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DATA SHEET

vibro-meter®

TQ902/TQ912, EA902 and IQS900 proximity measurement chains



TQ902 sensor
(standard mount)



TQ912 sensor
(reverse mount)



IQS900
signal conditioner

(Images not to scale)

KEY FEATURES AND BENEFITS

- From the vibro-meter® product line
- Non-contact measurement based on eddy-current principle
- Available in standard versions and Ex versions certified for use in hazardous areas (potentially explosive atmospheres)
- Conforms to API 670 5th edition
- 1, 5 and 10 m measurement chains
- Temperature-compensated design
- Voltage output or current output with short-circuit protection
- Current-signal transmission over distances up to 1 km
- Frequency response: DC to 20 kHz (−3 dB)
- Linear measurement range: 2 or 4 mm
- Temperature range (sensor): −40 to 180°C

KEY FEATURES AND BENEFITS *(cont'd)*

- Optional diagnostic circuitry detects sensor, cabling and/or signal conditioner problems
- Suitable for use in functional safety contexts: SIL 2 in accordance with IEC 61508 and Cat 1 PL c in accordance with ISO 13849
- Removable screw-terminal connectors and DIN-rail mounting (IQS900 signal conditioner)

APPLICATIONS

- Shaft relative vibration and gap/position measurement chains for machinery protection and/or advanced condition monitoring
- Ideal for use with VM600^{Mk2}/VM600 and VibroSmart® machinery monitoring systems
- API 670 applications
- Safety-related applications
- Speed (tachometer) sensor/measurement chain for overspeed detection system (ODS) applications

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DESCRIPTION

Introduction

The TQ902/TQ912, EA902 and IQS900 form proximity measurement chains, from Parker Meggitt's vibro-meter® product line.

TQ9xx-based proximity measurement chains allow contactless measurement of the relative displacement of moving machine elements, and provide an output signal proportional to the distance between the sensor tip and the target. Accordingly, these measurement chains are ideally suited for measuring the relative vibration and axial position of rotating machine shafts, such as those found in steam, gas and hydraulic turbines, as well as in alternators, turbo-compressors and pumps.

A TQ9xx-based proximity measurement chain consists of a TQ9xx proximity sensor, an optional EA90x extension cable and a IQS900 signal conditioner, configured for a particular industrial application. The EA90x extension cable is used to effectively lengthen the front-end, as required. Together, these form a calibrated proximity measurement chain in which each component is interchangeable.

The IQS900 signal conditioner is a versatile and configurable device that performs all required signal processing and generates the output signal (current or voltage) for input to a machinery monitoring system such as a VM600^{Mk2}/VM600 or VibroSmart®. In addition, the IQS900 supports optional diagnostic circuitry (that is, built-in self-test (BIST)) that automatically detects and remotely indicates problems with a measurement chain.

TQ902/TQ912 sensors and cabling

The active part of a TQ9xx proximity sensor is a coil of wire that is moulded inside the tip of the device, made of PPS (polyphenylene sulfide), a high-performance, high-temperature engineering thermoplastic. The sensor body is made of stainless steel. The target material must, in all cases, be metallic.

The TQ902 and TQ912 proximity sensors are essentially the same except that the TQ902 is intended for standard-mount and the TQ912 is for reverse-mount applications. Both sensor bodies are available with metric or imperial threads and have an integral coaxial cable terminated with a self-locking miniature coaxial connector. A TQ9xx sensor's integral cable and the EA90x extension cables are available in various lengths, which can be combined to obtain a particular total system length (TSL) for an application.

Optional interconnection protectors (IP172), junction boxes (JB118) and other housings are available for the mechanical and environmental protection of the connection between a TQ9xx sensor's integral cable and a EA90x extension cable.

IQS900 signal conditioner

The IQS900 signal conditioner contains a high-frequency modulator/demodulator that supplies a driving signal to a TQ9xx sensor. This generates an electromagnetic field in the tip of the sensor, which generates eddy-currents in the metallic target. When the target moves, the eddy-currents change, which causes a change in the electrical characteristics of the TQ9xx that the signal conditioner converts into a signal that is proportional to the distance to the target.

The IQS900's output is an analogue signal consisting of a dynamic component (AC) that corresponds to the measured vibration (displacement) and a quasi-static component (DC) that corresponds to the measured gap. The output can be configured as a current or a voltage signal, suitable for transmission to a monitoring system via current (2-wire) or voltage (3-wire) transmission cables, respectively.

For a IQS900 signal conditioner with optional diagnostics, the quasi-static DC component also functions as a diagnostic indicator. That is, 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.

For test purposes, the IQS900 provides a "raw" voltage output signal and supports a test voltage input signal that allow the measurement chain/system operation to be tested in situ, thereby simplifying commissioning and troubleshooting.

DESCRIPTION *(continued)*

Application information

The IQS900 signal conditioner's output is a dynamic signal suitable for spectral analysis. As such, the IQS900 is recommended for machinery protection and/or advanced condition monitoring applications. For more basic applications, a slowly-varying output signal such as that provided by the IQS910 signal conditioner could be more suitable. Refer to the *IQS910 signal conditioner data sheet* for more information.

A IQS900 signal conditioner with diagnostics automatically and remotely indicates the health/status of a TQ9xx-based measurement chain so you always know when measurements can be trusted. This helps to ensure that machinery is operated safely and reliably, extending its life and reducing costs.

Equally important, TQ9xx-based measurement chains using a IQS900 with diagnostics are SIL 2 "by design" so they bring enhanced reliability and significant risk reduction, making them suitable for use in safety-related applications (functional safety contexts).

Further, TQ9xx-based measurement chains are form, fit and functionally equivalent replacements that match or better the outstanding performance of TQ4xx-based measurement chains. Each component is interchangeable, so existing TQ4xx-based proximity measurement chains can be quickly and easily replaced or upgraded. For example, a IQS900 signal conditioner without diagnostics is a direct replacement for a IQS45x in most TQ4xx-based measurement chains.

Note: A TQ9xx-based measurement chain using a IQS900 configured with a current output and a GSI127 galvanic separation unit, allows transmission over distances up to 1 km – longer than any other solution.

For specific applications, contact your local Parker Meggitt representative.

SPECIFICATIONS

Overall proximity measurement chain

Operation

Sensitivity

- Ordering option code B21 : 8 mV/µm (203.2 mV/mil)
- Ordering option code B22 : 2.5 µA/µm (63.5 µA/mil)
- Ordering option code B23 : 4 mV/µm (101.6 mV/mil)
- Ordering option code B24 : 1.25 µA/µm (31.75 µA/mil)

Linear measurement range (typical)

- Ordering option code B21 : 0.15 to 2.15 mm, corresponding to a −1.6 to −17.6 V output
- Ordering option code B22 : 0.15 to 2.15 mm, corresponding to a −15.5 to −20.5 mA output
- Ordering option code B23 : 0.3 to 4.3 mm, corresponding to a −1.6 to −17.6 V output
- Ordering option code B24 : 0.3 to 4.3 mm, corresponding to a −15.5 to −20.5 mA output

Linearity : See **Performance curves on page 9 and on page 10**

Frequency response : DC to 20 kHz (−3 dB)

Interchangeability of elements : All components in chain are interchangeable

SPECIFICATIONS *(continued)*

Environmental

Potentially explosive atmospheres

Available in Ex approved versions for use in hazardous areas (ordering option code A5)

⚠ **For TQxxx, EAxxx and IQS900 proximity measurement chains intended for use in hazardous areas (potentially explosive atmospheres), each component of the sensor / measurement chain must be appropriately Ex marked.**
More specifically, for any order of a IQS900 signal conditioner for use in an Explosive (Ex) environment with ordering option code A5 (Ex ec or Ex ia), the associated TQ9xx proximity sensor and any EA90x extension cable must also have the ordering option code A5.

Protection mode	TQ9xx	EA90x	IQS900
Europe			
ec (Gas)	Ⓔx II 3 G (Zone 2) Ex ec IIC T6…T3 Gc LCIE 21 ATEX 1004 X T6: For −40°C ⩽ T_{amb} ⩽ +75°C T5: For −40°C ⩽ T_{amb} ⩽ +90°C T4: For −40°C ⩽ T_{amb} ⩽ +125°C T3: For −40°C ⩽ T_{amb} ⩽ +180°C	Suitable for IQS9xx Ex ec	Ⓔx II 3 G (Zone 2) Ex ec IIC T6…T5 Gc LCIE 21 ATEX 1004 X T6: For −40°C ⩽ T_{amb} ⩽ +70°C T5: For −40°C ⩽ T_{amb} ⩽ +85°C
ia (Gas)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	Ⓔx II 1 G (Zones 0, 1, 2) Ex ia IIC T6 or T5 Ga LCIE 21 ATEX 3002 X T6: For −40°C ⩽ T_{amb} ⩽ +70°C T5: For −40°C ⩽ T_{amb} ⩽ +85°C
ia (Dust)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	Ⓔx II 1 D (Zones 20, 21, 22) Ex ia IIIC T_{200} 80°C…T_{200} 115°C Da LCIE 21 ATEX 3002 X T_{200} 80°C: For −40°C ⩽ T_{amb} ⩽ +50°C T_{200} 95°C: For −40°C ⩽ T_{amb} ⩽ +65°C T_{200} 115°C: For −40°C ⩽ T_{amb} ⩽ +85°C

SPECIFICATIONS *(continued)*

Protection mode	TQ9xx	EA90x	IQS900
International			
ec (Gas)	Ex ec IIC T6…T3 Gc IECEx LCIE 21.0005X T6: For −40°C ⩽ T_{amb} ⩽ +75°C T5: For −40°C ⩽ T_{amb} ⩽ +90°C T4: For −40°C ⩽ T_{amb} ⩽ +125°C T3: For −40°C ⩽ T_{amb} ⩽ +180°C	Suitable for IQS9xx Ex ec	Ex ec IIC T6…T5 Gc IECEx LCIE 21.0005X T6: For −40°C ⩽ T_{amb} ⩽ +70°C T5: For −40°C ⩽ T_{amb} ⩽ +85°C
ia (Gas)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	Ex ia IIC T6 or T5 Ga IECEx LCIE 21.0006X T6: For −40°C ⩽ T_{amb} ⩽ +70°C T5: For −40°C ⩽ T_{amb} ⩽ +85°C
ia (Dust)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	Ex ia IIIC T_{200} 80°C…T_{200} 115°C Da IECEx LCIE 21.0006X T_{200} 80°C: For −40°C ⩽ T_{amb} ⩽ +50°C T_{200} 95°C: For −40°C ⩽ T_{amb} ⩽ +65°C T_{200} 115°C: For −40°C ⩽ T_{amb} ⩽ +85°C
North America			
ec (Gas)	Class I, Division 2, Groups A, B, C, D T6…T3 Ex ec IIC T6…T3 Gc Class I, Zone 2, AEx ec IIC T6…T3 Gc cCSAus 80084516	Suitable for IQS9xx Ex ec	Class I, Division 2, Groups A, B, C, D T6…T5 Ex ec IIC T6…T5 Gc Class I, Zone 2, AEx ec IIC T6…T5 Gc cCSAus 80084516
ia (Gas)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	IS Class I, Division 1, Groups A, B, C, D T6 or T5 Ex ia IIC T6 or T5 Ga Class I, Zone 0, AEx ia IIC T6 or T5 Ga cCSAus 80084516
ia (Dust)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	Class II, Division 1, Groups E, F, G T80°C…T115°C Ex ia IIIC T80°C…T115°C Da Zone 20, AEx ia IIIC T80°C…T115°C Da cCSAus 80084516

SPECIFICATIONS *(continued)*

Protection mode	TQ9xx	EA90x	IQS900
United Kingdom*			
ec (Gas)	Ⓔx II 3 G (Zone 2) Ex ec IIC T6…T3 Gc CML 21 UKEX 4549 X T6: For −40°C ⩽ T_{amb} ⩽ +75°C T5: For −40°C ⩽ T_{amb} ⩽ +90°C T4: For −40°C ⩽ T_{amb} ⩽ +125°C T3: For −40°C ⩽ T_{amb} ⩽ +180°C	Suitable for IQS9xx Ex ec	Ⓔx II 3 G (Zone 2) Ex ec IIC T6…T5 Gc CML 21 UKEX 4549 X T6: For −40°C ⩽ T_{amb} ⩽ +70°C T5: For −40°C ⩽ T_{amb} ⩽ +85°C
ia (Gas)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	Ⓔx II 1 G (Zones 0, 1, 2) Ex ia IIC T6 or T5 Ga CML 21 UKEX 2548 X T6: For −40°C ⩽ T_{amb} ⩽ +70°C T5: For −40°C ⩽ T_{amb} ⩽ +85°C
ia (Dust)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	Ⓔx II 1 D (Zones 20, 21, 22) Ex ia IIIC T_{200} 80°C…T_{200} 115°C Da CML 21 UKEX 2548 X T_{200} 80°C: For −40°C ⩽ T_{amb} ⩽ +50°C T_{200} 95°C: For −40°C ⩽ T_{amb} ⩽ +65°C T_{200} 115°C: For −40°C ⩽ T_{amb} ⩽ +85°C
*UKCA marking is not engraved/marked on the products.			

South Korea			
ec (Gas)	Ex ec IIC T6…T3 Gc KGS 24-GA4BO-0435X T6: For −40°C ⩽ T_{amb} ⩽ +75°C T5: For −40°C ⩽ T_{amb} ⩽ +90°C T4: For −40°C ⩽ T_{amb} ⩽ +125°C T3: For −40°C ⩽ T_{amb} ⩽ +180°C	Suitable for IQS9xx Ex ec	Ex ec IIC T6…T5 Gc KGS 24-GA4BO-0436X T6: For −40°C ⩽ T_{amb} ⩽ +70°C T5: For −40°C ⩽ T_{amb} ⩽ +85°C
ia (Gas)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	Ex ia IIC T6 or T5 Ga KGS 24-GA4BO-0437X T6: For −40°C ⩽ T_{amb} ⩽ +70°C T5: For −40°C ⩽ T_{amb} ⩽ +85°C
ia (Dust)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	Ex ia IIIC T_{200} 80°C…T_{200} 115°C Da KGS 24-GA4BO-0438X T_{200} 80°C: For −40°C ⩽ T_{amb} ⩽ +50°C T_{200} 95°C: For −40°C ⩽ T_{amb} ⩽ +65°C T_{200} 115°C: For −40°C ⩽ T_{amb} ⩽ +85°C

SPECIFICATIONS *(continued)*

Protection mode	TQ9xx	EA90x	IQS900
Kazakhstan (Eurasian Economic Union)			
ec (Gas)	Ex 2Ex e IIC T6…T3 Gc X EAЭC KZ 7100841.01.01.03722 T6: For −40°C ⩽ T_{amb} ⩽ +75°C T5: For −40°C ⩽ T_{amb} ⩽ +90°C T4: For −40°C ⩽ T_{amb} ⩽ +125°C T3: For −40°C ⩽ T_{amb} ⩽ +180°C	Suitable for IQS9xx Ex ec	Ex 2Ex e IIC T6…T5 Gc X EAЭC KZ 7100841.01.01.03722 T6: For −40°C ⩽ T_{amb} ⩽ +70°C T5: For −40°C ⩽ T_{amb} ⩽ +85°C
ia (Gas)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	Ex 0Ex ia IIC T6…T5 Ga X EAЭC KZ 7100841.01.01.03722 T6: For −40°C ⩽ T_{amb} ⩽ +70°C T5: For −40°C ⩽ T_{amb} ⩽ +85°C
ia (Dust)	Simple apparatus Suitable for IQS9xx Ex ia	Suitable for IQS9xx Ex ia	Ex Ex ia IIIC T_{200} 80°C…T_{200} 115°C Da X EAЭC KZ 7100841.01.01.03722 T_{200} 80°C: For −40°C ⩽ T_{amb} ⩽ +50°C T_{200} 95°C: For −40°C ⩽ T_{amb} ⩽ +65°C T_{200} 115°C: For −40°C ⩽ T_{amb} ⩽ +85°C

⚠ **For specific parameters of the mode of protection concerned and special conditions for safe use, refer to the Ex certificates that are available from Parker Meggitt.**

⚠ **For a IQS900 signal conditioner with protection mode "Ex ec" located in an Ex Zone 2, the user must ensure that the IQS900 is installed in an industrial housing or enclosure that ensures a protection rating of at least IP54 (or equivalent).**

⚠ **For the most recent information on Ex certifications that are applicable to the IQS900, refer to the *Ex product register (PL-1511) document* that is available from Parker Meggitt.**
For information on the IQS910's Ex certifications, refer to the *IQS910 signal conditioner data sheet*.

Approvals

Conformity	:	European Union (EU) declaration of conformity (CE marking). Eurasian Economic Union certificate/declaration of conformity (EAC marking).
Electromagnetic compatibility (EMC)	:	EMC compliant (2014/30/EU): EN 61000-6-2:2005. EN 61000-6-4:2007 + A1:2011. EN 61326-1:2013. EN 61326-3-2:2008 (SIL).
Electrical safety	:	EN/IEC 61010-1:2010. CAN/CSA C22.2 61010-1-12 / UL 61010-1:2012.
Environmental management	:	RoHS compliant (2011/65/EU)
Hazardous areas	:	Ex approved versions (see **Potentially explosive atmospheres on page 4**)
Functional safety	:	SIL 2 in accordance with IEC 61508-1:2010 and IEC 61508-2:2010. Cat 1 PL c in accordance with ISO 13849-1:2015.
Machinery protection systems	:	API 670 5th edition compliant

SPECIFICATIONS *(continued)*

System (chain) calibration

Calibration temperature	: +23˚C ±5˚C
Target material	: VCL 140 steel (1.7225)

Note: For applications using a non-standard or special target material, performance curves can be generated and supplied. Contact Parker Meggitt for further information.

Total system (chain) length

The total system length (TSL) is the sum of the length of the TQ9xx sensor's integral cable and the length of the EA90x extension cable. For TQ902/TQ912, EA902 and IQS900 proximity measurement chains, the supported TSLs are obtained from the following different combinations of cables.

Total system (chain) lengths

- 1 m : 1.0 m integral cable with no extension cable
- 5 m : 0.5 m integral cable + 4.5 m extension cable.
  1.0 m integral cable + 4.0 m extension cable.
  1.5 m integral cable + 3.5 m extension cable.
  2.0 m integral cable + 3.0 m extension cable.
  5.0 m integral cable with no extension cable.
- 10 m : 0.5 m integral cable + 9.5 m extension cable.
  1.0 m integral cable + 9.0 m extension cable.
  1.5 m integral cable + 8.5 m extension cable.
  2.0 m integral cable + 8.0 m extension cable.
  5.0 m integral cable + 5.0 m extension cable.
  10.0 m integral cable with no extension cable.

Note: The combination of cables selected for a particular total system (chain) length depends on the application. For example, to obtain the optimum location for the separation between the integral and extension cables or to eliminate the requirement for an extension cable.

Total system (chain) length trimming

Due to the characteristics of the coaxial cable, an "electrical trimming" of the nominal length of extension cables is necessary to optimize the system performance and the sensor interchangeability.

TSL for a 1 m measurement chain	: 0.9 m min.
TSL for a 5 m measurement chain	: 4.4 m min.
TSL for a 10 m measurement chain	: 8.8 m min.

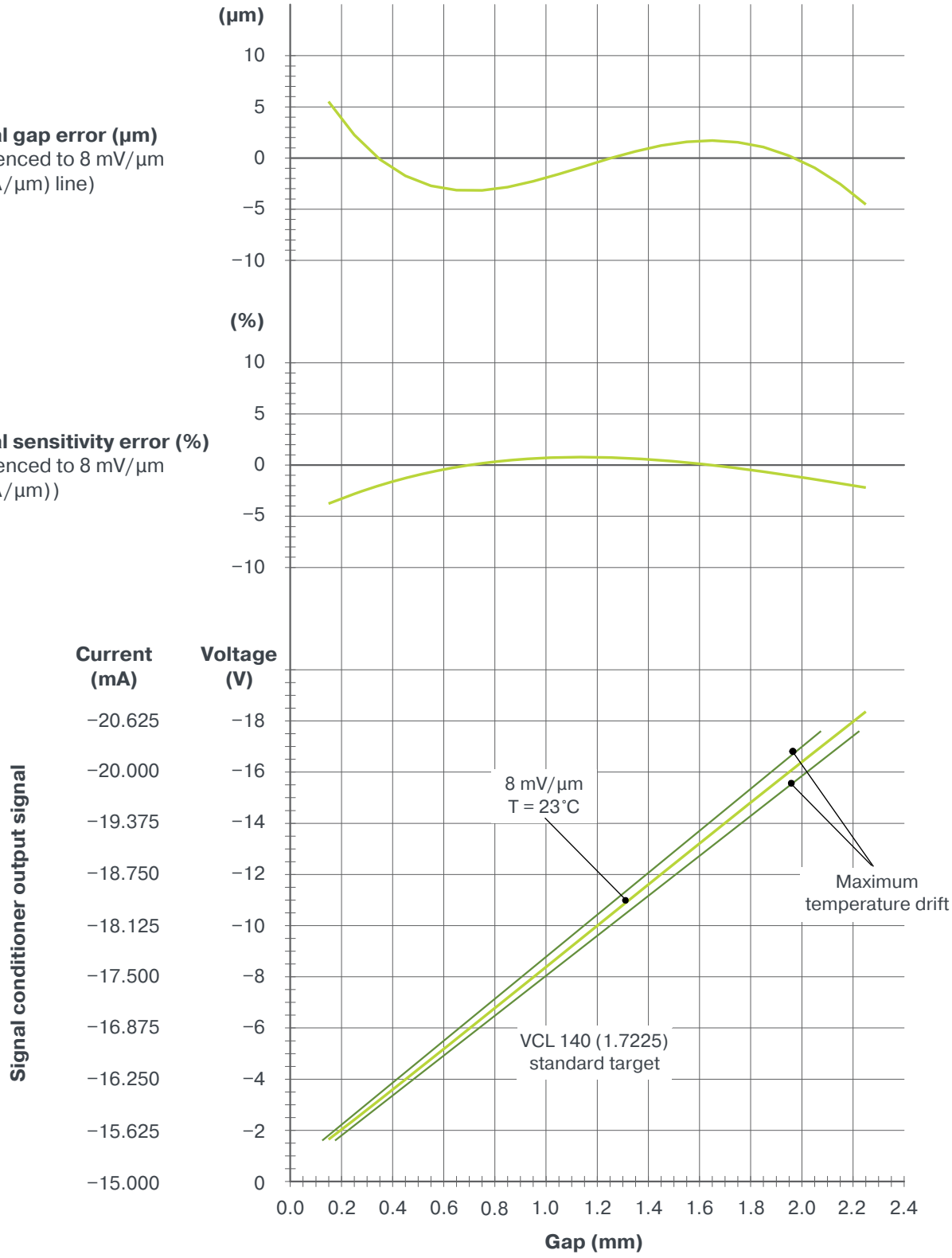
In-situ test support

Raw output	: The raw output (RAW/COM) provides a "raw" voltage output signal that corresponds to the internal signals of the IQS900 signal conditioner, even if the IQS900 is configured with a current output. This allows the measurement chain/system operation from sensor to signal conditioner to be easily verified in situ. See **Raw output (RAW/COM) on page 12**.
Test input	: The test input (TEST/ COM) allows an AC voltage signal to be injected at the input to the IQS900 signal conditioner in order to test the IQS900 itself and/or cabling to the monitoring system. This allows the measurement chain/system operation from signal conditioner to monitoring system to be easily verified in situ. See **Test input (TEST/COM) on page 13**.

Note: See **Connectors on page 14** and refer to the *Proximity measurement chains using TQ9xx proximity sensors with IQS9xx signal conditioners installation manual* for further information.

SPECIFICATIONS *(continued)*

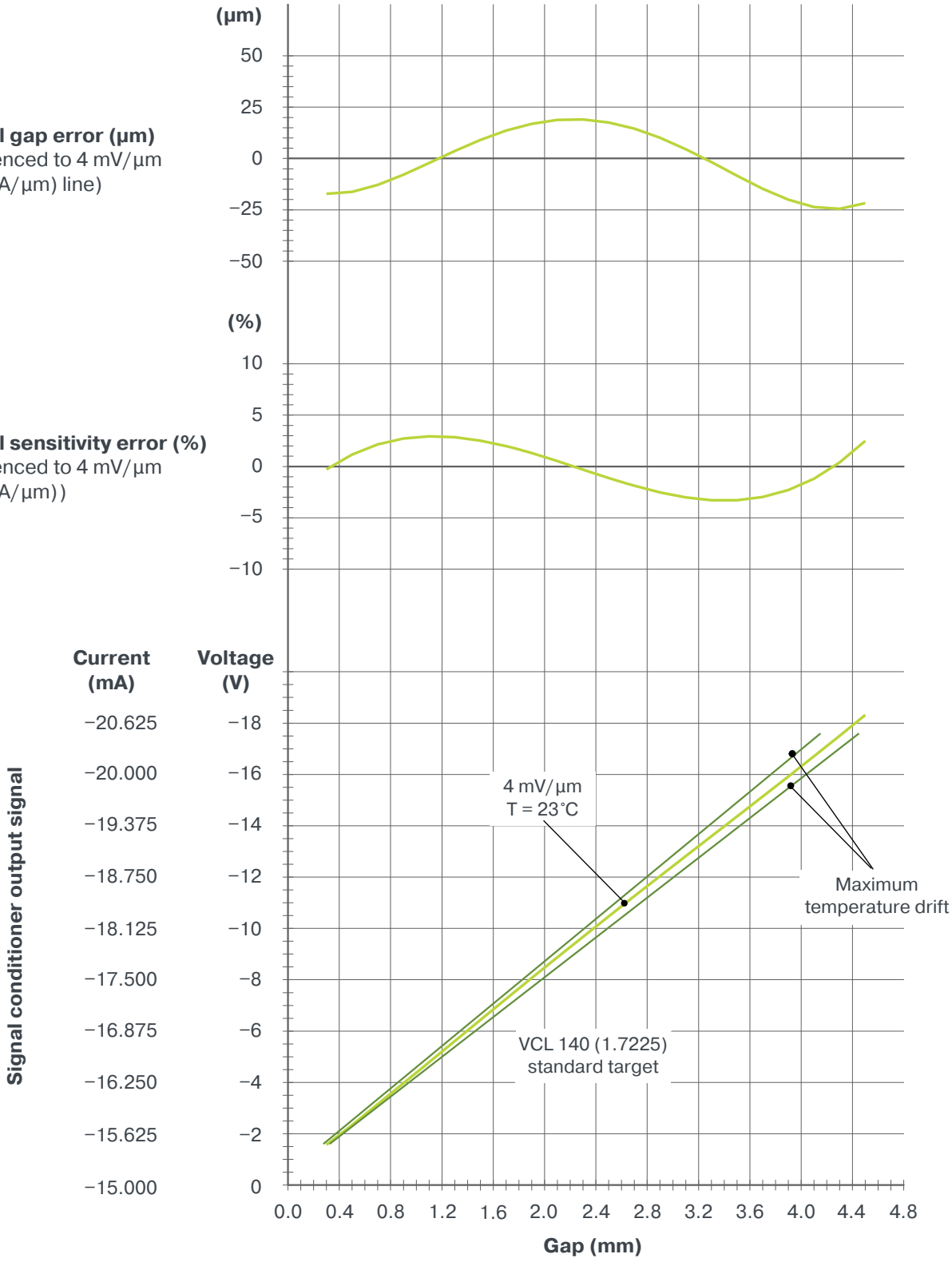
Performance curves for TQ902 or TQ912 with IQS900 – 2 mm measurement range



Proximity sensor: TQ902 or TQ912
Signal conditioner: IQS900 (ordering option code B21 or B22)
Standard target material: VCL 140 (1.7225)
Equivalent materials: A 37.11 (1.0065), AFNOR 40 CD4, AISI 4140

SPECIFICATIONS *(continued)*

Performance curves for TQ902 or TQ912 with IQS900 – 4 mm measurement range



Proximity sensor: TQ902 or TQ912
Signal conditioner: IQS900 (ordering option code B23 or B24)
Standard target material: VCL 140 (1.7225)
Equivalent materials: A 37.11 (1.0065), AFNOR 40 CD4, AISI 4140

SPECIFICATIONS *(continued)*

TQ902 and TQ912 proximity sensors and EA902 extension cable

General

Sensor input requirements	: High-frequency power source from a IQS9xx signal conditioner

Environmental

Temperature range	
• Sensor	: −40 to 180°C (−40 to 356°F) operating. 180 to 220°C (356 to 428°F) short-term survival for 2 hours max.
• Sensor and cabling	: Temperature for use in an Ex Zone: see **Potentially explosive atmospheres on page 4**
• Cabling, connector and optional protection	: −40 to 200°C (−40 to 392°F)
Measurement drift	
• Sensor and cabling with a total system (chain) length of 1, 5 or 10 m	: <5% for −30 to 150°C (−22 to 302°F)
Pressure between sensor tip and body	: 6 bar (100 psid) max.
Protection rating (according to IEC 60529)	: The head of the sensor (sensor tip and integral cable) is rated IP68
Vibration (according to IEC 60068-2-26)	: 5 g peak between 10 and 500 Hz
Shock acceleration (according to IEC 60068-2-27)	: 15 g peak (half sine impulse, 11 ms duration)

Physical characteristics

Sensor construction	: Wire coil Ø8 mm, PPS (polyphenylene sulfide) high-performance thermoplastic tip, crimped to a stainless-steel body (AISI 316L)
Integral and extension cables	: FEP covered 70 Ω coaxial cable, Ø3.6 mm
Connectors	: Self-locking miniature coaxial connectors. Note: When connecting, these should be hand-tightened until locked.
Optional protection	
• Flexible stainless-steel hose (protection tube) with FEP sheath (extruded fluorinated ethylene propylene)	: The combination of stainless-steel hose with FEP sheath provides sealed (leak-tight) mechanical and electrically insulated protection. Note: The FEP sheath also provides resistance to almost all chemicals and low permeability to liquids, gases and moisture, while being flexible, low friction and mechanically tough.

SPECIFICATIONS *(continued)*

IQS900 signal conditioner

Current output (2-wire signal transmission)

Current at min. / max. gap	: −15.5 mA / −20.5 mA
Measurement range	: 5 mA (corresponding to 2 or 4 mm)
Output sensitivity	: See **Operation on page 3** and **IQS900 signal conditioner on page 18**
Nominal output signal	
• Without diagnostics	: −15.5 to −20.5 mA
• With diagnostics	: −15.5 to −20.5 mA indicates normal operation. Other current values (>−15.5 or <−20.5 mA) indicate a problem with the measurement chain (sensor, cabling or signal conditioner).
Output impedance	: >60 kΩ. Note: Recommended monitoring system input impedance: ⩽350 Ω.

Voltage output (3-wire signal transmission)

Voltage at min. / max. gap	: −1.6 V / −17.6 V
Measurement range	: 16 V (corresponding to 2 or 4 mm)
Output sensitivity	: See **Operation on page 3** and **IQS900 signal conditioner on page 18**
Nominal output signal	
• Without diagnostics	: −1.6 t o −17.6 V
• With diagnostics	: −1.6 t o −17.6 V indicates normal operation. Other voltage values (>−1.6 or <−17.6 V) indicate a problem with the measurement chain (sensor, cabling or signal conditioner).
Output impedance (small signal)	: <100 Ω at DC. <300 Ω at 20 kHz. Note: Recommended monitoring system input impedance: ⩾50 kΩ. The low output impedance enables operation with a wider range of galvanic separation units / safety barriers, without loss of performance. For example, a IQS900 (output impedance 100 Ω) connected to a third-party galvanic isolator (input impedance 10 kΩ) will see 1% max. signal loss due to impedance matching.
Protection	: Short-circuit (35 mA), overvoltage (±33 V_{DC} typical)
Output voltage swing	: −0.05 to −22.5 V with a 50 kΩ load and a −24 V_{DC} power supply. −0.05 to −21.5 V with a 10 kΩ load and a −24 V_{DC} power supply.

Raw output (RAW/COM)

Output voltage range	: −0.8 to −8.8 V (nominal)
Output impedance	: <15 kΩ up to 20 kHz. <10 kΩ for DC measurement. Note: Recommended test equipment input impedance: >1 MΩ.
Protection	: Short-circuit, overvoltage (±33 V_{DC} typical)

SPECIFICATIONS *(continued)*

Test input (TEST/COM)

Transfer function

• Main current output (TEST input to −24V/COM output)	: Current output (mA) = V_{TEST} (V) × 0.5
• Main voltage output (TEST input to O/P/COM output)	: Voltage output (V) = V_{TEST} (V) × 1.6
• Test voltage output (TEST input to RAW/COM output)	: V_{RAW} output (V) = V_{TEST} (V) × 0.8
Input impedance	: 500 kΩ. Note: Recommended test equipment output impedance: >5 kΩ.
Protection	: Overvoltage (±33 V_{DC} typical)

Power supply (to IQS900)

Input voltage

• With a current output signal (2-wire signal transmission)	: −24 V_{DC} (nominal). −18 to −30 V_{DC} (range).
• With a voltage output signal (3-wire signal transmission)	: −24 V_{DC} (nominal). −19 to −30 V_{DC} (range).
Current consumption (with nominal 24 V_{DC} supply)	: −25 mA max. −15.5 mA standby.
Overvoltage protection (diode)	: ±33 V_{DC} typical

Note: The IQS900 signal conditioner should be powered (energised) using a limited-power, low-voltage power supply such as a sensor power supply output provided a VM600^{Mk2}/VM600 or VibroSmart® monitoring and/or protection system, a GSI127 galvanic separation unit or other suitable power supply.
In safety-related applications, a IQS900 must be powered using a limited-power, low-voltage power supply with a safe limitation of −30 V_{DC} (nominal), even in the event of a single fault with the power supply.

Environmental

Temperature

• Operating and storage	: −40 to 85°C (−40 to 185°F)
Humidity	: 0 to 95%, non-condensing
Protection rating (according to IEC 60529)	: IP20. Note: The IQS900 is suitable for indoor use only unless it is installed in an industrial housing or enclosure that ensures a higher level of environmental protection.
Flammability	: UL94 V-0
Vibration (according to IEC 60068-2-6)	: 5 g peak between 10 and 500 Hz
Shock acceleration (according to IEC 60068-2-27)	: 15 g peak (half sine impulse, 11 ms duration)

SPECIFICATIONS *(continued)*

Connectors

Self-locking miniature coaxial connector (bidirectional)	: 1 contact for sensor-side signal: sensor (connects to TQ9xx sensor or EA902 cable)
Screw-terminal connector (input)	: 4 contacts for test signals: raw output (RAW/COM) and test input (TEST/COM)
Screw-terminal connector (output)	: 4 contacts for monitor-side signals: measurement output (O/P/COM) and power supply input (−24V/COM)
Screw-terminal connectors	
• Clamping range (min. to max.)	: 0.2 to 1.5 mm^2 (28 to 16 AWG)
• Tightening torque (min. to max.)	: 0.2 to 0.25 N • m (0.15 to 0.18 lb-ft) for conductor screws. 0.2 to 0.3 N • m (0.15 to 0.22 lb-ft) for mounting-flange screws.

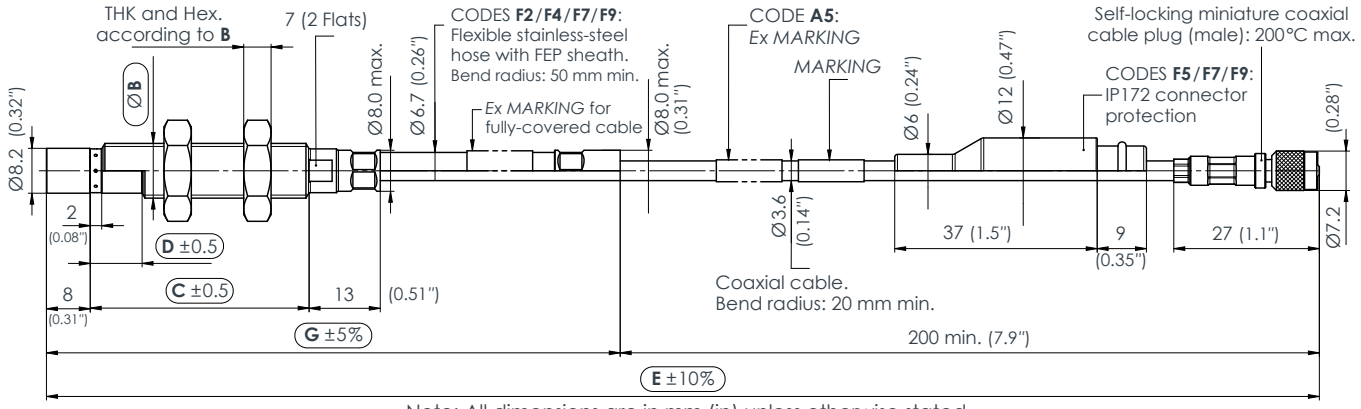
Note: The IQS900 features removal screw-terminal connectors that can unplugged from the main body of its housing to simplify installation and mounting.

Physical characteristics

Electrical connections	: Self-locking miniature coaxial connector and removable screw-terminal connectors (see **Connectors on page 14**)
Housing material	: Injection-moulded aluminium, painted
Dimensions	: See **Mechanical drawings and ordering information on page 18**
Weight	: 200 g (0.44 lb) approx.
Mounting	
• Without DIN-rail mounting adaptor	: Two M4 screws
• With DIN-rail mounting adaptor (ordering option code I1)	: MA130 DIN-rail mounting adaptor for signal conditioners. Suitable for TH 35 DIN rails (according to EN 50022 / IEC 60715). For example, TH 35-7.5 or TH 35-15. See **Accessories on page 19**.

MECHANICAL DRAWINGS AND ORDERING INFORMATION

TQ902 proximity sensor



Note: All dimensions are in mm (in) unless otherwise stated.

Ordering number:

111-902-000-011- **A** **B** **C** **D** **E** **F** **G** **H**

Environment (A) [1]	
Standard	1
Explosive (Ex)	5

Hex.	THK	Body thread (B)	
17	5	M10 × 1	1
22	7	M14 × 1.5	2
24	8	M16 × 1.5	3
9/16″	7/32″	3/8″-24UNF	6
15/16″	3/8″	5/8″-18UNF	7
3/4″	5/16″	1/2″-20UNF	8

Body length (C)	
Each 1 mm, from 20 to 250 mm	
20 mm min.	20
250 mm max.	250

Unthreaded length (D)	
Each 1 mm, from 2 to 230 mm	
2 mm min.	2
230 mm max.	230

Integral cable length (E)	
500 mm ±50 mm	500
1000 mm ±100 mm	1000
1500 mm ±150 mm	1500
2000 mm ±200 mm	2000
5000 mm ±500 mm	5000
10000 mm ±1000 mm	10000

Optional protection (F) [2]		
	Cable	Connector
0	None	None
2	Flexible hose with FEP sheath	None
4	Movable flexible hose with FEP sheath	None
5	None	IP172
7	Flexible hose with FEP sheath	IP172
9	Movable flexible hose with FEP sheath	IP172

Flexible hose length (G) [2]	
Each 100 mm, from 0 to 9800 mm	
0	None
100	100 mm min.
9800	9800 mm max.

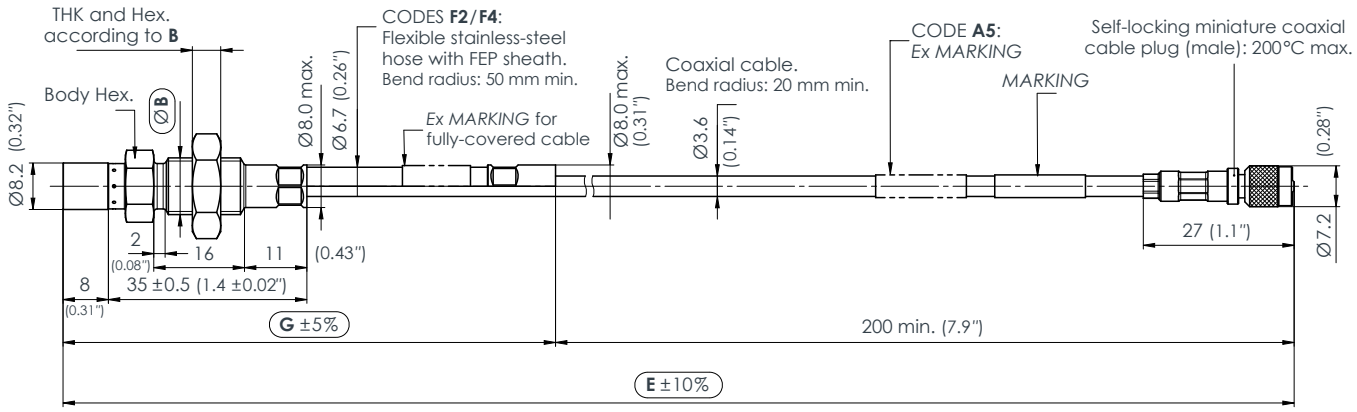
Total system length (H)	
01	1 m
05	5 m
10	10 m

Notes

1. For use in hazardous areas (potentially explosive atmospheres), each component of a sensor / measurement chain (TQ902/TQ912, EA902 and IQS900) must be appropriately Ex certified, that is, with ordering option code A5.
2. When optional protection such as a flexible stainless-steel hose with FEP sheath is ordered:
   Flexible hose length (G) min. = Body length (C) + 80 mm.
   Flexible hose length (G) max. = Integral cable length (E) − 200 mm, for an integral cable that is protected to the maximum extent possible ("fully-covered cable").

MECHANICAL DRAWINGS AND ORDERING INFORMATION *(continued)*

TQ912 proximity sensor



Ordering number:

111-912-000-011- **A** **B** **E** **F** **G** **H**

Environment (A) [1]	
Standard	1
Explosive (Ex)	5

Hex.	Th	Body Hex.	Body thread (B)	
17	5	11	M10 × 1	1
9/16″	7/32″	7/16″	3/8″-24UNF	6

Integral cable length (E)	
500 mm ±50 mm	500
1000 mm ±100 mm	1000
1500 mm ±150 mm	1500
2000 mm ±200 mm	2000
5000 mm ±500 mm	5000
10000 mm ±1000 mm	10000

Flexible hose length (G) [2]	
Each 100 mm, from 0 to 9800 mm	
0	None
100	100 mm min.
9800	9800 mm max.

Optional protection (F) [2]		
	Cable	Connector
0	None	None
2	Flexible hose with FEP sheath	None
4	Movable flexible hose with FEP sheath	None

Total system length (H)	
01	1 m
05	5 m
10	10 m

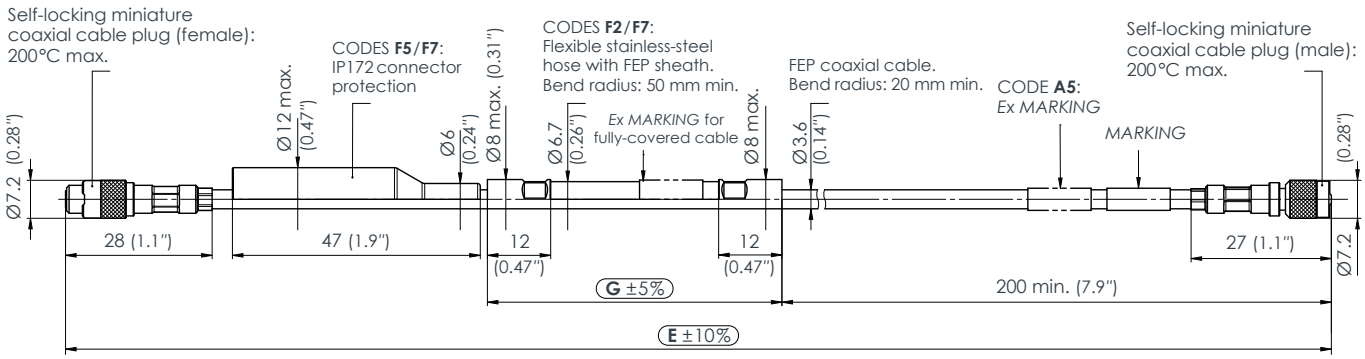
Notes

All dimensions are in mm (in) unless otherwise stated.

1. For use in hazardous areas (potentially explosive atmospheres), each component of a sensor / measurement chain (TQ902/TQ912, EA902 and IQS900) must be appropriately Ex certified, that is, with ordering option code A5.
2. When optional protection such as a flexible stainless-steel hose with FEP sheath is ordered:
   Flexible hose length (G) max. = Integral cable length (E) − 200 mm, for an integral cable that is protected to the maximum extent possible ("fully-covered cable").

MECHANICAL DRAWINGS AND ORDERING INFORMATION *(continued)*

EA902 extension cable



Ordering number:

913-902-000-011- **A** **E** **F** **G**

Environment (A) [1]	
Standard	1
Explosive (Ex)	5

Flexible hose length (G) [3]	
Each 100 mm, from 0 to 9300 mm.	
0	None
100	100 mm min.
9300	9300 mm max.

Extension cable length (E) [2]	
3000 mm ±300 mm	3000
3500 mm ±350 mm	3500
4000 mm ±400 mm	4000
4500 mm ±450 mm	4500
5000 mm ±500 mm	5000
8000 mm ±800 mm	8000
8500 mm ±850 mm	8500
9000 mm ±900 mm	9000
9500 mm ±950 mm	9500

Optional protection (F) [3]		
	Cable	**Connector**
0	None	None
2	Flexible hose with FEP sheath	None
5	None	IP172
7	Flexible hose with FEP sheath	IP172

Notes

All dimensions are in mm (in) unless otherwise stated.

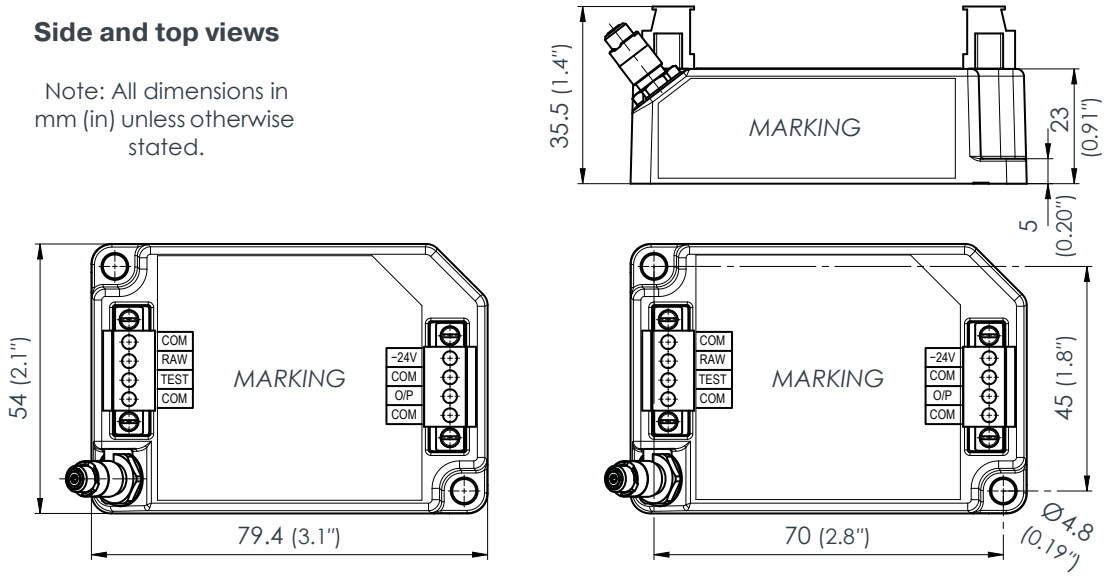
1. For use in hazardous areas (potentially explosive atmospheres), each component of a sensor / measurement chain (TQ902/TQ912, EA902 and IQS900) must be appropriately Ex certified, that is, with ordering option code A5.
2. The total system (chain) length = TQ902 or TQ912 integral cable length + EA902 extension cable length (E).
   For information on combining integral and extension cables to obtain a particular total system (chain) length, see Total system (chain) length on page 8. For information on cable length tolerances, see Total system (chain) length trimming on page 8.
3. When optional protection such as a flexible stainless-steel hose with FEP sheath is ordered:
   Flexible hose length (G) max. = EA902 extension cable length (E) − 200 mm, for an extension cable that is protected to the maximum extent possible (“fully-covered cable”).

MECHANICAL DRAWINGS AND ORDERING INFORMATION *(continued)*

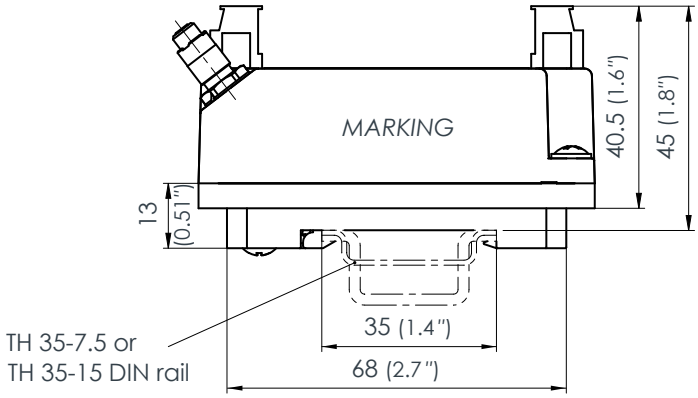
IQS900 signal conditioner

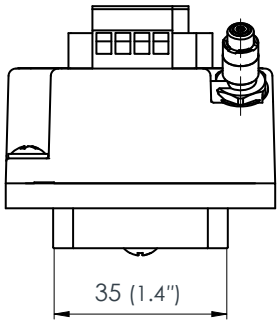
Side and top views

Note: All dimensions in mm (in) unless otherwise stated.



Side and end views with DIN-rail mounting adaptor (ordering option code I1)





IQS900 mounted on MA130 DIN-rail adaptor

Ordering number: 204-900-000-011- **A** **B** **C** **H** **I**

Environment (A) [1]	
Standard	1
Explosive (Ex)	5

Measurement range	Sensitivity (B)	
2 mm	8 mV/µm	21
	2.5 µA/µm	22
4 mm	4 mV/µm	23
	1.25 µA/µm	24

Diagnostics (C) [2]	
Without diagnostics	1
With diagnostics (SIL)	2

Total system length (H)	
1 m	01
5 m	05
10 m	10

Installation (I)	
Without DIN-rail adaptor	0
With DIN-rail adaptor (MA130)	1

Notes: See following page …

MECHANICAL DRAWINGS AND ORDERING INFORMATION *(continued)*

IQS900 signal conditioner *(continued)*

Notes

1. Ordering option code A5 (“Ex”) specifies a IQS900 signal conditioner suitable for use in hazardous areas.
   - For use in hazardous areas (potentially explosive atmospheres), each component of a sensor / measurement chain (TQ902/TQ912, EA902 and IQS900) must be appropriately Ex certified, that is, with ordering option code A5.
   - For a IQS900 signal conditioner with protection mode “Ex ec” located in an Ex Zone 2, the user must ensure that the IQS900 is installed in an industrial housing or enclosure that ensures a protection rating of at least IP54 (or equivalent).
2. Ordering option code C specifies a IQS900 signal conditioner either without diagnostics (C1) or with diagnostics (C2):
   - A IQS900 signal conditioner without diagnostics (C1) is similar to the IQS45x, which it replaces. The IQS900 is a form, fit and functionally equivalent replacement that matches or betters the measurement specifications of the IQS45x.
   - A IQS900 signal conditioner with diagnostics (C2) includes optional diagnostic circuitry that automatically detects and remotely indicates problems with the measurement chain (sensor, cabling and/or the IQS900 itself). A IQS900 with diagnostics is certified SIL 2 (IEC 61508) and Cat 1 PL c (ISO 13849) “by design” to more easily meet the requirements of safety-related applications.

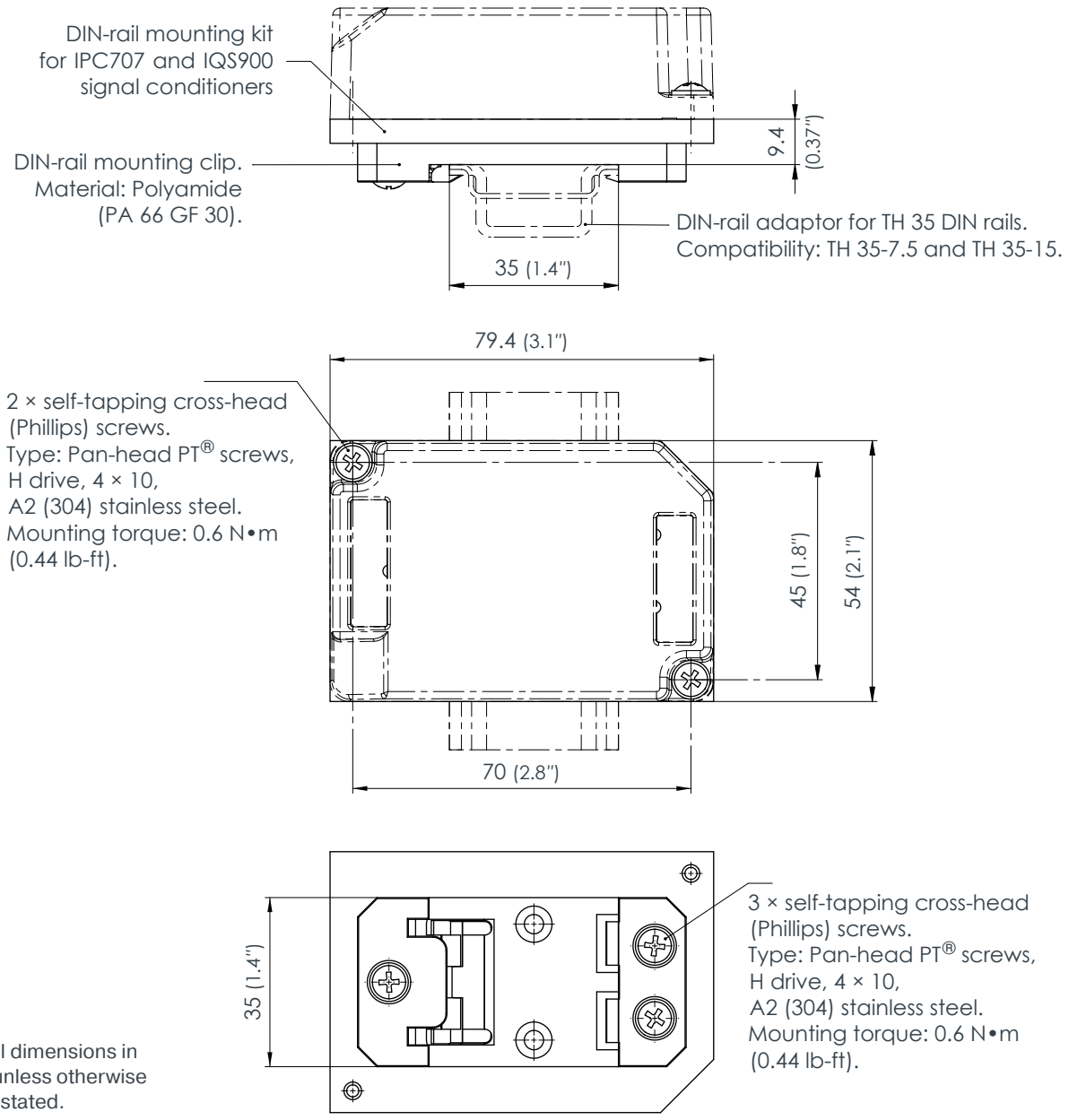
Contact Parker Meggitt for further information.

ACCESSORIES

ABA17x	Industrial housings	: Refer to corresponding data sheet
IP172	Interconnection protection	: Refer to corresponding data sheet
JB118	Junction box	: Refer to corresponding data sheet
KS107	Flexible conduit (protection tube)	: Refer to corresponding data sheet
MA130	Mounting adaptor	: See below
PA15x	Probe mounting adaptors	: Refer to corresponding data sheets
SG1xx	Cable feedthroughs	: Refer to corresponding data sheets

ACCESSORIES *(continued)*

MA130 DIN-rail mounting adaptor



Note: All dimensions in mm (in) unless otherwise stated.

Ordering number (PNR): 809-130-000-021

RELATED PRODUCTS

TQ922/TQ932, EA902 and IQS900	Proximity measurement chains (2 or 4 mm measurement range, high-pressure applications)	: Refer to corresponding data sheet
TQ942, EA902 and IQS900	Proximity measurement chains (2 or 4 mm measurement range, right-angle (90°) mount)	: Refer to corresponding data sheet
TQ401, EA401 and IQS900	Proximity measurement system (2 or 4 mm measurement range)	: Refer to corresponding data sheet
TQ403, EA403 and IQS900	Proximity measurement system (2 or 4 mm measurement range)	: Refer to corresponding data sheet
TQ423, EA403 and IQS900	Proximity measurement system (2 or 4 mm measurement range)	: Refer to corresponding data sheet
IQS910	Signal conditioner	: Refer to corresponding data sheet