

TQ 401 / EA 401 / IQS 451

Proximity System : TQ 401 Proximity Transducer EA 401 Extension Cable IQS 451 Signal Conditioner

FEATURES

- Non-contacting measurement system based on eddy current principle
- Certified for use in potentially explosive atmospheres
- 5 m and 10 m systems
- Temperature compensated system
- Voltage or current output with protection against short circuits

CHARACTERISTICS

- Measuring range:
2 mm
- Transducer temperature range:
-40°C to +180°C
- Sensitivity:
8 mV/μm or 2.5 μA/μm
- Frequency response:
DC to 20 kHz (-3 dB)



IQS 451



DESCRIPTION

This proximity system allows contactless measurement of the relative displacement of moving machine elements. It is particularly suitable 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.

The system is based around a TQ 401 non-contacting transducer and its matching IQS 451 signal conditioner. Together, these form a calibrated proximity system in which each component is interchangeable. The system outputs a voltage or current proportional to the distance between the transducer tip and the target (e.g. machine shaft).

The active part of the transducer is a coil of wire that is moulded inside the tip of the device, which is made of Torton (polyamide-imide). The transducer body is made of stainless steel. The target material must, in all cases,

be metallic.

The transducer body is available with metric or English thread. The TQ 401 has an integral coaxial cable, terminated with an AMP-type connector. Various cable lengths (integral and extension) may be ordered.

The IQS 451 signal conditioner contains an HF modulator/demodulator that supplies a driving signal to the transducer. This generates the necessary electromagnetic field used to measure the gap. The conditioner circuitry is made of high-quality components and is mounted in an aluminium extrusion.

The TQ 401 transducer can be matched with a single EA 401 extension cable. Optional junction boxes and housings offer mechanical protection of the integral and extension cable connectors.

The proximity system is powered by associated processor modules or a rack power supply..

SPECIFICATIONS

Overall Proximity System

OPERATION

Sensitivity	: 8 mV/ μ m (200 mV/mil) using IQS 451 Version 0XX 2.5 μ A/ μ m (62.5 μ A/mil) using IQS 451 Version 1XX
Linear measuring range (typical)	: 0.2 - 2.2 mm, corresponding to -1.6 V to -17.6 V output using IQS 451 Version 0XX 15.5 mA to 20.5 mA output using IQS 451 Version 1XX
Linearity	: See system performance curves
Frequency response	: DC to 20 kHz (-3 dB)
Interchangeability of elements	: All components in system are interchangeable

ENVIRONMENTAL

Use in explosive atmospheres

- *EC type examination certificate* : LCIE 02 ATEX 6086 X II 2 G (Zones 1, 2) EEx ib IIC T6 to T3



For specific parameters of the mode of protection concerned and special conditions for safe use, please refer to the "EC type examination certificate" that is available from Vibro-Meter SA on demand.

- *CSA standard* : Certificate 1514309 (LR 62075-5),
Class I, Divisions 1 and 2, Groups A, B, C and D Ex ia

SYSTEM CALIBRATION

Calibration temperature	: +23°C \pm 5°C
Target material	: VCL 140 steel (1.7225)

Note : If special calibration is required, please define the alloy precisely or supply a sample of alloy (min. \varnothing 30 mm / 1 cm thick)

SPECIFICATIONS *(Continued)*

TOTAL SYSTEM LENGTH (TSL)

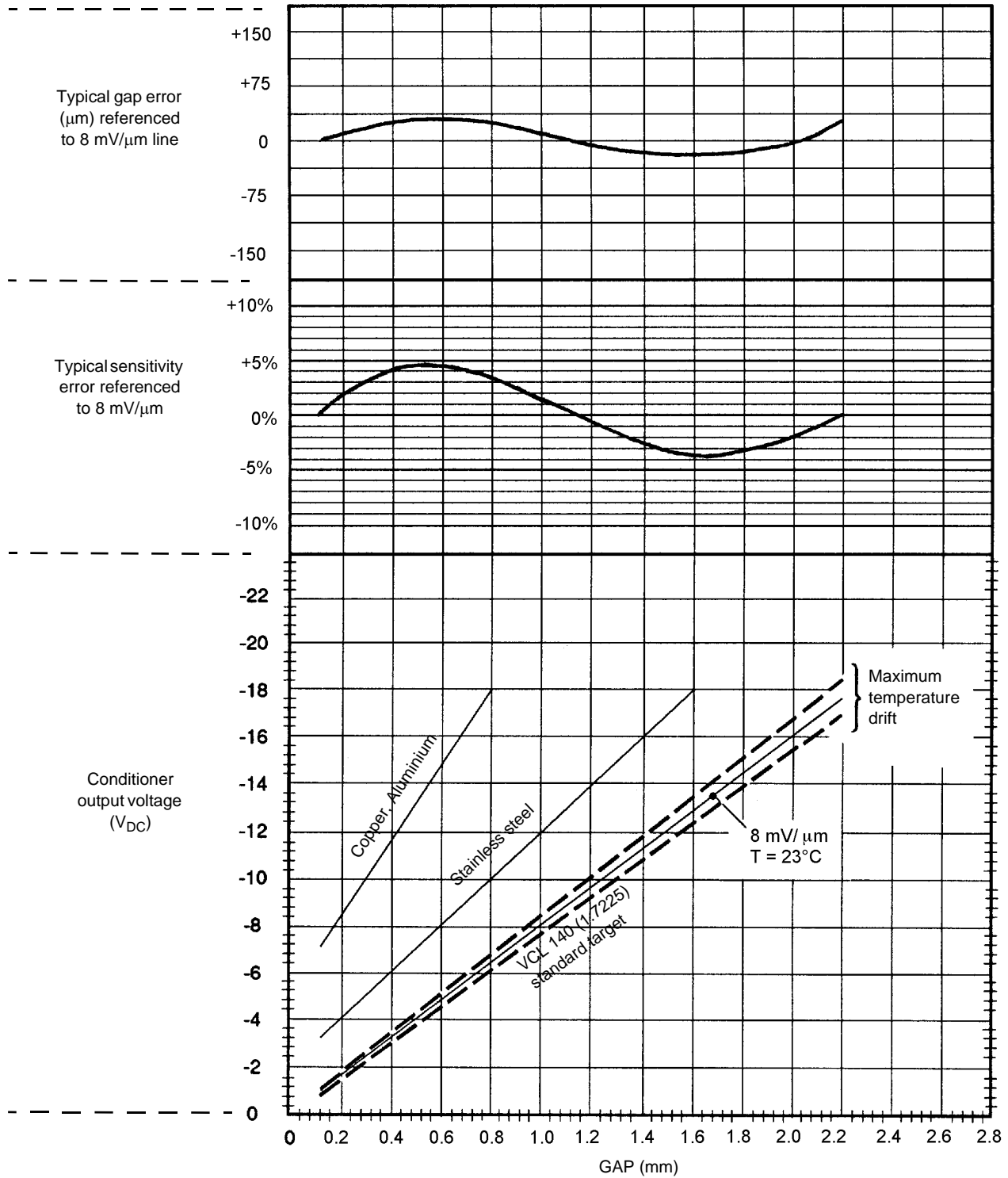
Due to the characteristics of the coaxial cable, an "electrical trimming" of the nominal length of the integral and extension cables is necessary to optimize the system performance and the transducer interchangeability.

TSL for a 5 m chain : 4.4 m minimum

TSL for a 10 m chain : 8.5 m minimum

SPECIFICATIONS (Continued)

Performance Curves for TQ 401 with IQS 451



Proximity transducer: TQ 401
 Signal conditioner: IQS 451
 Standard target material: VCL 140 (1.7225)
 Equivalent materials: A 37.11 (1.0065), AFNOR 40 CD4, AISI 4137

SPECIFICATIONS (Continued)

TQ 401 Proximity Transducer

GENERAL

Transducer input requirements : High-frequency power source via matching conditioner type IQS 451

ENVIRONMENTAL

Temperature ranges

- *Transducer* : -40°C to +180°C with drift < 5% (operation)
+180°C to +220°C with drift > 5% (short-term survival)
 - *Cable* : -100°C to +200°C
 - *Connector* : -65°C to +85°C
 - *Heat shrinkable sleeve (modified Polyolefin)* : -55°C to +135°C
- Protection class (according to IEC 529 and DIN 40050) : The tip of the transducer is rated IP 67
The connection between the transducer body and its integral cable is rated IP 64
- Transducer construction : Wire coil Ø 5 mm, Torlon (polyamide-imide) tip, encapsulated in stainless steel body (AISI 316L) with high-temperature epoxy glue
- Integral cable : FEP covered 50 Ω coaxial cable, Ø 2.65 mm
- *Option* : BOA stainless steel armour sheathing
Note : The BOA sheathing is not leaktight and the heat-shrinkable sleeve is splashproof only
- Connector : Miniature coaxial male connector type AMP 2-330 311-1
NB : This should be hand-tightened only when connecting

IQS 451 Signal Conditioner

OUTPUT CHARACTERISTICS

Voltage output, 3-wire configuration

- *Voltage at min. GAP* : -1.6 V
- *Voltage at max. GAP* : -17.6 V
- *Dynamic range* : 16 V
- *Output impedance* : 500 Ω
- *Short-circuit current* : 45 mA

Current output, 2-wire configuration

- *Current at min. GAP* : 15.5 mA
 - *Current at max. GAP* : 20.5 mA
 - *Dynamic range* : 5 mA
- Output capacitance : 1 nF
- Output inductance : 100 μH

SUPPLY

- Voltage : -20 V to -32 V
- Current : 13 ±1 mA (25 mA max.)
- Supply input capacitance : 1 nF
- Supply input inductance : 100 μH

SPECIFICATIONS *(Continued)*

ENVIRONMENTAL

(According to DIN 40040)

Temperature range

- *Operation* : -30°C to +70°C
- *Storage* : -40°C to +80°C

Humidity

- *Operation and storage* : Max. 95% non condensing

Vibration

- *Operation and storage* : 2 g peak between 10 Hz and 500 Hz

Protection class : IP 40

PHYSICAL CHARACTERISTICS

Construction material : Injection moulded aluminium

ELECTRICAL CONNECTIONS

Input : Stainless steel coaxial female socket

Output and power : Screw terminal strip

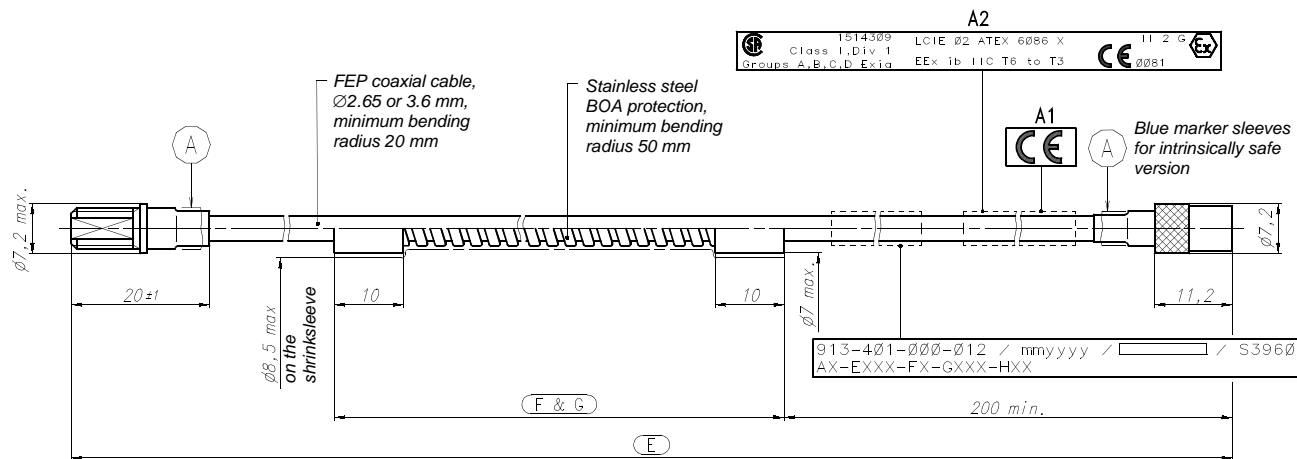
WEIGHT

Standard version : Approx. 140 g

Exi version : Approx. 220 g

DIMENSION AND ORDERING INFORMATION (Continued)

EA 401 Extension Cable



Ordering Number : 913 - 401 - 000 - 01 - **A** - **E** - **F** - **G**

Environment (A)	
Standard	1
Explosive	2

Cable Length (E)			
TSL 5 m	Ø 2.65	3.0 m	030
		3.5 m	035
		4.0 m	040
		4.5 m	045
TSL 10 m	Ø 3.6	8.0 m	080
		8.5 m	085
		9.0 m	090
		9.5 m	095

Cable Protection (F)	
None	0
BOA	1
BOA + sleeve	2

BOA Length (G)	
000	None
028	2.8 m
033	3.3 m
038	3.8 m
043	4.3 m
078	7.8 m
083	8.3 m
088	8.8 m
093	9.3 m

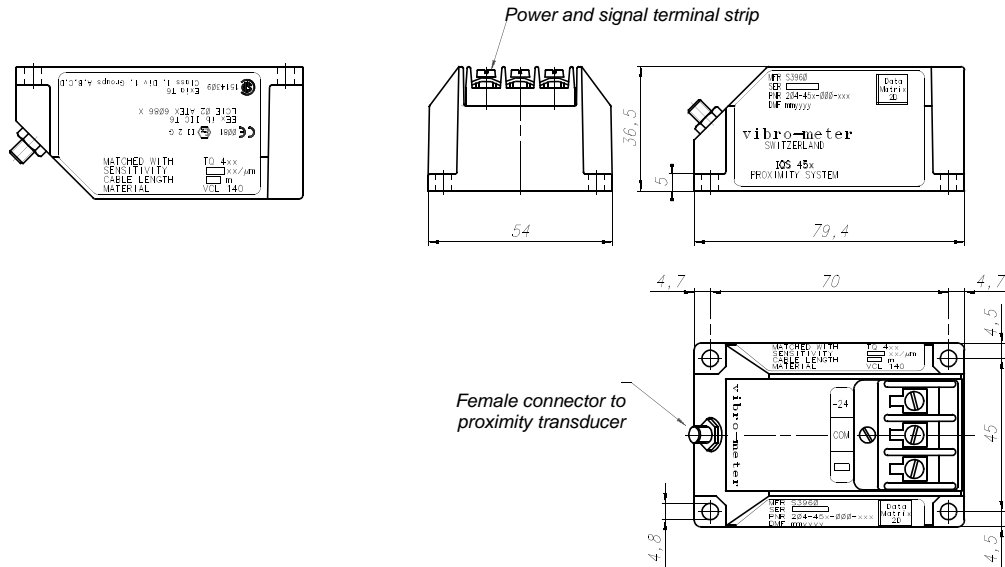
Notes :

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

(2) For details on cable length tolerances, please refer to the section "Total System Length (TSL)" on page 2.

DIMENSION AND ORDERING INFORMATION (Continued)

IQS 451 Signal Conditioner



To order please specify :

IQS Type	Mode	Sensitivity	Total System Length	Version	Ordering Number
IQS 451	Voltage output, 3-wire configuration	8 mV/μm	5 m	Standard	204-451-000-01
			10 m	Standard	204-451-000-02
			5 m	Exi	204-451-000-03
			10 m	Exi	204-451-000-04
	Current output, 2-wire configuration. ¹⁾	2.5 μA/μm	5 m	Standard	204-451-000-11
			10 m	Standard	204-451-000-12
			5 m	Exi	204-451-000-13
			10 m	Exi	204-451-000-14

¹⁾ Current output is used in conjunction with GSI 124 galvanic separation

ACCESSORIES

JB 118 Junction box
SG 101 Cable feedthrough



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