

MEGGITT

Sensors and measurement chains for turbomachinery

vibro-meter®

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vibro-meter legacy

For 70 years, vibro-meter products and expertise have enabled superior solutions for the sensing and monitoring of vibration, pressure and air-gap in critical plants and equipment.

Our sensors and measurement chains are used in various industries where the health of rotating machinery, especially large, critical machines is a major concern. They are installed on thousands of machines worldwide and help to monitor and protect these important assets every single day.

We make it our business to provide the best solutions for your measurement and monitoring requirements in order to project your investment. This allows you to reach higher levels of reliability, machine availability and output.

Today, our products are trusted by OEMs globally and have been qualified and adopted as standard-fit components on machinery used in Power Generation, Oil & Gas and other industrial applications.

QUALITY AND RELIABILITY

Meggitt SA is recognised for higher quality standards. First certified to ISO 9000 in 1995, we have been regularly recertified since. Our latest ISO 9001:2015 quality management and ISO 14001:2015 environmental management certificates were awarded by AFNOR Certification. In addition, for specific vibro-meter products:

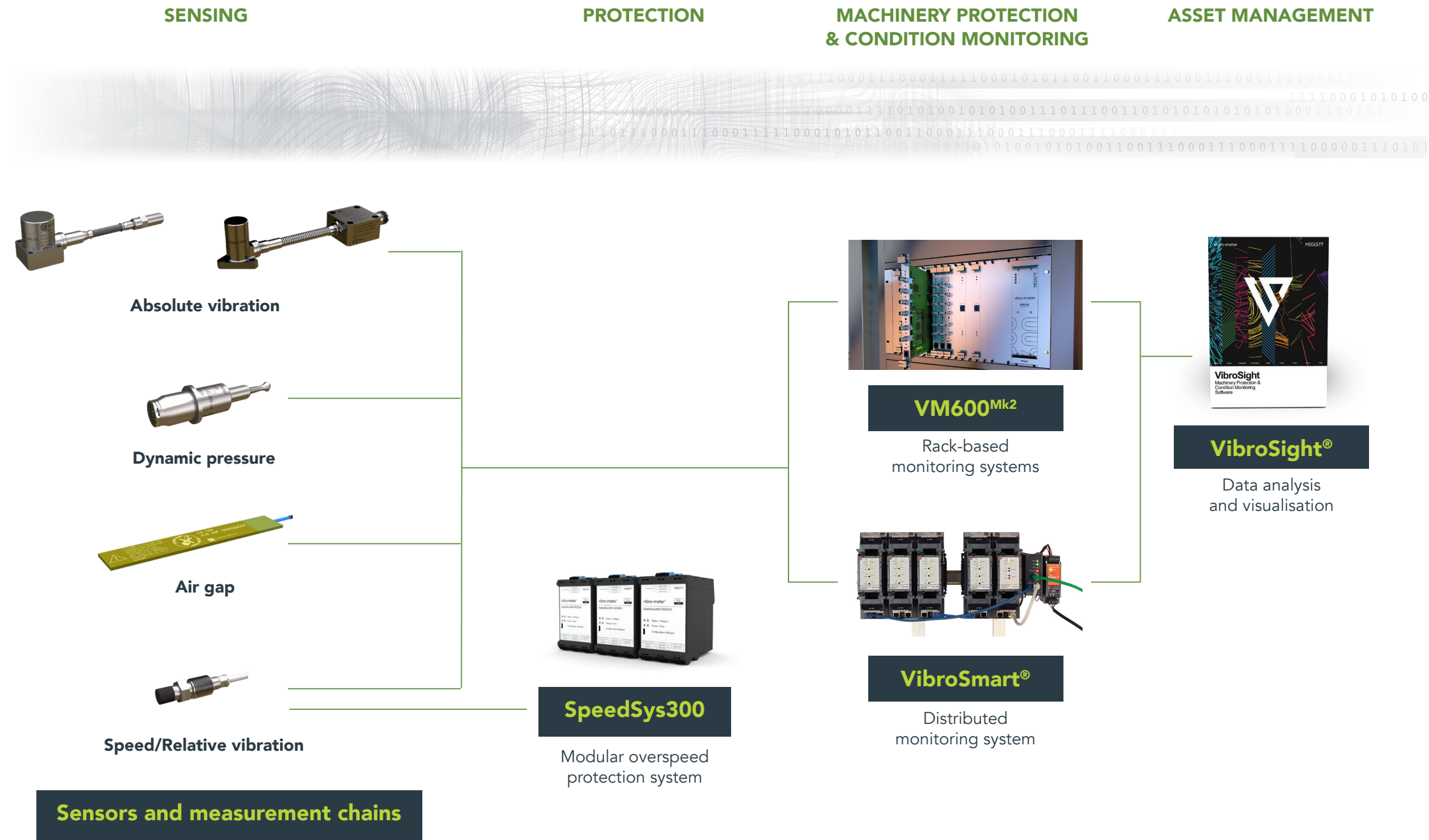
- A large number are Ex certified so that they can be used in hazardous areas (potentially explosive atmospheres), for example, installed on gas turbines.
- A number are SIL safety certified so that they can be used in safety-related applications (functional safety contexts), for example, critical protection systems.



vibro-meter product portfolio

FROM SENSORS
TO DECISIONS

Our comprehensive range of sensors and measurement chains can be used with our monitoring system hardware and software (or third-party systems) in order to provide complete solutions for the monitoring and protection of critical machines and processes. From standard environments to extreme conditions, our sensor catalogue includes the right choice for your application.



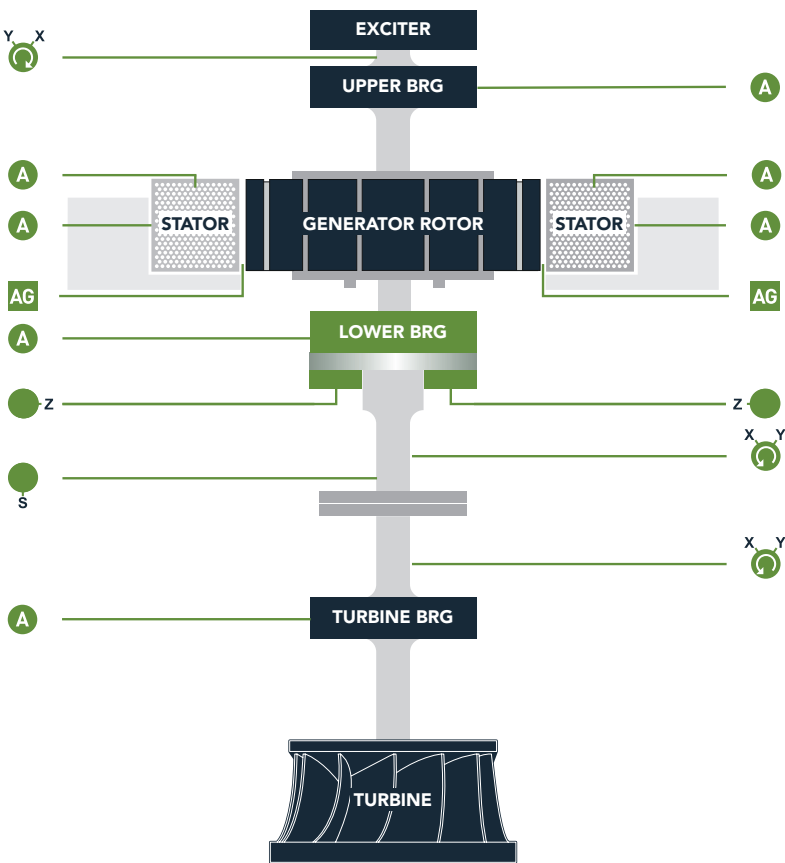
A WORLD LEADER IN SENSING AND MONITORING SOLUTIONS FOR THE ENERGY INDUSTRY

- Continuous product improvement • Complete turnkey solutions
- Support for industry standards (machinery monitoring, communications and cybersecurity)
- Services and support • Factory acceptance tests (FATs)

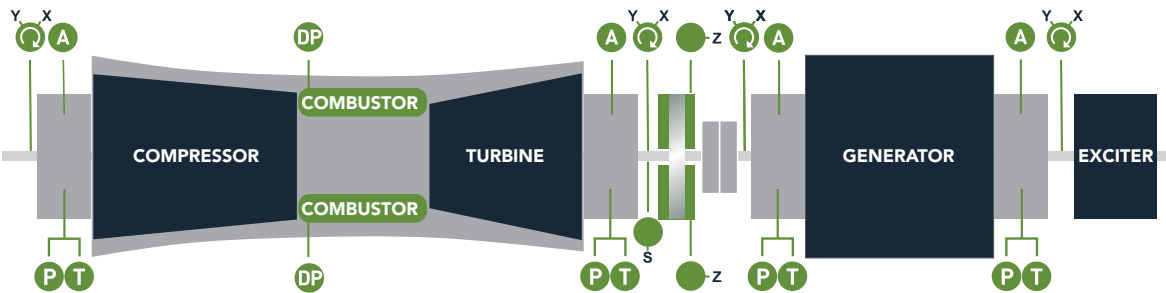
Sensors for critical applications

The vibro-meter portfolio specialises in products and solutions for machinery protection and condition monitoring of critical rotating machinery.

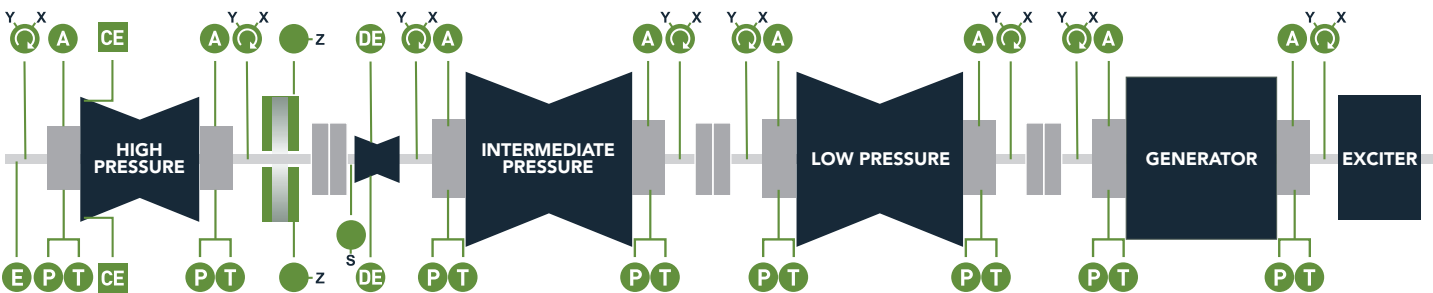
Hydro Turbine



Gas Turbine



Steam Turbine



- | | | | |
|-----------------------------|---|------------------------------------|-------------------------|
| AG Air gap | DP Dynamic pressure [combustor chamber] | T Lube oil pressure temperature | s Speed/phase reference |
| CE Case expansion | E Eccentricity | DE Rotor differential expansion | z Thrust/axial position |
| A Case (absolute) vibration | P Lube oil pressure | x-y Shaft relative vibration [x,y] | Thrust bearing |

High-temperature vibration sensors

The CA series of vibration sensors are high-temperature, piezoelectric-based accelerometers designed for the long-term measurement and monitoring of absolute vibration in the most severe of environments

An external IPC signal conditioner is required to convert the low-level charge signal (pC/g) output by a CA sensor into a current or voltage signal suitable for transmission to the monitoring system. This separation of electronics enables the sensor's high performance at higher temperatures.

CA ACCELEROMETER BASED SOLUTIONS ENABLE HIGH PERFORMANCE AT HIGHER TEMPERATURES

KEY FEATURES:

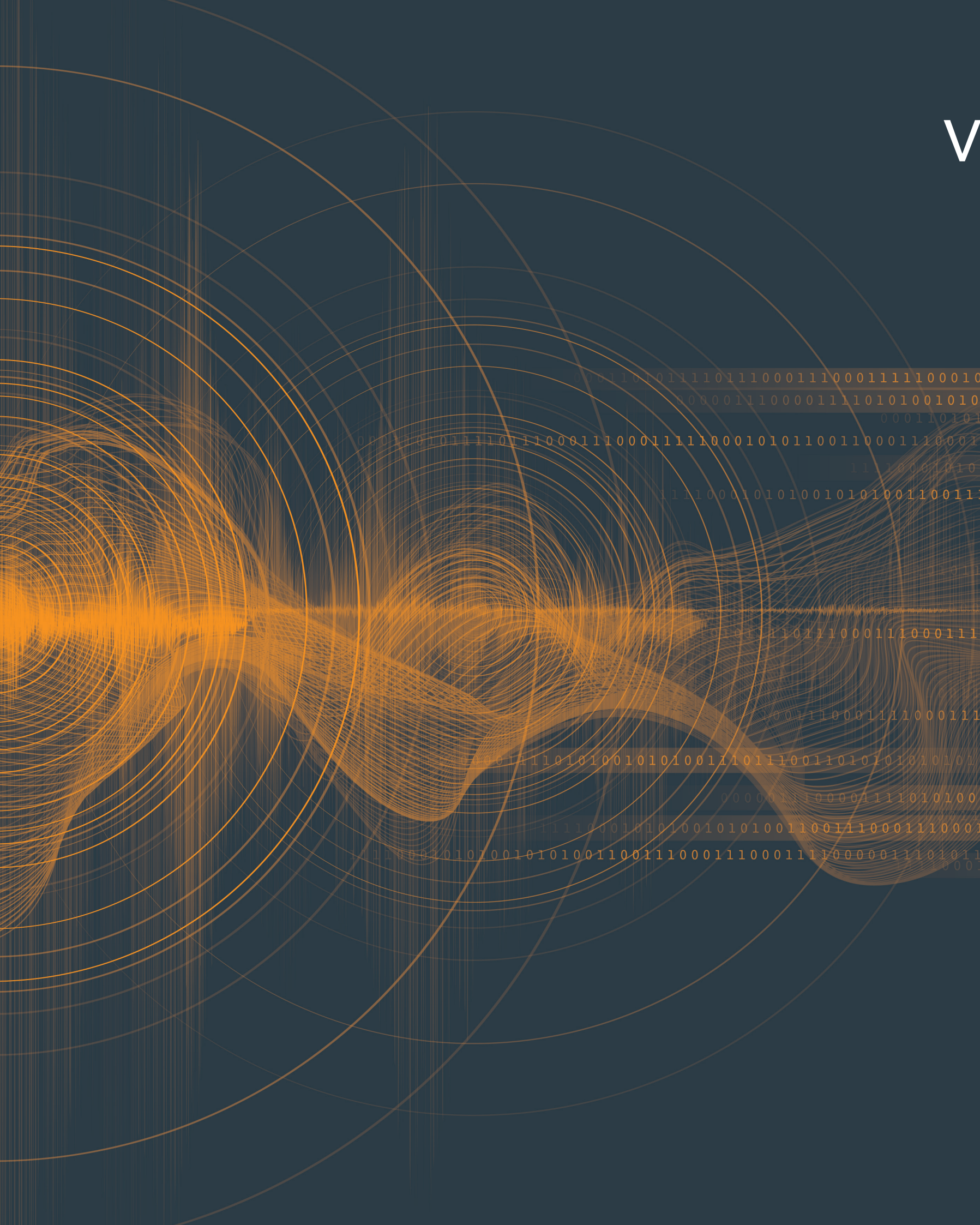
Available in standard versions and in Ex versions certified internationally for use in hazardous areas.

Suitable for high-temperature environments (up to 700°C) and safety-related applications using SIL 2 measurement chains.

Qualified by major OEMs for industrial vibration monitoring.

HIGH-TEMPERATURE VIBRATION SENSORS AND THEIR MEASUREMENT CHAINS





Vibration sensors with attached or integrated electronics

For applications that do not require the high-temperature capabilities of the CA series, these vibration sensors provide more cost-effective and easier to install solutions.

The CE series of sensors are piezoelectric-based accelerometers that come with either integrally attached electronics for higher temperature applications or integrated electronics for lower temperature applications. These sensors are suitable for the measurement and monitoring of vibration in harsh environments, such as gas or steam turbines, compressors, pumps and fans.

The SE120 is a high-sensitivity piezoresistive accelerometer suitable for the measurement and monitoring of vibration at lower frequencies in harsh environments, such as hydro turbines and fans.

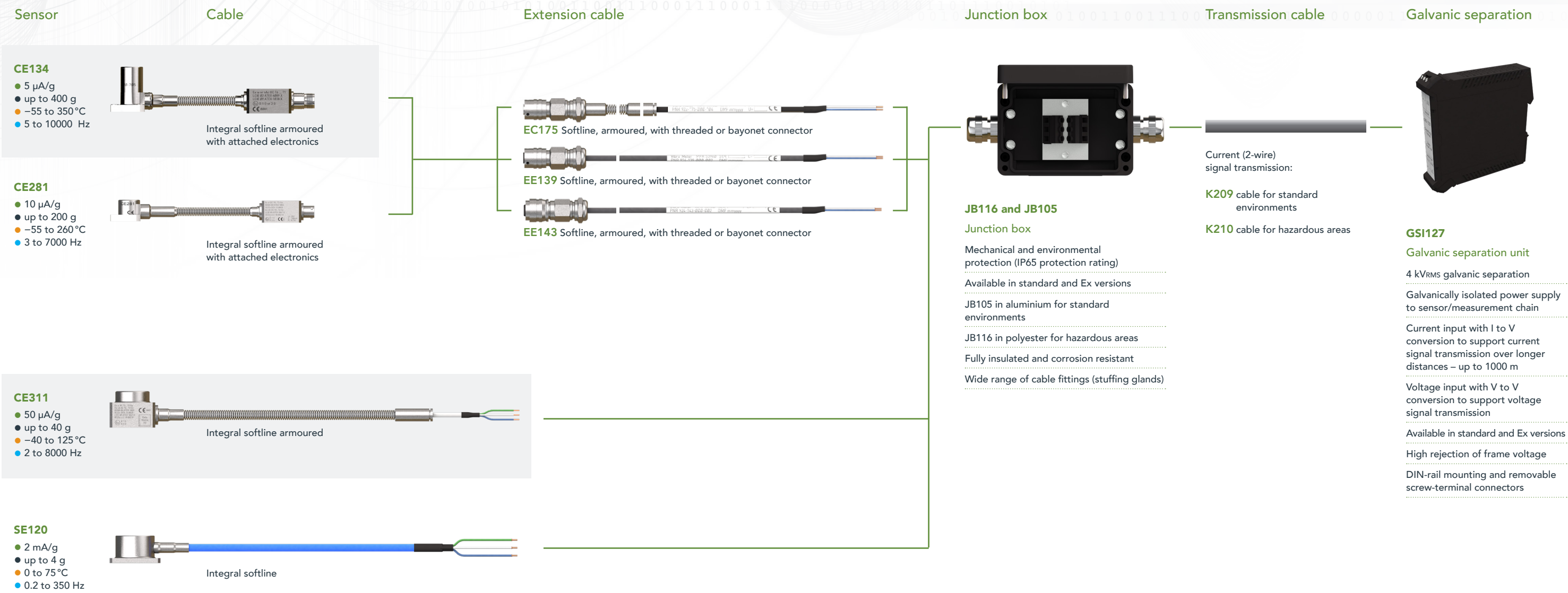
CE-BASED SOLUTIONS PROVIDE HIGH PERFORMANCE
AT HIGH TEMPERATURES

KEY FEATURES:

Available in standard versions and in Ex versions certified internationally for use in hazardous areas.

Attached or integrated electronics so installation is easier
(no external signal conditioners and simpler cabling).

VIBRATION SENSORS WITH ATTACHED OR INTEGRATED ELECTRONICS AND THEIR MEASUREMENT CHAINS



Vibration sensors with velocity output

For vibration monitoring of low speed rotating machinery.

Designed for the long-term measurement and monitoring of absolute vibration at low frequency, such as hydro turbines or fan applications.

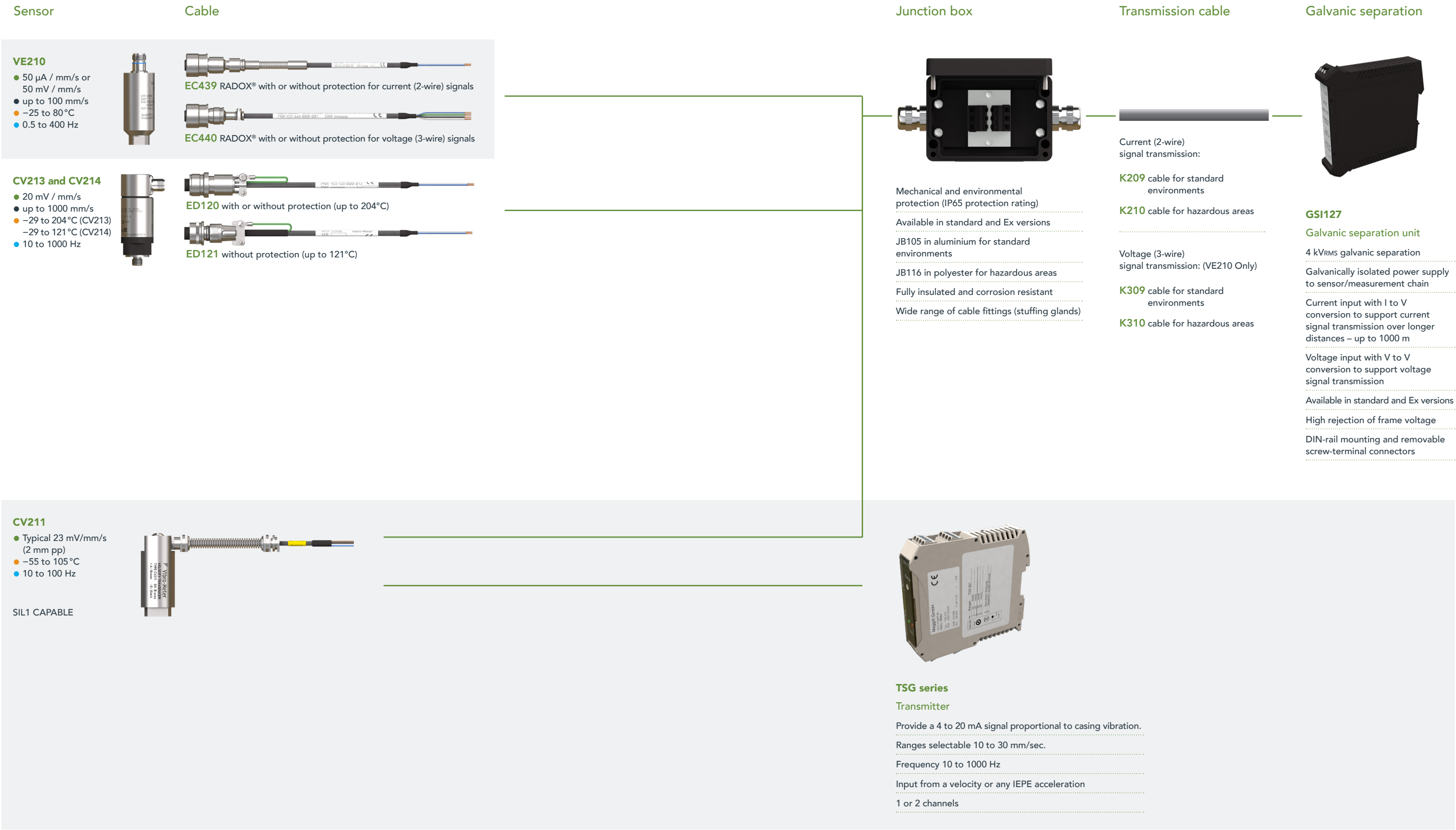
CV OR VE VELOCITY SENSORS ENABLE HIGH PERFORMANCE
AT LOW FREQUENCIES.

KEY FEATURES:

Velocity sensor designed according to the moving coil principle provide a high signal to noise ratio in the low frequency range.

CV's type available in EX version certified for use in hazardous areas up to 200°C.

VIBRATION SENSORS WITH VELOCITY OUTPUT
AND THEIR MEASUREMENT CHAINS





Dynamic pressure sensors for combustion monitoring

The CP series of dynamic pressure sensors are high-temperature, piezoelectric-based pressure sensors designed for the long-term measurement and monitoring of combustion – combustor pulsations and combustion dynamics – in gas turbines.

An external IPC signal conditioner is required to convert the low-level charge signal (pC/g) output by a CP sensor into a current or voltage signal suitable for transmission to the monitoring system. This separation of electronics enables the sensor's high performance at higher temperatures.

CP SENSORS USE PATENTED ACCELERATION-COMPENSATED DESIGNS TO ENABLE THE HIGHEST TEMPERATURES AND PRESSURE SENSITIVITIES IN THE INDUSTRY

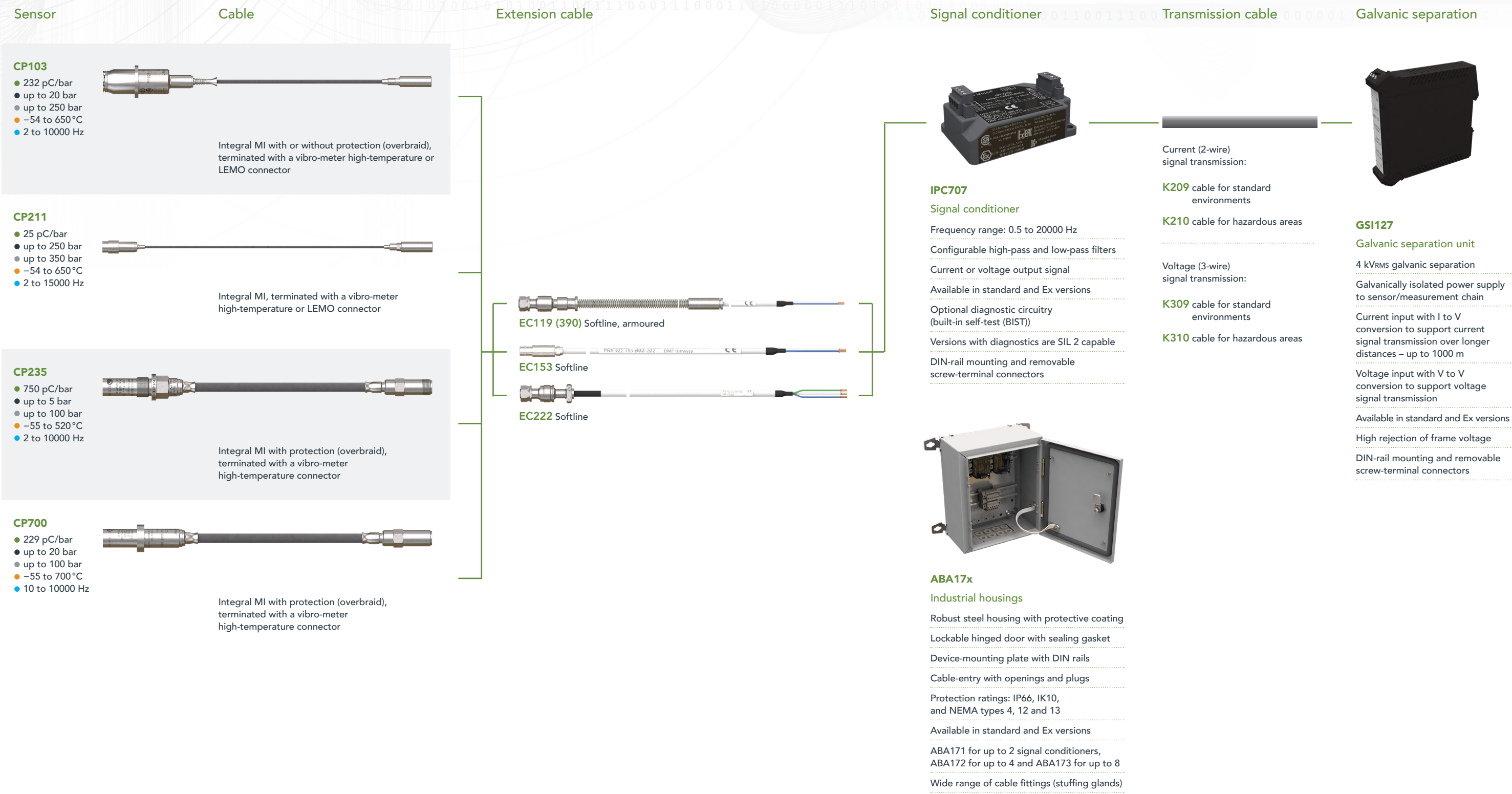
KEY FEATURES:

Available in Ex versions certified internationally for use in hazardous areas.

Suitable for high-temperature environments (up to 700°C) and safety-related applications using SIL 2 measurement chains.

Enables/supports high-temperature lean combustion monitoring – the key to reducing NOx and other emissions.

DYNAMIC PRESSURE SENSORS FOR COMBUSTION MONITORING AND THEIR MEASUREMENT CHAINS





Proximity sensors for relative vibration and other measurements

The TQ series of proximity sensors are rugged sensors that use the eddy-current principle in order to allow the contactless measurement of relative vibration, position and other measurements in harsh environments.

A TQ-based measurement chain consists of a proximity sensor, an optional extension cable and an IQS signal conditioner, configured for the particular application. The signal conditioner is required to perform all required signal processing and provide a current or voltage signal suitable for transmission to the monitoring system.

TQ-based measurement chains are ideally suited to the measurement and monitoring of relative vibration and axial position for rotating machine shafts, such as those found in steam, gas and hydraulic turbines, as well as in generators, turbo-compressors and pumps. They can also measure rotational speed and/or provide phase reference (1/REV pulse) signals.

TQ-BASED SOLUTIONS ENABLE COMPREHENSIVE MEASUREMENTS INCLUDING RADIAL VIBRATION, AXIAL POSITION, ROTATIONAL SPEED AND PHASE REFERENCE (1/REV PULSE)

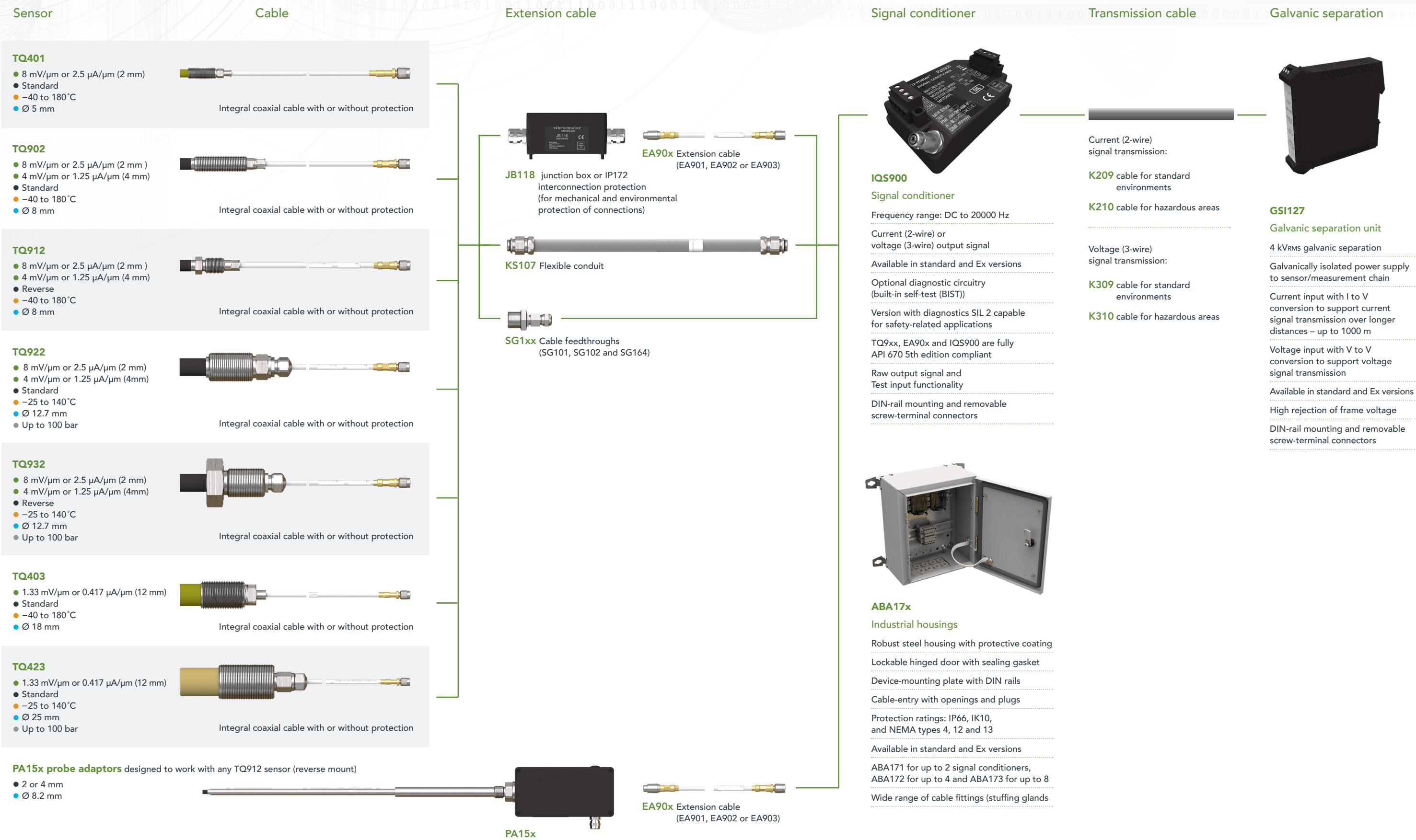
KEY FEATURES:

Available in standard versions and in Ex versions certified internationally for use in hazardous areas.

Broad family of sensors with different measurement ranges (sensitivities), mounting options (standard or reverse) and pressure capabilities (up to 100 bar).

Suitable for safety-related applications using SIL 2 measurement chains and conforms to API 670 5th edition.

PROXIMITY SENSOR MEASUREMENT CHAINS





Air gap monitoring system

Electric field (capacitance) technology for the contactless measurement of air gap in hydroelectric generators, and other large alternators and motors.

LS12x / ILS73x air-gap measurement systems provide three voltage output signals (pole profile, rotor profile and minimum gap) and one current output signal (pole profile, rotor profile or minimum gap) for signal transmission over longer distances.

The minimum gap provides the minimum air gap value for all poles of the rotor – without any post-processing – and is typically connected directly to a monitoring system for simple and reliable protection.

KEY FEATURES:

Easy, fast and reliable installation with enhanced filtering of noise and spikes (induced by high excitation currents).

Minimum gap signal for direct protection.

Accurate and precise results over the full measurement and temperature ranges.

Housing expansion probes

Eddy-current technology for the contactless measurement of absolute housing expansion on medium to large thermal machines such as gas and steam turbines.

KEY FEATURES:

Integrated electronics with a 4-20 mA output signal.

IP54 protection rating (splash proof).

AIR GAP MONITORING SYSTEM



ILS73x

Signal conditioner

ILS730 for LS120
ILS731 for LS121

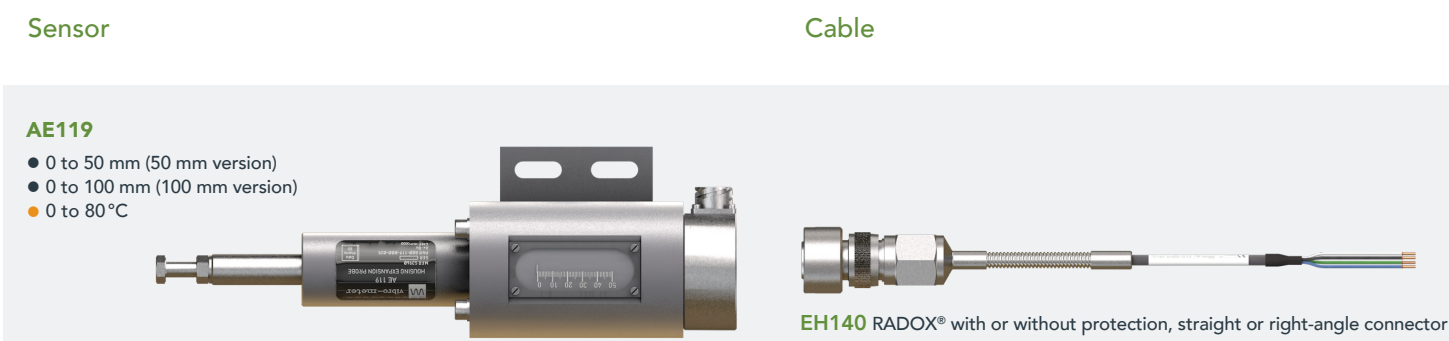
Three voltage output signals: pole profile,
rotor profile and minimum gap

One current output signal: pole profile, rotor
profile or minimum gap (factory configurable)

Aluminium enclosure

DIN-rail mounting and screw-terminal
connectors

HOUSING EXPANSION PROBES



Sensors for other applications

General-purpose vibration sensors

The CE6xx, CVS100 and PV6xx are general-purpose piezoelectric vibration sensors designed for the cost-effective measurement and monitoring of vibration in balance of plant (BOP) equipment such as compressors, gearboxes, motors, pumps and fans, as well as larger machinery such as hydro turbines.

The CE620 and CE687 are piezoelectric accelerometers that provide voltage (IEPE) and current (4 to 20 mA) outputs respectively, while the PV660 and PV685 are piezoelectric velocity sensors that also provide voltage and current outputs respectively.

The CVS100 series of vibration switches allow cost-effective vibration monitoring for stand-alone machines and BOP equipment, such as fans, pumps, centrifuges, mills, gears, etc., on whose operation important installations or processes depend.

GENERAL PURPOSE VIBRATION SENSORS

Vibration sensors with 4 to 20 mA output

Sensor

CE687

- 4 to 20 mA proportional to 0 to 1, 2, 5, 10 or 20 g (current output)
- Up to 50 g
- -25 to 90°C
- 2 to 1000 Hz

Cable

EC318 RADOX® cable with or without protection
EC319 RADOX® cable with or without protection, splashproof

Piezoelectric vibration sensors

CE620 piezoelectric accelerometer

- 100 mV/g or 500 mV/g (voltage output)
- Up to 80 g (100 mV/g version)
- Up to 16 g (500 mV/g version)
- -55 to 120°C (100 mV/g version)
- -55 to 90°C (500 mV/g version)
- 1 to 9000 Hz (100 mV/g version)
- 0.4 to 1600 Hz (500 mV/g version)

PV660 piezoelectric velocity sensor

- 4 mV/mm/s (voltage output)
- Up to 80 g
- -25 to 140°C
- 5 to 4000 Hz

Vibration switch

CVS100 series

- 2 to 50 mm/s RMS
- -20 to 70°C
- 10 to 1000 Hz

Direct alarm and/or trip relay output
Raw output and/or 4-20 mA for further signal processing

Sensors for other applications

General-purpose proximity probes

The WW and RE series of proximity transducers are used in combination with transmitter or converter for direct 4-20 mA current measurement of shaft vibration or relative displacement. Measurements are made according to the eddy-current principle.

The proximity transducer WW is used in combination with Transmitter TWW101 M1 for non-contact measurements of displacements.

The proximity transducers RE022, RE030 measure with the assistance of the transmitter RE101/R102 non-contacting the relative position of an object.

The large measurement range makes it ideal for steam turbines differential expansion monitoring.

GENERAL PURPOSE PROXIMITY PROBES

Sensor

WW007(V)/WW009

- 0.5 to 5.5 mm
- -20 to 180°C



Cable

WWVxxxxx

- length 4 or 9 m

Transmitter



- TSWxxx for shaft vibration
- TWWxxx for shaft position
- TIWxxx for speed and/or reference signals

WW030

- 2 to 14 mm
- -20 to 145°C



TWWxxx

RE022/RE030

- 22/30 mm
- -20 to 200°C



RE101/RE102 Typically for shaft relative expansion

Transmitters



TSW series

Transmitter

Provide a 4.20 mA signal proportional to shaft vibration.

Ranges selectable 50 to 500 µm.

Various Frequency ranges available

Raw signal for sensor adjustment



TIW series

Transmitter

Provides a TTL output of the detected pulses max 15 kHz

Provides a 4.20 mA output for the selected speed range

2 Ranges available, defined upon ordering. Max to 20.000 rpm

Raw signal for sensor adjustment



TWW series

Transmitter

Provide a 4.20 mA signal proportional to shaft position.

Ranges depending on specified sensor

Frequency DC to 2 Hz



RE series

Transmitter

Provides dual 4.20 mA signal or 4.20 mA and 4 mV/µm signal depending on version.

Additionally 0,5 to 4,5 V DC output for transducer transfer function.

Ranges depending on specified sensor 22 or 30 mm

Frequency DC to 2 Hz

About Meggitt and vibro-meter

Meggitt PLC is a global engineering group, headquartered in the UK, specialising in the design and manufacture of high-performance components and systems for aerospace and energy markets.

The Meggitt facility in Fribourg, Switzerland, operates as the legal entity Meggitt SA, vibro-meter is a portfolio of Meggitt that applies our core sensing and monitoring technologies to power generation, oil & gas and other industrial markets.

Meggitt SA produces a wide range of vibration, dynamic pressure, proximity, air-gap and other sensors capable of operation in extreme environments, electronic monitoring and protection systems, and innovative software for aerospace and land-based turbomachinery.

The vibro-meter portfolio has been at the forefront of sensing and monitoring for more than 70 years and help keep machinery and equipment working safely, reliably and efficiently. This includes the sensors and other products in this brochure produced for Meggitt vibro-meter.

MEGGITT

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