FAG

FAG SmartCheck

Network basics

SCHAEFFLER

LuK INA FAG

Imprint

FAG Industrial Services GmbH
Kaiserstraße 100
52134 Herzogenrath
Germany
Telephone: +49 (0) 2407 9149 66
Telefax: +49 (0) 2407 9149 59
Email: industrial-services@schaeffler.com
Webside: www.schaeffler.com/services

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Contents

1 Generell ... 4

1.1 About this guide ... 4

2 Network basics FAG SmartCheck ... 5

2.1 What is a network? ... 5

2.2 What is the TCP/IP protocol? ... 5

2.3 What is a IP address? ... 5

2.3.1 What is a subnet mask? ... 5

2.3.2 What is the difference between IPv4 and IPv6? ... 6

2.4 What is a hostname? ... 6

2.5 What is a MAC address? ... 6

2.6 What is a DHCP server? ... 6

2.7 What is a gateway? ... 7

2.8 What is a proxy? ... 7

2.8.1 Deactivate proxy ... 7

2.9 What is a browser cache? ... 9

2.9.1 Clear browser cache ... 10

2.10 How to determine the active IP address? ... 12

2.10.1 Determine the IP address of the PC ... 12

2.10.2 Determine the IP address of the FAG SmartCheck device ... 13

2.11 How to set the IP address? ... 14

2.11.1 Setting the IP address of the PC ... 14

2.11.2 Setting the IP address of the FAG SmartCheck device ... 16

2.12 How to test an IP address with PING? ... 17

2.13 How to integrate a FAG SmartCheck device into a network? ... 19

2.13.1 Connect FAG SmartCheck device directly with the PC (without network) ... 19

2.13.2 The FAG SmartCheck device is located in a network without DHCP ... 20

2.13.3 The FAG SmartCheck device is located in a network with DHCP ... 21

2.14 What if I cannot reach the FAG SmartCheck device? ... 22

2.14.1 Connection problems in the FAG SmartUtility or FAG SmartUtility Light software ... 22

2.14.2 Connection problems in the FAG SmartWeb software ... 23

3 Contact / Support ... 24

1 Generell

1.1 About this guide

This document describes the basics of computer networks. Most of it is common knowledge, some parts are specific to the vibration monitoring system FAG SmartCheck, the FAG SmartUtility or FAG SmartUtility Light software, the FAG SmartWeb software and the operating system Microsoft Windows 7.

Further information

The FAG SmartCheck vibration monitoring system also includes the integrated FAG SmartWeb software. To operate the FAG SmartCheck device, you will also need the supplied FAG SmartUtility Light software. You also have the option of purchasing the FAG SmartUtility, which features enhanced functionality.

The vibration monitoring system and the software products are dealt with in separate manuals.

Symbols used

This symbol indicates

- *helpful additional information and*
- *device settings or practical tips that will help you to perform activities more efficiently.*

Cross-reference symbol : This symbol refers to a page in the manual that provides further information. If you are reading the manual in PDF format on screen, clicking the word to the left of the cross-reference symbol will take you straight to the section in question.

2 Network basics FAG SmartCheck

2.1 What is a network?

A network is a connection of several computers or other network-compatible devices, like e.g. a FAG SmartCheck device. The connection can be realized by Ethernet LAN (**L**ocal **A**rea **N**etwork) or by WLAN (**W**ireless **LAN**).

There are public networks (e.g. the Internet), where each network address 6 must only exist once and local private networks (e.g. company networks).

2.2 What is the TCP/IP protocol?

To understand each other, all members of a computer network need a common language, which is called protocol. Among different protocols, the most commonly used protocol is the TCP/IP protocol (**T**ransmission **C**ontrol **P**rotocol / **I**nternet **P**rotocol). The following documentation is restricted to the TCP/IP protocol.

2.3 What is a IP address?

In a telephone network each member needs a telephone number. Accordingly each member of a computer network needs an identification number. In TCP/IP networks this identification number is called IP address. A commonly used IPv4 address is a number built of 4 parts, where each part is a number between 0 and 255.

Example:

IP address
`192.168.1.22`
`10.13.100.5`

2.3.1 What is a subnet mask?

The subnet mask is also a number built of 4 parts, where each part is a number between 0 and 255. A subnet mask determines, which parts of the associated IP address must be identical, so that 2 network members can communicate. The number 255 says "this part must be identical", the number 0 says "this part does not matter".

Example:

Subnet mask	**`255.255.255.0`**
Member A	`192.168.1.50`
Member B	`192.168.1.70`
Member C	`192.168.2.90`

Members A and B can communicate, because they are only different in the 4th part. Member C cannot communicate, because his IP address is different in the 3rd part, but the subnet mask is not `0` here. With a subnet mask of `255.255.0.0` member C could also communicate.

The subnet masks `255.255.255.0` *and* `255.255.0.0` *are the most commonly used ones. Values 1-254 are also possible; then the check is performed on bit basis, but this is not subject to this introduction.*

A subnet mask calculator can be found at http://www.subnet-calculator.com.

2.3.2 What is the difference between IPv4 and IPv6?

There are IP addresses of the fourth (IPv4) and the sixth generation (IPv6). IP addresses of the fourth generation (IPv4) consists of 4 parts. The IPv4 protocol provides an address space of max. 256*256*256*256 = approximately 4 billion IP addresses. That is not enough in the foreseeable future. For this reason, the Internet protocol of the sixth generation (IPv6) was invented. The IPv6 protocol provides 340 sextillion addresses. This IP addresses consists of 8 parts.

Example:

Protocol version	IP address
IPv4	`192.168.1.22`
IPv6	`2001:0db8:85a3:08d3:1319:8a2e:0370:7344`

2.4 What is a hostname?

A hostname is a unique name of a network member in a network. A hostname is usually easier to remember than for example an IP address. Each FAG SmartCheck device, a hostname can be assigned (see chapter "Setting the IP address of the SmartCheck device" 16).

2.5 What is a MAC address?

The MAC address (**M**edia-**A**ccess-**C**ontrol address; or also called physical address) is a globally unique number of each network adapter hardware. Typically, a MAC address consists of 6 bytes which are written in hexadecimal. Because each MAC address is unique, it is often used as a serial number of a device, e.g. with the FAG SmartCheck device.

Example:

MAC address
`f4:3d:80:00:16:b5`

2.6 What is a DHCP server?

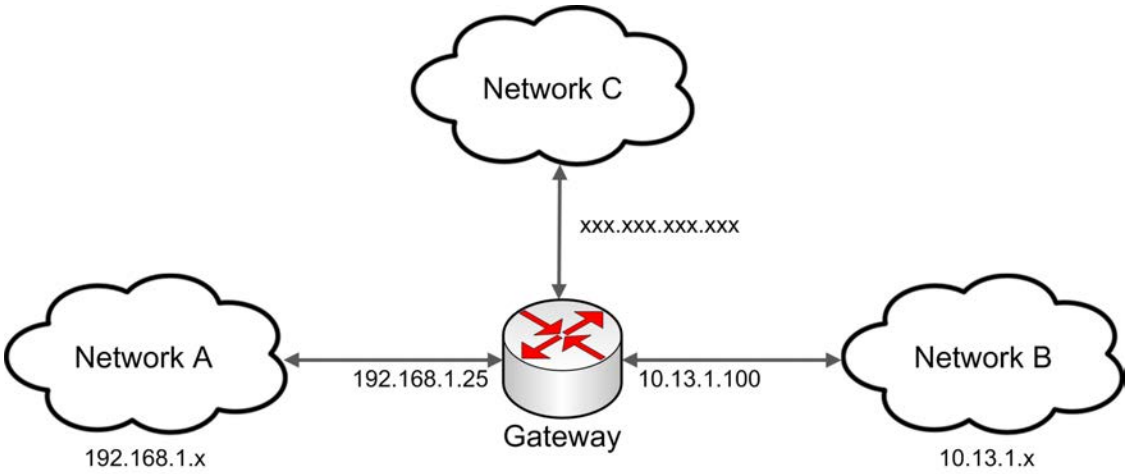
IP addresses can be assigned statically or dynamically. In the static assignment a network member gets a permanent IP address. With dynamic assignment, a network member gets after each power-on its IP address from a so-called DHCP server (**D**ynamic **H**ost **C**onfiguration **P**rotocol).

A DHCP server manages a pool of IP addresses and assigns each network member (also known as DHCP client) an IP address if he requests one. This IP address must not always be the same, but this can be enforced, if the system administrator configures a fixed IP address for the associated MAC address.

The FAG SmartCheck device can work with a fixed IP address as well as receiving its address from a DHCP server. The latter corresponds to the delivery status of the FAG SmartCheck device.

2.7 What is a gateway?

A gateway is a juncture for a number of different networks or subnets. Today mostly "default gateway" were used, that simply transmit all requests to foreign networks or subnets according to their configuration settings:



Example:

The members from the networks A and B may not communicate normally, because their IP addresses belong to different networks. But if each member sends his requests to his gateway instead, the gateway can forward the request accordingly. Therefore a gateway has multiple IP addresses, one for each network.

2.8 What is a proxy?

A proxy is also a connector between different networks. But a proxy acts more as a representative for a network with respect to other networks.

Compared to a simple gateway, a proxy can analyze the data traffic, filter requests, make modifications or buffer answers. Thus, they are quickly available in case of recurring requests, which is mainly important in the Internet traffic.

Often, a network member is configured in a way, that it does not send all inquiries directly to the target address, but instead of that it sends to the proxy.

2.8.1 Deactivate proxy

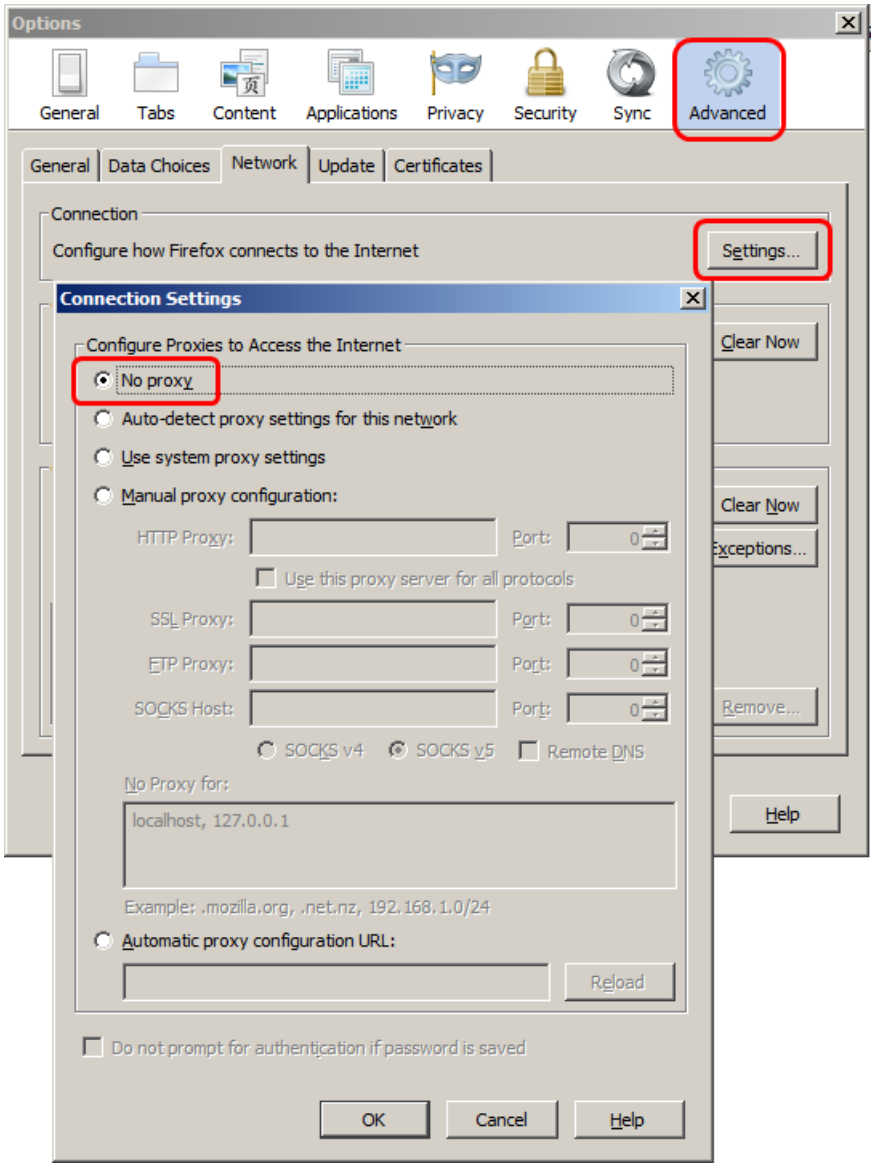
If you cannot reach the FAG SmartCheck device, this may be due to the proxy settings in your Internet browser. Then you cannot reach a SmartCheck device that is connected to a PC 23.

You have to deactivate the proxy, if you connect the FAG SmartCheck device directly with the PC.

You can disable the proxy in your Internet browser as follows:

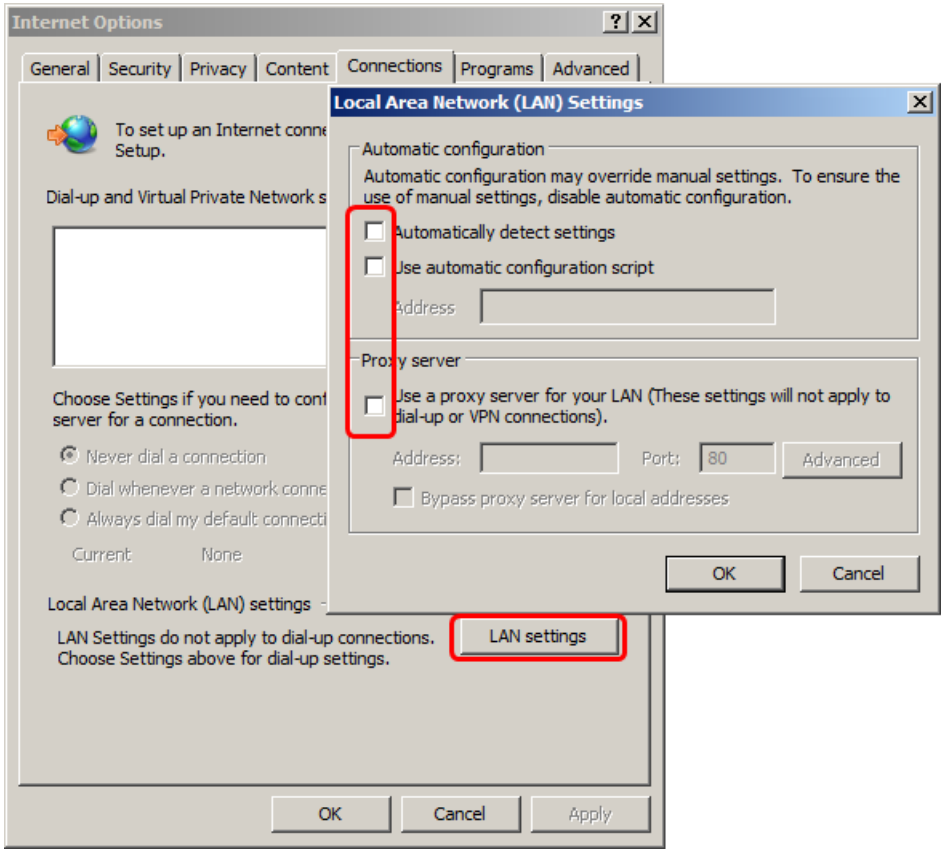
Deactivate proxy in Mozilla Firefox

- Click on the button **Open menu** ☰.
- Open **Advanced** in the **Settings** section.
- Select the **Network** tab and
- click in the **Connections** area on **Settings**.
- Select the connection settings **No proxy** and click **OK**.
- Close the settings.



Deactivate proxy in Microsoft Internet Explorer

- Click on the button **Extras** .
- Open the **Internet Options**.
- Select the **Connections** tab and
- click **LAN Settings**.
- Disable all 3 checkboxes and click **OK**.
- Close the settings.



2.9 What is a browser cache?

The browser cache is a buffer which stores temporarily graphics, scripts and other web page content locally stored on the user's PC. This will speed up many operations, because these data do not have to be downloaded again the next time.

Sometimes the browser cache contains outdated data without recognizing this. As a result the SmartWeb web interface of the SmartCheck device is no longer functioning properly.

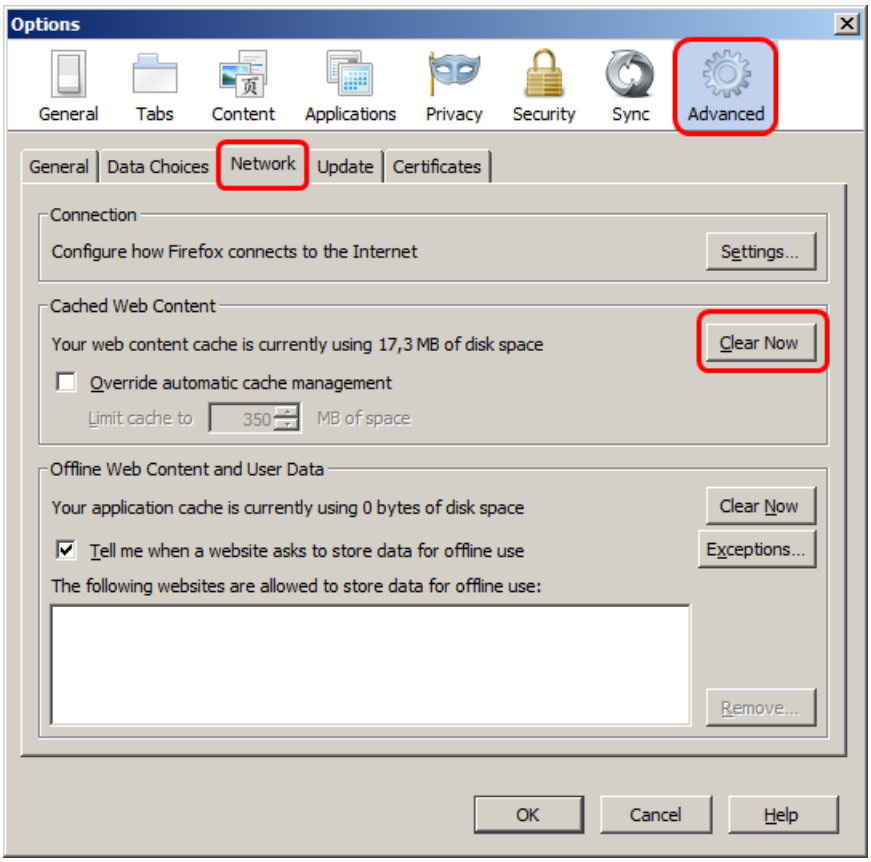
If you update the FAG SmartCheck firmware, please clear the browser cache.

2.9.1 Clear browser cache

You can clear the browser cache in Mozilla Firefox and Internet Explorer as follows:

Clear browser cache in Mozilla Firefox

- Click on the button **Open menu** .
- Open **Advanced** in the **Settings** section.
- Select the **Network** tab and
- click in the **Cached Web Content** area on **Clear now**.
- Click **OK.**

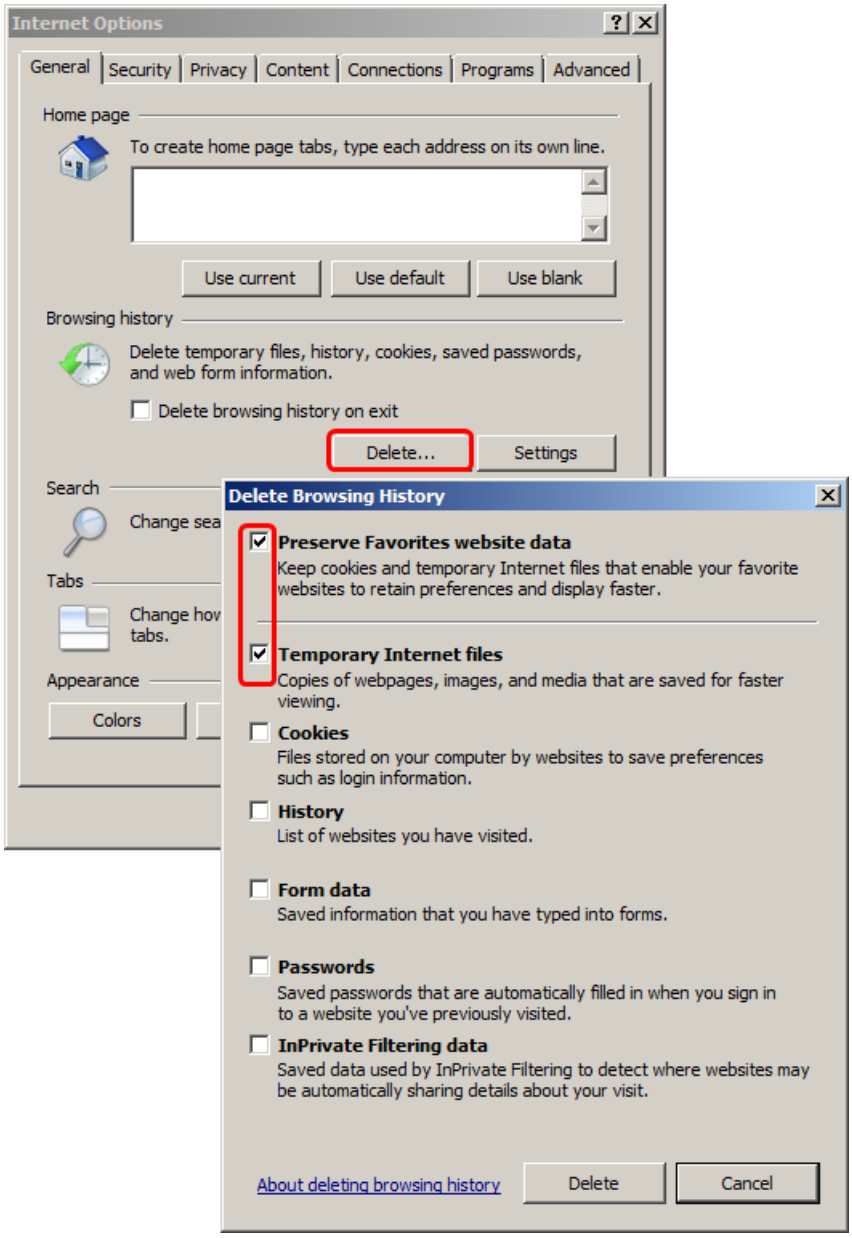


Clear browser cache in Microsoft Internet Explorer

- Click on the button **Extras** .
- Open the **Internet Options**.
- Select the **General** tab and
- click in the **Browsing history** area on **Delete**.
- Select the options **Preserve Favorites website data** and **Temporary Internet Files** and
- click on **Delete.**

Please do not select the other options. Otherwise more data will be deleted, as required.

- Close the settings.



2.10 How to determine the active IP address?

The following section describes how you can determine the active IP address of your PC and the IP address of the FAG SmartCheck device.

2.10.1 Determine the IP address of the PC

To determine the IP address of your own PC, your PC must already be connected via network cable to a network or a network device.

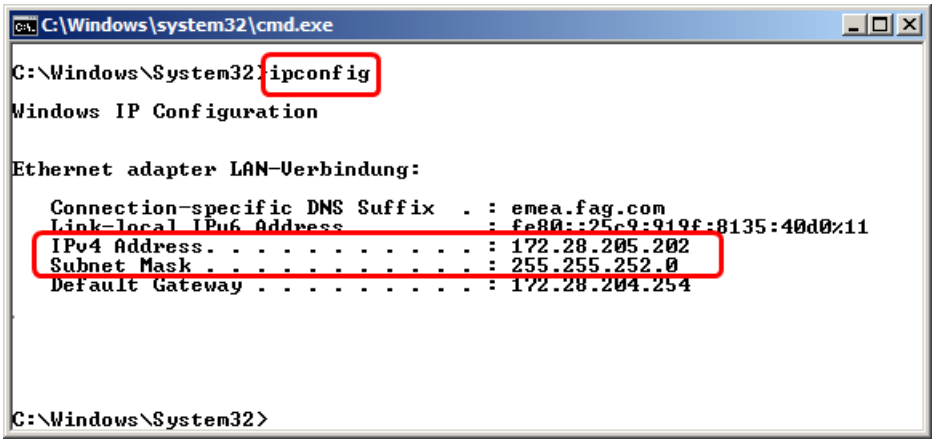
You can determine the IP settings of your PC under Windows 7 as follows:

- Click **Start** on the Windows taskbar.
- Enter **CMD** into the search field and press **Enter**.

The window with the Windows command prompt opens. Here you can enter MS DOS commands and other computer commands after the **>** prompt.

- Type **ipconfig** and press **ENTER**.

Now the IP address 5, the subnet mask 5 and the default gateway 7 of your PC will be displayed.



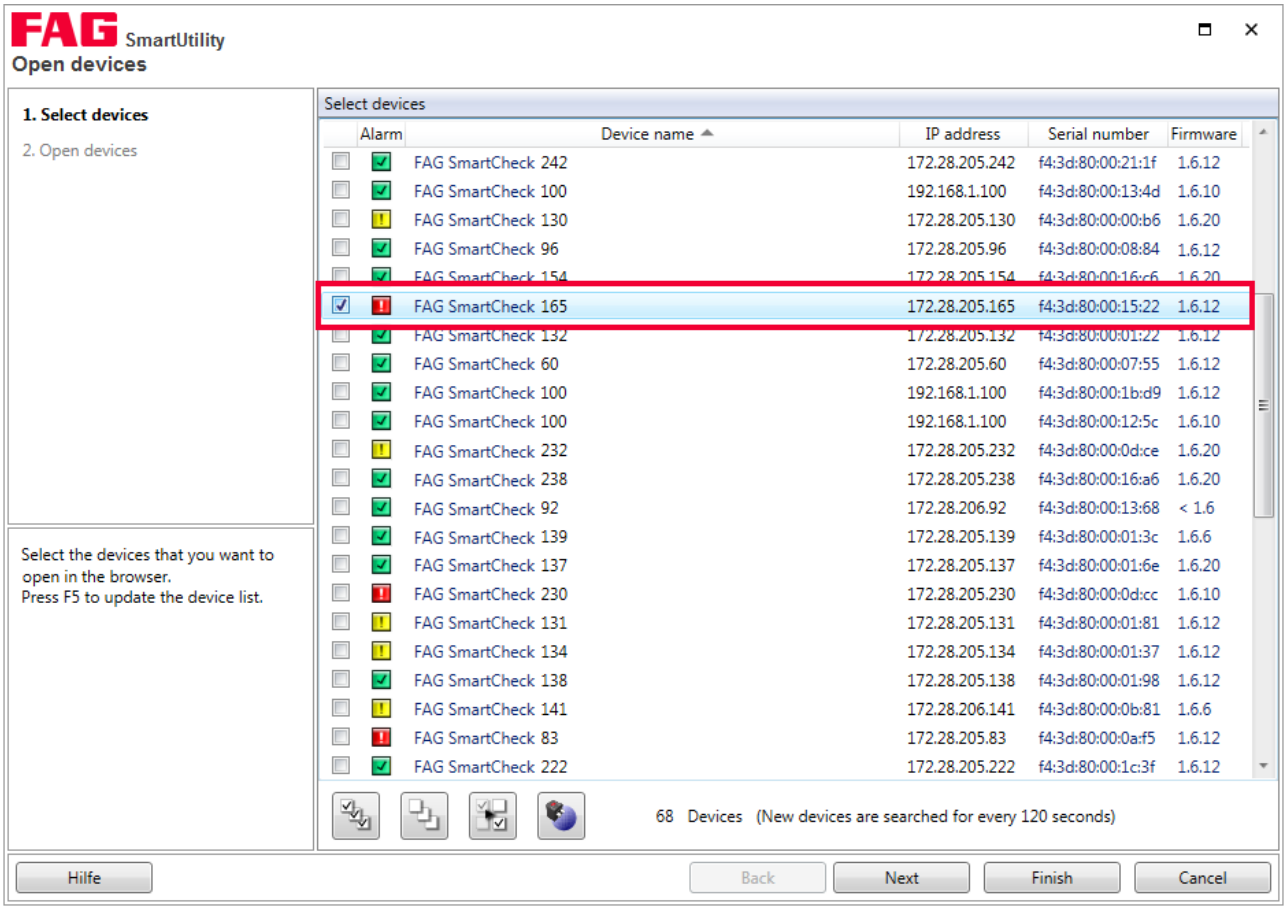
You can close the Windows command prompt by clicking ✕ **Close**.

2.10.2 Determine the IP address of the FAG SmartCheck device

You can determine the IP settings of the FAG SmartCheck device in the FAG SmartUtility or FAG SmartUtility Light software as follows:

- Open the FAG SmartUtility or FAG SmartUtility Light software.
- Click **Open devices**.
- Search the desired device in the list by its serial number 6 or name and read the IP address.

You can find further information to the dialog "Open devices" in the FAG SmartUtility or FAG SmartUtility Light software manual.



2.11 How to set the IP address?

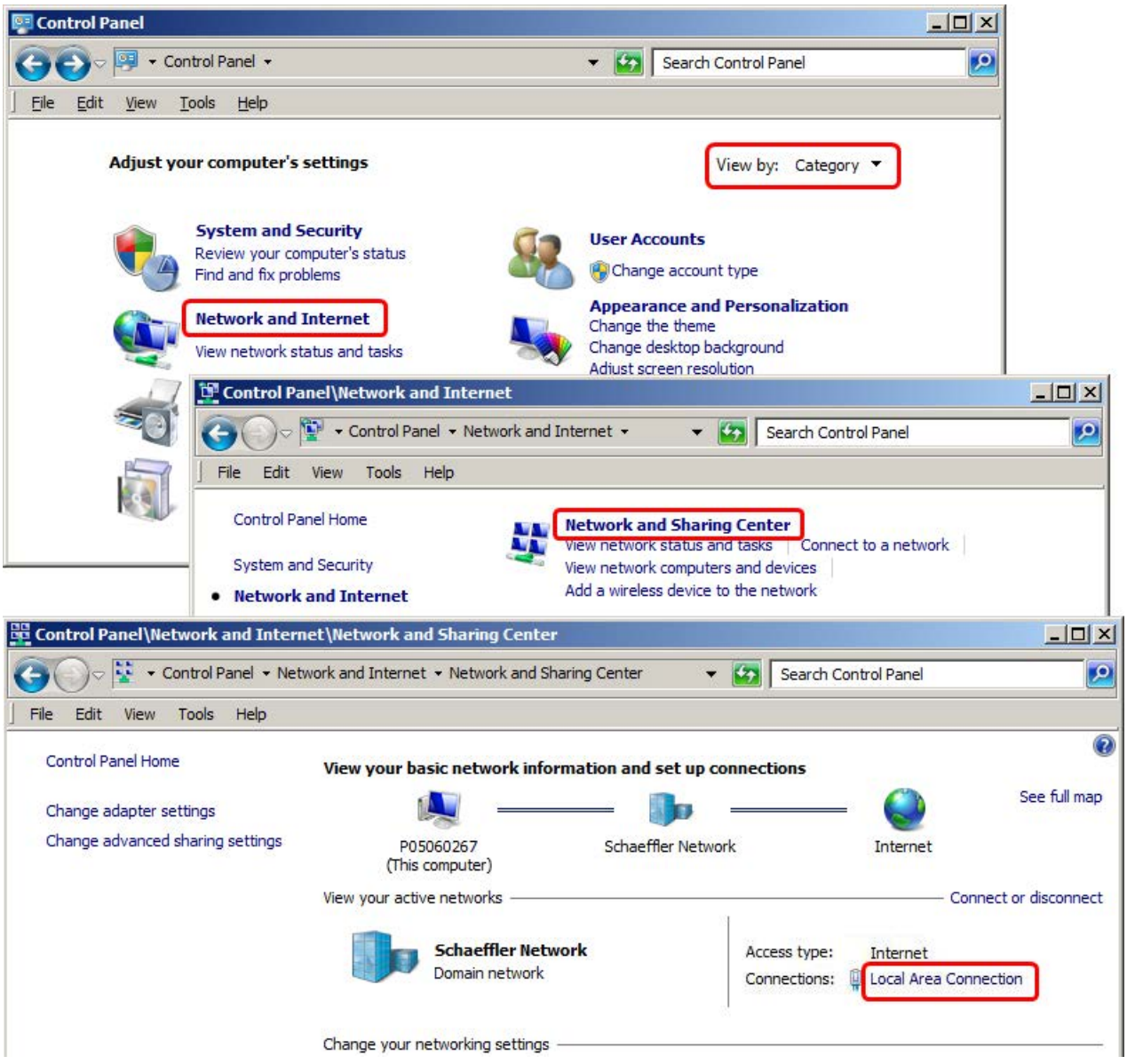
The following section describes how you can set the active IP address of your PC and the FAG SmartCheck device.

2.11.1 Setting the IP address of the PC

Your PC needs a suitable IP address [12] to be able to communicate with a network (or FAG SmartCheck device). To determine the IP address of your PC, your PC must already be connected via network cable to a network or a network device.

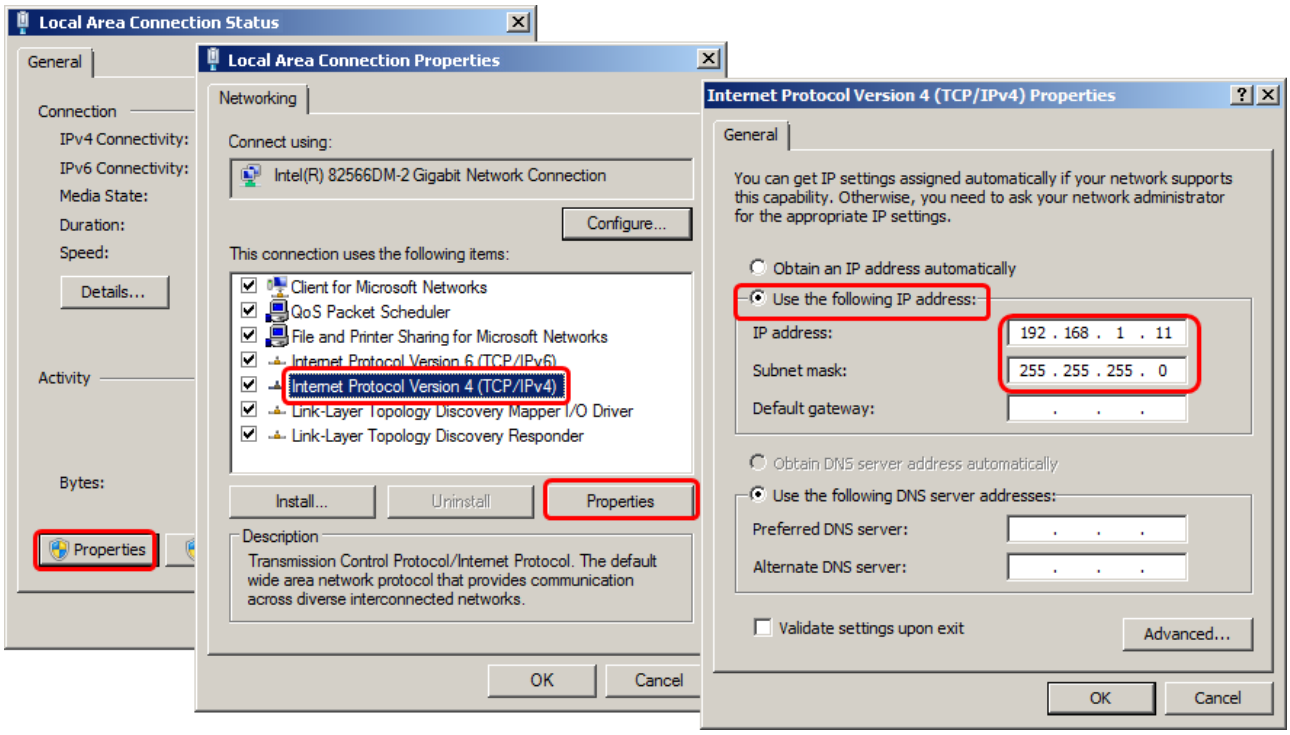
You can set the IP address of your PC under Windows 7 as follows:

- Click **Start** on the Windows taskbar.
- Click **Control panel**.
- In the area "Adjust your computer's settings" set view by **Category**.
- Select **Network and Internet** and click **Network and Sharing Center**.
- Click **Connections** and then click **Local Area Connection**.



The dialogue "Local Area Connection Status" opens.

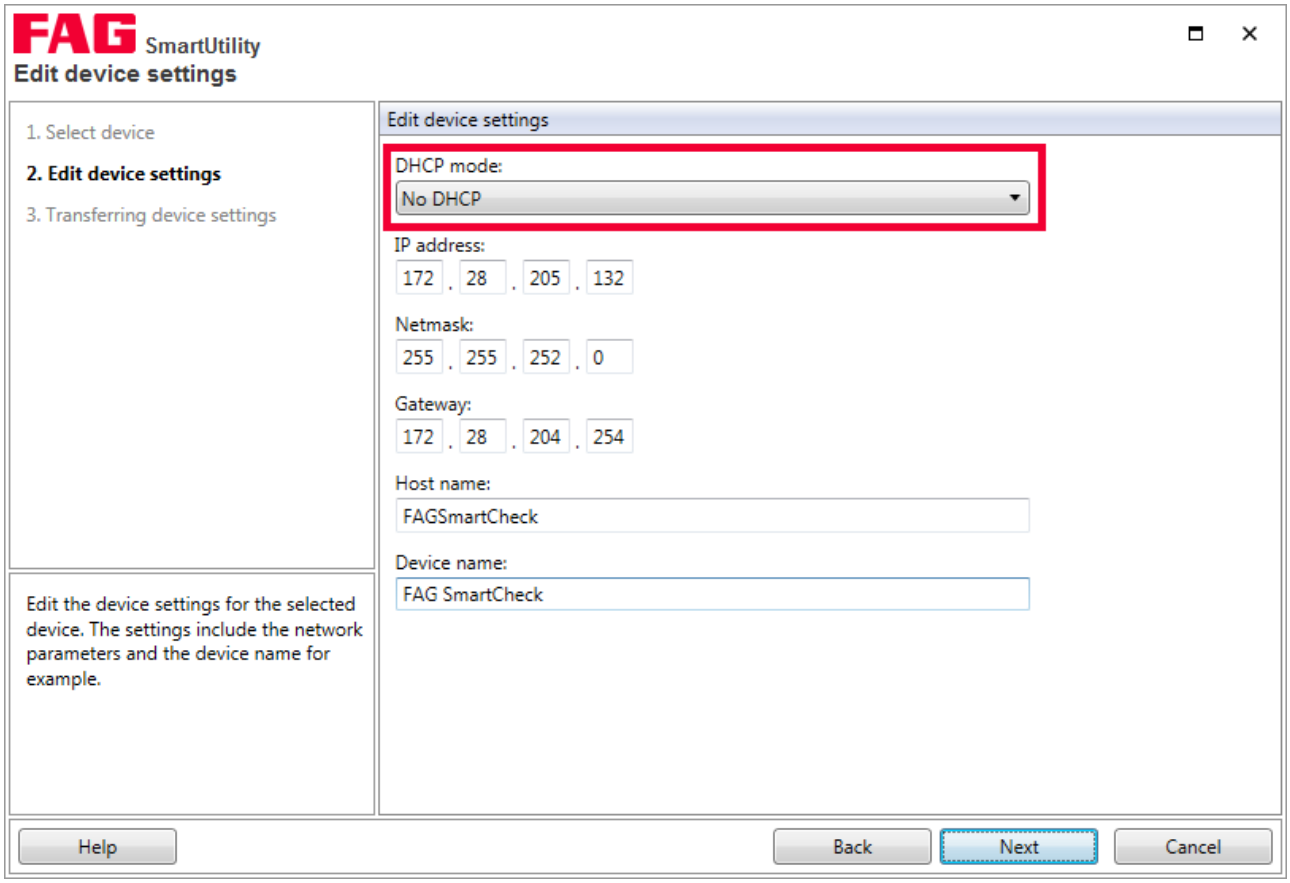
- Click **Properties**.
- Select **Internet Protocol Version 4 (TCP/IPv4)** in the list and click **Properties**.
- Select **Use the following IP address** and enter the desired **IP address** and **Subnet mask**.
  If necessary, you can also enter the default gateway. In this case please contact your system administrator.
- Click **OK**.
- Close the Network properties.



2.11.2 Setting the IP address of the FAG SmartCheck device

You can set the IP address of a FAG SmartCheck device in the FAG SmartUtility or FAG SmartUtility Light software as follows:

- Start the FAG SmartUtility or FAG SmartUtility Light software.
- Click **Edit device settings**.
- Select the desired SmartCheck device whose settings you want to edit.
- Click **Next**.



- Select the DHCP mode **No DHCP**.
- Enter the **IP address**, the **subnet mask** and if necessary the default **gateway.**
- If necessary, adjust the **hostname**.
- Click **Next**, to send the settings to the SmartCheck device.

- *Contact your system administrator to get the IP address, the subnet mask and the default gateways.*
- *The hostname is by default "SmartCheck" plus the last 6 digits of the serial number 6 of the FAG SmartCheck device (e.g. "SmartCheck001b95"). You should change this value only if your system administrator this requests.*
- *You will find more information about the dialogue "Edit device settings" in the FAG SmartUtility or FAG SmartUtility Light software manual.*

2.12 How to test an IP address with PING?

With the Command Prompt command "Ping" you can check whether a network member is reachable.

Proceed as follows:

- Click **Start** on the Windows taskbar.
- In the search box, type **CMD** and then press **Enter**.

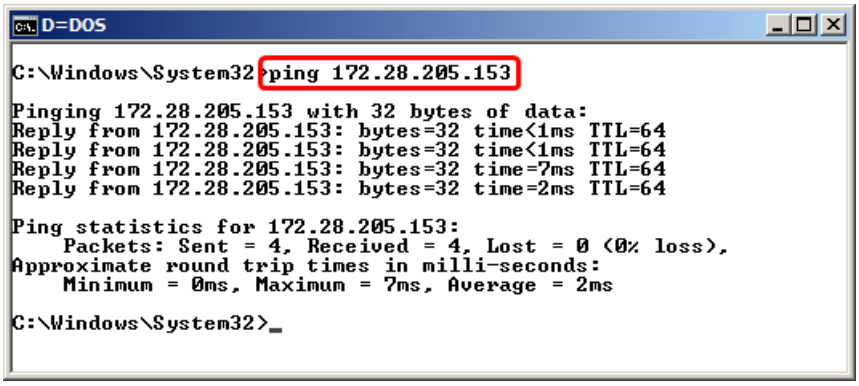
In the Command Prompt window you can enter MS DOS commands and other computer commands.

- Behind the angle bracket character (>) enter the command **ping** and the IP address, which you want to test, e.g. `"ping 172.28.205.153"`.
- Press **ENTER**.

Now the PC sends echo request packets to the other member, that the other must answer mandatory.

The member is reachable

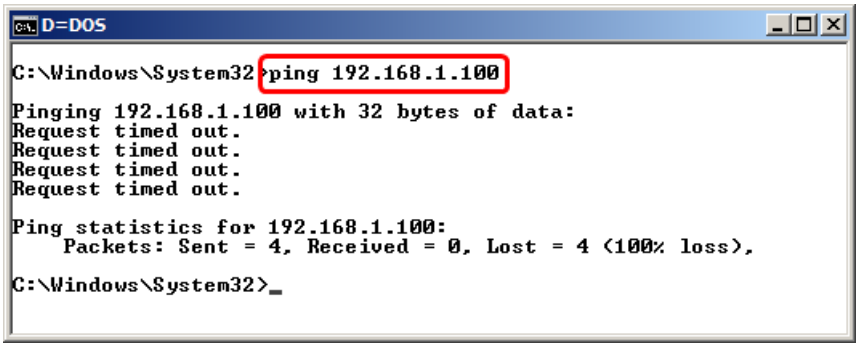
If the member can be reached, a message similar to the following will be shown:



The transmitted echo request packets have been received completely.

The member is not reachable

If the member cannot be reached or does not answer, a message similar to the following will be shown:



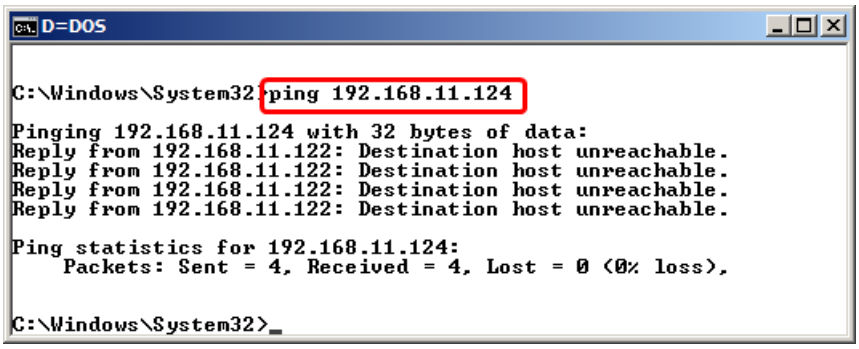
The transmitted echo request packets have not been received again.

Possible causes are:

- an incorrect IP address: Please check the IP address 5.
- an incorrect subnet mask: Please check the subnet mask 5.
- the member does not exist (due to a switched-off device, a cable break or an other defect).

The member is not reachable, because he is located in a foreign network

If the member is located in a foreign network that is generally not reachable, a similar message to the following will be shown:



The transmitted echo request packets have been received completely. but the destination host is not reachable.

Possible cause:

- The Gateway 7 cannot forward to the desired IP address.

2.13 How to integrate a FAG SmartCheck device into a network?

This section describes how you can integrate a FAG SmartCheck device in a computer network.

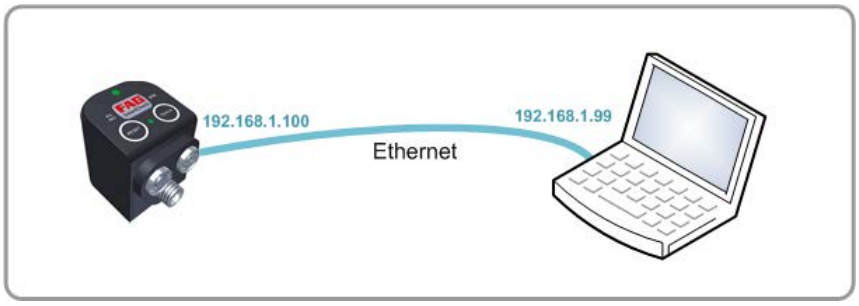
The following scenarios are considered:

- Connect the FAG SmartCheck device directly with the PC (without network) 19
- The FAG SmartCheck device is located in a network without DHCP 20
- The FAG SmartCheck device is located in a network with DHCP 21

- *Make sure that the FAG SmartCheck device is supplied with power and that the device is ready-for-operate.*
- *Connections via router in an other network are not included in this documentation. Ask your system administrator if necessary.*
- *If you cannot reach the SmartCheck device, please refer to the checklist* 22*. Contact the support* 24 *if necessary.*

2.13.1 Connect FAG SmartCheck device directly with the PC (without network)

You can connect the SmartCheck device directly via ethernet cable to your PC.



Proceed as follows:

- Connect the ethernet cable (M12 connector on RJ45) with the SmartCheck device and
- connect the other end of the ethernet cable to your PC.
- Now determine the IP address of the SmartCheck device 13. By default, the device has the IP address `192.168.1.100`. In this case the IP address of your PC must be in the range `192.168.1.x` and the subnet mask must be set to `255.255.255.0`. Think of a matching IP address.

Example:

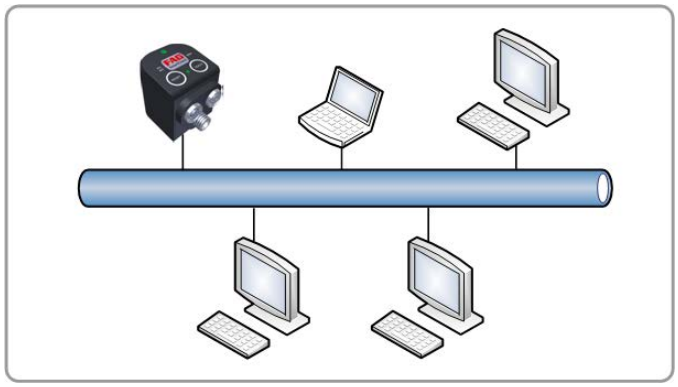
IP address SmartCheck	IP address PC	Subnet mask
`192.168.1.100`	`192.168.1.99`	`255.255.255.0`

Now set the IP address of the PC 14 as follows:

- Open **Network and Internet** and click **Network and Sharing Center**.
- Set in the Local Area Connection the IP address and the subnet mask.

2.13.2 The FAG SmartCheck device is located in a network without DHCP

If the SmartCheck device is located in a network without DHCP, you can reach the device as follows:

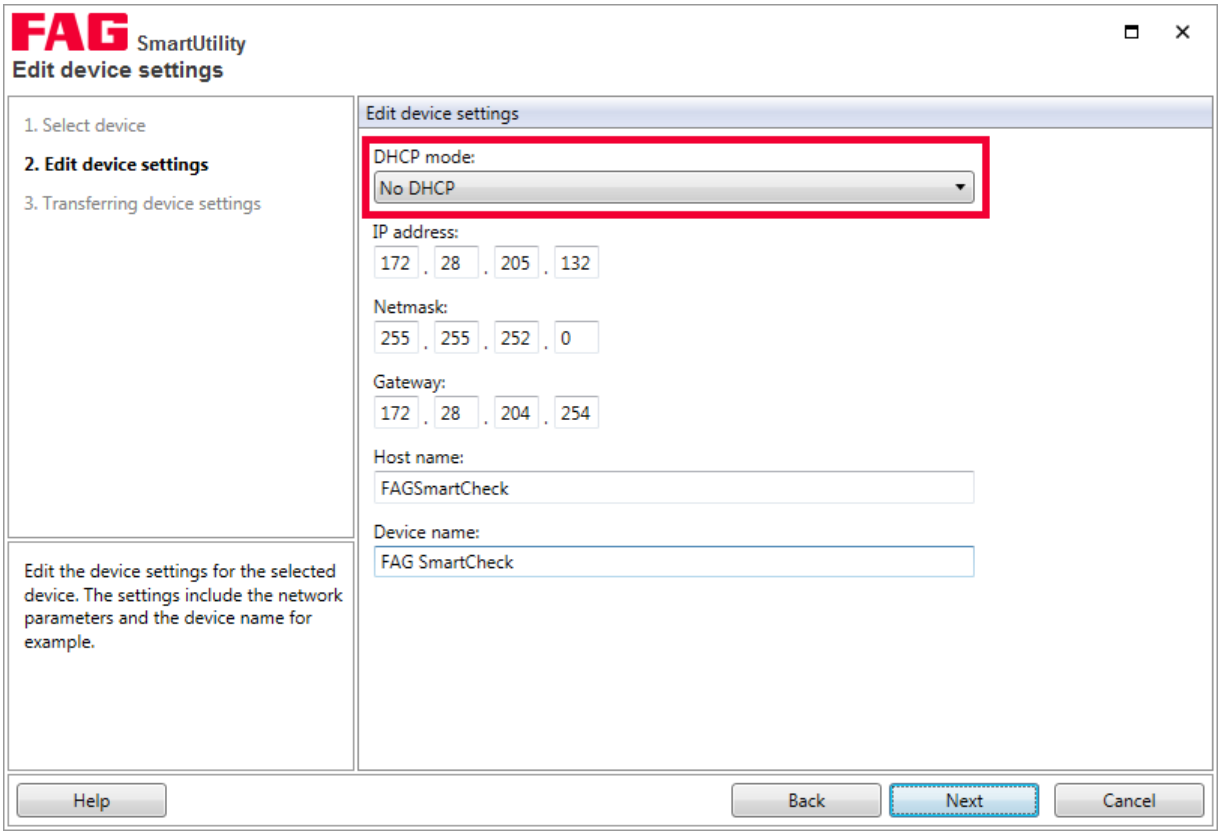


- Determine the IP address of the PC 12 and the subnet mask of your PC.
- Ask your system administrator for a free and matching IP address.

Example:

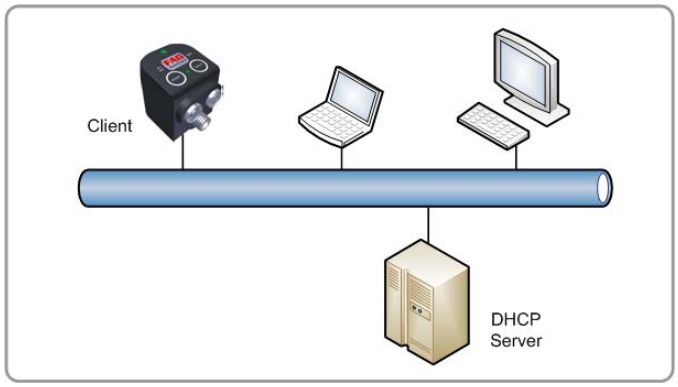
IP address PC	Subnet mask	IP address SmartCheck
172.28.205.93	255.255.255.0	172.28.205.132

- Connect the SmartCheck device with your network.
- Set the IP address and the subnet mask of the SmartCheck device in the FAG SmartUtility or SmartUtility Light software an (see chapter "Setting the IP address of the FAG SmartCheck device" 16).

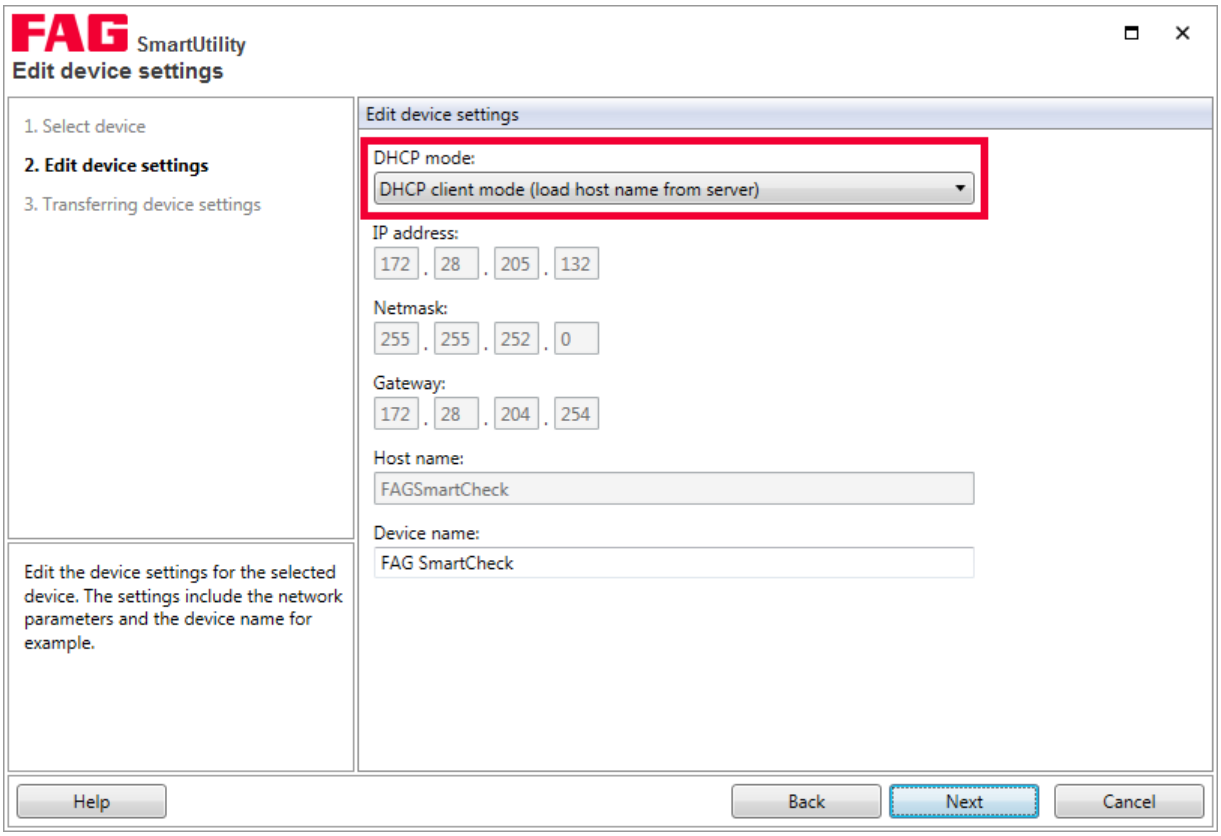


2.13.3 The FAG SmartCheck device is located in a network with DHCP

If the SmartCheck device is located in a network with DHCP, you can reach the device as follows:



- Talk to your system administrator and clarify that your DHCP server on request assigns an IP address to the SmartCheck device. Your system administrator might ask for the MAC address 6 (the serial number) of the SmartCheck device.
- Connect the SmartCheck device with your network.
- Set the DHCP mode of the SmartCheck device in the FAG SmartUtility or SmartUtility Light software on "DHCP client mode (Load hostname from server)" (see chapter "Setting the IP address of the FAG SmartCheck device" 16).



2.14 What if I cannot reach the FAG SmartCheck device?

If you have connection problems in your network with the FAG SmartCheck device, you will find in this section information for the diagnosis and troubleshooting.

If the connection problems persists, please contact your system administrator or the support 24.

2.14.1 Connection problems in the FAG SmartUtility or FAG SmartUtility Light software

If you cannot find the FAG SmartCheck device in the device list of the FAG SmartUtility or FAG SmartUtility Light software:

Possible reason	Check / Action	Information
Is the SmartCheck device ready-to-operate?	Which color shows the status LED of the SmartCheck device?	While the status LED alternately flashes red and yellow, the SmartCheck device is booting. During the boot process, the device is not reachable via network.
Disables a firewall the connection to the SmartCheck device?	Deactivate the firewall on your PC temporarily.	The UDP ports 19000 and 19001 must not be blocked by the firewall. All SmartCheck devices in the network are searched via an UDP broadcast. Your system administrator can include this exception in the firewall permanently.
Is the version of the SmartUtility or SmartUtility Light software compatible with the version of the SmartWeb firmware?	Compare the version numbers of SmartUtility or SmartUtility Light (under "Further actions" > "Info") and SmartWeb (under "Help" > "Version Information" > "Firmware").	The version number of SmartUtility or SmartUtility Light must be greater or equal of SmartWeb. If necessary, download the latest version under www.fag-smartcheck.com.
Does the SmartUtility or SmartUtility Light software work correctly?	Restart the SmartUtility or SmartUtility Light software.	Maybe a failure occurred while executing the SmartUtility or SmartUtility Light software.
Which is the easiest network connection to a SmartCheck device?	Connect the SmartCheck device directly via ethernet cable with your PC 19.	All other error causes a complex network can thus be reduced to basic functions.
Is the SmartCheck device accessible?	Interrupt the power supply of the SmartCheck device for about 10 seconds. Then the SmartCheck will reboot.	Rebooting the firmware of the SmartCheck device, obtains a defined starting point.

2.14.2 Connection problems in the FAG SmartWeb software

If you cannot open the FAG SmartWeb software in the Internet Browser:

Possible reason	Check / Action	Information
Is the IP address of the SmartCheck device correct?	Check in the device list 13 of the SmartUtility or SmartUtility Light software, which IP address the SmartCheck has. You can search the SmartCheck device via serial number.	Maybe the IP address has been reset to factory defaults. Then the IP address is 192.168.1.100.
Is the SmartCheck device ready-to-operate?	Which color shows the status LED of the SmartCheck device?	While the status LED alternately flashes red and yellow, the SmartCheck device is booting. During the boot process, the device is not reachable via network.
Is the IP address of the SmartCheck device reachable in the network?	Send the "Ping" command 17 with the IP address of the SmartCheck device.	This checks whether the SmartCheck device can be "seen" in the network.
Does your PC have an IP address?	Send the "ipconfig" command 12 and make sure that your PC has an IP address.	If DHCP is enabled, an error may have occurred and no IP address has been assigned to your PC. In this case, network communication is impossible.
Are the IP addresses and subnet masks of your PC and the SmartCheck device compatible?	Check the IP addresses and the subnet masks for transposed digits and also the network requirements 5.	If the IP addresses do not mage to the subnet mask, no communication is possible.
Does an IP address occur twice in your network?	Make sure, that neither the IP address of your PC nor the of the SmartCheck device are assigned twice in your network.	Each member in the network needs its own and unique IP address.
Can the proxy settings prevent your network connection?	Deactivate the proxy 7.	The request from the network is not send to the destination address, but to the proxy. This can occur with networks, which consist only of one PC and one SmartCheck device.
Is the content of the SmartWeb software displayed correctly?	Delete the cache 10 of your internet browser.	The cache contains temporary data for a better performance. These temporary data might be outdated.
Which is the easiest network connection to a SmartCheck device?	Connect the SmartCheck device directly via ethernet cable with your PC 19.	All other error causes a complex network can thus be reduced to basic functions.
Is the SmartCheck device accessible?	Interrupt the power supply of the SmartCheck device for about 10 seconds. Then the SmartCheck will reboot.	Rebooting the firmware of the SmartCheck device, obtains a defined starting point.

3 Contact / Support

Contact

FAG Industrial Services GmbH

Kaiserstraße 100
52134 Herzogenrath
Germany

Tel.: +49 (0) 2407 9149-66
Fax: +49 (0) 2407 9149-59
Support: +49 (0) 2407 9149-99

Website: www.schaeffler.com/services
Further information: www.FAG-SmartCheck.com
Contact: industrial-services@schaeffler.com

Please send all correspondence directly to FAG Industrial Services GmbH!

A subsidiary of
Schaeffler Technologies GmbH & Co. KG

PO Box 1260
97419 Schweinfurt
Germany

Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany

Support

Hotline: +49 (0) 2407 9149 99

Email: support.is@schaeffler.com

We provide support services for the FAG SmartCheck device and related software products. A detailed description of the type and scope of the support services we provide can be found online at www.FAG-SmartCheck.com.

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