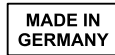




Vibration monitoring unit Series HE055



- Vibration speed (mm/s, rms)
- Vibration acceleration (g, rms)
- Vibration acceleration (g, peak)
- Temperature (°C)
- Crest value
- Bearing status parameter (bearing condition)
- Output 1: IO link or digital switching output
- Output 2: Analogue current output 4-20 mA or digital switching output
- Configurable frequency range: 1 Hz ... 1000 Hz
- BLOB raw signal recording with up to 64 KHz
Sample rate (low-pass at 12 KHz)

Date of manufacture: _____

Type description: _____

Serial no.: _____

Operating instructions

Vibration Monitoring Unit Type HE055

Version: 2024-08-09

Attention!

Prior to commissioning the product, the instruction manual must be read and understood.

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Subject to modifications.

Please contact the company with any questions:

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2 Safety information

2.1 General

The safety instructions are intended to protect people and property from damage and hazards that could arise as the result of improper use, incorrect operation or other misuse or devices, especially in explosive areas. Therefore, please read the operating instructions carefully before working on the product or operating it. The operating instructions must be accessible to operating personnel at all times.

Please make sure that all documents are present and complete before commissioning or performing other work on the product. If the documents have not all been delivered in full or if further copies are necessary, they can also be obtained in other languages.

The product is built according to the latest state of the art. However, hazards to people, machinery and systems can still arise as the result of improper handling, unintended use or operation and maintenance by persons inadequately trained on the product.

All those who are involved in the installation, operation and maintenance of the product in the operator's plant must read and understand the operating instructions.

The product may only be assembled, disassembled, installed and repaired by instructed, sufficiently trained and authorised personnel.

2.2 Symbols used



This symbol indicates a hazard from electrical current.



This symbol indicates safety-related information.



This symbol indicates information unrelated to safety.

3 Scope of this instruction manual

This instruction manual for the HE055-type vibration monitoring unit applies to all variants of the HE055.

4 Vibration Monitoring Unit Type HE055

Vibration monitoring unit type HE055 is a sensor that measures the vibration speed, vibration acceleration and the temperature with crest value development and can be used for purposes such as monitoring the absolute bearing vibrations of machinery in line with DIN ISO 10816. It offers the following features.

- Two freely configurable outputs
 - Output 1: IO link or digital switching output
 - Output 2: Analogue current output (4...20 mA) or digital switching output
- Crest value development
- Bearing condition according to 13337-3
- Configurable frequency range 1 Hz ... 1000 Hz for vibration speed (mm/s, rms) and vibration acceleration (g, rms) measurands
(. For all available frequency ranges, see "Frequency ranges (Filter settings)" on page 13.
- Fixed 10 Hz ... 10 kHz frequency range for vibration acceleration (g, peak), crest value and bearing condition

5 Intended Use

The-type HE055 is used exclusively for measuring mechanical vibrations and temperatures in machines and mechanical systems. It may only be used in accordance with the specifications listed in the data sheet. **Main fields of application:** Fans, ventilators, blowers, electric motors, pumps, centrifuges, separators, generators, turbines and similar oscillating mechanical equipment.



If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

6 Scope of supply

All versions include:



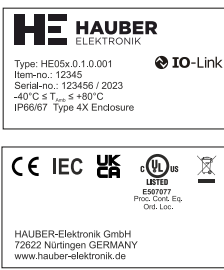
- Vibration monitoring
- Quick start guide

7 Documents and Certificates

You can find the following documents and certificates for HE055 type at www.hauber-elektro-nik.de where they can be viewed and downloaded:

- cULus certificate
- CE declaration of conformity
- Operating instructions
- IO-link Description File

8 Fields of application and example type plates

Coding	HE055.0.1.x.xxx
	x
	E507077
Functional safety	
Example type plate	

Standards applied

You can find a list of standards, including the related issue dates, in the EU type examination certificate for the vibration monitoring unit.

9 Information on the cULus validity range

In order to install the device according to the UL/CSA/IEC standard, the following information must be observed.

Electrical protection



Devices must be protected by means of fuses, circuit breakers, overheating protection, impedance-limiting switches or similar to ensure protection against excessive power output if there is a fault in the device. Protection must be applied to supply lines and switching lines.



A circuit breaker suitable for 30V/3A according to UL Standard 489/CSA Standard (C22.2) no. 5/IEC 60947-2 must be installed near the device.



A fuse suitable according to UL Standard 248/CSA Standard (C22.2) no. 248/IEC 60127 must be installed near the device. The fuse must have a slow triggering characteristic ("T").

10 Technical data

10.1 General data



The measuring range and frequency range can be adjusted via IO link.

Measuring accuracy:	± 10 % (according to DIN ISO 2954) ± 0.5 % at calibration point
Calibration point:	1 g (rms) @ 159.2 Hz
Transverse sensitivity:	< 5 %
Frequency range:	Can be selected in the 10 Hz to 1000 Hz range for v_{rms} , a_{rms} . See also Frequency ranges (Filter settings), page 13. a_{peak} , crest and bearing status are calculated for the 10 Hz to 10 KHz range
Maximum acceleration:	± 48 g
Lifetime:	10 years

Tbl. 1: General data

10.2**Electrical data**

Power supply:	18...30 V DC*
Power input (max.):	320 mA
Power input (max.) without switching contacts:	120 mA

Output Out 1 (pin 4)

Output signal:	IO link or switching contact
----------------	------------------------------

Output Out 2 (pin 2)

Output signal:	4...20 mA (proportional to the measuring range) or switching contact
----------------	--

Switching contacts

Output signal:	Switching signal
Electrical design:	PNP
Output function:	Contact maker / breaker (low-active / high-active)
Switching level:	0 V: Low 24 V: High High level corresponds to supply voltage minus 2 V
Current rating for each output:	100 mA (Out 1) 100 mA (Out 2)
Short-circuit protection:	yes*
Overload-proof:	yes*

* Ensure that the supply and bus lines are protected by a UL-approved fuse for UL-compliant sensor operation.

Tbl. 2: Electrical data

10.3 Operating range of the vibration monitoring unit

The operating range is independent from the measuring range. It can be derived from the maximum acceleration, which is $\pm 48 \text{ g}$ across all frequencies. The maximum measurable vibration speed is based on the formula

$$v_{max} = \int a_{max}$$

For sinusoidal vibration, applies

$$v_{max} = \frac{a_{max}}{2\pi f}$$

Fig. 1 shows the operating range of the vibration monitoring unit, which is limited by the maximum measurable vibration speed in mm/s, rms depending on the frequency in Hz.

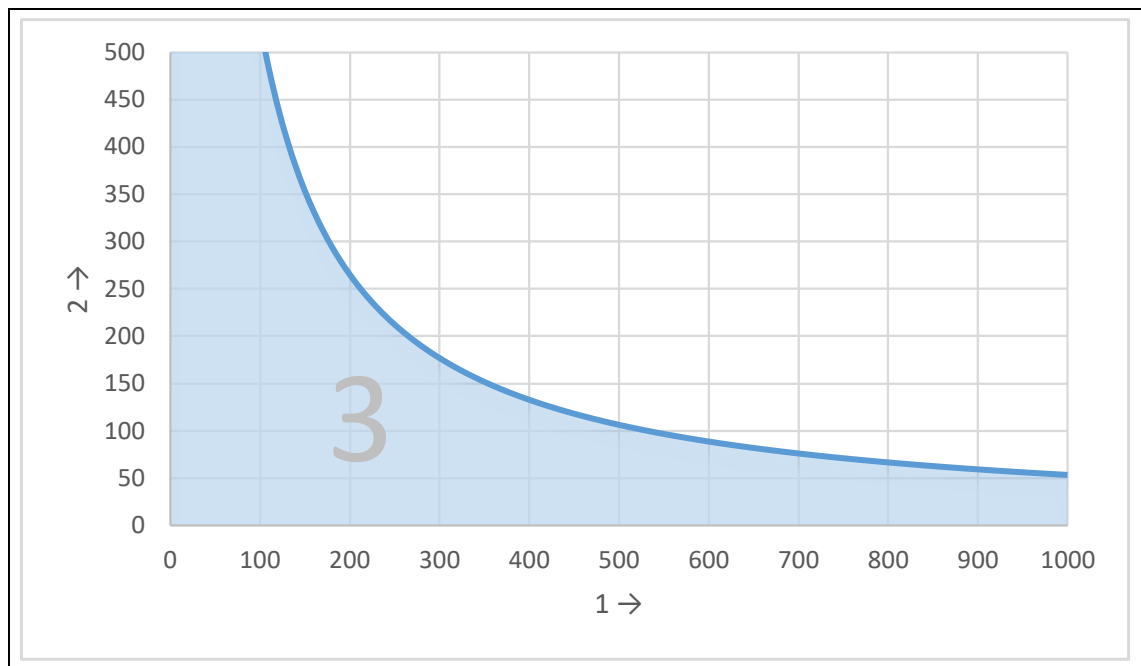


Fig. 1: Operating range diagram

- 1 Frequency in Hz
- 2 Vibration speed (mm/s, rms)
- 3 Operating range of the vibration monitoring unit

Reading example:

Frequency (Hz)	Maximum measurable vibration speed (mm/s, rms)
250	211.97
400	132.48
1000	53.0

Tbl. 3: Reading example of operating range

10.4 Typical frequency response

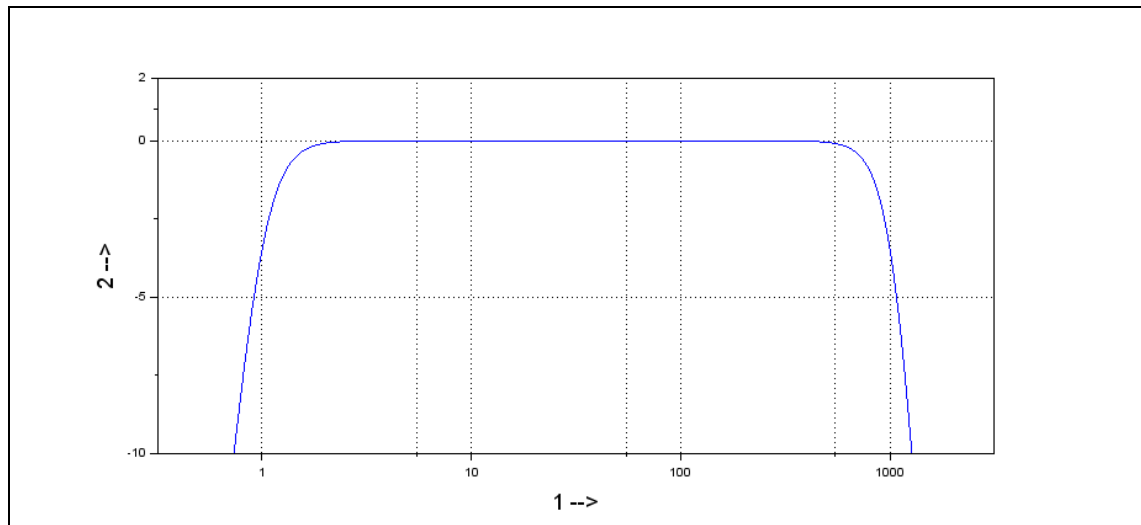


Fig. 2: Typical frequency response 1 Hz–1000 Hz

- 1 Frequency in Hz
- 2 Amplification in dB

10.5 Housing dimensions

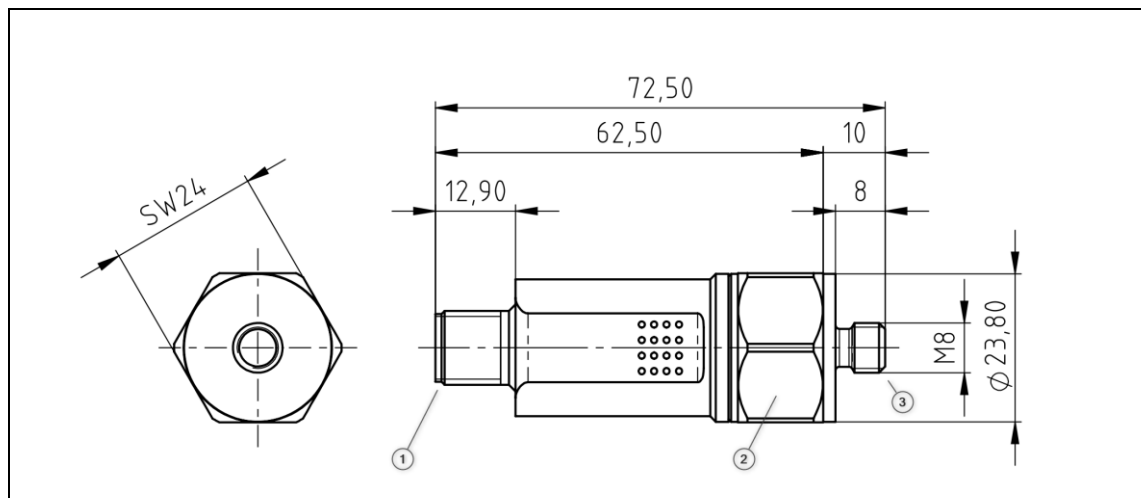


Fig. 3: Housing with M12 connector

All measurements in mm

- 1 M12 connector
- 2 Width A/F 24
- 3 Fixing
- 4 Measuring direction along the fixing axis

10.6 Mechanical data



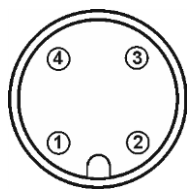
Additional materials and fixings can be found in section "Coding HE055" on page 18.

Housing material:	Stainless steel V2A, material no.: 1.4305 (standard)
Fastening:	Width across flats 24 (hexagonal) M8 x 8 mm Pitch: 1.25 mm (standard)
Installation type:	standing/vertical or lying/horizontal
Measuring direction:	Along the fastening axis
Tightening torque sensor	8 Nm
Max. torque of the M12 union nut on the connector	0.4 Nm
Weight:	approx. 90 g
Protection class:	When connected: IP 66/67 Type 4X enclosure Product is suitable for outdoor use
Ambient temperature T_A :	$-40\text{ °C} \leq T_A \leq +80\text{ °C}$
Measuring head temperature T_M :	$-40\text{ °C} \leq T_M \leq +85\text{ °C}$
Max. humidity:	100%

Tab. 4: Mechanical data

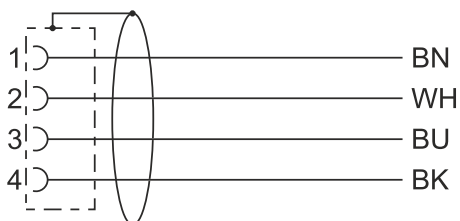
11 Connection

Connector, M12, 4-pin



Pin 1:	L+	18 – 30 V DC
Pin 2:	Out 2	4–20 mA or switching contact
Pin 3:	L-	0V / GND
Pin 4:	Out 1	IO link or switching contact

For the vibration monitoring unit HE055, Hauber cables type C and type F are suitable. They have the conductor colours of a typical connection cable.



12 IO-Link description of functionality

12.1 Introduction

IO-Link is the first standardised IO technology worldwide (IEC 61131-9) for the communication with sensors and also actuators. The powerful point-to-point communication is based on the long established 3-wire sensor and actuator connection without additional requirements regarding the cable material. So, IO-Link is no fieldbus but the further development of the existing, tried-and-tested connection technology for sensors and actuators.

To write and read data via IO-Link, an IO-Link master is required, which you can purchase separately.

12.2 Software-parameterization service

We offer the creation and application of bespoke parameters within the frame of possibilities which is given further on. Some sets of parameters can be found in chapter "Coding HE055" on page 18.

12.3 General data

Meets standards for IO-Link system and interface 1.1 (V.1.1.3)

Compliance IO-Link 1.1. Version 1.1.3 / Package 2020

All parameters and addresses are listed comprehensively within the IO-Link description file available in the download section of our [homepage](#). This chapter only serves as an overview of the products functions.

12.4 Measured values and process values

The following measurands and process variables can be continuously queried via IO-Link.

- Effective vibration speed (0.01 mm/s, rms)
- Effective vibration acceleration (0.01 g, rms)
- Peak vibration acceleration (0.01 g, peak)
- Temperature (1 °C)
- Status of the internal self-test
- Fault condition
- States of all switching signals
- Crest value
- Bearing status parameter (bearing condition)
- Blob status

12.5 Outputs

The two outputs can be configured as follows:

Output 1 acts, as soon as the sensor is connected to an IO-Link master, as the sensors IO-Link interface. Alternatively (When not connected to an IO-Link master) output 1 can be left unoccupied or act as a digital switching output.

Output 2 can either be configured as an analogue current output 4...20 mA or as a digital switching output. It can also be configured as "disabled". All measured values can be output as an analogue signal. The measuring range of the analogue signal can be freely set within a framework defined by the manufacturer.

12.6 Switching signal

Two configurable switching signals ("pre-alarm" and "main alarm") are available in the sensor for each measured or process variable, which can be output via IO-Link or one of the two outputs configured as a switching contact.

The following settings can be configured individually for each switching signal:

- Limit values (in the respective unit of the measurement parameter)
- Time delay in ms (1 ms ... 60000 ms)
- Mode:
 - o 0: deactivated
 - o 1: Alarm function ('single Point'). In this mode, the limit value 2 is ignored.
 - o 2: Window function, i.e., the signal switches as soon as the limit value falls below 2.
- Hysteresis:
 - o Describes the switching delay in terms of the limit. In the standard version, this is fixed at 2% and can only be freely configured for the temperature (0 K ... 20 K)

12.7 Frequency ranges (Filter settings)

Eight predefined frequency ranges can be selected:

- 0: 10 Hz ... 1000 Hz
- 1: 10 Hz ... 500 Hz
- 2: 10 Hz ... 100 Hz
- 3: 10 Hz ... 50 Hz
- 4: 1 Hz ... 1000 Hz
- 5: 1 Hz ... 500 Hz
- 6: 1 Hz ... 100 Hz
- 7: 1 Hz ... 50 Hz

12.8 Maintenance Data

Following data is available exclusively via IO-Link and cannot be output via any other output.

Counter

It is possible to set a third limit value for each measured value and for each process value (independent of the previously mentioned switching signals). Regarding this limit value there is a counter for the number of exceedances and another counter for the total duration of all exceedances. An IO-Link event reporting the exceedance of a defined counter reading can be created for both counters.

12.9 Raw signal via BLOB

An acceleration signal can be recorded for a specific duration and transmitted with delay using a BLOB (binary large object). This enables detailed vibration analyses.

The recording duration and sample rate can be configured via IO-Link. The maximum sample rate is 64 kHz with a 12 kHz low-pass filter. The memory can store up to 320,000 measurement points.

Separate instructions are available on our homepage.

13 Installation and commissioning

13.1 General notes

Installation and commissioning of the vibration monitoring unit may only be performed by an authorised specialist familiar with the safety regulations governing handling electrical components.



Protect the connection cable and any extension cable from electrical interference and mechanical damage! Local regulations and instructions must be observed in doing so!



The connection cable used must be suitable for the field of application.

We recommend HAUBER cables type C or F. For further information, see chapter "Accessories" on page 16.

13.2 Wiring diagram / earthing concept

Earth/ground loops are amongst the most common problems in measurement set-ups with sensitive sensor technology. These issues arise due to unintentional differences in potential in the electrical circuit between the sensor and evaluation unit.



Ensure that the earth connection is electrically secure.

The earthing concept stipulates that the sensor cable shield is electrically connected to the sensor housing through the knurled nut and is at earth potential on the evaluation unit or the switch cabinet. For longer wires, we recommend separating the disconnecting the shield at the evaluation unit (4) to prevent compensating currents through the shield.

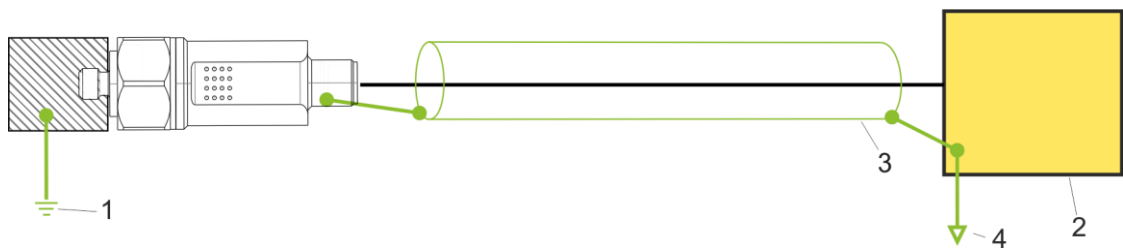


Fig. 4: Standard Earthing concept

- 1 Machine earth
- 2 Evaluation unit (measuring device, PLC, IO link master, etc.)
- 3 Cable shield
- 4 Evaluation unit earth potential

14 Assembly and disassembly

14.1 General notes

Assembly and disassembly work on and with the vibration monitoring unit may only be performed by an authorised specialist familiar with the safety regulations governing handling electrical components!



The housing of the vibration monitoring unit must be earthed via the fixing – through the machine earth of the mounting surface or through a separate protective conductor (PE)!

14.2 Fixing the vibration monitoring unit to the mounting surface

Prerequisites

- Mounting surface is clean and flat, i.e. free of paint, rust, etc.
- Measuring head area of the vibration monitoring unit must lie flat on the mounting surface.

Tool

- Open-end spanner, width A/F 24

Work steps and instructions

- Screw vibration monitoring unit into the threaded hole of the mounting surface in a friction-locked manner using an open-end spanner. The tightening torque should be 8 Nm.
- The tightening torque of the M12 union nut of the plug connection must not exceed 0.4 Nm.



To obtain precise measurement values, the vibration monitoring unit must be fixed to the mounting surface in a friction-locked manner!



Auxiliary structures for fixing are to be avoided! If unavoidable, make them as firm as possible!



Earth/ground loops are amongst the most common problems in measurement set-ups with sensitive sensor technology. These issues arise due to unintentional differences in potential in the electrical circuit between the sensor and evaluation unit. We recommend our Wiring diagram / earthing concepts as a countermeasure.



Ensure that the earth connection is electrically secure.

15 Accessories

The following accessories are available for the vibration monitoring unit type HE055.

Connection cables (other lengths available by request):

- Cable type C (M12 connector on open end of wire)
 - 1.5 m (item no.: 13051)
 - 3 m (item no.: 13052)
 - 10 m (item no.: 11888)
- Cable type F (M12 connector on M12 socket)
 - 1.5 m (item no.: 13187)
 - 3 m (item no.: 13363)

IO-link:

- USB IO-Link master parametrisation tool (item no.: 12987)
- Profinet IOL 8 Port Master (item no.: 14137)

Protection against environmental factors:

- HE rubber protective nozzle for type HE055 (item no.: 12524)

16 Maintenance and repair

16.1 General notes



Repair and cleaning work on vibration monitoring units may only be performed by an authorised specialist familiar with the safety regulations governing handling electrical components.



Before repair and cleaning disconnect the monitoring unit from the power supply! Separate plug connections must always be de-energized!



Immediately replace defective connection cables!
A defective vibration monitoring unit must be completely replaced!



The vibration monitoring unit HE055 is maintenance-free!

16.2 Troubleshooting Table

Fault	Cause	Action
No measured value (4-20 mA)	No analogue output configured	Configure output
	No power supply	Check power source and/or supply
	Discontinuity in connecting cable	Replace connecting cable
	Fuse defective	Replace fuse
	Connection has incorrect polarity	Connection of correct pole
	Vibration monitoring unit faulty	Replace vibration monitoring unit
Switching contact doesn't switch	No switching contact configured	Configure switching contact
	Wrong limit value set	Set correct limit value
	No power supply	Check power source and/or supply
	Discontinuity in connection	Replace connecting cable
	Fuse defective	Replace fuse
	Connection has incorrect polarity	Connection of correct pole
	Defective monitoring unit	Replace monitoring unit
False reading	Vibration monitoring unit not mounted in a friction-locked manner	Mount vibration monitoring unit in a friction-locked manner
	Vibration monitoring unit installed in wrong place	Install vibration monitoring unit in correct place
	EMC problems	"Wiring diagram / earthing concept" on page 14.

Tab. 5: Troubleshooting Table

17 Coding HE055

HE055.	0.	1.	0.	001
HE series				
055 = IO link sensor with crest value development				
Certifications				
0 = CE / IEC / cULus / EAC				
1 = CE / IEC / cULus / EAC + SIL 1				
IO link				
1 = IO link (output 1): Transmitter / switching contacts				
Housing				
0 = 1.4305 (V2A) with fastening M8 x 8 mm; incline 1.25 (Standard)				
1 = 1.4404 (V4A) with fastening M8 x 8 mm; incline 1.25 mm				
2 = 1.4462 duplex stainless steel with fastening M8 x 8 mm; incline 1.25 mm				
Software parameter settings (factory default)				
Output 1	Output 2			
001 = IO-Link	-			



Don't see your desired configuration listed? Please contact us and we can offer you a solution for your specific needs.

18 Transport, storage and disposal

The sensor must be protected from damaging environmental factors and mechanical damage during transport with the use of adequate packing.

The sensor may not be stored in ambient temperatures outside the permitted operating temperature.

The product contains electronic components and must be disposed of properly in accordance with local laws and regulations.

19 EU and UK Declaration of Conformity

Declaration of conformity

HAUBER-Elektronik GmbH
Fabrikstraße 6

D-72622 Nürtingen-Zizishausen, Germany

declares under our sole responsibility that the products listed below that relate to this declaration meet the basic health and safety requirements of the norms and directives below.

Product series

HE055

Norms and directives

EU Directive	Norms
2014/30/EU UKSI 2016:1091	EN 61000-6-2:2005 EN 61000-6-3:2007 + A1:2011
<i>Supplementary:</i>	<i>EN IEC 61000-6-2 :2019 EN IEC 61000-6-3 :2021 IO-Link Interface and System Specification V1.1.3 June 2019</i>
2011/65/EU UKSI 2012:3032	EN IEC 63000:2018

Signature

Nürtingen, Germany 09.08.2024

Place and date



Tobias Bronkal, Managing Owner