator.
The input signal range is 0-10V in the frequency range of 0-5kHz.
The output power (EUT test supply) than would result in 0-16V.

2 Test supply output
At this output the generator can be loaded with the maximum current of 10A. This output is also used for the internal wiring in a complete rack system installation.

3 Connector
This connector must be in this position and should not be changed .

4 Power On switch
230V or 115V system: The Power On switch includes also the power mains fuses (2 x 4A T) and filter unit.

8.2.3. Technical data RDS 200N

Output

Voltage for RDS 200	U = 0.0V - 16V ± 10%
Current	I = 0.0A – 10A ± 10%

Input/output

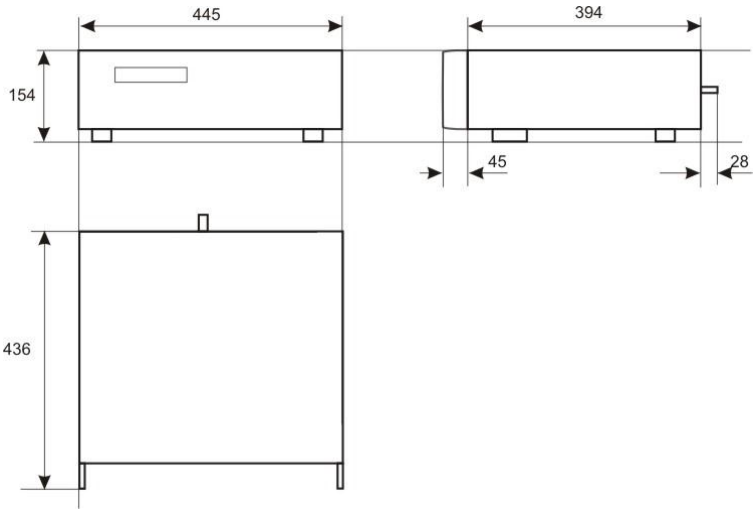
Test supply + / - output	Safety laboratory plugs at front and rear panel
Analog control input	0.0 - 10V / 10kΩ / DC - 5kHz 3dB
Bandwidth	Up to 5kHz with 8Vpp
Sense	Plug on the rear side
Ripple	Max. 0.85V rms

Interface

Remote control	To connect external arbitrary generators or analog out of PFS 200N

General data

Dimensions 19“ / 3HU, 448 x 154 x 394mm

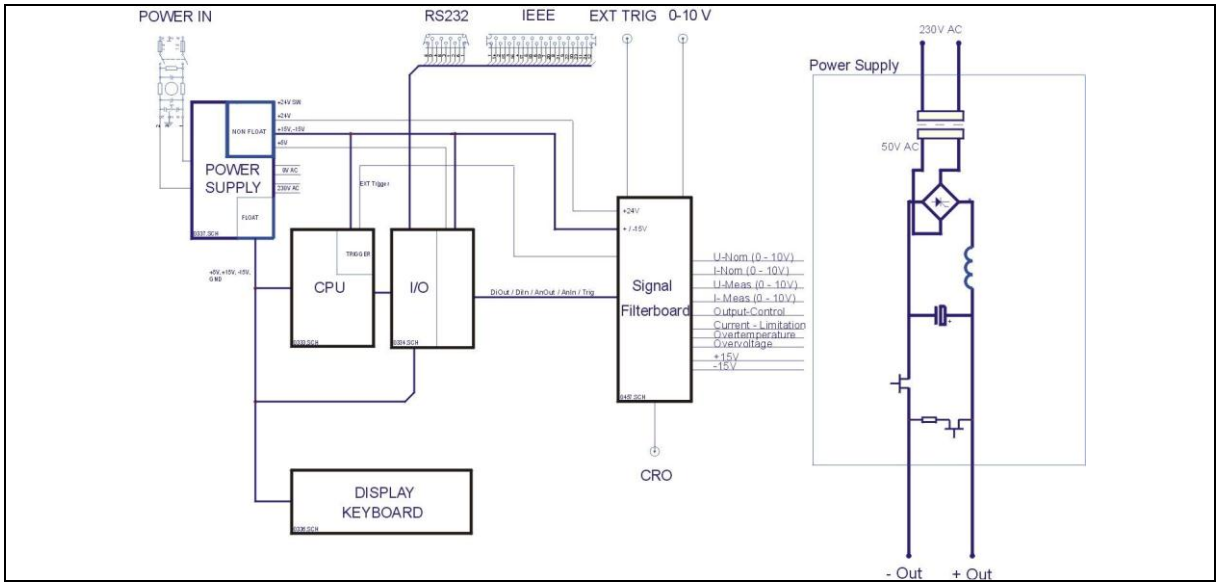


Weight	12.3kg
Supply voltage	115 or 230V +10/-15%
Fuses	T4A 5 x 20mm

8.2.4. Application

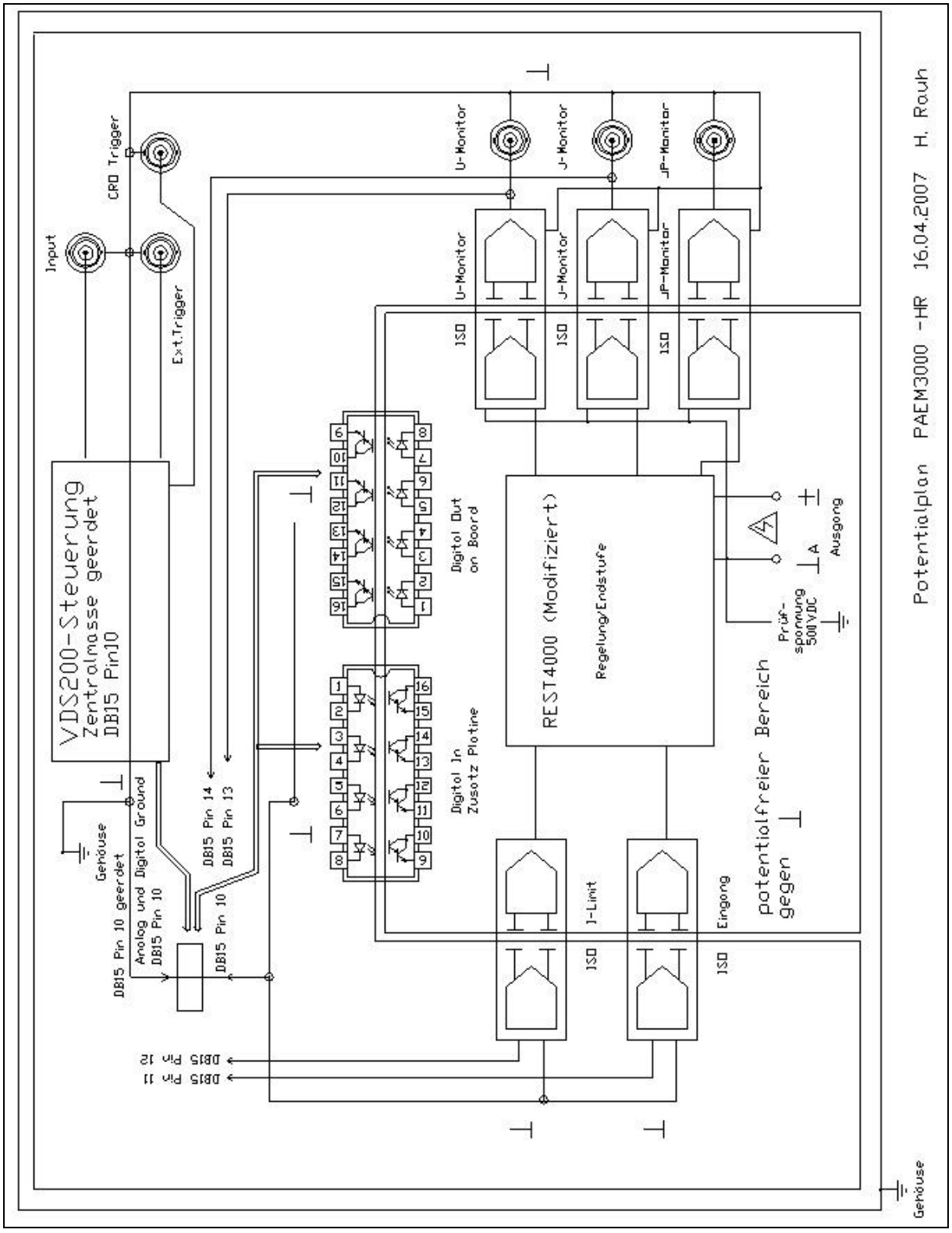
1. DC source	For voltage dip testing as per Chrysler PF 9326 Ford ES-XW7T for CI 260
2. Arbitrary wave	For power cycling as per Ford EMC-CS-2009 Ford ES-XW7T for CI 230

8.3. VDS 200N Blockdiagram



8.4. Bipolar VDS 200N Potential diagram

VDS200N30.1
VDS200N50.1
VDS200N100.1



8.5. Connectors

For additional connectors please download the catalogue from Multi Contact : www.multi-contact.com

- **100A Plugs and connectors from Multi Contact**

Safety sockets KBT6AR-N/...-S with snap-in lock and crimp connection

Model KBT6AR-N/...-S safety sockets are sockets with locking devices and for crimping onto highly flexible Cu conductor with cross-sections of 10mm2, 16mm2 or 25mm2.
This safety socket is suitable for mating with either safety flush-mounting plugs or plugs model KST6AR-N. Used together with a flush-mounting plug it acts as an appliance connector and with plugs as a coupler.

Safety branch adapter AZB6AR-N-S/6-4

Safety branch adapter with snap-in lock and ergonomic PA/TPE insulation that grips well. Mating plugs with suitable locking devices can be snap-locked into the socket. With one pick-off socket Ø 6mm and two safety sockets Ø 4mm for voltage tests up to 600V, CATIII.

Safety flush-mounting plugs ID/S6AR-N-B4S with snap-in lock and threaded stud

Model ID/S6AR-N-B4S safety flush-mounting plugs are insulated plugs designed for flush mounting in housings and panels. The plugs are designed to mate with sockets KBT6AR-N. The resulting plug connections are securable by means of snap-in lock. The plug ID/S6AR-N-B4S also mates with Ø 4mm MC Safety plugs, because the Ø 6mm plug has a Ø 4mm socket hole. The internal connection is made with an M6 threaded stud with nuts and washers. These safety flush-mounting plugs are also used to be connected with test leads according to the test accessories IEC/EN61010, (UL3111) and are UL recognized.

Safety - flush-mounting plugs and sockets for currents from 150A

3 Industrie-Steckverbinder
Industrial Connectors
Connecteurs industriels
Powerline

Round Connectors
single-pole, insulated

Ø 10mm with bayonet locking, up to 1000V, 250A

Ø 10mm, Ø 14mm with MC®-Locking system, up to 500V, 300A

Current	Model	Order No
200A	MD/B 14 AR-N	14.0021
150A	MD/B 10 AR-N	14.0011

Fuse NEOZED

Rating :	2 ..100A
Voltage:	AC 400V / DC 250V
Dimension	D02
Operating Class :	gG

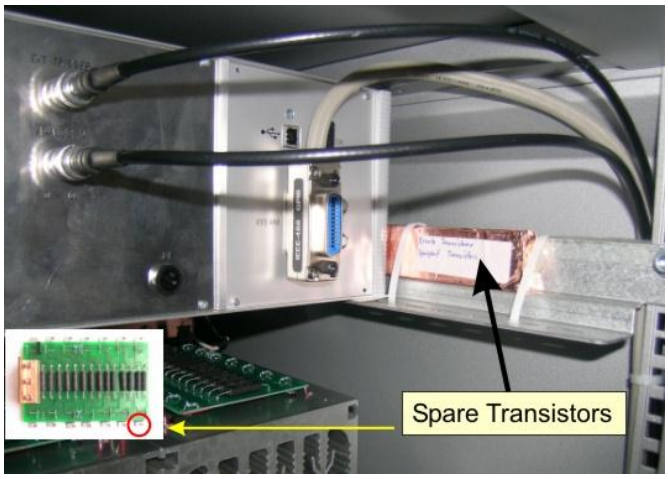
8.6. Spare parts transistors

There are some VDS 200N models where EM Test delivers spare transistors.

For replace any transistors in the power PCB EM Test delivers a couple of spare transistors with the unit.

It is mandatory to mount transistors of the same fabrication lot for simulate switching. Otherwise there is a risk for unbalanced transistor current and device damage.

See the attached picture where the spare transistors are located.



Spare transistor location

8.7. VDS 200N Menu overview

Page 0	Page 1	Page 2	Page 3	Page 4	Page 5
EM TEST VDS 200Nx Waveforms Voltage Drop Simulator V3.04 SWN: 000143	**Main menu** **F1** Wave simulator **F7** Service	**Waveform Simulator** **F1** Standards **F2** Functions **F3** DC Power Supply	**Standards** **F1** ISO 7637 **F2** ISO 16750-2 / WD 03/2000-2 **F3** JASO	**ISO 7637** **F1**: Pulse 4 **F2**: Pulse 2b	**Start** run the test procedure **Stop** stops the test procedure **Change** Select the parameters **Continue** the test procedure
				ISO 16750-2 WD 03/2000-2 **F1**: Short voltage drop **F2**: Slow decrease / increase **F3**: Supply voltage profile **F4**: Pulse 'Starting profile' **F5**: Sweep **F6**: Overvoltage Vmax	**Start** run the test procedure **Stop** stops the test procedure **Change** Select the parameters **Continue** the test procedure
				JASO **F1** Jaso	**Start ..Stop...**
			FUNCTIONS **F1** : Sinus **F2** : Jumpstart **F3** : VDS Extern **F4** : Pulse 4 (GM 9105P)	**Start** run the test procedure **Stop** stops the test procedure **Change** Select the parameters **Continue** the test procedure	
			DC Power Supply	**Start** run the test procedure **Stop** stops the test procedure **Change** Select the parameters **Continue** the test procedure	
		Service **F1** Addresses **F2** Self test **F3** Set-up	**Addresses** Addresses of EM TEST and their representatives are displayed.		
			Selftest **F1** Press the displayed Key	**Selftest** **F1** Continue **F2** Again **F3 Break**	
			Set-up **F1** Change language **F2** LCD backlighting **F3** Interfaces **F4** Keyboard beeper **F5** Timer **F6** Set voltage	**Change language** German/English **LCD** backlighting ON/OFF or AUTO **Interfaces** Select parameters **Keyboard-Beeper** (ON/OFF) **Timer** **Voltage** Unom, Umax. dc source	