

# Kistler LabAmp

Type 5167Ax0

## Charge amplifier and data acquisition for multi-channel measurement

This universal laboratory charge amplifier can be used wherever mechanical quantities are measured with multiple piezoelectric sensors. It covers slow, quasi-static signals as well as dynamic processes.

Piezoelectric sensors produce an electric charge which varies in direct proportion with the load acting on the sensor. The amplifier converts this charge directly into digital values or a proportional output voltage.

- 4- or 8-channel amplifier for piezoelectric sensors
- Integrated 24-bit data acquisition with up to 100 kSps per channel
- Continuous digital signal processing at minimal latency
- Fully flexible low-pass, high-pass and notch filter adjustment
- Low-noise design
- 4 or 8 analog outputs with fully flexible 2-point scaling and internal routing
- Status indication via LED
- Virtual channels for real-time calculations using one or more sensor channels
- Configuration and control in a standard web-browser
- Virtual instrument driver for LabVIEW
- Two Ethernet interfaces with included switch functionality
- Digital inputs for Reset/Measure and Trigger

### Description

The Kistler LabAmp Type 5167Ax0 is not only an outstanding low-noise charge amplifier for dynamic signals but also a powerful data acquisition device delivering the digitized measurement values directly to a host computer for further analysis. It is configured and operated in a web-interface, conveniently accessible by a standard web-browser.

Thanks to advanced signal processing technology, the Kistler LabAmp Type 5167Ax0 offers impressive flexibility. The frequencies of the high-pass, low-pass and notch filters can be directly entered as numeric values in Hertz. The input signals can be flexibly routed to the analog outputs.

The graphical user interface not only offers a simple and intuitive way to configure the device but also displays different measurement values (e.g. live value, peak value, root mean square). The virtual channel functionality allows real-time summation of different input signals.



Furthermore, the browser-based data download allows the acquired data to be processed in an analysis software. For more advanced tasks or direct analysis, the amplifier can be integrated directly into LabVIEW thanks to the provided Virtual Instruments Driver.

### Application

With its ability to measure quasi-static signals, Type 5167Ax0 is particularly suitable for multi-component force measurements in various applications in the laboratory as well as in research and development. For example, wheel force measurement on a tire test stand, reaction force measurements on engine-transmission units, monitoring of forces and torques in vibration tests etc.

For higher channel counts, the synchronization feature allows acquiring data from multiple Type 5167A... devices. Kistler LabAmp Type 5165A... devices can be synchronized with the Type 5167A... as well which allows the combined acquisition of pure dynamic signals from other charge or Piezotron (IEPE) sensors or any voltage signals.

## Technical data

### Connections

Number of channels		
Type 5167A40		4
Type 5167A80		8
Input connector type		BNC neg.
Analog output connector type		BNC neg.
Ethernet interface		2xRJ45
Remote control		D-Sub 9f

### Charge input

Measuring ranges	pC	±100 ... 1,000,000
Frequency range (–3 dB)		
≤195,000 pC	Hz	≈0 ... >45,000
>195,000 pC	Hz	≈0 ... >15,000
Input noise (typ.)		
1 Hz ... 100 kHz		
100 pC	pC <sub>rms</sub>	0.009
1,000 pC	pC <sub>rms</sub>	0.019
10,000 pC	pC <sub>rms</sub>	0.43
100,000 pC	pC <sub>rms</sub>	4.0
1,000,000 pC	pC <sub>rms</sub>	8.5
1 Hz ... 10 kHz		
100 pC	pC <sub>rms</sub>	0.007
1,000 pC	pC <sub>rms</sub>	0.012
10,000 pC	pC <sub>rms</sub>	0.25
100,000 pC	pC <sub>rms</sub>	3.0
1,000,000 pC	pC <sub>rms</sub>	3.4
Drift, measuring mode DC (Long)		
at 25°C, max. relative humidity RH of 60% (non-condensing)	pC/s	<±0.03
at 25°C, max. relative humidity RH of 70% (non-condensing)	pC/s	<±0.05
at 50°C, max. relative humidity RH of 50% (non-condensing)	pC/s	<±0.2
Measure-jump		Compensated
Measure-jump	pC	<±0.1
Correction time	ms	<20
Measurement uncertainty		
Measuring range <100 pC	%	<1
Measuring range ≥100 pC	%	<0.5
Temperature coefficient, typ.	ppm/°C	<50
Linearity error, typ.	%FSO	<0.01
Crosstalk between channels	dB	<–80
Sensor impedance	Ω	>10 <sup>10</sup>

### Voltage output

Nominal output range	V	±10
Output impedance	Ω	10
Max. common mode voltage between input and output ground	V	50
Output noise (all ranges)		
1 Hz ... 100 kHz, typ.	mV <sub>rms</sub>	0.030
1 Hz ... 10 kHz, typ.	mV <sub>rms</sub>	0.012
Frequency range (–3 dB)	Hz	0 ... 100,000
Group delay (input to output, filters off)	μs	≤14
Zero error	mV	<±2
DAC resolution (analog out)	Bit	16

### Data acquisition

ADC resolution	Bit	24
Internal ADC sampling rate	kSps	625
Acquisition data rate per channel (adjustable)	kSps	100

Note: For the data acquisition with ≥25 kSps an anti-aliasing filter is automatically set with a cut-off frequency of 0.3 ... 0.43 x selected output update rate.

### High-Pass filter

Order		1.
Analog high-pass filter		
Time constant DC (Long)		
<45,000 pC	s	>10,000
≥45,000 pC	s	>100,000
Time constant Short		
<45,000 pC	s	10
≥45,000 pC	s	110
Tolerance (typ.)	%	20
Digital High-Pass Filter		
Cutoff-frequency (–3 dB) selection in 0.1 Hz steps	Hz	≥0.1 ... 10,000
Tolerance (typ.)	%	<1

### Digital Low-Pass filter

Filter type		Bessel or Butterworth
Order		2./4.
Cutoff-frequency (–3 dB) selection in 0.1 Hz steps	Hz	≥10
Tolerance (typ.)	%	<1

## Technical data (continuation)

### Digital Notch filter

Center frequency (–3 dB) selection in 0.1 Hz steps	Hz	≥10
Tolerance (typ.)	%	<1
Q factor		0.9 ... 1,000

### Virtual channels

Number of channels		
Type 5167A40		2
Type 5167A80		6

### Ethernet interface

Data rate	MBit	100
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### Remote control

(Digital input and 24 V supply)

Remote measure and trigger with 10 kΩ pullup to +5 V

Connector type		D-Sub 9f
Input level		
High (Reset, Stop trigger)	V	>3.5
or		Input open
Low (Measure, Start trigger)	V	<1
Max. input voltage	V	±30
Supply (output)	V DC	+24/±10%
Output current (short circuit proof)	mA	≤200

### Operation

All settings are configured in a standard web-browser through the graphical user interface. Simply connect to the Kistler LabAmp Type 5167A... by its network name and start working.

### Power supply requirements

Supply voltage range	VDC	18 ... 30
Power consumption	W	<15
Socket for barrel jack plug (IEC 60130-10 Type A)	mm	5.5x2.5x9.5
Power supply requirements		– galvanic isolation – PE and GND not connected

### General data

Operating temperature range	°C	0 ... 60
Storage temperature range	°C	–10 ... 70
Rel. humidity, not condensing	%	≤90
Degree of protection (EN 60529)		IP20
Outer dimensions incl. feet and connectors (WxHxD)		
Type 5167A40	mm	≈218x50x223
Type 5167A80	mm	≈218x93x223
Weight		
Type 5167A40	kg	1.2
Type 5167A80	kg	1.8

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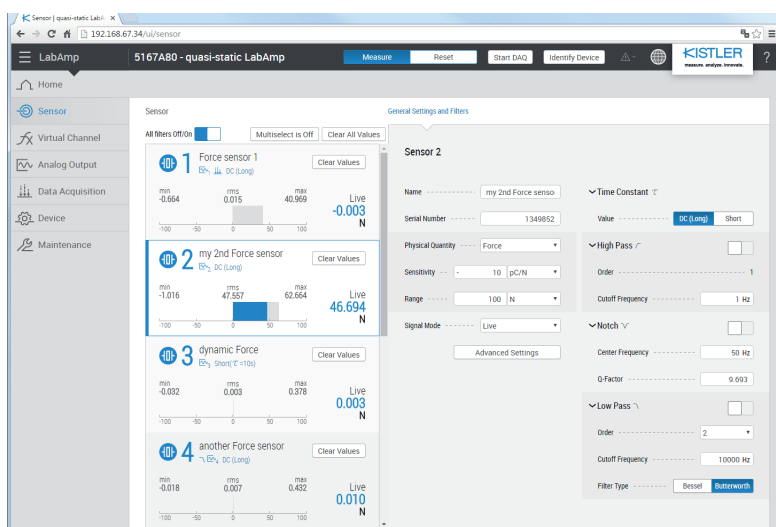


Fig. 1: Web user interface Type 5167Ax0

A simple data acquisition is also implemented, offering a data download controlled by a start/stop button. In addition, an API is available to perform automated measuring tasks PC-based.

**Block diagram**

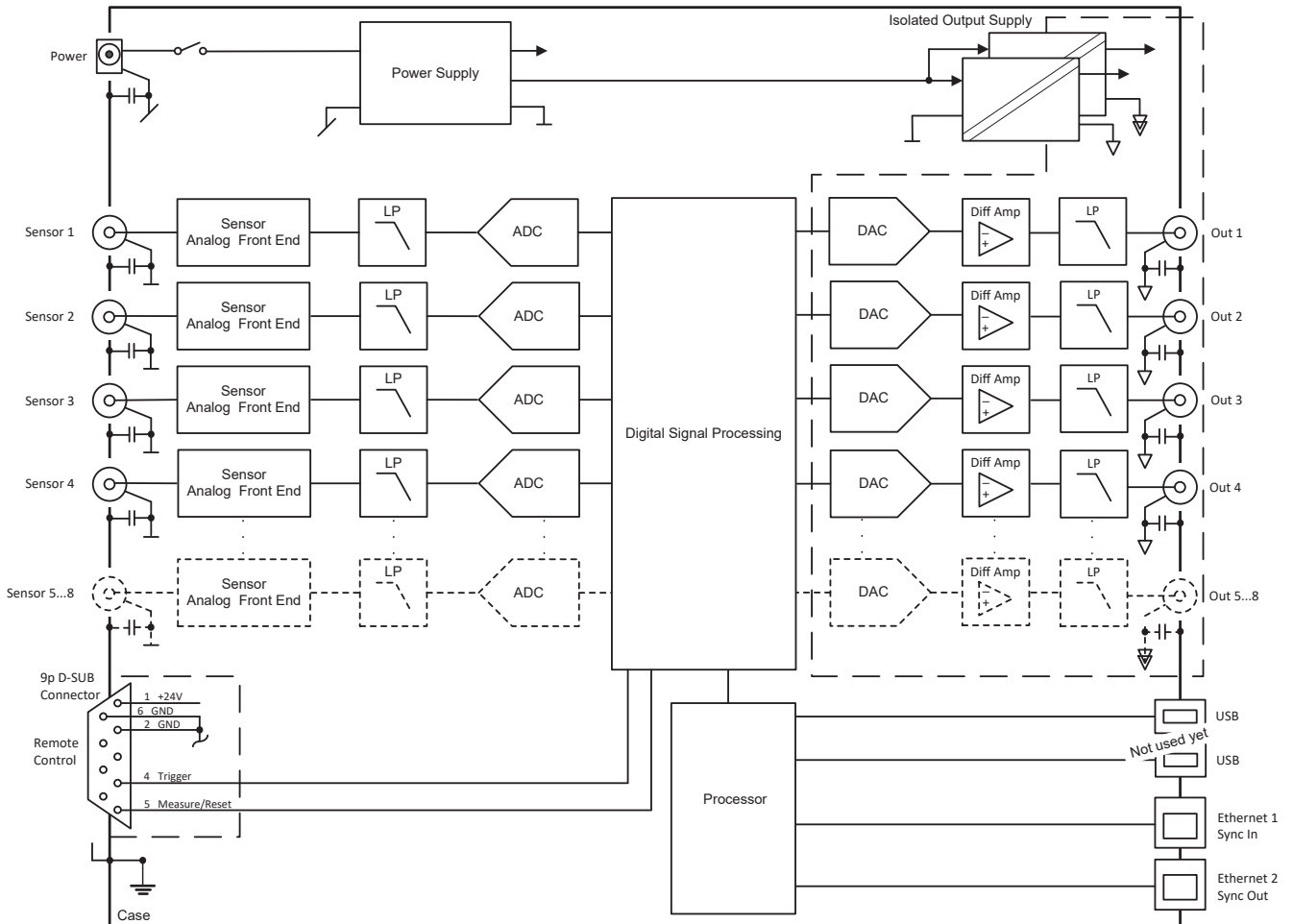


Fig. 2: Block diagram of the Kistler LabAmp Type 5167Ax0

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**Dimensions**

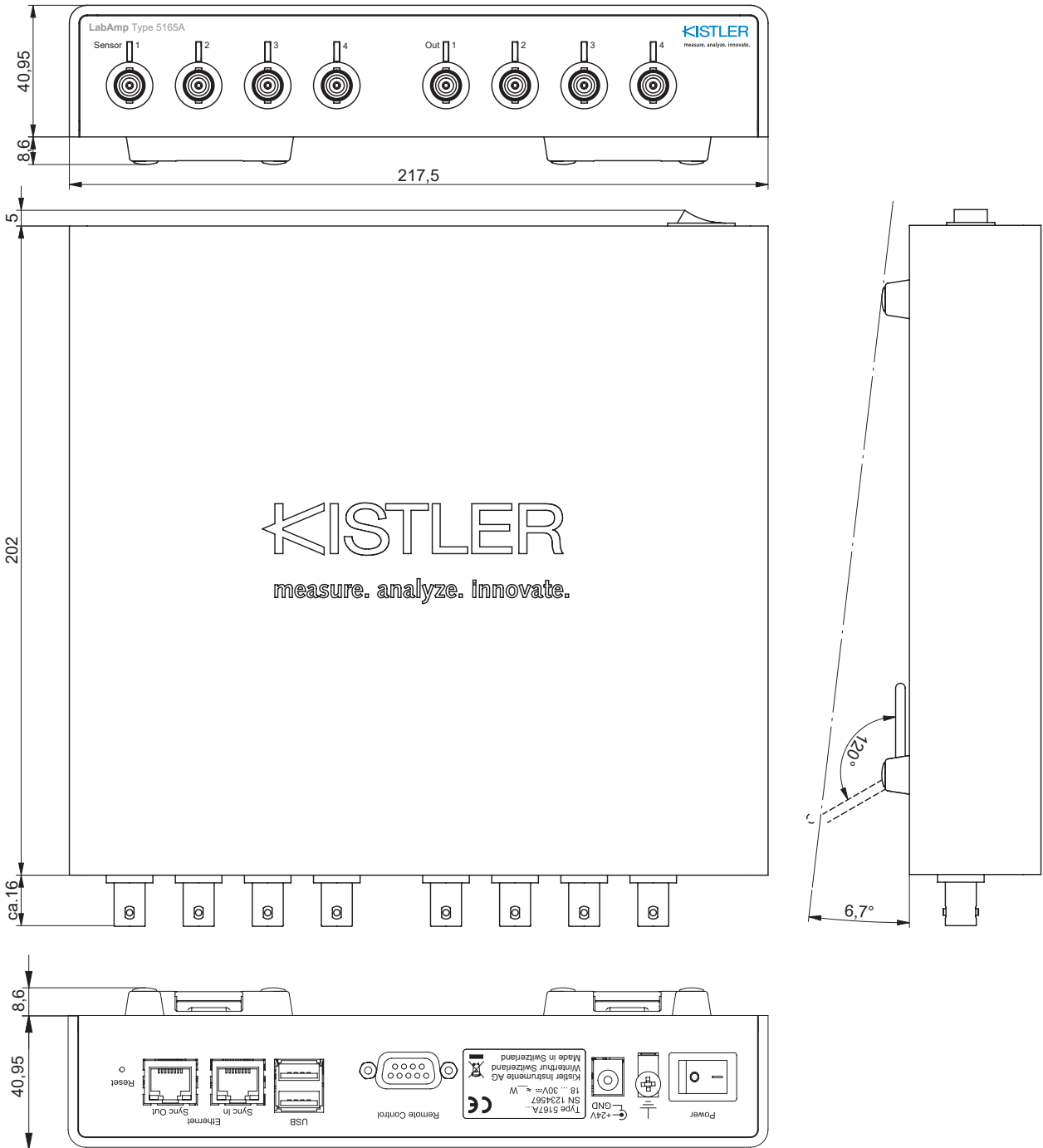
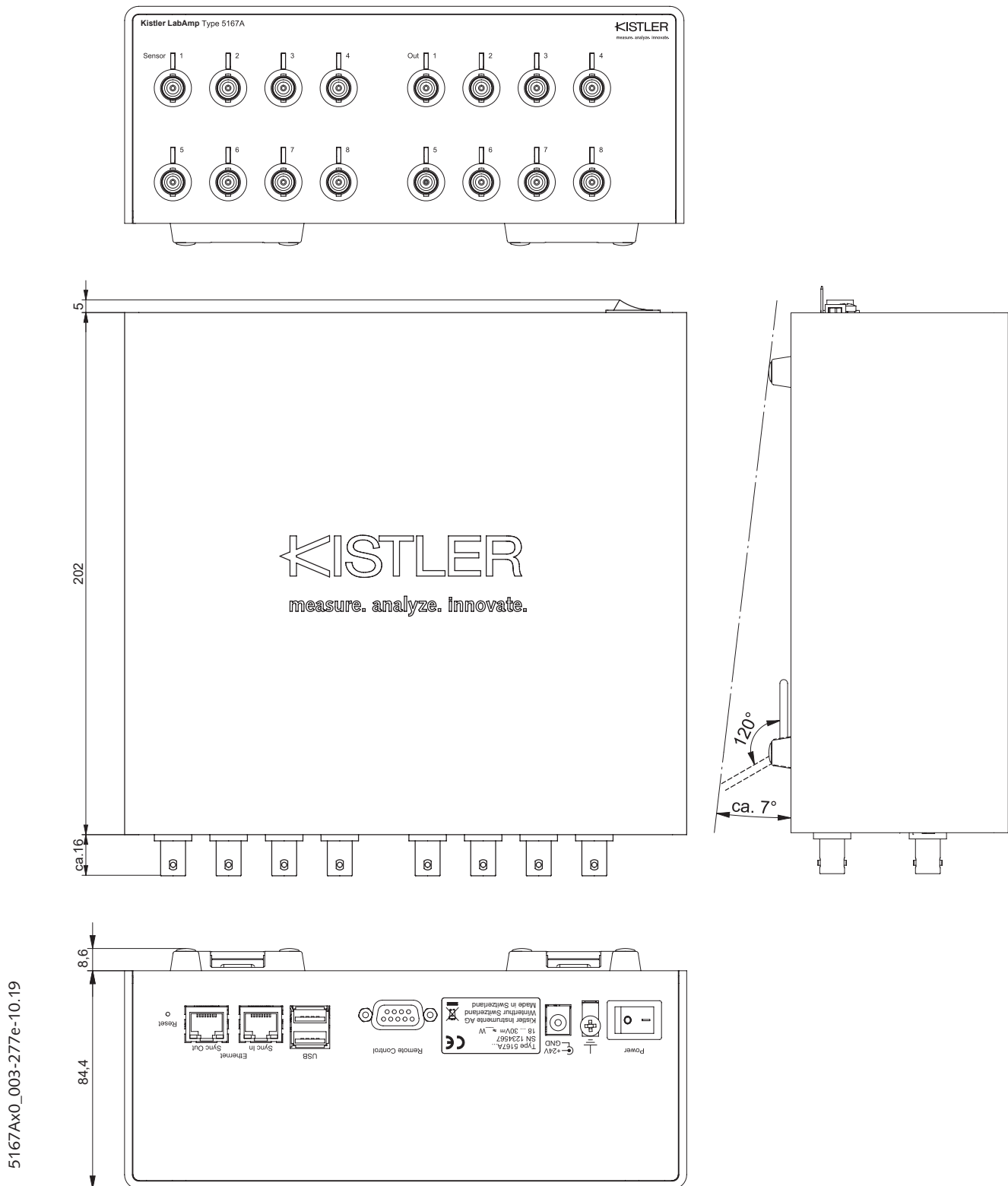


Fig. 3: Dimensions of Kistler LabAmp Type 5167A40

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Fig. 4: Dimensions of Kistler LabAmp Type 5167A80

### Included accessories

- Calibration sheet
- Quick-start guide

### Optional accessories

- 19" rack mounting tablet for Type 5167A40
- Dummy panel for empty 19" position (1 height unit)
- 19" rack mounting tablet for Type 5167A80
- Dummy panel for empty 19" position (2 height units)
- DynoWare software Full license with HASP license key
- Inductive proximity switch generates an external trigger signal to start measurement



- Power supply\* 24 V incl. country-specific plug
- Data Acquisition functionality (if not purchased with the device)
- jBEAM Professional T&M SW for Measurement Data Analysis

\* Available as combined kit together with the amplifier

### Type/Mat. No.

–  
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### Type/Mat. No.

5748A1  
5748A2  
5748A3  
5748A4  
2825A-03-2  
2233B

5779A2  
5167A---S1  
2897A2

### Ordering key

#### LabAmp

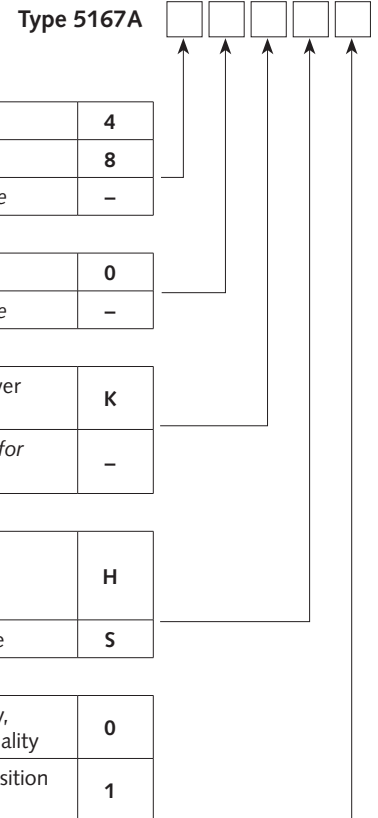
4 channels	4
8 channels	8
SW order for existing device	–

BNC input connectors	0
SW order for existing device	–

Kit with amplifier, 24 V power supply, 2 m Ethernet cable	K
Amplifier only or SW order for existing device	–

Hardware & Software (new device with potential SW features)	H
SW order for existing device	S

Eco version, analog out only, no data acquisition functionality	0
Full version (incl. data acquisition functionality)	1
Full version, incl. data acquisition & DynoWare Type 2825A	2



### Configuration examples:

- 5167A80KH1: 8-Channel device with BNC input connectors, incl. power supply & Ethernet cable, incl. data acquisition functionality
- 5167A---S1: Data acquisition functionality for an existing 5167A device