

FEATURES

- Modular concept for customized applications and sustainability
- 48/96/192 kHz sampling rate
- Improved sensitivity
- Standard variant allows for two complete standard setups
- General purpose in/outputs (GPIO) for simple interfacing

BENEFITS

- Running two lasers at the same time
- Each speaker channel has a high sensitivity current path -> no need to swap connectors anymore
- GPIO Port allows for complex applications



DESCRIPTION

The Klippel Analyzer 3 is the hardware platform for the RnD modules that performs the data acquisition and real time processing. It is connected to the Host-PC / dB-Lab via USB 2.0. In standard configuration the hardware hosts several input and output channels, which are all digitalized in a 24 bit format up to 192 kHz. It allows for direct current/voltage measurements on a speaker and has built in power source for BNC and XLR microphones.

Due to its modular design, the platform offers great sustainability and flexibility to make it fit best to special and future measurement applications.

Article number

2000-300

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1 Overview

1.1 Principle

The KA3 is a modular device, composed of a KA3-Frame and Cards. The Frame offers six slots for cards to plug in. The cards contain different connectors and processing capabilities to allow for certain data acquisition or software modules. Using this concept, it is possible to extend the functionality over time and needs as well as simplify repair and / or calibration.

In Standard version, the KA3 is equipped with a Laser-, Speaker- and XLR-Card. (see Figure 1)

Extending or changing the KA3 composition is possible on request only!

1.2 KA3-Frame

The basic KA3-frame is a 19" 2HE unit. It is powered by an external power supply of 24 VDC nominal and is connected to the measurement PC via USB. It also provides a 25 pin GPIO Port for basic I/O operations.

1.3 Cards

Laser-Card	Unbalanced I/O-Card containing 1x BNC output, 2x LEMO input with 24VDC supply, 2x BNC input IEPE powered
Speaker-Card	Contains 2x SpeakON speaker channel, 1x SpeakON Amplifier input
XLR-Card	Balanced I/O-Card containing 2x XLR output, 2x XLR input Phantom powered

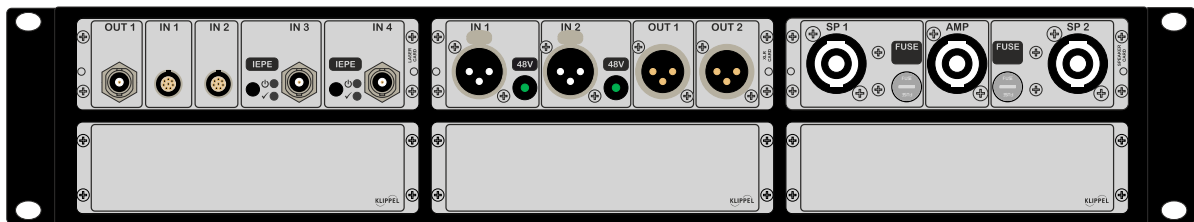
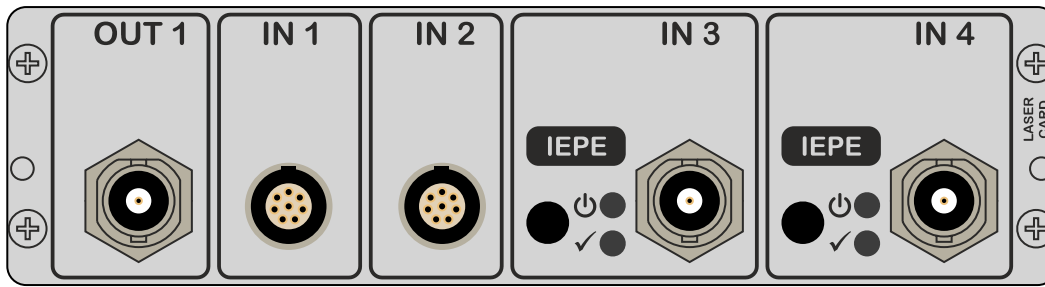




Figure 1: KA3 front in standard configuration

2 Cards

2.1 Laser-Card



Laser-Card

Element	Comment
OUT 1	Unbalanced universal BNC output (the output signal can be chosen in dB-Lab)
IN 1 / 2	The 8 pin-coax socket may host a plug of a laser displacement sensor (providing power and receiving the displacement signal) or of a B-field sensor.
IN 3 / 4	Microphone input with switchable IEPE compliant microphone power supply. The power supply can be switched by pressing the black button or via dB-Lab. The LED  indicates IEPE power is switched on. The LED  indicates power consumption of the connected microphone.

Maximum Ratings			
Parameter	Conditions	Max	Unit
Input voltage, any pin		50	V
Input current (DC), any pin		20	mA
Transient input current, any pin	T < 1 ms	6	A

BNC Output					
Parameter	Conditions	Min	Typ	Max	Unit
Output voltage		TBD	10		V _{peak}
Offset Voltage (absolute)	w Offset-Compensation		400	TBD	uV
	w/o Offset-Compensation		25	TBD	mV
Differential output impedance			TBD		Ohm
Short circuit duration		infinite			s
Output noise	BW = 20kHz		11	TBD	uV _{rms}
THD @ 1kHz	F _s =48-192kHz, 2V _{rms}		-90	TBD	dB
Lower Frequency limit (-3dB)	Offset-Compensation active	TBD	1.1	TBD	Hz

BNC Inputs					
Parameter	Conditions	Min	Typ	Max	Unit
IEPE supply current			7.3	TBD	mA
Max IEPE voltage		28			V
Sensitivity range ^{NOTE} (gain-controlled)	Input voltage for 0dBfs	0.2		15.7	V _{peak}
Noise level (@ nom sensitivity)	Shorted input, BW=20kHz		10	TBD	uV
Nominal sensitivity (0dB)	Input voltage for 0dBfs		3.9	TBD	V _{peak}
SNR ⁴	sinusoidal signal, BW=20kHz		108	TBD	dB

THD @ 1kHz (all Sample-Rates)	-1dBfs		-88	TBD	dB
Input impedance			10	TBD	kOhm
Input capacitance			TBD (10)		pF
Lower Frequency limit (-3dB)	AC-coupling enabled	TBD	1.6	TBD	Hz
Upper Frequency limit	Fs=48kHz, +/- 0.1dB		19		kHz
	Fs=96kHz, +/- 0.3dB		34		kHz
	Fs=192kHz, -1dB		49		kHz
	Fs=192kHz, -3dB		66		

LEMO Inputs (Laser)					
Parameter	Conditions	Min	Typ	Max	Unit
Common-Mode-Range*			+/- 14		Vpeak
Laser supply voltage		TBD	24	TBD	V
Laser supply current	short-circuit-proof (infinite time)			0.5	A
Sensitivity range ^{NOTE} (gain-controlled)	Input voltage for 0dBfs	0.2		15.7	Vpeak
Noise level (@ nom sensitivity)	Shorted input, BW=20kHz		36	TBD	uV
Nominal sensitivity (0dB)	Input voltage for 0dBfs		15.7	TBD	Vpeak
SNR ⁴	sinusoidal signal, BW=20kHz		109	TBD	dB
THD @ 1kHz (all Sample-Rates)	-6dBfs (5.5Vrms)		-88	TBD	dB
CMRR ³	0R mismatch ¹		70	TBD	dB
	10R mismatch ²		60	TBD	
Input impedance			10	TBD	kOhm
Input capacitance			TBD (10)		pF
Upper Frequency limit	Fs=48kHz, +/- 0.1dB		19	TBD	kHz
	Fs=96kHz, +/- 0.3dB		34	TBD	kHz
	Fs=192kHz, -1dB		49	TBD	kHz
	Fs=192kHz, -3dB		66	TBD	

¹ achieved within the frequency range of 0.1-5000 Hz

² CMRR decreases by 20 dB for every increase of the mismatch impedance by a factor of 10

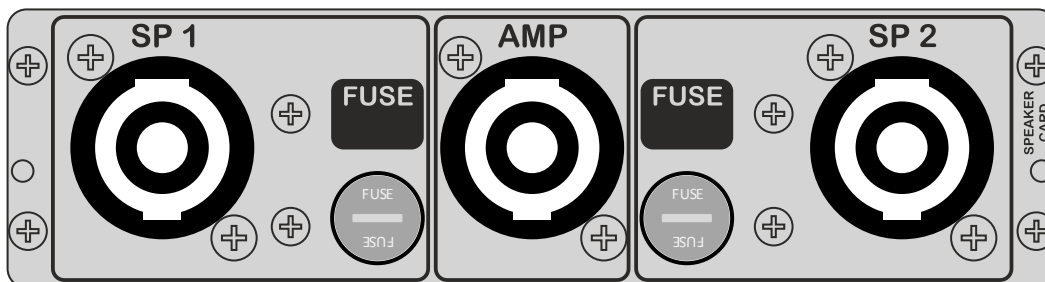
³ specified CMRR is achieved up to 20 kHz

⁴ SNR refers to signal levels instead of power levels

* Pin voltage (common mode + signal) has to be below 14.3 V absolute to avoid clipping

NOTE Gain control is limited to certain values defined by software module

2.2 Speaker-Card



Speaker-Card

SP 1 / 2	The SPEAKON output connectors can be connected to the terminals of the loudspeaker under test by using pins 1+ and 1- of the special loudspeaker cable. The remaining pins 2- and 2+ of the SPEAKON connector are used to sense the voltage close to the loudspeaker terminals.
Fuse 1 / 2	Each speaker channel is fused with 6.3 x 32 mm 8 A fast blow fuse (Littelfuse 313008).
AMP	The SPEAKON input connector AMPLIFIER should be connected to the output signal of the power amplifier. The signals supplied to pins 1- and 1+ will be provided at the Speaker 1 connector. The pins 2- and 2+ at the Amplifier connector correspond with the Speaker 2 connector.

Attention: High Voltages and / or currents may occur at the Amplifier / SPEAKON connectors. Risk of electrical shock! Use isolated wires, connectors and clamps only. Do not touch metal conductors.

Maximum Ratings		Unit
Speaker Voltage ¹	400	Vpeak
Speaker Current ³	80	Apeak

Recommended speaker impedance range: 2-2000 Ohm

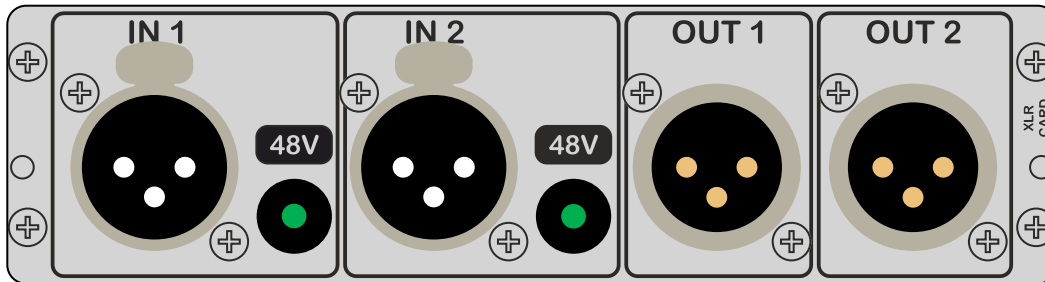
Voltage Measurement					
Parameter	Conditions	Min	Typ	Max	Unit
Accuracy	10 Vrms, all Sample rates		0.02	0.1	%
Noise Level	BW=20 kHz		1.4		mVrms
	BW=40 kHz		2		
	BW=80 kHz		3.5		
SNR ²	Sinusoidal signal, BW=20 kHz		106		dB
Frequency Response	0.1 Hz...20 kHz, Fs=48 kHz		-0.06		dB
	0.1 Hz...38 kHz, Fs=96 kHz		-0.35		
	0.1 Hz...50 kHz, Fs=192 kHz		-0.8		
	0.1 Hz...66 kHz, Fs=192 kHz		-3		

Current Measurement					
Parameter	Conditions	Min	Typ	Max	Unit
Low Sense Path					
Accuracy	1Arms, all Sample rates		0.05	0.2	%
Noise Level	BW=20 kHz		1.4		mArms
	BW=40 kHz		2		
	BW=80 kHz		10.5		
SNR ²	Sinusoidal signal, BW=20 kHz		75		dB
THD	1 Arms(1 kHz, noise limited)		-60		dB
	5 Arms(1 kHz, noise limited)		-72		
	10 Arms (1 kHz)		-72		

	20 Arms (1 k Hz)		-68		
	20 Arms,20Hz-20 kHz		-64		
Frequency Response	0.1 Hz...20 kHz, Fs=48 kHz		-0.1		dB
	0.1 Hz...38 kHz, Fs=96 kHz		-0.3		
	0.1 Hz...50 kHz, Fs=192 kHz		-1.4		
	0.1 Hz...59 kHz, Fs=192 kHz		-3		

¹ each speaker terminal is limited to a maximum of 200 Vpeak against earth potential² SNR refers to signal levels instead of power levels

2.3 XLR-Card



XLR-Card

Elements	Comment
IN 1 / 2	The XLR input connectors IN 1 and IN 2 provide a balanced line input. Phantom power can be activated by switch or dB-Lab. The green LED indicates phantom power status.
OUT 1 / 2	The XLR output connectors OUT 1 and OUT 2 provide a balanced analog output signal at pin 2 (hot/+), pin 3 (cold/-) and pin 1 (ground). If asymmetric output is required use pin 2 (hot/+) and short pin 3 (cold/-) with pin 1 (ground).

Maximum Ratings			
Parameter	Conditions	Max	Unit
Input voltage, any pin		50	V
Input current (DC), any pin		20	mA
Transient input current, any pin	T < 1 ms	6	A

XLR Outputs					
Parameter	Conditions	Min	Typ	Max	Unit
Accuracy			0.05	0.2	%
Differential output voltage	High-Range setup	TBD	14	TBD	V _{peak}
	Low-Range setup	TBD	2.1	TBD	V _{peak}
Common-Mode-Range*			+/-13		V
Differential Offset Voltage (absolute)	w Offset-Compensation		100	TBD	uV
	w/o Offset-Compensation		10	TBD	mV
Differential output impedance			30	TBD	Ohm
Shortcircuit duration			infinite		s
Output noise	BW = 20kHz		7	TBD	uV _{rms}
THD @ 1kHz	Fs=48-192 kHz, HiRange, -1 dBFs		-107	TBD	dB
Lower Frequency limit (-3dB)	Offset compensation active	TBD	TBD	TBD	Hz

XLR Inputs					
Parameter	Conditions	Min	Typ	Max	Unit
Phantom Power Voltage	Open input		48		V
Phantom Power Source Resistance			6.8		kOhm
Accuracy			0.05	0.2	%
Common-Mode-Range*			+/- 14		Vpeak
Sensitivity range (gain-controlled) ^{NOTE}	Input voltage for 0 dBFs	0.06		21	Vpeak
Noise level (@ nom sensitivity)	Shorted input, BW=20 kHz				
Nominal sensitivity (0dB)	Input voltage for 0 dBFs		3		Vpeak
Dynamic Range	sinewave		115	TBD	dB
THD @ 1kHz (all Sample-Rates)	-1 dBFs		-100	TBD	dB
CMRR	0R mismatch, @50Hz		80	TBD	dB
	10R mismatch, @50 Hz		80	TBD	
	1kOhm mismatch, @50 Hz		75	TBD	
Input impedance			10		kOhm
Input capacitance			15	TBD	pF
Lower Frequency limit (-3dB)	AC-coupling enabled	TBD	TBD	TBD	Hz
Upper Frequency limit	Fs=48 kHz, +/- 0.1 dB		20		kHz
	Fs=96 kHz, +/- 0.2 dB		35		kHz
	Fs=192 kHz, +/- 0.2 dB		75		kHz

^{NOTE} Gain control is limited to certain values defined by software module

*Pin voltage (common mode + signal) has to be below 14.3 V absolute to avoid clipping

3 KA3-Frame

Dimensions	486 mm x 280 mm x 88 mm 19"/2U (19.1 in x 11 in x 3.5 in)
Weight (standard version)	4.8 kg (10.5 lb)
EMC	IEC 61326-1:2013
Safety	(EN 61010-1:2010)

4 Recommended Operating Conditions

Parameter	Symbol	Min	Typ.	Max	Unit
Power supply voltage	V_{AC}	100		240	V
Power AC-frequency	f_{AC}	50		60	Hz
Operating ambient temperature	T_A	0	25	60 ⁴⁾	°C
Relative Humidity	RH		40	90 ³⁾	%
Input power	P		15	100	W

3) non-condensing conditions

4) external power supply is limited to 50°C ambient

Primary power supply connection with protective earth conductor is required!

Power supply connection with removed earth contact could cause high voltages at the enclosure of the device.

Find explanations for symbols at:

<http://www.klippel.de/know-how/literature.html>

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