Acceleration sensor NVT/S3
with PROFIsafe on PROFINET interface

Relevant data sheet NVT 14587

SUPREME SENSORING
TWK

Document no: NVT 14588 EE
Date: 10.04.2019

Preliminary

PROFIsafe

PROFINET®

Certified according to EN ISO 13849: PLd

User manual

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Inhaltsverzeichnis

1. Safety instructions

1.1 Scope

This user manual is valid exclusively for the following vibration sensor with PROFINET interface:

- NVT90-x x00-xS3xTxx

1.2 Documentation

The following documents must be observed:

- The owner's system-specific operating instructions
- This user manual NVT14588
- Data sheet number NVT14587
- The connection assignment enclosed with the device

1.3 Proper use

The TWK-ELEKTRONIK GmbH sensors and linear transducers are used to register angular, linear positions or vibrations and make their measured value available in the form of an electrical output signal. As part of a system, they have to be connected to the downstream electronics and must only be used for this purpose.

The device has the possibility to transmit the acceleration data via a NON-safety PROFINET channel as well (grey channel). Be sure to use at safety applications the PROFIsafe data (yellow channel).

1.4 Commissioning

- The relevant device may only be set up and operated in combination with this and the documentation specified under point 1.2.
- Protect the device against mechanical damage during installation and operation.
- Device commissioning and operation may only be undertaken by a specialist electrician.
- Do not operate the device outside of the limit values specified in the data sheet.
- Check all electrical connections before commissioning the system.

2. General information

The vibration sensor NVT/S3 is composed of a redundant sensor modul. The sensor chips are one, two or three axis acceleration sensors based on MEMS (Micro-Electro-Mechanical-System) technology which work with the gravitational force. Each sensor modul ist optimized for the dedicated measuring task.

The sensor modul is connected to the evaluation electronic which processes the measuring signal by filtering, plausibility check, linearisation and calibration and provides the measuring values via PROFIsafe/PROFINET protocol for the user.

The PROFINET interface according to IEC 61158 / 61784 or PNO specifications, order Nos. 2.712 and 2.722 version 2.3, and the PROFIsafe protocol according to "PROFIsafe – Profile for Safety Technology on PROFIBUS DP and PROFINET IO", order Nos. 3.092 and 3.192 version 2.4, are integrated.

The specifications can be obtained from the profibus user organisation (www.profibus.com).

3. Installation

3.1 General information

- During installation, observe the profinet assembly guideline PNO order No.: 8.071 /3/ and the PROFIsafe Environmental Requirements related to PROFIsafe - Profile for Safety Technology on PROFIBUS DP and PROFINET IO /6/.
- Use only certified profinet cables, connectors and switches (see "PROFINET Cabling and Interconnection Technology" PNO order No.: 2.252 and "Installation Guideline PROFINET Part 2: Network Components" PNO order No.: 2.252 p2).
- Hubs are not permissible.
- The cable length between two subscribers may be max. 100 m.
- The TWK NVT vibration sensor possesses an integrated switch. This not only enables tree and star topologies but also the linear topology.
- Media redundancy protocol support enables the establishment of a redundant ring.
- The setting of addresses, the baud rate or terminating resistors on the device is not necessary.

3.2 Installation

For safety reason the mechanical installation of the NVT/S3 has to be done in such a way, that an accidental displacement of the device is not possible.This means that a form-locked installation has to be done.

3.3 Electrical connection

The vibration sensors "NVT...MT01" with connector output have separate connectors for the supply and the PROFINET system. Port 1 or port 2 are optionally available for the PROFINET connection. Due to the integrated switch, it is irrelevant which port is used.

Connection	Designation	Connector type
PROFINET	Port 1	M12x4 D-coded socket
PROFINET	Port 2	M12x4 D-coded socket
Voltage supply	24 VDC	M12x4 A-coded pins

Refer to data sheet No. 14587 for connector assignment and ordering information.

3.4 Status LEDs

The vibration sensor has four LEDs. These have the following meaning:

UB (VS)	Link 1 (L1)	Link 2 (L2)	Status (NS)	Description
green	**green**	**green**	**green / red**	
on				Operating voltage available
	on			Network connection established
		on		Network connection established
			green	Data exchange, device in operation and OK
			green flashing	Network connection o.k. but no connection to a PROFINET controller
			red, slow flashing	Firmware download mode
			red flashing	Interference accelerations to high or preset error
			Fast red flashing	Device error
			red	Connection to the PROFINET controller disrupted

In Chapter 7 diagnosis you can find all diagnosis data of the NVT/S3.

Flashing codes

Errors which lead to sensor system standstill (hard errors) are indicated by a flashing code on the part of the red NS LED. Following introductory flickering by the red LED, a specific number of flashing cycles are output for the cause of the error.

	Number of flashing cycles (Duration approx. 1 s)	Error cause
Flashing code 1	1	F stack error
Flashing code 2	2	CRC error ROM
Flashing code 3	3	RAM/XRAM error
Flashing code 5	5	Programme sequence error
Flashing code 6	6	Power consumption too high

3.5 Project planning

A device description file (GSD file) in the XML format GSDML and an image (bitmap) to integrate the vibration sensor into a project planning tool are available in the internet under www.twk.de

File name of the GSD file: GSDML-V2.32-TWK-NVTS3-20171206.xml (The version and date may vary depending on the status of the GSD file)

File name of the bitmap: GSDML-0159-8100-TWK_NVTS.bmp

Project planning using the example of Step7 is explained in the following chapter.

4. Project planning with Simatic Step7

4.1 Step7, Safety Advance - TIA-Portal

This chapter explains the procedure for integrating the TWK NVT/S3 vibration sensor into the PROFINET network of a Siemens S7 control system with Step 7 Professional V14 and Safety Advanced V14.

4.1.1 Prerequisites

You have installed and parameterized a F PLC under "Devices & networks" according to your equiment as well as a PROFINET subnet.

This is shown here using the example of a CPU1511F:

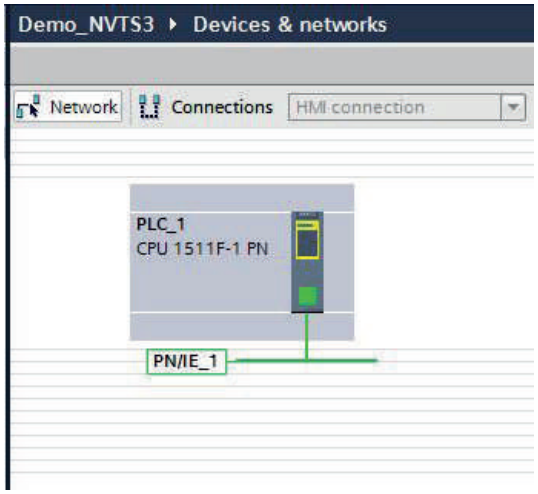


Fig.: 1

4.1.2 Installation of the GSD file

- In the main menu choose **Options**, **Install general station description file (GSD)**.
- Set the source path to your GSD file, check the GSD file and click on "Install" (see Figure 2).
- The vibration sensor symbol is also installed automatically, provided that it is in the same directory

Note: The GSD file and the sensor symbol (bitmap) are available for download under www.twk.de.

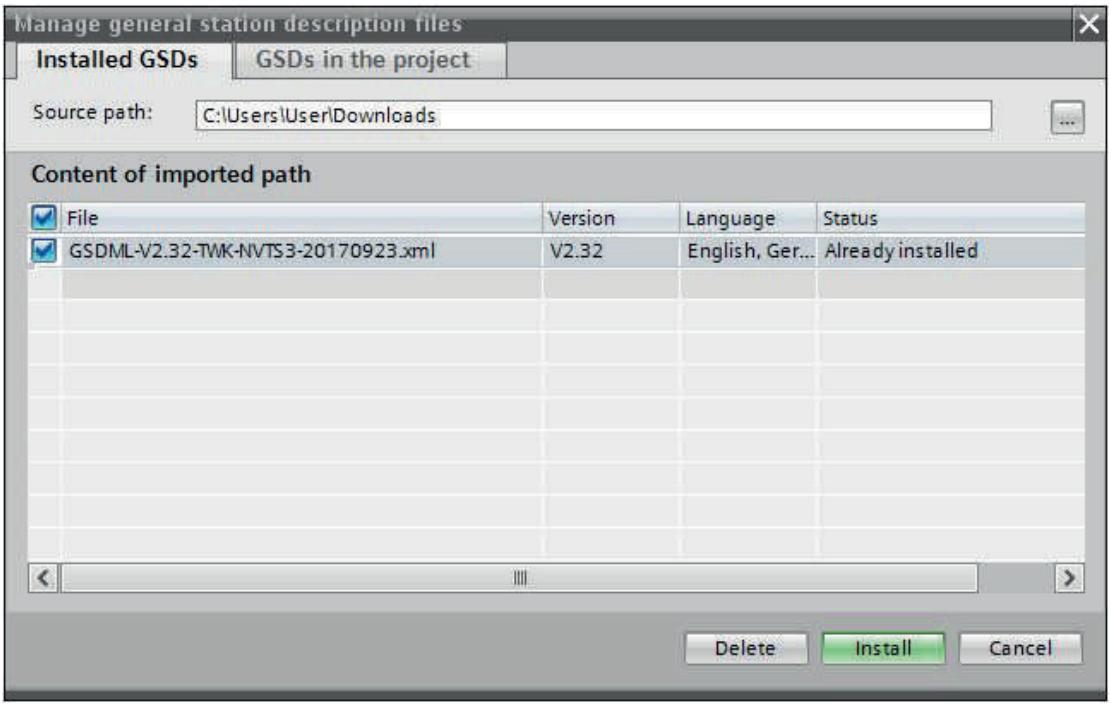


Fig.: 2

After installing the GSD file, the hardware catalogue is automatically updated. The vibration sensor NVT/S3 is located in **Further FIELD DEVICES, PROFINET IO, Sensors, TWK-ELEKTRONIK GmbH, TWK N-Series, NVT/S.**

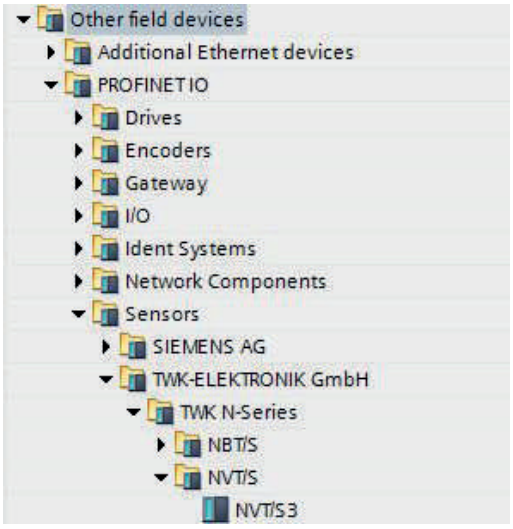


Fig.: 3

4.1.3 Installing the vibration sensor

Now drag the NVT/S3 from the hardware catalog in the netview of your project.

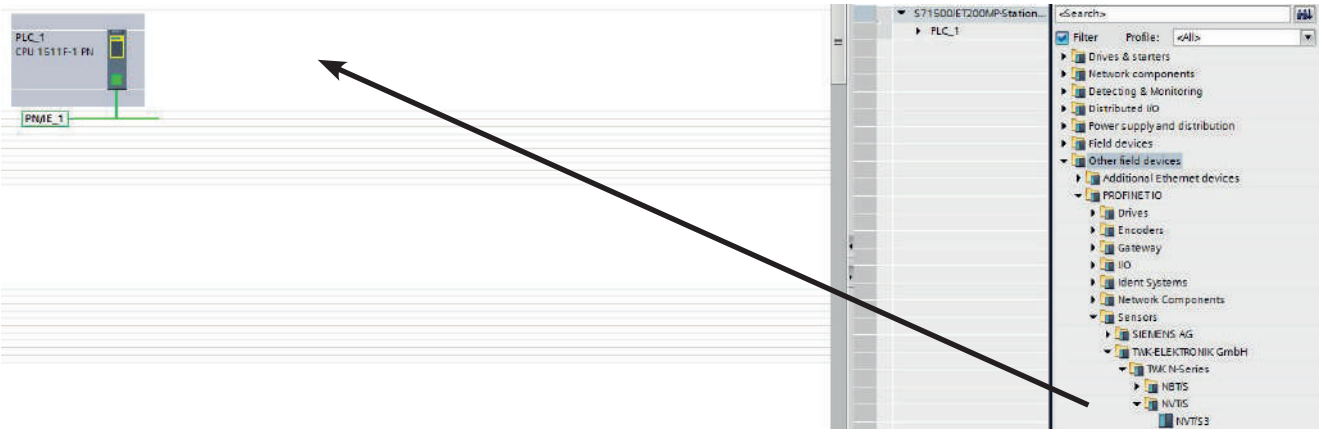


Fig.: 4

Afterwards click on "Not assigned" and assign the vibration sensor to the PROFINET interface of your CPU or draw a network connection from the vibration sensor to the CPU port with your mouse.

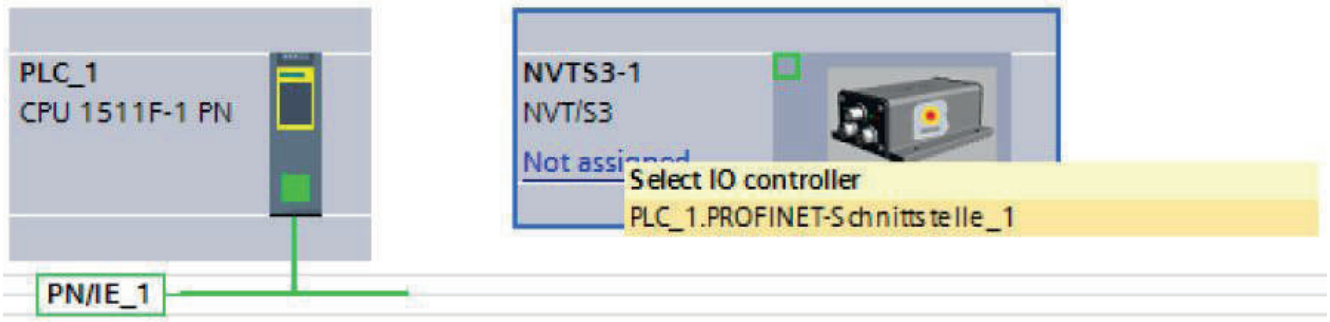


Fig.: 5

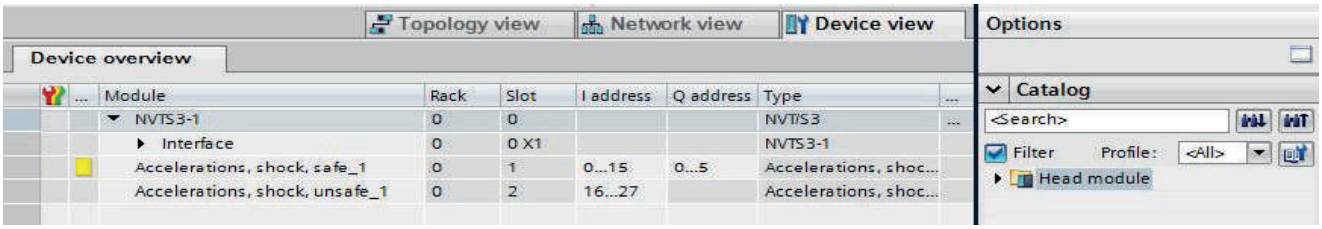


Fig.: 6

The modules don't have to be dragged to the module list. They are installed already.
In the properties of the installed module we will set the I/O address and the sensor parameters later on.

4.1.4 Install module (chapter not valid - modules are installed automatically)

4.1.5 Setting the network data

Select the vibration sensor in the Device view to show the properties of the PROFINET interface of the NVT/S3.

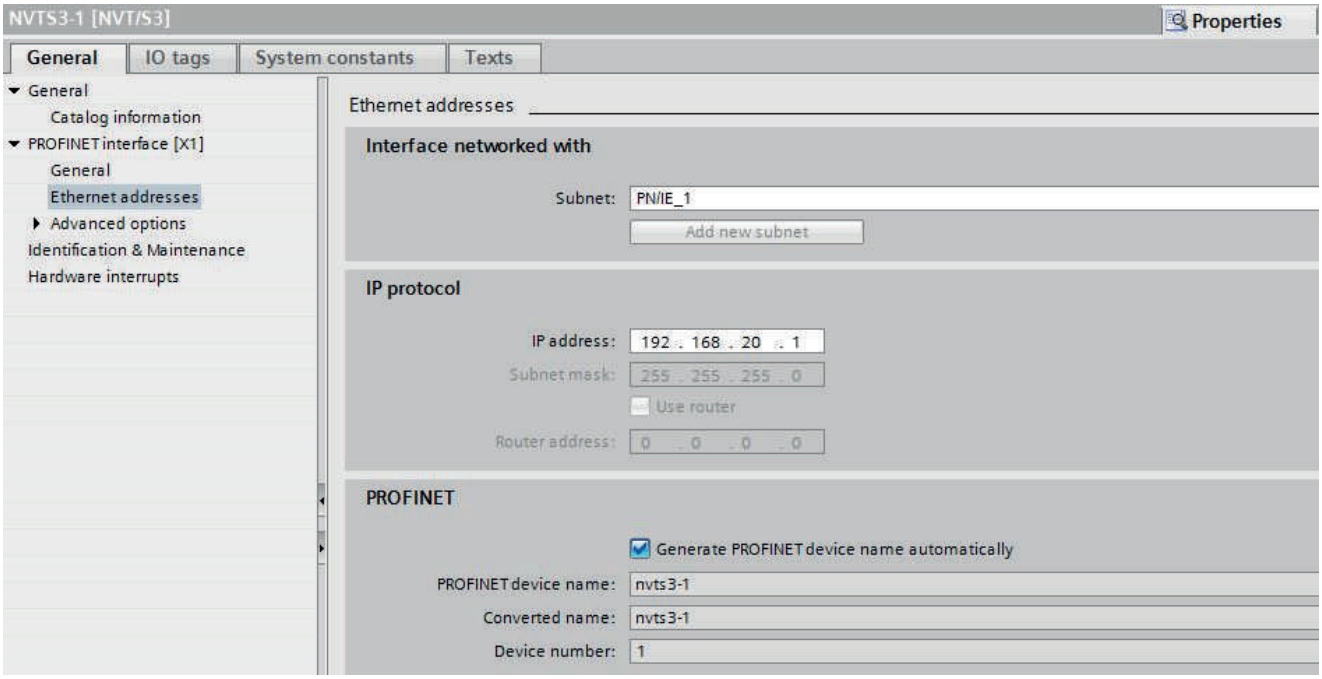


Fig.: 7

4.1.5.1 Setting the PROFINET / PROFIsafe address

Under "General" enter the **PROFINET name** which must be unique throughout the network to identify the device. If **Generate PROFINET device name automatically** is selected the name which is entered under **PROFINET interface - General** will be registered here. The default name is NVTS3-1.

In the NVT/S3, the **Profisafe address** must be added to the PROFINET name. To do this, attach a number between 1 and 65,535 to the end (a special separator between the Profinet name and Profisafe address is not necessary). The attached number must then be entered for F_Dest_Add under the F parameters (see Chapter 4.1.6.3).

The complete name assigned here must either be manually allocated to the vibration sensor (see Chapter 4.1.8) or it can be assigned automatically by the controller using the topology editor (see Chapter 4.1.7 Planning of "Device exchange without programming device" and "Automatic commissioning").

The device name is stored in the vibration sensor, where it is protected against zero voltage. An installed device can be exchanged with a brand new device without a programming device or exchanging a memory card. The correct name is automatically assigned to the new sensor by the controller. To do this, however, the prerequisites under Chapter 4.1.7 have to be met.

4.1.5.2 IP address

Under **PROFINET interface - Ethernet addresses - IP protocol** the boxes **Use IP protocol** and **Set IP address in the project** should be checked. Step7 automatically assigns an IP address when inserting the device in the project. Manually setting of the IP address is also possible.

4.1.5.3 Prioritized startup, media redundancy, update time and synchronisation

Via the interface option **Prioritized startup** the startup time of the NVT/S3 from power on until PROFINET I/O data exchange can be reduced from approx. 10s to 5s. However, this can only be achieved as of the second startup.

The NVT/S3 can be used as member (client) in a redundant ring. In case of a line topology one network cable from the last client to the controller (manager) is necessary only to achieve a redundant communication. Bevor setting the **media redundancy role** of the NVT/S3 a MRP domain has to be created and the MRP manager (normally the controller) to be assigned.

Under **PROFINET interface**, **Advanced options**, **Real time settings** the desired **Update time** of the NVT/S3 can be set. The possible values depend on the setting of the send clock of the CPU. The minimal update time for the NVT/S3 is 250 µs.

The desired real time class can be set under **Synchronisation**. The NVT/S3 supports the classes RT and IRT.

4.1.6 Setting the vibration sensor

4.1.6.1 Setting the I/O address

After switching to the device view of the NVT/S3 and selecting slot 1 in the device overview the properties of the module can be accessed.

Set the PLC addresses for the input data (status word and vibration) and for the output data (control word and preset value) under I/O addresses (see Chapter 5 for the data format).

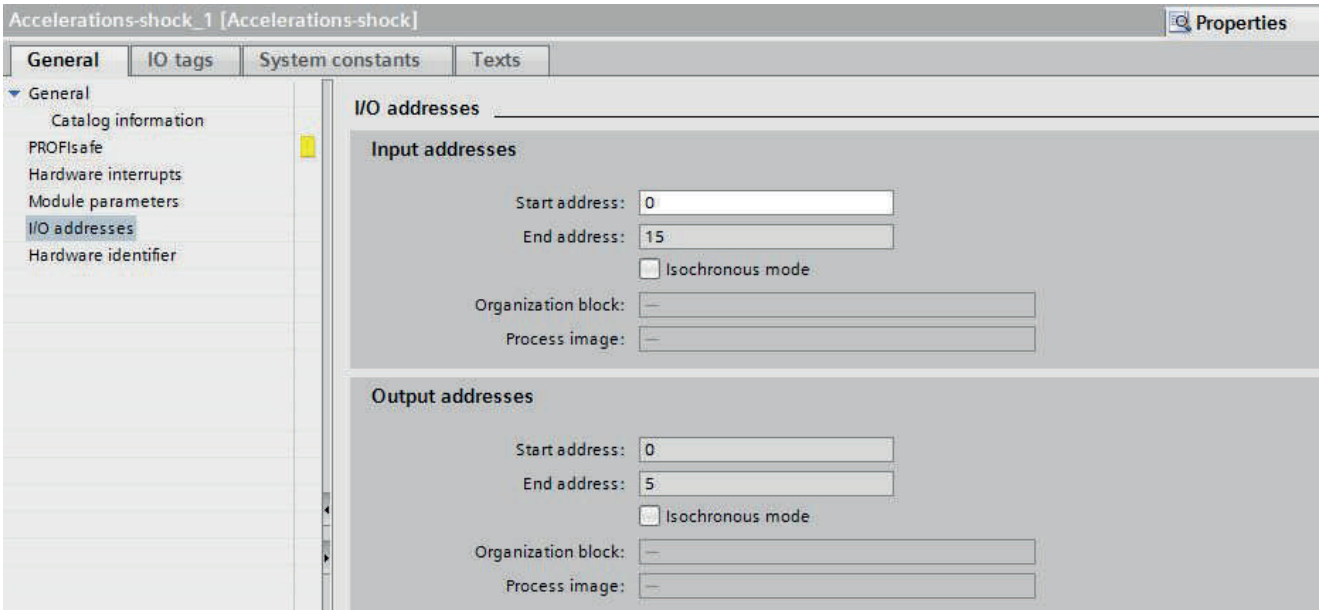


Fig.: 8

For the NON-safety channel is valid:

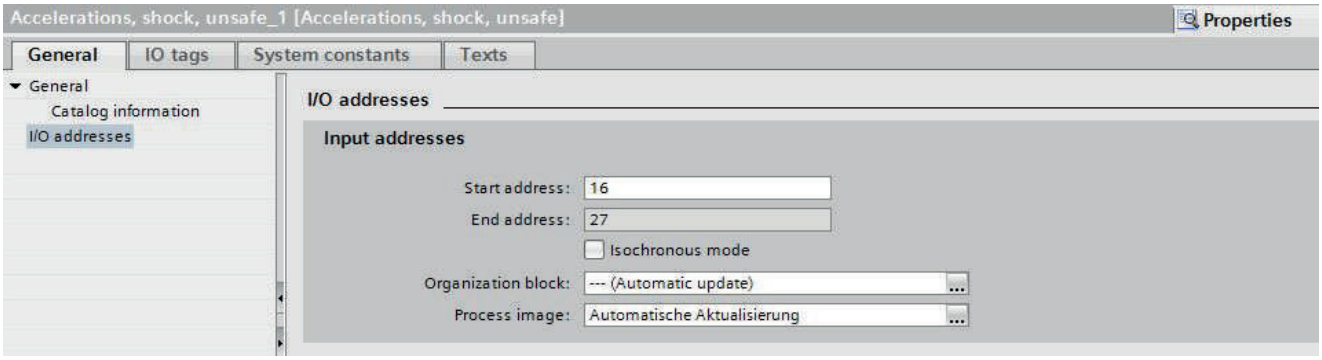
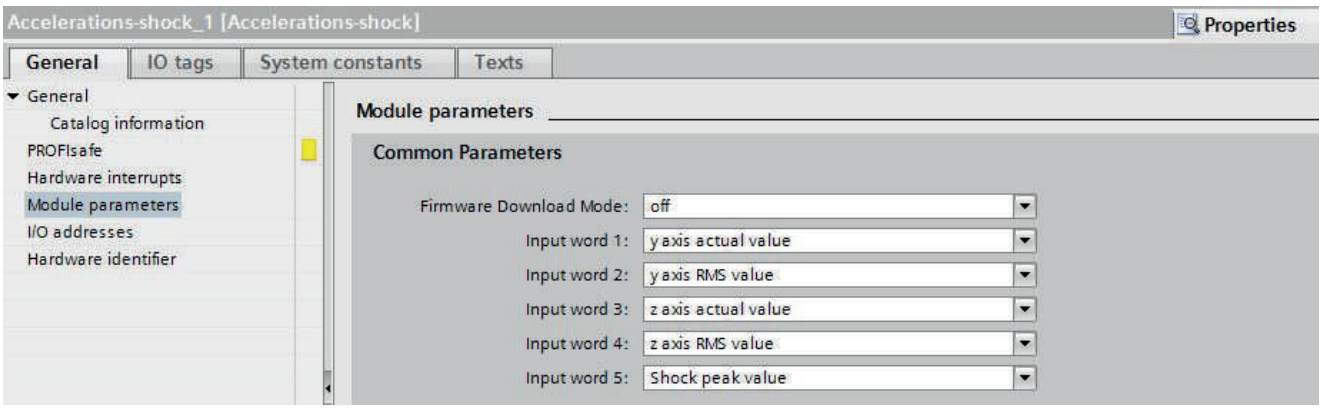


Fig.: 8a

4.1.6.2 Parameterising the vibration sensor *

The vibration sensor's parameters can be changed in the "Module parameters" tab *. An explanation of the parameters can be found in Chapter 6. After changing the sensor parameters the checksum has to be re-calculated and entered under the F-parameters (see next chapter).

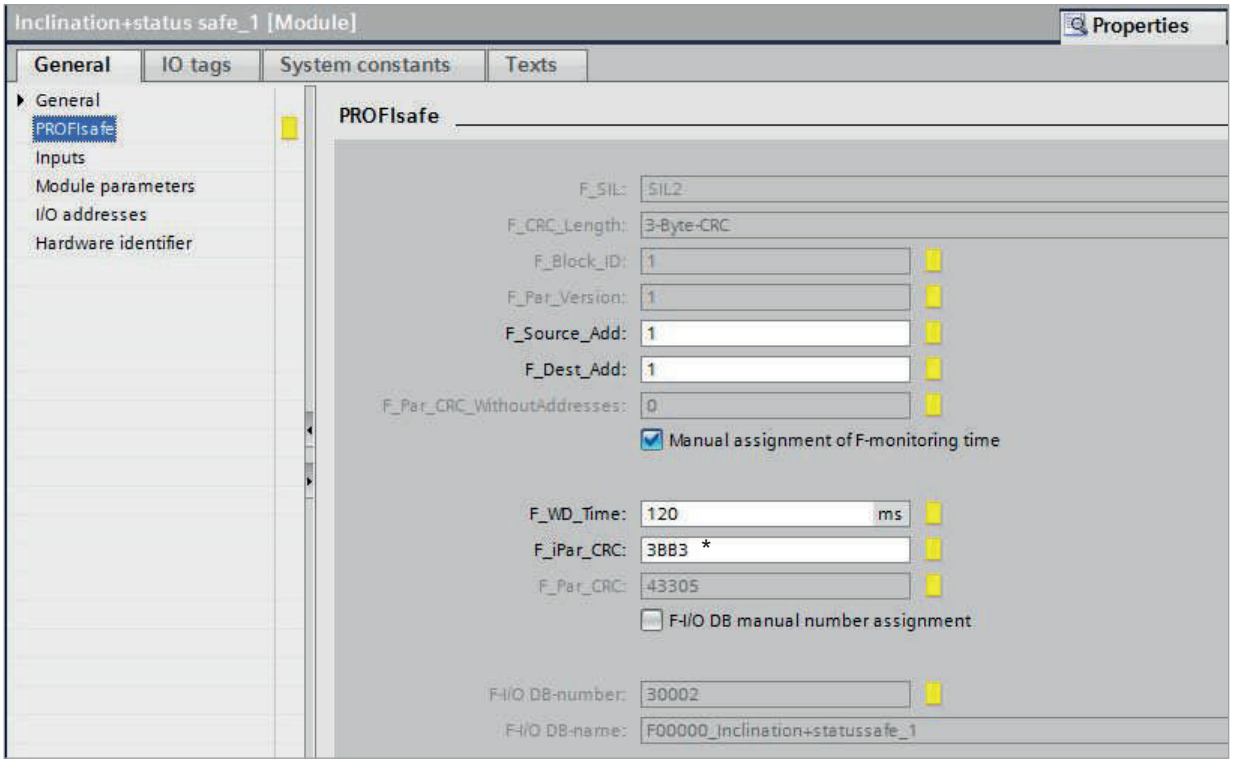


* At the time a parameterization of model NVT90 is not possible. All parameters are set ex works.

Fig.: 9

4.1.6.3 Setting the F parameters

The F parameters must be set in the "PROFIsafe" tab. Here, you have to set the Profisafe address attached to the Profinet name under "F_Dest_Add" and to specify a watchdog time corresponding to your system under "F_WD_Time" or you to take over the automatic setting. "F_Source_Add" is assigned automatically by the S7.



* It is defined at NVT90: 18808 (4978_{hex})

Fig.: 10

At the bottom of this window you can see the number and the symbolic name of the F-IO data block of this sensor assigned by Step7.

4.1.7 Planning of "Device exchange without programming device" and "Automatic commissioning"

If system restarting without the assignment of a new device name or the IP address is to be possible following the exchange of an installed sesnor with a mint condition device, this must be taken into consideration during project planning. This also applies to "Automatic commissioning", in which the manual and, in the case of larger projects, time-consuming assignment of the device name (as described in Chapter 4.1.8) is avoided during commissioning.

The following prerequisites have to be met:

- The controller and the devices must support the function "Device exchange without interchangeable medium or programming device" (for the latter, at least the device itself and its neighbouring devices). The NVT/S3 sup ports this function.
- The function "Device exchange without interchangeable medium" must be activated in the controller. This is the default setting.
- The devices must be in delivery condition, i.e. they must not yet possess any device name.

Now call the topology editor using the PROFINET system's context menu and define all PROFINET connections between the subscribers.

If the project is now loaded into the control system and the actual structure corresponds to the planned topology, all subscribers receive their planned names from the controller and device exchange succeeds without the reassignment of the device name.

4.1.8 Assignment of the device name

If a PROFINET topology has not been defined as described in Chapter 4.1.7 or if the prerequisites for automatic commissioning are not met, the vibration sensor name must be assigned manually. With the vibration sensor connected and the programming device connected to the control system, select "Assign device name" in the context menu of the PROFINET.

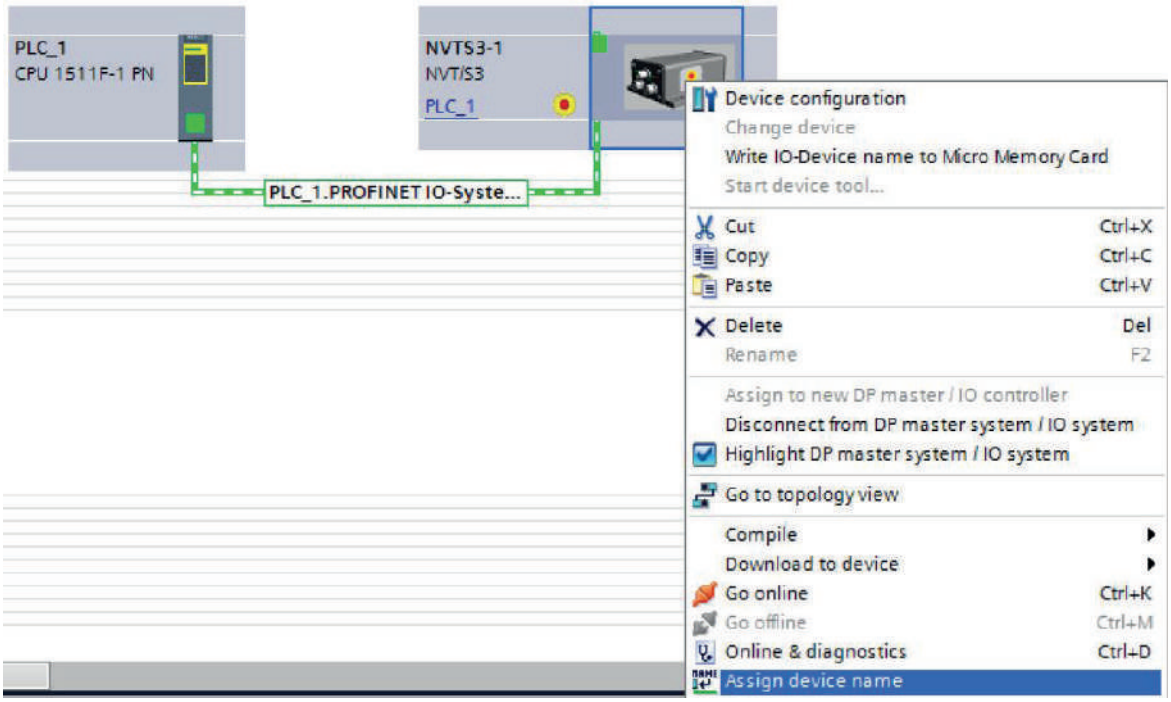


Fig.: 11

Subsequently the window "Assign PROFINET device name" appears. After selecting the correct online connection the accessible devices will be displayed. This for example could look like shown in figure 11.

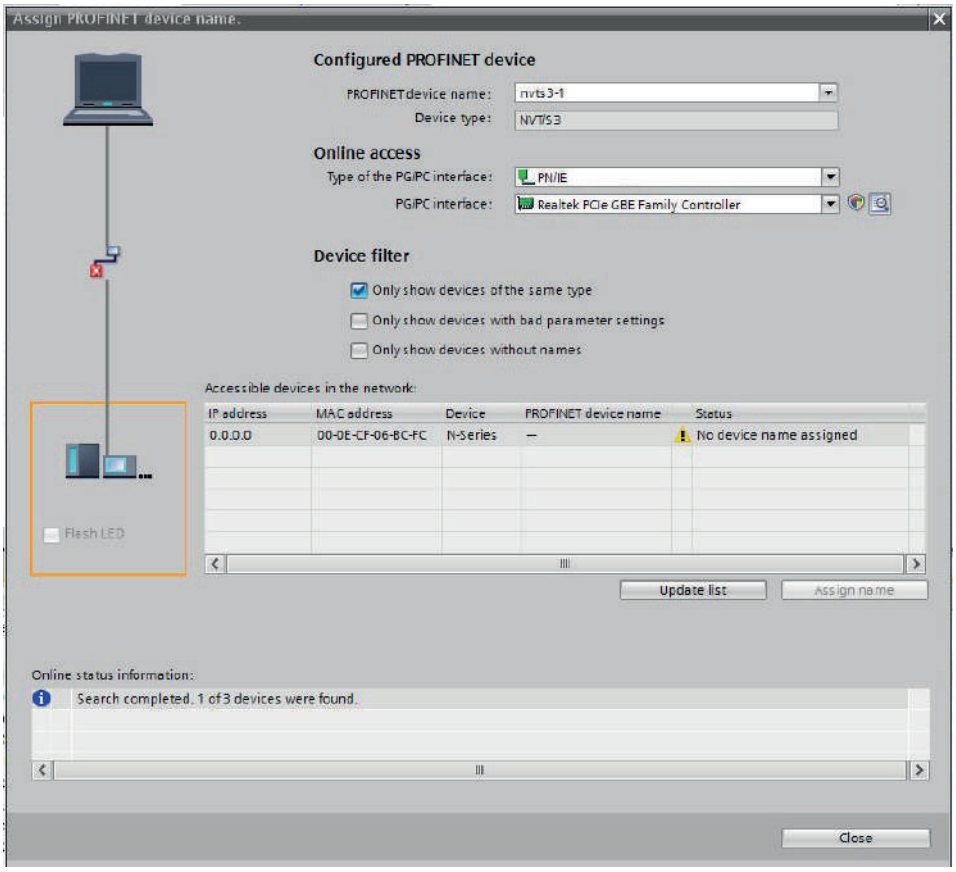


Fig.: 12

It can be seen that the vibration sensor device type "N series" does not possess either a valid IP address or a name. Now mark the sensor, check the name proposed at the top of the window and click on "assign name." The device name is then stored in the vibration sensor, where it is protected against zero voltage.

The vibration sensor now logs onto the controller with its device name and is then provided with a valid IP address by the controller. This is also stored in the vibration sensor, where it is protected against zero voltage.

4.1.9 Resetting to the factory settings

After going online the online diagnosis is available via the context menu of the NVT/S3. Under "Functions" the function "Reset to factory settings" is available.

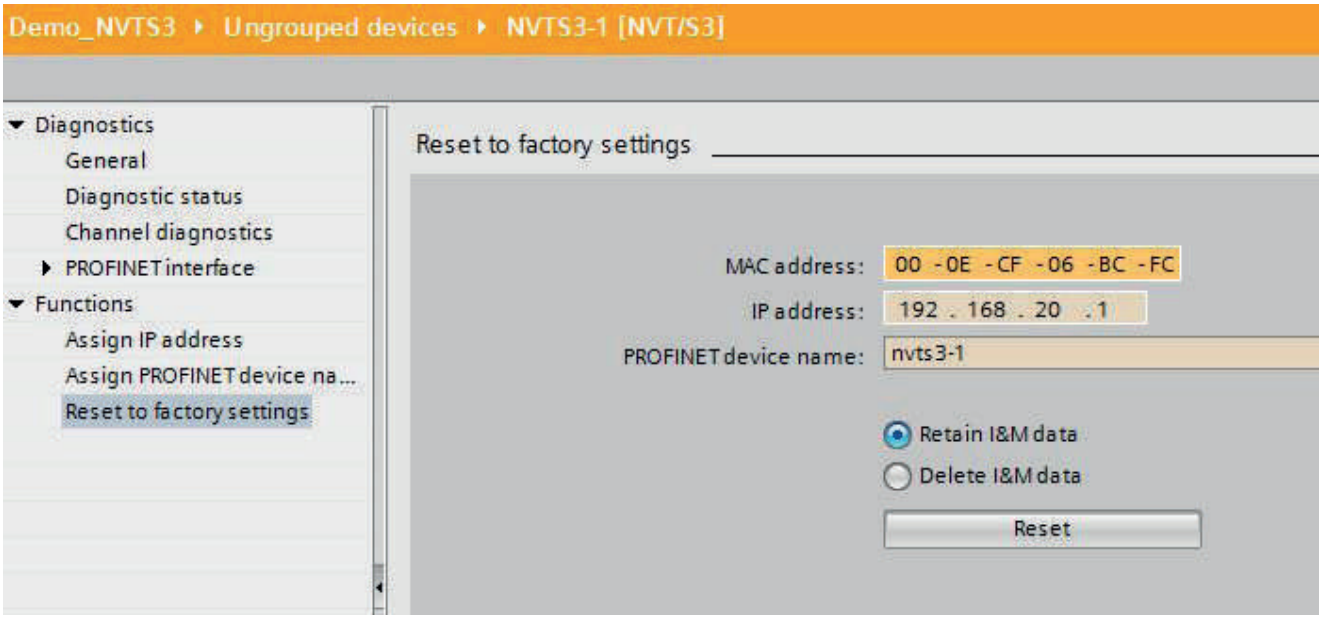


Fig.: 13

The following data will be reset as follows:

The following are reset	delivery condition
Parameters	see Chapter 6.1 for default values
Device name	empty
IP-parameters	All 0
I&M0-revision counter	0
I&M1-3	empty (only when choosing "Delete" I&M data)

After resetting, the connection to the Profinet controller is closed and the NS LED lights up red. After switching the voltage off/on, the connection can be re-established by assigning the device name.

If the connections have been defined using the topology editor, the NVT/S3 restarts automatically with the name assigned during project planning.

4.2 Application program

4.2.1 Remarks

For a detailed documentation for project planning and programming of F programs in Safety Advance refer to::

SIMATIC Safety - Project Planning and Programming /7/ and SIMATIC Safety Getting Started /8/

4.2.2 F periphery DB

On translation of the hardware configuration, an **F periphery DB** is generated for the vibration sensor, as for each other Profisafe subscriber. The automatically generated name consists of the I/O address and the module name.

The F periphery DB contains the for the operation of the sensor necessary variables. It has the following appearance: (A detailed description can be found in the documentation mentioned above)

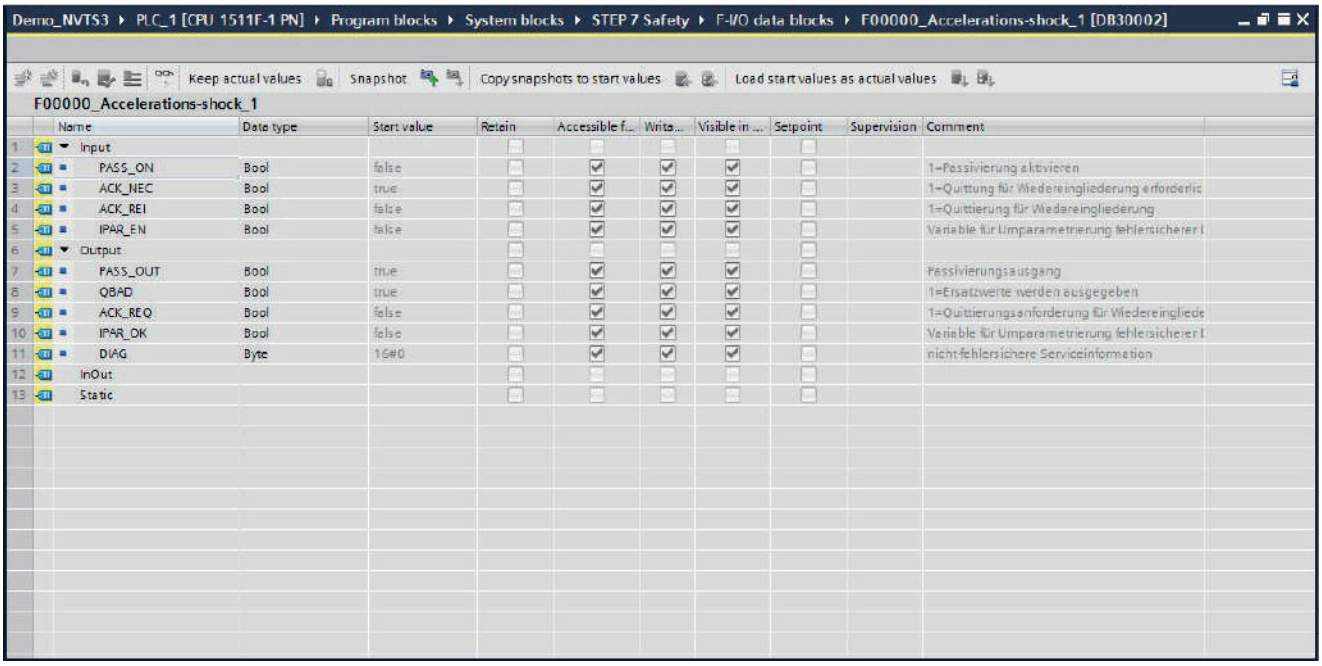


Fig.: 14

4.2.3 Accessing the vibration sensor in the F program

Important for the fail safe operation of the vibration sensor are: reintegration after communication or F periphery errors by the variables „ACK_REQ“ and "ACK_REI" or "ACK_GL", evaluation of the failsafe status by the variable "QBAD" and the evaluation of the diagnostic data by the variable "DIAG". All mentioned variables are provided by the F periphery DB. An example can be found in the following example program.

5. I/O data

5.1 Overview

Input data - safety: Device → Controller

Octet 1	Octet 2	Octet 3	Octet 4	Octet 5	Octet 6	Octet 7	Octet 8	Octet 9	Octet 10	Octet 11	Octet 12
status word		momentary y* axis		RMS y* axis		momentary z* axis		RMS z* axis		PEAK sqrt(y²+z²)*	

*: In the NVT90 standard devices y and z is called **x** and **y**

Octet 13	Octet 14	Octet 15	Octet 16
F output data			

Output data - safety: Controller → Device

Octet 1	Octet 2	Octet 3	Octet 4	Octet 5	Octet 6
control word		F output data			

Input data - NON safety: Device → Controller (*grey channel*)

Octet 1	Octet 2	Octet 3	Octet 4	Octet 5	Octet 6	Octet 7	Octet 8	Octet 9	Octet 10	Octet 11	Octet 12
status word		momentary y* axis		RMS y* axis		momentary z* axis		RMS z* axis		PEAK sqrt(y²+z²)*	

Output data - NON safety: Controller → Device: No output data due to the fact that the grey channel is only for reading data. All other functionality is given via PROFIsafe. The grey channel is mirrored from the safety area.

5.2 Input data

5.2.1 Status word

The status word contains error bits which have to be evaluated in the user program of the PLC.

Octet 1								Octet 2							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
16 bit status word															

Bit	Name	Remarks/remedy
0	Out_of_range	Vibration exceeds ±2 g.
1	Position_not_valid	Mounting position not correct. It exceeds ± ~15° tilt angle.
2	Device_error	Sensor defective. Replacement and/or power OFF/ON necessary.
3 - 15	not used	

5.2.2 Vibration data

The NVT/S3 provides a 2 axis vibration measurement. These 2 axes are located horizontally, means parallel to the mounting surface of the NVT. The axes are called x and y or in special cases y and z. Besides the momentary values are additional calculated values possible: RMS, Peak, etc. (see chapter 5.1).

The vibration value is output as a 16 bit signed integer value in Motorola format (Big Endian) for each value. The resolution is 4096 digits per g (1 g = 9,81 m/s²).

Octet 3,5,7,9,11								Octet 4,6,8,10,12							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
vibration: *momentary* or *RMS* or *Peak*															

5.2.3 F input data

The 4-byte F input data consist of the 1-byte F status and the 3-byte CRC checksum. Their content is defined in the Profisafe profile /1/. The status of the F status bit must be evaluated in the F application programme (see programme example in Chapter 4.2.4).

5.3 Output data

5.3.1 Control word

Octet 1								Octet 2							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
16 bit control word															

Bit	Name	Remarks
0 - 15	not used	No parameterization at NVT90

5.3.2 F output data

The 4-byte F output data consist of 1 control byte and the 3-byte CRC checksum. Their content is defined in the Profisafe profile /1/. The F control bits are made available by the F control system and must be implemented in the F application program (see programme example Chapter 4.2.4).

6. Parameterisation

Parameterisation of the vibration sensor is carried out using the acyclical PROFINET services. In the case of the Simatic S7 control system, this is carried out during starting as default. Changing the parameter of the NVT/S3 during cyclic I/O data exchange is not possible.

Attention: Never change the parameterisation whilst a system or machine is in operation! A complete function test has to be performed after each parameter change befor returning to normal operation.

Record index	Data set
0x1000	Vibration sensor parameter
0x64	F parameter

6.1 Vibration sensor parameter

6.1.1 Overview

Byte	Data type	Designation	Range
1	BYTE	Operating mode	0x0, 0x80
2	BYTE	Input word 1	y axis actual value *
3	BYTE	Input word 2	y axis RMS value *
4	BYTE	Input word 3	z axis actual value *
5	BYTE	Input word 4	z axis RMS value *
6	BYTE	Input word 5	shock peak value *

*: In the NVT90 standard devices y and z is called **x** and **y**

6.1.2 Description of Byte 1 Operating Mode

Byte	Bit No.	Parameter	Value range	Default	Remark
1	0-6	not used			
	7	FW download mode	off, on	off	Sets the sensor in the firmware download mode. Afterwards the sensor waits for the transfer of the new firmware via the Profinet interface.

Note:

After changing of one of the vibration sensor parameters, the checksum F_iPar_CRC has to be changed also. See chapter 6.2.2.

6.2 F parameter

6.2.1 Overview

Overview			
Octet	**Data type**	**Description**	**Default**
1	Unsigned8	F_Prm_Flag1	See 6.2.2
2	Unsigned8	F_Prm_Flag2	See 6.2.2
3-4	Unsigned16	F_Source_Add	0
5-6	Unsigned16	F_Dest_Add	1
7-8	Unsigned16	F_WD_Time	120
9-12	Unsigned32	F_iPar_CRC	18808 (4978_{hex})
13-14	Unsigned16	F_Par_CRC	-----

6.2.2 Description of the F parameters

Octet 1: F_Prm_Flag1				
Bit no.	**Parameter name**	**Value range**	**Default**	**Remarks**
0	**F_Check_SeqNr**	0: NoCheck	NoCheck	Fixed to "No Check"
1	**F_Check_iPar**	0: NoCheck	NoCheck	Fixed to "No Check"
2-3	**F_SIL**	1: SIL2	SIL2	Fixed to "SIL2" - PLd resp. (NVT/S3 is certified according to EN ISO 13849: SIL 2 has to be read as Performance Level d)
4-5	**F_CRC_Length**	0: 3-Byte-CRC (V2 Mode)	3-Byte-CRC	Checksum of the process data (CRC2).
6-7	not used			

Octet 2: F_Prm_Flag2				
Bit no.	**Parameter name**	**Value range**	**Default**	**Remarks**
0-2	not used			
3-5	**F_Block_ID**	0 - 7	1	1 = F parameter block contains F_iPar_CRC
6-7	**F_Par_Version**	1: V2-Mode	1	Parameter version

Octet 3-14				
Octet	**Parameter name**	**Value range**	**Default**	**Remarks**
3-4	**F_Source_Add**	1 - 65534		Automatically assigned by the SIMATIC manager

5-6	**F_Dest_Add**	1 - 65535	200	Must correspond to the Profisafe address set in the Profinet name. The NVT/S3 is a F device with PROFIsafe address type 1, i.e. the F_Dest_Add has be unique netwide and CPU-wide.
7-8	**F_WD_Time**	1 - 65534	120	Monitoring time in the failsafe slave. Within the monitoring time, a valid, current safety message must be received from the F CPU. Otherwise, the device goes to the safe state. Set the monitoring time long enough to ensure not only that the communication functions tolerate telegram delays, but also that the fault response is triggered quickly enough if a fault occurs (e.g. interruption of the communication connection). The minimum watchdog time for the NVT/S3 is 120 ms (for 4 ms actualisation time).
9-12	**F_iPar_CRC**	1 - 0xFFFF FFFF	18808 (4978_{hex})	CRC checksum on the iParameters (vibration sensor parameters). After changing the vibration sensor parameters this default value has to be changed to: For FW download mode = "on" to 16137 ($3F09_{hex}$)
13-14	**F_ParCRC (CRC1)**	0 - 65535		CRC checksum on the F parameters. Is generated from the SIMATIC Manager.

7. Diagnostic

7.1 Overview

The vibration sensor NVT/S3 provides diagnostic data in 3 different ways.

- LEDs (see Chapter 3.4)
- PROFINET alarms (see Chapter 7.2)
- Diagnostic data (see Chapter 7.3)

7.2 PROFINET alarms

The following alarms are send via the PROFINET alarm mechanism. In the PROFINET controller they are displayed in plain text and partially with a help text.

Error no. (hex)	Error text	Reaction	Status-LED (NS)	Remarks/remedy
0x001A	Internal communication error (TPS-1)	Input and F data = 0		Please switch power off/on or change the device
0x0040	Mismatch of safety destination address (F_Dest_Add)	Diagnostic data: F parameter error	red flashing (1 Hz)	
0x0041	Safety destination address not valid (F_Dest_Add)	Diagnostic data: F parameter error	red flashing (1 Hz)	
0x0042	Safety source address not valid (F_Source_Add)	Diagnostic data: F parameter error	red flashing (1 Hz)	
0x0043	Safety watchdog time value is 0 ms(F_WD_Time)	Diagnostic data: F parameter error	red flashing (1 Hz)	
0x0044	Parameter "F_SIL" exceeds SIL from specific device application	Diagnostic data: F parameter error	red flashing (1 Hz)	
0x0045	Parameter "F_CRC_Length" does not match the generated values	Diagnostic data: F parameter error	red flashing (1 Hz)	
0x0046	Version of F-Parameter set incorrect (F_Par_Version)	Diagnostic data: F parameter error	red flashing (1 Hz)	
0x0047	F parameter CRC error (CRC1-Fault)	Diagnostic data: F parameter error	red flashing (1 Hz)	
0x0048	Error in F parameterset	Diagnostic data: F parameter error	red flashing (1 Hz)	
0x004B	Inconsistent iParameters (iPar-CRC error)	Diagnostic data: F parameter error	red flashing (1 Hz)	Please check the value of the F parameter F-iPar-CRC.
0x110x	Device error (different kind)	Diagnostic data: device error F status word: FV_activated, Device_Fault	fast red flashing (10 Hz)	Please switch power off/on or change the device.

0x1150	Supply voltage out of range	F status word: FV_activated, Device_ Fault	red flashing (1 Hz)	Please check the supply voltage and switch power supply off/on.
0x1160	Wrong Record Index on startup	F status word: FV_activated, Device_ Fault	red flashing (1 Hz)	Please check your GSD file.
0x1170	Sensor not ready	F status word: FV_activated, Device_ Fault	red flashing (1 Hz)	Please switch power off/on or change the device.
0x1190	Installation position not correct	F status word: FV_activated, Device_ Fault	red flashing (1 Hz)	Tilt angle of ±~15° is exceeded

7.3 Diagnostic data records

The following diagnostic records are available in the NVT/S3. They can be read out with the PROFINET acyclic read services

Record index	Data set
0xAFF0	I&M0 data (according to I&M-specification version 1.2 /9/)
0xBF02	Parameter data (see Chapter 6)

8. Scope of delivery

The scope of delivery includes:
- Vibration sensor with PROFIsafe interface
- Connection assignment TY XXXXX (depending on the device variant)

Available for download on www.twk.de are:
- the corresponding datasheet NVT14587
- this user manual NVT14588
- the certificates (as soon as available)
- GSD file and bitmap

9. Literature

/1/ PROFIsafe-Profile for Safety Technology, Order No. 3.092 und 3.192, PROFIBUS Nutzerorganisation e. V., Haid-und-Neu-Str. 7, D-76131 Karlsruhe, www.profibus.com

/2/ PROFINET - Interface nach IEC 61158 / 61784 bzw. PNO-Spezifikation, Order No. 2.712 und 2.722, PRO FIBUS Nutzerorganisation e. V., Haid-und-Neu-Str. 7, D-76131 Karlsruhe, www.profibus.com

/3/ PROFINET Installation guidline, Order No. 8.071, PROFIBUS Nutzerorganisation e. V., Haid-und-Neu-Str. 7, D-76131 Karlsruhe, www.profibus.com

/4/ PROFINET Cabling and Interconnection Technology, Order No.: 2.252, PROFIBUS Nutzerorganisation e. V., Haid-und-Neu-Str. 7, D-76131 Karlsruhe, www.profibus.com

/5/ Installation Guideline PROFINET Part2: Network Components, Order No.: 2.252 p2, PROFIBUS Nutzeror ganisation e. V., Haid-und-Neu-Str. 7, D-76131 Karlsruhe, www.profibus.com

/6/ PROFIsafe - Environmental Requirements related to PROFIsafe - Profile for Safety Technology on PROFI-BUS DP and PROFINET IO (IEC 61784-3-3), Order No. 2.232, PROFIBUS Nutzerorganisation e. V., Haid-und-Neu-Str. 7, D-76131 Karlsruhe, www.profibus.com

/7/ SIMATIC Safety - Project Planning and Programming (A5E02714440-AC) - http://support.automation.siemens.com

/8/ SIMATIC Safety - Getting Started (A5E02714463-01) - http://support.automation.siemens.com

/9/ Profile Guidelines Part 1: Identification & Maintenance Functions, Order No. 3.502, www.profibus.com