GB

Operating instructions
Diagnostic electronics with EtherCAT interface for vibration sensors
VSE152

11441755 / 00 02 / 2022

Contents

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 architect 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.
- The design of the unit corresponds to protection class III (EN61010) except for the terminal blocks. Protection against accidental contact (safety from finger contact to IP 20) for qualified personnel is only ensured if the terminals have been completely inserted. Therefore the unit must always be mounted in a control cabinet of at least IP 54 which can only be opened using a tool.
- For DC units the external 24 V DC supply must be generated and supplied according to the requirements for safe extra-low voltage (SELV) since this voltage is provided near the operating elements and at the terminals for the supply of sensors without further protection measures.

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 Legal notice

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

4 Intended use

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

5 Device functions

The diagnostic electronics has

- 2 analogue inputs
- 4 dynamic inputs
- 1 analogue or digital output
- 1 digital output
- 1 TCP/IP parameter setting interface
- 1 EtherCAT port signal input / 1 EtherCAT port signal output

An analogue current signal (0/4…20 mA) or a pulse signal (HTL) can be connected to the analogue inputs.

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

The EtherCAT ports are used for communication between the diagnostic electronics and an EtherCAT controller (e.g. PLC).

The EtherCAT interface can be used for

- transferring the current measured values, limits and alarm states of the diagnostic electronics to the PLC
- reading the counter readings of the diagnostic electronics
- writing rotational speeds and other values from the PLC to the diagnostic electronics
- writing limits from the PLC to the diagnostic electronics

5.1 Function description

This device allows for

- 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)

to 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. The respective object states per sensor are also indicated via the 4 sensor LEDs.

The system LED displays the operating status of the device.

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,....).

Exchange of data (e.g. measured values, alarm states, limits, rotational speeds, counter readings, ...) between the diagnostic electronics and the EtherCAT controller (e.g. PLC) is done via the EtherCAT ports.

5.2 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.

6 Installation

▶ Mount the unit in a control cabinet with a protection rating of at least IP 54 to ensure protection against accidental contact with dangerous contact voltages and against atmospheric influence.

The control cabinet should be installed in accordance with local and national rules and regulations.

▶ Mount the unit vertically on a DIN rail.

▶ Leave enough space between the unit and neighbouring heat sources and the top or bottom of the control cabinet to enable air circulation and to avoid excessive heating.

▶ Prevent penetration of conductive or other dirt during installation and wiring.

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.

6.1 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.

▶ During installation, all connector locking mechanisms (screws, coupling nuts) must be firmly tightened in order to ensure the best possible contact between shielding and ground. Before initial start-up, the ground or shielding connection of cables must be checked for low-resistance continuity.

6.2 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.

6.3 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.

Only operate the device when mounted on a grounded DIN rail in order to dissipate electrostatic charges.

7 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 device, connection via Combicon connectors (pre-mounted).
- ▶ To prevent negative effects on the functions caused by noise voltages, lay sensor cables and load cables separately. Maximum length of the sensor cable: 250 m.
- ▶ Use a screened sensor cable.

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).

7.1 Connection of the sensors

Adhere to the SELV criteria (safety extra-low voltage, circuit electrically isolated from other circuits, ungrounded) when the sensors are 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.

7.2 Connection technology

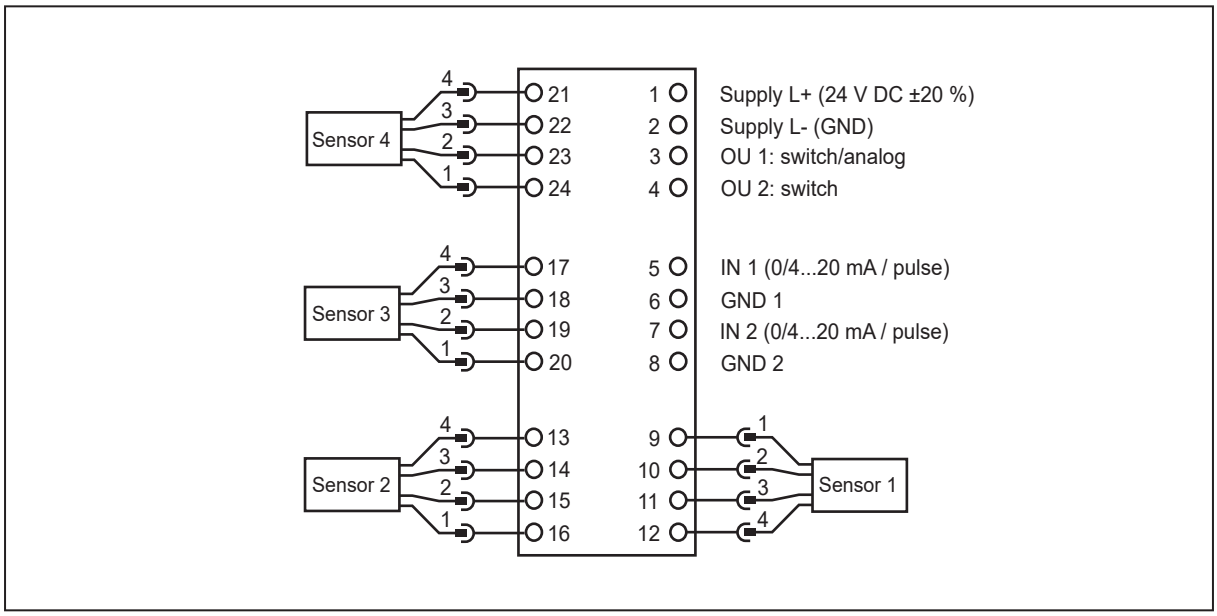
ATTENTION

Terminal block not connected with connectors.

▷ Protection rating IP 20 not ensured.

▶ Cover unused terminals with connectors.

7.3 Wiring



Wiring of sensors 1...4 (S1...S4) according to their use

Sensor				VSA	IEPE/VSP	0...20 mA
S1	S2	S3	S4			
09	16	20	24	BN: L+ (+ 9 V)	not connected (n.c.)	not connected (n.c.)
10	15	19	23	WH: Signal	IEPE +	Signal
11	14	18	22	BU: GND	IEPE -	GND
12	13	17	21	BK: Test	not connected (n.c.)	not connected (n.c.)

Sensor input	Use		
S1…S4	VSM		
9,16,20,24	not connected (n.c.)		
10,15,19,23	IEPE x	IEPE y	IEPE z
11,14,18,22	IEPE -		
12,13,17,21	not connected (n.c.)		Test *

* The self-test is only carried out via the Z axis.

▶ Connect both cables to the same terminal of a suitable evaluation unit (e.g. VSExxx).

▷ Terminal 1 Supply L+
When using an IEPE input 24 V + 20% (Integrated Electronics Piezo Electric)

▷ The ground GND of the DC supply is directly connected with the ground GND of the sensor supply. Therefore the SELV criteria have to be met for the DC supply.

▶ Protect the supply voltage externally (max. 2 A).

7.4 Ethernet connection

The RJ45 socket is used for the connection to the Ethernet.

8 EtherCAT interface

8.1 Technical data EtherCAT

Requirement	Parameter
Device type	EtherCAT slave
Transmission rate	100 Mbit/s
Minimum cycle time	1ms
Data format	Little Endian (default), VSE004 allows for configuration to Big Endian
Max. data size	1024 bytes
Configuration	Via PC with configuration tool: VES004
Device description	ESI file (e.g. ifm_VSE152.xml)
Slave Information Interface (SII)	EEPROM file (e.g. ifm_VSE152.bin)

8.2 PDO data mapping

8.2.1 Process data configuration

The device features a "Fixed process data configuration". The general process data structure is defined in the ESI file and in the Slave Information Interface (EEPROM). A PDO upload/download is not supported.

8.2.2 Input module

Number	Module name	Description
1	4x4bytesIn(16B in)	16 bytes input module for 4 bytes data types
2	8x4bytesIn(32B in)	32 bytes input module for 4 bytes data types
3	16x4bytesIn(64B in)	64 bytes input module for 4 bytes data types
4	32x4bytesIn(128B in)	128 bytes input module for 4 bytes data types
5	24x2bytesIn(48B in)	48 bytes input module for 2 bytes data types
6	40x1byte(38B in)	40 bytes input module for 1 byte data types

8.2.3 Output module

The SyncManager watchdog for monitoring correct and timely process data communication is activated per default. If you do not set parameters for an output module, there will be a SyncManager watchdog timeout.

▶ Recommendation: set parameters for at least one output. If this is not possible, the SyncManager watchdog timer (ESC Register. 420h) has to be set to "0" via the PLC development environment.

▷ The SyncManager watchdog is switched off.

▷ The ERR LED will no longer signal any errors in process data communication.

Number	Module name	Description
1	4x4bytesOut(16B out)	16 bytes output module for 4 bytes data types
2	8x4bytesOut(32B out)	32 bytes output module for 4 bytes data types
3	16x4bytesOut(32B out)	64 bytes output module for 4 bytes data types

Number	Module name	Description
4	32x4bytesOut(32B out)	128 bytes output module for 4 bytes data types
5	4x1byteOut(3B out)	4 bytes output module, is filled with 1 byte data types (byte).

8.2.4 RxPDO and TxPDO object index

Project-specific parameter setting is done via the PC software VES004. The RxPDO and TxPDO index is assigned to the individual input and output modules via the VES004 parameter setting software.

This is done by using the following formula:

Number	Module name	Description
RxPDOs	Index = 0x1600 + (slot number of the module - 1)	16 bytes output module for 4 bytes data types
TxPDOs	Index = 0x1A00 + (slot number of the module - 1)	32 bytes output module for 4 bytes data types

8.3 Identity information

8.3.1 Object Directory Communication Area

Index	Description	Parameter	Data type	Access
0x1000	Device Type	0 (Generic Device)	UINT32	read only
0x1008	Manufacturer Device Name	VSE152	STRING	read only
0x1009	Manufacturer Hardware Version	e.g. "AA"	STRING	read only
0x100A	Manufacturer Software Version	e.g. "V1.0"	STRING	read only
0x1018	Identity Object:			
	Sub-index 0x01: Vendor ID	0x622	UDINT32	read only
	Sub-index 0x02: Product code	152dez (98hex)	UDINT32	read only
	Sub-index 0x03: Revision Number	Minor Rev.: Bit0-15 Major Rev.: Bit16-31 e.g. 00010002hex (Revision 1.2)	UDINT32	read only
	Sub-index 0x04: Serial number	Is defined in the production process	UDINT32	read only

8.3.2 Object Directory Manufacturer Specific Area

Index	Description	Parameter	Data type	Access
0x2001	Component name	“Diagnostic Electronics VSE152”	STRING	read only
0x2002	Vendor name	“ifm electronic”	STRING	read only
0x2003	Vendor URL	www.ifm.com	STRING	read only
0x2004	Order number	“VSE152”	STRING	read only
0x2007	Installation location	Location of installation (user-defined)	STRING	read/write

Index	Description	Parameter	Data type	Access
0x200A	Equipment ID	Device name (user-defined)	STRING	read/write

8.4 Slave Information Interface (SII) / EEPROM

8.4.1 Slave Information Interface

Description

SII is an EEPROM in the EtherCAT slave that can be read by the master directly via the EtherCAT fieldbus chip.
In addition to information on the configuration of the EtherCAT chip, it contains further information for the master.

Definition

1) The Slave Information Interface Area is coded according to EtherCAT Specification - Part 6. (Application Layer protocol specification ETG.1000.6)

2) The serial number information is not stored in the SII of the device. The default value is entered (Serial number = 0).

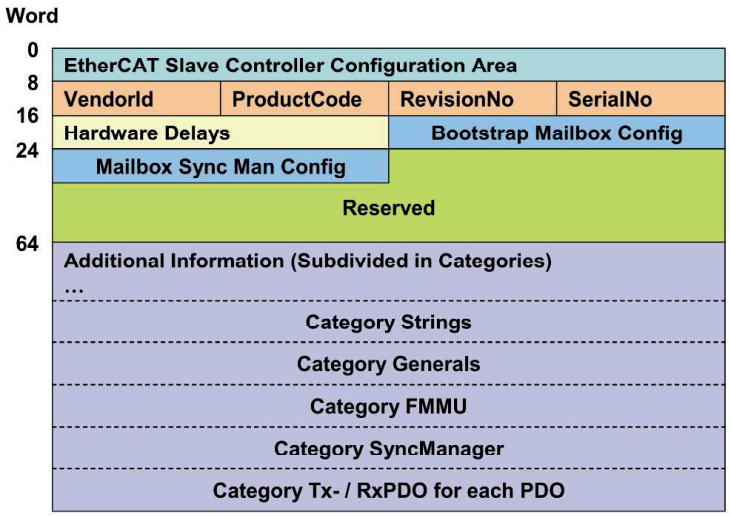


Figure 6: EEPROM Table of Register Values

8.5 Application Layer (AL) Status Codes

AL status code	Meaning
0x0000	No error
0x0004	Output / input configuration not valid for this hardware or software revision
0x0011	Requested state inadmissible (e.g. OP with slave being in PREOP)
0x0012	Requested state undefined
0x0013	BOOT state is not supported
0x0016	Mailbox configuration invalid
0x0018	No valid inputs available
0x001B	SyncManager watchdog timeout
0x001D	SyncManager 2 settings (output data) invalid

AL status code	Meaning
0x001E	SyncManager 3 settings (input data) invalid
0x001F	Watchdog settings invalid
0x0030	DC Sync settings invalid
0x8000	The slave application has changed the EtherCAT status autonomously (e.g. write parameter set via VES004)

8.6 SDO Abort Codes

SDO Abort Code	Meaning
0x00000000	No error
0x05040005	Not enough memory
0x06010000	Access to the object is not supported. (e.g. complete access to a sub-index greater 1)
0x06010002	Attempt to write on a read only object
0x06020000	Object does not exist
0x06070010	Data type does not match. Length of the service parameter does not match.
0x06070012	Data type does not match. Length of the service parameter too long.
0x06090013	Data type does not match. Length of the service parameter too short.
0x06090030	Value range of the parameter exceeded (for write access only).
0x08000000	General error
0x08000020	Data can neither be transferred to nor stored in the application.
0x08000021	Data can neither be transferred to nor stored in the application. No "write" permission for manufacturer data.
0x08000022	Data cannot be transferred to the application or stored due to the current device status.
0x08000023	Dynamic generation of the object directory fails or there is no object directory.

8.7 EtherCAT data model

The EtherCAT data to be transferred is selected via the VES004 PC software. After respective parameter setting of the requested input and output data the EtherCAT data model is created flexibly and transferred to the device via writing the parameter set.

The created data model is then available in the respective controller (see “Parameter setting”).

Input (PLC)				
Source		**Data type / Byte order / Unit**	**Data size**	**Use**
Dynamic inputs				
	<input name>	• Real or DINT with factor • Big or Little Endian	4 bytes	Value of the signal connected to dynamic input (sensor 1…4) if it has been configured as a “DC input”.
Analogue inputs				
	<input name>	• Real or DINT with factor • Big or Little Endian	4 bytes	Value of the signal connected to the analogue input (IN1, IN2)
External inputs				
	<input name>	• Real or DINT with factor • Big or Little Endian	4 bytes	Value of the external input (External_xx)

Input (PLC)				
Objects (time domain, frequency domain, upper/lower limit monitor)				
	<object name>			
	Value	• Real or DINT with factor • Big or Little Endian • Has a unit (default SI unit)	4 bytes	Object value has a unit
	Status	Byte	1 byte	Current status/state of the object 0: OK 1: warning alarm 2: damage alarm 3: inactive 4: error
	Error	Word	2 bytes	Error codes for description of error in object state 0x0000: no error 0x0001: internal error 0x0002: calculation error 0x0004: speed out of range 0x0008: speed not stable 0x0010: invalid baseline 0x0020: invalid reference value (1) 0x0040: invalid reference value (2) 0x0100: deactivated by signal weighting 0x0200: reference value out of range 0x1000: warning alarm 0x3000: warning and damage alarm 0x8000: object inactive (by variant)
	Rotational speed	• Real or DINT with factor • Big or Little Endian	4 bytes	Trigger - rotational speed
	Reference value	• Real or DINT with factor • Big or Little Endian	4 bytes	Trigger - reference value
	Warning alarm	• Real or DINT with factor • Big or Little Endian	4 bytes	Limit - warning alarm (relative)
	Damage alarm	• Real or DINT with factor • Big or Little Endian	4 bytes	Limit - damage alarm (relative)
	Baseline	• Real or DINT with factor • Big or Little Endian • Has a unit (default SI unit)	4 bytes	Limit - unit-based baseline for time and frequency objects Note: This parameter is not applicable for the upper/lower limit monitor objects

Input (PLC)				
Counter				
	<counter name>	• DINT • Big or Little Endian	4 bytes	Counter value (in seconds)
History				
	<object name>			
	History value	• Real or DINT with factor • Big or Little Endian • Has a unit (default SI unit)	4 bytes	Unit-based current history entry of the object
	Average value of the history	• Real or DINT with factor • Big or Little Endian • Has a unit (default SI unit)	4 bytes	Unit-based average value of the current history entry of the object
	Speed of the history	• Real or DINT with factor • Big or Little Endian	4 bytes	Trigger - speed of the current history entry of the object
	Reference value of the history	• Real or DINT with factor • Big or Little Endian	4 bytes	Trigger - reference value of the current history entry of the object
	Input counter of the history values	• DINT • Big or Little Endian	4 bytes	Counter of the received history entries of the object
Alarms (OUT1 / OUT2)				
	<alarm name (OUT1)>	• Float or DINT with factor • Big or Little Endian	4 bytes	Configuration as analogue alarm output: value of alarm output
		Byte	1 byte	Configuration as digital alarm output: alarm state Configuration as NC No alarm: 1 Alarm: 0 Configuration as NO No alarm: 0 Alarm: 1
	<alarm name (OUT2)>	Byte	1 byte	Alarm state Configuration as NC No alarm: 1 Alarm: 0 Configuration as NO No alarm: 0 Alarm: 1
Alarms (IO1 - IO8)				
	<alarm name>	Byte	1 byte	Alarm state Configuration as NC No alarm: 1 Alarm: 0 Configuration as NO No alarm: 0 Alarm: 1
General				
	Variant	Byte	1 byte	Value of the active variant (0...31)

Input (PLC)				
	System mode	Byte	1 byte	Current system mode of the device 0x00: reserved 0x01: supervise (normal monitoring) 0x02: set-up (parameter setting) 0x03: measure (spectrum, raw data) 0x04: start-up (system booting) 0x05: self-test (self-test active)
	Self-test result	Byte	1 byte	Bit pattern Bit1 - sensor 1 Bit2 - sensor 2 Bit3 - sensor 3 Bit4 - sensor 4 Note on evaluation 0x00: Sensors OK 0x01: sensor 1 self-test failed 0x02: sensor 2 self-test failed 0x04: sensor 3 self-test failed 0x08: sensor 4 self-test failed 0x0F: sensor1…4 self-test failed
	Current queue level	Byte	1 byte	Current queue level of the internal device communication
	Queue overflow counter	• DINT • Big or Little Endian	4 bytes	Overflow counter of the internal device communication
	Checksum error counter	• DINT • Big or Little Endian	4 bytes	Checksum error counter of the internal device communication
	Read time	DINT	4 bytes	Read device time (UTC) PROFINET devices: U32:0x00ssmmhh EtherNetIP devices: U32:0x00hhmmss EtherCAT devices: U32:0x00hhmmss MODBUS devices: U32:0x00hhmmss
Placeholder				
	<placeholder>	Byte	xx byte	Placeholder for fieldbus transmission

Output (PLC)			
Source	Data type / Byte order / Unit	Data size	Fieldbus representation

Output (PLC)				
External inputs				
	<input name>	• Real or DINT with factor • Big or Little Endian	4 bytes	Set value of the external input (External_xx)
Objects (time domain, frequency domain)				
	<object name>			
	Baseline	• Real or DINT with factor • Big or Little Endian • Has a unit (default SI unit)	4 bytes	Limits - set unit-based baseline for time and frequency objects to adjust damage limits
General				
	Variant	Byte	1 byte	Set current variant (0...31)
	Do self-test	Byte	1 byte	Execute self-test Note A value change from 0 to ≠ 0 starts the self-test After completion of the self-test, the unit automatically switches to the “Monitoring” system mode
	Set time	DINT	4 bytes	Set time (always UTC format) PROFINET devices: U32:0x00ssmmhh EtherNet/IP devices: U32:0x00hhmmss EtherCAT devices: U32:0x00hhmmss MODBUS devices: U32:0x00hhmmss
	Set counter ID	Byte	1 byte	Set the ID of the counter (1…32)
	Set counter value	• DINT • Big or Little Endian	4 bytes	Set value of the counter selected with the ID (in seconds)
Placeholder				
	<placeholder>	Byte	xx byte	Placeholder for fieldbus transmission

8.8 Behaviour if parameter set is changed

Writing of the parameter set (even without changes) or changing the system mode of the diagnostic electronics to “set-up” triggers an initialisation (reboot) of the fieldbus module.

The connection of the PLC (master / controller / supervisor) to the diagnostic electronics is interrupted. It depends on the programming of the PLC how a connection loss is handled. The LED behaviour is described in the chapter “Operating and display elements”.

9 Factory setting

On delivery there are the following factory settings:

IP settings, parameter setting interface, delivery status

9.1 General factory setting

Requirement	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

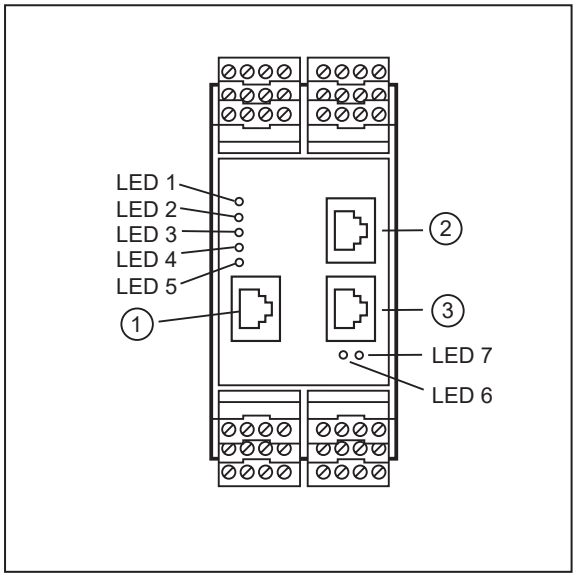
10 Parameter setting

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.

The parameter setting of the EtherCAT device is carried out via the configuration tool of the EtherCAT controller. For this purpose, integrate the EtherCAT Slave Information (ESI) file into the TwinCAT software.

11 Operating and display elements



1: Config: TCP/IP, IP address 192.168.0.1 (factory setting), parameter setting and data interface (e.g. VES004)
2: IE 1: EtherCAT
3: IE 2: EtherCAT

11.1 LEDs for sensor and system

LED 1 for sensor 1... LED 4 for sensor 4	
green on	Sensor connected with set parameters
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 5 for 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 unit restricted

11.2 Link and activity status LEDs

LED Connection/Activity status		
Labelling	LED	Description
L/A (Connection/Activity)	green on	Connection to port established
	green off	No connection to the port

LED Connection/Activity status		
L/A (Connection/Activity)	yellow on	The connection is active, currently no data transmission
	yellow flashing	The connection is active, currently data transmission taking place
	yellow off	No connection available, currently no data transmission

11.3 EtherCAT status LEDs

Two LEDs on the front of the device allow for the maintenance personnel to rapidly identify error states.

RUN: LED 7 for status indication of the EtherCAT state machine

ERR: LED 6 for fault indication

11.4 Switch-on test

On power up, a switching sequence is carried out in order to test the RUN and ERR LEDs.

Switching sequence	ERR (LED 6)	RUN (LED 7)
1	orange for approx. 3 s	orange for approx. 3 s
2	off	off
3	off	green for approx. 0.25 s
4	off	red for approx. 0.25 s
5	off	orange for approx. 0.25 s
6	off	off
7	green for approx. 0.25 s	off
8	red for approx. 0.25 s	off
9	orange for approx. 0.25 s	off
10	current operating status	current operating status

11.5 Operating states of the ERR and RUN LED

LED 6 ERR and LED 7 RUN		
ERR	Meaning	Description
off	Error indication	no error
red flashing (2.5 Hz)		invalid configuration
red flashing (200 ms on, 200 ms off, 200 ms on, 1000 ms off)		SyncManager watchdog error
red flashing (200 ms on, 1000 ms off...)		The slave application has changed the EtherCAT status autonomously.
RUN	Meaning	Description
off	Operation indication	Device is in INIT state or is switched off (no voltage supply)
green on		Device in OPERATIONAL state
green flashing (2.5 Hz)		Device in PRE-OPERATIONAL state

LED 6 ERR and LED 7 RUN		
green flashing (200 ms on, 1000 ms off...)	Operation indication	Device in SAFE-OPERATIONAL state

11.6 LED states during firmware update

LED 6 ERR and LED 7 RUN		
ERR	Meaning	Description
off	Error indication	no error
RUN	Meaning	Description
orange flashing (1 Hz)	Firmware Update	Firmware is being loaded to the RAM memory
orange on		Firmware is being loaded to the flash memory
green flashing for approx. 2 s		Firmware has correctly been loaded to the flash memory
orange flashing for approx. 2 s		Parameter set was successfully transferred

12 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.