ACS 500/LV

4-QUADRANT CURRENT AMPLIFIER

4-quadrant amplifier ACS 500/LV

The relating applications:

Testing of RCDs

- ✓ Operates from DC up to 30 kHz large signal bandwidth (-3 dB)
- ✓ Integrated 4-channel signal synthesiser for arbitrary waveform generation and integrated waveform storage capability
- ✓ High output current accuracy and stability, high short-time current capability
- ✓ Extended synchronisation possibilities (e.g. 3 x current + 3 x voltage sources)
- ✓ Remote control interface (Ethernet, Digital I/O)
- ✓ Voltage limitation adjustable
- ✓ Internal oscilloscope
- ✓ Amplifier control via webinterface and interface commands

CURRENT SOURCE FOR RCD TESTING

TOUCHSCREEN USER INTERFACE

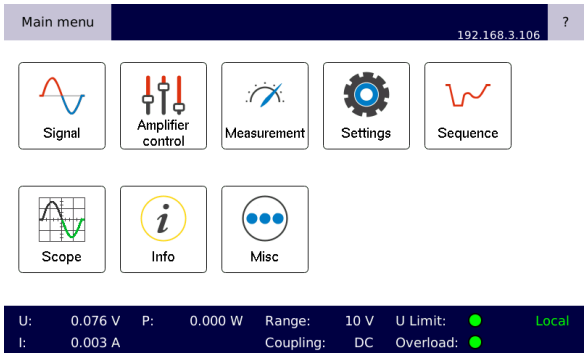

Fig. 1: Main menu

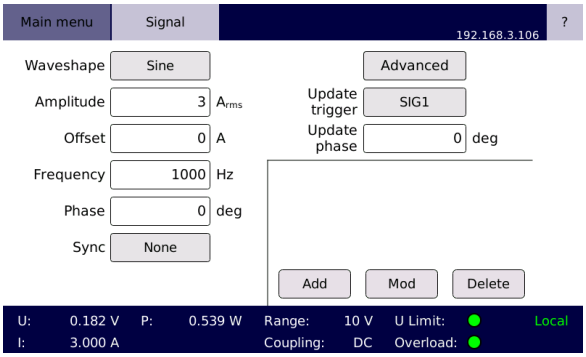

Fig.2: Signal setting

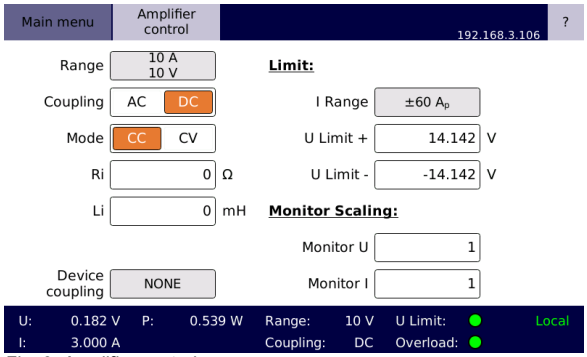

Fig. 3: Amplifier control

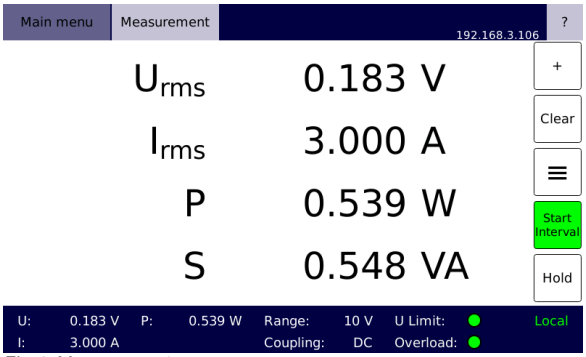

Fig.4: Measurement

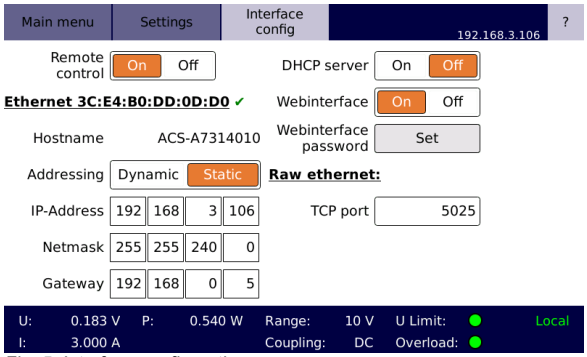

Fig. 5: Interface configuration

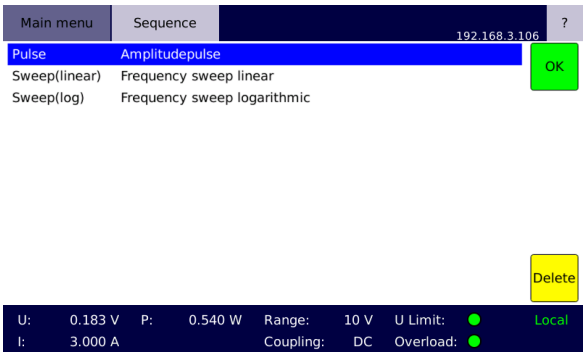

Fig.6: Sequence menu

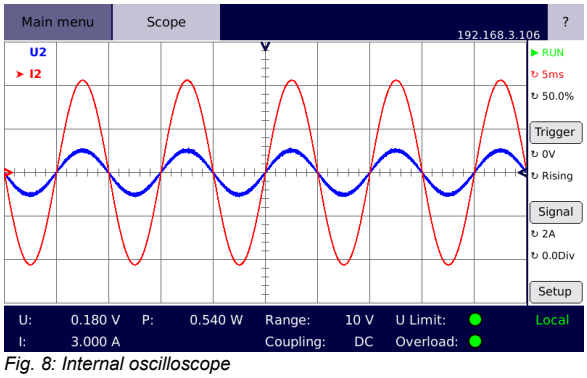

Fig. 8: Internal oscilloscope

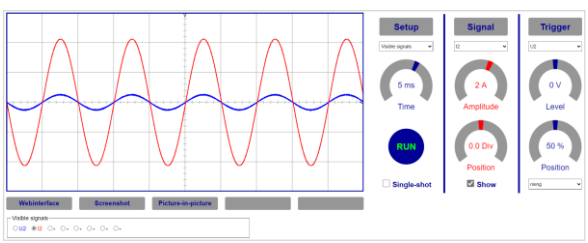

Fig. 7: Web oscilloscope

SOFTWARE CONTROL

SPS SystemControl

- ✓ Simulation and control software for arbitrary waveforms, current and frequency variations
- ✓ Generation of user defined sequences
- ✓ Sequence preview graph

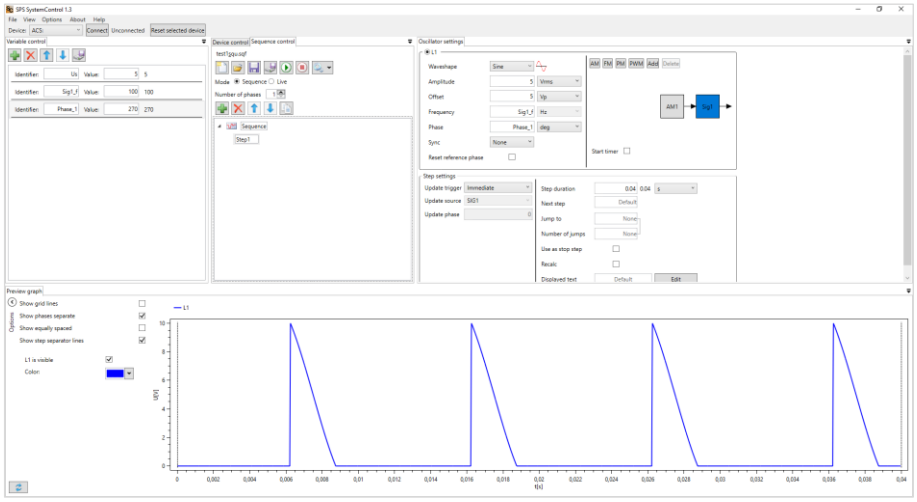

Fig. 9: SPS SystemControl software

Command interface

- ✓ Easily integrate the device into your own software applications
- ✓ Remote control commands are based on the SCPI standard

Webinterface

- ✓ Monitor and control the connected device via a web browser
- ✓ Oscilloscope function

TECHNICAL DATA – GENERAL

		ACS 500/LV			
Current range		10 A			
Peak current		60 A			
Nominal voltage *RMS (peak)*		10 V (±14 V)			
Peak voltage *(at open output)*		15 V			
Load regulation *(short circuit to nominal load cos φ = 1)*		DC … 450 Hz 0.2 %	450 Hz ... 5 kHz 5.0 %	5 kHz ... 10 kHz 15.0 %	10 kHz … 30 kHz 25.0 %
Stability *(1 h)*		gain: < 0.1 % / offset: < 0.02 % of range at constant load and temperature			
Line regulation		< 1.5 x 10^{-4} per 10 V line-voltage change			
Frequency bandwidth		large signal: DC … 30 kHz (-3 dB)			
Harmonic distortion *(max.)*		15 Hz … 450 Hz 0.2 %	450 Hz ... 5 kHz 2.0 %	5 kHz ... 10 kHz 5.0 %	10 kHz … 30 kHz 7.0 %
		(10 % … 100 % of range)			
Protection circuits		overload / overtemperature / open output			
Floating output		max. voltage between earth and the amplifier's ground output: < 100 V (RMS)			
External input *(optional)*	*Max. peak voltage*	0 … U_{ExtMax} (U_{ExtMax} is adjustable between ±2 V … ±25 V)			
	Impedance	approx. 10 kΩ			
	Delay time	signal delay between amplifier's external input and amplifier's output < 5 µs			
Internal oscillator unit					
	Type	4-channel synthesiser			
	Wave forms	DC, sine, square, triangle, ramp, arbitrary			
	Amplitude resolution	17 Bit			
	Frequency range	DC … 1 MHz			
	Frequency resolution	1 µHz			
	Frequency accuracy	25 ppm			
	Phase range	0° … 360°			
	Phase resolution	0.001°			
	Memory depth	1 MSample			
	Synthesiser functions	ADD, AM, FM, PM, PWM			
	Sequence memory	1024 steps			
Internal control unit					
	Display	7.0" touchscreen (17.8 cm, resolution 800 x 480)			
	Sequencer	user defined sequences memory			
	User interface	touchscreen / front-panel button / incremental encoder webinterface			
	Digital I/O (optional)	8 digital DC inputs: +5 V … +24 V 8 digital DC outputs: +5 V (internal U_{CC}), I_L = 40 mA (external DC input U_{CC}: +5 V … +24 V, I_L = 250 mA)			

Measurement					
	Peak voltage measurement range	20 V			
	Peak current measurement ranges	0.025 A / 0.05 A / 0.1 A / 0.2 A / 0.4 A / 0.8 A / 1.6 A / 3.2 A / 6.4 A / 12.8 A / 25.6 A / 60 A			
	Measurement accuracy	± (% of reading + % of range)			
	Frequency	DC 45 Hz … 450 Hz	10 Hz … 45 Hz 450 Hz … 5 kHz	5 kHz ... 15 kHz	15 kHz ... 30 kHz
	*Voltage accuracy**	0.1 + 0.02	0.2 + 0.2	0.4 + 0.4	0.8 + 0.8
	Current accuracy	0.2 + 0.04	0.4 + 0.4	0.8 + 0.8	1.6 + 1.6
Monitoring unit *(optional)*		voltage		current	
	Max. peak output	±10 V			
	Scaling factor 'sf' (adjustable)	sf: 0.2 … 1000		sf: 0.1 … 1000	
	Bandwidth	300 kHz		200 kHz	
	Monitoring accuracy	± (% of reading + % of range + error(sf))			
	Frequency	DC 45 Hz … 450 Hz	10 Hz … 45 Hz 450 Hz … 5 kHz	5 kHz … 15 kHz	15 kHz … 30 kHz
	Voltage monitor accuracy	0.12 + 0.02 + 2 mV * sf	0.3 + 0.2 + 2 mV * sf	0.7 + 0.4 + 2.2 mV * sf	1.4 + 0.8 + 2.3 mV * sf
	Current monitor accuracy	0.22 + 0.04 + 2 mA * sf	0.5 + 0.4 + 2 mA * sf	1.1 + 0.8 + 2.2 mA * sf	2.2 + 1.6 + 2.3 mA * sf
	Noise of ADC measurement (RMS)	< 20 mV (DC … 300 kHz)		< 1.5 mA (DC … 300 kHz)	
	Noise DAC output (RMS)	< 0.2 mV (DC … 300 kHz)			
	Delay time	< 1 µs			
	Output impedance	47 Ω			
	Isolation	earth / remaining electronics / each other			
	Protection	short circuit			
Interface		Ethernet 100 Mbit/s (HiSLIP SCPI) USB 2.0 Host			
Synchronisation bus *(multiple devices)*		device synchronisation and internal communication optical fibre, LC duplex: - synchronised sequence start - parallel operation - only one ethernet connection required			
Insulation resistance		> 1 MΩ			
Peak withstand voltage *(max. 10 s, output to earth)*		> 500 V			
Cooling		temperature-controlled forced air cooling			
Ambient temperature		+10 °C up to +40 °C			
Storage temperature		-25 °C up to +60 °C			
Relative humidity		non condensing, max. 80 % for temperature < 31 °C, decreasing linearly to 50 % at 40 °C			
Ingress protection		IP20			
Power supply *(±10 %, 50/60 Hz)*		230 V			
Line protection, connection		4 A, Schuko			
Housing		plug-in unit or rack, light grey (RAL 7035)			
	Amplifier approx. dimensions (HxWxD)	19", 7 U 311 x 483 x 355 mm			
Weight	*Amplifier (approx.)*	20 kg			

* The voltage measurement point is connected internal before the output switch

OPTIONS AND ACCESSORIES

Options		
OPT.01	IEEE488	Not in combination with OPT.02
OPT.02	RS232	Not in combination with OPT.01
OPT.05	U/I monitor	Galvanically isolated voltage and current measurement outputs accessible via BNC sockets (includes OPT.14)
OPT.14	External input	0 … $U_{Ext\ max}$ $U_{Ext\ max}$ peak is adjustable between ±2 V … ±25 V OPT.14 includes a digital low pass input filter Type Bessel or Butterworth, order 1 ... 6 (adjustable) Filter frequency selectable 100 Hz ... 10 MHz
OPT.OVP	Protective circuit for amplifier output	Output voltage is limited to approx. 30 V. The external current must not exceed 100 A (for max 10 ms)