Your Global Automation Partner

TURCK

CMVT
Vibration/Temperature Sensors
for Condition Monitoring

Products are linked with further information.

Condition Monitoring through Vibration Monitoring

Every machine generates vibrations — even when new. However, the vibration states can change due to various factors, such as imbalances, loose parts, misalignment of shafts or contamination of rotor blades.

Imbalance

Loosening

Misalignment

Contamination

ISO 10816-3 specifies precise limit values for the effective vibration velocity of industrial rotary machines. These limit values are used to assess the condition of the machine. They indicate whether the machine is operating in a good condition similar to new, whether short-term operation can still be tolerated despite increased vibrations but rapid maintenance is recommended, or whether the vibrations are so severe that machine damage is to be expected.

The CMVT sensor analyzes the vibration behavior of machines and detects critical machine conditions. On the one hand, the CMVT supports the planning of maintenance intervals in the sense that maintenance is carried out only when it is really necessary; on the other hand, the sensor improves the safety of machine operation by warning in good time when a critical vibration condition is imminent.

In addition to an increase in vibration, machine faults frequently cause rising temperatures due to greater friction. For this reason, the CMVT records the temperature in addition to the vibration, which

serves to further record the condition of the machine. All these considerations increase the availability and effectiveness of the machine and ensure that imminent

faults are detected and rectified in good time, thus preventing expensive damage and unplanned machine downtimes from occurring in the first place.
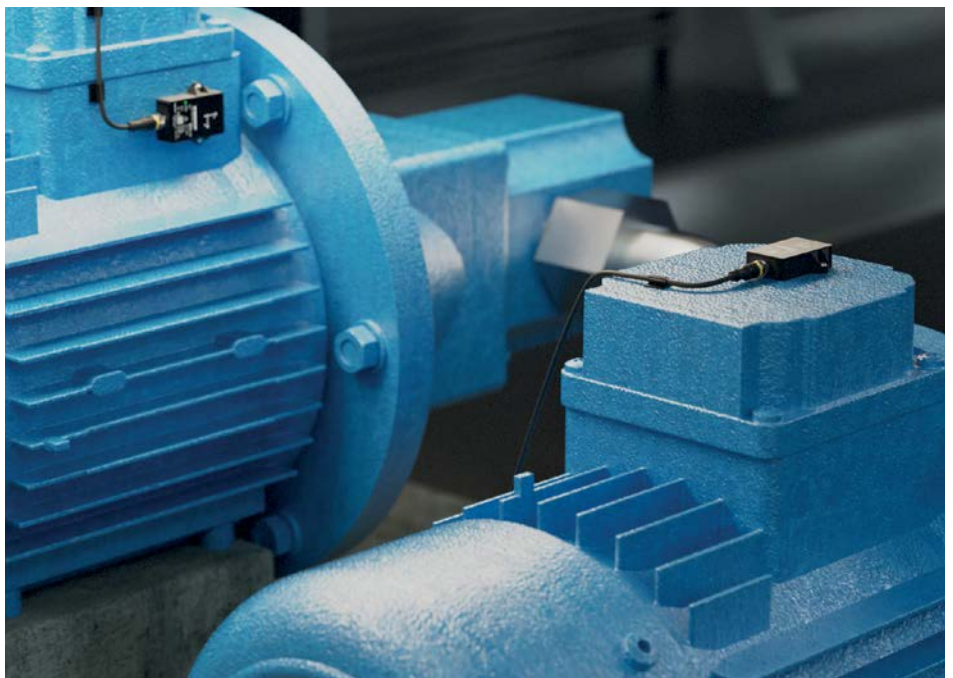
Maintenance-free operation
Robust and sealed housings with protection class IP68/IP69K and a high shock resistance of 200 g as well as a wide temperature range of -40 °C…+85 °C allow maintenance-free operation even in demanding environments.

IP67

-40°C...+85°C
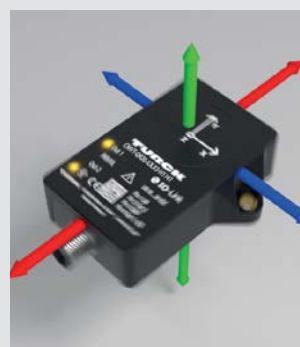
Measurement over three axes
Thanks to the 3D measuring cell, the CMVT records the vibration over three axes, offering a choice between effective vibration velocity (acceleration) and peak-to-peak value. The sensor also detects rising temperatures, which can indicate increased machine wear, for example.

Applications with recurring vibrations

Display of the vibrations over time
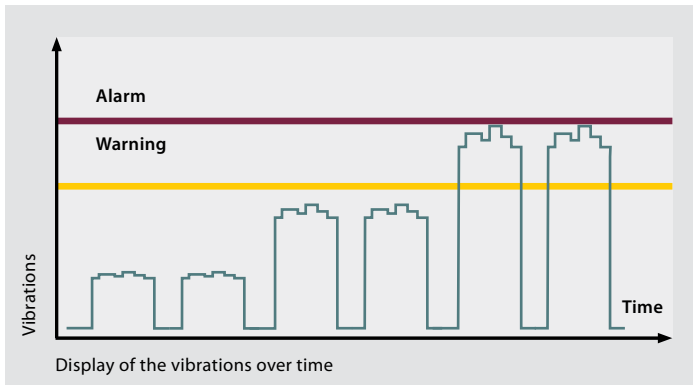
If the vibration increases during recurring processes, this can indicate damaged or worn tools. The CMVT offers the possibility to parametrize alarm or warning limits as required and to activate simple switching outputs when these limits are exceeded.

## Fan with increasing imbalance

Display of the vibrations over time
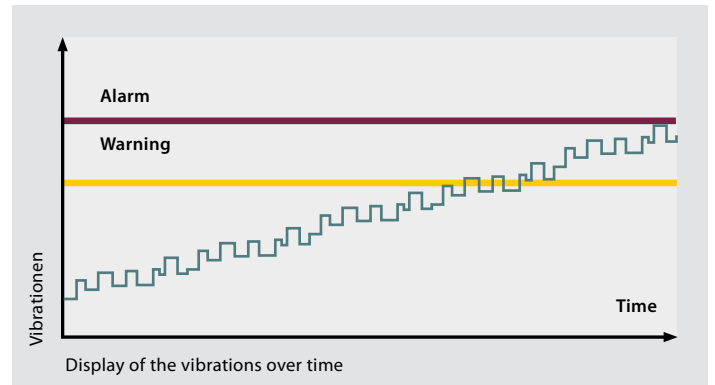
The smallest changes in vibration behavior or a steady increase in vibration velocity can be output as a process value via IO-Link and transferred to the controller for further analysis.

Solution without PLC integration
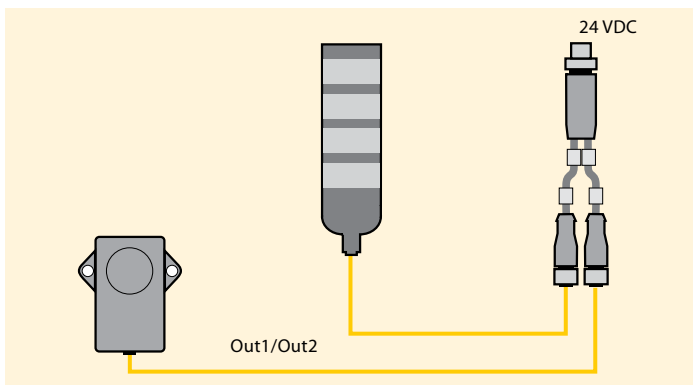
Simple retrofit of existing systems without PLC integration via switching outputs on a tower light

Communication via IO-Link
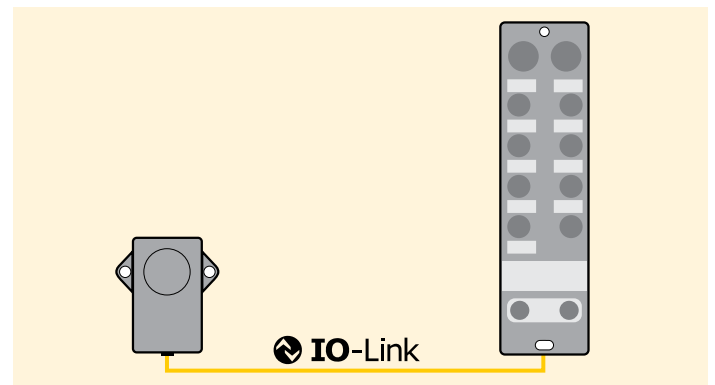
Simple commissioning of the sensor using standardized IO-Link protocol

Simple integration via IO-Link

The IO-Link protocol guarantees simple data transmission and generates additional information, such as sensor identification or the number of operating hours. In addition, the sensors can be parametrized so that switching outputs are activated as a warning or alarm when threshold values are exceeded.

Vibration monitor

The free web-based vibration monitor is the best solution for enabling easy visualization and analysis of the vibration data. All Turck IO-Link masters have the vibration monitor implemented directly as a web server.
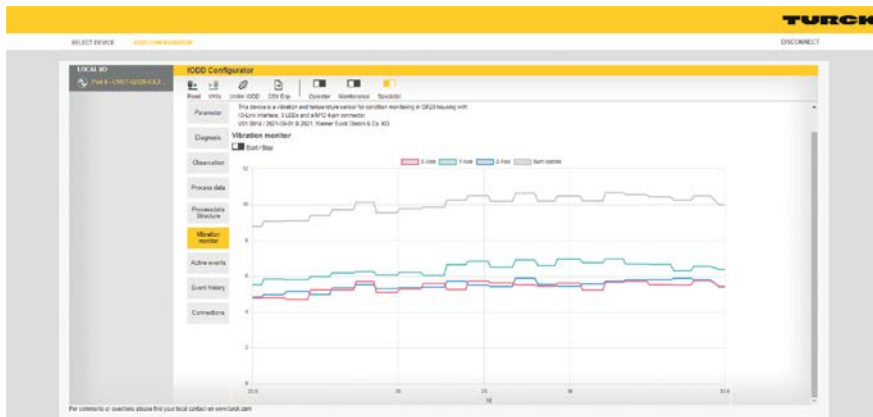
Types and Features

Vibration monitor

The vibration monitor is a web-based tool implemented directly as a web server for all Turck IO-Link masters. The vibration data recorded over three axes can be displayed very easily in the web browser and made available for further analysis via data export. Setting individual vibration velocity threshold values via the vibration monitor is also particularly easy. PNP/NPN outputs are set to activate a warning or alarm when the threshold values are exceeded. In the event that no Turck IO-Link master is used, the web demo and configuration tool represents the best solution. This free tool also allows web-based access to the full performance spectrum of the vibration monitor thanks to a simple connection from the PC via the USB-2-IOL-0002 parameterization device to the CMVT vibration sensor.

- Easy analysis of vibration and temperature
- Simple parameterization process, e.g. for setting the threshold values of switching outputs, for activating warnings or alarms

Example visualization of vibration across three detection axes on a fan

| ID		Type designation	Description
100016543		CMVT-QR20-IOLX3-H1141	CMVT sensor with M12 male connector
100029966		CMVT-QR20-IOLX3-0.3-RS4	CMVT sensor with cable outlet and M12 male connector

Products are linked with further information.

Over 30 subsidiaries and 60 representatives worldwide!

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Vibration & Temperature Sensor
For Condition Monitoring with IO-Link
CMVT-QR20-IOLX3-0.3-RS4
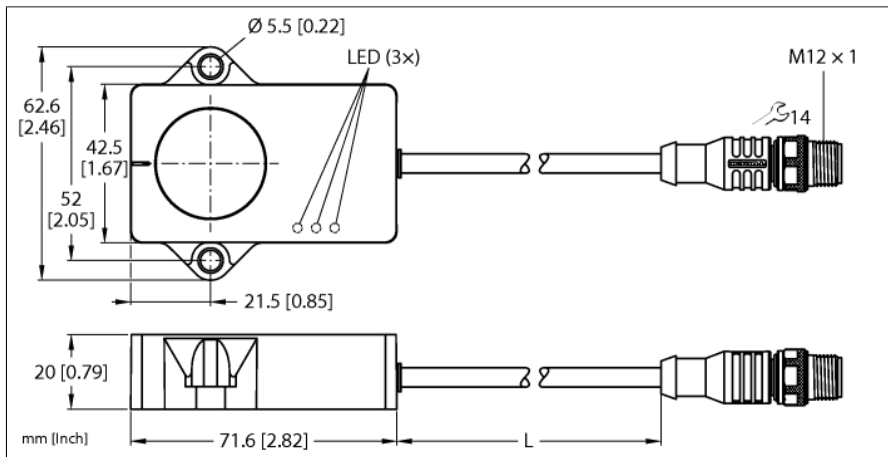
Type	CMVT-QR20-IOLX3-0.3-RS4
ID	100029966

Vibration — Acceleration	
Sampling rate of the acceleration measuring cell	6.6 KHz
RMS measuring range	± 16 g
RMS resolution	0.01 g
RMS linearity deviation, typical	≤ ±3 % @ 78 Hz
RMS repeatability, typical	≤ ±5 % @ 78 Hz

Vibration — Speed	
RMS measuring range	0…320 mm/s at 78 Hz
RMS resolution	0.01 mm/s
RMS linearity deviation, typical	≤ ±1 % @ 78 Hz
RMS repeatability, typical	≤ ±5 % @ 78 Hz

Temperature	
Temperature measuring range	-40…85 °C
Temperature linearity deviation	≤ 1 %
Temperature repeatability	≤ ± 2.4 %

Electrical data	
Operating voltage	18…30 VDC
Residual ripple	≤ 10 % U_{ss}
Isolation test voltage	≤ 0.5 kV
Communication protocol	IO-Link
Current consumption	< 50 mA

IO-Link	
Communication mode	COM 3 (230.4 kBaud)
Function Pin 4	IO-Link/SIO
Function Pin 2	SIO

- Rectangular, plastic, Ultem
- Status displayed via LED
- Acceleration and speed output RMS or peak to peak of the vibration
- Acceleration measuring range ±16 g
- Detection over 3 axes
- Temperature measuring range -40 °C to +85 °C
- High protection class IP68/IP69K
- 18…30 VDC, communication via IO-Link
- 10…30 VDC, SIO mode PNP/NPN switching outputs
- Cable with male connector, M12 × 1, 4-pin

Wiring Diagram
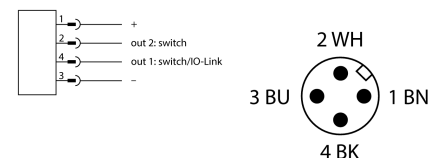
Functional principle

Condition monitoring sensors help to prevent unplanned downtimes and malfunctions during the production process. They monitor the condition of the machine as a preventative measure.
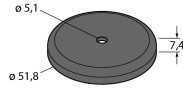
Using the CM sensors can prevent system downtime or machine damage, which in turn improves system effectiveness and allows uninterrupted operation.

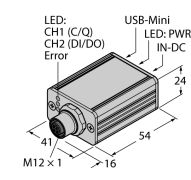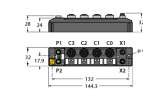The use of CMVT sensors also directly benefits the user in a quantifiable way.

Information on vibration and temperature is output via the standardized IO-Link protocol. Warning and alarm messages are also displayed via simple switching outputs.

Mechanical data	
Design	Rectangular, QR20
Dimensions	71.6 x 62.6 x 20 mm
Housing material	Plastic, Ultem
Electrical connection	Cable with connector, M12 × 1
Cable quality	Ø 4.5 mm, PUR, 0.3 m
	Halogen free, flame retardant acc. to IEC 60332-2-2 and UL FT2
Core cross-section	4 x 0.34 mm^2

Environmental conditions	
Ambient temperature	-40…+85 °C
Temperature changes (EN60068-2-14)	-40… +85 °C; 20 cycles
Vibration resistance (EN 60068-2-6)	20 g; 5 h/axis; 3 axes
Shock resistance (EN 60068-2-27)	200 g; 4 ms ½ sine
Protection class	IP68
	IP69K
MTTF	548 years acc. to SN 29500 (Ed. 99) 40 °C

Power-on indication	LED, Green
Switching state	2 × LEDs, Yellow

Accessories

Type code	Ident no.		Dimension drawing
SMBWLSMAG	3019574	Magnetic fixture for mounting work lights and sensors, 2 pieces	

Function accessories

Type code	Ident no.		Dimension drawing
USB-2-IOL-0002	6825482	IO-Link Master with integrated USB port	
TBEN-S2-4IOL	6814024	Compact multiprotocol I/O module, 4 IO-Link Master 1.1 Class A, 4 universal PNP digital channels 0.5 A	