HAUBER ELEKTRONIK

Vibration Sensor
HE050-A Series

MADE IN GERMANY · IO-Link · CE · IECEE · UKCA · cULus LISTED

- Vibration displacement (mm, s-pp)
- Vibration acceleration (g, a-rms)
- Vibration acceleration (g, a-peak)
- Temperature (°C)
- Current acceleration (m/s², a-current)
- Dominant frequency (Hz)
- Frequency range: 5 … 100 Hz

Date of manufacture :	_____
Type designation:	_____
Serial no.:	_____

User Manual

Vibration Sensor
Type HE050-A

Edition: 2026-05-07

Attention!
Before using the product, the operating instructions must be read and understood.

For any questions, please contact:
HAUBER-Elektronik GmbH
Fabrikstraße 6
D-72622 Nürtingen
Germany
Tel.: +49 (0) 7022 / 21750-0
Fax:
info@hauber-elektronik.de
www.hauber-elektronik.de

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2 Safety information

2.1 General

The safety instructions serve to protect people and property from damage and hazards resulting from improper use, incorrect operation or other faulty handling of devices, especially in potentially explosive areas. Therefore, read the operating instructions carefully before working on the product or putting it into operation. The operating instructions must be accessible to operating personnel at all times.

Please check that all documents are complete before commissioning or carrying out any other work on the product. If not, all documents have been provided in full or if additional copies are required, these can also be obtained in other languages.

The product is built according to the latest state of the art. Nevertheless, it cannot be ruled out that improper handling, use contrary to the intended purpose, or operation and maintenance by inadequately trained persons may result in hazards arising from the product, which in turn may endanger people, machines and systems.

Every person involved in the installation, operation and maintenance of the product at the operator's premises must have read and understood the operating instructions.

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

2.2 Symbols used

This symbol indicates a hazard due to electric current.

This symbol indicates safety-related information.

This symbol indicates information that is not relevant to safety.

3 Scope of the user manual

This user manual is for the Vibration Sensor Type HE050-A.

4 The Vibration Sensor Type HE050-A

The vibration sensor HE050-A is a sensor for measuring vibration displacement, vibration acceleration, frequency, and temperature. It can be used, for example, for vibration displacement monitoring on vibrating machinery. The HE050-A is available as:

IO-Link sensor

With two freely configurable outputs.

- Output 1: IO-Link or digital switching output
- Output 2: Analog output (4…20 mA) or digital switching output

Analog sensor

With one or two fixed-configured outputs.

- Output 1: Free or digital switching output
- Output 2: Analog output (4…20 mA) or digital switching output

5 Intended use

The HE050-A is intended exclusively for measuring mechanical vibrations and temperature on machines and mechanical systems. Use is permitted only within the specifications stated in the data sheet. **Main application area**: vibrating machinery.

If the device is not used in accordance with the manufacturer's instructions, the protection provided by the device may be impaired.

6 Scope of delivery

All variants include:

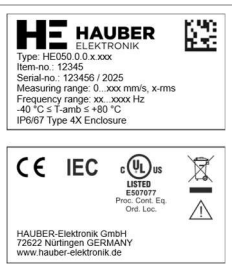
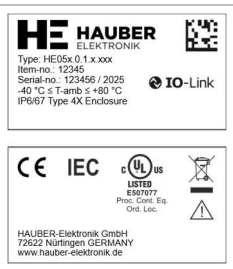
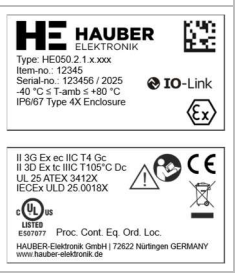
- Vibration sensor
- Quick start guide

7 Documents and certificates

The following documents and certificates for the Type HE050-A can be viewed and downloaded at http://www.hauber-elektronik.de/en:

- cULus certificate
- CE Declaration of Conformity
- Operating instructions
- IO-Link description file
- EU type examination certificate ATEX Zone 2 / 22, No.: UL 25 ATEX 3412X
- IECEx Certificate of Conformity, No.: IECEx ULD 25.0018X

8 Type plate examples

Coding	HE050.0.0.x.Axx	HE050.0.1.x.Axx	HE050.2.0.x.Axx	HE050.2.1.x.Axx
CE IEC	✓	✓	✓	✓
c UL us LISTED	E507077	E507077	E507077	E507077
IO-Link	-	✓	-	✓
Ex	-		II 3G Ex ec IIC T4 Gc II 3D Ex tc IIIC 105°C Dc UL 25 ATEX 3412 X	
IEC Ex	-		Ex ec IIC T4 Gc Ex tc IIIC 105°C Dc IECEx ULD 25.0018 Issue 0X	
Type plate example				

Applied standards

The list of standards, including the corresponding issue dates, can be found in the EU type examination certificate for vibration sensor.

9 Notes on the scope of validity cULus

The following notes must be observed to install the device in accordance with UL/CSA/IEC standards.

Electrical protection

Devices must be protected by fuses, circuit breakers, overheating protection, impedance, limiting circuits or similar means to ensure protection against excessive power output in the event of a fault in the device. The protection must be applied to the supply and switch lines.

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

A suitable fuse in accordance with UL Standard 248 / CSA Standard (C22.2) No. 248 / IEC 60127 must be installed near the device. The fuse must have a slow-blow "T" tripping characteristic.

10 Technical data

10.1 General data

The measuring range can be set via IO-Link.

Measuring accuracy:	± 10% (according to DIN ISO 2954) ± 0.5% at the calibration point
Calibration point:	without IO-Link: 90% measuring range @ 159.2 Hz with IO-Link: 1 g (rms) @ 159.2 Hz
Cross sensitivity:	< 5%
Frequency range:	5…100 Hz
Maximum acceleration:	± 15 g
Service life:	10 years

Table1 : General data

10.2 Electrical data

Power supply:	18…30 V DC*
Current consumption (max.):	700 mA
Current consumption (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:	Normally open / normally closed (low-active / high-active)
Switching level:	Low: 0 V High: (24 V)* *High level corresponds to the supply voltage minus 2 V
Current carrying capacity per output:	100 mA (Out 1) 500 mA (Out 2)
Short-circuit protection:	Yes*
Overload protection:	Yes*
* To operate the sensor in compliance with UL standards, the supply and data lines must be protected by a UL-approved fuse.	

Table2 : Electrical data

10.3 Working range of vibration sensor

The working range is independent of the measuring range. It can be derived from the maximum acceleration, which is ± 15 g across all frequencies. The maximum measurable vibration displacement is calculated using the formula

$$s(t) = \int \int a(t)\, dt^2$$

For sinusoidal vibrations, the following applies

$$s_{max} = \frac{a_{max}}{(2\pi f)^2}$$

Fig.1 shows the working range of the vibration sensor, which is limited by the maximum measurable vibration displacement in mm, s-pp depending on the frequency in Hz.

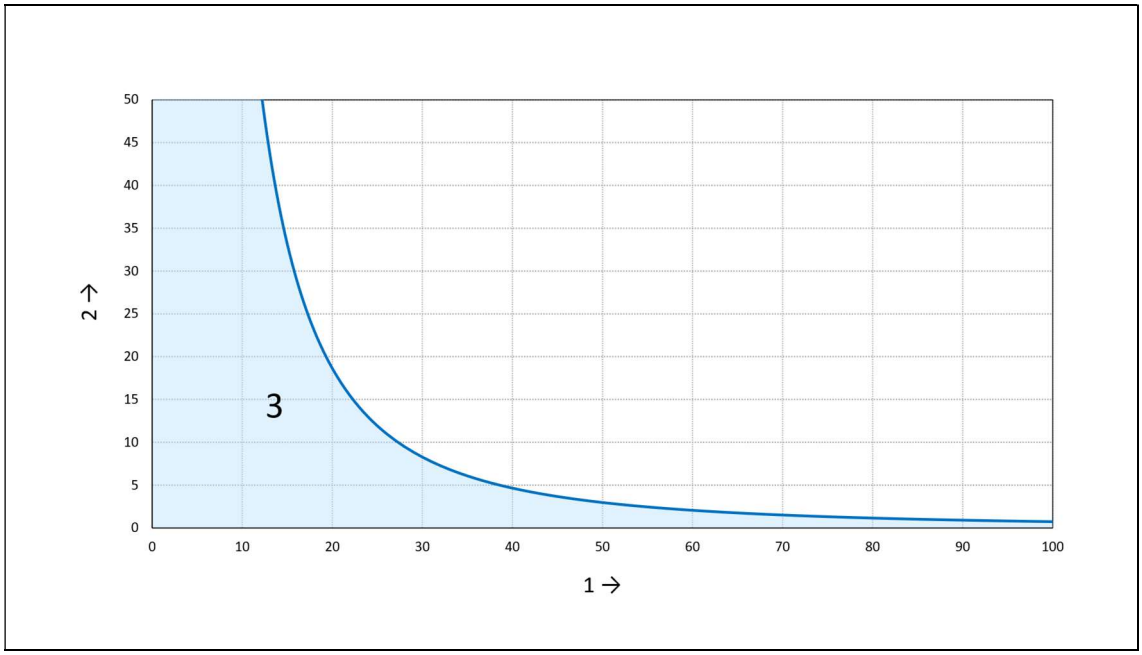


Fig.1 : Diagram of working range

1 Frequency in Hz
2 Vibration displacement (mm, s-pp)
3 Working range of vibration sensor

Reading examples:

Frequency (Hz)	Maximum measurable vibration displacement (mm, s-pp)
20	18,64
50	2,98
80	1,16

Tab. 3: Reading examples Working range

10.4 Typical frequency response

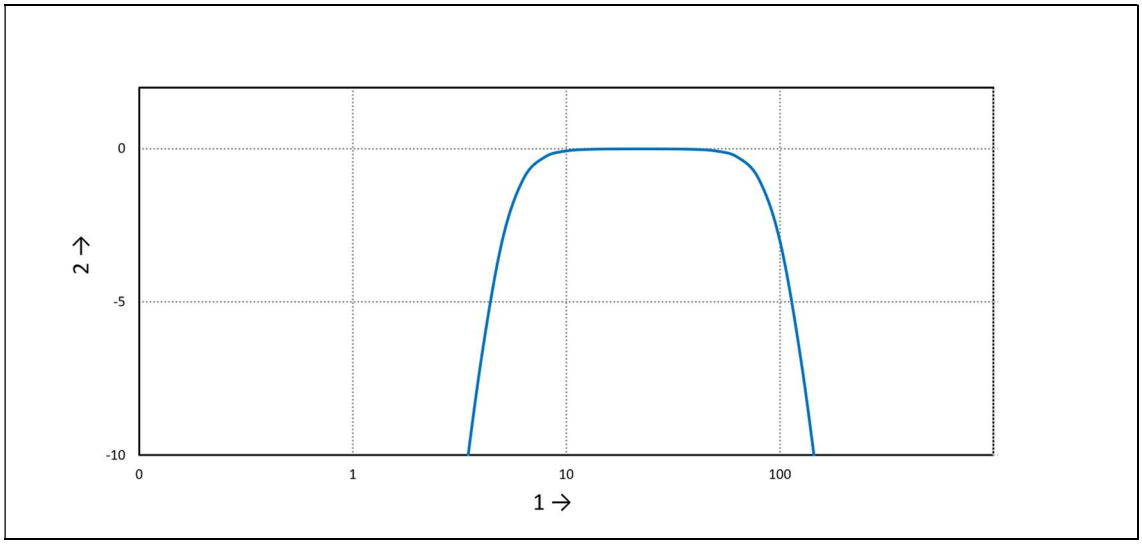


Fig. 2: Typical frequency response 5 Hz to 100 Hz

1 Frequency in Hz

2 Gain in dB

10.5 Housing dimensions

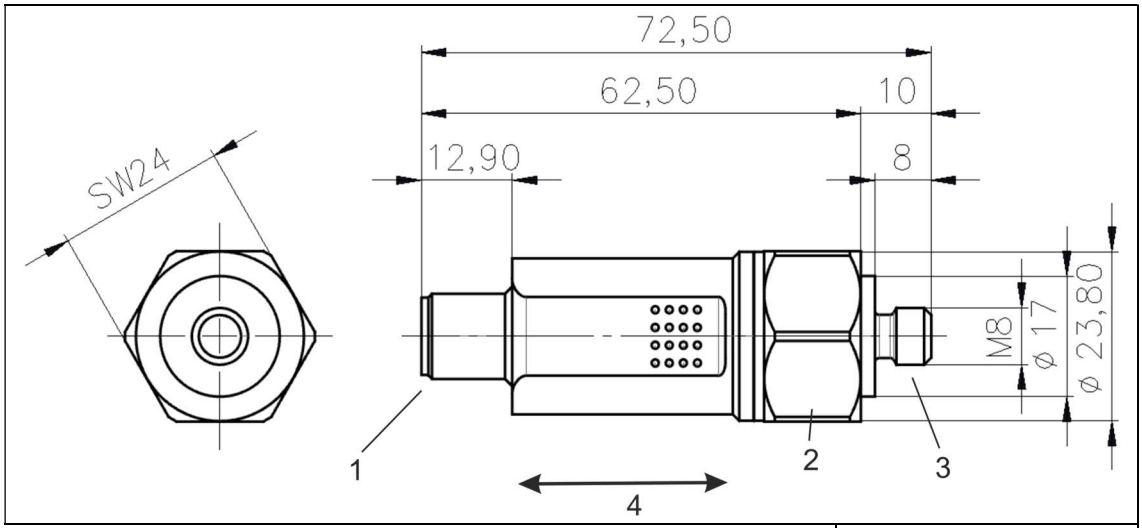


Fig. 3 : Enclosure with M12 connector

All dimensions in mm

1 M12 connector

2 SW24

3 Mounting

4 Measuring direction along the mounting axis

10.6 Mechanical data

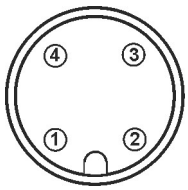
Further materials and fastenings can be found in the chapter Coding HE050-A on page 18.

Housing material:	Stainless steel V2A, material no.: 1.4305 (standard)
Fastening:	Wrench size 24 (hexagonal) M8 x 8 mm Pitch: 1.25 mm (standard)
Mounting type:	upright/vertical or horizontal
Measuring direction:	Along the mounting axis
Tightening torque sensor	8 Nm
Max. torque of the M12 union nut on the plug	0.4 Nm
Weight:	approx. 90 g
Protection class:	When connected: IP 66/67 Type 4X enclosure Product is suitable for outdoor applications
Ambient temperature T_A :	-40 °C ≤ T_A≤ +80 °C
Measuring head temperature T_M :	-40 °C ≤ T_M≤ +85 °C
Max. humidity:	100%

Tab. 4 : Mechanical data

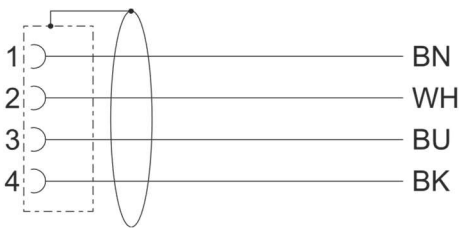
11 Connections

Plug, M12, 4-pin



Pin 1:	L	18…30 V DC
Pin 2:	Out 2	4...20 mA or switching contact
Pin 3:	L-	0 V / GND
Pin 4:	Out 1	IO-Link or switching contact

The HAUBER cable types C and F are suitable for the HE050-A vibration sensor. They have the same wire colours as a standard connection cable.



12 IO-Link Description of functionality

12.1 Introduction

IO-Link is the first globally standardised IO technology (IEC 61131-9) for communicating with sensors and actuators. The powerful point-to-point communication is based on the long-established 3-wire sensor and actuator connection without any additional requirements for the cable material. IO-Link is therefore not a fieldbus, but rather the evolutionary further development of the existing, proven connection technology for sensors and actuators.

IO-Link can be used to both read and write data. This requires an IO-Link master, which can be purchased separately.

12.2 General data

Complies with the IO-Link System and Interface 1.1 standard (V.1.1.3)

Compliance IO-Link 1.1. Version 1.1.3 / Package 2020

All parameters and addresses are described in detail in a separate interface specification document. In addition, HAUBER-Elektronik provides an IO-Description File (IODD) for the IO-Link master. This chapter serves as an overview of the functions.

12.3 Measured and process variables

The following measurement and process variables can be continuously retrieved via IO-Link.

- Peak-to-peak value of vibration displacement (0.01 mm, s-pp)
- Effective value of vibration acceleration (0.01 g, a-rms)
- Peak value of vibration acceleration (0.01 g, a-peak)
- Temperature (1 °C)
- Current acceleration (0.01 g)
- Dominant frequency (0.1 Hz)
- Status of the internal self-test
- Fault condition
- Status of all switching signals

12.4 Output

The two outputs can be assigned as follows:

Output 1 acts as the sensor's IO-Link interface as soon as the sensor is connected to an IO-Link master. Alternatively (if the sensor is not connected to an IO-Link master), output 1 can remain unassigned or act as a digital switching contact.

Output 2 can be configured either as an analogue output 4...20 mA, as a switching contact or as "deactivated". All measured variables are available as analogue signals. The measuring range of the analogue signal can be freely selected within a range defined by the manufacturer.

12.5 Switching signal

The sensor has two configurable switching signals ("pre-alarm and main alarm") for each measured or process variable, which can be output via IO-Link or one of the two outputs configured as switching contacts.

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

- Limit values (in the respective unit of the measured variable)
- Time delay in ms (1 ms ... 60000 ms)
- Mode:
    - 0: deactivated
    - 1: Alarm function ("single point"). In this mode, limit value 2 is ignored.
    - 2: Window function, i.e. the signal switches as soon as the value falls below limit value 2.
- Hysteresis:
    - Describes the switching delay with regard to the limit. This is fixed at 2% in the standard setting and can only be freely configured for the temperature (0 K ... 20 K).

12.6 Maintenance data

The following data is only available via IO-Link and cannot be configured on the outputs:

Counter

It is possible to configure an additional limit value for each measured variable (independent of the switching signals mentioned above). Based on this limit value, there is a counter that counts the number of exceedances and a counter that counts the total duration of the exceedances. An IO-Link event can be configured for both counters, which reports when a configurable counter value is exceeded.

12.7 Raw signal via BLOB

A vibration acceleration signal can be recorded for a defined period using a BLOB (Binary Large Object) and transmitted with a time delay. This enables detailed vibration analyses.

The recording length and sampling rate can be configured via IO-Link. The maximum sampling rate is 26.66 kHz with a 5 kHz low-pass filter. The memory can store up to 320,000 measured values (18-bit resolution, data type unsigned int 32).

13 Installation and commissioning

13.1 General information

Installation and commissioning of the vibration sensor may only be carried out by an authorised specialist who is familiar with the safety regulations for handling electrical components!

Protect the connection cable and any extension cables from electrical interference and mechanical damage! It is essential to observe local regulations and instructions!

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

We recommend HAUBER cable type C or type F. Further information can be found in the chapter Accessories on page 16.

13.2 Connection diagram / grounding concept

Ground loops are one of the most common problems in measurement setups with sensitive sensors. They are caused by unwanted potential differences in the circuit between the sensor and the evaluation unit.

Care must be taken to ensure that the ground connection is electrically secure.

The grounding concept stipulates that the shield of the sensor cable is electrically connected to the sensor housing via the knurled nut and is at ground potential at the evaluation unit or control cabinet. For long cable lengths, it is recommended to disconnect the shield at the evaluation unit (4) in order to avoid compensating currents via the shield.

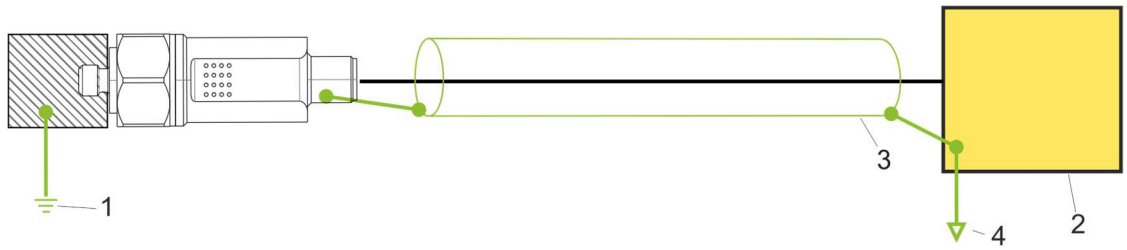


Fig.4 : Standard Grounding concept

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

14 Assembly and disassembly

14.1 General

Installation and removal work on and with the vibration sensor may only be carried out by an authorised specialist who is familiar with the safety regulations for handling electrical components!

The housing of the vibration sensor must be earthed via the mounting – either via the machine ground of the mounting surface or via a separate protective earth conductor (PE)!

14.2 Attaching the vibration sensor to the mounting surface

Requirements

- The mounting surface is clean and flat, i.e. free of paint, rust, etc.
- The measuring head surface of the vibration sensor must lie flat on the mounting surface.

Tools

- Open-end wrench, SW 24

Work steps and notes

- Screw the vibration monitor into the threaded hole on the mounting surface using the 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.

In order to obtain accurate measurements, the vibration monitor must be securely fastened to the mounting surface!

Avoid using auxiliary structures for fastening! If unavoidable, make them as rigid as possible!

Ground loops are one of the most common problems in measurement setups with sensitive sensors. They are caused by unwanted potential differences in the circuit between the sensor and the evaluation unit. As a countermeasure, we recommend our Connection diagram / grounding concept.

Ensure that the earth connection is electrically safe.

15 Accessories

The following accessories are available for vibration sensor type HE050-A.

Connection cable (other lengths available on request):

- Cable type C (M12 plug to free cable end)
  - 1.5 m (item no.: 13051)
  - 3 m (item no.: 13052)
  - 10 m (item no.: 11888)

- Cable type F (M12 plug to M12 socket)
  - 1.5 m (item no.: 13178)
  - 3 m (item no.: 13363)

IO-Link:

- USB IO-Link master parameterisation tool (item no.: 12987)

Protection against environmental influences:

- HE rubber protective sleeve for type HE050 (item no.: 12524)

16 Maintenance and repair

16.1 General information

Repair and cleaning work on vibration monitors may only be carried out by an authorised specialist who is familiar with the safety regulations for handling electrical components!

Replace defective connection cables immediately!
A defective vibration sensor must be replaced completely!

The vibration sensor HE050-A is maintenance-free!

16.2 Troubleshooting table

Fault	Cause	Action
No measured value (4-20 mA)	No analogue output configured	Configure output
	No supply voltage	Check voltage source and/or supply cable
	Interruption in the connection cable	Replace connection cable
	Fuse defective	Replace fuse
	Connection polarity reversed	Correct polarity of connection
	Vibration sensor defective	Replace vibration sensor
Switch contact does not switch	No switching contact configured	Configure switching contact
	Incorrect limit value set	Set correct limit value
	No supply voltage	Check voltage source and/or supply cable
	Interruption in the connection	Replace connection cable
	Fuse defective	Replace fuse
	Connection polarity reversed	Correct polarity of connection
	Sensor defective	Replace sensor
Incorrect measured value	Vibration sensor not mounted in a force-fit manner	Securely mounted vibration sensor
	Vibration sensor installed in the wrong place	Mounting vibration sensor in the correct location
	EMC problems	Connection diagram / grounding concept on page 14

Tab. 5: Troubleshooting table

17 Coding HE050-A

HE050.	0.	1.	0.	A40

HE series

050 = Vibration sensor

Approvals

0 = CE / IEC / cULus
2 = ATEX / IECEx Zone 2/22

IO-Link

0 = no IO-Link
1 = IO-Link (alternative function output 1)

Housing

0 = 1.4305 (V2A) with M8 x 8 mm fastening; pitch 1.25 (standard)
1 = 1.4404 (V4A) with M8 x 8 mm fastening; pitch 1.25 mm
2 = 1.4462 duplex stainless steel with M8 x 8 mm fastening; pitch 1.25 mm

Software parameterisation (delivery state)

	Output 1	Output 2
A40 =	IO-Link	-
A01 =	IO-Link / -	4…20 mA - 0…40 mm, s-pp; 5…100 Hz
A02 =	-	4…20 mA - 0…30 mm, s-pp; 5…100 Hz
A03 =	-	4…20 mA - 0…20 mm, s-pp; 5…100 Hz
A04 =	-	4…20 mA - 0…10 mm, s-pp; 5…100 Hz
A05 =	-	4…20 mA - 0…8 mm, s-pp; 5…100 Hz

Is your desired configuration not listed? Please contact us, we can offer you a customised solution.

18 Transport, storage and disposal

The sensor must be protected from harmful environmental influences and mechanical damage during transport by means of suitable packaging.

The sensor must not be stored at ambient temperatures outside the approved operating temperature range.

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

19 EU Declaration of Conformity

Declaration of conformity

HAUBER-Elektronik GmbH
Fabrikstraße 6
D-72622 Nürtingen-Zizishausen

declares under its sole responsibility that the products listed below, to which this declaration refers, comply with the essential health and safety requirements of the directives and standards listed below.

Product range

HE050-A

ATEX Annex

UL International Demko A/S, as **a notified body No. 0539** in accordance with the Directive of the Council of the European Community of 26 February 2014 (2014/34/EU), certifies that the manufacturer maintains a quality assurance system for production that complies with **Annex IV** of this Directive.

Marking and certificates

HE050.2.x.x.Axx

Marking	Certificate
 **II 3G Ex ec IIC T4 Gc**  **II 3D Ex tc IIIC 105°C Dc**	**UL 25 ATEX 3412X**

Directives and standards

EU Directive	Standards
2014/30/EU	EN 55011:2016 + A1:2017 + A11:2020 EN 61000-6-3:2007 + A1:2011
Supplementary:	*EN 61000-6-7:2015*
2014/34/EU	EN IEC 60079-0:2018 + AC:2020-02 EN IEC 60079-7:2015 + A1:2018 EN 60079-31:2014
2011/65/EU	EN IEC 63000:2018

Signature

Nürtingen, the 2026-05-07

Place and date

Tobias Bronkal, Managing Owner