



Operating instructions
Diagnostic electronics for vibration sensors

GB

VSE903

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1 Safety instructions

- The unit described is a subcomponent for integration into a system.
 - The system architect is responsible for the safety of the system.
 - The system creator undertakes to perform a risk assessment and to create documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the architect of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ Intended use).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, operation and maintenance of the product must be carried out by qualified personnel authorised by the machine operator.
- Protect units and cables against damage.



2 Preliminary note

You will find instructions, technical data, approvals, accessories and further information using the QR code on the unit / packaging or at www.ifm.com.

2.1 Symbols used

- ✓ Requirement
- ▶ Instructions
- ▷ Reaction, result
- [...] Designation of keys, buttons or indications
- Cross-reference
-  Important note
Non-compliance may result in malfunction or interference.
-  Information
Supplementary note

2.2 Warnings used

	ATTENTION Warning of damage to property
	CAUTION Warning of personal injury ▷ Slight reversible injuries may result.
	WARNING Warning of serious personal injury ▷ Death or serious irreversible injuries may result.

3 Intended use

The device has been designed for process value monitoring, vibration monitoring and analysis of dynamic signals.

4 Device functions

The diagnostic electronics has

- 1 analogue input, 1 digital input
- 4 dynamic inputs
- 1 analogue or digital output
- 1 digital output
- 1 TCP/IP parameter setting interface

Input IN1: connection for a pulse signal (HTL).

Input IN2: connection for an analogue current signal (4...20 mA).

The analogue inputs can be used

- as trigger for measurements (e.g. rotational speed for vibration diagnostics)
- as trigger of a counter
- for process monitoring

VSA, VSM, VSP or standard IEPE acceleration sensors can be connected to the dynamic inputs.

The dynamic inputs can be used for

- vibration monitoring
- vibration diagnostics
- analysis of other dynamic signals

Alternatively, the dynamic inputs can also be used like an analogue input with an analogue current signal (4...20 mA).

The hardware outputs can be configured as 2 x binary (no/nc) or as 1 x analogue (0/4...20 mA) and 1 x binary (no/nc).

The outputs can be used for

- time-critical alarms (e.g. machine protection, response time up to 1 ms)
- alarm output
- analogue value output of values measured by the diagnostic electronics

The parameter setting interface (TCP/IP) is used for communication between the diagnostic electronics and a PC (e.g. VES004 parameter setting software).

The parameter setting interface can be used for

- parameter setting of the device
- online data monitoring
- reading the history memory
- firmware update

ATTENTION

The device is not approved for safety-related tasks in the field of operator protection.

4.1 Function description

With the device

- vibration monitoring (total vibration to ISO)

- condition monitoring (condition-based monitoring on the basis of vibration characteristics)
- machine protection/process monitoring (monitoring vibration characteristics in real time with a very fast response time up to 1 ms)

can be implemented.

Monitoring of

- up to 24 objects (indicators for different machine parts, vibration characteristics or process values)
- dynamic values within the time range (e.g. v-RMS to ISO)
- dynamic values within the frequency range FFT or HFFT (e.g. unbalance or rolling element bearing)
- process values (analogue signals) for current value above or below the limit

The device has an internal history memory (> 850,000 values) with real-time clock and flexible memory interval per object. The memory is a ring memory (FIFO).

Up to 32 counters can be configured to measure the duration of operating times and/or how long a limit value is exceeded.

The signals at the inputs are permanently picked up and continuously monitored according to the set parameters.

With objects in the frequency range (unbalance, rolling element bearing,...), monitoring is done in multiplex mode.

With objects in the time range (v-RMS, a-RMS and a-Peak), all 4 dynamic inputs are monitored simultaneously and without interruption.

The two outputs OU1/2 can be used for alarms.

Parameter setting of monitoring tasks and alarming is done via the VES004 software. The software allows to display and record the current measured values, spectra and time signals (online data).

Via the Ethernet interface of the device, networking is possible to visualise data (measured values, alarm states,...) in other systems (e.g. SCADA, MES,...).

4.2 Firmware

► Recommendation: Install/Use the latest firmware to use all device functions.

The firmware can only be updated via the VES004 PC software. Only the firmware of the entire device can be updated.



▷ Firmware and operating software → download area www.ifm.com

▷ A description of all firmware parameters and their meaning → VES004 PC software manual.



During the firmware update, the parameter set and the history on the device are deleted. All counters are reset.

The IP settings of the configuration and fieldbus interface are retained.

► Recommendation: Run a parameter backup before the firmware update.

5 Mounting



- ▶ Disconnect the power to the machine during installation.
- ▶ Use a flat mounting surface for installation.
- ▶ Fasten the module onto the mounting surface using M6 screws and washers.
- ▶ Ground the device with the earthing screw provided.
- ▶ To guarantee the protection rating IP 67, M12 sockets from ifm must be used.
- ▶ Cover the unused sockets with the enclosed protective caps.

The M12 connection parts in the device comply with the ingress resistance requirements of the standard EN 61076-2-101. To adhere to the protection rating, only cables certified to this standard must be used. The system architect undertakes to ensure the ingress resistance of cables they have cut to length.

- ▶ Carry out the fitting according to the indications of the cable manufacturer. The permitted maximum is 0.6 Nm.
- ▶ During installation, place the M12 connector vertically so that the coupling nut will not damage the thread.
- ▶ Provide cables with a strain relief depending on the mounting conditions to avoid excessive strain on the installation points and the M12 connections.
- ▶ Ensure correct fit and proper assembly of the M12 connection parts. If these instructions are not complied with, the specified protection rating cannot be guaranteed.

When preparing for cable installation, the local conditions and the corresponding mounting regulations are very important. Cables can be installed, for example, in cable ducts or on cable bridges.

A minimum distance between the cabling and possible sources of interference (e.g. machines, welding equipment, power lines) is defined in the applicable regulations and standards. During system planning and installation, these regulations and standards must be taken into account and observed.

Protect the bus cables from sources of electric/magnetic interference and mechanical strain.

Observe the guidelines regarding "electromagnetic compatibility" (EMC) to keep mechanical risks and interference to a minimum.

5.1 Emission

This is a class A product. The device may cause radio interference in domestic areas.

- ▶ If necessary, take measures to prevent radio interference.

5.2 Sources of interference

- ▶ Signal cables and power supply lines should not be installed in parallel.
- ▶ If necessary, metal isolating segments should be placed between the power supply lines and signal cables.

5.3 Cable routing

Network/bus cables: Install network/bus cables in separate cable ducts or separate cable bundles.



- ▶ Where possible, do not install network/bus cables parallel to power supply lines.
- ▶ Install network/bus cables at least 10 cm away from power lines.

5.4 Installation instructions

Electrostatic discharge

The device contains components that can be damaged or destroyed by electrostatic discharge.

- ▶ When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and IEC 61340-5-1.

6 Electrical connection

The national and international regulations for the installation of electrical equipment must be adhered to. Avoid contact with dangerous contact voltages.

- ▶ Disconnect power.
- ▶ Connect the device.
- ▶ To prevent negative effects on the functions caused by noise voltages, lay sensor cables and load cables separately.

Maximum cable length for the sensors 1...4: 250 m.

Maximum cable length for the inputs IN1 and IN2: 30 m.

The outputs are short-circuit proof and can be configured as either normally closed or normally open.


In addition, an analogue signal can be provided on output [OU 1] (0/4...20 mA) (e.g. acceleration values).

Adhere to the SELV criteria (safety extra-low voltage, circuit electrically isolated from other circuits, ungrounded) when the device is connected so that no dangerous contact voltages are applied to the sensor or transferred to the device.

If the DC circuit is to be grounded (e.g. due to national regulations), the PELV criteria must be adhered to (protective extra-low voltage, circuit electrically isolated from other circuits).

Sensor and diagnostic electronics supply are not electrically isolated.


6.1 Wiring

Sensor 1...4	
M12 socket, A-coded	
1: L+ (bn)	
2: signal (wh)	
3: GND (bu)	
4: Self-test (bk)	
5: not used	





▶ The wiring (sensor 1...4) is designed for VSA-type acceleration meters from ifm.


▶ If other sensors are used, check the wiring.

Config	
M12 socket, D-coded	
1: TxD+	
2: RxD+	
3: TxD-	
4: RxD-	
5: not used	

IN 1
M12 socket, A-coded

IN 1	
1: 24 V DC (bn)	
2: not used	
3: GND (bu)	
4: IN 1 pulse (bk)	
5: not used	

IN 2	
M12 socket, A-coded	
1: 24 V DC (bn)	
2: IN 2 4...20 mA (wh)	
3: GND (bu)	
4: not used	
5: not used	

OU / Supply	
M12 connector, A-coded	
1: 24 V DC (bn)	
2: current output or switching output (wh)	
3: GND (gn)	
4: OU2: switch	

7 Factory setting

7.1 General factory setting

Request	Parameter
Parameter set	None
Host name	No name assigned
IP address	192.168.0.1
TCP/IP port	3321
Subnet mask	255.255.255.0
Default gateway	192.168.0.244
MAC address	Is defined in the production process

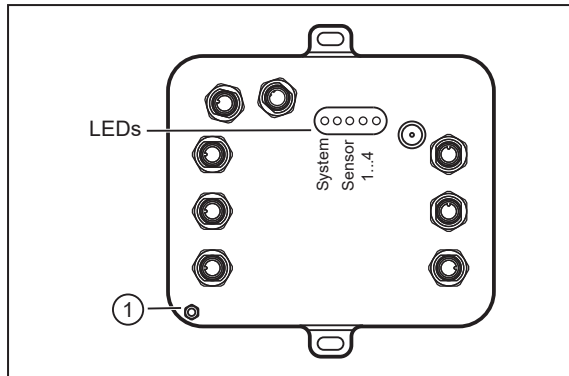
8 Parameter setting

The device parameters are set exclusively via the VES004 PC software. All parameters of the configured application are bundled in a parameter set and transferred to the device.

For a detailed description of all parameters and possible configurations we refer you to the VES004 software manual.

9 Operating and display elements

For quick identification of error states, the device has a system LED on the device front.



1: Earthing screw

9.1 LEDs for sensor and system

LED 1 for sensor 1 LED 4 for sensor 4	
green on	sensor connected and parameterized
green flashing	sensor with set parameters Type VSA: sensor not connected or faulty Type IEPE: sensor not connected
yellow on	warning
red on	damage alarm
green/yellow flash alternately	teach process active
yellow/red flash alternately	no parameter set loaded

LED system	
green on	system OK, monitoring running
yellow on	system OK, no monitoring due to parameter setting, self-test or FFT mode
green/yellow flash alternately	monitoring not possible, faulty parameter set
green/red flash alternately	system error, EEPROM defective, other conditions Error in the system, function of the device restricted

10 Maintenance, repair and disposal

The operation of the unit is maintenance-free.

Only the manufacturer is allowed to repair the unit.

- ▶ After use dispose of the device in an environmentally friendly way in accordance with the applicable national regulations.

Cleaning the unit:

- ▶ Disconnect the unit from the voltage supply.
- ▶ Clean the unit from dirt using a soft, chemically untreated and dry micro-fibre cloth.