Vibro-Meter

TQ 403 / EA 403 / IQS 453

Proximity System :
TQ 403 Proximity Transducer
EA 403 Extension Cable
IQS 453 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

TQ 403

CHARACTERISTICS

- Measuring range:
  12 mm
- Transducer temperature range:
  -40°C to +180°C
- Sensitivity:
  1.33 mV/µm or 0.417 µA/µm
- Frequency response:
  DC to 20 kHz (-3 dB)

IQS 453

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smart engineering for
extreme environments

DESCRIPTION

This proximity system allows contactless measurement of the relative displacement of moving machine elements. It is particularly suitable for measuring the 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 403 non-contacting transducer and its matching IQS 453 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 Torlon (polyamide-imide). The transducer body is made of stainless steel. The target material must, in all cases, be metallic.

The transducer body is available only with metric thread. The TQ 403 has an integral coaxial cable, terminated with an AMP-type connector. Various cable lengths (integral and extension) may be ordered.

The IQS 453 signal conditioner contains an HF modulator/demodulator that supplies a driving signal to the transducer. This generates the necessary electro-magnetic field used to measure the gap. The conditioner circuitry is made of high-quality components and is mounted in an aluminium extrusion.

The TQ 403 transducer can be matched with a single EA 403 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	: 1.33 mV/µm (34 mV/mil) using IQS 453 Version 0XX 0.417 µA/µm (10.6 µA/mil) using IQS 453 Version 1XX
Linear measuring range (typical)	: 0.75 - 12.75 mm, corresponding to -1.6 V to -17.6 V output using IQS 453 Version 0XX 15.5 mA to 20.5 mA output using IQS 453 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 ± 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. Ø 60 mm / 1 cm thick)

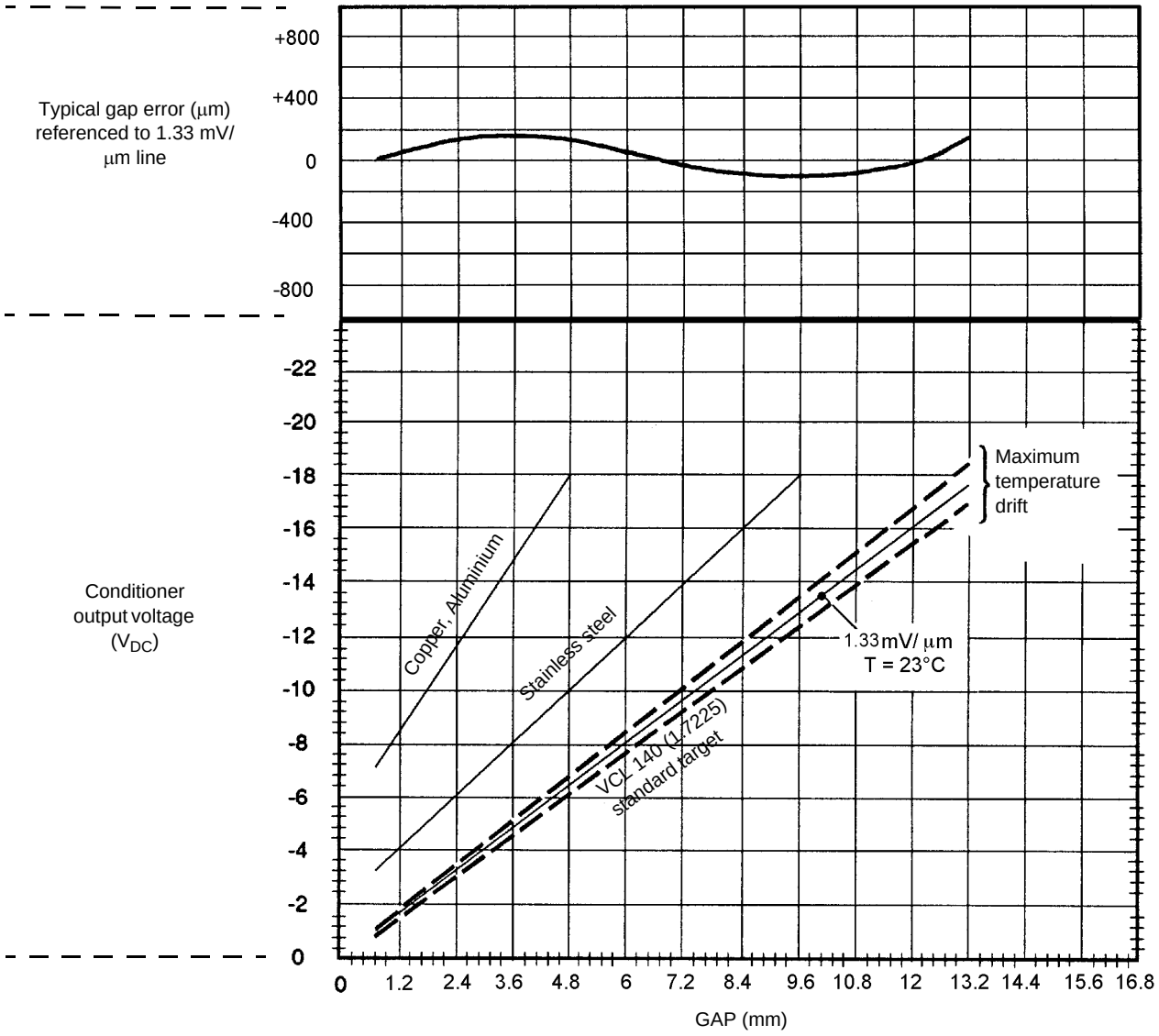
TOTAL SYSTEM LENGTH (TSL)

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	: 8.8 m minimum

SPECIFICATIONS *(Continued)*

Performance Curves for TQ 403 with IQS 453



Proximity transducer: **TQ 403**
Signal conditioner: **IQS 453**
Standard target material: **VCL 140 (1.7225)**
Equivalent materials: **A 37.11 (1.0065), AFNOR 40 CD4, AISI 4137**

SPECIFICATIONS *(Continued)*

TQ 403 Proximity Transducer

GENERAL

Transducer input requirements	:	High-frequency power source via matching conditioner type IQS 453

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 18 mm, Torlon (polyamide-imide) tip, encapsulated in MAZ (1.4305) stainless steel body with high-temperature epoxy glue
Integral cable	:	FEP covered 70 Ω coaxial cable, Ø 3.6 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 1-330 723-0 NB : This should be hand-tightened only when connecting

SPECIFICATIONS *(Continued)*

IQS 453 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

ENVIRONMENTAL CHARACTERISTICS

(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

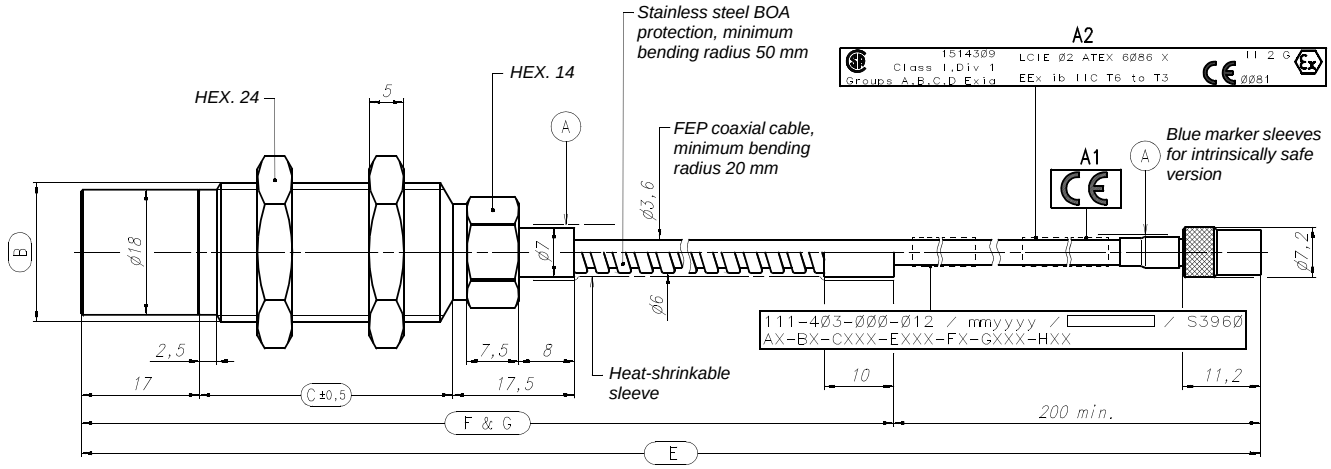
WEIGHT

Standard version : Approx. 140 g

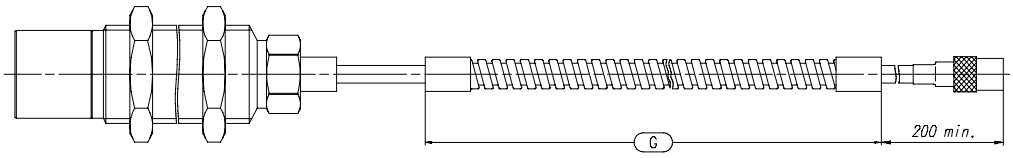
Exi version : Approx. 220 g

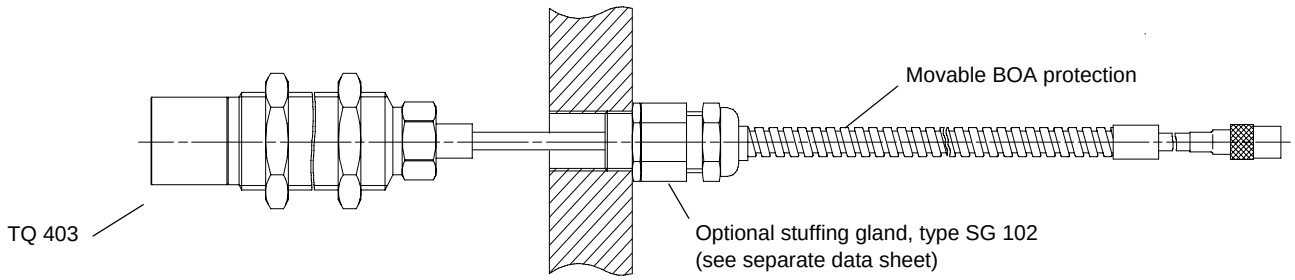
DIMENSIONS AND ORDERING INFORMATION

TQ 403 Proximity Transducer



Movable BOA for TQ 403





Ordering Number :

111 - 403 - 000 - 01 — **A** | **B 1** | **C** | **E** | **F** | **G** | **H**

Environment (A)	
Standard	1
Explosive	2

Body Thread (B)	
M20x1.5	1

Body Length (C)	
36 mm	036
86 mm	086

Integral Cable (E)	
1 m length	010
5 m length	050
10 m length	100

Cable Protection (F)	
None	0
BOA	1
BOA + sleeve	2
Movable BOA	3
Movable BOA + sleeve	4

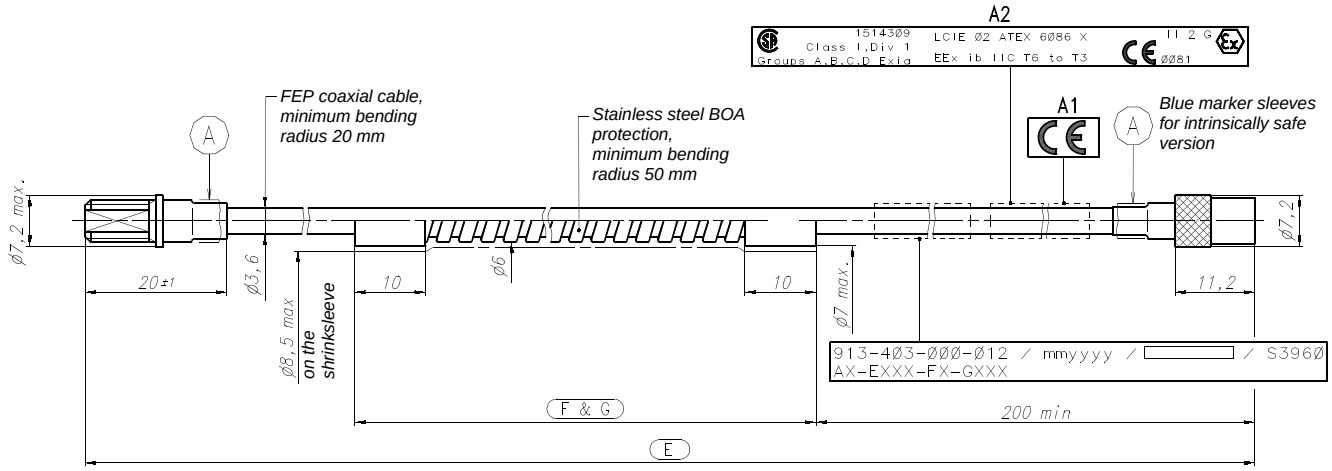
BOA Length (G)	
	Each 0.1 m, from 0 to 10.0 m
000	None
001	Min. 0.1 m
100	Max. 10.0 m

Total System Length (H)	
5 m length	05
10 m length	10

Notes :
(1) All dimensions are in mm.
(2) The total system length (dimension “H”) is the sum of the lengths of the integral cable and the extension cable.
(3) For details on cable length tolerances, please refer to the section ”Total System Length (TSL)” on page 2.

DIMENSIONS AND ORDERING INFORMATION *(Continued)*

EA 403 Extension Cable



Ordering Number : 913 - 403 - 000 - 01 – A | E | F | G

Environment (A)	
Standard	1
Explosive	2

Cable Length (E)		
Ø 3.6	4.0 m	040
	9.0 m	090

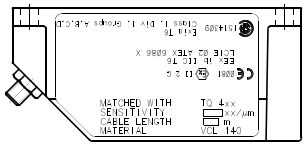
Cable Protection (F)	
None	0
BOA	1
BOA + sleeve	2

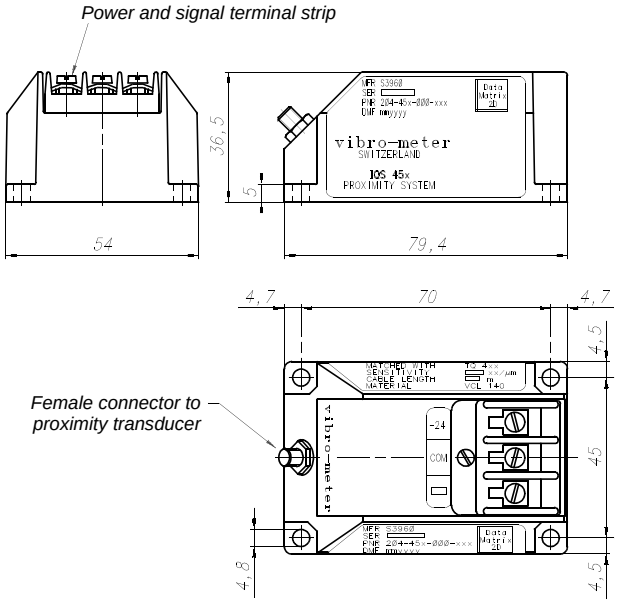
BOA Length (G)	
000	None
038	3.8 m
088	8.8 m

Note :
(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

DIMENSIONS AND ORDERING INFORMATION *(Continued)*

IQS 453 Signal Conditioner





To order please specify :

IQS Type	Mode	Sensitivity	Total System Length	Version	Ordering Number
IQS 453	Voltage output, 3-wire configuration	1.33 mV/µm	5 m	Standard	204-453-000-01
			10 m	Standard	204-453-000-02
			5 m	Exi	204-453-000-03
			10 m	Exi	204-453-000-04
	Current output, 2-wire configuration [1)]	0.417 µA/µm	5 m	Standard	204-453-000-11
			10 m	Standard	204-453-000-12
			5 m	Exi	204-453-000-13
			10 m	Exi	204-453-000-14

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

ACCESSORIES

JB 118 Junction box
SG 102 Cable feedthrough

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ISO 9001

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