

KISTLER

measure. analyze. innovate.



Thermoacoustics technical brochure

Product line to measure combustion dynamics with pressure and acceleration sensors on gas turbines



Absolute Attention for tomorrow's world

Kistler develops solutions for challenges in measurement technology with a portfolio that comprises sensors, electronics, systems and services. We push the frontiers of physics in fields such as emission reduction, quality control, mobility and vehicle safety: our products deliver top performance to meet the standards of tomorrow's world, providing the ideal basis for Industry 4.0. This is how we pave the way for innovation and growth – for our customers, and with our customers.



Kistler: the byword for advances in engine monitoring, vehicle safety and vehicle dynamics. Our products deliver data that plays a key part in developing efficient vehicles for tomorrow's world.



Measurement technology from Kistler ensures top performance in sport diagnostics, traffic data acquisition, cutting force analysis and many other applications where absolutely reliable measurements are required despite extreme conditions.



By supporting all the stages in networked, digitalized production, Kistler's systems maximize process efficiency and cost-effectiveness in the smart factories of the next generation.

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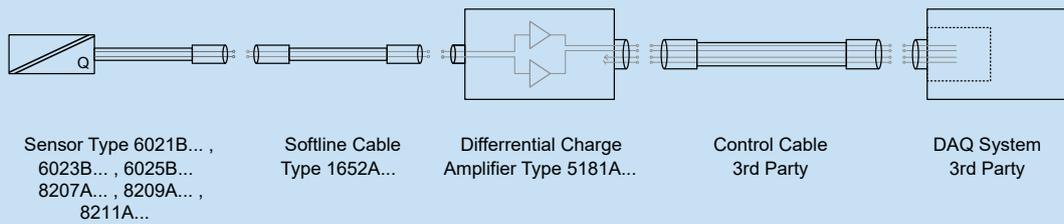
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Modular measuring chains

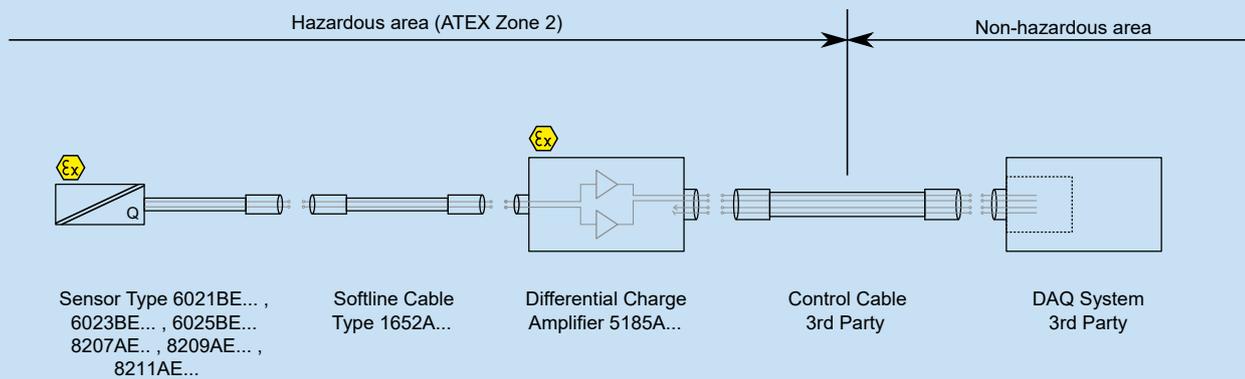
This technical brochure provides an overview how the various system components of the Kistler thermoacoustics product line can be combined to form complete measuring chains for typical application scenarios. Various measuring chain configurations for operation in non explosive environments (Non-Ex) and in

potentially explosive atmospheres ('Ex-nA' non sparking and 'Ex-ia' intrinsically safe) are explained in detail. Charge amplifier, softline cable and ATEX barrier can be combined both with pressure and acceleration sensors.

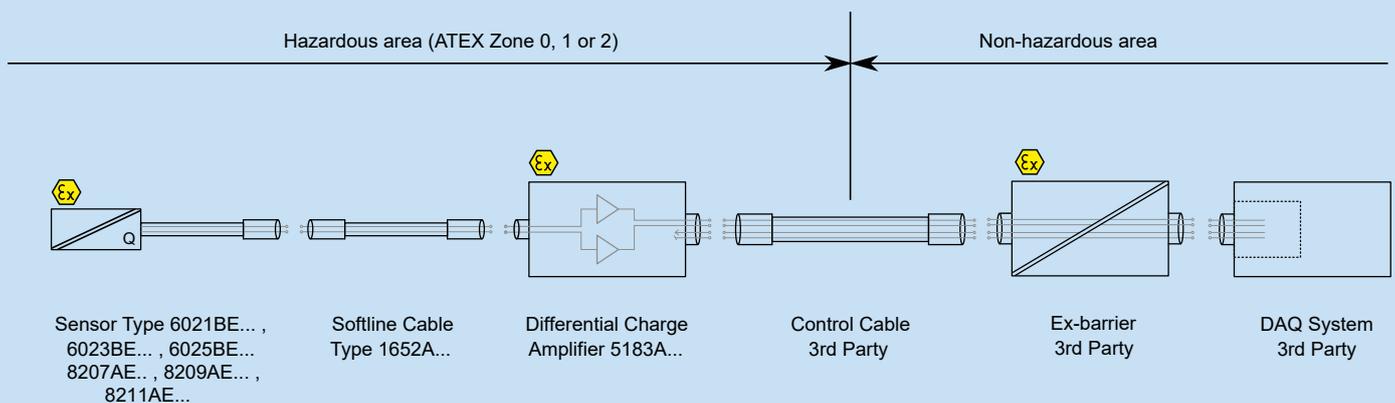
Non-Ex



Non-sparking (Ex-nA)



Intrinsically safe (Ex-ia)



High-temperature pressure sensors

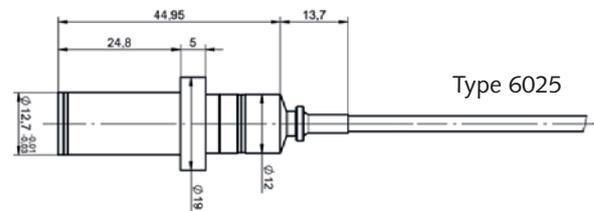
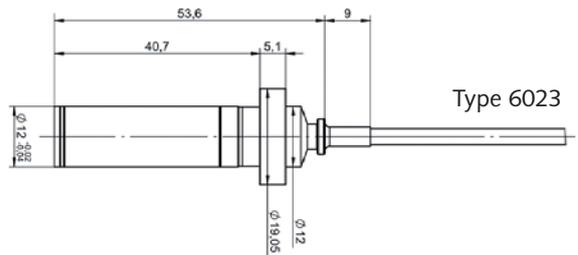
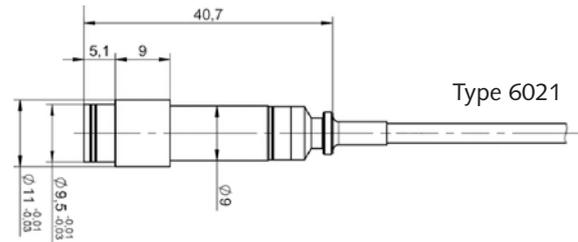
Kistler's durable pressure sensors based on proprietary PiezoStar crystal material have been developed specifically for high-temperature environments of up to 700°C.

Key features

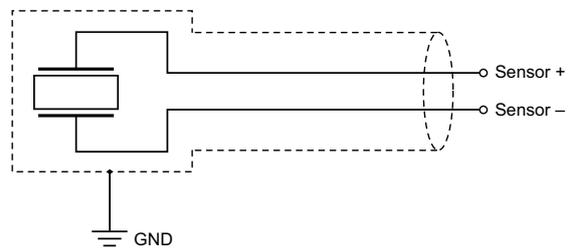
- Operating temperature range
-55 ... 700°C / -67 ... 1300°F
- Integrated mineral insulated hardline cable
- Differential signal output, 2-wire system
- Acceleration compensated
- High natural frequency >50 kHz
- Internally case isolated

Options

- Length of hardline cable
- Various cable terminations
- Ex-Certification (Ex-nA, Ex-ia)



Types 6021B..., 6023B..., and 6025B...



Available sensor configurations

The Kistler sensor platform is highly flexible. Sensors are available in different cable lengths and with several cable terminations.

Sensor Type	Sensitivity	Sensor configurations
Type 6021B...	65 pC/bar	
Type 6023B...	95 pC/bar	
Type 6025B...	105 pC/bar	

High-temperature acceleration sensors

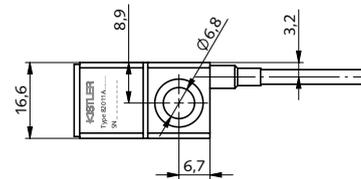
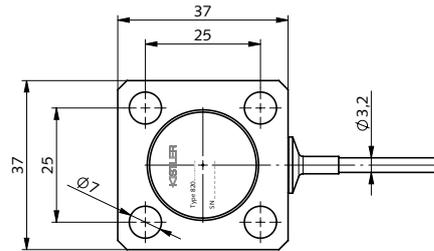
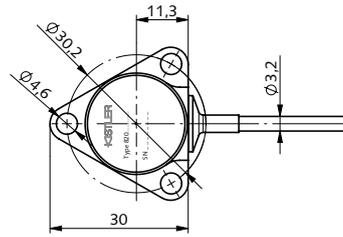
Kistler's durable acceleration sensors based on proprietary PiezoStar crystal material have been developed specifically for high-temperature environments of up to 700°C.

Key features

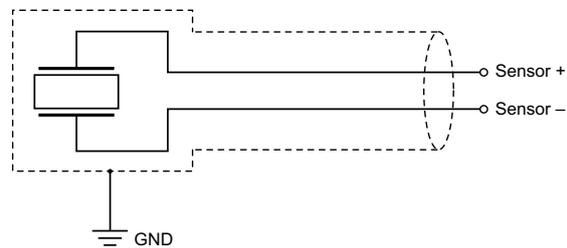
- Operating temperature range
 - Type 8207A
–55 ... 480°C / –67 ... 900°F
 - Type 8209A, 8211A
–55 ... 700°C / –67 ... 1 300°F
- Integrated mineral insulated hardline cable
- Differential signal output, 2-wire system
- Lowest transverse sensitivity
- 0.5 Hz .. 5 kHz freq. range
- Internally case isolated

Options

- Length of hardline cable
- Various cable terminations
- Ex-Certification (Ex-nA, Ex-ia)

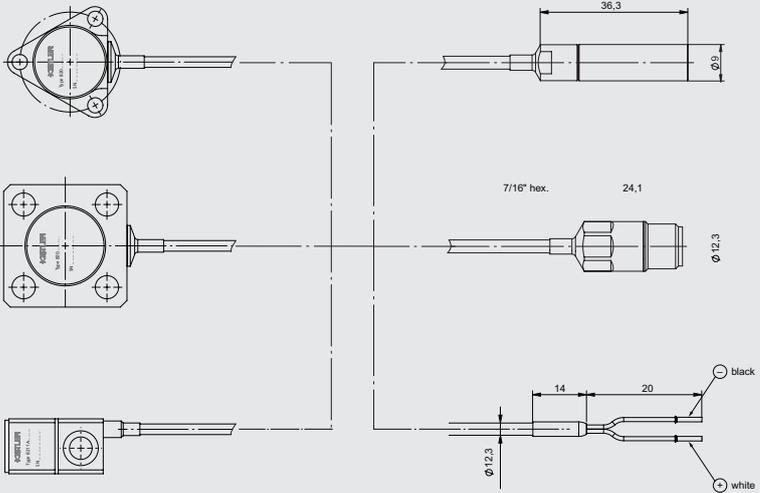


Types 8207A..., 8209A... and 8211A...



Available sensor configurations

The Kistler sensor platform is highly flexible. Sensors are available in different cable lengths and with several cable terminations.

Sensor Type	Sensor configurations
Type 8207A / 8209A  Arinc footprint	
Type 8207A / 8209A  25 x 25 mm footprint	
Type 8211A 	

Two-wire softline cables

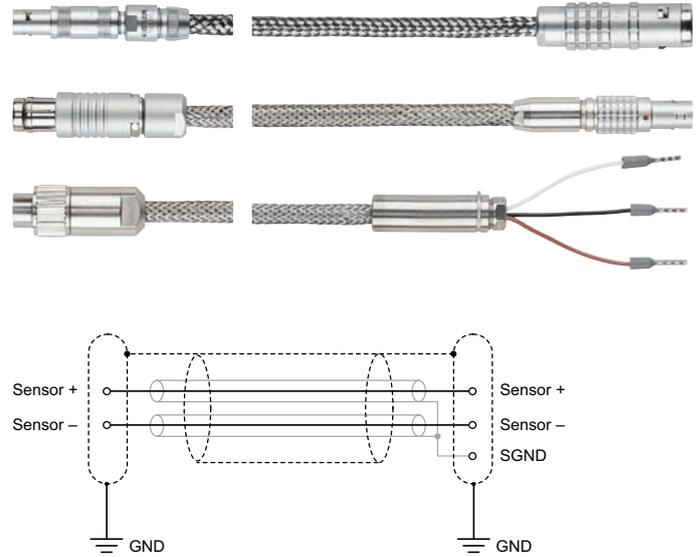
Kistler's two-wire softline cables form an integral part of the differential measuring system. They are responsible for disturbance-free transmission of low level charge signals over distances up to 50 meters even in environments with electromagnetic interferences.

Key features

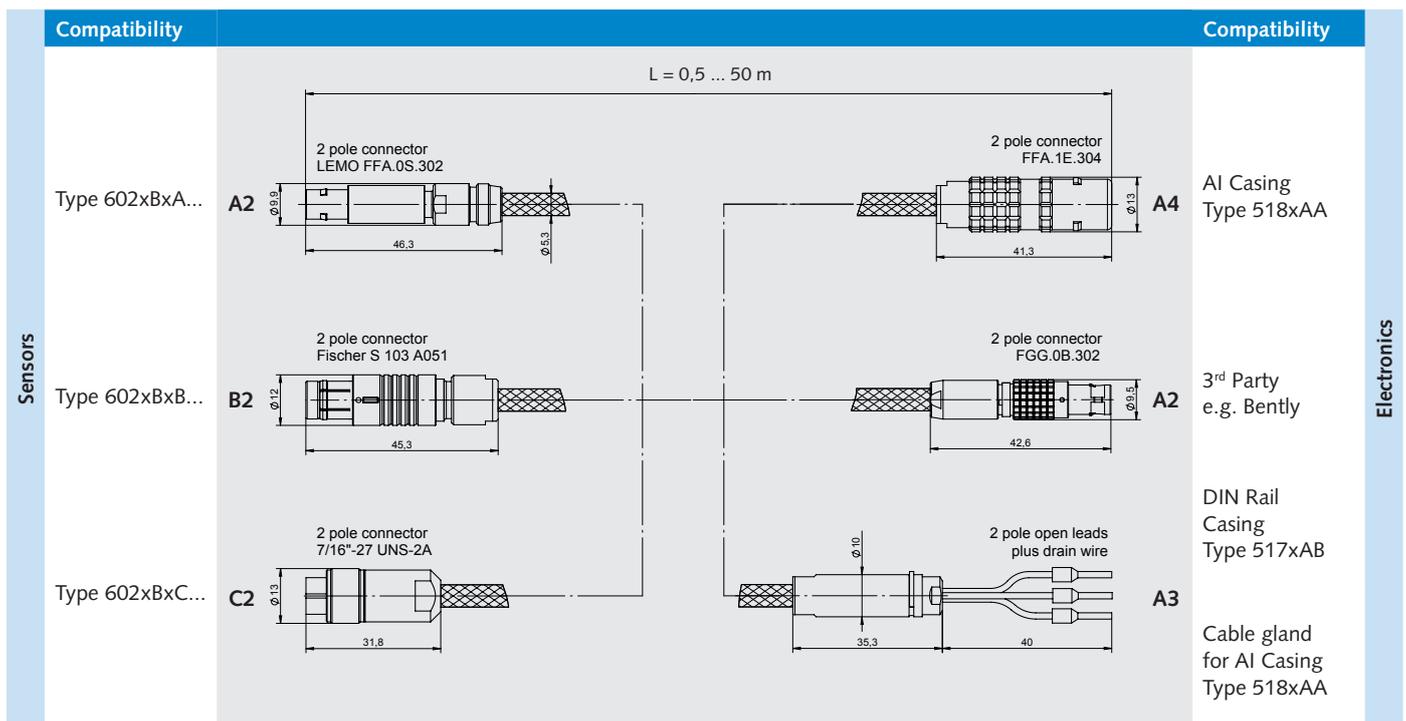
- Operating temperature range
-55 ... 200°C / -67 ... 392°F
- 2-core twisted pair, indiv. braided shield
- Steel overbraid
- Locking connectors

Options

- Standard cable length: 5, 10 and 20 m
- Different connector options



Available cable configurations



Differential charge amplifiers

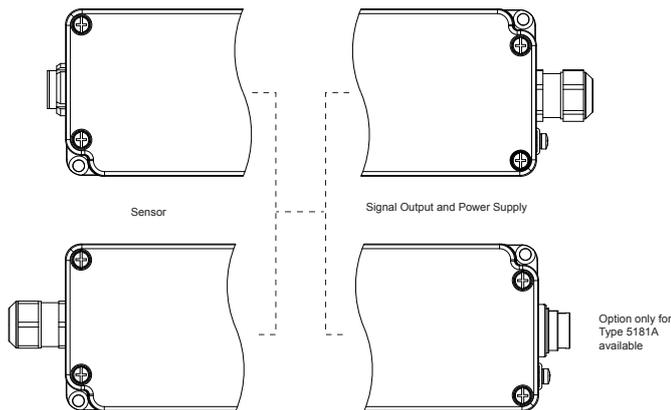
Kistler's differential charge amplifier family offers a wide range of signal conversion possibilities and is available in non-Ex, Ex-ia and Ex-nA versions. The complete family is compatible with the high temperature pressure and acceleration portfolio.

Type	Version	Ex Protection	Enclosure
5181A...	Non-Ex		
5183A...	Ex-ia	– II 3G Ex ia II T5 Ga – II 3G Ex ia IIC T5 Ga X	Aluminum die-cast Plastic DIN-Rail
5185A...	Ex-nA	– II 3G Ex nA IIC T5 Gc – II 3G Ex nA IIC T5 Gc X	Aluminum die-cast Plastic DIN-Rail

Each Type is available in two enclosure versions:

Aluminum die cast enclosure

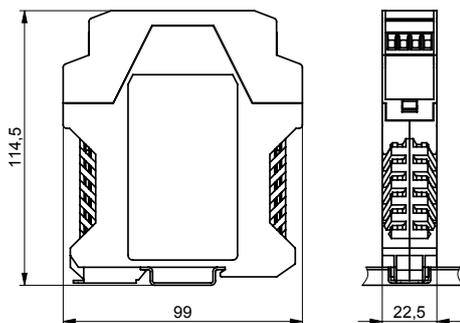
- Ideal for low channel count
- Installation in Ex-zone without additional enclosure
- Connectors or cable glands



Types 5181AA... / 5183AA... / 5185AA...

Plastic DIN-Rail enclosure

- Ideal for high channel count
- Installation in Ex-zone requires additional "Ex Box"
- Screw terminal connections



Types 5181AB... / 5183AB... / 5185AB...



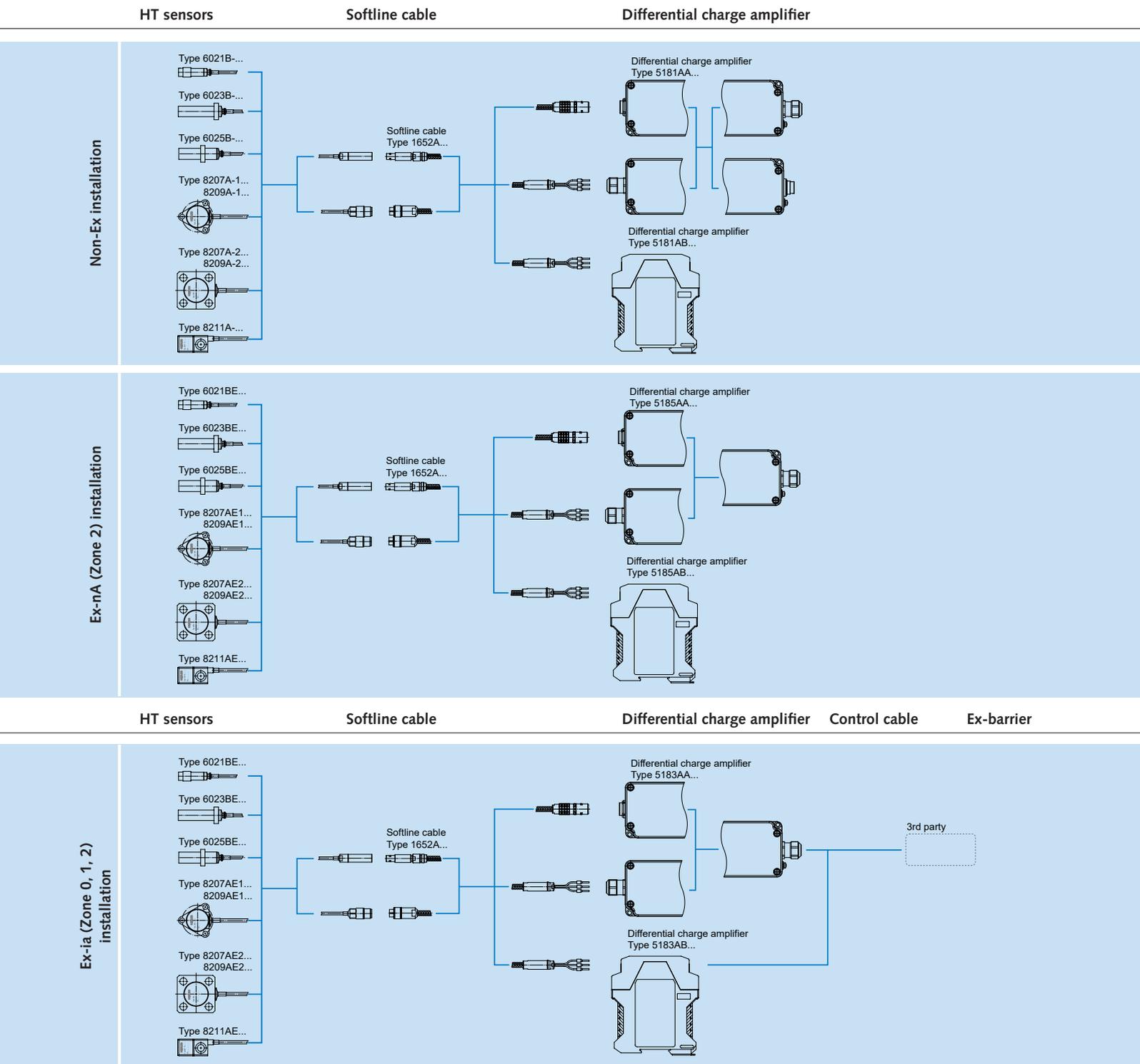
Options

- **Sensitivity:**
 - Default
 - U-Out version: 10 mV/pC
 - I-Out version: 6 µA/pC
 - Custom
 - SE voltage Out * ±10 V: 10 ... 400 mV/pC
 - SE voltage Out 5 ±5 V: 5 ... 200 mV/pC
 - Diff. Out ±10 V: 10 ... 400 mV/pC
 - I-Out 14 ±6 mA: 6 ... 240 µA/pC
 - * Extended ranges are available on request
- **Signal output options:**
 - Voltage SE (±10 V; 5 ±5 V) or Differential (±10 V)
 - Current (14 ±6 mA); 3-wire or 2-wire current loop
 - Velocity output is available on request
- **Programmable low and high pass filter**
 - Default (f_{HP} 0,5 Hz / f_{LP} 10 kHz)



Measuring chain configurations

The following examples show some of the most common measuring chain configurations for non-Ex and for Ex-protection Ex-nA and Ex-ia.



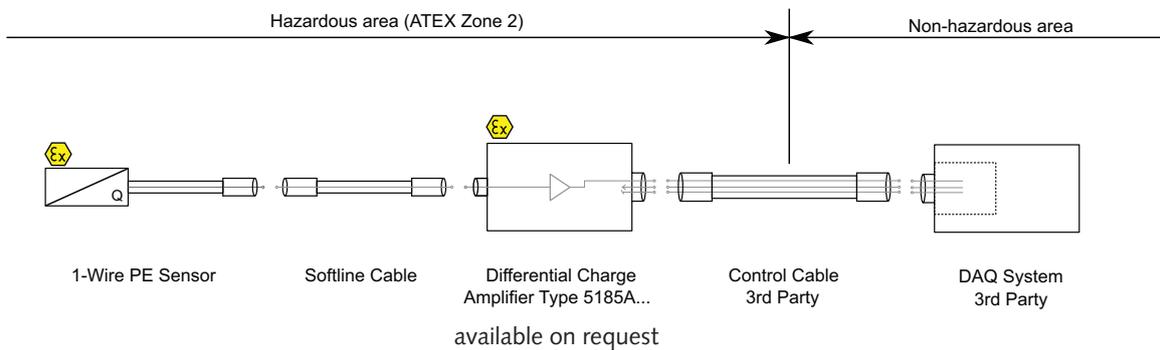
Special use cases

The following use cases show how Kistler measuring chains can be configured to meet specific requirements.

Use case 1:

Ex-Applications (-nA, -ia) – 1-wire PE Sensor – Differential Charge Amplifier

For applications in hazardous environment (-nA, -ia) standard 1-wire PE Ex-certified pressure sensors can be operated with the differential charge amplifier Type 5183 or 5185.



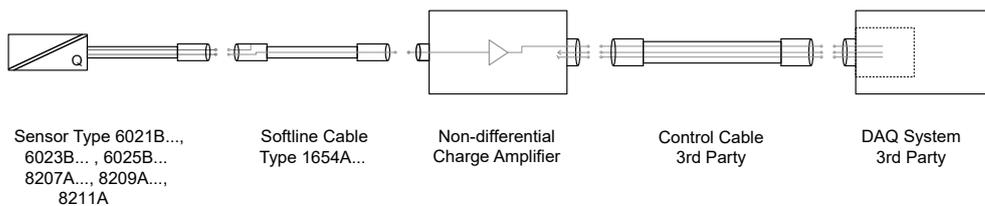
Advantage: Ex-applications can be covered

Disadvantage: non differential signal

Use Case 2:

Differential – Single Ended

Operation of differential output sensor with a conventional non-differential charge amplifier (typically in a laboratory environment).

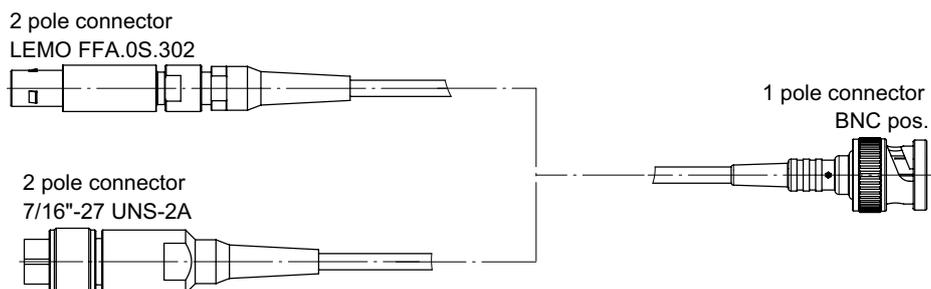


Advantage: use of non-differential charge amplifiers

Disadvantage: non differential signal

1-wire Ground Isolated Connecting Cable, Type 1654A...

For operation with non-differential charge amplifiers.



At our customers' service across the globe

Thanks to Kistler's global sales and service network, we are always close to our customers. Approximately 2 000 employees at 61 locations are dedicated to the development of new measurement solutions and offer customized on-site support of individual applications.



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Our representatives are here to help
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The targeted approach to boosting engine efficiency

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Sensor Technology

Kistler – Measuring Systems and Sensors

The Kistler Group is the global market leader in dynamic measurement technology. With – and for – our customers, we develop technology-based measuring solutions that push the physical limits, as we work together to break new ground: Kistler, for measuring systems and sensors that meet extreme challenges.

Our technology measures pressure, force, acceleration and torque. Our instruments are used to measure and analyze physical processes, control industrial processes and optimize products. Our product offering is used in engine development and monitoring, vehicle technology, plastics processing and metal machining, as well as assembly and testing technology. We develop and supply sensors, electronics, and software, backed up by a full range of services. In short: everything from one single source.

NEWS

Kistler presents new measurement technologies at the Automotive Testing Expo 2017 02.05.

Kistler presents innovative measurement equipment for demanding vehicle testing applications

Kistler showcases practical sensor integration for injection molds 25.04.

At Moulding Expo 2017, we will show how easy it is to install the measurement



Education and training events
Education and training courses, during which our sensors and measuring systems are explained by Kistler experts, are the most efficient way for you to obtain the required user knowledge.

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Take the lead – right from the start

Biomechanics
Force measurement solutions for motion analysis, sport performance diagnosis, rehabilitation and ergonomics

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Safe braking thanks to efficient maintenance

Brake force measurement in the rail transport sector
Proven and accurate for gradual brake force braking

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Flexible to create and easy to integrate

Now OML-ready as well

Weigh In Motion
Advanced equipment for axle weight, axle load, axle spacing, axle load and full vehicle applications

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Measuring equipment for demanding T&M applications

Test & Measurement
Sensors and signal conditioning centres

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Develop and operate gas turbines more efficiently

Gas turbine monitoring
Measuring combustion dynamics improves turbo-machinery performance

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Analyzing and commanding sophisticated machining processes

Cutting force measurement
Force measuring systems for machining

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