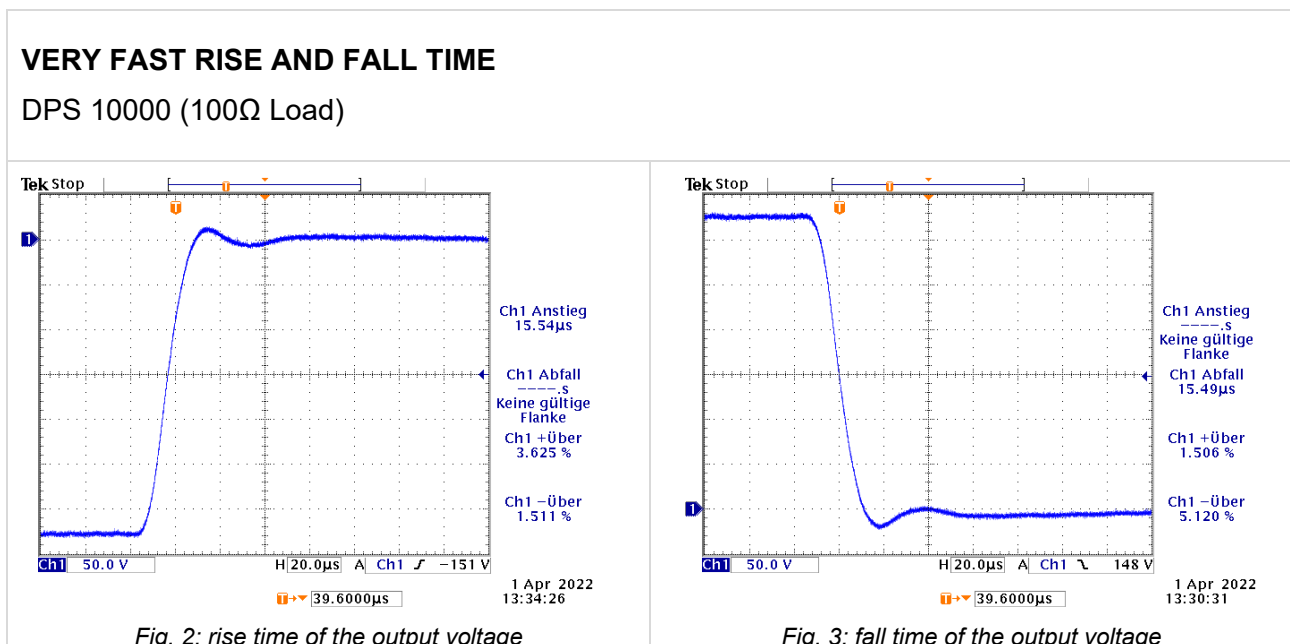


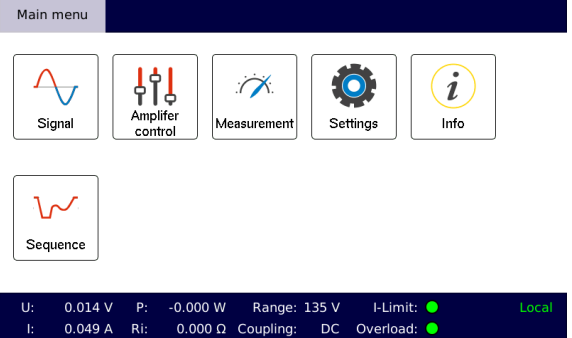
# 4-Quadrant-Bidirectional Amplifier series DPS

## 4-QUADRANT VOLTAGE / CURRENT AMPLIFIER

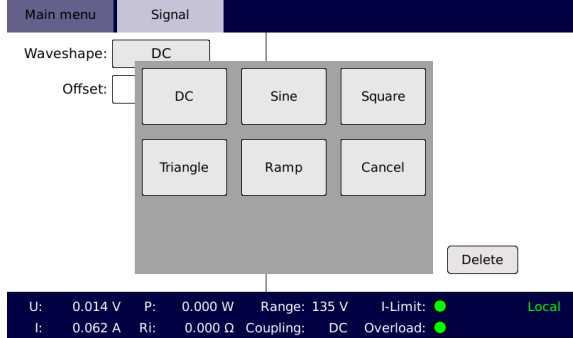
- ✓ Touch panel operation 7" (800x480)
- ✓ High peak-load ability (up to 2...3ms)
- ✓ Very low internal resistance
- ✓ Very fast slew rate > 5V/μs (rise time < 50μs at 230V<sub>rms</sub>)
- ✓ Operates from DC up to 5kHz large signal bandwidth (-3dB)
- ✓ Small signal bandwidth up to 10kHz
- ✓ Real 4-quadrant operation mode (source and sink)
- ✓ Current and voltage limitation adjustable
- ✓ High efficiency >85%
- ✓ Optical link for easy PHIL interface
- ✓ Control signal to output delay < 50μs
- ✓ Operating modes for parallel and serial connection of additional amplifiers



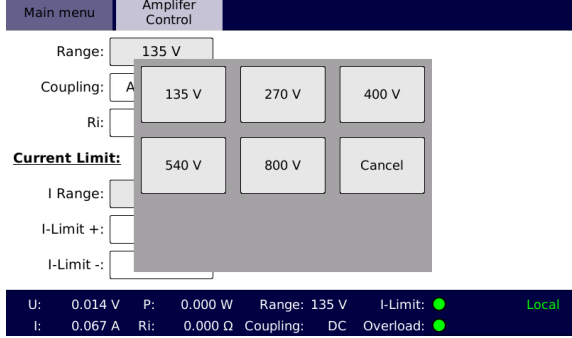
## TOUCHSCREEN USER INTERFACE



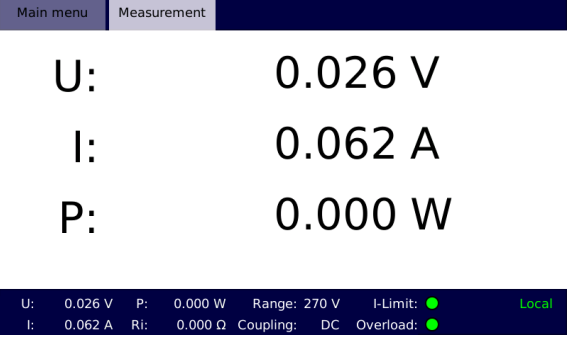
*Fig. 6: Main menu*



*Fig. 7: Selection of the output signal waveshape*



*Fig. 8: Selection of the output voltage range*



*Fig. 9: Measurement unit display*

## TECHNICAL DATA - GENERAL

		<b>DPS series</b>		
<b>Nominal voltage ranges<sup>1)</sup></b>	<i>AC (DC)</i>	0...354V <sub>rms</sub> (±500V <sub>DC</sub> )		
<b>Load regulation</b>		Voltage	DC ... 450Hz	450Hz ... 5kHz
		240V <sub>rms</sub>	0.2%	2.5%
<b>Stability (1h)</b>		gain: <0.1% / offset: <0.1% of range value at constant load and temperature		
<b>Line regulation</b>		<1.5x10 <sup>-4</sup> per 10V line-voltage change		
<b>Frequency bandwidth</b>		large signal: DC ... 5kHz (-3dB) small signal (10%): DC ... 10kHz (-3dB)		
<b>Slew rate</b>		>5V/μs (rise time <50μs at 230V <sub>rms</sub> )		
<b>Harmonic distortion (max.)</b>		Voltage	DC ... 450Hz	450Hz ... 5kHz
		240V <sub>rms</sub>	0.4%	1.0%
<b>Floating output</b>		max. voltage between earth and the amplifier's ground output: <300V <sub>rms</sub>		
<b>Internal resistance compensation</b>		<8V <sub>p</sub> (ground and each phase line)		
<b>Protection circuits</b>		overload / short circuit / over temperature		
<b>External input</b>				
	<i>Max. voltage</i>	0 ... V <sub>ExtMax</sub> (V <sub>ExtMax</sub> is adjustable between ±2V <sub>p</sub> ... ±25V <sub>p</sub> )		
	<i>Impedance</i>	approx. 10kΩ		
	<i>Delay time</i>	Signal delay between amplifier's external input and amplifier's output <5μs		

<b>Interface</b>	Ethernet 100MBit
<b>Internal oscillator unit</b>	
<i>Type</i>	4-channel synthesizer
<i>Wave forms</i>	DC, sine, square, triangle, ramp, arbitrary
<i>Amplitude resolution</i>	17Bit
<i>Frequency range</i>	DC ... 1MHz
<i>Frequency resolution</i>	1μHz
<i>Frequency accuracy</i>	25ppm
<i>Phase range</i>	0° ... 360°
<i>Phase resolution</i>	0.001°
<i>Memory depth</i>	1MSample
<i>Synthesizer functions</i>	ADD, AM, FM, PM, PWM
<i>Sequence memory</i>	1024 steps

<b>Internal control unit</b>	
<b>Display</b>	7.0" Touchscreen (17.8cm, resolution 800x480)
<b>Sequencer</b>	Integrated sequences: amplitude pulse, frequency pulse (lin/log) User defined sequences memory
<b>User interface</b>	Touchscreen / front-panel button / incremental encoder
<b>Digital I/O</b>	8 digital inputs: +5V <sub>DC</sub> ... +24V <sub>DC</sub> 8 digital outputs: +5V <sub>DC</sub> (internal V <sub>CC</sub> ), I <sub>L</sub> =40mA (external V <sub>CC</sub> input: +5V <sub>DC</sub> ... +24V <sub>DC</sub> , I <sub>L</sub> =500mA)

<b>Digital instrument</b>							
<i>Voltage measurement range</i>	900V <sub>p</sub>						
<i>Voltage accuracy</i>	± (% of measured value + % of voltage measurement range value)						
	<table border="1"> <tr> <td>DC</td> <td>10Hz ... 45Hz</td> </tr> <tr> <td>45Hz ... 450Hz</td> <td>450Hz ... 5kHz</td> </tr> <tr> <td>0.1 + 0.02</td> <td>0.2 + 0.2</td> </tr> </table>	DC	10Hz ... 45Hz	45Hz ... 450Hz	450Hz ... 5kHz	0.1 + 0.02	0.2 + 0.2
DC	10Hz ... 45Hz						
45Hz ... 450Hz	450Hz ... 5kHz						
0.1 + 0.02	0.2 + 0.2						
<i>Current measurement range</i>	depending on peak current of the amplifier						
<i>Current accuracy</i>	± (% of measured value + % of current measurement range value)						
	<table border="1"> <tr> <td>DC</td> <td>10Hz ... 45Hz</td> </tr> <tr> <td>45Hz ... 450Hz</td> <td>450Hz ... 5kHz</td> </tr> <tr> <td>0.2 + 0.04</td> <td>0.4 + 0.4</td> </tr> </table>	DC	10Hz ... 45Hz	45Hz ... 450Hz	450Hz ... 5kHz	0.2 + 0.04	0.4 + 0.4
DC	10Hz ... 45Hz						
45Hz ... 450Hz	450Hz ... 5kHz						
0.2 + 0.04	0.4 + 0.4						

<b>Monitoring unit<sup>2)</sup></b>	voltage	current	
<i>Max. output</i>	±10V <sub>p</sub>		
<i>Scaling factor 'sf' (adjustable)</i>	sf: 0.2 ... 1000	sf: 0.1 ... 1000	
<i>Bandwidth</i>	300kHz	200kHz	
<i>Monitoring accuracy frequency</i>	± (% of measured value + % of voltage measurement range value + error(sf))		
	DC	10Hz ... 45Hz	
	45Hz ... 450Hz	450Hz ... 5kHz	5kHz ... 15kHz
<i>voltage monitor</i>	0.12 + 0.02 + 2mV*sf	0.3 + 0.2 + 2mV*sf	0.7 + 0.4 + 2.2mV*sf
<i>current monitor</i>	0.22 + 0.04 + 2mA*sf	0.5 + 0.4 + 2mA*sf	1.1 + 0.8 + 2.2mA*sf
<i>Noise of ADC measurement</i>	<20mV <sub>rms</sub> (DC ... 300kHz)		<1.5mA <sub>rms</sub> (DC ... 300kHz)
<i>Noise DAC output</i>	<0.2mV <sub>rms</sub> (DC ... 300kHz)		
<i>Delay time</i>	<1μs		
<i>Output impedance</i>	470Ωm		
<i>Isolation</i>	earth / remaining electronics / each other		
<i>Protection</i>	short circuit		

<b>Insulation resistance</b>	>1M $\Omega$
<b>Withstand voltage</b>	>2000V <sub>DC</sub>
<b>Ambient temperature</b>	0°C up to 40°C
<b>Relative Humidity</b> (non-condensing)	max. 80% for temperatures <31°C, decreasing linearly to 50% at 40°C
<b>System of protection</b>	IP20

## TECHNICAL DATA – DPS 10000 / 40000

		<b>DPS 10000</b>	<b>DPS 40000</b>
<b>Power AC</b>	- continuous	10000VA	40000VA
<b>Power DC</b>	- continuous	10000W	40000W
<b>Short-time power</b>		20000VA	80000VA
<b>Peak current</b>		110A <sub>p</sub>	350A <sub>p</sub>
<b>Power Supply (<math>\pm 10\%</math>, 50/60Hz)</b>			
<b>Cos phi</b>		>0.95	>0.95
<b>Protection</b>		3 x 32A	3 x 125A
<b>Housing</b>		19" 24U	19", 37U
	<i>approx. dimensions</i> (mm)	1328x620x1072	1927x820x1072
<b>Weight</b>	<i>(approx.)</i>	150kg	400kg

## DPS SERIES ADD-ONS AND OPTIONS

<b>Options</b>		
OPT.01	IEEE488	
OPT.02	RS232	RS232, RS485
		USB Host, USB Device on request
OPT.05	U/I monitor	Galvanically isolated BNC plugs for monitoring voltage and current (includes OPT.14.5)
OPT.14	External input	0...V <sub>ExtMax</sub> V <sub>ExtMax</sub> is adjustable between $\pm 2V_p$ ... $\pm 25V_p$ OPT.14 includes a digital input filter: type Bessel or Butterworth, order 1 ... 6 (adjustable) Filter frequency selectable 100Hz ... 10MHz
NT.18	Special line voltage	available on request in the range of 110V <sub>rms</sub> ... 300V <sub>rms</sub>
OPT.21	Common output	Common output plugs for parallel operation

OPT.24	Programmable internal impedance	model	Ri max. [ $\Omega$ ]	Li max. [mH]
		DPS 10000	1800	24
		DPS 40000	450	6
OPT.25	Constant current mode			
OPT.30	Optical link	Optical interface to real time simulator LC duplex interface / Aurora 8B/10B protocol / 2Gb/s data rate		
UT.540.C	Voltage transformer	Output voltages 400V <sub>rms</sub> / 540V <sub>rms</sub> Other voltages on request		
OPT.RSA	Output disconnection by redundant contactors	Current flow is only possible if the external contacts of the monitoring circuits are closed		