



Vibration Control Type 663



- Vibration Velocity (mm/s, rms)
- 2 Relay-Switching Outputs** (Adjustable)
- Analogue Current Output: 4...20 mA
- Frequency Range: 10 Hz...1000 Hz
1 Hz...1000 Hz



* The hardware, the vibration control Type 663, was tested using Exida's FMEDA. The results of the FMEDA meet the criteria according to SIL2, SIL3 and PL-d.

** In determining the safety function, using the safety key figures in accordance with the standards mentioned under item 4 in the safety manual, the relay contacts of the vibration control Type 663 were explicitly evaluated and taken into account. The current output 4...20 mA is not configured in a safety-relevant manner.

Instruction Manual

Vibration Control Type 663

Standard

Zone-1-21

Zone-2-22

Issue: 01/02/2016

Attention!

Before commissioning the product, you must have read and understood the instruction manual in its entirety!

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1 Safety Information

General Information

The safety instructions serve to protect persons and objects from damage and danger that may arise from misuse, incorrect operation, or other incorrect handling of devices, especially in potentially explosive atmospheres. Therefore, read the instruction manual carefully, before working with or commissioning the product. Ensure that the instruction manual is accessible to the operating personnel at all times.

Before commissioning or otherwise working with the product please check whether all the documents are available in their entirety. If some documents are missing or if further copies are required, they can be obtained in different languages.

This is a state-of-the-art product. Nevertheless there are a number of residual risks. This means that incorrect handling, misuse, or operation and maintenance by insufficiently trained personnel may cause hazards in the product which may themselves lead to bodily, machine, or system hazards. Everyone at the operating company, who is concerned with installing, operating, or maintaining the product, has to have read and understood the instruction manual. Only instructed, sufficiently trained and authorised personnel are allowed to mount, dismount, install, or repair this product.

Symbols Used



This symbol indicates an explosion hazard.



This symbol indicates an electrical hazard.



This symbol indicates (non-safety relevant) information.

2 Instruction Manual Scope

The present instruction manual of Vibration Control Type 663 is applicable for the models: Standard, Zone-1-21 and Zone-2-22.

The functionality of these models is identical. In addition, they have certifications and labellings allowing their operation in potentially explosive atmospheres. (see Sect. 7, Operation Areas).

3 Vibration Control Type 663

Vibration Control Type 663 is used for measuring and monitoring the bearing vibration of machines as per DIN ISO 10816. It offers the following features:

- Two limit values and two associated delays are separately adjustable.
- The two relay outputs signal if the adjusted limit values are exceeded.
This can be used to generate a pre- and a main alarm.
- Measurement parameter: The root mean square (rms) of the vibration velocity (mm/s).
- Analogue current output: Interference-free direct current from 4...20 mA, proportional to the vibration amplitude.
- Cable break on the control cable can be detected by a downstream evaluation unit:
Value of the direct current signal < 3.5 mA.

In determining the safety function, using the safety key figures in accordance with the standards mentioned under item 4 in the safety manual, the relay contacts of the vibration control Type 663 were explicitly evaluated and taken into account. The current output 4...20 mA is not configured in a safety-relevant manner.

4 Intended Use

Type 663 is used to protect machines and mechanical equipment against undue mechanical vibrations. Its use is only allowed within the specifications as per the data sheet, and exclusively for measuring mechanical vibrations. **Main areas of application:** Industrial fans, ventilators, blowers, electric motors, pumps, centrifuges, seperators, generators, turbines, and similar oscillation mechanical equipment.

5 Safety Level

The hardware, vibration control Type 663, was tested using Exida's FMEDA. The results of the FMEDA meet the criteria according to SIL2, SIL3 and PL-d.

For more information, refer to the safety manual.

6 Documents and Certificates

- EC Declaration of Conformity
- Safety manual SIL2
- Safety manual SIL3
- Declaration of conformity ATEX zones 2 und 22, no.: LU 15 ATEX 0131X
- EC-type examination certificate ATEX zones 1 und 21, no.: SNCH 09 ATEX 4380

7 Responsibility for Safe Operation / Disclaimer

The correct layout of the electrical connections with regard to explosion protection directions and correct commissioning is the sole responsibility of the system owner.

If the owner commissions a subcontractor to build the system, the system cannot be commissioned unless the subcontractor has submitted an installation certificate as proof of the correct nature of the installation, in accordance with applicable regulations.

The owner must inform the relevant authorities about initial commissioning of explosion-protected systems or system parts as well as about re-commissioning following major modifications or maintenance work

8 Fields of Application

Model	Application Fields	Labelling
Standard	Non-explosive atmospheres	SIL3* SIL2 PL-d
Zone-1-21	Potentially explosive atmospheres, zones 1 and 21	SIL3* SIL2 Ex II 2 G Ex d IIC T4 Gb PL-d II 2 D Ex tb IIIC T120 °C Db
Zone-2-22	Potentially explosive atmospheres, zones 2 and 22	SIL3* SIL2 Ex II 3 G Ex d nA IIC T4 Gc PL-d II 3 D Ex tc IIIC T120 °C Dc

* The hardware, i.e., vibration control Type 663, was tested using Exida's FMEDA. The results of the FMEDA meet the criteria according to SIL2, SIL3 and PL-d

9 Scope of Delivery


Standard	<ul style="list-style-type: none"> • Vibration Control Type 663 • Allen Screw, M8 x 20 mm • Spring Washer, M8 • Instruction Manual
Zone-1-21	<ul style="list-style-type: none"> • Vibration Control Type 663, Integrated Cable, L= 2, 5, 10, 25 m or on request • Allen Screw, M8 x 20 mm • Spring Washer, M8 • Instruction Manual
Zone-2-22	<ul style="list-style-type: none"> • Vibration Control Type 663 • Protective Cover for M12 Connector • Safety Clip • Allen Screw, M8 x 20 mm • Spring Washer, M8 • Instruction Manual
	Available Supplies: <ul style="list-style-type: none"> • Allocable Mating Connector, for Assembly, M12, 8-Pin • Connection Cable, M12 Socket, 8-Pin, 0.25 mm², L= 2 m, 5 m or 10 m • EMC Adapter

10 Electrical Data

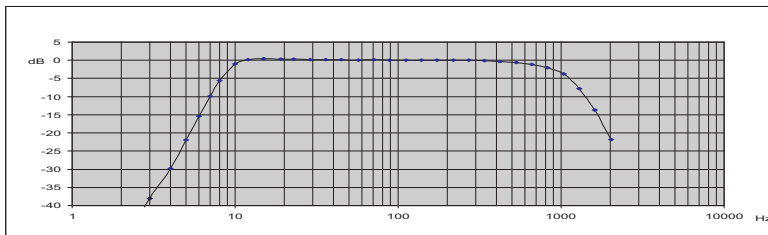


Only unscrew the housing cover if Type 663 is disconnected from the mains or if the atmosphere is non-explosive. Otherwise, there is an explosion hazard from sparking when operating ATEX-certified Type 663 in potentially explosive atmospheres!

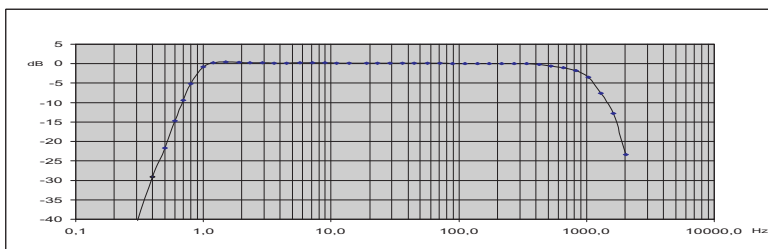
Prior to commissioning Type 663, protect the mains using a microfuse (medium time lag 160 mA, breaking capacity C)!

<p>Measuring ranges:</p> <p>Measuring accuracy:</p> <p>Transverse sensitivity:</p> <p>Frequency range:</p> <p>Output signals:</p> <p>Relay switching load:</p> <p>Voltage supply:</p> <p>Power input (max.):</p> <p>Ambient temperature:</p> <p>Operating temperature range:</p> <p>Burden/load (max.):</p> <p>Fusing:</p> <p>C)</p> <p>Automatically:</p>	<p>0... 8 mm/s</p> <p>0... 16 mm/s</p> <p>0... 32 mm/s</p> <p>0... 64 mm/s</p> <p>0... 128 mm/s</p> <p>0... 256 mm/s</p> <p>± 5%</p> <p>< 5 %</p> <p>10 Hz...1000 Hz (standard)</p> <p>1 Hz ...1000 Hz (optionally)</p> <p>1 x 4...20 mA</p> <p>2 x relay contact (pre- and main alarm)</p> <p>1A / 30V DC</p> <p>24V DC ±10%</p> <p>80 mA</p> <p>-30°C...+60°C</p> <p>-30°C...+85°C (meas. head temp. at fastening)</p> <p>500 Ω</p> <p>The burden comprises the resistance of the evaluation unit, the specific line resistance, and the transition resistances.</p> <p>Microfuse (medium time lag, 160 mA, breaking capacity C)</p> <p>As soon as the vibration values fall below the limit values, the relays automatically re-energise</p>	 <ul style="list-style-type: none"> • Each Type 663 has one of the listed measuring ranges. • Further measuring ranges on request. • Please indicate the measuring range in your order.
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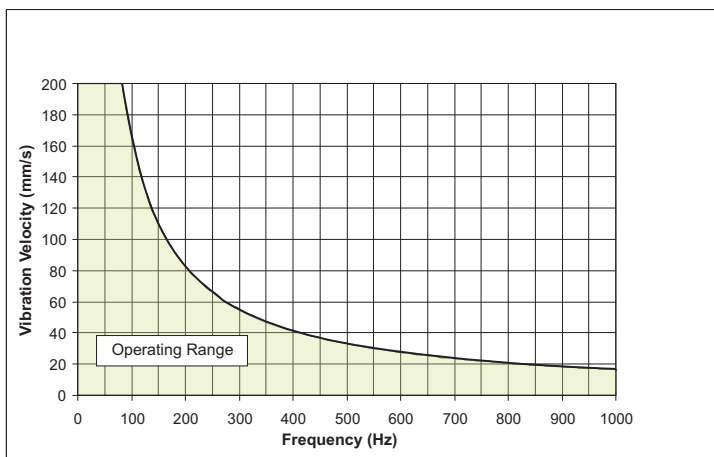
Frequency Response 10 Hz...1000 Hz



Frequency Response 1 Hz...1000 Hz



Operating Range of Vibration Control Type 663



Reading example:

Frequency (Hz)	Max. measurable vibration velocity
100	160
400	40
1000	18

The operating range is independent of the measuring range. The diagram shows that the vibration velocity amplitude decreases as the frequency increases.

11 Mechanical Data

Housing material:

M12 connector material:

Cable gland:

Fastening:

Mounting:

Weight:

IP code:

V2A stainless steel; material no.: 1.4305

CuZn (brass), nickel plated

V2A stainless steel

Allen screw, M8 x 20 mm,

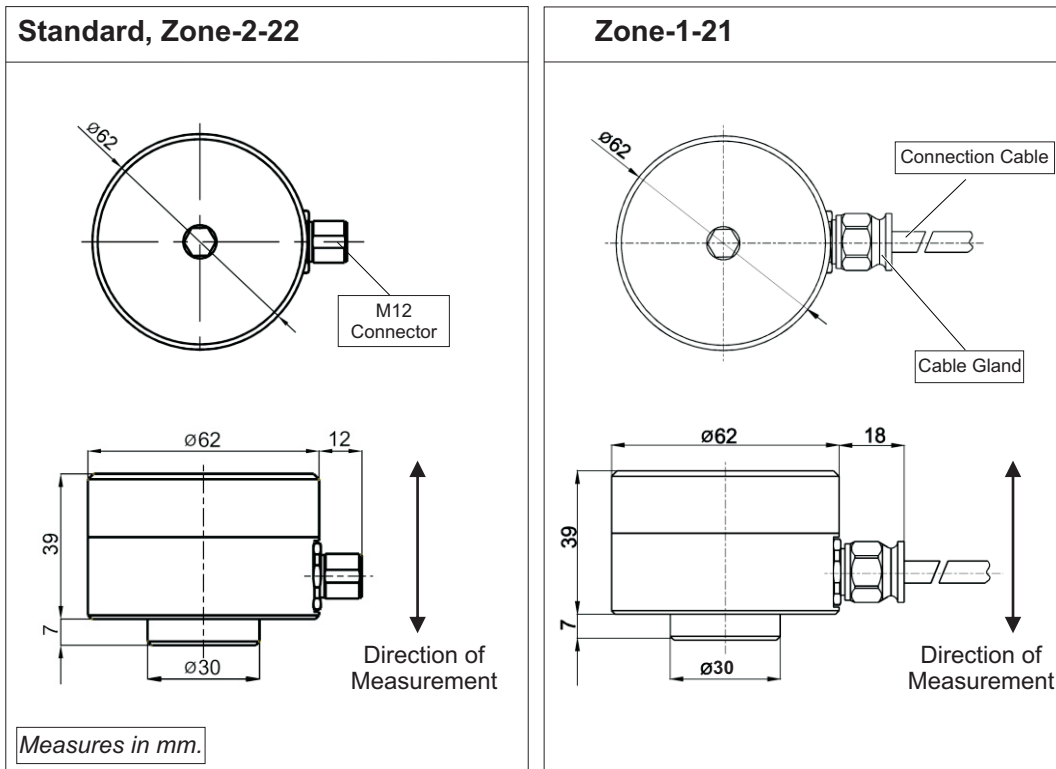
Thread pitch: 1.25 mm

Ground housing using M8 fastening (see Sect.16).

approx. 500 g

IP 67

Housing Dimensions and Direction of Measurement



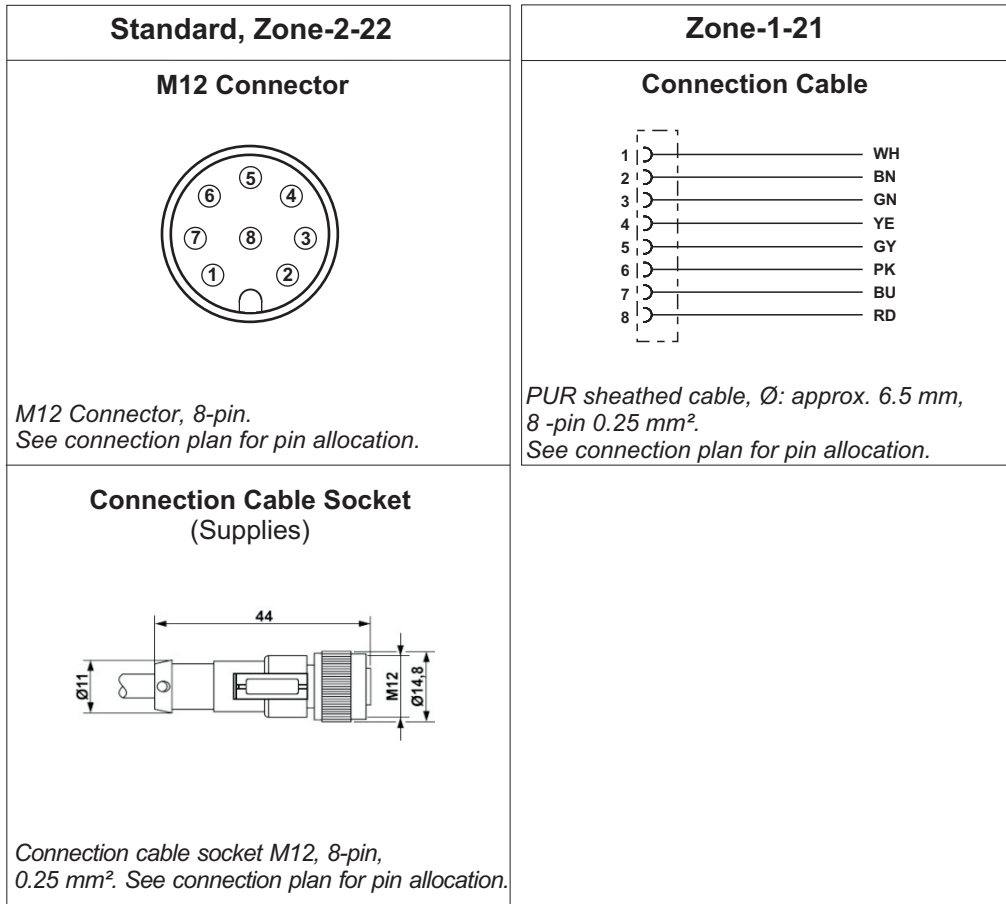
Housing Dimensions and Direction of Measurement: Standard, Zone-2-22

Housing Dimensions and Direction of Measurement: Zone-1-21

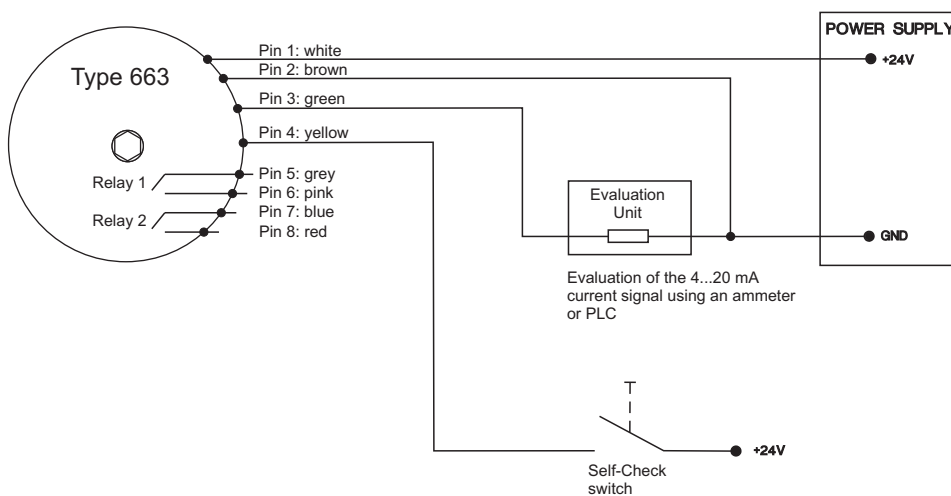


Note: Direction of measurement = direction of fastening

12 Connections



Connection Plan for All 3 Models



Note: The connection plan shows the alarm condition and/or the currentless condition! Relay 1 and 2 are dropped out (see p. 11 for more information on operating conditions).

13 Functional Description

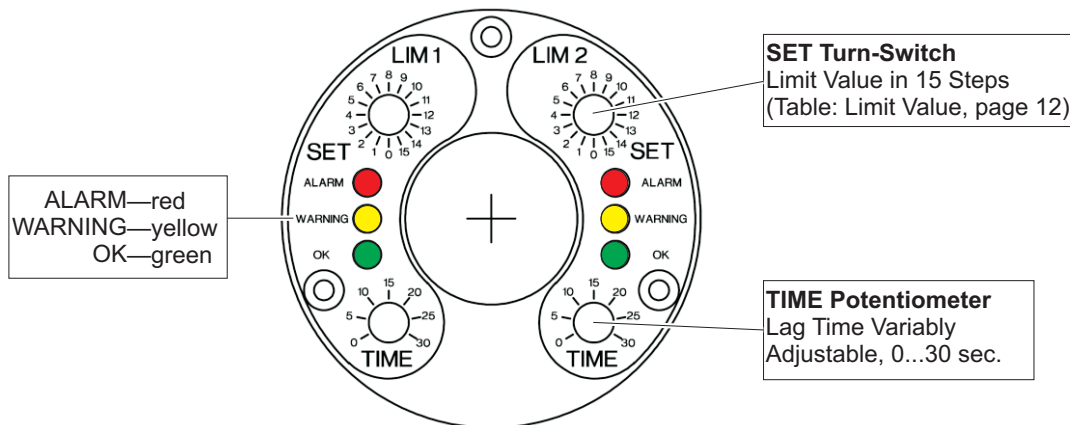


Only unscrew the housing cover if Type 663 is disconnected from the mains or if the atmosphere is non-explosive. Otherwise, there is an explosion hazard from sparking when operating ATEX-certified Type 663 in potentially explosive atmospheres!

Type 663 has two limit values, LIM1 and LIM2, with their respective lag times, which can all be adjusted separately.

Relay outputs 1 and 2 signal if the adjusted limit value has been exceeded by dropping out the respective relay contact. If the limit value is then undercut, relay outputs 1 and 2 will also signal this by automatically re-energising.

In addition, Type 663 has an analogue current output. This delivers a direct current of 4...20 mA proportional to the vibration amplitude.



User Interface Channels LIM1 and LIM2—Controls and LED Indicators

Operating Conditions Channels LIM1 and LIM2

Operating Condition	Measurement	Relay	LED Indicator
OK	\leq Limit Value	Energised	OK
WARNING	$>$ Limit Value, Lag Time Running	Energised	WARNING+OK
ALARM	$>$ Limit Value, Lag Time Expired	Dropped Out	ALARM

14 Limit Value Adjustment

SET Turn-Switch Position	Limit Value					
	Range 0...8 mm/s	Range 0...16 mm/s	Range 0...32 mm/s	Range 0...64 mm/s	Range 0...128 mm/s	Range 0...256 mm/s
0	0	0	0	0	0	0
1	0.5	1	2	4	8	16
2	1	2	4	8	16	32
3	1.5	3	6	12	24	48
4	2	4	8	16	32	64
5	2.5	5	10	20	40	80
6	3	6	12	24	48	96
7	3.5	7	14	28	56	112
8	4	8	16	32	64	128
9	4.5	9	18	36	72	144
10	5	10	20	40	80	160
11	5.5	11	22	44	88	176
12	6	12	24	48	96	192
13	6.5	13	26	52	104	208
14	7	14	28	56	112	224
15	7.5	15	30	60	120	240

Example: Limit value adjustment

Measuring range e.g.: 0...32 mm/s

Set turn-switch pos.: 8

Limit value: 16 mm/s

15 Self-Test

The self-test is to verify the correct functioning of the vibration control. Therefore, a test signal is applied to pin 4 of the control. The test signal simulates a vibration amplitude exceeding the maximum limit value. This will trigger the control's alarm condition.

Test signal:

- a. Direct current, 24 V DC or
- b. Square wave signal, 24 V DC / 0.5 Hz

Initial state: Normal operation

Self-test start:

- Apply the test signal to pin 4.
 - The output current signal increases up to ~23 mA.
 - After < 35 s, the alarm relays drop out.
 - If one or both alarm relays fail to drop out, this indicates a fault.
- Remove the test signal.
 - After a further < 60 s the output current signal has returned to to 4 mA or its actual value.

End self-test.

Final state: Normal operation

Duration: approx. 95 s



• **Test signal a** is only available for production no. 75478 or later.

16 Mounting and Dismounting

Only authorised experts, who are familiar with the safety instructions for handling electrical components, are allowed to perform mounting or dismounting work on or using this control. For handling ATEX-certified controls within potentially explosive atmospheres the expert also has to be familiar with the safety instructions relevant there.



Before mounting or dismounting, disconnect the control from the mains! Ensure that disconnected plug connections are always de-energised! Otherwise, there is an explosion hazard from sparking when operating ATEX-certified Type 663 in potentially explosive atmospheres!



Ground the control housing via the fastening, i.e. the machine earth or a separate earth conductor (PE)!

16.1 Fastening on the Mounting Surface

Requirements

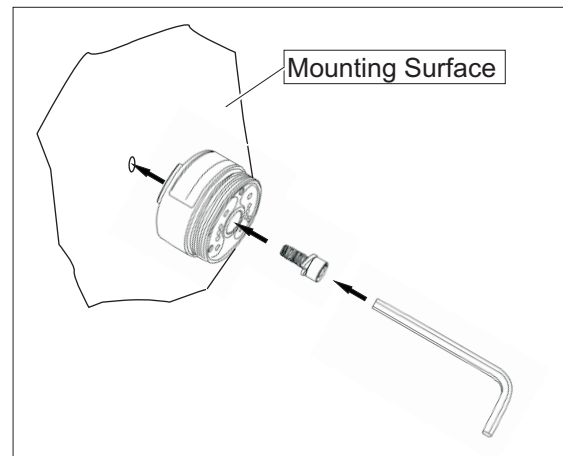
- Mounting surface clean and flat, i.e. free from paint, rust, etc.
- Threaded hole on the mounting surface:
Depth: 15 mm
Thread: M8

Tools and materials

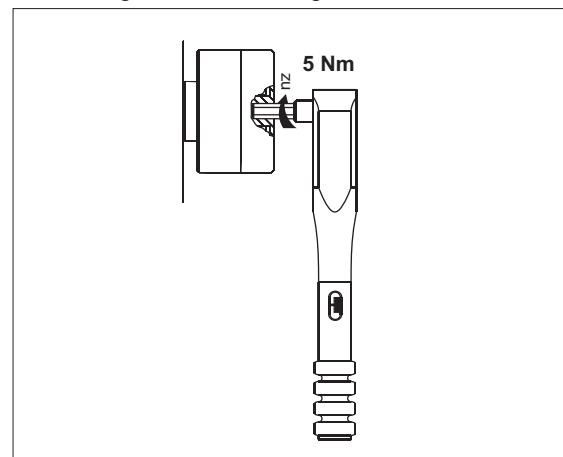
- Allen key, SW6, SW8
- Torque wrench SW8
- Allen screw M8x20
- Spring washer for M8

Workflow

1. Unscrew housing cover from housing base.
 - Allen key, SW8
2. Use Allen screw and spring washer to **friction-lock** the control on the mounting surface.
 - Allen key, SW6
3. Slightly fasten housing cover to housing base by hand.
(Avoid jamming the thread!)
Tighten housing cover using a tightening torque = 5 Nm.
 - Torque wrench SW8



Fastening on the mounting surface



Tightening housing cover using a torque wrench



Note: To prevent any cold-welding between housing cover and housing base, the control is delivered with a fitting lubricant for stainless steel connections applied to its thread.

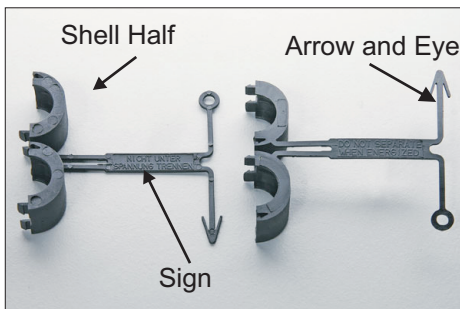
16.2 Zone-2-22—Fastening Safety Clip / Protective Cover



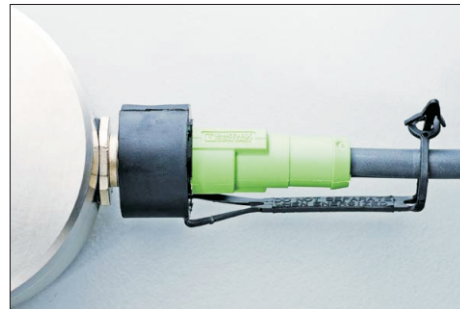
Always operate model Zone-2-22 with the safety clip to avoid accidental disconnection of the plug connection! Otherwise, there is an explosion hazard from sparking when operating this control in potentially explosive atmospheres!

Fastening Safety Clip

1. Fully insert the connection cable socket into the M12 connector.
(Pay attention to the code cam position!)
2. Tightly fasten the lock-nut of the connection cable socket by hand.
3. Mount the safety clip to avoid accidental disconnection of the plug connection:
 1. Place both shell halves of the safety clip around the plug connection.
 2. Press both shell halves of the safety clip together by hand until the catch lock engages.
 3. Place the arrow connected to both shell halves around the cable, then thread it through the eye on the other end so that the notice sign is legible alongside the cable.



Safety Clip



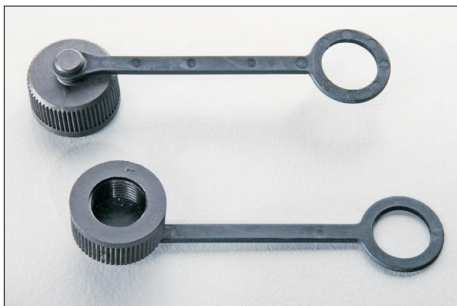
Fastened Safety Clip

Fastening Protective Cover

Fasten the protective cover using the M12 connector after disconnecting the plug connection!

Disassemble the safety clip and fasten the protective cover:

1. Disconnect the control from the mains.
2. Separate both shell halves of the fuse clip using a screw driver.
3. Use the M12 connector to firmly close the protective cover.



Protective Cover



Fastened Protective Cover

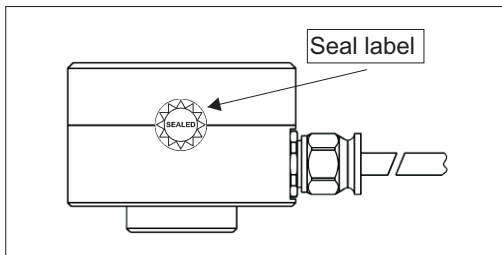
16.3 Anti-tamper protection

Attaching the seal label

The "SEALED" seal label indicates that it is not permissible to open the casing cover.

After the system operator has assembled the casing cover, the seal label is attached to the side so that it covers the casing parting line.

Any attempt to tamper with the casing will destroy the label and makes the attempted tampering visible to the system operator.



Attaching the seal label

17 Installation and Commissioning

Only authorised experts, who are familiar with the safety instructions for handling electrical components, are allowed to install or commission this control. For handling ATEX-certified controls within potentially explosive atmospheres the expert also has to be familiar with the safety instructions relevant there.



Ensure the housing cover is properly fastened prior to commissioning (tightening torque = 5 Nm)! Otherwise, there is an explosion hazard from sparking when operating ATEX-certified Type 663 in potentially explosive atmospheres!



Prior to commissioning Type 663, protect the mains with a microfuse (medium time lag, 160 mA, breaking capacity C)!

Protect the connection cable and possible extension cables from electrical influences or mechanical damage! Ensure to strictly follow local regulations and directives!

Check the self-test during commissioning.

18 Maintenance and Repairs

Only authorised experts, who are familiar with the safety instructions for handling electrical components, are allowed to repair this control. For handling ATEX-certified controls within potentially explosive atmospheres the expert also has to be familiar with the safety instructions relevant there.



Disconnect Type 663 from the mains prior to performing repair or cleaning work! Ensure that disconnected plug connections are always de-energised! Otherwise, there is an explosion hazard from sparking when operating ATEX-certified Type 663 in potentially explosive atmospheres!



Immediately replace defective connection cables! Otherwise, there is an explosion hazard from sparking when operating ATEX-certified Type 663 in potentially explosive atmospheres!

If the control is defective, replace it in its entirety!



Note: Type 663 and its models are maintenance free!

Error Table

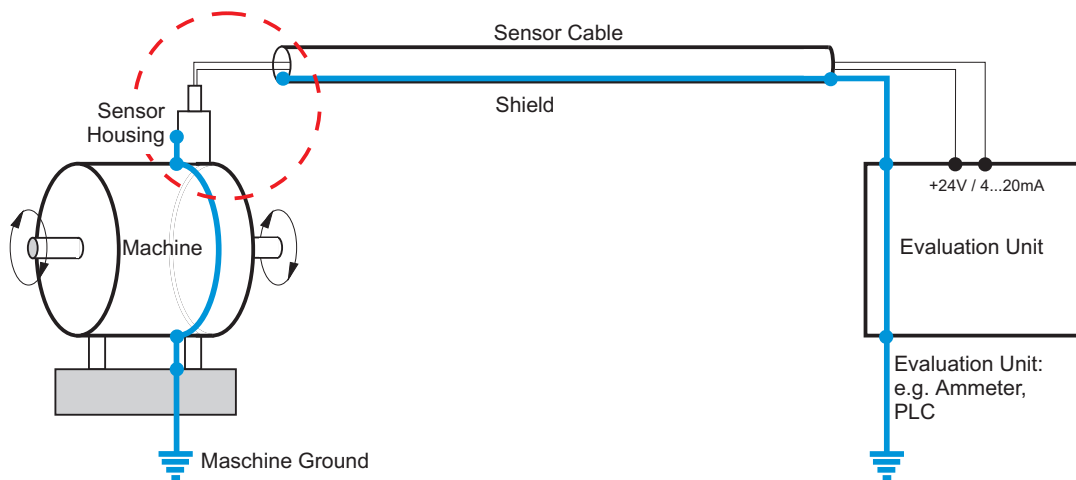
Error	Cause	Countermeasure
No measured value (4...20 mA)	No power supply	Check power supply and/or connection cable
	Connection cable interrupted	Replace connection cable
	Defective fuse	Replace fuse
	Wrong connection cable polarity	Correct connection cable polarity
	Defective control	Replace control
Relay fails to switch	Limit value incorrectly adjusted	Correctly adjust limit value
	No power supply	Check power supply and/or connection cable
	Connection cable interrupted	Replace connection cable
	Defective fuse	Replace fuse
	Wrong connection cable polarity	Correct connection cable polarity
Incorrect reading	Defective control	Replace control
	Control mounting not friction-locked	Friction-lock control
EMC issues	Control mounting at wrong position	Mount control at correct position
		See Sect. 19, Grounding Concepts

19 Grounding Concepts to Avoid Ground Loops

Ground loops are among the most frequent problems in measurement setups with sensitive sensor technology. They arise through unwanted potential differences inside the current circuit between sensor and evaluation unit. As a countermeasure we recommend our **Standard Grounding Concept** or, depending on your application, our **Alternative Grounding Concept**.

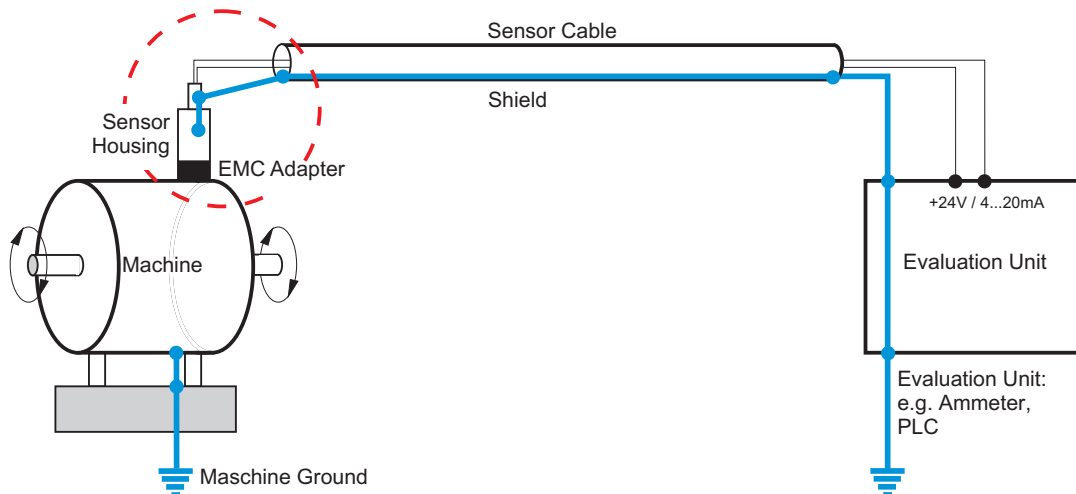
Standard Grounding Concept

In the Standard Grounding Concept the shield of the sensor cable is not connected to the sensor housing (dotted circle). The potential applied to the sensor housing and the machine ground is identical.



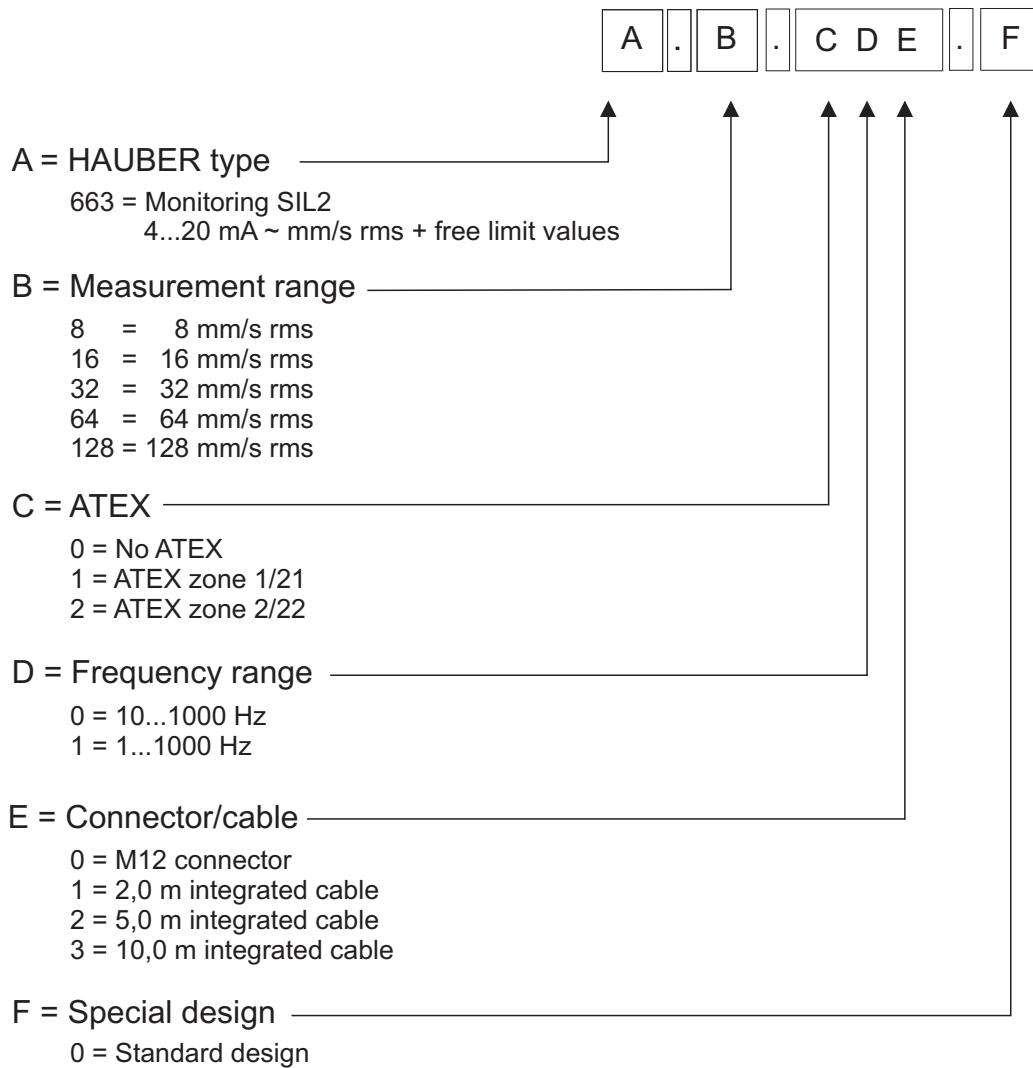
Alternative Grounding Concept

In the Alternative Grounding Concept the shield of the sensor cable is connected to the sensor housing (dotted circle). The sensor housing is uncoupled from the machine ground via an EMC adapter (black).



Please indicate in your order if you wish to use the **Alternative Grounding Concept**. We will then offer you the respective sensor cable and EMC adapter.

20 Order code



Example:
Type 663.16.000.0

Vibration monitoring type 663
Measurement range 16 mm/s rms
Frequency range 10...1000 Hz
No ATEX
With M12 plug-in connection
No special design = Standard

Example:
Type 663.64.113.0

Vibration monitoring type 663
Measuring range 64 mm/s rms
Frequency range 1...1000 Hz
ATEX zone 1/21
With integrated cable 10.0 m
No special design = Standard