



Operating Instructions

Electronic camera radio system for frame alignment of commercial vehicles

CMC4000

Chassis Member Check

Camera Radio System

Technical modifications reserved. Text and layout protected. Reprinting and copies, including extracts, are only permitted with written authorisation.

Table of contents

1	General Safety Instructions	5
1.1	Operator's duty of care	5
2	Handling and storage - CMC4000	6
3	Product description	7
3.1	Authorised intended use	8
3.2	Technical data	9
3.3	PC system requirements for CMC4000.....	9
4	Equipment provided	10
4.1	Parts list, CMC4000 basic version	10
4.2	Optional accessories CMC4000.....	11
5	Commissioning	12
5.1	Mounting the camera stand	12
5.2	Mounting the frame scale.....	14
5.3	Installing the software in Windows	15
5.4	Installing the FM transmitter.....	15
6	The CMC4000 program	17
6.1	Setting up the software	17
6.2	Overview of the program settings	18
6.2.1	Customer data:.....	18
6.2.2	Language:	18
6.2.3	Interface:	19
6.2.4	Camera symbol information:	19
6.2.5	Instructions.....	20
6.2.6	Data directory.....	20
6.2.7	Advanced settings.....	21
6.2.8	Password	21
6.2.9	System overview	21
7	Preparing for measurement	22
7.1	Preparatory measures	23
8	Frame alignment	25
8.1	Defining vehicle data in the program.....	25
8.2	Recording measurements.....	26
8.3	Sorting measurements.....	27
9	Viewing the measurements.....	28
10	Adjusting the vehicle frame.....	29
11	Protocol & vehicle overview	30
12	Servicing.....	31
12.1	Maintenance and care	31

13	Error description.....	32
13.1	Description and causes of errors	32
14	Appendix	33
14.1	Example measurement protocol for vehicle frame alignment	33
15	EC Declaration of Conformity.....	34

HAWEKA AG
Kokenhorststr. 4
30938 Burgwedel
Tel. 05139 / 8996 - 0
Fax: 05139 / 8996 222

info@haweke.com
www.haweke.com

Burgwedel 10.01.18
Version Notes Page 7

1 General Safety Instructions

1.1 Operator's duty of care



The electronic camera radio system CMC4000 has been designed and constructed in accordance with a thorough selection of applicable harmonised standards. Hence, it corresponds to the current state of technology and offers the highest degree of safety during operation.

The device components of the CMC4000 may only be structurally modified by the manufacturer with written authorisation!

Device safety can only be implemented in practice during operation if all the required applicable measures have been taken. The operator's duty of care includes planning such measures and checking that they have been implemented.

In particular, the operator must ensure that:

- the device is only used for its intended purpose
- the device is only used in a fully functioning state and free from defects
- the complete operating instructions are permanently available in a readable condition at the operating location of the device
- only qualified and authorised personnel who are familiar with these operating instructions and can work in accordance with these instructions operate the device!
- personnel are regularly instructed in all relevant work safety issues and are familiar with the operating instructions, in particular the safety instructions.



Prior to each use of the frame measuring system, the system must be checked for visible damage, and it must be ensured that the device is only operated free from defects. Defects that are identified must be reported to your superior immediately!



Note

The user is personally responsible for proper operation and compliance with safety regulations.

2 Handling and storage - CMC4000



Caution

Severe shocks must be avoided during transport.



The system must be protected against moisture at all times.

This applies in particular during transport and storage of the entire electronic camera radio system.

Care should be taken to ensure that the storage location is dry and dust-free.



Note

Always store the camera charged.

3 Product description

Frame measuring device CMC4000

924 000 111 / 112



Last updated: 01 / 2018

Technical modifications reserved.

Version 1.1

Illustrations: HAWEKA AG / D-30938 Burgwedel

Reproduction in any form is not permitted.

3.1 Authorised intended use

- The frame measuring device CMC4000 has been developed in order to measure the vehicle frames on trucks, trailers and semi-trailers.
- It is designed solely for rapid measurement of the vehicle frame.

The following is recorded on the vehicle frame:

- **the lateral frame deformation = horizontal deviations**
 - **the height difference of the frame = vertical deviation**
 - **the torsion of the frame**
- The frame measuring device CMC4000 allows you to measure in “drive position”, i.e. the vehicle does not have to be raised.



If the frame measuring device **CMC4000** is not used as per this intended use, there is not guarantee that operating the device will be safe!



The operator of the frame measuring device, and not the manufacturer, shall be liable for all damage to persons and property caused by incorrect use!

3.2 Technical data

	Measuring range	Measuring accuracy:
Horizontal frame offset	0 - 750 mm	± 0.5 mm
Vertical frame offset	0 - 750 mm	± 0.5 mm
Frame torsion	-18 degrees to +18 degrees	± 0°05'
Measurable max. frame length	up to 18 metres	
Measurable max. frame width	750 - 1,350 mm	
Operating temperature	+5 to +40 degrees Celsius	
Shock resistance of the sensor	3500 g (inclinometer) 2000 g (gyro)	
Radio module:		
Band	2,4 GHz band (2405 – 2480 MHz) Automatic frequency correction	
Number of channels	10	
Transmission power	10 mW	
Camera:		
Power supply:	Lithium Ion battery pack: 18650 CF 2S1P 7,4 V / 2250 mAh	
Operating time with fully charged batteries	> 10 h	
Battery charger:		
Operating voltage	100 - 240 Volts	

3.3 PC system requirements for CMC4000

Required operating system: Windows XP, Windows 7, 8.1, 10

Minimum hardware requirements:

Processor: Pentium IV – AMD Athlon 1 GHz
RAM: 512 MB (Windows XP) / 2048 MB (Windows 7, 8.1, 10)
60 MB available hard disk space
Graphics: 1024 x 768 pixel resolution / High Colour
Sound card
Port: USB 1.1
CD-ROM drive

Recommended:

Processor: 1.6 GHz Pentium or AMD or better
RAM: 2048 MB
Graphic card with 16 MB AMD (ATI) or NVIDIA chipset or better
1280 x 1024 pixel resolution / True Colour
Printer

4 Equipment provided

4.1 Parts list, CMC4000 basic version

- x1 Radio camera
Item No. 924 001 161



- x1 Transmission/receiver unit
Item No. 924 001 160

- x1 0.5 m USB cable for radio receiver
Item No. 924 001 067



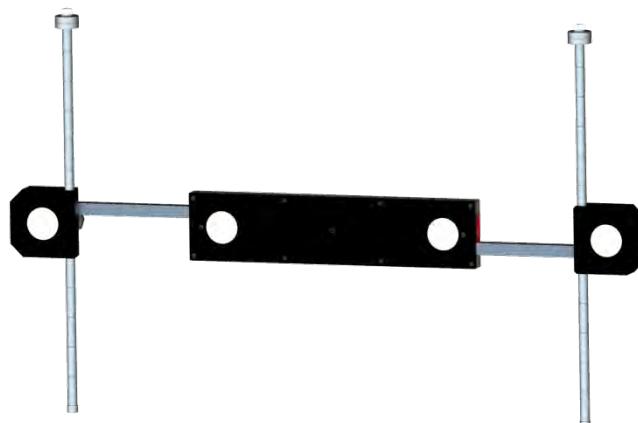
- x1 Camera charging station
Item No. 924 001 034



- x1 512 MB USB stick
Item No. 924 001 195



- x1 Frame scale
Item No. 924 001 071



- x1 Camera holder
Item No. 924 001 088



- x1 Operating Instructions
Item No. GEB 001 218



4.2 Optional accessories CMC4000

- x2 100 mm extensions
Item No. 924 001 086



- x2 150 mm extensions
Item No. 924 001 083



Note

Please contact your sales representative for additional accessories.

5 Commissioning

On first use of the **CMC4000**, the following must be carried out:



Mounting of the components



Installation of the software and the FM transmitter in Windows



Software setup

5.1 Mounting the camera stand

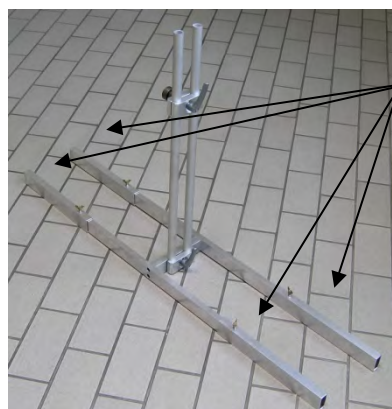


Camera guide tube

Telescopic foot stand



The camera guide tube is inserted vertically into the foot stand and locked in place.



The 4 telescopic tubes are extended and locked in place using the wing nuts.



Mount the camera onto the camera stand mounting pin.
(see Page 23)

5.2 Mounting the frame scale



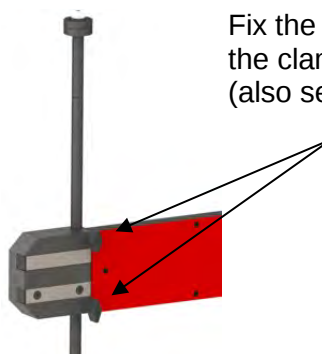
Frame scale with attachment bars.



Unscrew the ends of the attachment bars.



Guide the attachment bars through the scale and screw them back together.



Fix the attachment bars in place with the clamping screws.
(also see 7.1)

5.3 Installing the software in Windows



(Fig. 1)

- Close all open applications on the computer.
- Place the USB-Stick in the PC.

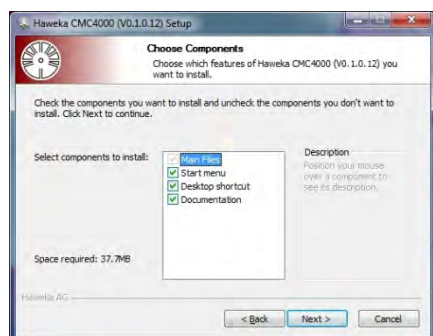
*If the installation wizard does not start automatically, click **Start** on the Windows taskbar, then **Run**.*

*Enter D:\cmc4000setup_1.00.002.exe, where **D** is the removable media.*



(Fig. 2)

- Confirm the Windows security warning if necessary and click **Run**.
- Read the licence agreement and follow the instructions of the installation wizard on screen. (Fig. 2)



(Fig. 3)

- Select the components to be installed (Fig. 3)
- When the installation procedure has completed, the **CMC4000** software and the driver for the FM transmitter have been installed on the computer.
- Remove the USB-Stick from the PC.

The driver for the FM transmitter is normally automatically installed on the system on your computer when the **CMC4000** program is installed. When the FM transmitter is connected to a free USB port on the PC after installation, the new hardware is recognised and added to the system.

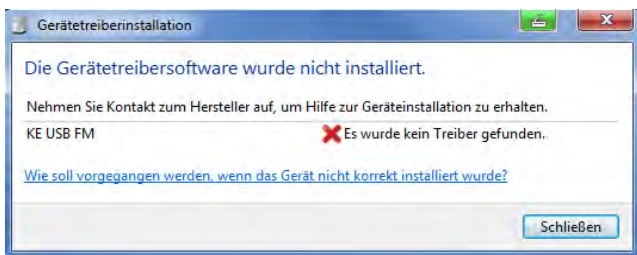
If this does not take place automatically, or if you uninstall and want to reinstall the driver manually, the driver can be added to your system again as following.

5.4 Installing the FM transmitter



(Fig. 4)

- Connect the transmission and receiver unit (the FM transmitter) to a free USB port on the computer using the enclosed USB connection cable (Fig. 4) and insert the **CMC4000** USB-Stick
- The new hardware is recognised by Windows, and the installation wizard searches for the appropriate driver.

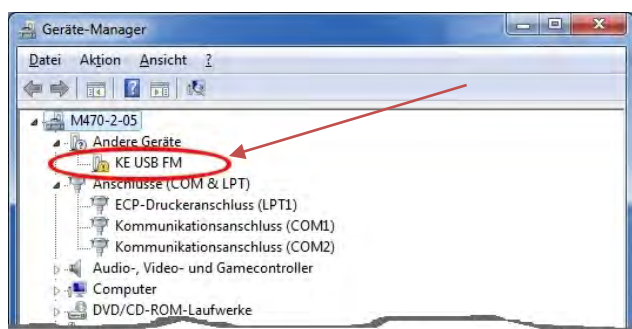


(Fig. 5)

- The driver cannot be found, so please close the *Device driver installation* dialogue to install the driver manually. (Fig. 5)

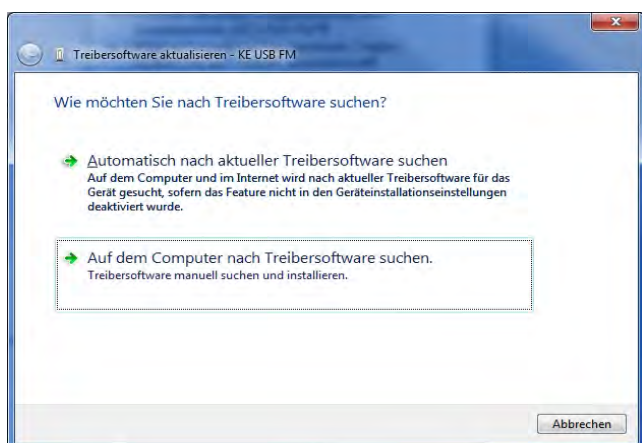
**Note**

You must be logged in as an administrator to be able to carry out the following steps.



(Fig. 6)

- open the Windows *Device manager* under the *Control panel*.
- Double click on the device name “**KE USB FM**”. (Fig. 6)
- Click on the *Driver* tab, then click on *Update driver*



(Fig. 7)

- Select the option *Locate and install driver software manually*. (Fig. 7)
- Click on *Browse* and select the **FM-Driver** folder on the **CMC4000** USB-Stick. Click on *Continue* and the driver is installed.
- The operating system recognises the driver and provides some information on compatibility with Windows. Review this information and continue with the installation. Select the following: *Install this driver software anyway*. (Fig. 8)



(Fig. 8)

- The driver software for the **KE USB wireless modem** has been installed successfully.
- Remove the USB-Stick from the PC.

6 The CMC4000 program

We have taken great care to ensure that the entire program is straightforward and clear so that the user can monitor and operate the device at all times with ease.

Help text and graphical illustrations introduce you to the different parts of the program and provide information about the program at all times.

6.1 Setting up the software

- Start the program.

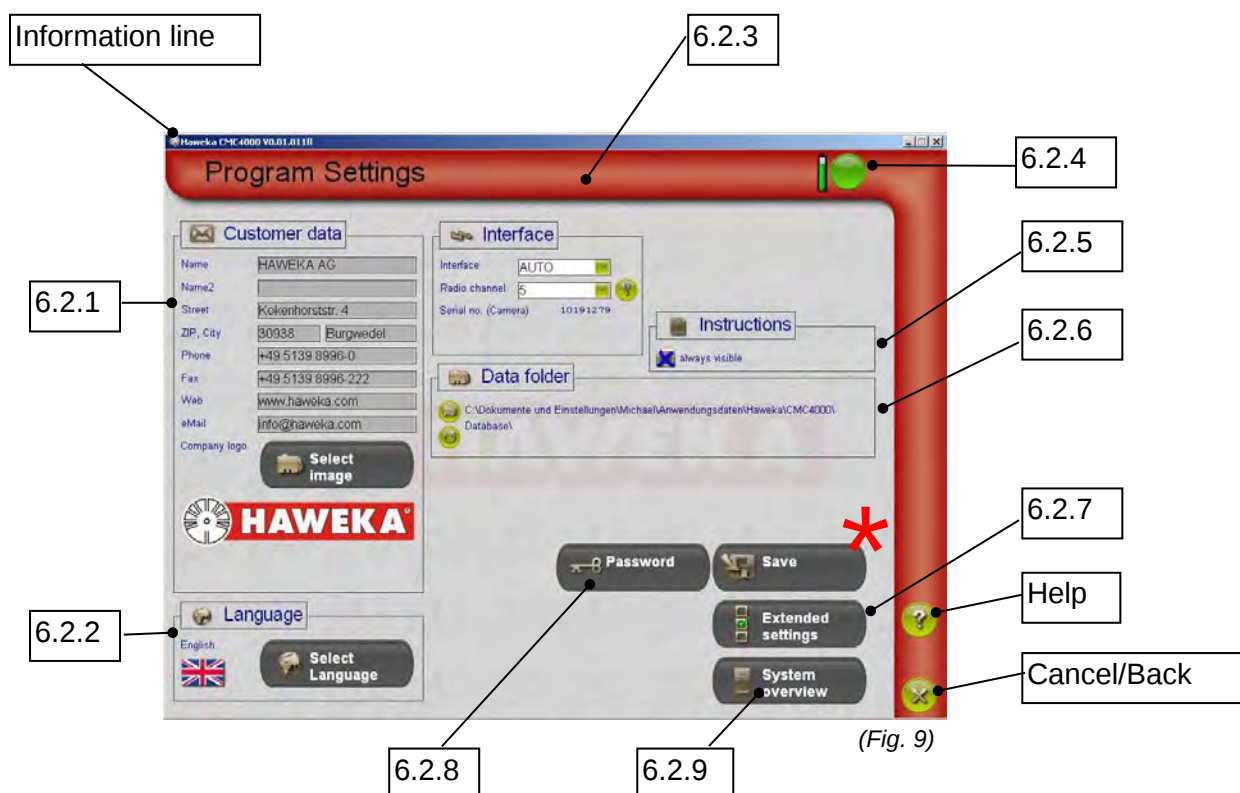
In Windows, select the following: *START – PROGRAMS – HAWEKA – CMC4000* and click on the **CMC4000 link**.



(Fig. 8)

When the program has started, select the “**Settings**” option for initial basic setup.

6.2 Overview of the program settings



6.2.1 Customer data:

Enter your company name on the applicable lines so that the name can be included and printed on the measurement protocol. (Fig. 9)

Click on the **Select image** button:

A company logo can be saved, which will be displayed on the protocol.

Supported file types: BMP, JPG, GIF, PNG

The image size is scaled.



Note

Image files that are too small are enlarged and their quality is therefore reduced. The smallest format should be 400 x 200 pixels at 72 dpi.

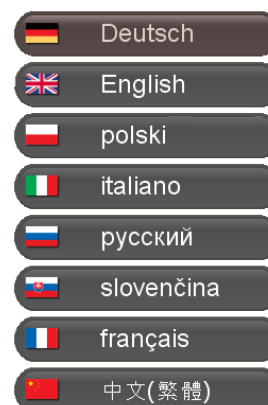
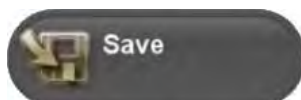
6.2.2 Language:

Click on the **Select Language** button to display menus and all instructions in another language. (Fig. 10)



Note

* All settings must be confirmed by clicking the **Save** button.



(Fig. 10)

6.2.3 Interface:

After successful installation, a new virtual COM interface has been added to the computer for communication with the FM transmitter.

The interface setting in the program should be set to *AUTO* for an automatic connection.

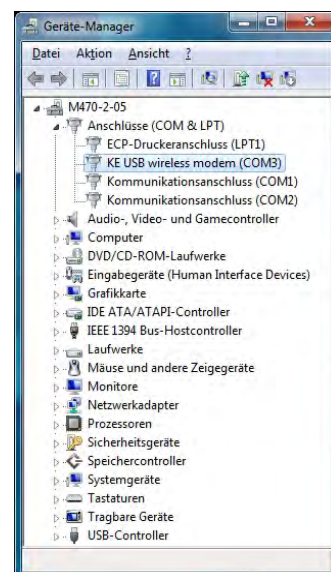
The interface may be changed manually to a specific port if required (no connection to the camera).



Note

A new entry has been added to the Windows device manager for the new FM transmitter COM interface (**KE USB wireless modem**).

(Fig. 11)



(Fig. 11)

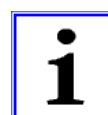
Radio channel:

The radio channel set on the camera is automatically displayed for data transfer between the camera sensor and the program.

The radio channel may be changed on the camera if necessary and must then be confirmed by clicking the **Magnifier** button.

Magnifier button

The dialogue window is divided into two columns. The left column displays a camera that has been found by the program, but is not yet connected. The right column displays a camera that is already connected to the program by radio.



Note

The camera and the FM transmitter must be set to the same radio channel.



(Fig. 12)

Serial number:

The camera's serial number is displayed as soon as the program has established a connection with the camera.

6.2.4 Camera symbol information:

During the entire program run, the connection to the camera and the battery charge status are constantly checked and displayed.

Description of symbols:

The program has not yet made a connection query to the camera; status unknown. (Fig. 12)



(Fig. 12)

The display flashes yellow and red alternately. The program is attempting to establish a connection with the camera. (Fig. 13)



(Fig. 13)

Display is green: Connection to the camera has been established. (Fig. 14)



(Fig. 14)

Display is green, with a red centre: Connection has been established, but no reflector has been found. (Fig. 15)



(Fig. 15)

Display is green, with a yellow centre: Connection has been established and the reflectors on the frame scale have been recognised. (Fig. 16)



(Fig. 16)

Battery charge status of the camera
100%, 75%, 50%, <25% of capacity. (Fig. 17)



(Fig. 17)

At a battery charge status below 25%, the camera symbol flashes. (Fig. 18)



(Fig. 18)



Caution

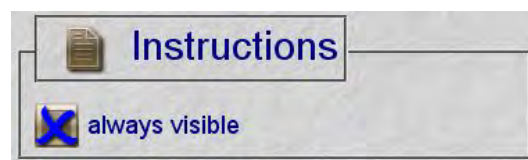
The camera must be charged before any further measurements.

6.2.5 Instructions

Specifying the default for displaying/hiding operating instructions during measurements. (Fig. 20)



The instructions window can be displayed/hidden at any point in the program. Click on the **Instructions** button on the program page.

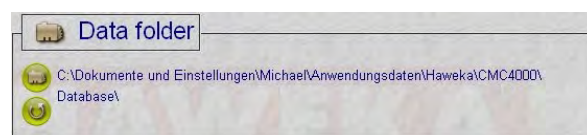


(Fig. 20)



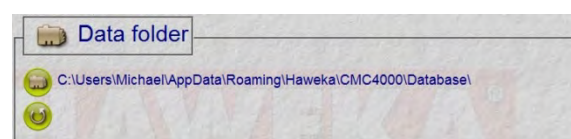
6.2.6 Data directory

All vehicle measurements are saved in a protocol file. The preset save path in **WINDOWS XP** is:
My_Documents\Username\Application_Data\HaweKa\CMC4000\Database
(Fig. 21)



(Fig. 21)

In **WINDOWS 7**, the preset path is:
C:\Users\xx-User-xx\AppData\Roaming\HaweKa\CMC4000\Database (Fig. 22)



(Fig. 22)

To change the save location, click on the **“Folder”** button:



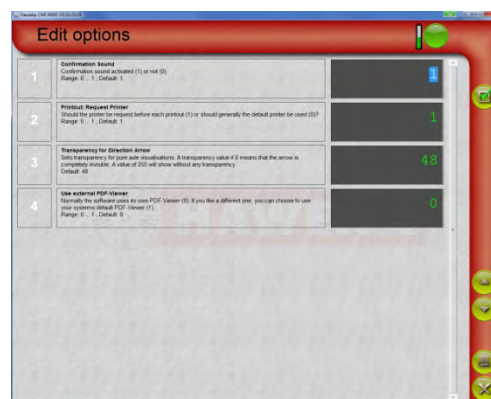
To reset the default path, click on the **“Reset”** button:



6.2.7 Advanced settings

Under advanced settings, the user has the option of personalising the program. (Fig. 22)

To customise settings, select the applicable parameter on the table and change the value.



(Fig. 22)

The modified entries must be confirmed by clicking the **“Accept values”** button (Fig. 23).

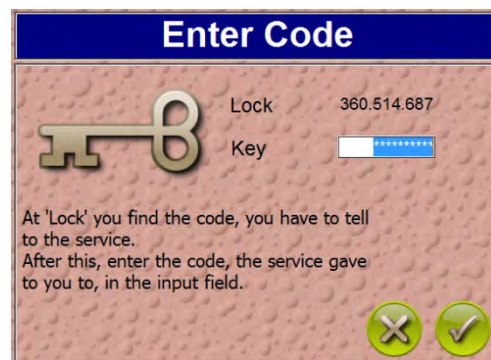


(Fig. 23)

6.2.8 Password

This function is used by our service personnel to carry out diagnostics on the system.

This option allows our service personnel to test special functions and implement program-specific changes. (Fig. 24)

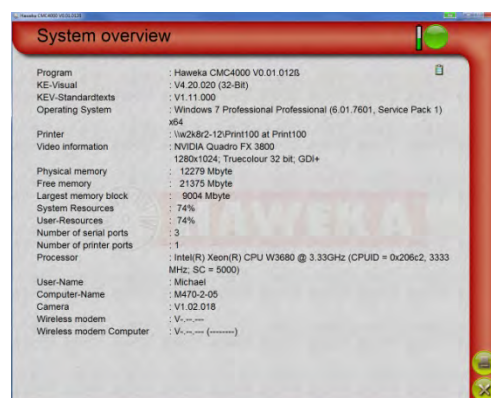


(Fig. 24)

6.2.9 System overview

The system overview provides a list of the components used, the PC, the camera, the FM transmitter and the program versions.

This information is used by the service technician in the event of errors as an overview of the system. (Fig. 25)



(Fig. 25)

7 Preparing for measurement



Note

Before measurement can begin, the measurement area and the vehicle must be prepared.

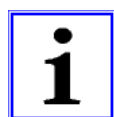
The following preconditions must be observed:

- Check that the vehicle has rims and tires of the same size
- Check that the tire pressure is correct
- Check the condition of the suspension and shock absorbers
- The floor of the area used for measurement should not be uneven.
- The measurement points on the frame must be freely accessible.
- If necessary, the attachment parts on the frame
(e.g. spare wheel brackets, tool boxes etc.) must be removed.

7.1 Preparatory measures

Park the vehicle on level ground

- Use the attachment bars to set the frame scale bars to a length such that visual contact is guaranteed between the frame scale and camera throughout measurement. (Fig. 26)
- Position the camera stand to the centre rear of the vehicle and suspend the frame scale at the rear end of the frame. (Fig. 27)
- Pull out the four telescopic tubes and lock them in place. (Fig. 28)



Note

Care must be taken to ensure that the camera has free visual contact of the frame scale.



Caution

The length of the frame scale attachment bars must not be altered during measurement.

Attaching the camera

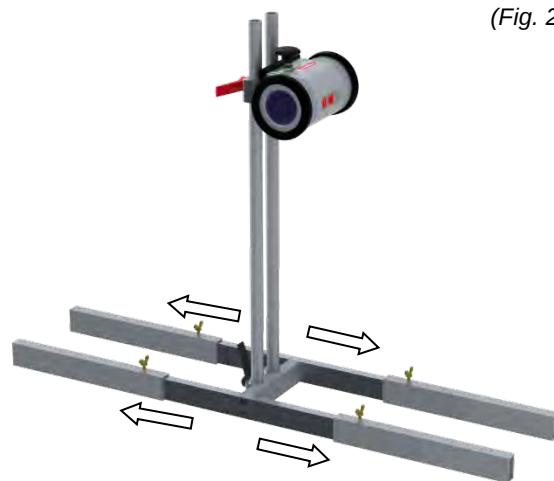
- Pull the camera's mounting bolt gently upwards, and slide the camera onto the camera mounting pin until the mounting bolt locks into the groove on the mounting pin.
- Thereafter, fix the camera to the pin by gently tightening the mounting bolt. (Fig. 29)



(Fig. 26)



(Fig. 27)



(Fig. 28)



(Fig. 29)

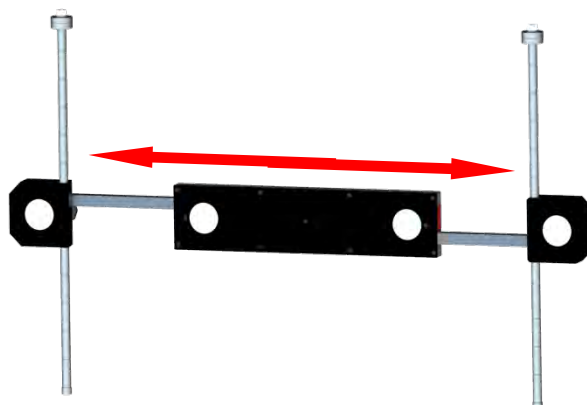
Frame scale

- The frame scale is suspended at the end of the vehicle frame.
- The frame scale width must be adjusted to the vehicle frame width.



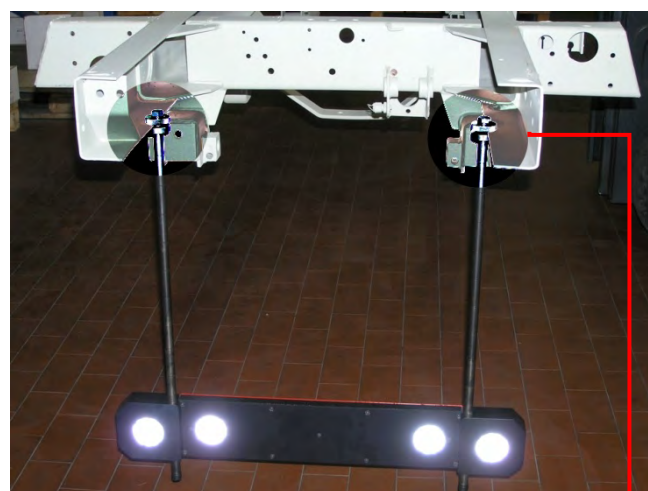
Note

The scale width is adjusted synchronously. Hence, the frame scale is always located at the centre of the vehicle frame.

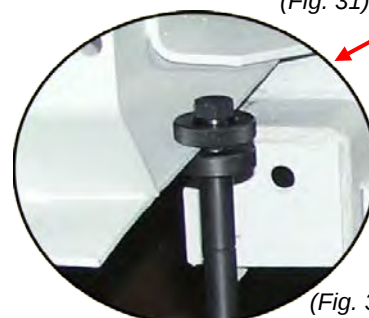


(Fig. 30)

- The frame scale is fitted to the frame profile. If necessary, the frame scale can be attached to the frame profile with the two knurled nuts. (Fig. 32)



(Fig. 31)

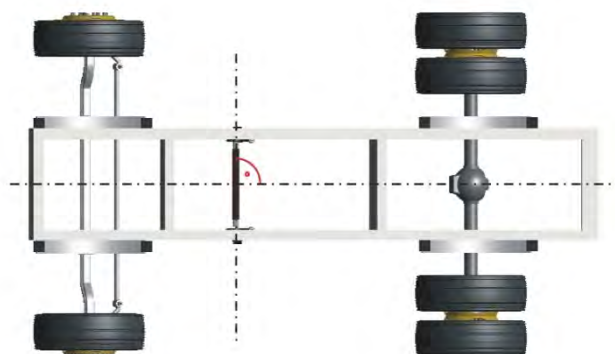


(Fig. 32)



Note

The frame scale should be at a right angle to the frame, as far as possible. (Fig. 33)

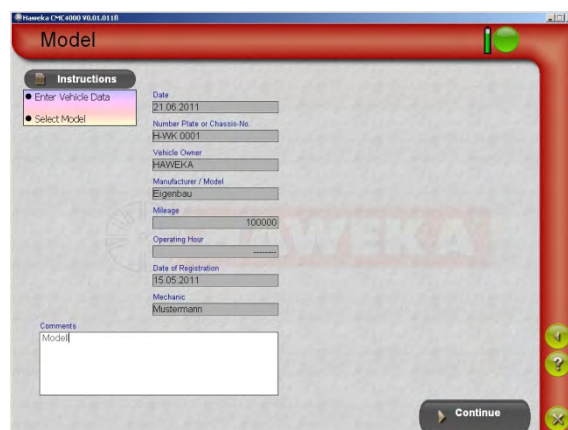


(Fig. 33)

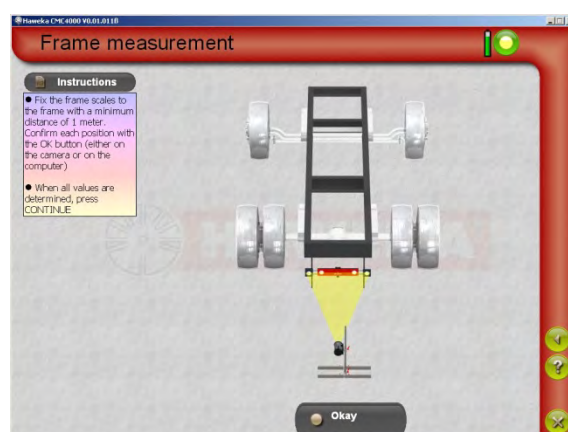
8 Frame alignment

8.1 Defining vehicle data in the program

- The transmission/receiver unit is connected to the PC (see Installation 5.4)
- The PC is switched on, the **CMC4000** program is running and is on the start page.
- Click the **Start measurement** button. (Fig. 34)
- Enter the vehicle data.
Vehicle-specific notes can be entered in the Comments box. These notes are included when the protocol is printed.
- Confirm the vehicle data that has been entered by clicking *Continue*, which takes you automatically to the next page of the program (Fig. 35)
- Before recording the first measuring point, the program displays the instructions for the procedure.
- The frame scale can be positioned on the vehicle frame on a case-by-case basis. I.e., the measuring points can be adjusted.
- In areas that are considered critical or damaged, a narrower measurement grid can be selected.



(Fig. 35)

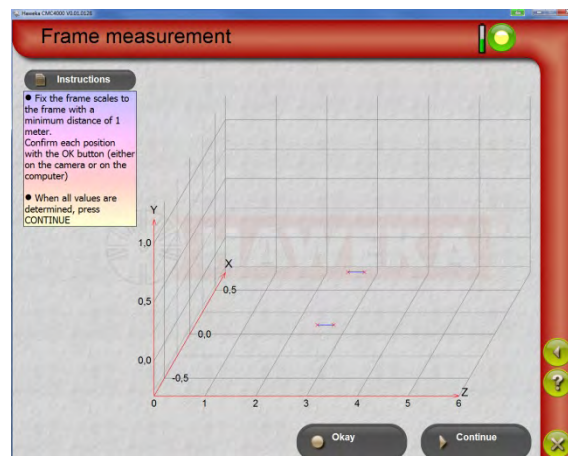


(Fig. 36)

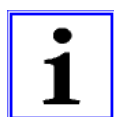
Frame alignment

8.2 Recording measurements

- Once preparations have been completed, the first measuring point can be recorded in the program by clicking the **Okay** button.
- Put the frame scale at a new position on the vehicle frame and click the **Okay** button to record the next measurement. (Fig. 37)



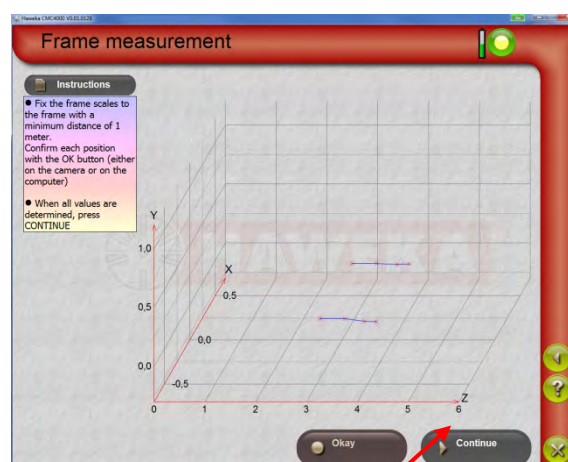
(Fig. 37)



Note

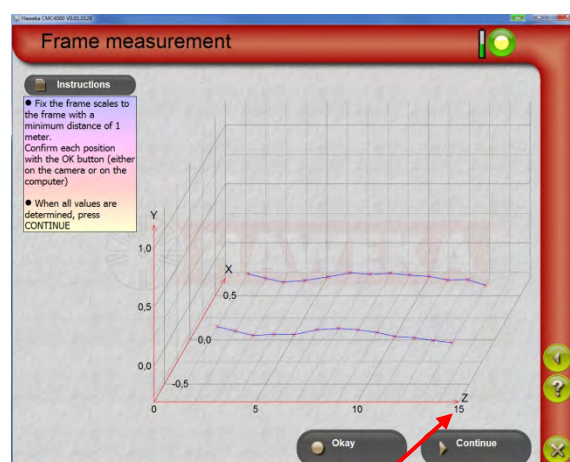
Mark the position of each measuring point on the frame with a chalk line.

- Depending on the distance between measuring points and depending on the frame length, the Z-axis of the graph is automatically extended. (Fig. 38 & Fig. 39)
- Once all measuring points have been recorded, click on **Continue**.



(Fig. 38)

up to 6



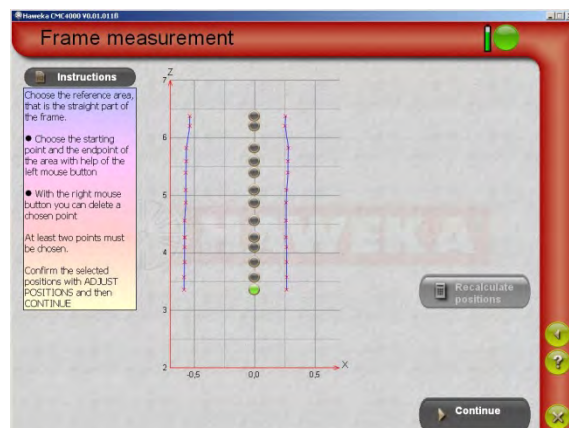
(Fig. 39)

up to 15 m

Frame alignment

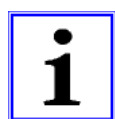
8.3 Sorting measurements

- To evaluate measurements, a reference area must be selected on the vehicle frame. I.e., an undamaged area is marked on the vehicle frame and used as a reference for the calculations.
- This area is defined between two points (green), which indicate the beginning and end of the reference area. All points between are automatically selected. (Fig. 40)



(Fig. 40)

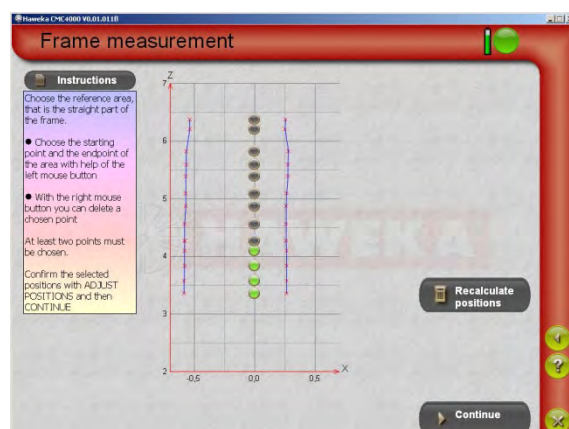
- The marked area can start and end at any point and must not necessarily be at the beginning or end of the frame.



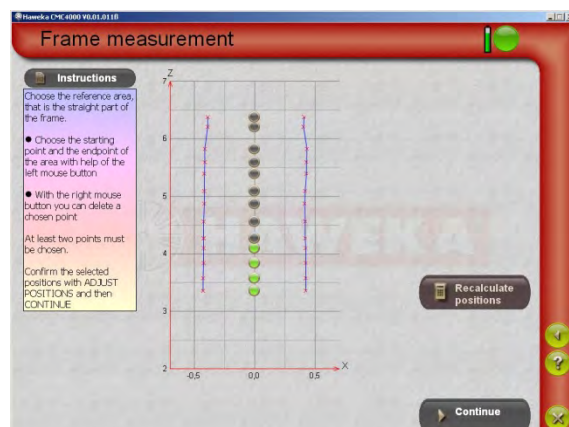
Note

You can delete a chosen point using the **right mouse button**.

- At least two points must be chosen on the vehicle frame.
- Once you have made your selection, click on the **Recalculate positions** button.
- The program identifies the reference plane and centres the frame graphically to the centre of the vehicle. (Fig. 42)
- Click on **Continue** to display the measurement results.



(Fig. 41)



(Fig. 42)

9 Viewing the measurements

The measurements of the vehicle frame are displayed on a chart.

It is possible to customise what measurements are displayed or hidden on the chart, as the **CMC4000** program has a large number of display options.

- Click on the **View options** button (Fig. 43) to select different displays. Select one or more view options as required.



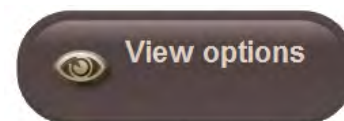
Note

Select different displays (Fig. 44) and print with each setting.

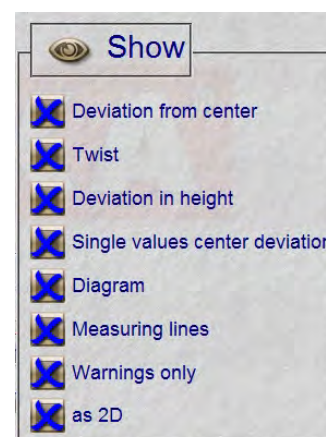
Simplified 3D display showing key measurements. (Fig. 45)

Display with all measurements, including reference lines. (Fig. 46)

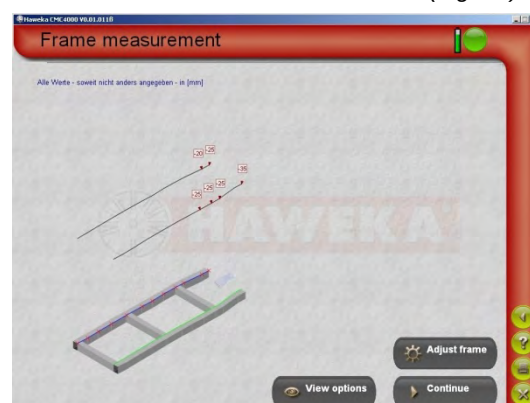
Click on the **Print** button (Fig. 47) to print out the different displays on an installed printer, as a protocol.



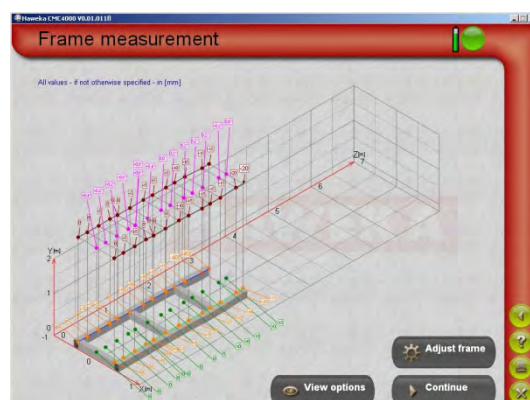
(Fig. 43)



(Fig. 44)



(Fig. 45)



(Fig. 46)



(Fig. 47)

10 Adjusting the vehicle frame



Caution

This part of the program only provides assistance during adjustment. Thereafter, it is necessary to repeat frame alignment in every case.

- Click on the Adjust frame button to adjust the vehicle frame. (Fig. 48)



Adjust frame

(Fig. 48)

Please note that the data must be carefully evaluated prior to adjustment. Specialist tools are no less important in terms of adjusting the vehicle frame than your eyes and ears and technical competence.

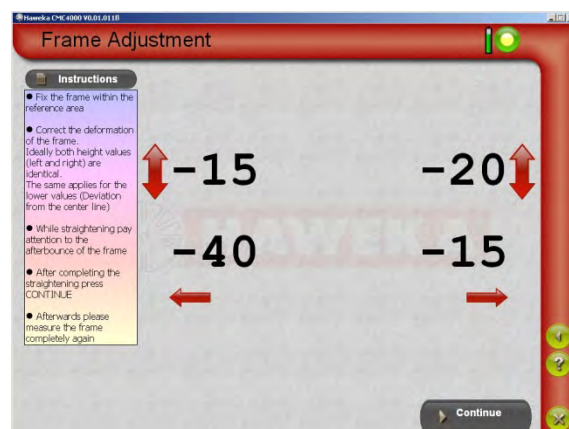


Note

When adjusted, the vehicle frame undergoes plastic deformation. The deformation behaviour depends, among other things, on the existing state of stress, the temperature, the type of load and the load rate.

Ask the manufacturer for further information on the type and scope of possible work.

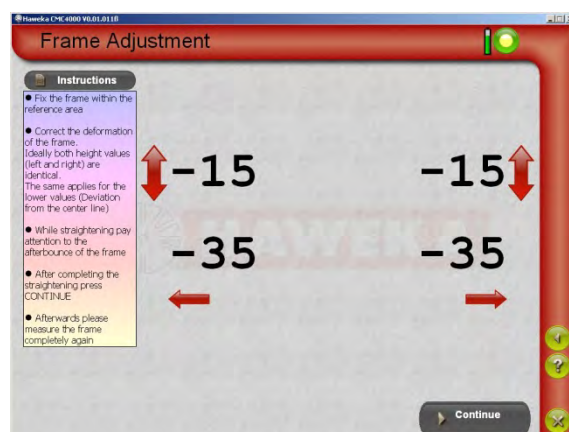
- The live image on the display shows the frame values for the height difference and the deviation from the centre of the vehicle at the location of the frame scale on the vehicle frame. (Fig. 49)
- During adjustment, the frame scale must be fixed to the vehicle frame with the knurled screws. (Fig. 49)
- Correction of the vehicle frame can be observed directly on the monitor.
- Ideally, the left and right values should be adjusted to the same value. This applies to both the height difference and the lateral deformation from the centre of the vehicle. (Fig. 51)
- When the work has been completed, the vehicle frame must be remeasured. Click on the **Continue** button to complete this procedure.
- Save this measurement and repeat the measurement process.



(Fig. 49)



(Fig. 50)



(Fig. 51)

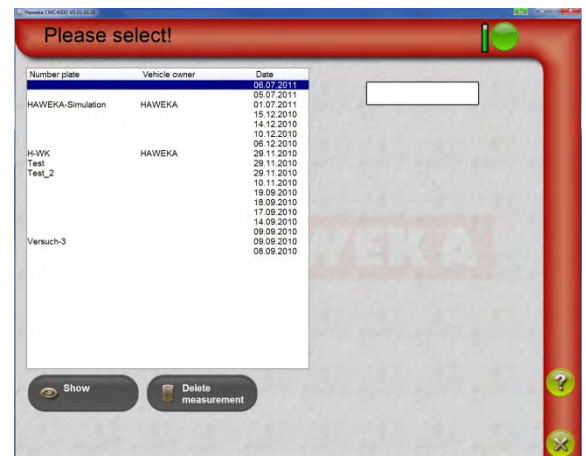
11 Protocol & vehicle overview

- Click the Show protocol button on the start page of the program to reopen a saved measurement session. (Fig. 51)



(Fig. 51)

- A list of all saved measurement sessions with basic information is displayed when you click Show protocol. (Fig. 52)
- Clicking on the “Show” button displays the selected dataset from a frame alignment session on the overview page, where the view options can also be modified.



(Fig. 52)

12 Servicing

12.1 Maintenance and care

The frame scale and camera must be kept free of dirt at all times.



Note

Please note that the camera and its accessories are precision components. These components must be used and maintained with great care at all times.



Caution

The protective screen in front of the camera lens must be cleaned with a dry, soft cloth, if necessary. Never clean the lens with alcohol or other liquids!

Care must be taken to ensure that the reflectors on the frame scale are not scratched.

Scratched reflectors may cause errors when measurements are recorded.



Only use the supplied battery charger to charge the battery in the camera measuring head. The charger conforms to European safety standards and has been designed specifically for use with the CMC4000.

13 Error description



Caution

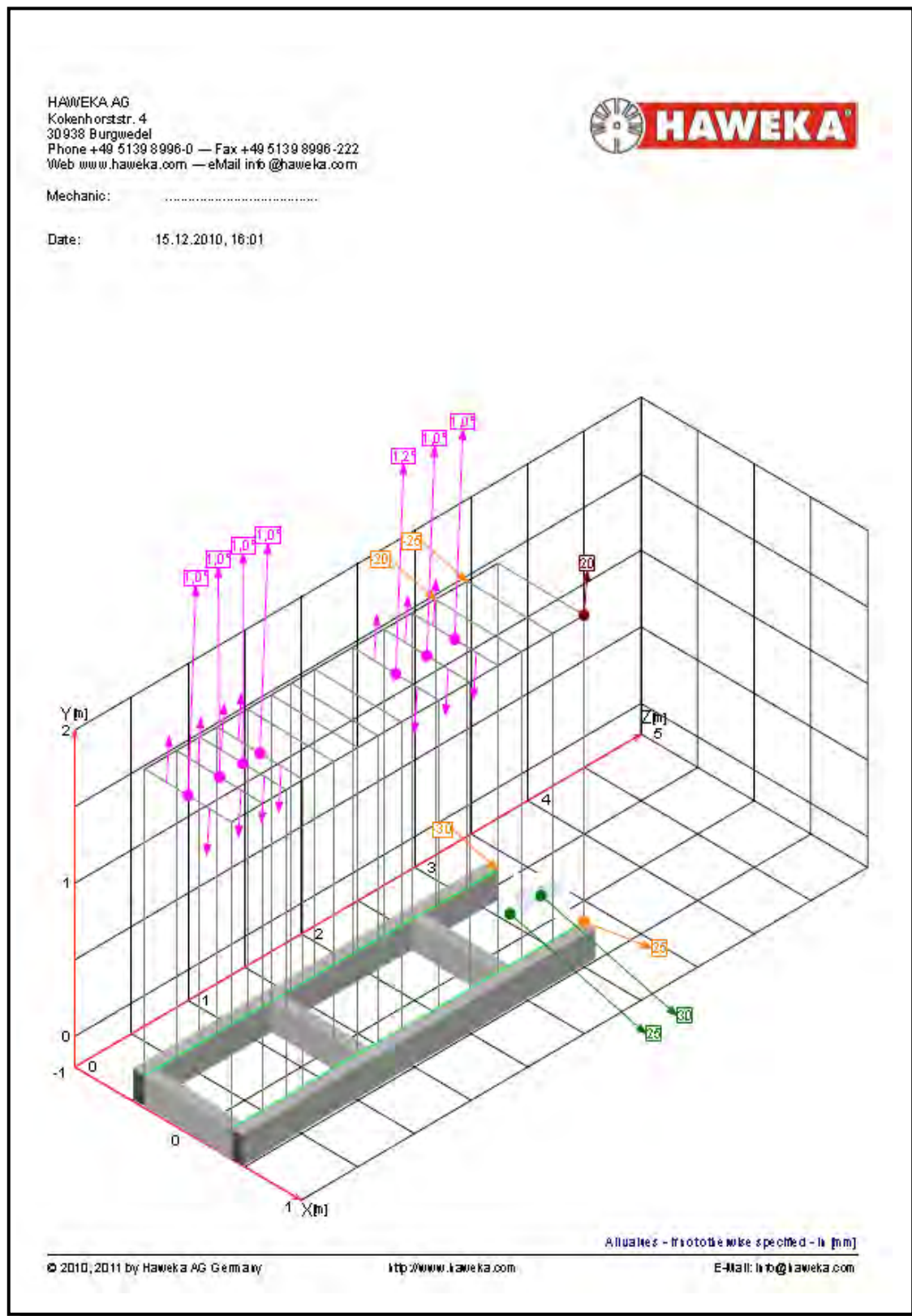
Operators may only correct errors that are clearly the result of errors during operation or maintenance!

13.1 Description and causes of errors

Description	Possible causes	Correction of error
The program has started, but there is no connection with the camera	- There is insufficient battery power - Incorrect interface connection specified in the program - No or incorrect radio channel for the camera connection. No USB driver installed for the receiver on the operating system.	- Charge the batteries in the camera measuring head with the battery charger provided. - After the program has started, click on "Settings"; the interface should be set to <i>AUTO</i> (see 6.2.3) - Try to establish a new connection over a different radio channel. - Install the USB driver from the USB-Stick provided . (5.4, page 15)
The camera does not detect a signal.	The reflectors are badly damaged or dirty. The camera does not have a clear view of the reflectors.	Clean the reflectors, or replace with new reflectors, if necessary. Align the frame scale and camera stand to one another. If this occurs during a measurement, the measurement process must be restarted.

14 Appendix

14.1 Example measurement protocol for vehicle frame alignment



15 EC Declaration of Conformity

The manufacturer:

HAWEKA AG
Kokenhorststraße 4
D-30938 Burgwedel

hereby declares that the system described in the following:

Electronic wireless camera system for frame measurement on commercial vehicles
 Type: CMC4000

complies with the following directives and norms.

EMC directive	2014/30/EC
Low voltage directive	2006/95/EC
RED directive	2014/53/EU
RoHS II directive	2011/65/EC

Applied European norms:

EMC for radio units with a short range device (SRD)	(ETSI) EN 301 489-03 (ETSI) EN 301 489-01 (ETSI) EN 300 220-1 (ETSI) EN 300 220-2
Broadband transmission systems 2,4 GHz ISM-band	ETSI EN 300 328 V2.1.1
Interference immunity and interference emissions	EN 61326-1
Photobiological safety of lamps and lamp systems	EN 62471
Exposure limits for artificial optical radiation	BGI 5006
Protection: IP54	DIN EN 529
Shock test: Free fall	DIN EN 60068-2-31, EC

Design changes that affect the technical data specified in the operating instructions as well as the proper, intended use of the system render this conformity declaration invalid!

CEO
 Dirk Warkotsch

Burgwedel, 04/12/2017




(Signature)



HAWEKA AG

Kokenhorststr. 4 ♦ D-30938 Burgwedel

 +49 5139-8996-0  +49 5139-8996-222

www.haweke.com ♦ Info@haweke.com