CE

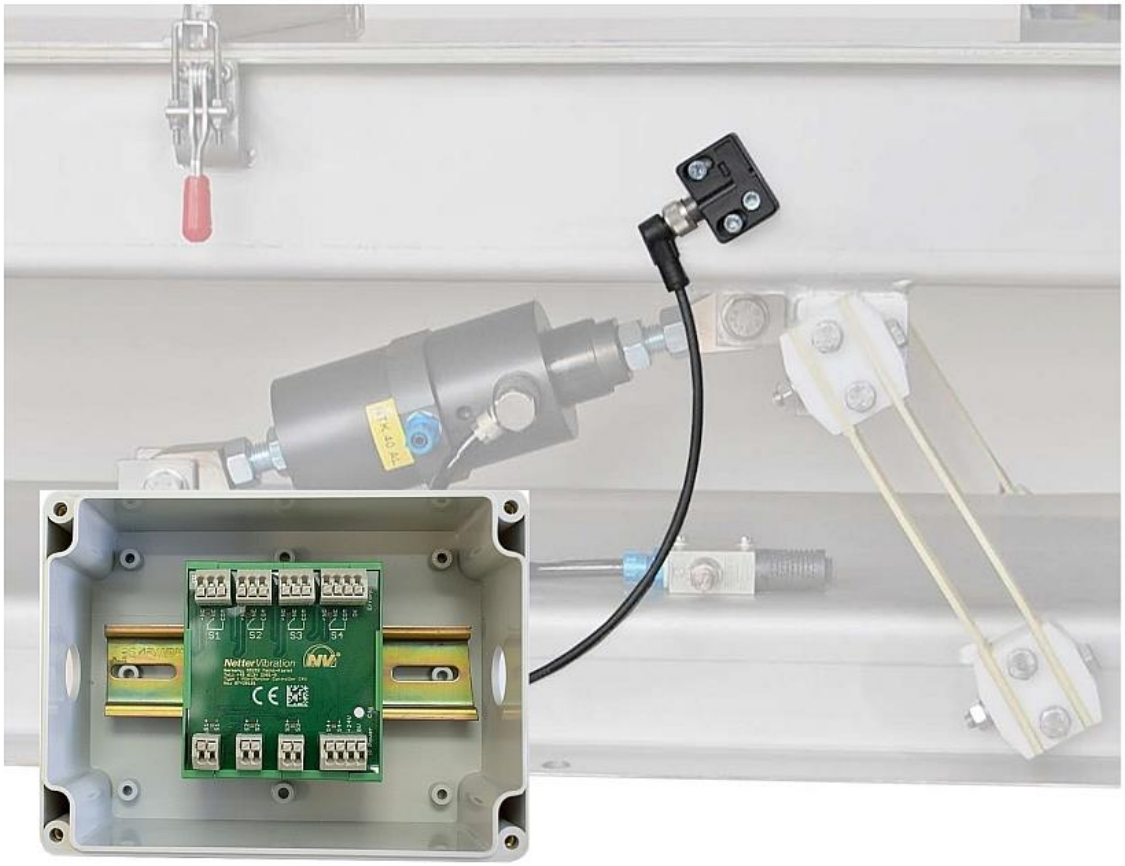
NetterVibration

Operating instructions for Vibration Monitoring Systems *Vibro*Monitor NVM

August 2024
No. 2206E

These operating instructions apply to:

Controller NVM C1W
Controller NVM C4W
Sensor NVM S10



Serving industry with vibration

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Contents

Scope of delivery

Please refer to the delivery note for the scope of delivery.

Check the packaging for possible transport damage. In the event of damage to the packaging, check the contents for completeness and possible damage. Inform the carrier in the case of damage.

Designation

The Vibration Monitoring Systems series VibroMonitor are hereafter referred to as "NVM".

Version of document

Document no.	2206E
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1 General information

Use and storage

Before installing the NVM read these instructions carefully. It is the basis for any action when dealing with the NVM, and may be used for training purposes. The instructions should be subsequently stored at the operation site.

Target group

The target group for these instructions is technical staff, who have basic knowledge in mechanics and electrics.

Only complying technical staff may work on the NVM.

The NVM may only be installed, put into operation, maintained, troubleshot and disassembled by persons authorised by the operator.

Copyright

Limitation of liability

All technical information, data and instructions for installation, operation and maintenance in these instructions are based on the latest information available at the time of printing and take our past experience to the best of our knowledge into account.

No claims can be derived from the information, illustrations and descriptions in these operating instructions.

The manufacturer does not assume liability for damages resulting from:

- failure to observe the instructions,
- improper use,
- unauthorised repairs,
- technical modifications,
- use of non-permissible spare parts.

Translations are made to the best of our knowledge.

Netter*Vibration* does not assume liability for translation errors, even if the translation was made by us or on our behalf. Only the original German text remains binding.

Directives / standards observed

The Vibration Monitoring Systems series VibroMonitor are build according to the following standards and directives:

- 2014/35/EU low voltage directive
- 2014/30/EU electromagnetic compatibility directive
- DIN EN 60204-1
- DIN EN 61010-1
- DIN EN 61326-1

The rules and regulations of the local associations for electrical engineering apply (e. g. IEC, VDE, OEVE, SEV, etc.).

Instruction and warning symbols

The following instruction and warning symbols are used in these instructions:

Personal injuries

⚠ DANGER	
	indicates an immediate danger. Disregard of this notice will result in death or severe personal injuries.

⚠ WARNING	
	indicates a potential danger. Disregard of this notice can result in death or severe personal injuries.

⚠ CAUTION	
	indicates a potentially dangerous situation. Disregard of this notice can result in minor or moderate personal injuries.

Material damages

NOTICE
indicates potential material damage. Disregard of this notice can result in material damage.

Notes

IMPORTANT
indicates actions, methods or notes that are not relative to safety, e.g. useful information and tips.

	**Environmentally safe disposal** indicates the obligation of environmentally safe disposal.

2 Safety

Intended use

Vibration Monitoring Systems series VibroMonitor measure vibrations. They are used for permanent operational monitoring and are intended for installation in vibration systems.

The Vibration Monitoring Systems consist of up to four acceleration sensors and a controller, which supplies the sensors with power and evaluates the signals. In conjunction with a controller (e.g. PLC), the signals can be reused directly via the controller.

Possible areas of application are vibration systems, e.g. vibration tables, conveyors, compactors or test systems.

Any other use is considered improper.

Qualification of qualified personnel

Installation, commissioning, maintenance and troubleshooting of the NVM may only be performed by authorised qualified personnel, who have basic knowledge in mechanics and electrics.

All handling of the NVM is the responsibility of the operator.

High voltage

⚠ DANGER

Risk of electric shock due to high voltage

Live parts can cause severe injuries or even death.

- The electrical installation may only be carried out by authorized qualified personnel.
- The cabinet doors must not be opened when energised.
- All work on the system may only be carried out in a volt-free state.
- Observe the permissible protection class and protective grounding. The NVM may only be operated with the correct connection of the protective conductor.
- Perform all work only with insulated tools suitable for the application.

Safety rules

⚠ DANGER

Electric shock

An electric shock will result in serious injury or even death. The NVM must be free of voltage during assembly, start-up, maintenance and trouble-shooting.

Observe the following five safety rules:

1. Disconnect the NVM from the mains supply.
2. Secure the NVM against re-activation.
3. Establish that the NVM has no voltage.
4. Earth and short-circuit the power supply of the NVM.
5. Cover adjacent live parts or fence them off.

Electric shock

⚠ DANGER

Danger of electric shock due to high voltage

Live parts can cause severe injuries or even death.

- ➢ Lay electrical cables carefully. Make sure that electrical cables are not worn through vibrating parts or sharp edges.
- ➢ Check the perfect condition of the electric cables regularly. Detected errors must be eliminated immediately.

3 Technical data

Permissible operating conditions

Controller (measuring unit)		
Series:	***Vibro**Monitor* NVM	
Operating voltage	24 V DC (+10 % /-5 %), residual ripple < 0,1 V	
Current consumption	Controller C1W	50 mA
	Controller C4W	150 mA
Humidity	The relative humidity should not exceed 60%	
Degree of protection	IP 20	
Ambient temperature	0 °C to 40 °C	
Sensor with cable		
Type	NVM S10	
Degree of protection	IP 65	
Cable length between sensor and controller	max. 250 m	
Shock acceleration	max. 100 g peak	
Ambient temperature	-20 °C to 40 °C	

Parameters controller

	Controller NVM C1W	**Controller NVM C4W**
		
Sensor inputs	1x not protected against reverse polarity	4x not protected against reverse polarity
Relay outputs	1x switching output	4x switching output
	potential-free changeover contact, max. 75 V DC, max. 5 A	
	If the acceleration value is greater than the set threshold, the normally open contact closes (the NC contact opens). If the acceleration value is lower than the set threshold, the normally open contact opens (the NC contact closes).	

	Controller NVM C1W	Controller NVM C4W
Fault output	1 x Fault output (cable break or short circuit)	
	NPN, not potential-free, max. 1 A. If there is a sensor connection fault, an external load (at +24 V DC) is pulled towards 0 V.	
Status LED	1x operating voltage 1x relay output 1x fault output 1x sensor status	1x operating voltage 4x relay output 1x fault output 4x sensor status
Setting		Internally, via a button on the circuit board.
Installation	M36-DIN standard rail (EN 50022)	
Dimensions (H x W x D)	77 x 23 x 43 mm	77 x 70 x 43 mm

Parameters sensor

	Sensor NVM S10
	
Type	capacitive, monocrystalline (MEMS), integrated amplifier
Connection	4-pin socket for round connectors M12 × 1 (preferably with cap nut and interlock
Material	cylindrical sensor made of stainless steel
Shock acceleration	max. 100 g (peak)
Adjustable switching threshold	0-7 g (RMS), 0-10 g (peak) Standard setting: 3,5 g (RMS), 5,0 g (peak)
Cable length	between sensor and controller: max. 250 m
Dimensions	Ø 12 × 40, thread (plug) M12 × 1

4 Design and function

Design

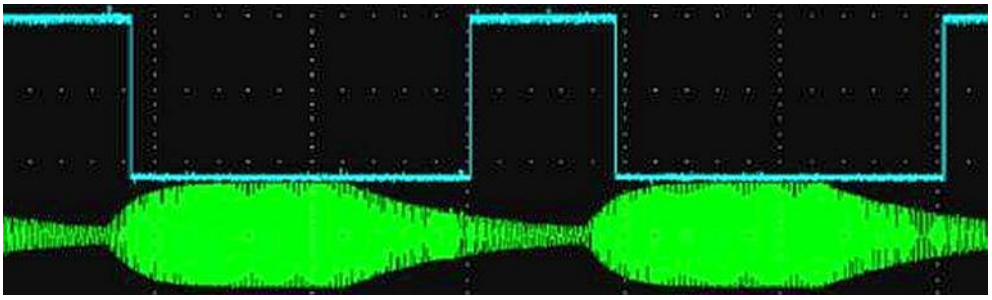
No.	Element	Function
1	Sensor with sensor cable	Records acceleration values on vibration systems. Connected to the controller via the sensor cable.
2	Controller (here NVM C4W)	Used to supply power to the sensors and for signal evaluation. In combination with a control system (e.g. PLC), the signals can be used directly via the controller.
3	Mounting rail (optional)	Used to mount the controller in the housing.
4	Housing (optional)	Protects the electrical components. Can be attached to the wall.

Function

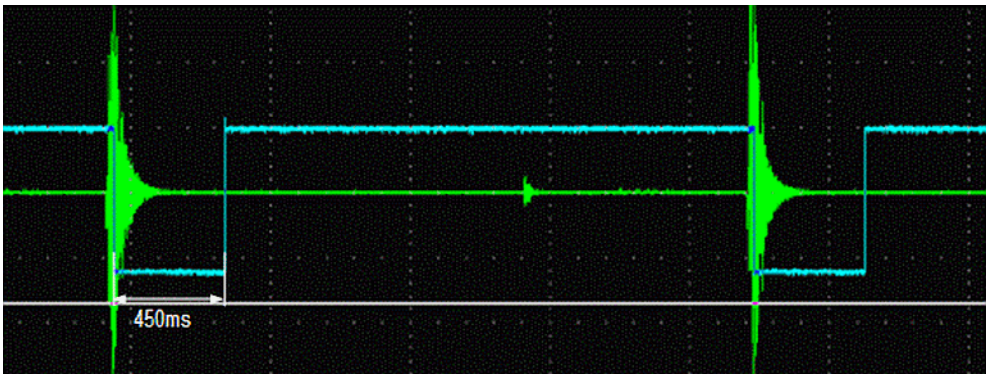
The Vibration Monitoring Systems are used for the constant monitoring of vibration units. They consist of up to four acceleration sensors and a control unit, which provides both the power supply for the sensors and signal analysis. In combination with a controller the signals can be directly used for additional operations.
The system distinguishes two conditions for each connected sensor:

1. vibration active
2. no vibration

If the acceleration at a sensor is higher than the set switching threshold (standard 5 g peak, 3,5 g RMS), the system reports "vibration active". Accelerations below the switching threshold lead to the signal "no vibration”. To ensure that also short impacts, e.g. of impactors, are reliably detected, the "vibration active" signal has a delay time of 450 ms.



Monitoring of a vibrator with a frequency of 50 Hz.
The digital output of the NVM (blue) shows the accelerations (green) when exceeding the switching threshold.



Detection of impacts in the millisecond range.
The digital output of the NVM (blue) holds its status for at least 450 ms and therefore reliably records even short impacts (green acceleration signal).

5 Transport and storage

Transport conditions

Special conditions of transport are not required.

Packaging

The NVM are packed ready for installation.

The packaging protects the NVM from transport damage. The packaging material has been selected from an environmentally safe and technically disposable point of view and is therefore recyclable.

The return of packaging to the material cycle conserves raw materials and reduces the amount of waste.

Storage

- Store the NVM in a dry and clean environment.
- The permissible storage temperature is between 0 °C and +40 °C.
- The permissible relative humidity is max. 60 %.
- Do not store the NVM outdoors. The electrical components are not protected against corrosion.

6 Installation and connection

Observe the safety instructions in chap. Safety, starting on page 5.

Notes on mounting

Mount the controller on a standard mounting rail (M36-DIN) in a suitable control cabinet (degree of protection IP 54).

The sensors are mounted directly on the vibrating part with use of a plastic clamp holder or a rubberized pipe clamp. Ensure that for linear vibrations the longitudinal axis of the sensor must be parallel to the direction of vibration.

Connect the controller C1W

NVM Controller requires an operating voltage of 24V DC.

The acceleration sensor is connected to the input clamps S0+ and S0-. Attention: Make sure polarity is correct.
The sensor status can be captured using a relay output (NO, NC). The external voltage source is connected to clamp COM. If the acceleration at the sensor exceeds the switching threshold, the relay contact connects clamps NO und COM or disconnects clamps NC and COM.

Once the acceleration drops below the switching threshold, at the earliest, however, after 450 ms, the relay contact returns to its initial position, disconnecting clamps NO and COM and reconnecting clamps NC and COM. The maximum switching voltage must not exceed 75 V DC, the maximum permitted switching current is 5.0 A.
It is possible to use the NPN output ERR to query externally whether there is a fault. The fault outputs on several NVM C1 control units can be monitored simultaneously by parallel connection.

C1W controller terminals		
	S0+	Sensor input
	S0-	
	+24V	Power supply +24V
	0V	Power supply 0V
	NO	Relay output NO contact
	NC	Relay output NC contact
	COM	Relay output lead
	ERR	NPN fault output

LED status display C1W

LED	Status	Meaning
red green	on on	broken cable
red green	on off	short circuit For an error reset, restart once (power off)
red green	off on (dimmed)	Sensor recognised
red green	off on (bright)	Sensor has reached switching threshold

Connect the controller

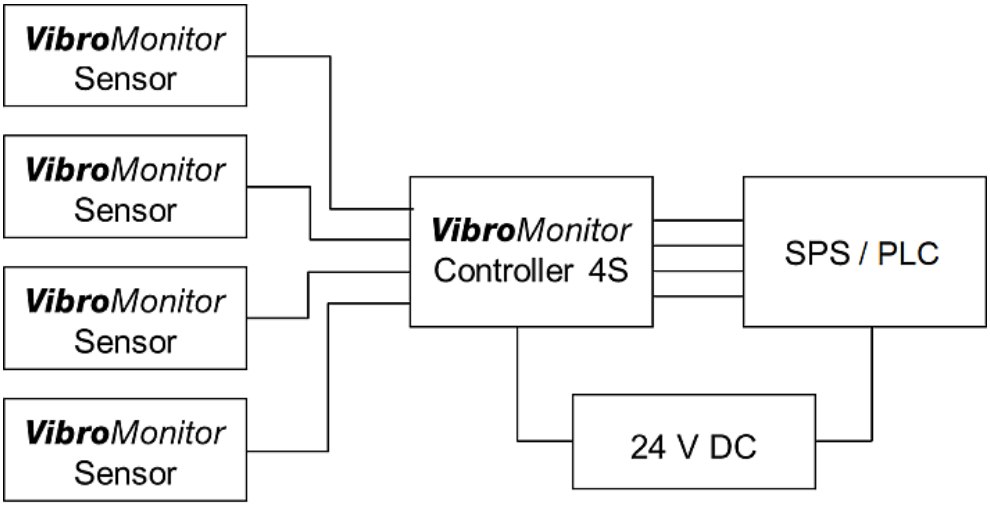
Controller of the NVM requires an operating voltage of 24V DC (connection terminals +24V / 0V).

Up to four sensors can be connected to the sensor inputs S1 to S4, whereby the polarity must be observed.
The status of the sensors, e.g. for digital inputs of a PLC, can be tapped via the relay outputs on terminals S1 to S4.

Pinbelegung des Controllers C4W

S 1	NO	Relay output NO contact, sensor 1
	NC	Relay output NC contact, sensor 1
	COM	Relay output lead, sensor 1
S 2	NO	Relay output NO contact, sensor 2
	NC	Relay output NC contact, sensor 2
	COM	Relay output lead, sensor 2
S 3	NO	Relay output NO contact, sensor 3
	NC	Relay output NC contact, sensor 3
	COM	Relay output lead, sensor 3
S 4	NO	Relay output NO contact, sensor 4
	NC	Relay output NC contact, sensor 4
	COM	Relay output lead, sensor 4
OK		NPN fault output
S1+		Sensor input 1
S1-		
S2+		Sensor input 2
S2-		
S3+		Sensor input 3
S3-		
S4+		Sensor input 4
S4-		
+24V		Power supply +24V
0V		Power supply 0V

Connection diagram C4W



LED status display C4W

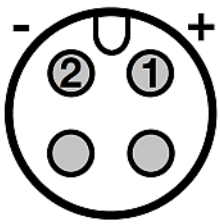
LED	Status	Meaning
red green	off off	No sensor connection
red green	on on	Broken cable
red green	on off	Short circuit For an error reset, restart once (power off)
red green	off on (dimmed)	Sensor recognised
red green	off on (bright)	Sensor has reached switching threshold

Mount the sensor

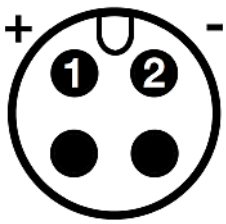
The sensors are attached directly to the vibrating application part using a plastic clamp mount or a rubberized pipe clamp. Make sure that the longitudinal axis of the sensor is parallel to the direction of vibration for linear vibrations.

The sensor has a connection socket for 4-pin round plug connectors with M12 × 1 union screw connection (preferably with integrated screw lock). The maximum length of the sensor cable must not exceed 250 m.

Pins 1 and 2 must be connected to one of the controller's two-pole sensor inputs.



sensor



connector

7 Start-up and operation

Observe the safety instructions in chap. Safety, starting on page 5.

Permissible operating conditions

Please refer to chap. Technical data, page 7 for permissible operating conditions.

Regulations

Installation work as well as operation of the system are to be carried out taking the valid accident prevention regulations into account.

The operator is responsible for the proper condition of the system.

Measures

Carry out the following measures before start-up:

1. Check the mains voltage and the grid feed-in.
2. Check that the system is in perfect electrical condition.
3. Check that all protective measures on the system have been observed.
4. Check that the cables are undamaged and laid according to the known regulations and standards.
5. Eliminate possible errors.

Setting the number of sensors C4W

After the operating voltage is applied, the connected sensors are detected and displayed via the status LEDs. If, for example, only 2 sensors are connected to S1 and S2, the green status LEDs on S1 and S2 light up, the red error LEDs on S3 and S4 light up and the OK-output issues an error. This may mean that no sensors are connected to S3 and S4 or that they have a short circuit or cable break. If not all of the controller's sensor connections are required, unused inputs and outputs can be switched off. The controller can be set to the connected sensors using a push-button. The button must be pressed for at least 3 seconds for teaching. The controller is then set to the connected sensors. This is indicated by the error LEDs going out. This status is maintained even in the event of a power failure until the button is pressed for at least 0.5 s.

8 Maintenance and servicing

Observe the safety instructions in chap. Safety, starting on page 5.

Maintenance plan

Maintenance of the NVM must be carried out as follows:

Interval	Action
Monthly	Check cables.
Every 6 month	Check proper condition of connecting cables and plugs.
At least every 4 years	Check proper condition of electrical systems and stationary electrical equipment.

9 Troubleshooting

Observe the safety instructions in chap. Safety, starting on page 5.

Expertise and regulations

Electrical faults may only be processed by a qualified electrician. Work on the NVM may only be carried out by authorised persons.

In the case of unauthorised intervention in the NVM there is no longer any warranty claim. Interventions of any kind are to be agreed upon with ***Netter****Vibration*.

Malfunctions and causes

In the case of malfunctions of the NVM proceed as follows:

Malfunction	Possible causes	Corrective action
No function LED red = off LED green = off	No voltage available	Check and apply voltage.
Only for controller C4W: No function LED red = off LED green = off	Sensors are not detected	Connecting and teaching sensors correctly.
No function LED red = on LED green = off	Broken cable	Replace cable.
No function LED red = on LED green = off	Short circuit	Correct error. Restart 1x for error reset.

10 Spare parts and accessories

Ordering of spare parts

Please provide the following details when ordering spare parts:

- type of NVM
- description and position of spare part
- required amount

Requirements for exchange

Spare parts of the NVM and of the electrical installation must be installed by an authorised electrician. This specialist must be familiar with the protective measures.

Defective parts must be replaced by parts of the same type. If you need to replace components of the NVM, then contact ***Netter****Vibration*.

Possible accessories

The following accessories are available for the NVM:

Accessory	Description
Sensor connecting cable, 5 m	Version with angled socket M12 × 1 and free cable end, material: PUR
Sensor connecting cable, 10 m	Version with angled socket M12 × 1 and free cable end, material: PUR
Sensor connector M12 x 1, angled	Version with angled socket M12×1 and plastic interlock
Sensor connector M12 x 1, straight	Version with straight cable connector M12 × 1 and plastic interlock
Sensor clamp	Version: plastic design, material: polyamide, colour: black, fixing: for 2 × M5
Sensor clamp	Version: rubber-coated stainless steel pipe clamp, Mounting hole Ø 8,4 mm

11 Disposal

Disposal

	All parts of the NVM must be disposed of properly according to the material specifications.
	Do not dispose the electrical and electronic components of the NVM in the normal household waste, but in a special collection point for the environmentally friendly disposal of electrical equipment. Observe the national regulations for disposal.