Assembly and Operating Manual FPS-F5

Electronic processor

Translation of Original Operating Manual

Hand in hand for tomorrow

Imprint

Technical changes:
We reserve the right to make alterations for the purpose of technical improvement.

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Dear Customer,

Thank you for trusting 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. Ask us questions and challenge us. 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 manual

This manual contains important information for a safe and appropriate use of the product.

This manual is an integral part of the product and must be kept accessible for the personnel at all times.

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

1.1.1 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.

CAUTION

Material damage!

Information about avoiding material damage.

1.1.2 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *
- Assembly and operating manual for the SCHUNK module on which the FPS is used *

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

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

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the ex-works delivery date under the following conditions:

- Observe the applicable documents, ▸ 1.1.2 [🗋 5]
- Observe the ambient conditions and operating conditions, ▸ 2.3 [🗋 7]

1.3 Scope of delivery

The scope of delivery includes

- Electronic processor FPS-F5 in the ordered model
- Assembly and Operating Manual
- SUB-D serial connector

1.4 Accessories

The following accessories, which must be ordered separately, are required for the product:

- Flexible Position Sensor FPS-S M8
- Flexible Position Sensor FPS-S 13
- Analog magnetic switch MMS 22-A 5V
- Connection cables

For information regarding which accessory articles can be used with the corresponding product variants, see catalog data sheet.

2 Basic safety notes

2.1 Intended use

The sensor is used for sensing a specific magnetic field of a SCHUNK product via a magnetic control cam.

- The product is intended for installation in a machine/system. The applicable guidelines must be observed and complied with.
- The product may only be used within the scope of its technical data, ▸ 3 [🗋 9].

2.2 Inappropriate use

The product is not a safety component in accordance with the EC Machine Directive 2006/42/EC and must not be used in safety-relevant parts of machine control units.

2.3 Environmental and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is used only in the context of its defined application parameters, ▸ 3 [🗋 9].
- Make sure that the environment is free from splash water and vapors as well as from abrasion or processing dust. Exceptions are products that are designed especially for contaminated environments.

2.4 Constructional changes

Implementation of structural changes

By conversions, changes, and reworking, e.g. additional threads, holes, or safety devices can impair the functioning or safety of the product or damage it.

- Structural changes should only be made with the written approval of SCHUNK.

2.5 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

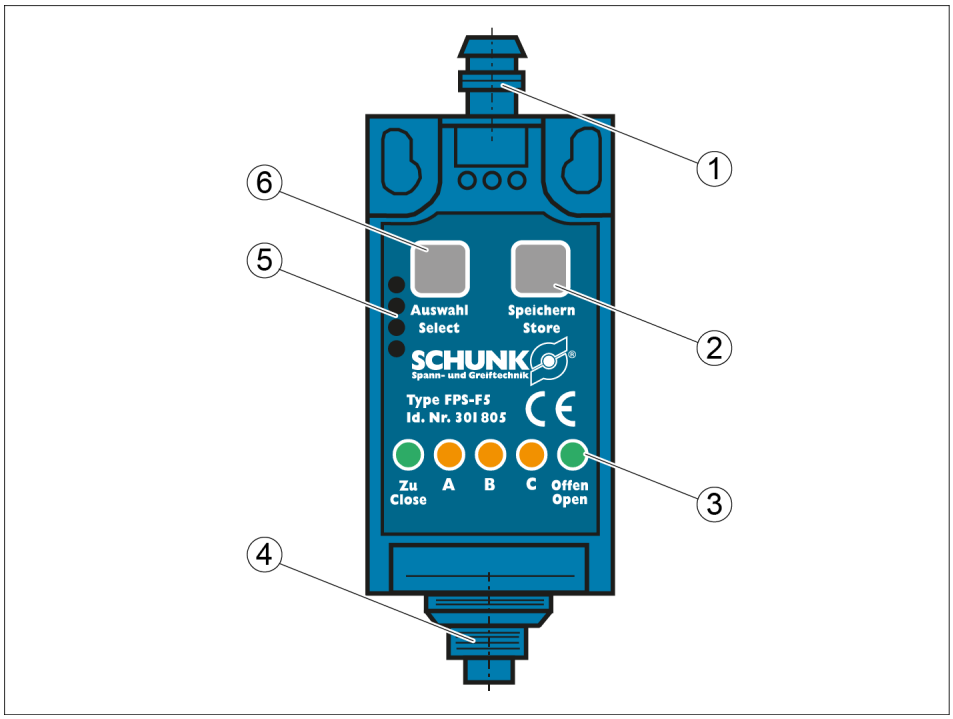
3 Technical data

Designation	FPS-F5
Ambient temperature [°C]	
Min.	- 20
Max.	+ 70
Nominal voltage [VDC]	24
Min.	12
Max.	35
IP rating	65

More technical data is included in the catalog data sheet. Whichever is the latest version.

4 Design and description

4.1 Structure



Control and display panel

Item	Designation	Item	Designation
1	Sensor connection	4	Voltage supply connection and digital inputs and outputs
2	Save button	5	RS 232 interface and coding pin
3	LED output signals	6	Selection button
The control and display panel is covered by a plastic lid.			

4.2 Description

Operating principle

The FPS sensor system consists of a magnetic field-sensitive sensor and electronic processor. A permanent magnet is attached to the base jaw of the gripper, which moves past the sensor in parallel. The output voltage of the sensor changes with the position of the permanent magnet. This voltage is amplified in the electronic processor and divided into five reference points. The reference points are saved using pushbuttons or via the control unit. When a reference point is reached, the corresponding digital output is switched on and the previous output is switched off. Only one digital output is active at a time.

Instructions for use

Observe the following when using the FPS sensor system:

- Avoid using the sensor in the immediate vicinity of strong magnetic fields or temporarily approaching or touching the sensor or the magnet of larger ferromagnetic materials. There is no impact due to these kinds of materials being gripped, as the distance to the sensor is sufficiently large (>10 – 20 mm).
- Avoid contamination of the sensor or the magnet due to ferromagnetic chips and dust.
- Adjust the sensor at operating temperature to achieve the accuracy specified in the catalog.
- Ground the electronic processor to the ground connection on the bottom to avoid small interference pulses on the ground line. In the event of major faults, determine and eliminate the cause.
- For increased precision, calibrate the electronic processor at regular intervals.

Possible sensors in conjunction with the electronic processor

- Flexible Position Sensor FPS-S M8
- Flexible Position Sensor FPS-S 13
- Analog magnetic switch MMS 22-A 5V

5 Assembly and settings

NOTE

The assembly instructions in this chapter are generally applicable.

Module-specific assembly instructions for the sensor can be found in the Assembly and Operating Manual for the module, which can be downloaded at schunk.com

5.1 Mechanical connection

CAUTION

Property damage due to incorrect bending radius!

The product may get damaged if the cable's bending radius is less than the minimum.

- **Static:** 10 times the cable diameter.
- **Dynamic:** 15 times the cable diameter.

CAUTION

Risk of damage to the sensor during assembly!

- Observe the maximal tightening torque.

NOTE

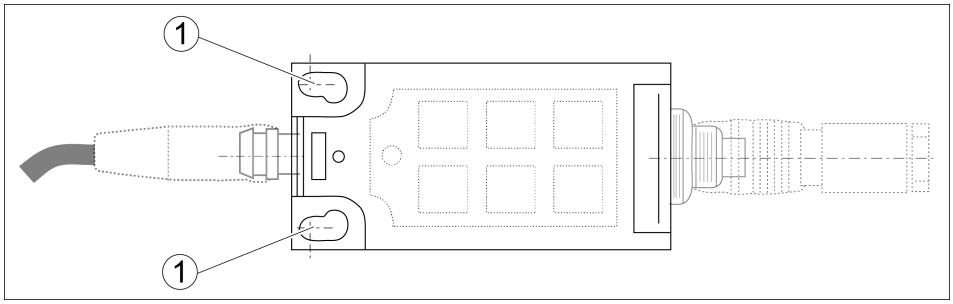
- Do not use the sensor as a safety component.
- Do not pull on the cable of the sensor.
- Secure the cable and connection plug so that they are not taught and cannot move during operation.
- Do not exceed the permitted bending radius of the cable.
- Do not allow the sensor to come into contact with hard objects and chemicals (e. g., nitric acid, chromic acid and sulfuric acid).

The sensor is an electronic component that can be sensitive to high-frequency interference or electromagnetic fields.

- Check whether there is sufficient distance between the sensor and sources of interference and their supply cables.

Ferromagnetic components, e.g. adapter plates made of construction steel, change the switching positions of the sensor.

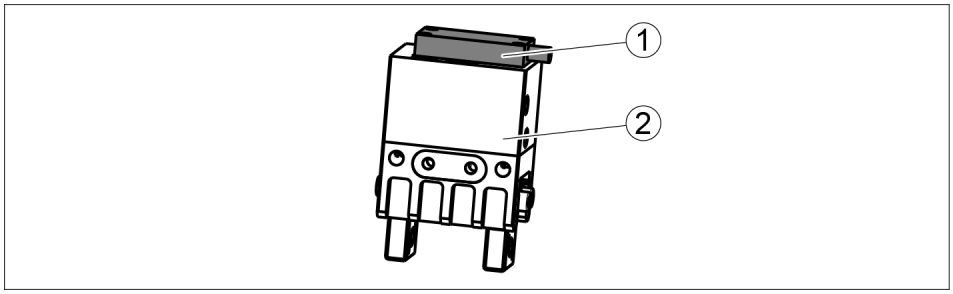
5.1.1 Mechanical connection FPS-F5



Mechanical connection

1	Screw-on points, M4 screws

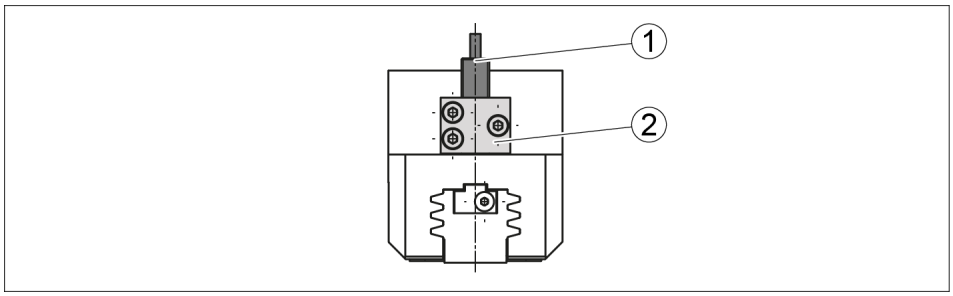
5.1.2 Mechanical connection FPS-S 13



Installing the sensor

1. Position the active sensor area (circular elevation) in the recess provided for it in the product (2).
2. Screw the sensor (1) onto the product (2).
3. Connect the sensor (1) to the electronic processor and fasten the cable.

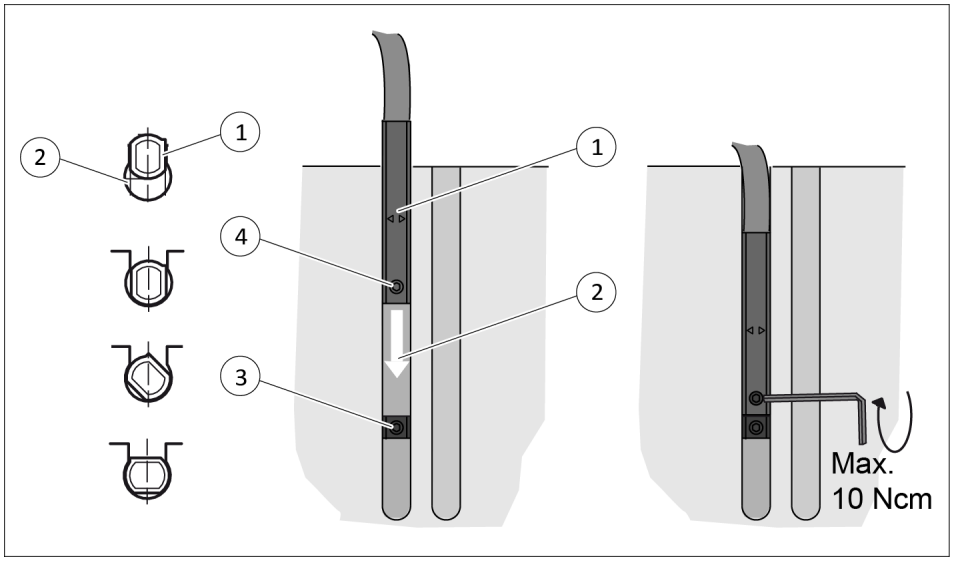
5.1.3 Mechanical connection FPS-S M8



Installing the sensor

1. Push the sensor (1) through the clamping holder (2) until it stops in the housing.
2. Tighten the screws on the clamp holder (2).
3. Connect the sensor (1) to the evaluation electronics and fasten the cable.

5.1.4 Mechanical connection MMS 22-A



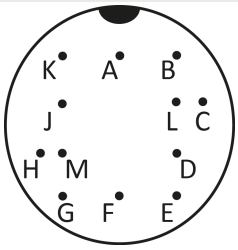
Mechanical connection

1. Turn the sensor (1) into the groove (2)
   Or: Push the sensor (1) into the groove (2) until it reaches the clamping stop.
2. Secure the sensor (1) using the set-screw.
   ⇨ Observe the maximum tightening torque of 10 Ncm.
3. Connect the sensor (1) and fasten the cable.

5.2 Electrical connection

5.2.1 Electrical connection FPS-F5

12-pin connector



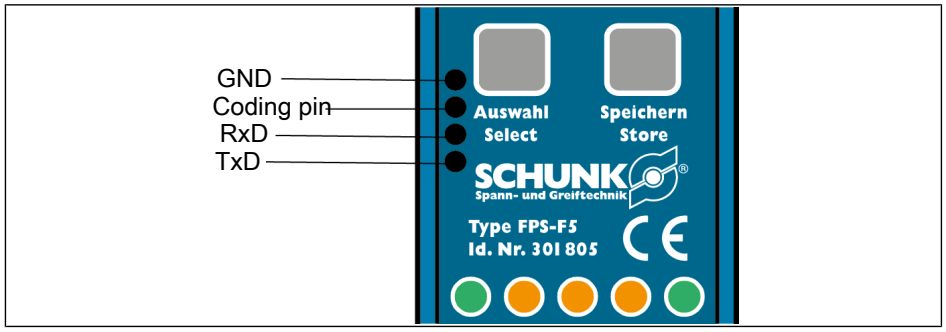
View of the FPS connector

Pin	Function
A	+24 V
B	TX
C	Open (digital output)
D	C (digital output)
E	B (digital output)
F	A (digital output)
G	Closed (digital output)
H	RX
J	GND
K	n.c.
L	select (digital input)
M	store (digital input)

NOTE

The connections with the designations *Open*, *A*, *B*, *C* and *Closed* correspond to the five switching outputs.

RS 232



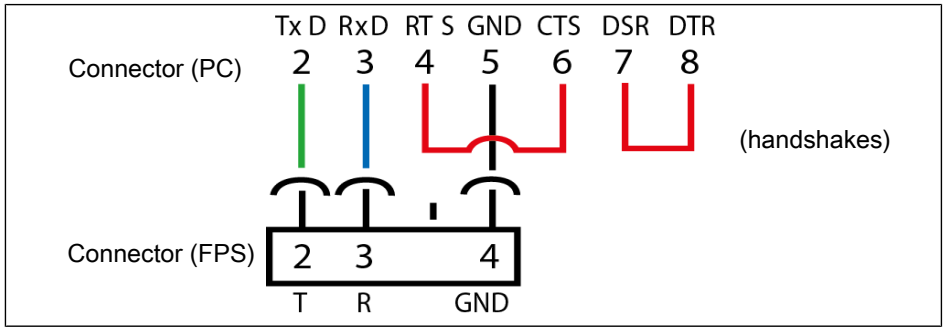
Interface RS 232

Adapter RS 232

PC 25pin	Adapter Buchse / Adapter bushing FPS F5 PC 9-pin	SIGNAL		Adapter Stecker / Adapter plug FPS F5 Modem 9-pin	Modem 25-pin
8	1	Car detect	Car detect	1	8
7	5	GND	GND	5	7
2	3	TxD	RxD	2	3
3	2	RxD	TxD	3	2
5	8	CTS	RTS	7	4
4	7	RTS	CTS	8	5
6	6	DSR	DTR	4	20
20	4	DTR	DSR	6	6

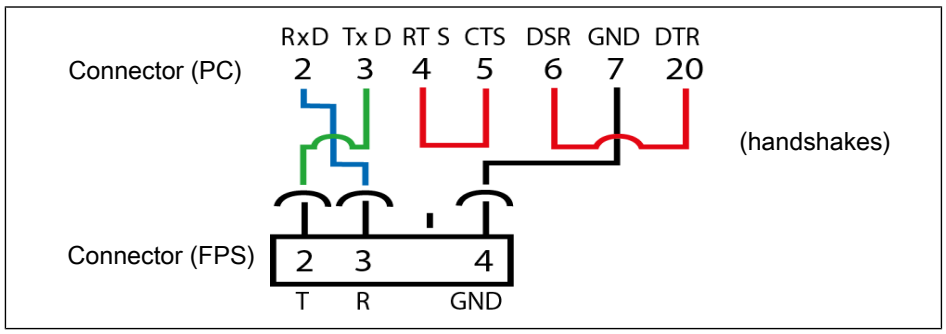
Cable assignment adapter to interface RS 232

9-pin SUB-D connector



Assignment of 9-pin SUB-D connector

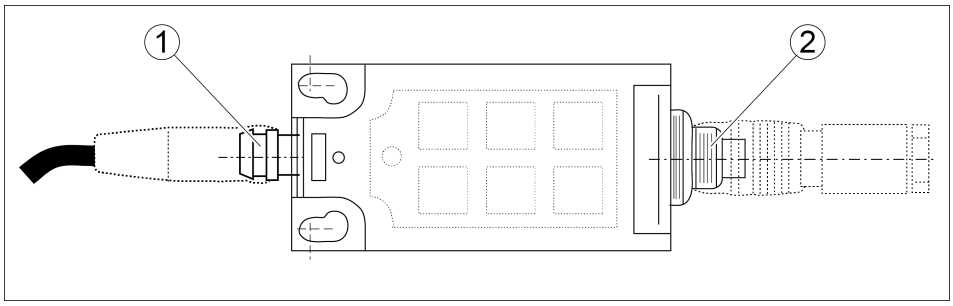
25-pin SUB-D connector



Assignment of 25-pin SUB-D connector

NOTE

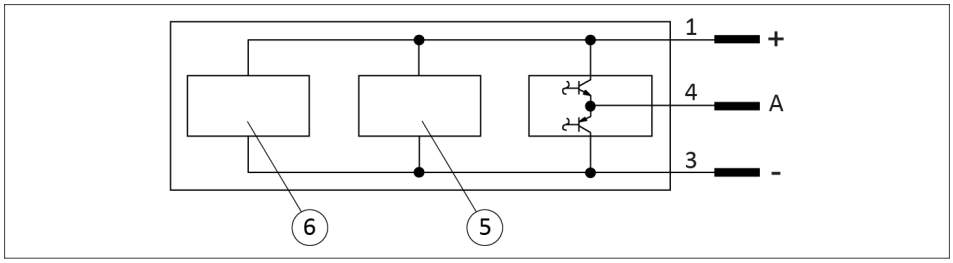
For connection to the modem, there is a 9-pin and 25-pin socket instead of the connector. Pins 2 and 3 are reversed, otherwise connection is the same as for the PC.



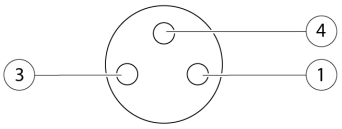
Electrical connection

1	Sensor connector, 3-pin connector
2	Output connector, 12-pin connector

5.2.2 Electrical connection FPS-S 13



Type of switching: Analog

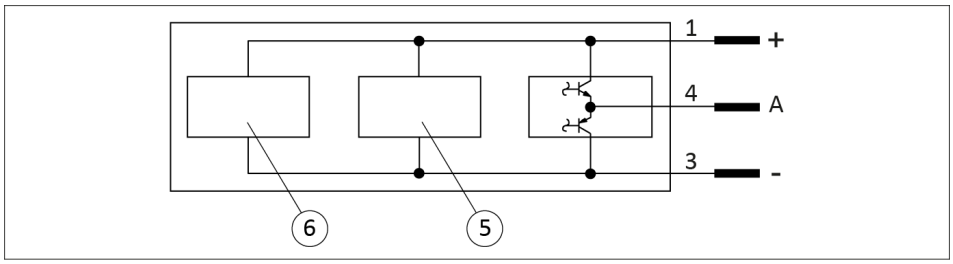
Sleeve M8	
	
1	Supply voltage
3	GND
4	Output

Note about circuit symbol

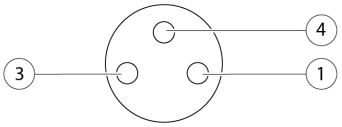
5	Hall-effect sensor	6	Amplifier

- Connect the sensor cable to the port of the evaluation electronics and tighten the screw connection.
  ⇨ Do not exceed the permitted bending radius of the cable.

5.2.3 Electrical connection FPS-S M8



Type of switching: Analog

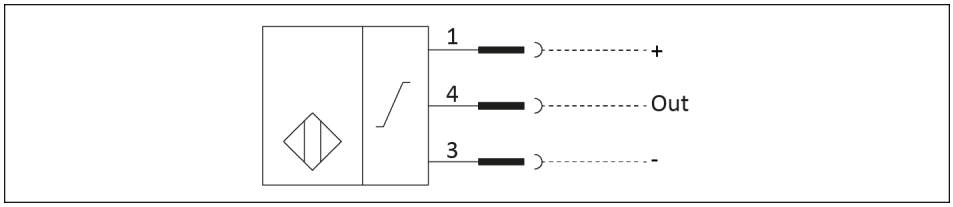
Sleeve M8	
	
1	Supply voltage
3	GND
4	Output

Note about circuit symbol

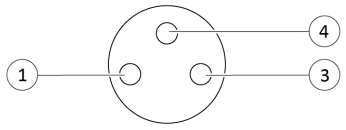
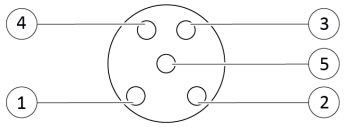
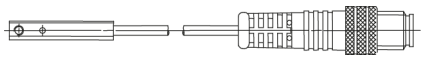
5	Hall-effect sensor	6	Amplifier

- Connect the sensor cable to the port of the evaluation electronics and tighten the screw connection.
  ⇨ Do not exceed the permitted bending radius of the cable.

5.2.4 Electrical connection MMS 22A

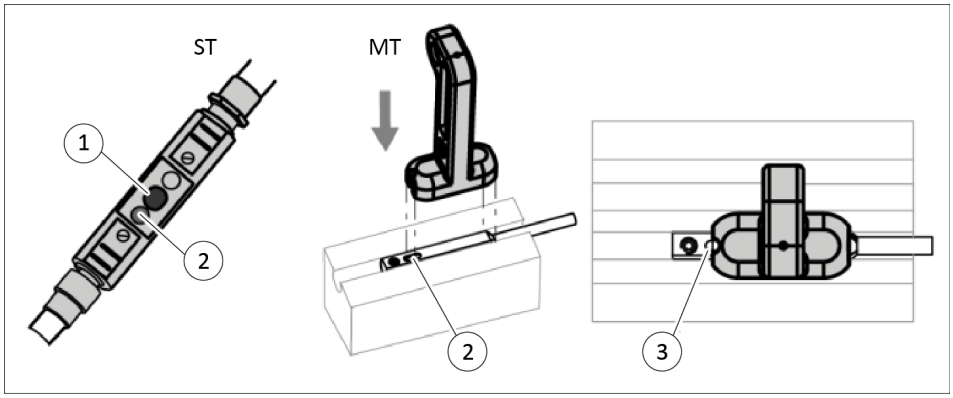


Type of switching: Analog

M8 socket for 5 V Connection plug M8/M12 at 10 V	M8  M12 
	

1	Brown	5 VDC for 5 V + 10 to 30 VDC for 10 V	4	Black	Analog output
2		Blind hole	5		Blind hole
3	Blue	GND			

5.3 Set sensor MMS 22-A



Button on cable teach tool (CT)/Attachment of magnet teach tool (MT)

1. Put module in position 1 in which it is to be set e.g. "Gripper open".
2. Place the magnet teach tool (MT) on the sensor (3) or press the button (1) on the cable teach tool (CT) until the LED goes out.
3. Remove magnet teach tool or let go of button (1) on cable teach tool (CT).
4. Wait for 4 seconds until LED (2) flashes slowly (1 Hz).
5. Put module in position 2 in which it is to be set e.g. "Gripper closed".
6. Wait for 4 seconds until LED (2) flashes slowly (2 Hz).
7. Place the magnet teaching tool (MT) on the sensor (3) or press the button (1) on the cable teaching tool (CT) until the LED (2) flashes very quickly (6 Hz).
8. Remove magnet teaching tool or let go of button (1) on cable teaching tool (CT) and wait 5 s.
   ⇨ The LED (2) lights up continuously.

NOTE

The setting procedure is canceled after 13 seconds if the MT is not reinserted or the button (1) on the CT is not pressed. LED 1 flashes at 2-second intervals if the magnetic field is too large or too small.

If the sensor (3) cannot be taught at the relevant position, the LED lights up continuously, e.g. no magnet is present or the module was not moved. The sensor returns to its state prior to the teach procedure and retains the old settings. The waiting times need to be observed without the module moving.

NOTE

The three workpiece switching points cannot be programmed to a single point.

NOTE

The analog signal is affected if the sensor is operated with a teach tool.

- After adjusting the sensor: Remove the magnet teaching tool (MT) or cable teaching tool (KT).

5.4 Commissioning sensors with FPS-F5

1. Connect the earthing cable to the bottom of the electronic processor.
2. Connect the sensor connector to the electronic processor and tighten the screw connection, ▸ 5.2 [🗋 15].
3. Connect the output connector to the electronic processor and tighten the screw connection, ▸ 5.2 [🗋 15].
   ⇨ The electronic processor switch to the *SAFE* operating mode.
   ⇨ The green LEDs *Closed* and *Open* flash for two seconds.
   ⇨ **The unit can now be put into operation (without software),** ▸ 6.1 [🗋 22]

or put into operation with software

1. Installing the software on a computer, ▸ 6.2 [🗋 24].
2. Connect the electronic processor to the COM port of the computer via the RS 232 interface, ▸ 5.2 [🗋 15].
3. Enter the selected COM (port 1-4) in the INI file of the gateway
4. Start the *Gateway* program.
5. Start the *FPS-Controller* program and establish a connection to the electronic processor.
6. Open *Programming* function, ▸ 6.3.3 [🗋 29].
7. Move the gripper to the first required position and press the relevant button *Learn current gripping value*.
   ⇨ The position value is entered in the field below and saved.
8. Move the gripper to all required positions and save the values.
9. Press the *button to transfer values to FPS*.
   ⇨ Values are stored in the input memory of the electronic processor, but not yet activated.
10. Press the *Switching point* button.
    ⇨ Values are stored in the working memory of the electronic processor and activated.
11. Disconnect the computer from the electronic processor.

Normal operation is now carried out via the digital inputs or the buttons on the electronic processor.

6 Operation

6.1 Operation without software

When the electronic processor is connected to the power supply for the first time, the electronic processor switch to the *SAFE* operating mode. The two green LEDs *Closed* and *Open* flash for two seconds.

If the LEDs do not light up, then

- either the polarity of the voltage supply is incorrect and the reverse polarity protection is active
- or an output has short-circuited and the built-in short-circuit protection has switched off the outputs, thereby also deactivating the output LEDs.
  - In this case, remove the output connector, eliminate the cause of the short circuit and reconnect the output connector.
- Or the switching points are programmed so that the gripper is opened further than is saved in the On<-->Off switching point.
  - In this case, remove the output connector, close the gripper completely and reconnect the output connector.

6.1.1 Operating modes of the FPS-F5 electronic processor

The electronic processor has two different operating modes:

- *SAFE* operating mode
  - The *SAFE* mode corresponds to the software *area*. Factory preset on the electronic processor.
- *EXACT* operating mode
  - The *EXACT* mode corresponds to the *switching point* in the software.

Switching principle for the *SAFE* and *EXACT* operating modes:

Situation example:
A gripper with a 10 mm stroke is used.
The switching positions CLOSED, A, B, C and OPEN can be programmed.

- **A:** Part A = 4 mm
- **B:** Part B = 5 mm
- **C:** Part C = 8 mm

Switching points in *SAFE* mode

When saving all five positions, the switching points are set to the safest possible value in the middle between the switching points, ▸ 6.1.3 [🗋 23].

When saving individual positions, the switching points are offset against the unchanged switching points.

Closed	Part A	Part B	Part C	Open
under	2.0 – 4.5 mm	4.5 – 6.5 mm	6.5 – 9.0 mm	above

Switching points in *EXACT* mode

When saving individual or all five positions, the exact switching points are adopted.

Closed	Part A	Part B	Part C	Open
under	0 – 4 mm	4 – 5 mm	5 – 8 mm	above

6.1.2 Changing operating modes

1. Disconnect the electronic processor from the voltage supply.
2. Press and hold the *Save* button.
3. Connect the voltage supply to the electronic processor.
4. Release the *Save* button.
   - ⇨ In *SAFE* mode, the green LEDs *Closed* and *Open* flash for two seconds.
   - ⇨ In *EXACT* mode, the yellow LEDs *A*, *B* and *C* flash for two seconds.

⇨ The operating mode has been changed and saved in the electronic processor.

6.1.3 Position setting Closed, A, B, C, Open and tolerance

The positions can be changed using the buttons on the electronic processor or via the inputs through the external control unit.

1. Press the *Select* button or activate the *Select* input signal.
   - ⇨ LEDs of the set operating mode flash for two seconds.
   - ⇨ The first output to be saved flashes.
2. Move gripper fingers to the desired position.
3. Press the *Save* button or activate the *Save* input signal.
   - ⇨ The desired position is saved. After saving, the next output is automatically activated.
4. To save all positions, move the gripper finger to the desired position and save the position. Once all positions have been saved, no output flashes.

NOTE

If only a specific position is to be saved, press the *Selection* button or the *Selection* input signal repeatedly until the desired output flashes.

6.2 Operation with software/remote maintenance functionality

6.2.1 General information

The software for the electronic processor consists of two programs:

1. **Gateway**
   Gateway monitors the COM port and incoming requests from the internet and releases the connection to the *FPS controller*. The signals coming from the electronic processor at the COM port are converted by the gateway into the TCP/IP protocol. The connection to the *FPS controller* is established via port 5000 – 5002.
2. **FPS-Controller**
   FPS-Controller visualizes the connected FPS-F5 electronic processor.
   Attention: The "FPS-Controller" software is only compatible with Windows XP or older versions.

Both programs are controlled via an initialization file, ▶ 6.2.2 [🗋 24].

NOTE
If there are connection problems, contact SCHUNK Service.

6.2.2 Initialization file

The initialization file contains a range of information that influences the program start. The file is read once when the program is started. Most entries are written and saved while the program is running.

Please contact SCHUNK Service if there are any issues.

FPS controller

All preset entries in the initialization file apply to almost every system.

Gateway

The most important entries	
Ports	Number of electronic processor connected at the same time
Secured = 0	No password request at program start
Secured = 1	Password request at program start
Password	If the password prompt at program start is set, the password is shown here.
Port 1	Change settings for the first electronic processor COM port, default setting is COM1
Port 2	Change settings for the second electronic processor COM port, default setting is COM2

6.2.3 Connection options

6.2.3.1 Connect the electronic processor to the higher-level control system

- An operating system *Windows* is available on the computer of the higher-level controller

1. Open the cover of the electronic processor.
2. Plug the adapter cable into the serial interface of the electronic processor.
3. Plug the socket of the adapter cable into the serial interface of the computer.
4. Connect the voltage supply to the electronic processor.
5. Install the *Gateway* and *FPS-Controller* programs.
6. Integrate the required commands into the higher-level control system.

6.2.3.2 Connecting the electronic processor to the computer

- Windows operating system is available on the computer

1. Open the cover of the electronic processor.
2. Plug the adapter cable into the serial interface of the electronic processor.
3. Plug the socket of the adapter cable into the serial interface of the computer.
4. Connect the voltage supply to the electronic processor.
5. Install the *Gateway* and *FPS-Controller* programs.
6. Enter the COM port in the INI file of the gateway (TCPIP_RS232_GW.ini) and save the file.
7. Start Gateway.
8. Start FPS Controller.
   ⇨ A login window appears, ▸ 6.3.2 [🗋 29].
9. Enter password if required.
10. Select network, enter IP address 127.0.0.1 and press *OK*.
    ⇨ The program window opens and the *Programming* function is displayed, ▸ 6.3.3 [🗋 29].

6.2.3.3 Connect electronic processor to computer and remote maintenance computer via the Internet

- Ports 5000–5002 are enabled
- The computer is connected to the electronic processor and the *Gateway* and *FPS-Controller* programs are installed, ▸ 6.2.3.2 [🗋 25]

1. Open the DOS window in the computer.
2. Enter the command *ipconfig* and confirm by pressing *Enter*. **IMPORTANT! The IP address is also displayed via the route print command.**
   ⇨ IP address is displayed.
3. Close the DOS window.
4. Start the remote maintenance computer.
5. Start FPS Controller.
   ⇨ A login window appears, ▸ 6.3.2 [🗋 29].
6. Enter password if required.
7. Select the network, enter the IP address of the computer connected to the electronic processor and press *OK*.
   ⇨ The program window opens and the *Programming* function is displayed, ▸ 6.3.3 [🗋 29].

6.2.3.4 Connect electronic processor to modem and remote maintenance computer via the telephone network

A communication program such as *Hyperterminal* is required to connect the electronic processor to a modem and to access it with a remote maintenance computer via the telephone network.

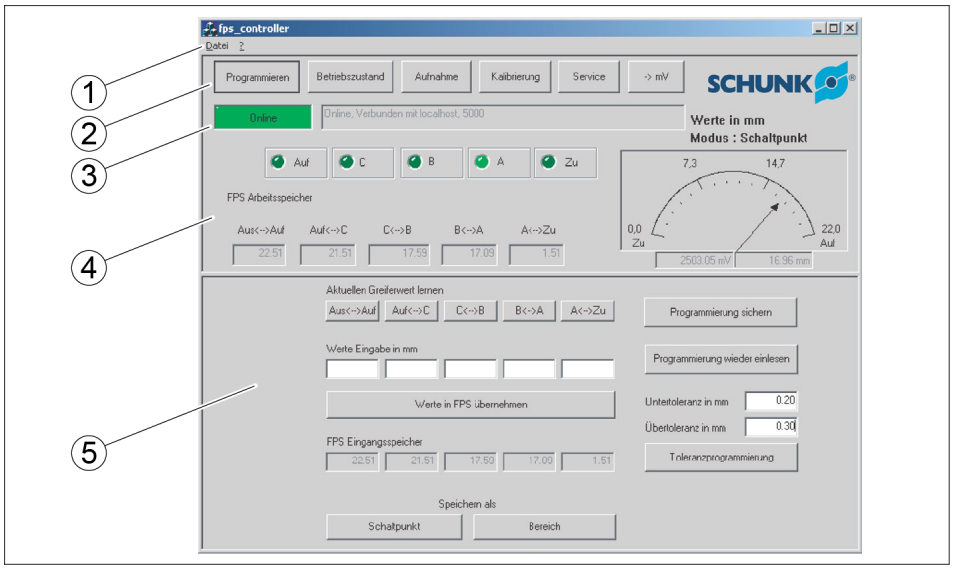
1. In the communication program, select the *Direct connection via Com1* connection and enter the following parameters:
   ⇨ Bits per second: 9600
   ⇨ Data bits: 8
   ⇨ Parity: none
   ⇨ Stop bits: 1
   ⇨ Protocol: none
   ⇨ Press "OK"
2. Initialize modem to factory settings *at &f --> Enter*.
3. Initialize the modem with the following five commands.
   ⇨ The modem must respond to all commands with OK.

atx0	confirm with Enter	Dialing routine
at&d0		Ignore DTR signal
ats0=1		pick up after the first ring
ats23=27		Baud rate to 9600 bps
at&w		Save permanently

1. Connect the modem cable to the telephone socket.
2. Connect the adapter cable of the electronic processor to the modem, use a 9-pin to 25-pin adapter if necessary.
3. Connect the remote maintenance computer to the telephone network via the modem.
4. Start the Gateway program.
5. Start the FPS Controller program.
   ⇨ A login window appears, ▸ 6.3.2 [🗋 29].
6. Enter password if required.
7. Select the modem, enter the telephone number of the modem to which the evaluation unit is connected, enter the IP address 127.0.0.1 and press *OK*.
   IMPORTANT! If an outside line is required, a 0 must be entered before the telephone number.
   ⇨ The program window opens and the *Programming* function is displayed, ▸ 6.3.3 [🗋 29].

6.3 FPS controller program

6.3.1 Program window structure



Program window

1	Menu bar	4	Display panel
2	Function bar	5	Lower half of the screen
3	Status bar		

The basic structure of the program window is the same for every function.

In the menu bar (1), the program can be closed and help can be called up.

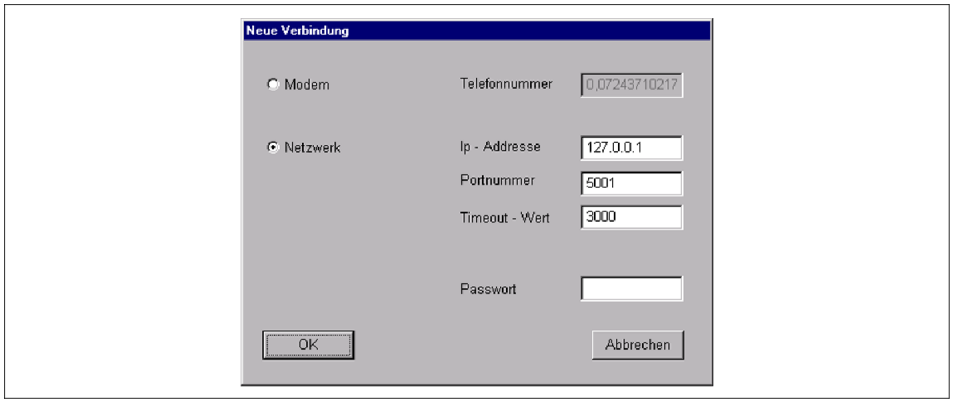
A function can be called up in the function bar (2).

The connection status, the type of connection and the selected module are displayed in the status bar (3).

The display panel (4) shows the digital outputs, the current finger position (value and pointer position) and the values of the stored switching points.

The display of the lower half of the screen (5) depends on the function selected.

6.3.2 Login window



Login window

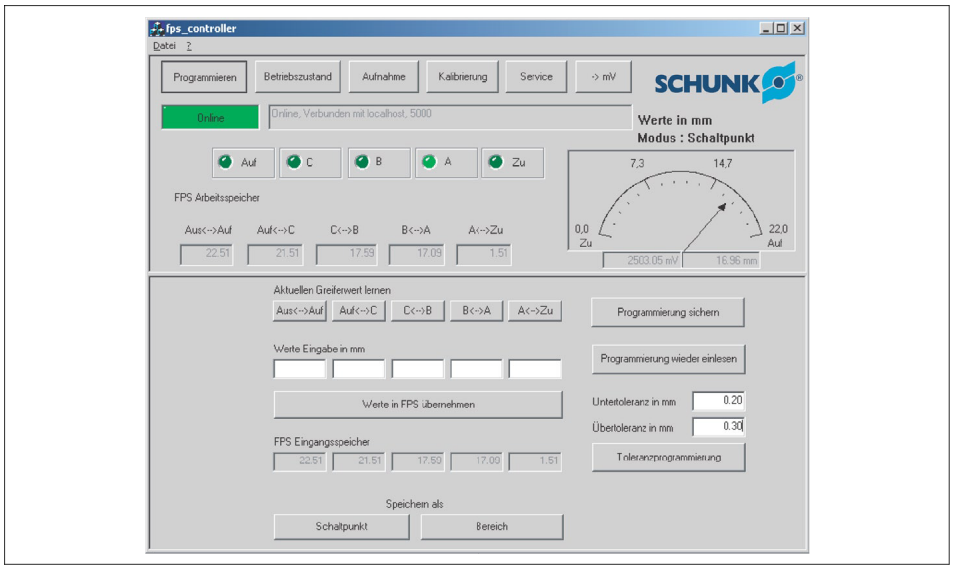
The login window opens automatically when the program is started. The login window is used to select how the computer is connected to the electronic processor.

If the *Password request at program start* variable is set in the initialization file of the *FPS controller* program, the password entered in the initialization file must be entered.

The following connection options can be selected:

- Modem and telephone number
- Internet with internet address of the computer
  - Here, select Network, enter the IP address 127.0.0.1 and the port number of the electronic processor.
- Direct connection to the computer's Com port
  - Here, select Network and enter the IP address 127.0.0.1.

6.3.3 Programming function



Programming function

This function is used to enter and save the switching points for the electronic processor *FPS-F5*.

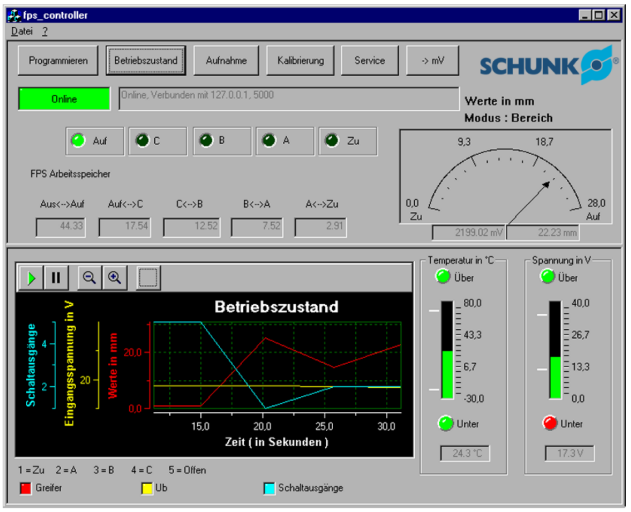
1. By pressing the *Learn current gripper value* buttons, the current position value at the time the button is pressed is entered in the input field below *Values input in mm*.
2. If the input values are known, they can also be entered directly in the *Values input in mm* input fields.

NOTE

If there is no value in one of the fields (empty field), the corresponding value remains stored and unchanged in the input memory of the electronic processor. This makes it possible to change only a single value.

3. Pressing the *Transfer values to FPS* button saves the values entered in the electronic processor input memory but does not yet activate them as new switching points.
   ⇨ Electronic processors work with the old switching points.
4. If the *Save as switching point* button is pressed, the values of the input memory are written directly to the working memory of the electronic processor.
   ⇨ From this point on, the electronic processor will work with these new switching points.
5. **Or:** If the *Save as range* button is pressed, the values of the input memory are written to the working memory of the electronic processor so that the switching point is always exactly in the middle between two values of the input memory. This results in previously taught-in parts being optimally differentiated from one another.
   ⇨ From this point on, the electronic processor will work with these new switching points.

6.3.4 Operating status function



Operating status function

This function displays the current operating status. The following values are displayed:

- Diagram with switching outputs, input voltage and position values
- Temperature inside the electronic processor
- Voltage supply of the electronic processor

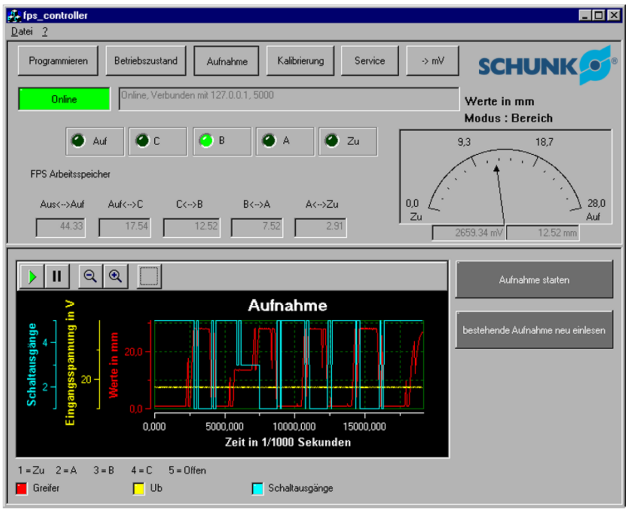
If the temperature and voltage supply values exceed or fall below the limit values once, the corresponding LED lights up red. Each time the system is restarted, the LED remains red.

Switching outputs, input voltage and position values in the diagram are displayed in relation to time. The diagram is updated every second.

NOTE

Detailed information on switching outputs, input voltage and position values can be called up in the *Recording* function. The entire diagram can be zoomed by pressing the *magnifying glass* buttons. Pressing the *Window* button allows you to zoom into any area of the diagram.

6.3.5 Recording function



Recording function

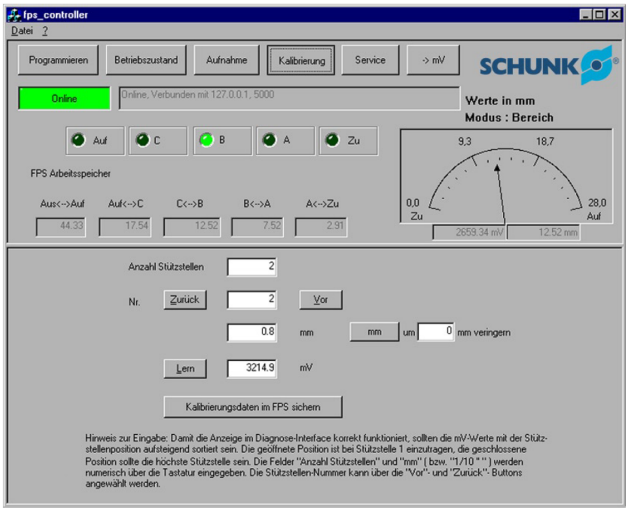
This window displays the most recently recorded values of the switching outputs, the input voltage and the position values saved in the electronic processor.

If a new recording is to be made, the *Start recording* button must be pressed. The electronic processor then save the states of the next 15 seconds at a rate of one millisecond, compresses this data and then transfers it to the connected computer. The transfer can take up to several minutes.

NOTE

Recording can also be carried out without a connected computer. Here, the *Save* button must be pressed on the electronic processor during normal operation.

6.3.6 Calibrate function

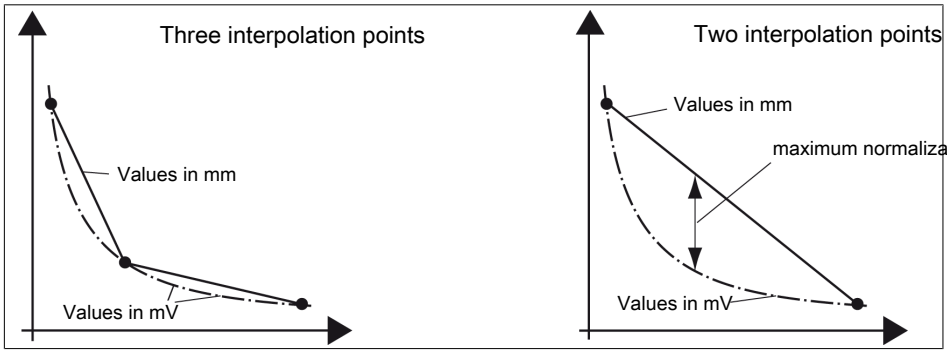


Calibrate function

The system works by converting the magnetic field into an analog voltage and digitizing this voltage. These voltage values cannot generally be assigned directly. To enable direct assignment, the measured values (in mV) must be converted into the gripper opening width (in mm). This assignment is carried out once by entering interpolation points. The sampling points are stored in the electronic processor and are available to the connected software.

As the magnetic field is not linear, the ratio of delta (mV) to delta (mm) changes at each stroke position of the gripper. This means that absolute tolerances can only be used after calibration. Working with tolerances in mV is a major source of error and only works in a very limited range (quasi linear range of the magnetic field curve).

- Performing calibration
- Only work in mm mode



Example of interpolation points

NOTE

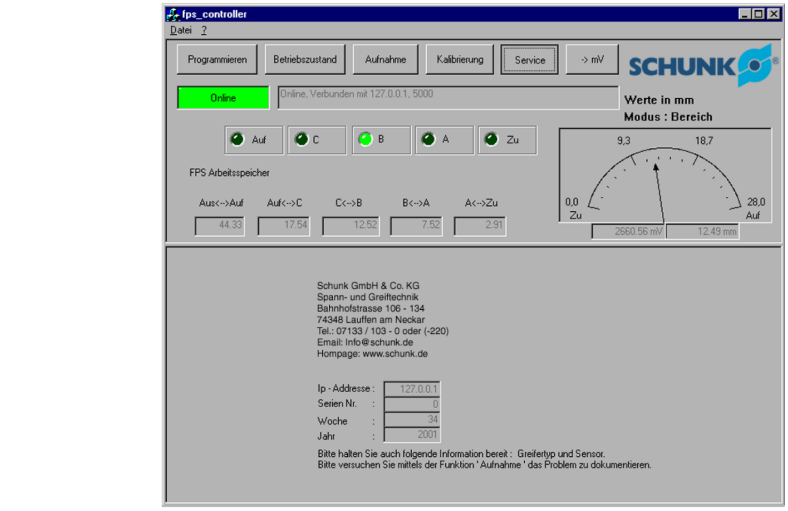
The interpolation points must be programmed in the order from *Gripper Open* to *Gripper Closed*. The *Gripper Open* position corresponds to support point 1.

1. Enter the number of interpolation points.
   ⇨ Standardization in increments of 0.5 mm or less is recommended. The number of interpolation points is calculated from the **formula:** Number of interpolation points = [(gripper stroke/step width) +1].
2. Move the gripper fully open.
3. Enter the opening width in mm and press the *Learn* button.
4. Press *OK*.
5. Place the gripper in the next position.
6. Enter the opening width in mm and press the *Learn* button.

7. After entering all the interpolation points from *Gripper Open* to *Gripper Closed* press the *Save calibration data in the FPS* button.

You can use the *Back* and *Forward* buttons to check the reference points entered.

6.3.7 Service function



Service function

This window contains all the information required for support from SCHUNK.

7 Troubleshooting

7.1 Unit cannot be programmed

With the FPS unit, the positions can be taught via buttons and software, but the values are not transferred to the EEPROM memory.

- Hardware defect on the circuit board.

7.2 No connection possible via the software

1. Driver not installed correctly.
2. Electronics defective.

7.3 Module does not react/draws no current

1. Check the voltage supply
2. Check the connector.
3. Hardware defect due to overload.

7.4 Sensor cannot detect switching points

1. Check the overall system.
2. Sensor set correctly?/teach if necessary.

7.5 Several signals are present at the same time

1. Excess voltage fault.
2. Earthing terminal connected?
3. Smooth out +Vcc voltage.

7.6 Jumping signals at the FPS

1. Sensor not set correctly.
2. Sensor not taught in --> Observe the sensor operating manual.
3. Switching lug/attachment kit for sensor not installed.
4. Switching points not set correctly.
5. Hardware defect on the FPS unit.

7.7 Signals A/B/C do not light up

1. Taught correctly?
2. Hardware defect/unit has no polarity reversal.

8 Translation of the original declaration of conformity

Manufacturer/ Distributor	SCHUNK SE & Co. KG Spanntechnik | Greiftechnik | Automatisierungstechnik Bahnhofstr. 106 – 134 D–74348 Lauffen/Neckar
Product designation:	Electronic processor FPS-F5
ID number	0301805

We hereby declare on our sole authority that the product meets the requirements of the following directives at the time of the declaration.
The declaration is rendered invalid if modifications are made to the product.

- **Electromagnetic compatibility (EMC directive) 2014/30/EU**

Applied harmonized standards, especially:

EN 60947-5-7:2003	Low-voltage switchgear and controlgear – Part 5-7: Control circuit devices and switching elements – Requirements for proximity devices with analogue output (IEC 60947-5-7:2003)

Signed for and on behalf of: SCHUNK SE & Co. KG

Lauffen/Neckar, May 2024

i.V. Nico Peper;
Director Software and Electronics;
Technology & Innovation

9 UKCA Declaration of Conformity

Manufacturer/ Distributor	SCHUNK Intec Limited Clamping and gripping technology 3 Drakes Mews, Crownhill MK8 0ER Milton Keynes
Product designation:	Electronic processor FPS-F5
ID number	0301805

We hereby declare that the product complies with all relevant harmonization legislation of the following directives at the time of declaration.
The declaration is rendered invalid if modifications are made to the product.

- **Electromagnetic Compatibility Regulations 2016**

Applied harmonized standards, especially:

EN 60947-5-7:2003	Low-voltage switchgear and controlgear – Part 5-7: Control circuit devices and switching elements – Requirements for proximity devices with analogue output (IEC 60947-5-7:2003)

Person authorized to compile the technical documentation:
Marcel Machado, address: refer to manufacturer's address

Signed for and on behalf of: SCHUNK SE & Co. KG

Lauffen/Neckar, May 2024

i.V. Nico Peper;
Director Software and Electronics;
Technology & Innovation

10 Information on the RoHS Directive, REACH Regulation and Substances of Very High Concern (SVHC)

RoHS Directive

SCHUNK products are classified as "large-scale stationary installations" or as "large-scale stationary industrial tools" within the meaning of Directive 2011/65/EU and its extension 2015/863/EU "on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)", or fulfill their intended function only as part of one. Therefore products from SCHUNK do not fall within the scope of the directive at this time.

REACH Regulation

Products from SCHUNK fully comply with the regulations of Regulation (EC) No. 1907/2006 "concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)" and its amendment 2022/477. SCHUNK attaches great importance to completely avoiding chemicals of concern to humans and the environment wherever possible.

Only in rare exceptional cases do SCHUNK products contain SVHC substances on the candidate list with a mass content above 0.1%. In accordance with Article. 33 (1) of Regulation (EC) No. 1907/2006, SCHUNK complies with its duty to "communicate information on substances in articles" and lists the components concerned and the substances used in an overview that can be viewed at **schunk.com\SVHC**.

Signature: see original declaration

Lauffen/Neckar, May 2024

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

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