Condition monitoring sensors

Vibration and temperature sensor	CMSVT38	IO-Link

The CMSVT38 condition monitoring sensor records reliable information about vibrations / oscillations in 3 axes as well as temperatures.

The measurement data is exchanged with the controller for processing via an IO-Link interface. Alternatively, two PNP/NPN switching outputs can be used individually in SIO mode and parameterized via IO-Link communication.

The CMSVT38 can be integrated into various condition monitoring concepts or used as a stand-alone solution in combination with signal lights from Kübler. In addition to condition monitoring, the sensors can also be used to record process steps.

Features and benefits

- **Precise vibration measurement over three axes**
  Various setting options depending on application requirements
  - Effective vibration speed (acceleration)
  - Peak-to-peak values

- **Simple commissioning, parameterization and installation**
  - Visualization of operating states via LEDs.
  - LEDs in translucent housing without bridging. This provides additional added value for the protection class.
  - Simple setting and adaptation of parameters and limit values to a wide range of application requirements (in accordance with ISO 10816-3) via IO-Link.

- **Industrie 4.0 ready with IO-Link interface**
  IO-Link interface for seamless integration and communication in the latest Industry 4.0 / IIoT control concepts.

- **Visual status display made easy**
  The sensor can be used in SIO mode with two PNP/NPN switching outputs, which are individually parameterized to the respective requirements via IO-Link. Limit values can then be visualized via suitable signal lights.

- **Precise measurement even under harsh environmental conditions**
  - Temperatue range -40 °C ... +85 °C and protection IP68 / IP69K
  - Robust housing with shock resistance up to 200 g

Condition Monitoring – Basis for predictive maintenance concepts

- **Background**
  - Only around 18 % of device or system failures are due to ageing components.
  - 82 % of failures are caused by improper installation, operating errors, quality problems, overloads, etc..

- **Minimize downtimes - increase productivity**
  The collection of specific data with the help of sensors provides information about the condition of machines. The resulting recognition of changes makes it possible to coordinate machine maintenance with foresight and eliminate malfunctions, before they have any damaging effects.

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Condition monitoring through vibration monitoring

Every machine - whether new or old - generates vibrations even without the influence of malfunctions. If vibration levels change over the course of the life cycle, this can be an indicator of damage occurring and the resulting system failures.

Negative causes of vibrations
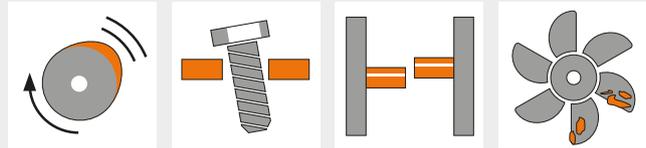
Imbalances

Parts coming loose

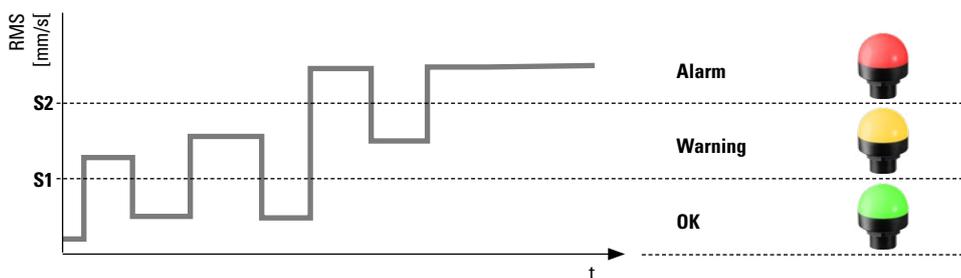Misalignments of shafts

Dirt on rotor blades

Assessment of vibrations on machines according to ISO 10816-3

Depending on the recorded vibration velocities, the states of machines are assessed according to the following table.

	A	New machine
	B	Long-term operation permitted
	C	Short-term operation still permitted
	D	Vibrations lead to damage

Definition		Large machines P =300 kW ... 50 MW H > 315 mm		Medium sized machines P = 15 ... 300 kW 160 mm < H < 315 mm	
Installation		fixed	flexible	fixed	flexible
Vibration speeds RMS [mm/s[	> 11	D	D	D	D
	7.1 ... 11	C	D	D	D
	4.5 ... 7.1	B	C	C	D
	3.5 ... 4.5	B	B	B	C
	2.8 ... 3.5	A	B	B	C
	2.3 ... 2.8	A	B	B	B
	1.4 ... 2.3	A	A	A	B
	0 ... 1.4	A	A	A	A

Visualization via signal lights

RMS [mm/s[

S2

S1

t

Alarm

Warning

OK

The transition points S1 and S2 between the warning levels can be individually parameterized as switching outputs in the vibration sensor.

Condition monitoring sensors

Vibration and temperature sensor	CMSVT38	IO-Link

Order code sensor

8.CMSVT38 . 1 1 4 1 . 1 1 X
Type   **ⓐ**   **ⓑ**

ⓐ *Interface*
4 = IO-Link with 2 switching outputs (SIO-Mode)

ⓑ *Type of connection*
1 = cable 0.3 m with M12 connector, 4-pin
4 = M12 connector, 4-pin

General accessories | | Order no.

IO-Link Master USB	For parameterizing device settings via FDT/IODD communication. USB interface for easy connection to a PC and for power supply. Adapter cable suitable for CMSVT: 05.00.6061.6462.002M (see below)	**IOL1A. 1K1341.ZZ1UU1**
EMC shield terminal	For an EMC-compliant installation of the cable - top-hat rail mounting - spring steel, galvanized - shield diameter 3.0 ... 12.0 mm	**8.0000.4G06.0312**

Cables and connectors | | Order no.

Preassembled cables	M12 female connector with coupling nut, 4-pin, A coded, straight single ended 2 m [6.56'] PUR cable	**05.00.6061.6211.002M**
	M12 female connector with coupling nut, 4-pin, A coded, straight M12 male connector with external thread, 4-pin, A coded, straight 2 m [6.56'] PUR cable	**05.00.6061.6462.002M**
Connectors	M12 female connector with coupling nut, 4-pin, A coded, straight (plastic)	**05.B8141-0**

Further Kübler accessories can be found at: kuebler.com/accessories
Further Kübler cables and connectors can be found at: kuebler.com/connection-technology

Condition monitoring sensors

Vibration and temperature sensor	CMSVT38	IO-Link

Technical data

Vibration detection - acceleration output

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 %, at 78 Hz
RMS repeatability, typical	≤ ±5 %, at 78 Hz

Vibration detection - speed output

RMS measuring range	0 ... 320 mm/s, at 78 Hz
RMS resolution	0.01 mm/s
RMS linearity deviation, typical	≤ ±1 %, at 78 Hz
RMS repeatability, typical	≤ ±5 %, at 78 Hz

Temperature measurement

Measuring range	-40 °C ... +85 °C
Linearity deviation	≤ ±1 %
Repeatability	≤ ±2.4 %

Mechanical characteristics

Electrical connection	M12 connectors, 4-pin
Weight	89 g [3.14 oz]
Protection acc. to EN 60529	IP68 / IP69k
Working temperature range	-40 °C ... +85 °C [-40 °F ... +185 °F]
Temperature changes (EN60068-2-14)	-40 °C ... +85 °C [-40 °F ... +185 °F] 20 cycles
Material housing	Plastic, polyetherimide
Vibration resistance (EN 60068-2-6)	20 g; 5 h/axis; 3 axes
Shock resistance (EN 60068-2-27)	200 g; 4 ms 1/2 sine
MTTF	548 years acc. to SN 29500 (Ed. 99)
Dimensions	71.6 x 62.6 x 20 mm [2.82 x 2.46 x 0.79"]

Electrical characteristics

Supply voltage	18 ... 30 V DC
Residual ripple	≤ 10 % Uss
Isolation test voltage	≤ 0.5 kV
Wire breakage / Reverse polarity protection	yes
Current consumption	max. 50 mA

Interface characteristics IO-Link

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

Approvals

UL compliant in accordance with	File-Nr. E539414
CE compliant in accordance with	
EMV Directive	2014/30/EU
RoHS Directive	2011/65/EU

Terminal assignment

Interface	M12 connector, male contacts, 4-pin, A-coded				
4	Signal:	+V	Out 2	0 V	Out 1/IOL
	Pin:	1	2	3	4

+V : Supply voltage +V DC
0 V : Supply voltage ground GND (0 V)
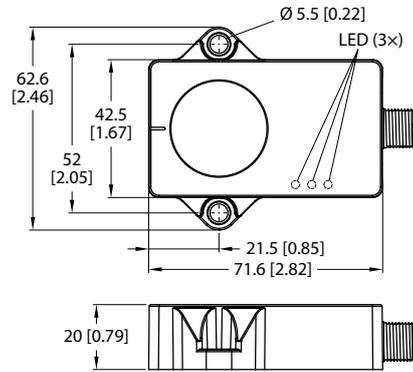Out 1 / Out 2 : Switching outputs
IOL : IO-Link

Vibration and temperature sensor	CMSVT38	IO-Link

Dimensions

Dimensions in mm [inch]

Variant with M12 connector

Ø 5.5 [0.22]
LED (3×)
62.6 [2.46]
42.5 [1.67]
52 [2.05]
21.5 [0.85]
71.6 [2.82]
20 [0.79]

Variant with cable and M12 connector

Ø 5.5 [0.22]
LED (3×)
M12 × 1
14
62.6 [2.46]
42.5 [1.67]
52 [2.05]
21.5 [0.85]
20 [0.79]
71.6 [2.82]
L
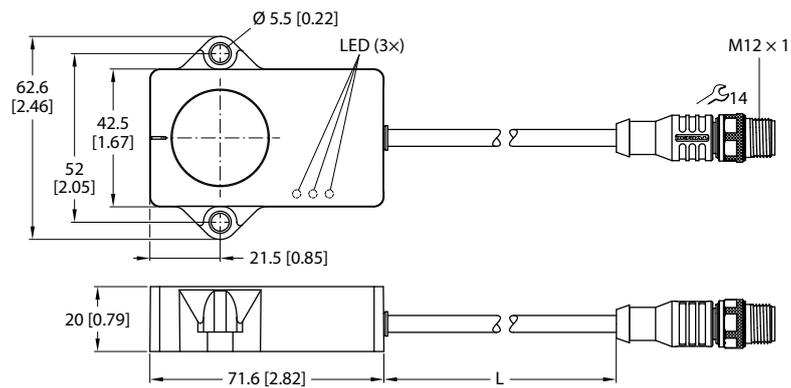
Vibration and temperature sensor	CMSVT38	IO-Link

Stand-alone solution in SIO mode

Combination CMSVT38 with signal light and IO-Link Y-distributor

The CMSVT38 vibration sensor detects machine vibrations and transmits 2 switching signals for predefined limit values in SIO mode. The switching outputs can be connected directly to the SL35 or SL55 signal lights via the IO-Link Y distributor, which also supplies the system with power.
At the same time, the switching signals are also transmitted for further processing. For example, switches, motors or valves can be activated in addition to the visualization. The Kübler SL35 and SL55 signal lights are equipped with a predefined switching pattern for this application.
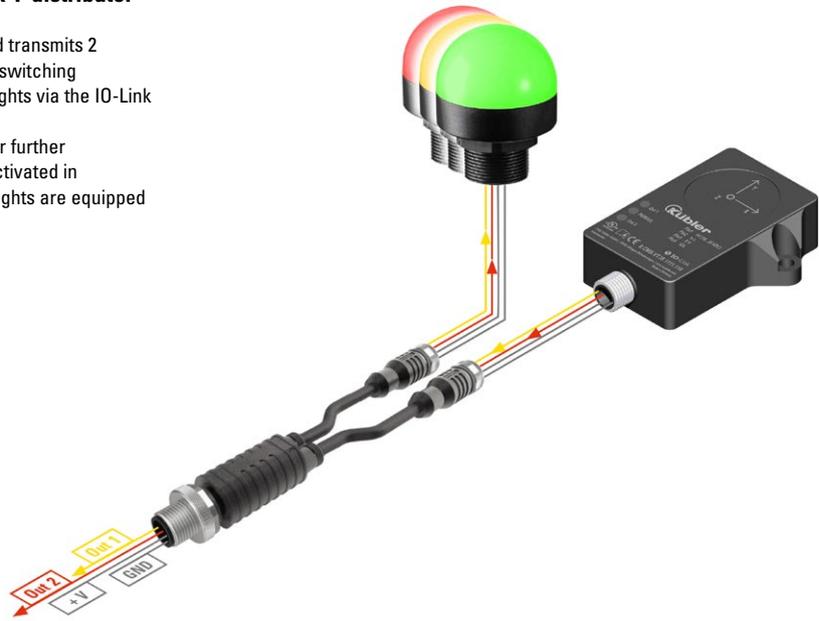
Sensor switching state	Signal light color
No switching output active	
Switching output 1 active	
Switching output 2 active	

System components used (in addition to the CMSVT38) — Order no.

Signal light	Compact LED recessed light with continuous light, optional siren and 35 mm or 55 mm diameter. Controlled via a pre-assembled M12 connector. High level of safety thanks to UL approval and IP69k.		
		ø 35 mm	
		without siren	**6.SL35.101.310**
		with siren	**6.SL35.102.310**
		ø 55 mm	
		without siren	**6.SL55.101.310**
		with siren	**6.SL55.102.310**

IO-Link Y distributor	1 x male connector with external thread, 4-pin, A coded	2 x female connector with coupling nut 4-pin, A coded	05.00.6062.6462.00M6

M12 x 1 ø 19
M12 x 1
ø 15 M12 x 1
41.2
60.6
600
42

Cordset, pre-assembled	M12 female connector with coupling nut, 4-pin, A coded, straight M12 male connector with external thread, 4-pin, A coded, straight 2 m [6.56'] PUR cable (further lengths available)	05.00.6061.6462.002M

Weiteres Kübler Zubehör finden Sie unter: kuebler.com/zubehoer
Weitere Kübler Kabel und Steckverbinder finden Sie unter: kuebler.com/anschlusstechnik

Vibration and temperature sensor	CMSVT38	IO-Link

Integrated into Ethernet networks in IO-Link mode

Combination CMSVT38 with signal tower and IO-Link master

In IO-Link mode, the CMSVT38 vibration sensor can be integrated into an Ethernet network via an IO-Link master. By communicating with the controller, the IO-Link signal tower ST40, for example, can signal the detected states on site.

Industrial Ethernet

IO-Link

| System components used (in addition to the CMSVT38)			Order no.
Signal tower	The ST40 signal tower for floor or built-in installation with a diameter of 40 mm can be optionally equipped with a siren. The integrated IO-Link interface enables simple connection to an IO-Link network and the signal light can be used to signal the status of machines and systems both visually and acoustically.	**Floor mounting**	
		without siren	**6.ST40.101.310**
		with siren	**6.ST40.102.310**
		Flush mounting	
		without siren	**6.ST40.101.310**
		with siren	**6.ST40.102.310**
IO-Link master	The IO-Link masters from Kübler are available with the Ethernet/IP, EtherCAT and PROFINET protocols. Versions with 4 or 8 ports in Class A and Class B are available from stock. Existing field devices that send classic switching signals can also be operated per port in SIO mode.	**4 Ports Class A**	
		Ethernet/IP	**IOL4A.124341.1222A1**
		EtherCAT	**IOL4A.124341.1222B1**
		PROFINET	**IOL4A.124341.1222C1**
		4 Ports Class A + 4 Ports Class B	
		Ethernet/IP	**IOL4A4B.1L8341.1L21A1**
		EtherCAT	**IOL4A4B.1L8341.1L21B1**
		PROFINET	**IOL4A4B.1L8341.1L21C1**
Cordset, pre-assembled	M12 female connector with coupling nut, 4-pin, A coded, straight M12 male connector with external thread, 4-pin, A coded, straight 2 m [6.56'] PUR cable (further lengths available)		**05.00.6061.6462.002M**

Further Kübler accessories can be found at: kuebler.com/accessories
Further Kübler cables and connectors can be found at: kuebler.com/connection-technology

Vibration and temperature sensor	CMSVT38	IO-Link

Technology in detail

Individual setting options for the switching outputs via FDT/IODD with IO-Link Master USB
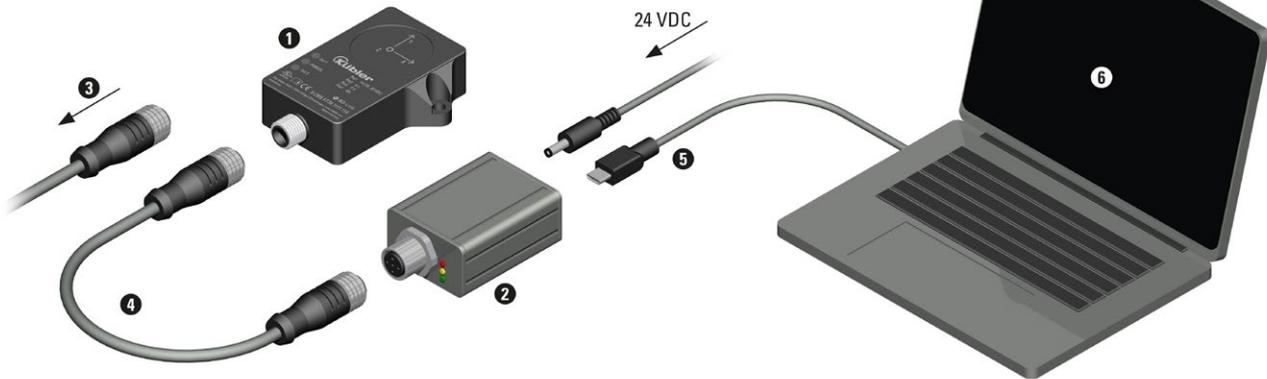
Connection

The vibration sensor ❶ is or will be disconnected from the application ❸. The IO-Link Master USB ❷ is connected to the vibration sensor with the adapter cable ❹ and connected to the PC via the USB interface ❺. The following parameters can be set using the appropriate software ❻ (e.g. PACTware):

Setting options

Reset device	The measured maximum vibration values are reset.
Reset application	The application-specific parameters are reset. The measured maximum vibration values are reset.
Configure process data	The following process data can be set: - RMS in mm/s - Peak-to-Peak in mm/s - RMS in g - Peak-to-Peak in g
Configure switching outputs	The following can be set for each switching output: - Switching values - Action when the switching values are reached as normally open (NO) or normally closed (NC) - PNP or NPN signal - Pre-alarm or warning or alarm

Operating status display

Operating status – LED green

Permanent light	Appliance ready for operation
Blinking	IO-Link communication

Switching outputs – LEDs yellow

Out 1	Switching status of switching output 1
Out 2	Switching status of switching output 2