Commissioning instructions FTS with PROFINET Interface, Firmware 2.1.0

Force-torque sensor

Translation of original commissioning instructions

Hand in hand for tomorrow

Imprint

Technical changes:
We reserve the right to make technical improvements.

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Dear Customer

Dear Customer,

Thank you for putting your trust in our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. We look forward to your challenging questions. We will find a solution!

Best regards,

Your SCHUNK team

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Please read the operating manual in full and keep it close to the product.

Table of contents

1 General

1.1 About this document

This manual describes the commissioning as well as the operating and parameterization options for a Force-Torque Sensor with the following interfaces:

- PROFINET (PN)

Validity

This version of the manual describes the functions for firmware versions 2.1.0 of the interface box and sensor.

The firmware version can be read. For information on the corresponding parameter, see ▸ 4.2.1 [🗋 16] and ▸ 4.2.2 [🗋 22].

Conventions

The following conventions apply to this guide:

- The Force-Torque sensor is referred to below as a "Module".
- Actions initiated by the user that the module is to perform are hereafter referred to as a "commands" and can be initiated in the control byte via control bits.
- Identification of parameters: <Parameter>
- Identification of events: WARNING
- Page number in references: [► 4]

NOTE: The illustrations in this manual are intended to provide a basic understanding and may deviate from the actual version.

Applicable documents

- General terms of business *
- Assembly and Operating Manual of the module *

The documents labeled with an asterisk (*) can be downloaded from **schunk.com/downloads**.

2 Communication

2.1 Data exchanges

Integrated fieldbus interfaces can be used to exchange data cyclically and acyclically between the module and the controller.

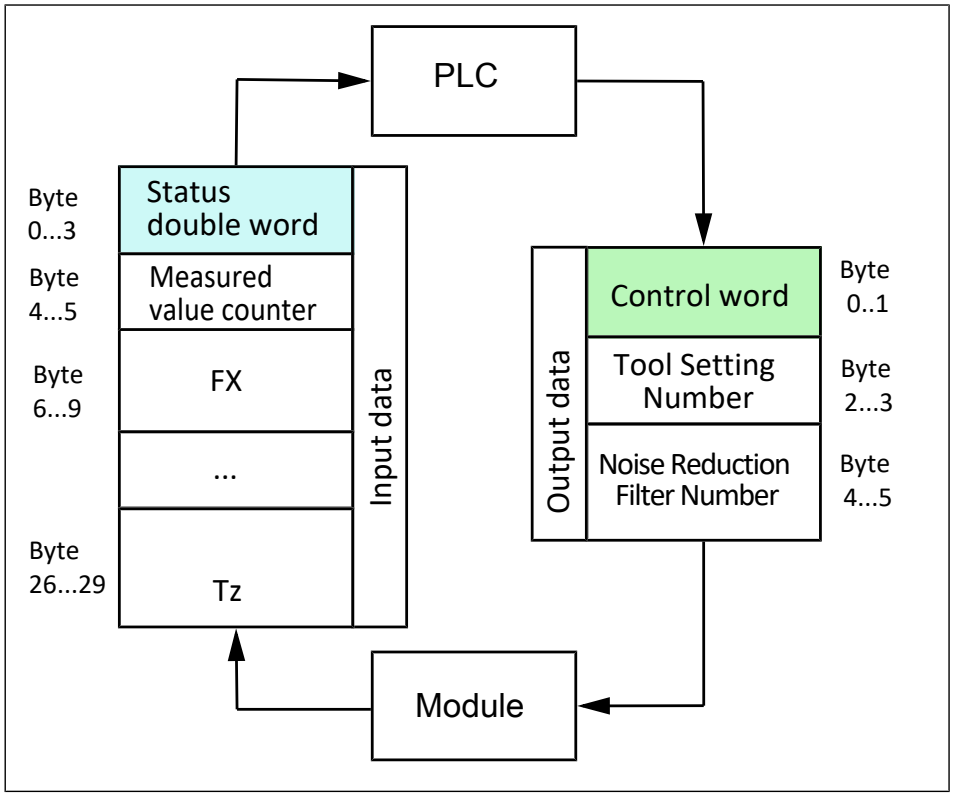
Communication types

The module supports the following communication types:

- RT (Real Time)
  IO data exchange between automation devices in real time (> 1 ms).

2.1.1 Cyclical data exchange

For cyclical data exchange, a fixed data frame for input and output data is defined. The data frame is based on the use of data double words, control and status bytes. The output data frame is set to a data length of six bytes and the input data frame to a data length of 34 bytes.



For reasons of clarity, the two reserved double words (bytes 30 to 33) have been omitted from the input data in the diagram.

For further information on data transmission and interpretation, see the following sections.

2.1.1.1 Cyclical output data

The cyclical output data is transferred from the control unit to the module and thus commands are sent to the module.

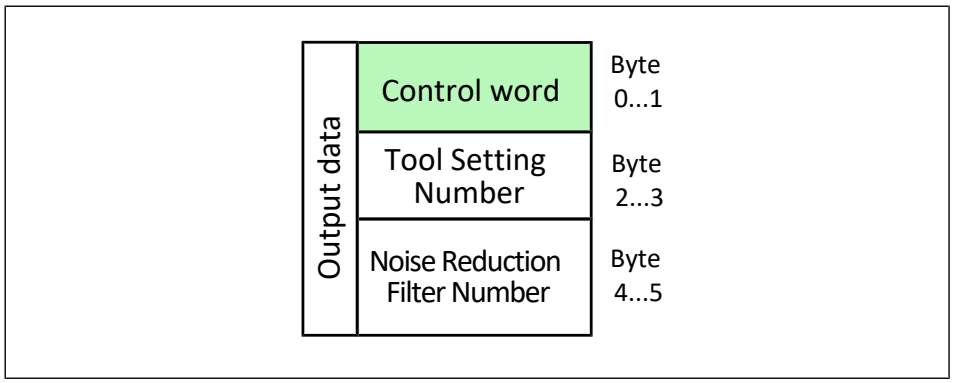
Implementation of the control commands

Commands sent to the module may or may not be permitted.

- Permitted commands are implemented by the module. This is indicated to the PLC by setting the "Command Processed Toggle" status bit.
- Illegal commands are not implemented. This is indicated to the PLC by setting the "Command Error" status bit.

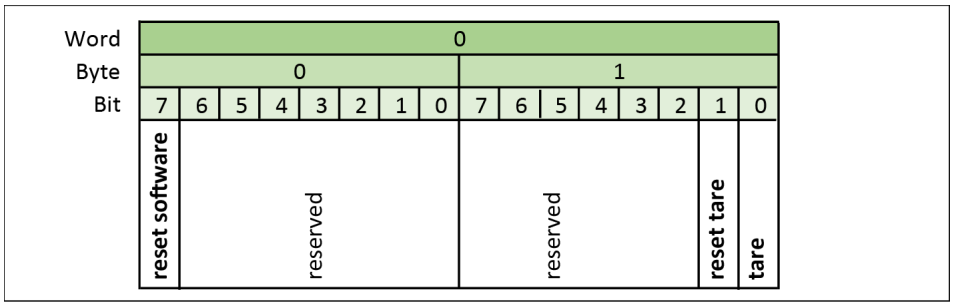
Data frame

The data frame of cyclical output data consists of the control word, the numbers for the tool settings and the noise suppression filter.



Control byte

The control byte is transferred in bytes 0 and 1 of the cyclical output data.



Word	Byte	Bit	Cyclical output data
0	1	0	tare EN: tare DE: Tara
		1	reset tare EN: reset tare DE: Tara Zurücksetzen
		2 – 7	reserved
	0	0 – 6	reserved
		7	reset software EN: reset software DE: Neustart

Tool Settings Number

- The tool settings number is transmitted in bytes 2 and 3 of the cyclical output data in order to select the preconfigured memory bank of the tool settings.
- The data format of the parameter is unsigned 16 bit. Valid values are 0 to 3.

Noise Reduction Filter Number

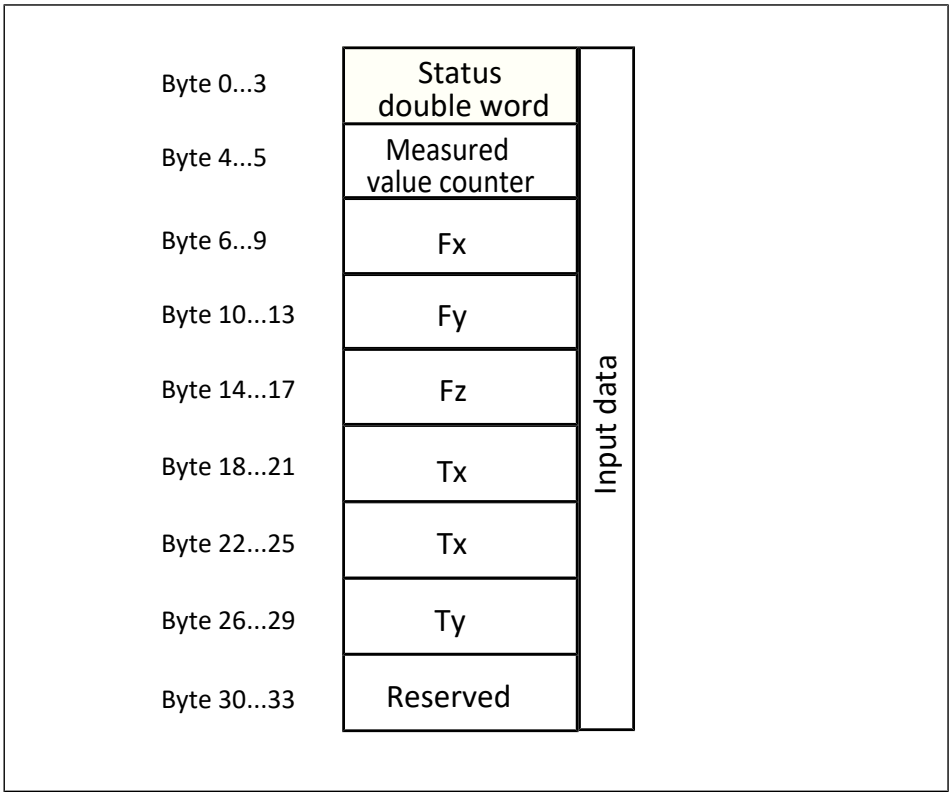
- The noise reduction filter is selected via a number in bytes 4 and 5 of the cyclical output data.
- The data format of the parameter is unsigned 16 bits. Valid values are 0 to 4.

2.1.1.2 Cyclical input data

The cyclical input data is transferred from the module to the controller. As a result, the PLC receives feedback from the module on the commands and can react accordingly. The force/torque values are also transmitted.

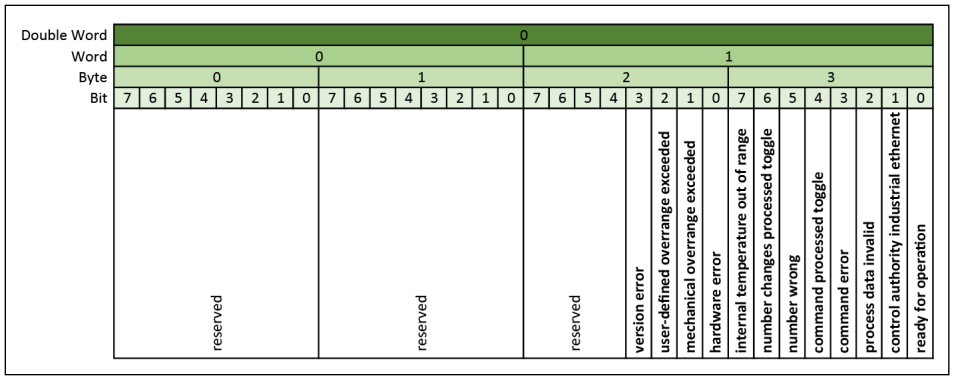
Data frame

The data frame of cyclical input data consists of the status double word, a measured value counter and the force/torque values.



Status double word

The status double word is transmitted in bytes 0 – 3 of the cyclical input data.



Word	Byte	Bit	Cyclical input data
1	3	0	ready for operation EN: ready for operation DE: Betriebsbereit
		1	control authority fieldbus EN: control authority fieldbus DE: Steuerhoheit Feldbus
		2	process data invalid * EN: cyclic process output data invalid DE: Zyklische Prozessausgangsdaten ungültig
		3	command error EN: command error DE: Befehlsfehler
		4	command processed toggle EN: command processed toggle DE: Befehl durchgeführt
		5	number wrong EN: number wrong DE: Falsche Nummer
		6	number changes processed toggle EN: number changes processed toggle DE: Änderung der Nummer erfolgreich
		7	internal temperature out of range EN: internal temperature out of range DE: Interne Temperatur nicht im zulässigen Bereich
1	2	8	hardware error EN: hardware error DE: Hardware-Fehler
		9	mechanical overrange exceeded EN: mechanical overrange exceeded DE: Mechanische Überlastgrenzen überschritten

Word	Byte	Bit	Cyclical input data
		10	user-defined overrange exceeded EN: user-defined overrange exceeded DE: Nutzerdefinierte Überlastgrenzen überschritten
		11	firmware version error EN: firmware version error DE: Firmware-Versionsfehler
		12	reserved
		13	reserved
		14	reserved
		15	reserved
0	1		reserved
0	0		reserved

*The "process data invalid" bit is set to "1" in the following cases:

- As long as the parameter <unlock_tool_settings> is set to enable changing the tool settings.
- If a hardware error has occurred in the sensor.
- If the mechanical overload limits have been exceeded.
- If the internal temperature is not within the permissible range.

Measured value counter

- A measured value counter is transmitted in bytes 4 and 5 of the cyclical input data.
- The data format of the parameter is unsigned 16 bits.
- The measurement value counter is typically increased by two with each new measurement value. Increases of one or three are system-related and do not indicate a malfunction or data loss. At 65535, the measured value counter jumps back to zero.

Force-torque values

- The six scaled force/torque values are transmitted in bytes 6 to 29 of the cyclical input data.
- The data format of each force or torque value is signed 32 bits.
- The <force_torque_scaling_factor> parameter can be used to scale the force/torque values and thus set the number of decimal places, for example. By default, the parameter is set to 1000, which corresponds to three decimal places.

Reserved

- No user data is currently transmitted in bytes 30 – 33 of the cyclical input data.

2.1.2 Acyclical data exchange

Execution of the acyclic data exchange complies with the specifications of the PNO (Profibus User Organization, www.profibus.com).

All cyclical information pertaining to acyclical data exchange can be found in chapter ▸ 4 [🗋 15].

3 Module functions

3.1 Booting and restarting

3.1.1 Booting and establishing operational readiness

Short description

When booting, the internal hardware and the connected communication interfaces are checked after the electronics have booted up. It also checks whether a sensor is connected to the interface box.

Triggering

Booting can be triggered on the hardware side by applying the supply voltage, or triggered on the software side by a restart.

NOTE

To prevent any unexpected behavior of the module, all control bits equal to 0 should be cyclically transmitted to the module during booting.

Module feedback

- A change to the control byte is displayed by an immediate status change of the "command received toggle" status bit. This confirmation occurs regardless of whether the control command is subsequently completed successfully or if it can be processed at all.
- If establishing operational readiness was successful, this is displayed by setting the "ready for operation" status bit.
- If establishing operational readiness was not successful, the module remains in the error state. The "ready for operation" status bit is not set and the "process data invalid" status bit is set.

3.1.2 Restart

Short description

Booting is initiated when the module is restarted.

Trigger

The restart is triggered by a setting of the "reset software" control bit.

Module feedback

After the restart, the "command received toggle" status bit changes state and the "ready for operation" status bit is reset.

3.2 Taring functions

3.2.1 Tare

Short description

The tare function sets the current force/torque values to zero when the corresponding bit in the control word is set.

An average value is formed over ten measured values and subtracted from future measurements.

Trigger

- The tare function is triggered by setting the "tare" control bit.
- The bit must be reset after execution to enable reactivation.

Module feedback

- The end of the tare function is indicated by setting the "command processed toggle" status bit if no error has occurred.
- Ending the tare function is indicated by setting the "command error" status bit if an error has occurred and the tare function could not be performed.

3.2.2 Reset tare

Short description

The reset tare function restores the original measurement when the corresponding bit in the control word is set.

This means that the average value calculated in ▸ 3.2.1 [🗋 12] is no longer subtracted from future measured values.

Trigger

- The reset tare function is triggered by setting the "reset tare" control bit.
- The bit must be reset after execution to enable reactivation.

Module feedback

- The end of the reset tare function is indicated by setting the "command processed toggle" status bit if no error has occurred.
- The end of the reset tare function is indicated by setting the "command error" status bit if an error has occurred and the reset tare function could not be carried out.

3.3 Switching tool settings

Short description

The tool settings switching function can be used to select between four pre-configured memory banks of tool settings. Each memory bank contains the following settings:

- Tool zero point – to perform a coordinate transformation from the sensor zero point (see operating manual) to the tool zero point. This is implemented by three translations and three rotations in the X, Y and Z directions. The translations are calculated first and then the rotations. The tool zero point can be reset to the sensor zero point if all translations and rotations are set to zero.

NOTICE

For example, if the tool zero point is set at the same point at which a force is applied, no torque acting on the sensor is displayed in the cyclical output data. This can lead to the sensor being overloaded.

The sensor zero point must therefore be used to monitor overload conditions. In addition, a status bit in the cyclical output data indicates when the sensor is mechanically overloaded.

- User-defined overload limits – to set user-defined limit values for limit value monitoring. If this is exceeded, the corresponding status bit is set in the cyclical output data.

Trigger

The tool settings function is triggered by changing the "tool settings number". The number must be transmitted cyclically to the module. Valid numbers are the values 0 – 3.

Command parameters

Valid indices are the values 0 – 3.

Module feedback

- Receipt of the command is displayed by an immediate status change of the "command received toggle" status bit. This confirmation occurs regardless of whether the control command is subsequently completed successfully or if it can be processed at all.
- Completion of the tool settings switching function is indicated by setting the "command successfully processed" status bit if no error has occurred.
- Exiting the tool settings switchover function is indicated by setting the "command error" status bit if an error has occurred and the function could not be carried out. This mainly occurs if an invalid value in the <Tool Settings Index> has been cyclically transmitted to the module.

3.4 Switching the noise reduction filter

Short description

The noise reduction filter function allows you to choose between five noise reduction filters. The noise reduction is implemented using a moving average. The command parameter is used to set the window size.

Trigger

The noise reduction filter function is triggered by changing the "noise reduction filter number". The number must be transmitted cyclically to the module. Valid numbers are the values 0 – 4, which stand for a window size of 1, 2, 4, 8 or 16 values in ascending order.

Command parameters

Valid numbers are the values 0 – 4, which stand for a window size of 1, 2, 4, 8 or 16 values in ascending order.

Module feedback

- Exiting the noise reduction filter function is indicated by setting the "number changes processed toggle" status bit if no error has occurred.
- Exiting the noise reduction filter function is indicated by setting the "number wrong" status bit if an error has occurred and the function could not be performed. This occurs in particular if an invalid value in <Noise Reduction Filter Number> was transmitted cyclically to the module.

4 System parameters

4.1 Value ranges

Value ranges

The following internal data types are used:

Data type	Threshold	Numerical values
BOOL	MIN_BOOL	0
	MAX_BOOL	1
UINT8	MIN_UINT8	0
	MAX_UINT8	255
UINT16	MIN_UINT16	0
	MAX_UINT16	65535
UINT32	MIN_UINT32	0
	MAX_UINT32	4294968295
INT32	MIN_INT32	-2147483648
	MAX_INT32	2147483647
FLOAT	MIN_FLOAT	-3.402823E+38
	MAX_FLOAT	3.402823E+38
CHAR	MIN_CHAR	0
	MAX_CHAR	255
ENUM	MIN_ENUM	0
	MAX_ENUM	255

4.2 Parameter list

In the following, all system-relevant parameters are listed according to the diagram "HEX-Code/DEC-Code <Parametername>"

NOTE

The parameter list refers to parameters that can be read out or written acyclically.

Some of the parameters listed here as "read only" can be changed in principle, but the user does not have the right to change these parameters.

All parameters that do not appear in this list are internal or reserved parameters.

Parameter configuration

All system parameters whereby the user has write permissions can be configured via acyclical data exchange.

4.2.1 Sensor

HEX 0x0040
DEC 64

<product_name>

Short description:	The pending product name can be read out with this parameter.
Parameter name:	Product name
Access rights:	Read
Data type:	CHAR[30]
Format:	ASCII-String

HEX 0x0041
DEC 65

<product_text>

Short description:	The product text can be read out with this parameter.
Parameter name:	Product text
Access rights:	Read
Data type:	CHAR[30]
Format:	ASCII-String

HEX 0x0042
DEC 66

<device_id>

Short description:	The device ID can be read out with this parameter.
Parameter name:	Device ID
Access rights:	Read
Data type:	UINT32

HEX 0x0043
DEC 67

<product_id>

Short description:	The product ID of the sensor can be read out via this parameter.
Parameter name:	Product ID
Access rights:	Read
Data type:	UINT32

HEX 0x0080
DEC 128

<serial_number>

Short description:	The serial number of the sensor can be read out with this parameter.
Parameter name:	Serial number
Access rights:	Read
Data type	CHAR[8]
Format:	ASCII-String

HEX 0x00C0
DEC 192

<hardware_version>

Short description:	The current hardware version of the sensor can be read out with this parameter.
Parameter name:	Hardware version
Access rights:	Read
Data type	CHAR[8]
Format:	ASCII-String

HEX 0x00C1
DEC 193

<firmware_version>

Short description:	The firmware version of the sensor can be read out with this parameter.
Parameter name:	Firmware version
Access rights:	Read
Data type	CHAR[8]
Format:	ASCII-String

HEX 0x0040
DEC 3392

<internal_temperature>

Short description:	This parameter can be used to read out the internal temperature of the sensor.
Parameter name:	Internal temperature
Access rights:	Read
Data type:	FLOAT
Unit	degrees Celsius

HEX 0x1800
DEC 6144

<unlock_tool_settings>

Short description:	This parameter can be used to lock or unlock the tool settings.
Parameter name:	Unlocking tool settings
Access rights:	Read and write
Data type:	BOOL
Values:	TRUE = Tool settings unlocked FALSE = Tool settings locked
Default:	FALSE
sequence:	To change the tool settings, follow these steps: **1.** Set parameter to TRUE. ⇨ The "process data invalid" bit is set in the status double word. **2.** Make changes to memory banks 0 to 3 of the tool settings. **3.** Set parameter to FALSE. ⇨ The changes are saved permanently and the values are applied to the calculations. ⇨ The "process data invalid" bit is reset in the status double word.

HEX 0x1840 ff.
DEC 6208 ff.

<0_tool_center_point>

Short description:	Memory bank 0: This parameter can be used to move the tool zero point by means of a coordinate transformation starting from the sensor zero point.
Parameter name:	0: Tool zero point
Access rights:	Read and write
Data type:	FLOAT
Subindices:	HEX 0x1840, DEC 6208: Translation x HEX 0x1841, DEC 6209: Translation y HEX 0x1842, DEC 6210: Translation z HEX 0x1843, DEC 6211: Rotation x HEX 0x1844, DEC 6212: Rotation y HEX 0x1845, DEC 6213: Rotation z
Unit	Translation [m], Rotation [rad]

HEX 0x1880 ff.
DEC 6272 ff.

<0_user_defined_overrange>

Short description:	Memory bank 0: This parameter allows the user to set their own limit values for limit value monitoring. If this is exceeded, the corresponding status bit is set in the cyclical data. For each axis (Fx, Fy, Fz, Tx, Ty, Tz) there is a sub-index for the positive and negative limit value.
Parameter name:	0: User-defined overload limits
Access rights:	Read and write
Data type:	FLOAT
Indices:	HEX 0x1880, DEC 6272: Upper overload limit Fx HEX 0x1881, DEC 6273: Lower overload limit Fx HEX 0x1882, DEC 6274: Upper overload limit Fy HEX 0x1883, DEC 6275: Lower overload limit Fy HEX 0x1884, DEC 6276: Upper overload limit Fz HEX 0x1885, DEC 6277: Lower overload limit Fz HEX 0x1886, DEC 6278: Upper overload limit Tx HEX 0x1887, DEC 6279: Lower overload limit Tx HEX 0x1888, DEC 6280: Upper overload limit Ty HEX 0x1889, DEC 6281: Lower overload limit Ty HEX 0x188A, DEC 6282: Upper overload limit Tz HEX 0x188B, DEC 6283: Lower overload limit Tz
Unit	F [N], T [Nm]

HEX 0x18C0 ff.
DEC 6336 ff

<1_tool_center_point>

Short description:	Memory bank 1: This parameter can be used to move the tool zero point by means of a coordinate transformation starting from the sensor zero point.
Parameter name:	1: Tool zero point
Access rights:	Read and write
Data type:	FLOAT
Indices:	HEX 0x18C0, DEC 6336: Translation x HEX 0x18C1, DEC 6337: Translation y HEX 0x18C2, DEC 6338: Translation z HEX 0x18C3, DEC 6339: Rotation x HEX 0x18C4, DEC 6340: Rotation y HEX 0x18C5, DEC 6341: Rotation z
Unit	Translation [m], Rotation [rad]

HEX 0x1900 ff.
DEC 6400 ff

<1_user_defined_overrange>

Short description:	Memory bank 1: This parameter allows the user to set their own limit values for limit value monitoring. If this is exceeded, the corresponding status bit is set in the cyclical data. For each axis (Fx, Fy, Fz, Tx, Ty, Tz) there is a sub-index for the positive and negative limit value.
Parameter name:	1: User-defined overload limits
Access rights:	Read and write
Data type:	FLOAT
Indices:	HEX 0x1900, DEC 6400: Upper overload limit Fx HEX 0x1901, DEC 6401: Lower overload limit Fx HEX 0x1902, DEC 6402: Upper overload limit Fy HEX 0x1903, DEC 6403: Lower overload limit Fy HEX 0x1904, DEC 6404: Upper overload limit Fz HEX 0x1905, DEC 6405: Lower overload limit Fz HEX 0x1906, DEC 6406: Upper overload limit Tx HEX 0x1907, DEC 6407: Lower overload limit Tx HEX 0x1908, DEC 6408: Upper overload limit Ty HEX 0x1909, DEC 6409: Lower overload limit Ty HEX 0x190A, DEC 6410: Upper overload limit Tz HEX 0x190B, DEC 6411: Lower overload limit Tz
Unit	Fx+, Fx-, Fy+, Fy-, Fz+, Fz- [N], Tx+, Tx-, Ty+, Ty-, Tz+, Tz- [Nm]

HEX 0x1940 ff.
DEC 6464 ff

<2_tool_center_point>

Short description:	Memory bank 2: With this parameter, the tool zero point can be shifted by means of a coordinate transformation starting from the sensor zero point.
Parameter name:	2: Tool zero point
Access rights:	Read and write
Data type:	FLOAT
Indices	HEX 0x1940, DEC 6464: Translation x HEX 0x1941, DEC 6465: Translation y HEX 0x1942, DEC 6466: Translation z HEX 0x1943, DEC 6467: Rotation x HEX 0x1944, DEC 6468: Rotation y HEX 0x1945, DEC 6469: Rotation z
Unit	Translation [m], Rotation [rad]

HEX 0x1980
ff.DEC 6528 ff.

<2_user_defined_overrange>

Short description:	Memory bank 2: This parameter allows the user to set their own limit values for limit value monitoring. If this is exceeded, the corresponding status bit is set in the cyclical data. For each axis (Fx, Fy, Fz, Tx, Ty, Tz) there is a sub-index for the positive and the negative limit value
Parameter name:	2: User-defined overload limits
Access rights:	Read and write
Data type:	FLOAT
Indices:	HEX 0x1980, DEC 6528: Upper overload limit Fx HEX 0x1981, DEC 6529: Lower overload limit Fx HEX 0x1982, DEC 6530: Upper overload limit Fy HEX 0x1983, DEC 6531: Lower overload limit Fy HEX 0x1984, DEC 6532: Upper overload limit Fz HEX 0x1985, DEC 6533: Lower overload limit Fz HEX 0x1986, DEC 6534: Upper overload limit Tx HEX 0x1987, DEC 6535: Lower overload limit Tx HEX 0x1988, DEC 6536: Upper overload limit Ty HEX 0x1989, DEC 6537: Lower overload limit Ty HEX 0x198A, DEC 6538: Upper overload limit Tz HEX 0x198B, DEC 6539: Lower overload limit Tz
Unit	Fx+, Fx-, Fy+, Fy-, Fz+, Fz- [N], Tx+, Tx-, Ty+, Ty-, Tz+, Tz- [Nm]

HEX 0x19C0 ff.
DEC 6592 ff.

<3_tool_center_point>

Short description:	Memory bank 3: With this parameter, the tool zero point can be shifted by means of a coordinate transformation starting from the sensor zero point.
Parameter name:	3: Tool zero point
Access rights:	Read and write
Data type:	FLOAT
Indices	HEX 0x19C0, DEC 6592: Translation x HEX 0x19C1, DEC 6593: Translation y HEX 0x19C2, DEC 6594: Translation z HEX 0x19C3, DEC 6595: Rotation x HEX 0x19C4, DEC 6596: Rotation y HEX 0x19C5, DEC 6597: Rotation z
Unit	Translation [m], Rotation [rad]

HEX 0x1A00 ff.
DEC 6656 ff.

<3_user_defined_overrange>

Short description:	Memory bank 3: This parameter allows the user to set their own limit values for limit value monitoring. If this is exceeded, the corresponding status bit is set in the cyclical data. For each axis (Fx, Fy, Fz, Tx, Ty, Tz) there is a sub-index for the positive and negative limit value.
Parameter name:	3: User-defined overload limits
Access rights:	Read and write
Data type:	FLOAT
Indices	HEX 0x1A00, DEC 6656: Upper overload limit Fx HEX 0x1A01, DEC 6657: Lower overload limit Fx HEX 0x1A02, DEC 6658: Upper overload limit Fy HEX 0x1A03, DEC 6659: Lower overload limit Fy HEX 0x1A04, DEC 6660: Upper overload limit Fz HEX 0x1A05, DEC 6661: Lower overload limit Fz HEX 0x1A06, DEC 6662: Upper overload limit Tx HEX 0x1A07, DEC 6663: Lower overload limit Tx HEX 0x1A08, DEC 6664: Upper overload limit Ty HEX 0x1A09, DEC 6665: Lower overload limit Ty HEX 0x1A0A, DEC 6666: Upper overload limit Tz HEX 0x1A0B, DEC 6667: Lower overload limit Tz
Unit	Fx+, Fx-, Fy+, Fy-, Fz+, Fz- [N], Tx+, Tx-, Ty+, Ty-, Tz+, Tz- [Nm]

4.2.2 Interface box

HEX 0x4000
DEC 16384

<vendor_name>

Short description:	The manufacturer can be read out with this parameter.
Parameter name:	Manufacturer name
Access rights:	Read
Data type:	CHAR[30]
Format:	ASCII-String

HEX 0x4001
DEC 16385

<vendor_text>

Short description:	The manufacturer text can be read out with this parameter.
Parameter name:	Manufacturer text
Access rights:	Read
Data type:	CHAR[30]
Format:	ASCII-String

HEX 0x4040
DEC 16448

<product_id>

Short description:	The product ID of the interface box can be read out with this parameter.
Parameter name:	Product ID
Access rights:	Read
Data type:	UINT32

HEX 0x4041
DEC 16449

<serial_number>

Short description:	The serial number of the interface box can be read out with this parameter.
Parameter name:	Serial number
Access rights:	Read
Data type	CHAR[8]
Format:	ASCII-String

HEX 0x4080
DEC 16512

<hardware_version>

Short description:	The current hardware version of the interface box can be read out with this parameter.
Parameter name:	Hardware version
Access rights:	Read
Data type	CHAR[8]
Format:	ASCII-String

HEX 0x4081
DEC 16513

<firmware_version>

Short description:	The firmware version of the interface box can be read out with this parameter.
Parameter name:	Firmware version
Access rights:	Read
Data type	CHAR[8]
Format:	ASCII-String

HEX 0x40C0
DEC 16576

<function_tag>

Short description:	The function tag can be read out with this parameter.
Parameter name:	Function tag
Access rights:	Read
Data type:	CHAR[30]
Format:	ASCII-String

HEX 0x40C1
DEC 16577

<location_tag>

Short description:	The location tag can be read out with this parameter.
Parameter name:	Location tag
Access rights:	Read
Data type:	CHAR[30]
Format:	ASCII-String

HEX 0x4840
DEC 18496

<force_torque_scaling_factor>

Short description:	This parameter can be used to read and write the scaling factor for the force-torque values of the industrial bus.
Parameter name:	Scaling factor for force-torque values of the industrial bus
Access rights:	Read and write
Data type:	UINT32
Default:	1000
Min.	1
Max.	1.000.000

HEX 0x4C80
DEC 19584

<customer_interface_type>

Short description:	The type of customer interface can be read out with this parameter.
Parameter name:	Customer interface type
Access rights:	Read
Data type:	ENUM
Enumeration:	0 = Unknown 1 = EtherCat 2 = Profinet 3 = Ethernet/IP 4 = Plain Ethernet

5 Start-up

5.1 Safety

Commissioning of the module may only be carried out by qualified personnel with programming and interface knowledge!

⚠ CAUTION

Risk of injury due to electromagnetic interference!

Electromagnetic interference can cause malfunctions and lead to unexpected movements.

- Use electrical components, e.g. sensors, controllers, etc. according to EN 61000-5-7.

5.2 System integration

The communication protocol "SCHUNK Flexible Protocol" is available for operation within the plant.
For further information on communication, module functions and parameters, see the corresponding sections in this manual.

NOTE

If the module is **not** operated at a Siemens control, the byte sequence must be checked and if necessary adapted at the control.

Overview

- The module is mounted and electrically connected. For more information, see Assembly and Operating Manual, ▸ 1.1 [🗋 4].

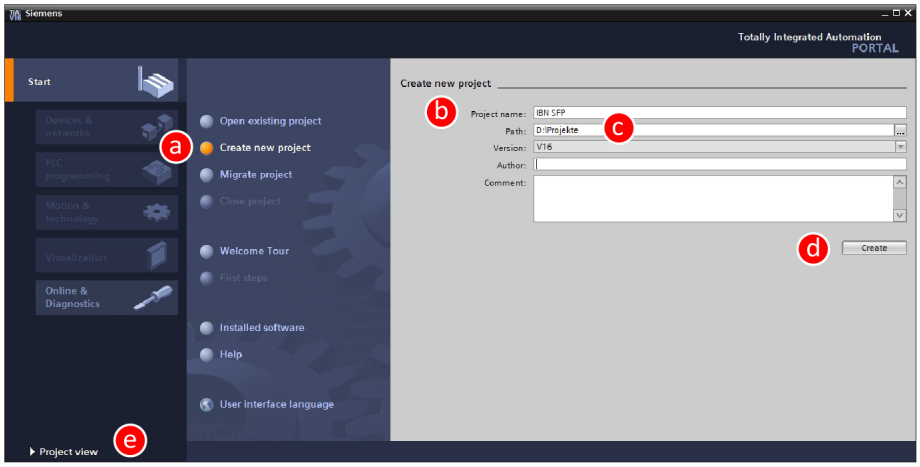
1. Activate logic and power supply.
   ⇨ LED LOG and PWR light up green.
2. Connect the cables for communication.
   ⇨ Communication is reported back by LED status indicator.
3. Configure controller and module, ▸ 5.3 [🗋 26].

5.3 Commissioning with Siemens "TIA Portal" software for PROFINET

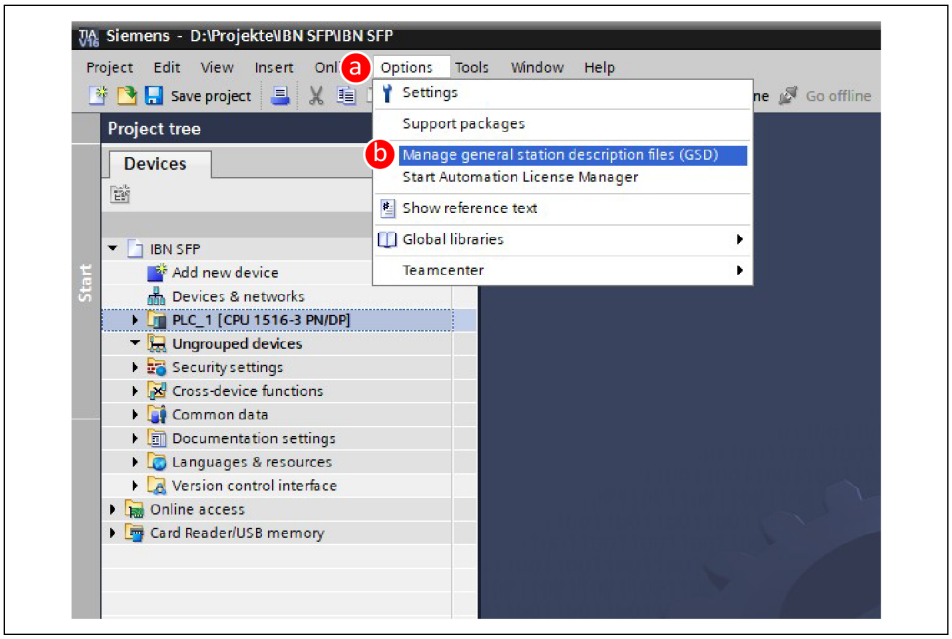
NOTE

The modules support prioritized start-up (FSU - **F**ast-**S**tart-**U**p).

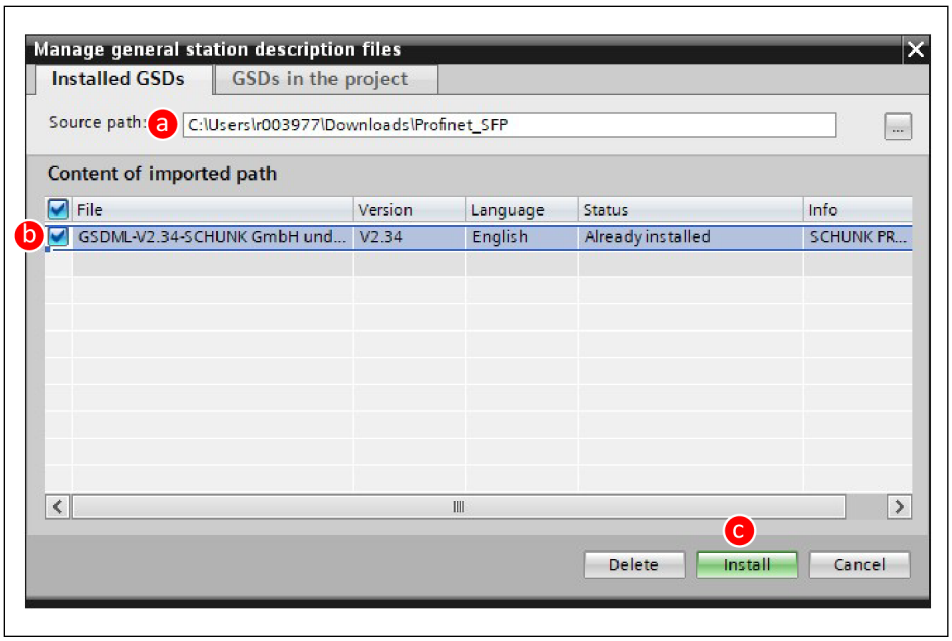
1. Start TIA Portal and select "Create new project" (a).
2. Assign project name (b) and specify storage location (c).
3. Click the "Create" (d) button.
4. Follow the instructions of the TIA Portal to create the project completely.
5. After successfully creating the project, click "Project view" (e) at the bottom left to switch to the project view.



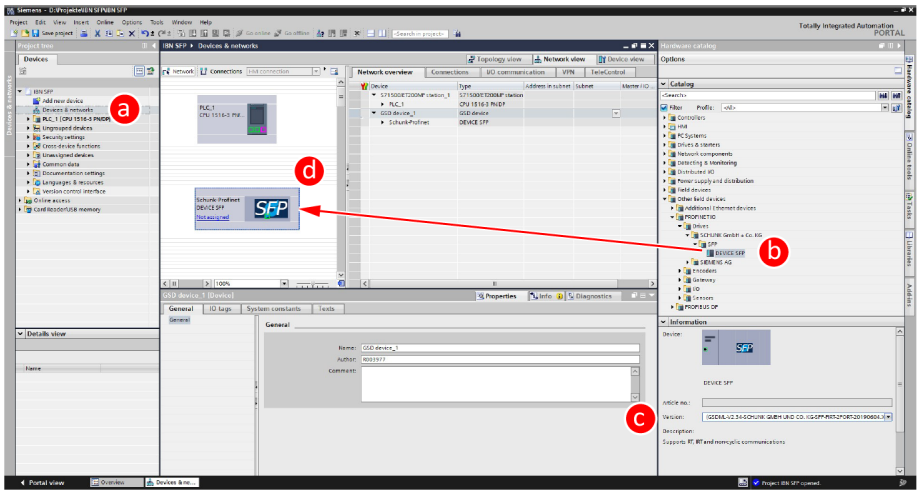
6. In the menu bar of the project view, click the "Options" button (a) and then "Manage device description files (GSD)" (b).



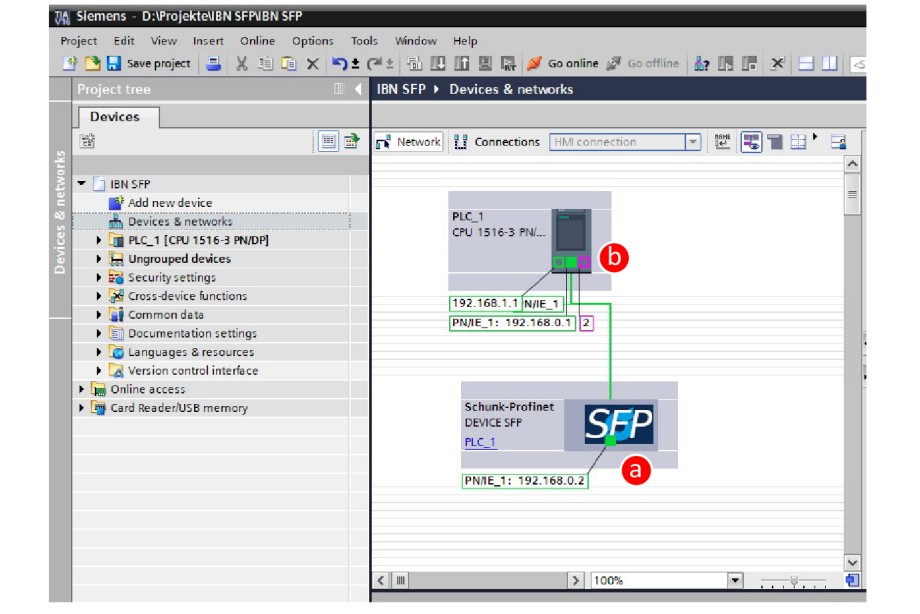
7. Select "Source Path" (a) and choose the folder containing the GSDML file to be installed.
8. Select the corresponding file (b) and click the "Install" button (c).



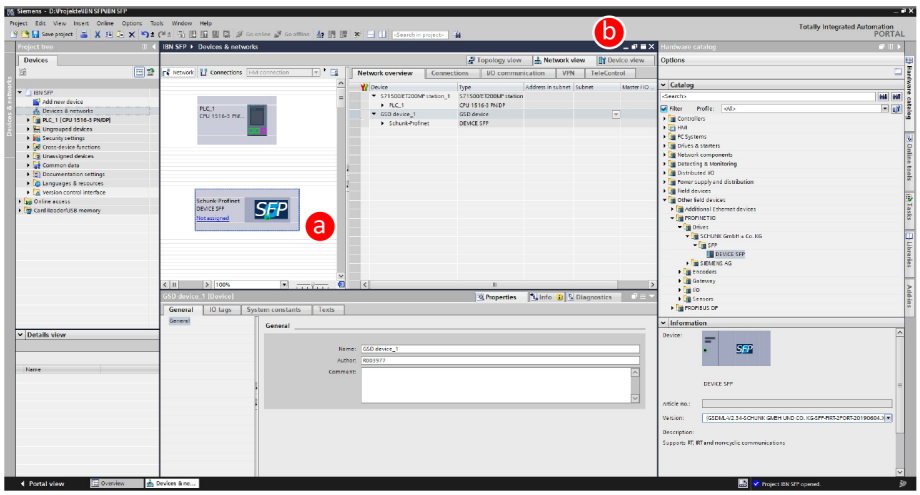
9. After completing the installation, switch to "Devices and networks" (a) in the project navigation (left side).
10. In the hardware catalog (right side) in the subitem *Other field devices > Profinet IO > Drives > Schunk GmbH & Co. KG > SFP*, select the corresponding device (b) and, if necessary, the correct version (c).
11. Drag and drop the device into the "Network view" window (d).



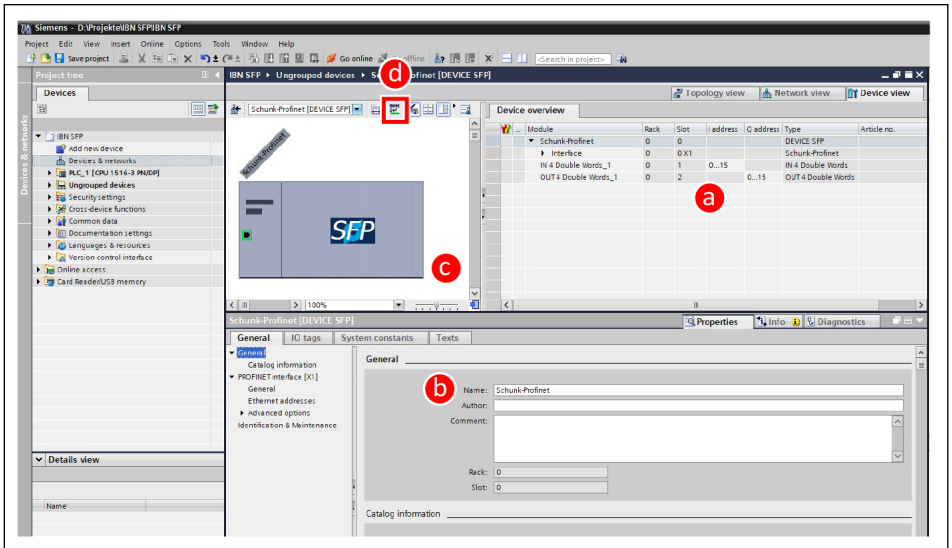
12. Connect device (a) to CPU (b)



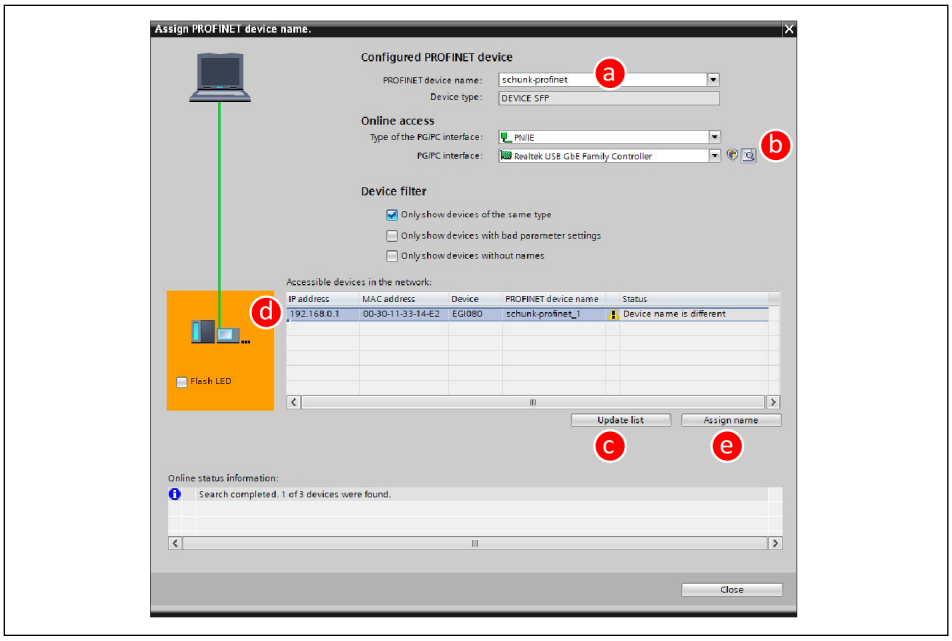
13. Open the device overview: To do this, click the device (a) and then "Device view" (b) or double-click *or* on the device (a).



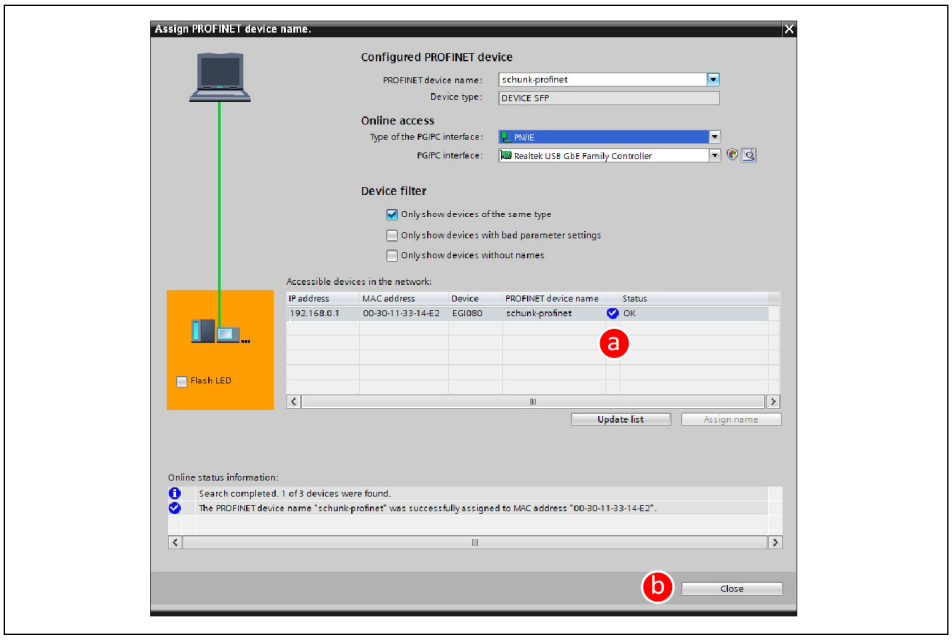
14. Change hardware address (a) and device name (b) if necessary.
15. Ensure that the device is connected to a programming device via PROFINET and that the logic of the device is supplied with voltage.
16. Assign device name: To do this, click the device (c) and then click the "Assign device name" button (d).



17. PROFINET-Select device name (a).
18. Select the interface (b) and click the "Update list" button (c).
19. Highlight the device (d) found and click the "Assign name" button (e)
    ⇨ PROFINET device name (a) has been assigned.



20. Once the PROFINET device name (a) has been assigned successfully, click the "Close" button (b).



21. Transfer the hardware configuration to the CPU and control the device using a variable table.

5.4 SCHUNK Control Center – App FTS

The *FTS (Force Torque Sensor)* application can be started via the SCHUNK Control Center. This app enables fast commissioning and parameterization of the module.

The software can be downloaded from **schunk.com/downloads-software**.

Range of functions of the *FTS* app

- Configuration and commissioning:
  - Display status information
  - Record force and torque values
  - Changing the IP address
  - Display diagnostic and error messages
  - Execute firmware updates
- Automatic and manual search for modules in the network
- Visual display of the connected module
- Configuration of connected tools
- Setting filters for the measurement signal

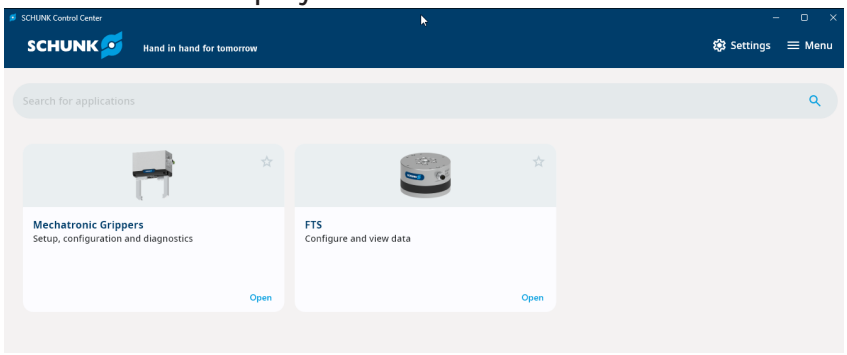
Start software

NOTE

In order for the *FTS* app to communicate with the module over an Ethernet network, it must be ensured that the communication is not prevented by a firewall or other network technology.

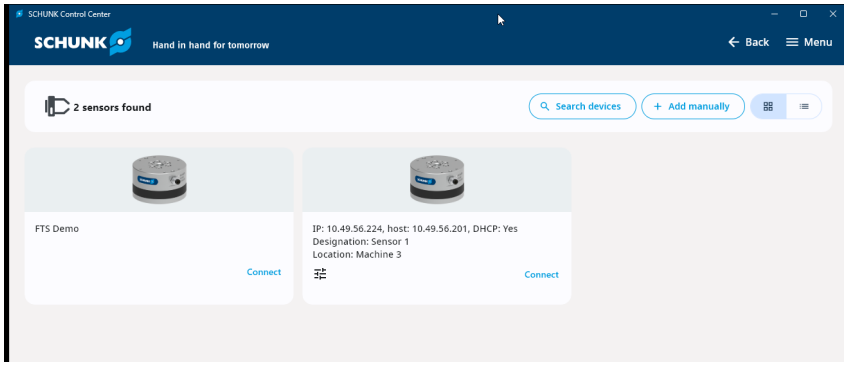
- Module is electrically connected to the power supply unit.
- SCHUNK Control Center is installed.

1. Connect the computer directly to the module via Ethernet.
   OR:
   Connect the computer to the network in which the module is integrated.
2. Open SCHUNK Control Center.
   ⇨ Start screen is displayed.



3. Select the *FTS* app.
   ⇨ The system automatically searches for sensors in the network.

⇨ Sensors found are displayed in the communication interface selection window.



4. Select the desired sensor.

⇨ The app connects to the sensor.

⇨ Access to the functions of the sensor is possible.

6 Appendix

6.1 Control word

The controls of the control word are described in detail below. For a clear illustration of the control word, see chapter ▸ 2.1.1.1 [🗋 6].

Never set more than one control bit. If more than one control bit is set at any one time, the "command error" status bit is set.

Bit 0 – tare

Edge change	Module reaction
0 → 1	Start tare process to calculate tare values
1 → 0	no reaction

Bit 1 – reset tare

Edge change	Module reaction
0 → 1	Reset tare values
1 → 0	no reaction

Bit 2 to 14– reserved

Edge change	Module reaction
0 → 1	no reaction
1 → 0	no reaction

Bit 15 – reset software

Edge change	Module reaction
0 → 1	The module is restarted on the software side
1 → 0	no reaction

6.2 Status double word

The status bits of the status double word are described in detail below. For a clear representation of the status double word, see chapter ▸ 2.1.1.2 [🗋 7].

Bit 0 – ready for operation

Status	Module feedback
0	The module is not ready for operation.
1	The module is ready for operation.

Bit 1 – control authority fieldbus

Status	Module feedback
0	The fieldbus does not have a control logic.
1	The fieldbus has a control logic.

Bit 2 – process data invalid

Status	Module feedback
0	The cyclical process output data is valid.
1	The cyclical process output data is invalid.

Bit 3 – command error

Status	Module feedback
0	No information is reported.
1	The command sent to the module is not feasible.

Bit 4 – command processed toggle

Status	Module feedback
0 –> 1	The command sent to the module was successfully executed.
1 –> 0	The command sent to the module was successfully executed.

Bit 5 – Number wrong

Status	Module feedback
0	No information is reported.
1	The number sent to the module cannot be executed.

Bit 6 – number changes processed toggle

Status	Module feedback
0 –> 1	The number sent to the module has been successfully changed.
1 –> 0	The number sent to the module has been successfully changed.

Bit 7 – internal temperature out of range

Status	Module feedback
0	The internal temperature of the sensor is within the permissible range.
1	The internal temperature of the sensor is outside the permitted range of 0 to XX degrees.

Bit 8 – hardware error

Status	Module feedback
0	The hardware is working properly.
1	There is a hardware error, e.g. in the internal communication or the memory.

Bit 9 – mechanical overrange limits exceeded

Status	Module feedback
0	No limit value exceeded.
1	The mechanical overload limits of the sensor have been exceeded. The sensor is possibly damaged.

Bit 10 – user-defined overrange limits exceeded

Status	Module feedback
0	No limit value exceeded.
1	One or more of the user-defined overload limit values has been exceeded. See parameter 0x0061 ff. of the tool settings.

Bit 11 – firmware version error

Status	Module feedback
0	Sensor and interface box have the same firmware version.
1	The sensor and interface box have different firmware versions and require an update or downgrade.

Bit 12 to 31 – reserved

Status	Module feedback
0	No information is provided in feedback.
1	No information is provided in feedback.

6.3 Brands

- PROFINET is a registered trademark of PROFIBUS Nutzerorganisation e.V.

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