MEGGiTT

Enabling the Extraordinary
To Fly To Power To Live

PROXIMITY SYSTEMS

TQ/IQS

vibro-meter

Presented by Ricardo Madureira / Gael Coron
Technical Centre of Excellence
September 2022

MEGGiTT

AGENDA

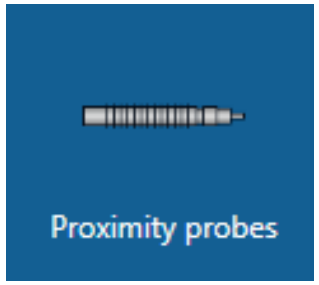
1. Applications and requirements of a Proximity System
2. Proximity probes technology
3. TQ/IQS Proximity System additional features
4. Common field issues
5. IQS910
6. Q&A

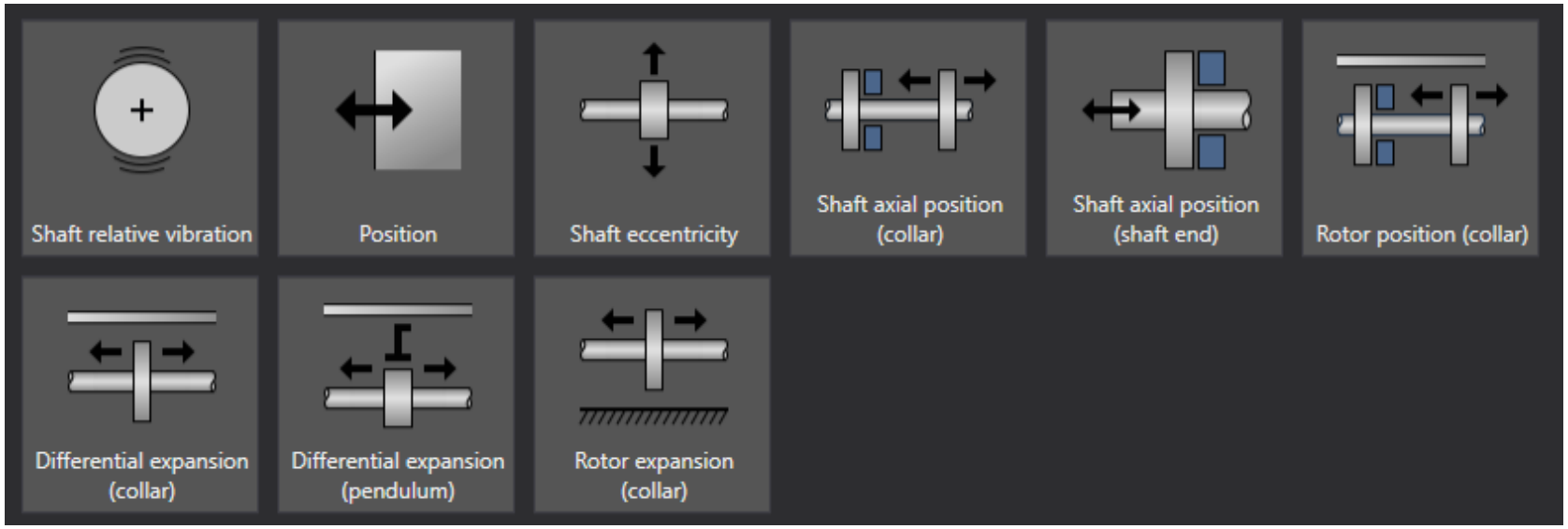
MEGGiTT

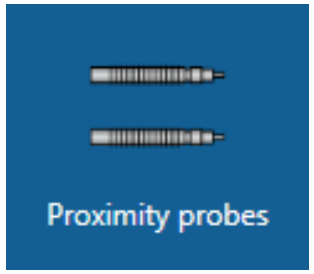
Applications and requirements of a Proximity System

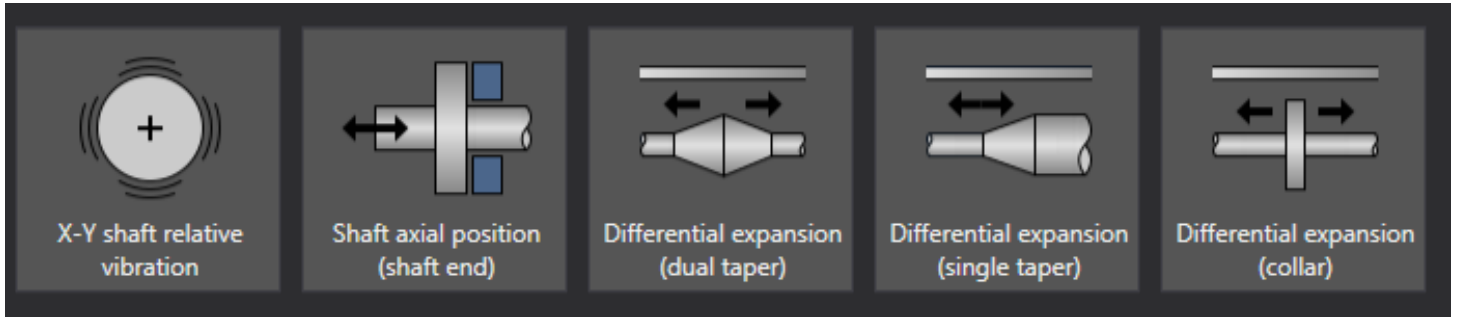
TQ/IQS Proximity chain

Applications and requirements



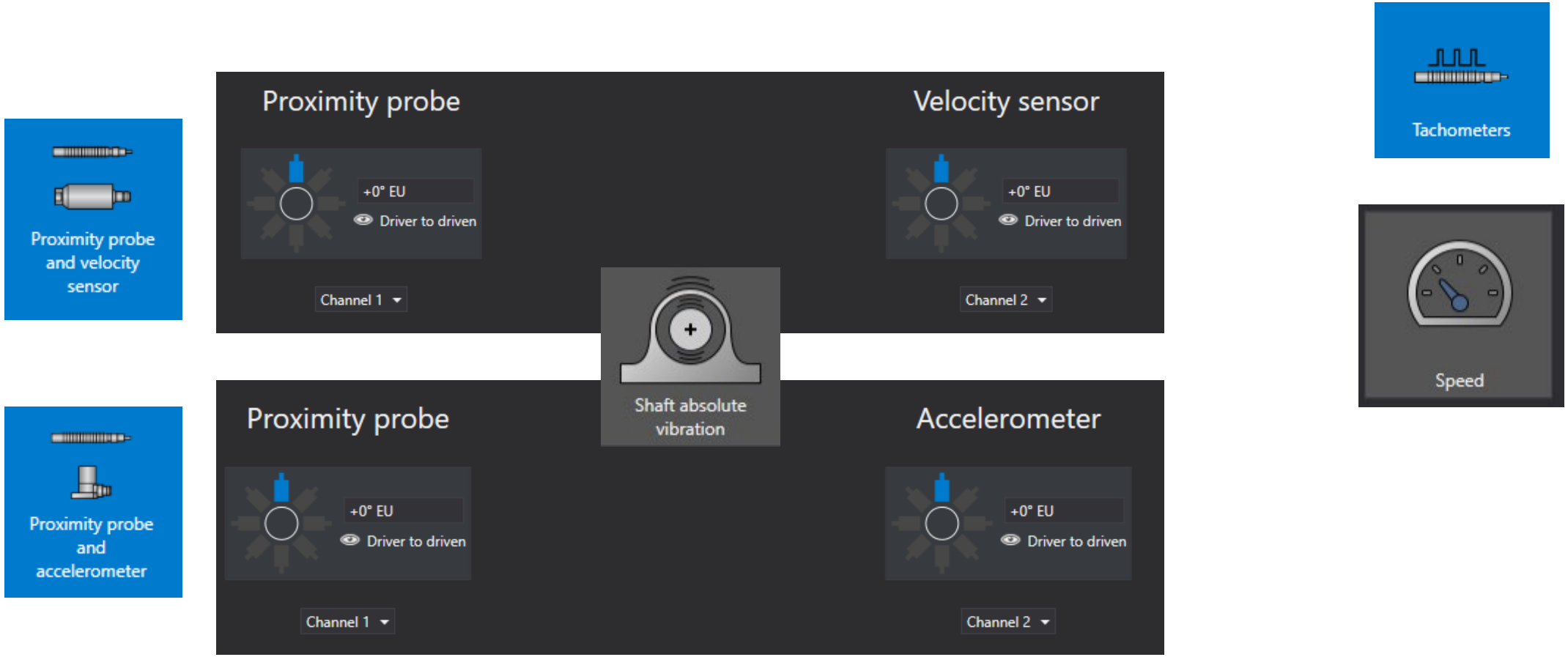






TQ/IQS Proximity chain

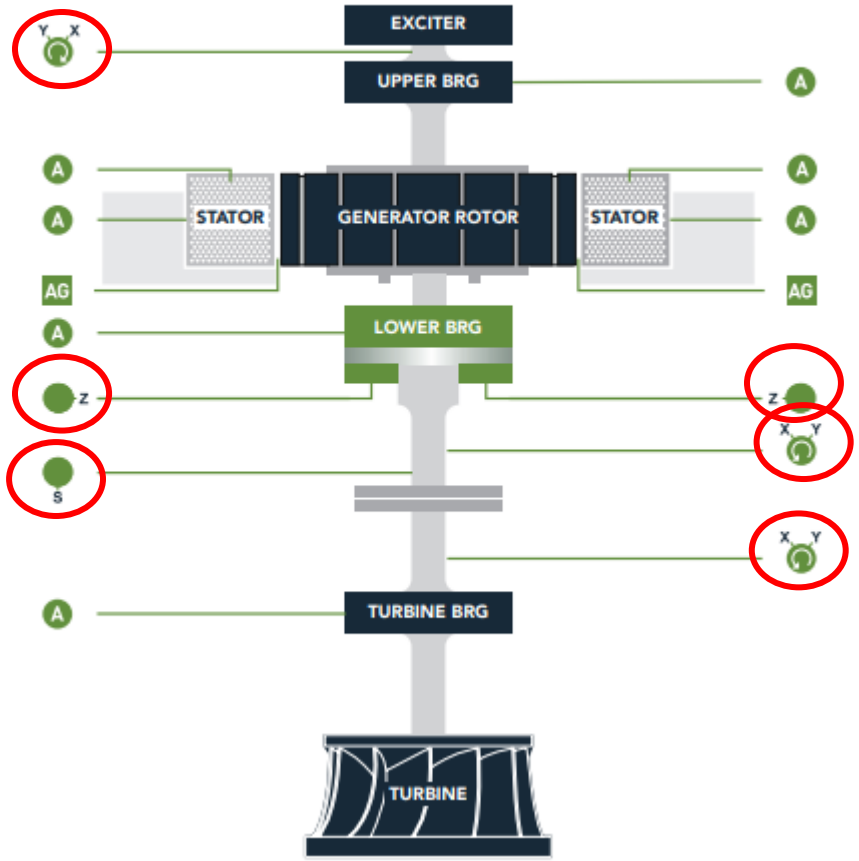
Applications and requirements



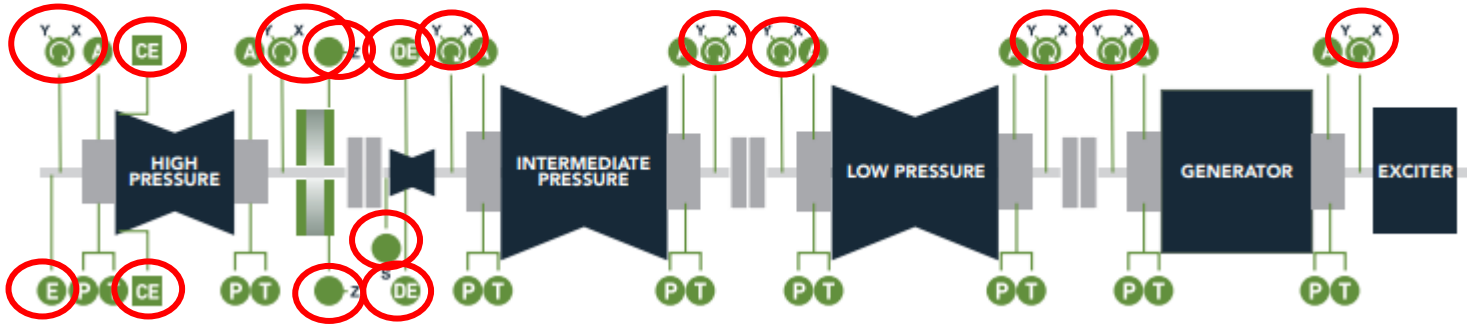
TQ/IQS Proximity chain

Applications and requirements

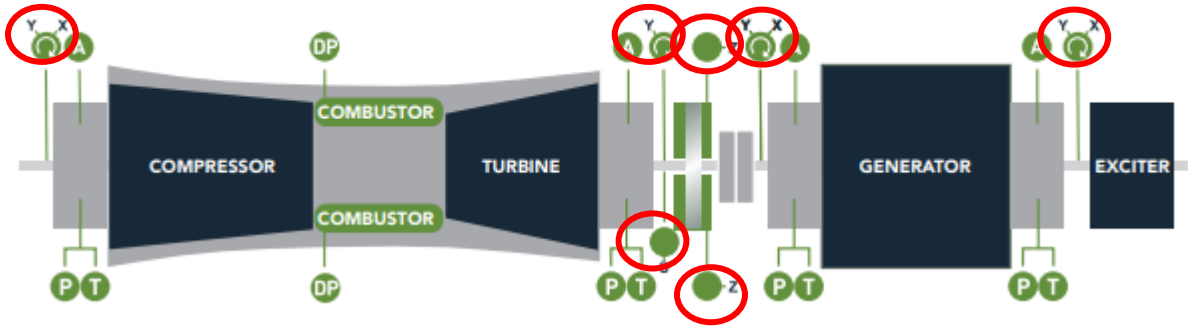
Hydro Turbine



Steam Turbine



Gas Turbine



TQ/IQS Proximity chain

Applications and requirements

- *The TQ9xx are available for temperature ranges from -40°C up to +180°C, supporting absolute pressures up to 100 bar, in different sizes, threads and lengths.*
- ***The TQ/IQS proximity chain is highly precise and with submicron resolutions.***
- ***The TQ/IQS proximity chain reliability is close to 3 million hours.***

TQ/IQS Proximity chain

Applications and requirements

Complexity

Harshness

MEGGiTT

Proximity probes technology

TQ/IQS Proximity chain

TQ/IQS Technology

- **The TQ/IQS proximity chain is based on the eddy current principle**

This technology provides the best compromise on the three main requirements: fit, reliability, precision

TQ/IQS Proximity chain

TQ/IQS Technology

- **The TQ/IQS proximity chain is based on the eddy current principle**

An eddy

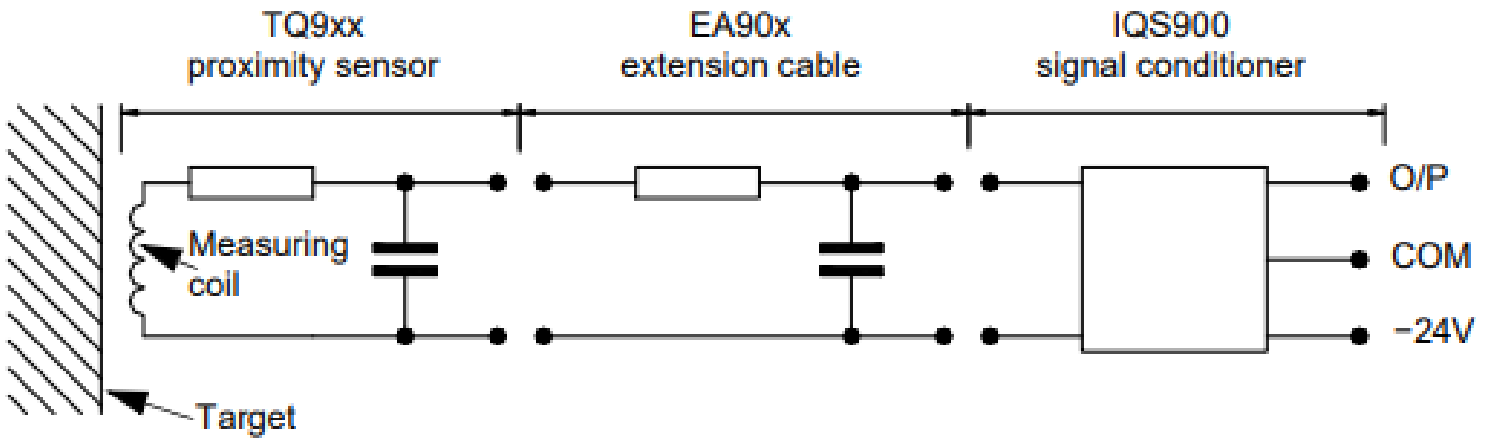
Michael Faraday

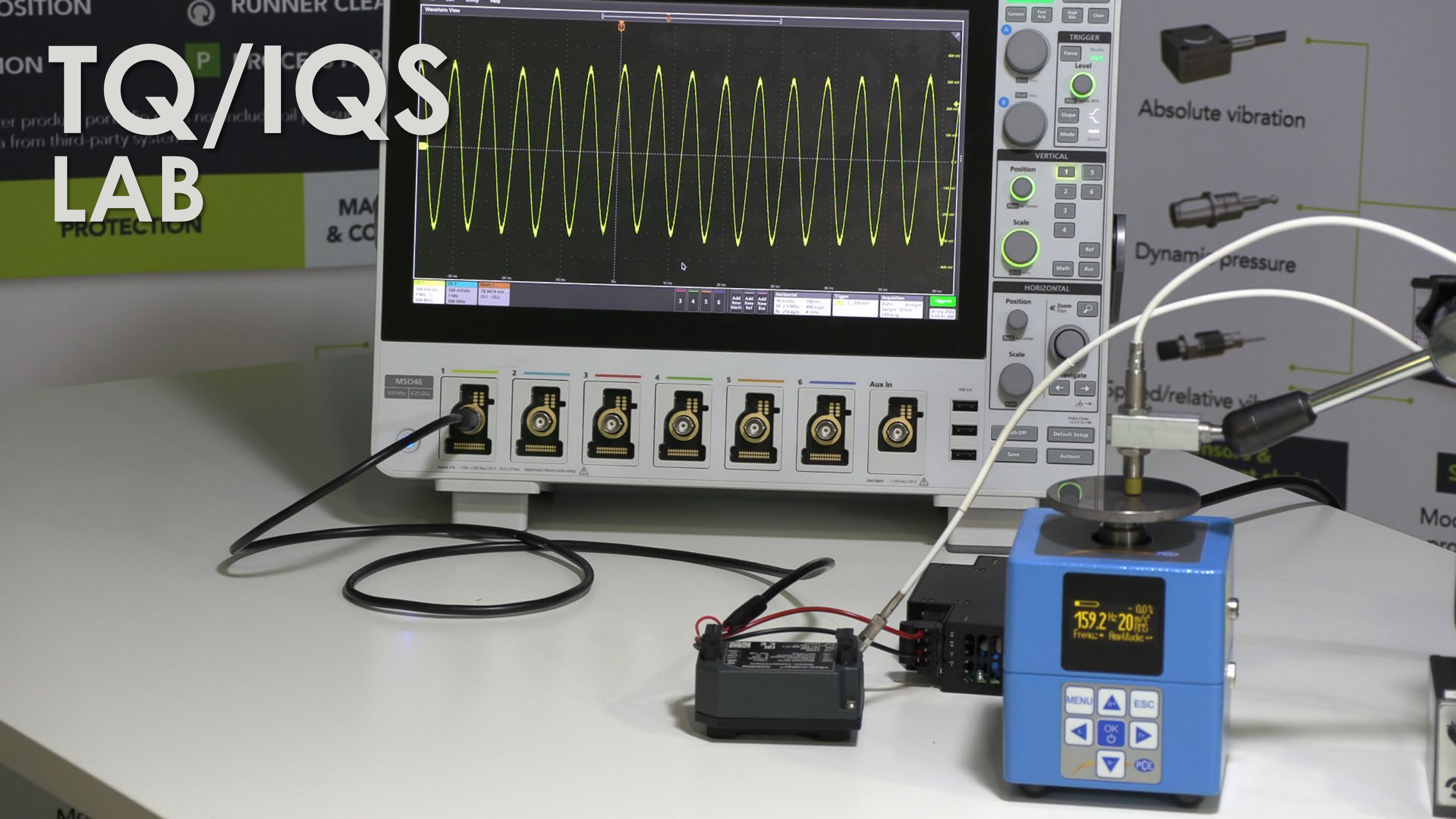
Emil Khristianovich Lenz

TQ/IQS Proximity chain

TQ/IQS Technology

- **The TQ/IQS proximity chain is based on the eddy current principle**

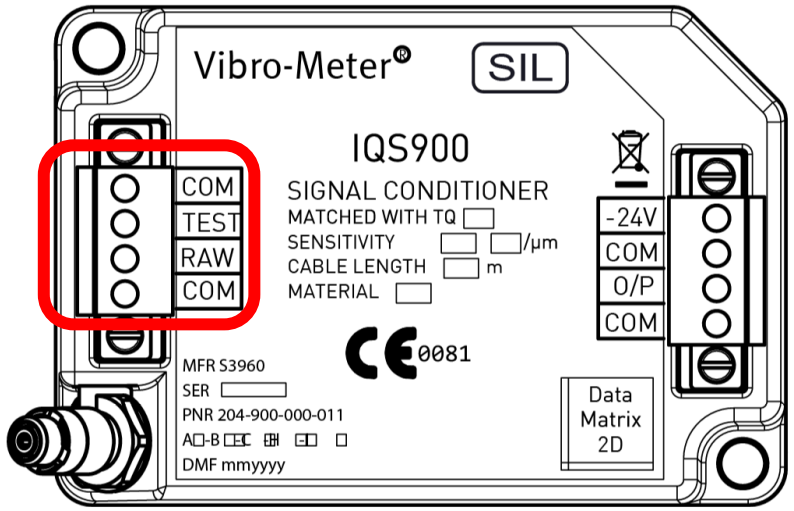



TQ/IQS
LAB
Absolute vibration
Dynami pressure
MSO46
Aux In
TRIGGER
VERTICAL
HORIZONTAL
Position
Scale
Level
Default Setup
Save
Autoset
159.2 Hz 20
MENU
ESC
OK
PCE

TQ/IQS Proximity System additional features

TQ/IQS Proximity chain

TQ/IQS Technology



- **The RAW Output**
  the IQS900 includes a "raw" voltage output signal, that gives in situ access to the measurement, without disturbing the measurement chain and control systems downstream.

- **The TEST Input**
  The IQS900 includes a test input signal that allow the measurement chain/system operation to be tested in situ, thereby simplifying commissioning and troubleshooting.

- **The embedded DIAGNOSTIC**
  The IQS900's diagnostic circuitry continuously checks the integrity of the measurement chain and will drive the measurement/diagnostic component (DC) outside of its normal operating range to indicate a problem with the sensor, the cabling and/or the signal conditioner itself.

TQ/IQS Proximity chain

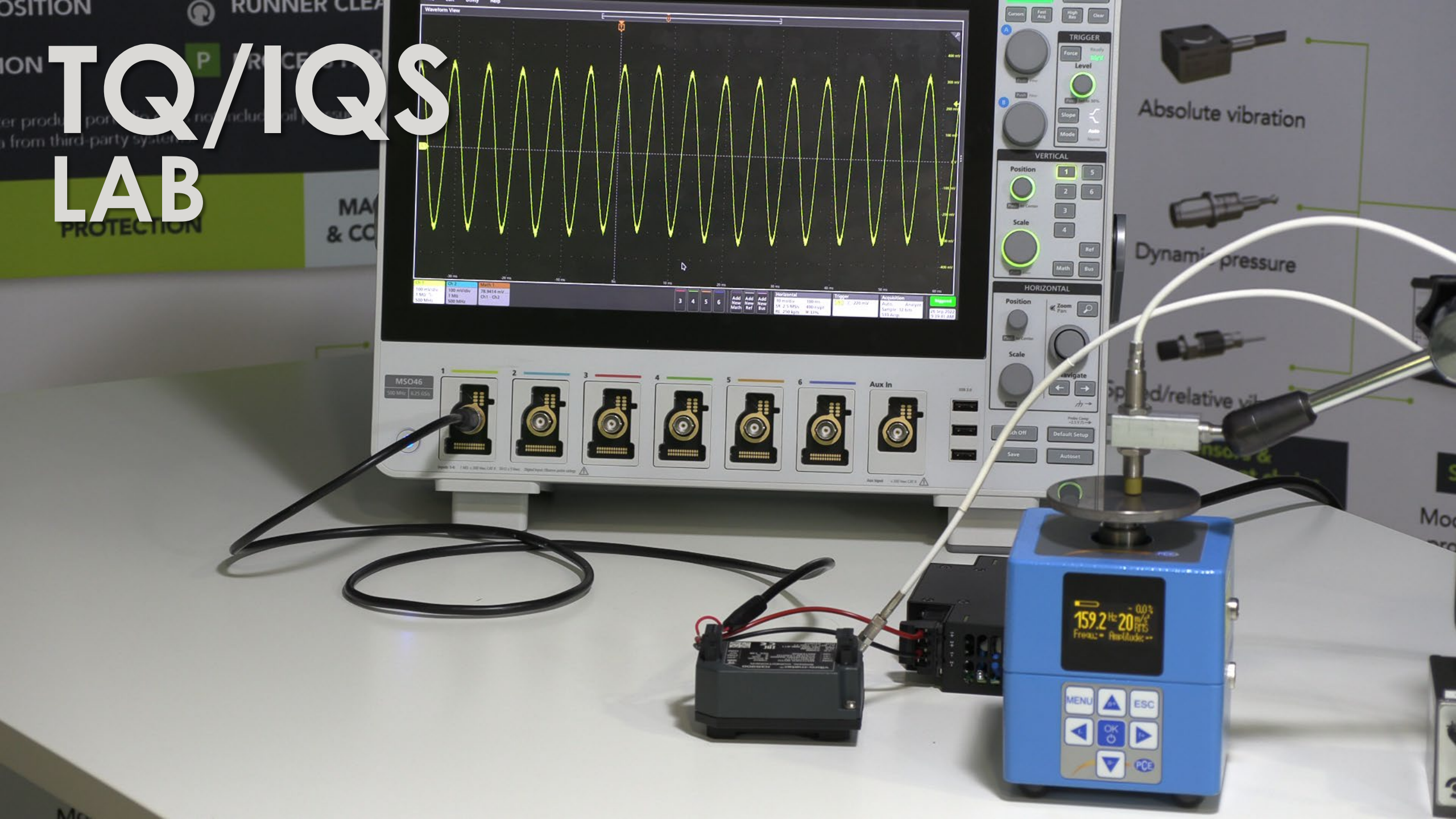
TQ/IQS Technology

Proximity sensor type	Measurement range	Sensitivity (main output)	IQS900 ordering option code (Bx)	Raw output sensitivity ("RAW" output)
TQ901 (or TQ401)	2 mm	8 mV/µm	B11	4 mV/µm
		2.5 µA/µm	B12	
TQ9x2 (or TQ4x2)	2 mm	8 mV/µm	B21	
		2.5 µA/µm	B22	
	4 mm	4 mV/µm	B23	2 mV/µm
		1.25 µA/µm	B24	
TQ9x3 (or TQ4x3)	12 mm	1.33 mV/µm	B31	0.665 mV/µm
		0.417 µA/µm	B32	

TQ/IQS Proximity chain

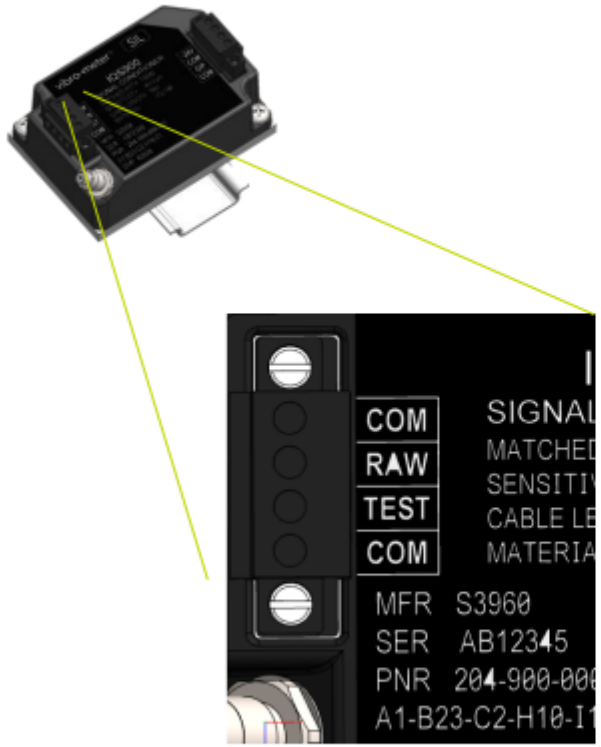
TQ/IQS Technology

Test input	IQS900 output	IQS900 ordering option code (Bx)	Transfer function (output)
Frequency range: 50 Hz to 10 kHz. Voltage range: see Table 9-3 and Table 9-4.	Main output (current signal)	B12, B22, B24 or B32	I_{OUTPUT} = ($V_{INJECTED}$ × 0.5) in mA Note: Output signal available via "–24" and "COM" pins.
	Main output (voltage signal)	B11, B21, B23 or B31	V_{OUTPUT} = $V_{INJECTED}$ × 1.6 Note: Gain of 4 dB. Output signal available via "O/P" and "COM" pins.
	Raw output (voltage signal)	B11, B12, B21, B22, B23, B24, B31 or B32	V_{OUTPUT} = $V_{INJECTED}$ × 0.8 Note: Gain of –2 dB. Output signal available via "RAW" and "COM" pins.


TQ/IQS
LAB
Absolute vibration
Dynami pressure
MSO46
Aux In
TRIGGER
VERTICAL
HORIZONTAL
Position
Scale
Level
Default Setup
Save
Autoset
159.2 Hz 20
MENU
ESC
OK
PCE

IQS900 – RAW Pin

New features

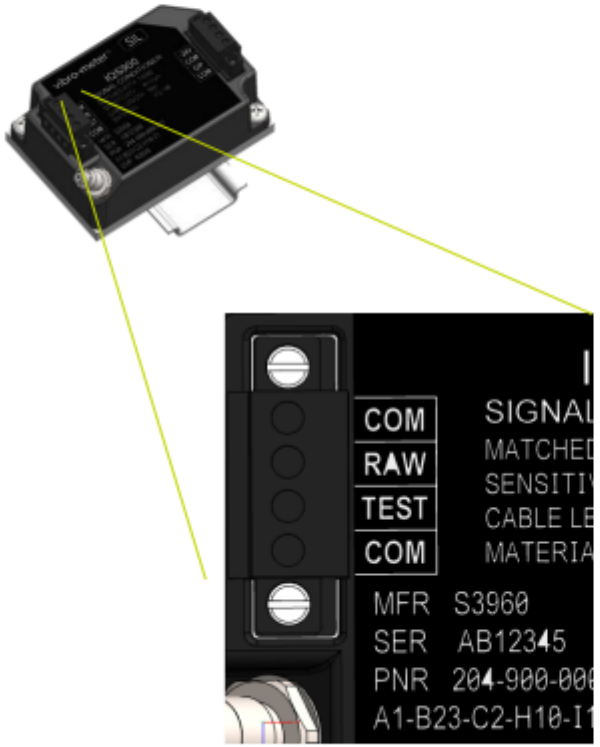


- The **RAW pin** allows operators to get a signal value from the IQS900 directly using a voltmeter without disrupting the measuring chain
- Raw outputs for each configuration:

TQ type	Range	IQS900 code (B)	Output sensitivity	Raw output sensitivity
4X1/9X1	2 mm	B11	8 mV/µm	4 mV/µm
	2 mm	B12	2.5 µA/µm	4 mV/µm
4X2/9X2	2 mm	B21	8 mV/µm	4 mV/µm
	2 mm	B22	2.5 µA/µm	4 mV/µm
	4 mm	B23	4 mV/µm	2 mV/µm
	4 mm	B24	1.25 µA/µm	2 mV/µm
4X3/9X3	12 mm	B31	1.33 mV/µm	0.665 mV/µm
	12 mm	B32	0.417 µA/µm	0.665 mV/µm

IQS900 – TEST Pin

New features

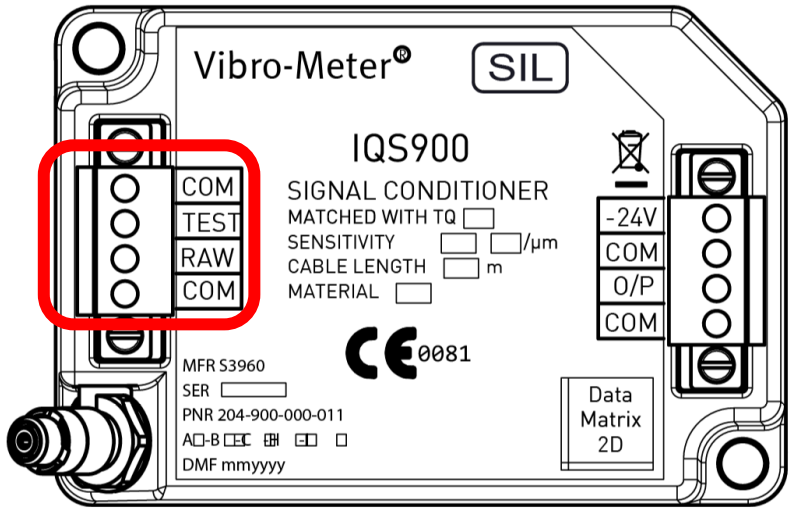


- The **TEST pin** allows an operators to simulate an input signal and verify that the IQS transmits the correct value along the chain.
- Used for the Proof-Test (SIL-2 maintenance requirement)
- Checking full chain from IQS to MPS
- The test results can be read both on the **O/P pin** or the **RAW pin**
- The **test procedures** are listed in our Installation and Safety Manual

TQ/IQS Proximity chain

TQ/IQS additional features

- **The embedded DIAGNOSTIC**
  The IQS900's diagnostic circuitry continuously checks the integrity of the measurement chain and will drive the measurement/diagnostic component (DC) outside of its normal operating range to indicate a problem with the sensor, the cabling and/or the signal conditioner itself.



SIL Safety

The diagnostic is able to detect the following failures:

- Open and short circuits in the sensor element (TQ)
- Open and short circuits in the sensor integral cable (TQ) or in extension cable (EA)
- Component defects
- Under and over voltage on the power supply

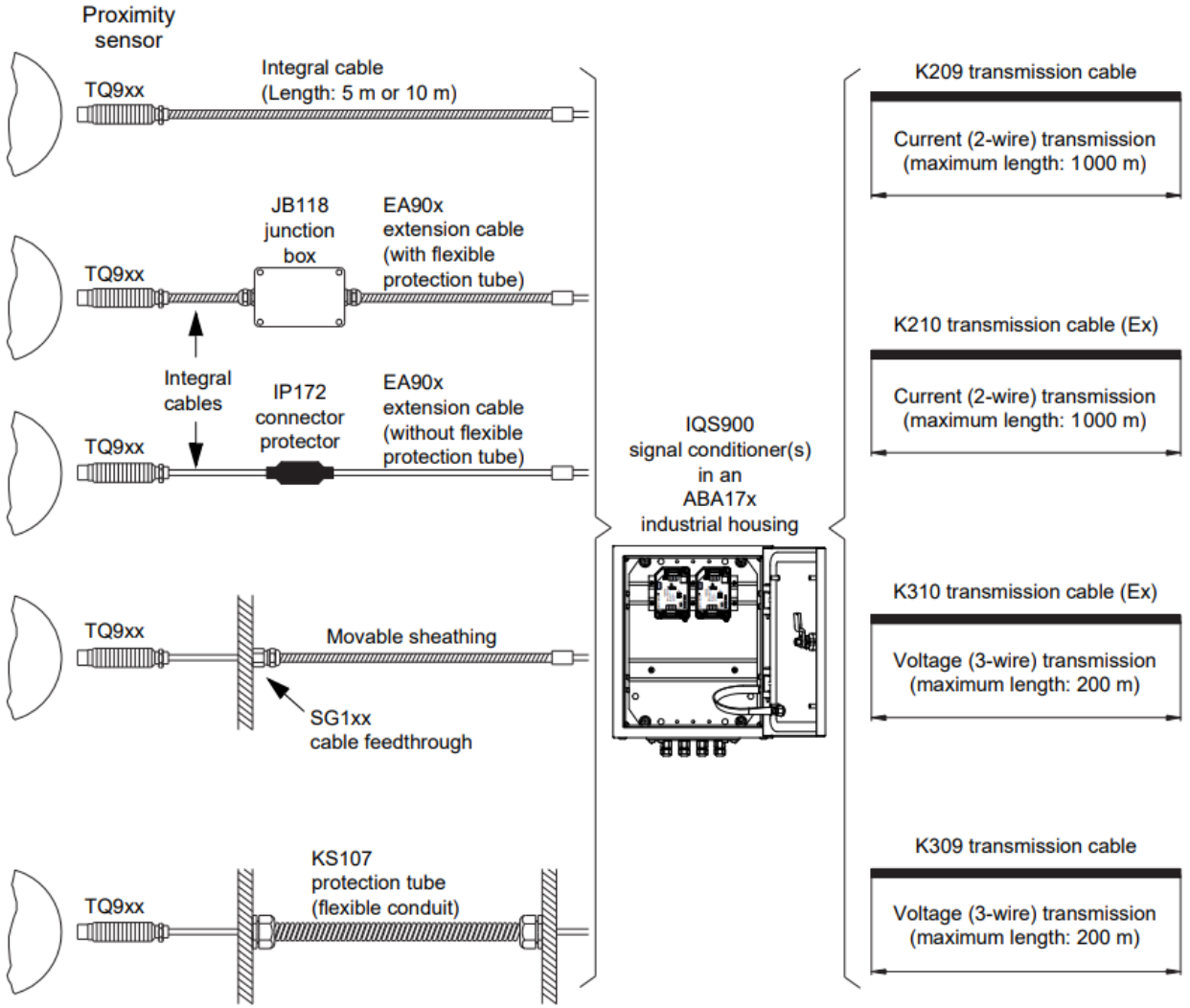
MEGGITT

Common field issues

TQ/IQS Proximity chain

Common Field Issues

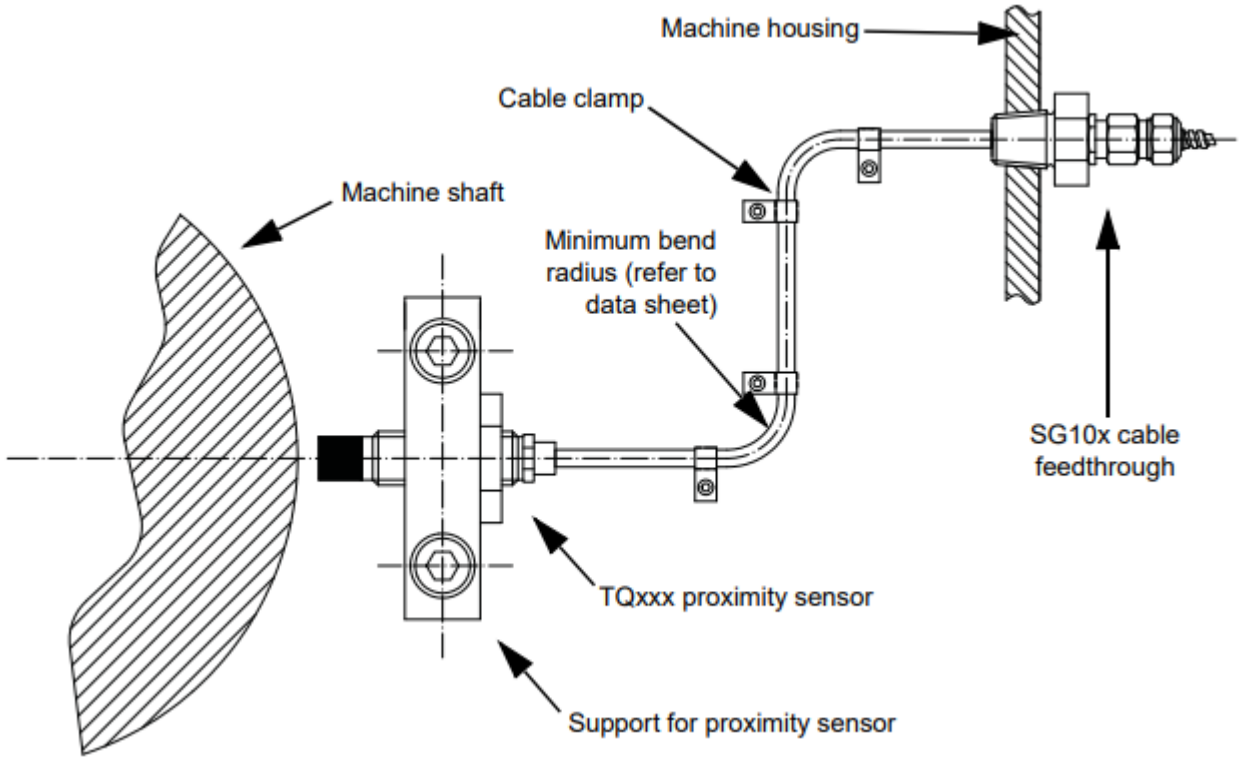
- **Wiring**

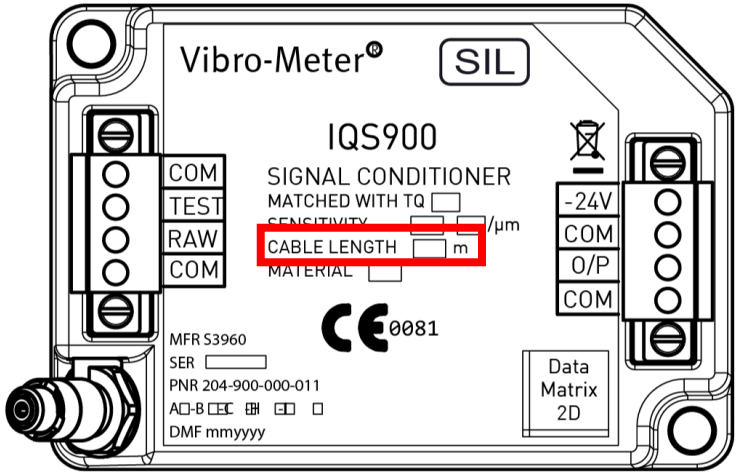


TQ/IQS Proximity chain

Common Field Issues

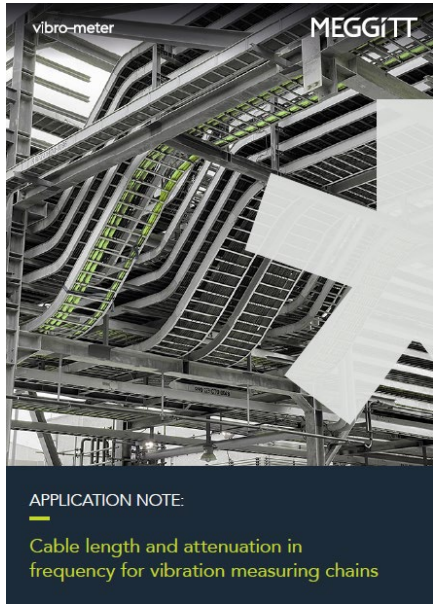
- **Wiring**

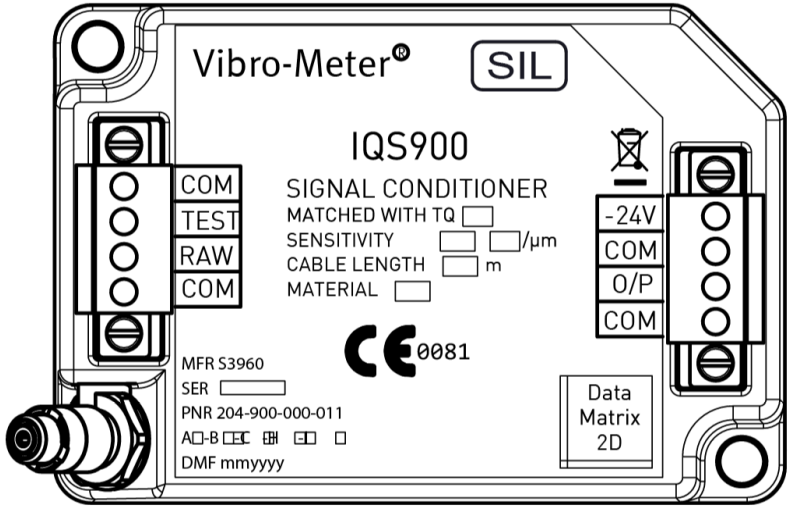




TQ/IQS Proximity chain

Common Field Issues





- **Grounding**

  The IQS9xx has dedicated "COM" pins, one for each signal.

  Grounding should follow API670 §4.15

  For explosive environments grounding MUST follow Ex recommendations

  Versions available with insulated DIN rail adaptor

TQ/IQS Proximity chain

Common Field Issues

- **Grounding**

  Grounding means to connect electrical equipment to a common reference ground or earth.

  This is a “functional” connection.

- **Shielding**

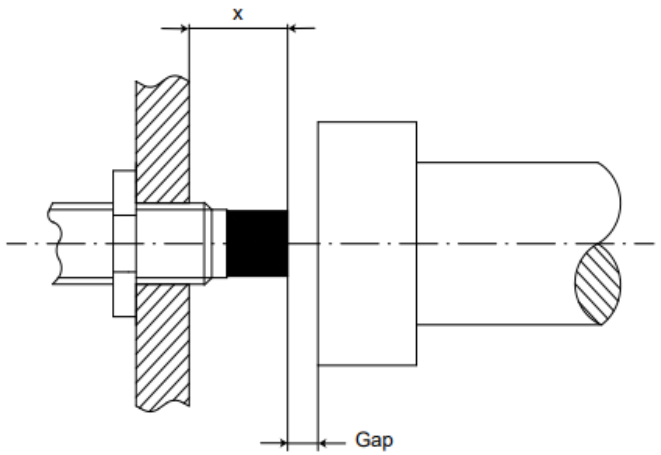
  Shielding is used both Electromagnetic compliance, i.e. for increased immunity and reduced emission.

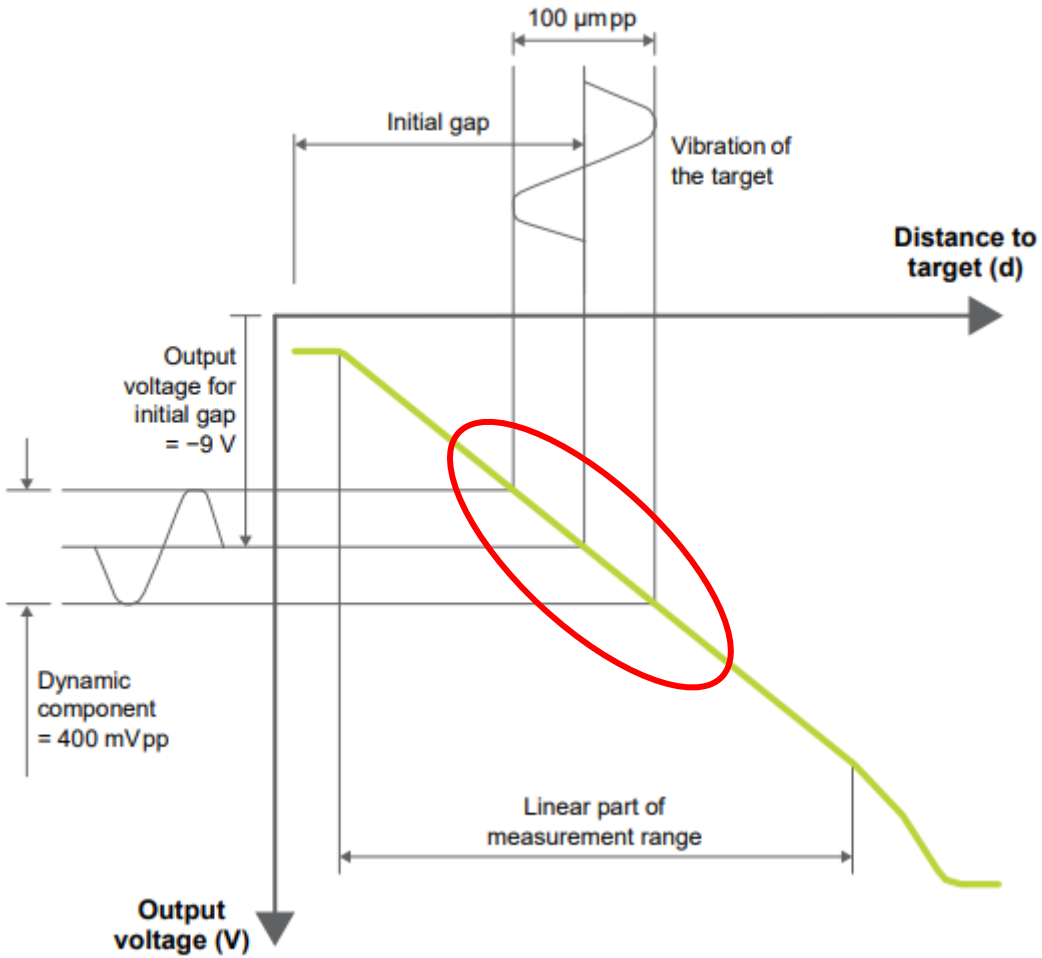
  This is a “non-functional” connection.

TQ/IQS Proximity chain

Common Field Issues

- **Mounting Constraints**

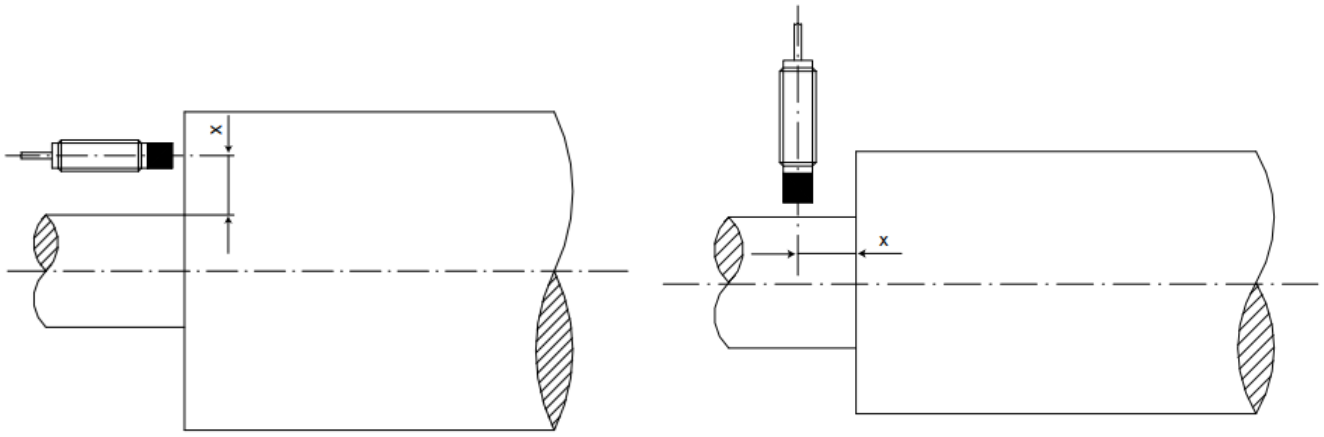


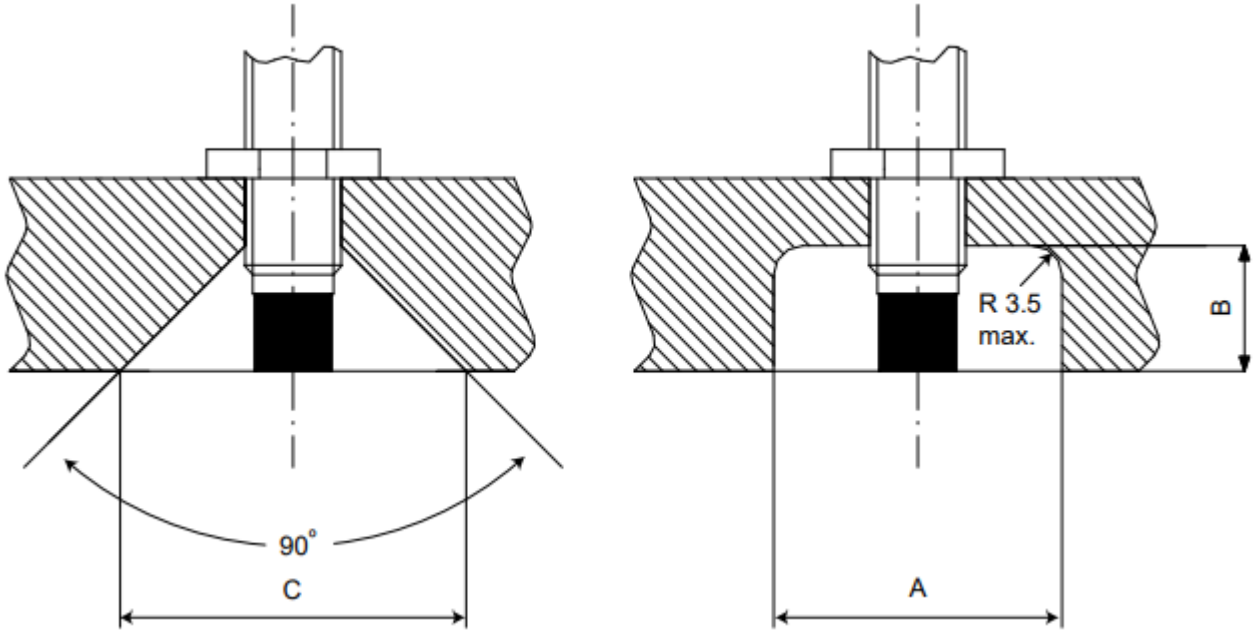


TQ/IQS Proximity chain

Common Field Issues

- **Mounting Constraints**

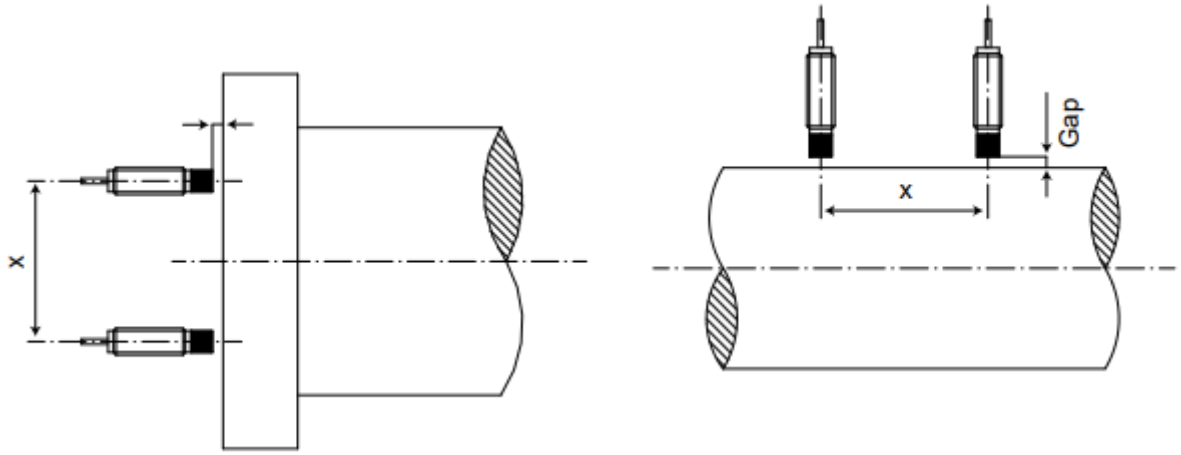




TQ/IQS Proximity chain

Common Field Issues

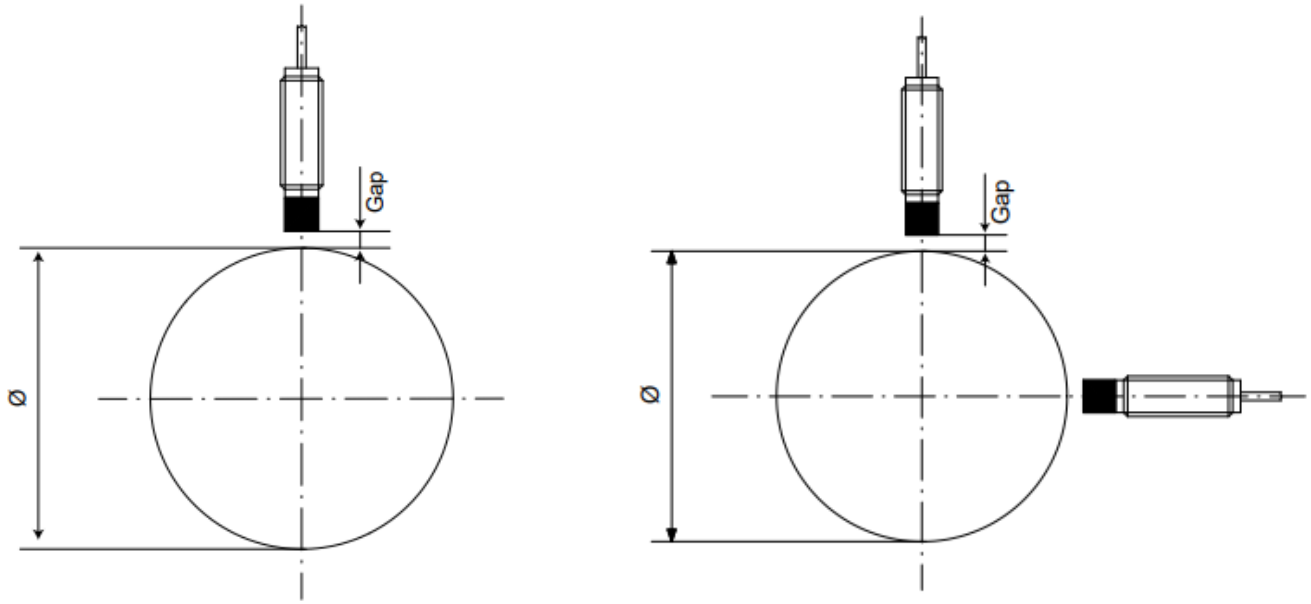
- **Mounting Constraints**



TQ/IQS Proximity chain

Common Field Issues

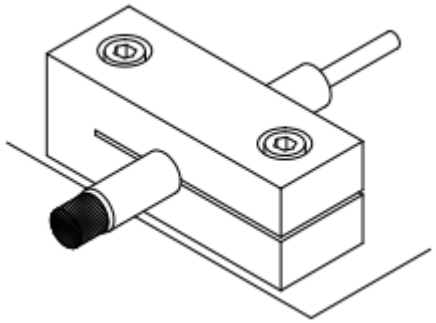
- **Mounting Constraints**

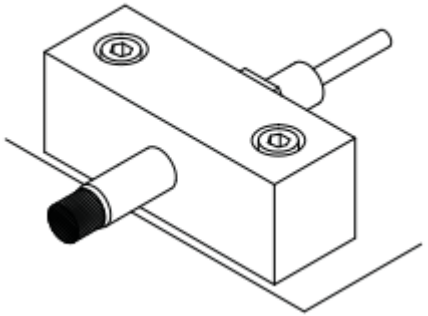


TQ/IQS Proximity chain

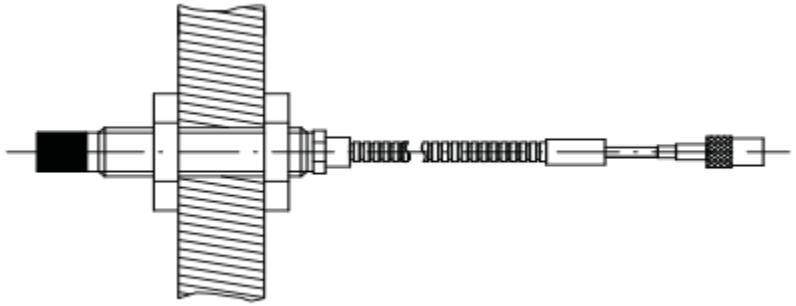
Common Field Issues

- **Mounting Constraints**





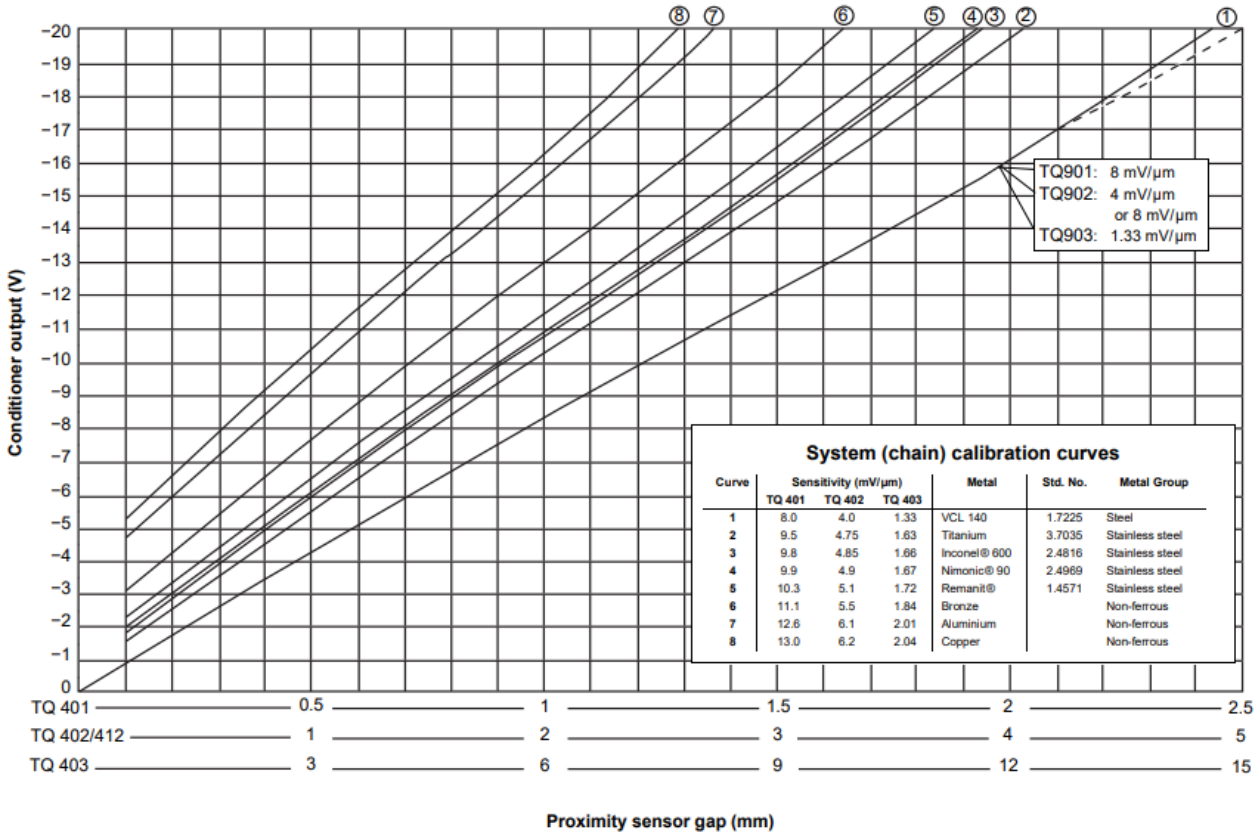
Failure to respect the recommended tightening torque when mounting a proximity sensor can lead to permanent sensor damage.



TQ/IQS Proximity chain

Common Field Issues

- **Target Material**



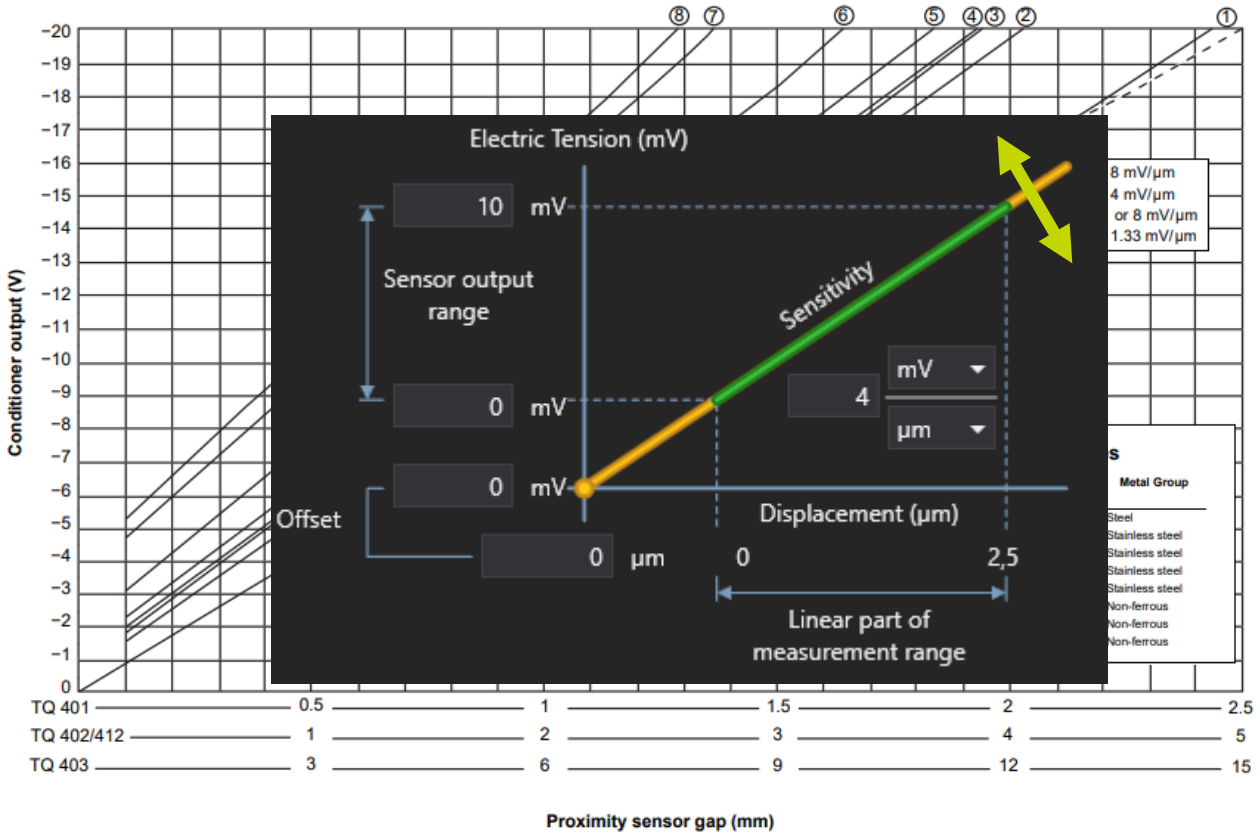
System (chain) calibration curves

Curve	Sensitivity (mV/µm) TQ 401	TQ 402	TQ 403	Metal	Std. No.	Metal Group
1	8.0	4.0	1.33	VCL 140	1.7225	Steel
2	9.5	4.75	1.63	Titanium	3.7035	Stainless steel
3	9.8	4.85	1.66	Inconel® 600	2.4816	Stainless steel
4	9.9	4.9	1.67	Nimonic® 90	2.4969	Stainless steel
5	10.3	5.1	1.72	Remanit®	1.4571	Stainless steel
6	11.1	5.5	1.84	Bronze		Non-ferrous
7	12.6	6.1	2.01	Aluminium		Non-ferrous
8	13.0	6.2	2.04	Copper		Non-ferrous

TQ/IQS Proximity chain

Common Field Issues

- **Target Material**



MEGGITT

New IQS910

TQ/IQS Proximity chain

The new IQS910

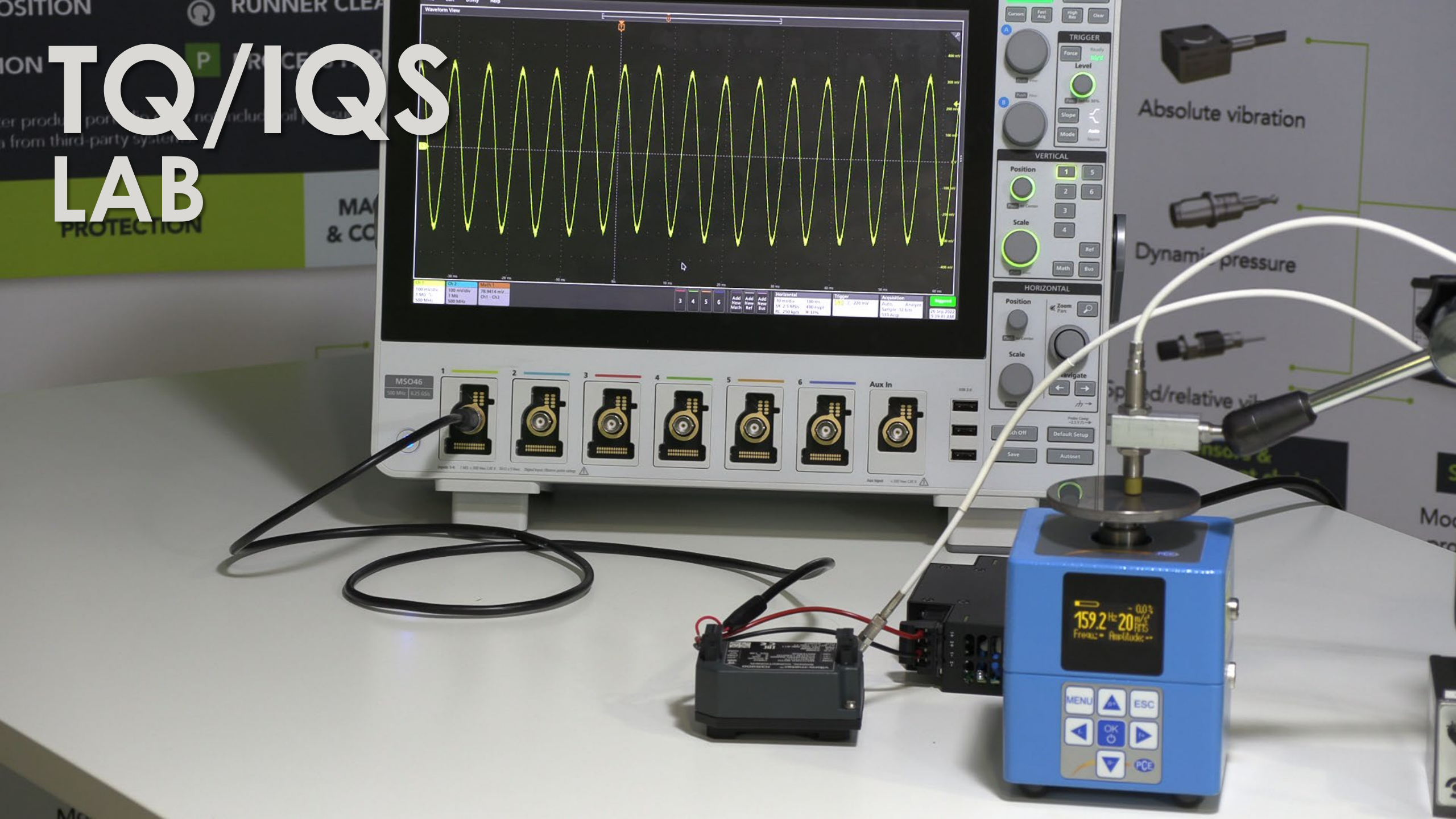
- **4-20mA standard output**
  2mm range, 4-20mA output

- **Vibration "peak-meter" processing for vibration measurement**

Q1/Q2 2023

Peak-meter processing

Frequency response (bandwidth)	: 5 to 15 kHz (−3 dB)
Rise time (0 to 90%)	: 70 ms ±20 ms
Fall time (100 to 10%)	: 4.8 s ±0.5 s
Sensitivity error	: ±5% max.


TQ/IQS
LAB
Absolute vibration
Dynami pressure
MSO46
Aux In
TRIGGER
VERTICAL
HORIZONTAL
Position
Scale
Level
Default Setup
Save
Autoset
159.2 Hz 20
MENU
ESC
OK
PCE

MARKETING UPDATE

MEGGiTT

Global Sales Partner Meeting 2023 – Save the Date announcement – 16th Sept.

Expert articles

#1 Integrating a machinery protection platform into your plantwide ecosystem

#2 Sensor Selection Criteria for Low-Frequency Measurements in 2 parts:

- Part 1: The physics of low-frequency measurements

Application note: Cable length and attenuation in frequency for vibration measuring chains

(goes with expert article - Sensor Field Wiring Length Considerations for Hazardous Areas)

White Paper: Whitepaper on Gas Turbine Monitoring

Application pages: Gas and Steam turbine monitoring solutions

NEW

Expert article

Sensor Selection Criteria for Low-Frequency Measurements Part II: Sensor reliability

Case Study: Axpo combined cycle power plants

MEGGITT

THANK YOU

Presented by Ricardo Madureira / Gael Coron

Technical Centre of Excellence

September 2022

Disclaimer

Business legal entity, Business address

Legal entity registration information as appropriate

Information contained in this document may be subject to export control regulations of the United Kingdom, European Union, United States or other national jurisdictions, including the US International Traffic in Arms Regulations and/or Export Administration Regulations.

Each recipient of this document is responsible for ensuring that transfer or use of any information contained herein complies with all relevant Export Control Regulations.