Fine Dust Measuring Device

Fidas 200 – System

Operating Manual

– for people with specialist knowledge –

5200-en_V2.3_03/24

V 2.3

Table of contents

1 About this manual

1.1 Function of the manual

This manual provides information on fine dust measurement devices in the series *Fidas 200*.

Some of the topics addressed are:

- Safety
- Functionality
- Use
- Operation
- Maintenance

The manual specifies all of the tasks necessary for initial commissioning of the device. For more information, refer to the section "Initial commissioning [▷ 29]."

1.2 Target group for the manual

This manual is intended to be used by **persons with professional knowledge** who, due to their technical education or experience, are familiar with activities in the field of particle measurement technology.

1.3 Validity of the manual

This manual applies to the following types of devices:

- Fidas 200
- Fidas 200 E
- Fidas 200 S

1.4 Related documents

- Operating manual for the *PDAnalyze* software
- Operating manual for the *PDAnalyze Fidas* software
- Descriptions of communication protocols
- Operating instructions for the weather station

1.5 Storage of documents

The storage of documents is the responsibility of the owner and/or user to ensure the documents are available when they are needed. Store the documents together with the device.

1.6 Presentation rules

The following presentations are used in this manual:

Text	Product names and product descriptions Example: *Fidas*
	Cross-references to other documents Example: *Information about … is found in the manual for the …*
`Text`	Menu items Example: `Shut Down System`
	Selection and settings Example: Start measuring with `Record`
`Text > Text`	Menu paths. The sequence of the menus is indicated by the “>” character. Example: `Menu > Check for Updates`
“Text”	Word compositions and figurative language Example: “Measuring Unit”
[□32]	Reference to page number Example: For further information, see the section “Technical data [□12]”

2 For your safety

2.1 Hazards and safety instructions

Electric shock

Mains voltage is applied to the electrical connections. This can lead to electric shock.

1. Work on the electrical installation may only be performed by specialized personnel.
2. Work on the electrical components may only be performed by specialized personnel.
3. Ensure that live components do not get wet.
4. Observe the applicable regulations.

Safe operation of the device

1. Operate the device only when it is connected to an electrical outlet with residual current circuit breaker.
2. Only operate the device with the insulation and/or casing fully installed.
3. Make sure that the housing and/or the casing on the device is undamaged, complete, and correctly installed.

Safe use of the device

1. Do **not** use the device in a flammable or explosive environment, e.g. rich in hydrogen or oxygen.
2. Do **not** use the device with flammable or explosive carrier gases, e.g. rich in hydrogen or oxygen.

Specialized person

1. Installation, commissioning and working with the device should be performed only by specialized persons.
2. Install the device in compliance with good engineering practices.

Preventive measures to avoid stumbling and falling hazards

Cables and lines that are not laid properly can pose a hazard. There is a risk stumbling and falling.

- Ensure that cables and hoses are positioned properly.

Radio radiation - protection of other devices

Delivery of the device includes a WiFi flash drive that generates, uses and radiates radio frequencies. This radiation can disrupt other equipment.

1. Use the WiFi flash drive only where permitted!
2. Do not use the WiFi flash drive if it could interfere with electronic equipment or potentially cause other hazards.

2.2 Warnings

The warnings in this manual are highlighted with pictographs and signal words. The severity of a hazard is indicated by the pictograph and signal word.

Layout of the warnings

The warnings that precede each action are shown as follows:

	**⚠ DANGER**
	Type and source of the hazard Explanation of type and source of the hazard / description of consequences of failure to comply with the warning. ▸ Measures to avert the hazard

Meaning of the signal words

DANGER	Immediate danger to life or risk of severe physical injury if this hazard is not avoided.
WARNING	Possible risk of severe physical injury if this hazard is not avoided.
CAUTION	Possible risk of minor physical injury if this hazard is not avoided.
NOTICE	Damage to property if this hazard is not avoided.

Meaning of the pictographs

	DANGER Warnings with information about the severity of the hazard
	DANGER Danger to life due to electric shock
	NOTICE Damage to property

2.2.1 Warnings on the device

There are warning stickers on the rear of the device.

Meaning of the pictographs

	Disconnect the power plug before opening the housing.
	Read the operating manual.

2.3 Regulations

Observe the following regulations and directives:

Legal requirements

- Legal regulations for Health and Safety at Work
- Legal regulations for environmental protection
- Employer's Liability Insurance Association provisions

Standards and directives

- The applicable safety requirements according to DIN, EN, and VDE

2.4 Obligations of the user

To ensure proper functioning of the device, observe the following:

1. Carefully read through the manual before using the device.
2. Keep the manuals in the vicinity of the device to ensure that information can be checked at all times.
3. Only carry out activities described in the manual intended for your use.
4. Make sure that the required inspections and maintenance tasks are carried out.
5. Have the device serviced by the manufacturer or an authorized distributor.
6. Have damage to the device repaired promptly by the manufacturer.

3 Product description

3.1 Use

3.1.1 Intended use

The device is manufactured and tested according to good engineering practices and the recognized safety rules. In order to avoid hazards to yourself or third parties and damage to the device and other assets, only use the device properly and as intended.

The device is intended to be used only for measuring fine dust.

Measurable fine dust fractions: PM_1, $PM_{2,5}$, PM_4 and PM_{10}.

Countable particle sizes within the certified range: 0.18 - 18 µm.

The potential range of the device is a factor of the respective model:

Fidas 200 and *Fidas 200 E*: The device is intended to be installed in a weatherproof and air conditioned (+5°C to +40°C) measurement station.

Fidas 200 S: The device can be set up outdoors.

The sampling tube and the weather station have to be secured to suitable structures.

The device is intended to be used only by the following persons:

- Persons who are familiar with activities in the field of particle measuring technology based on their education or experience.

Any use other than the intended use is prohibited. The manufacturer assumes no liability for damages resulting from this. All warranty claims are voided if changes are made to the device, including in the course of assembly and installation.

All corresponding documentation must be observed for any work on the device.

3.1.2 Improper use

The device is not intended for use by the following persons:

- Persons with limited physical, sensory or mental abilities
- Persons lacking the required qualification, experience or knowledge
- Persons under 18 years of age

The device is not intended to be operated or stored under the following ambient conditions:

- Corrosive environments
- Explosive environments
- Environments with flammable materials
- Areas with strong electrical or electromagnetic fields

- Areas with ionizing radiation
- Areas subjected to shock and vibrations

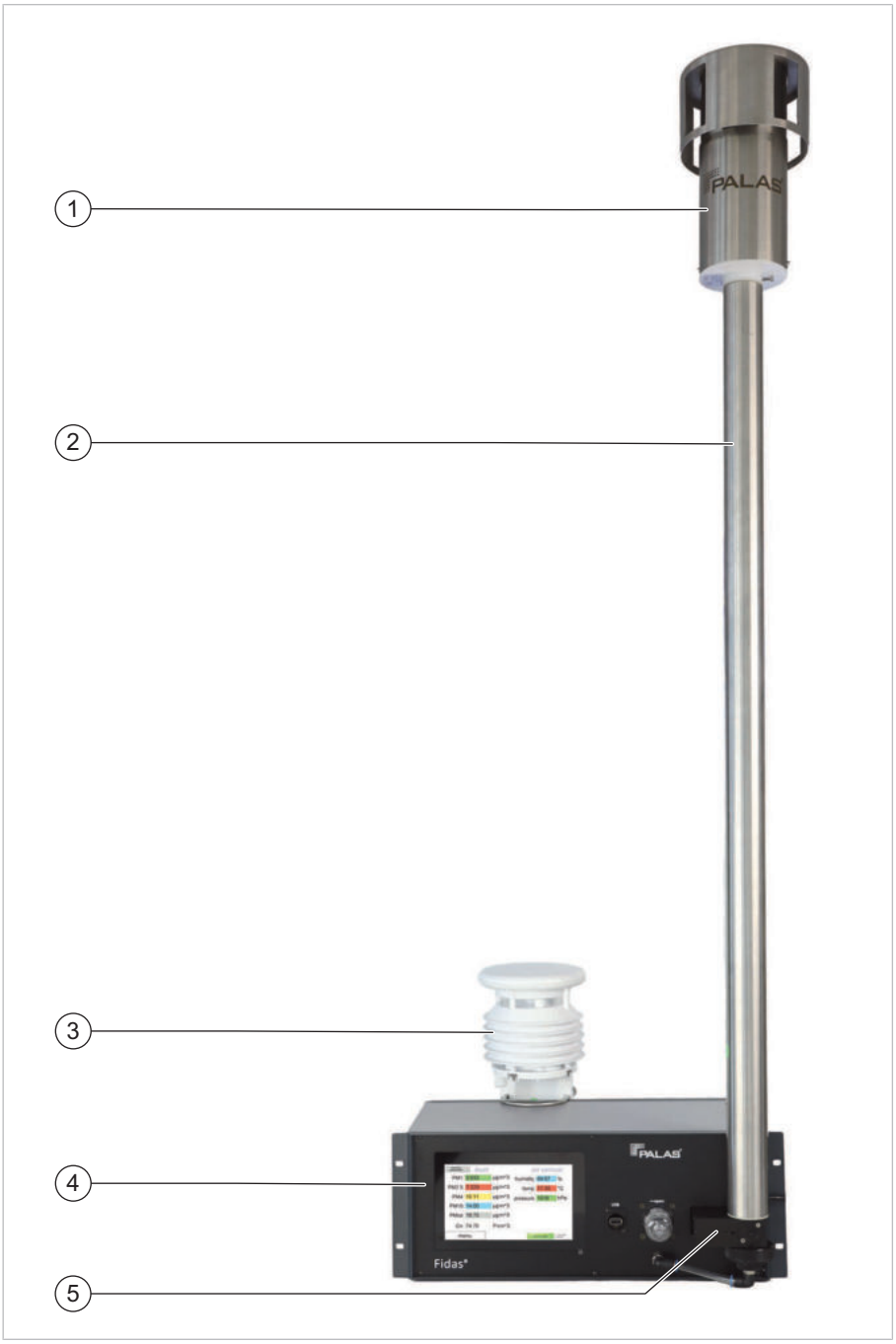
Neither the manufacturer nor the supplier of the device will be liable for damage that can be attributed to unintended use.

3.2 Models

These operating instructions describe three models of the measuring system:

- *Fidas 200*: Controller with attached aerosol sensor
- *Fidas 200 E*: Controller with external aerosol sensor
- *Fidas 200 S*: Controller with attached aerosol sensor and with weatherproof housing

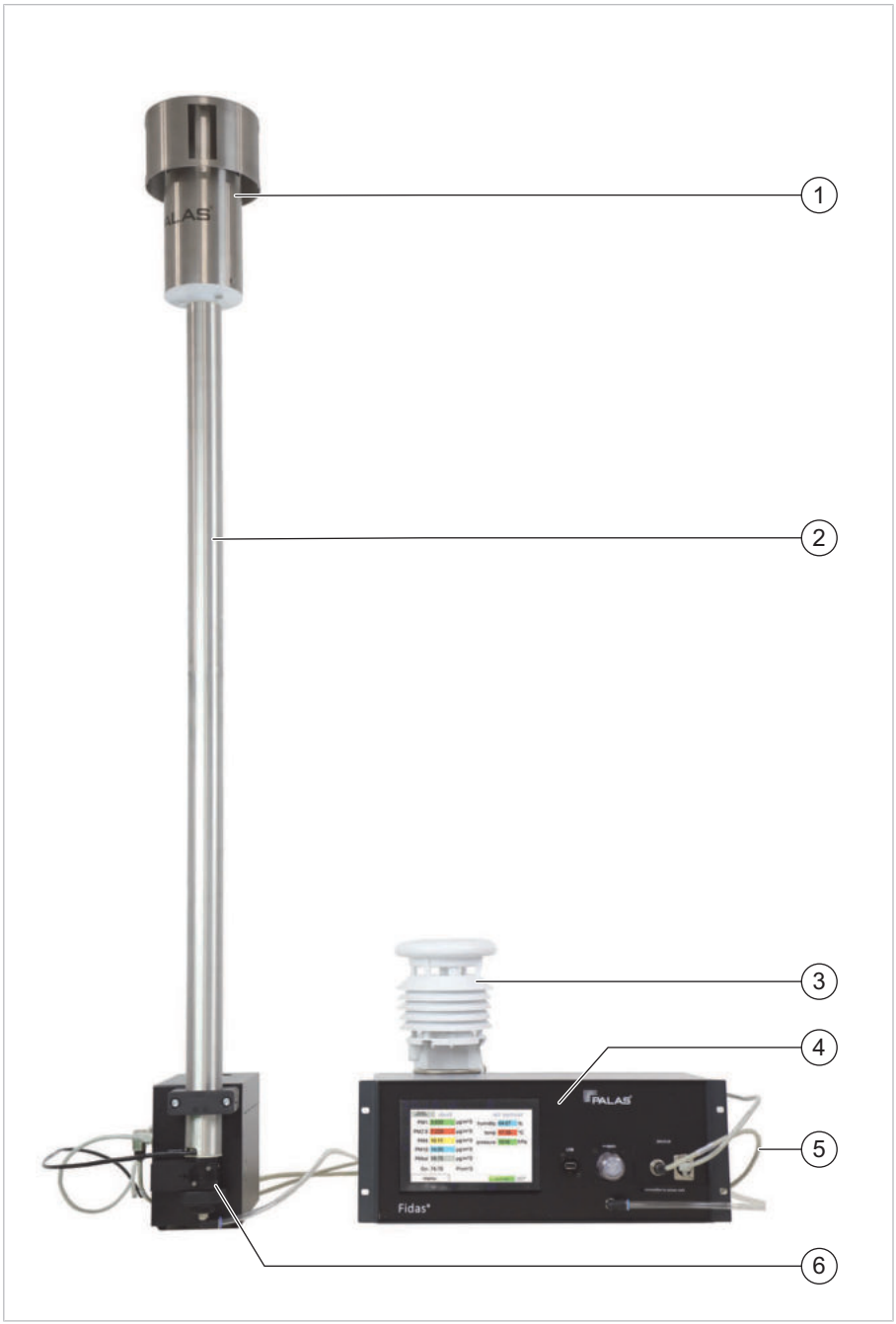
3.2.1 Components of the model Fidas 200



Components of the model Fidas 200

1	Sampling head Sigma-2	2	Sampling tube with drying section IADS (Intelligent Aerosol Drying System)
3	Weather station	4	Controller
5	Aerosol sensor and gravimetric filter		

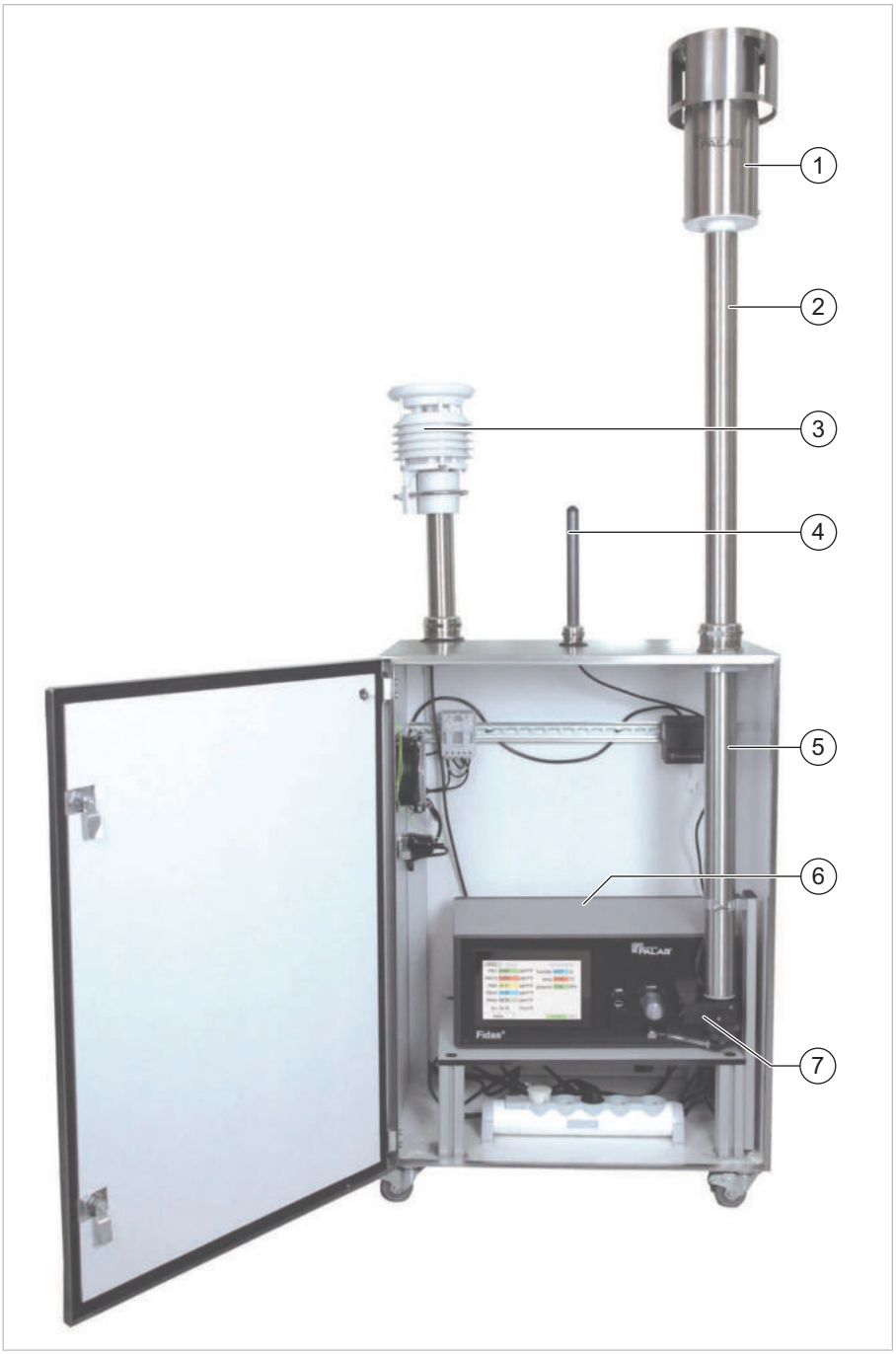
3.2.2 Components of the model Fidas 200 E



Components of the model Fidas 200 E

1	Sampling head Sigma-2	2	Sampling tube with drying section IADS (Intelligent Aerosol Drying System)
3	Weather station	4	Controller
5	Connecting lines	6	Aerosol sensor and gravimetric filter

3.2.3 Components of the model Fidas 200 S

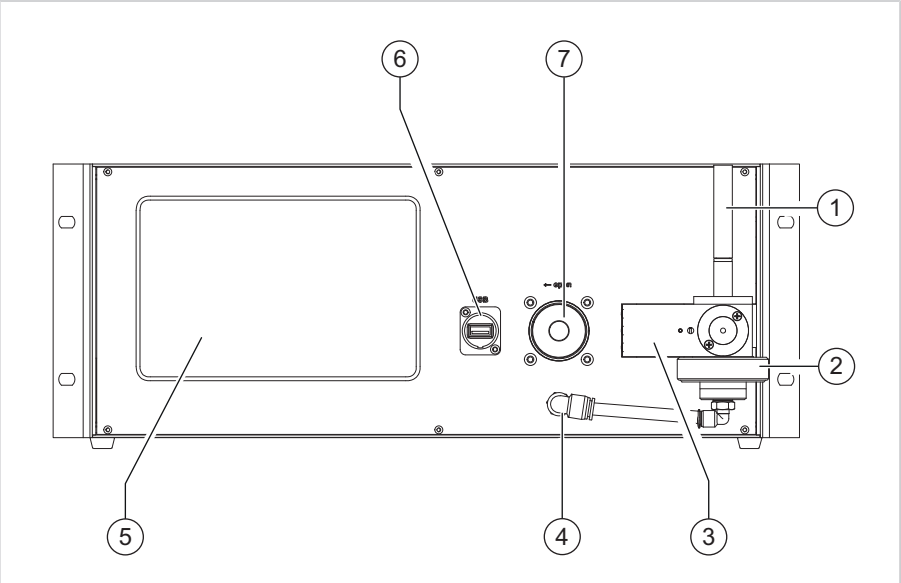


Components of the model Fidas 200 S

1	Sampling head Sigma-2	2	Sampling tube with drying section IADS (Intelligent Aerosol Drying System)
3	Weather station	4	UMTS antenna (optional)
5	Weatherproof housing	6	Controller
7	Aerosol sensor and gravimetric filter		

3.3 Controller

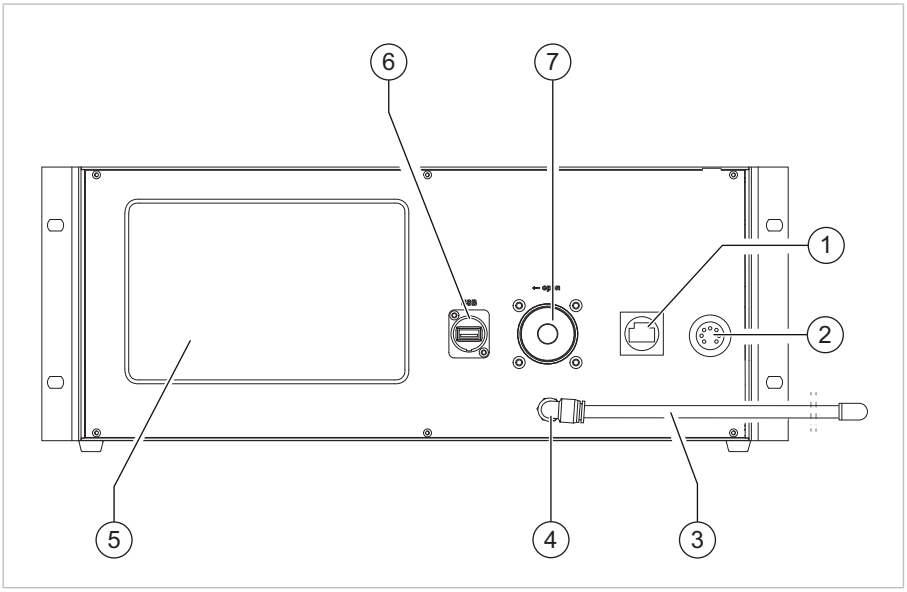
Controller with aerosol sensor (Fidas 200 and Fidas 200 S)



Controller with attached aerosol sensor – front of device

1	Aerosol inlet tube	2	Gravimetric filter
3	Aerosol sensor	4	Feed line to interior aerosol pumps
5	Touch screen	6	USB port
7	Filter for the aerosol pumps		

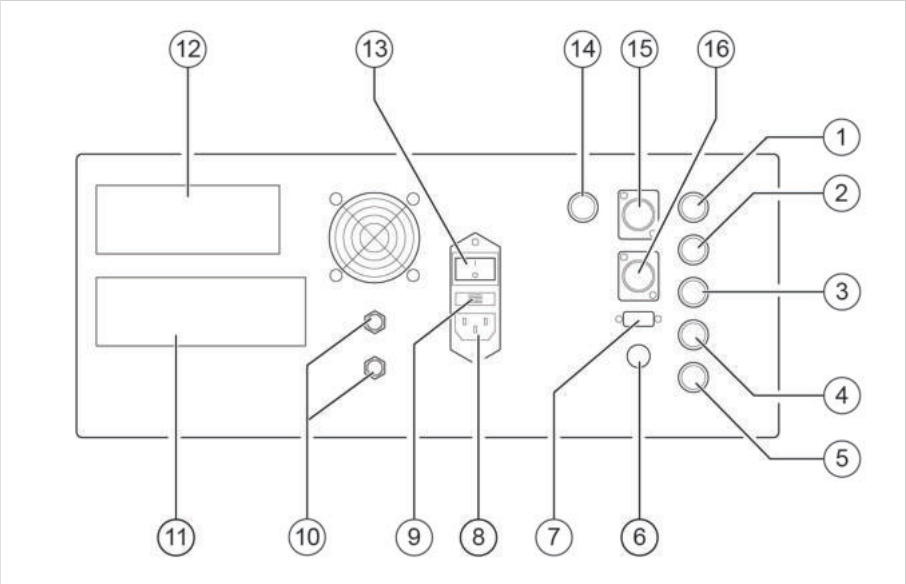
Controller without aerosol sensor (Fidas 200 E)



Controller without aerosol sensor – front of device

1	Port for LAN cable for data transmission	2	Port for cable for power supply to external sensor unit
3	Tube to external aerosol sensor	4	Feed line to interior aerosol pumps
5	Touch screen	6	USB port
7	Filter for aerosol pumps		

Elements on the back of the controller



Elements on the back of the controller

1	“temp., r.h.” Port for external moisture and temperature sensor	2	“abs. pressure” Port for an external pressure sensor (barometric pressure)
3	“diff. pressure” Port for external differential pressure sensor*	4	“weather station” Port for the weather station
5	“IADS” Port for the drying section IADS	6	Fuse
7	“serial interface” RS-232 plug as serial interface to externally trigger controller	8	Receptacle for power cable
9	Fuse	10	“outlet” Outlet for filtered air to be used for sample
11	Warning sign	12	Type plate
13	Power switch	14	“digital out” Port to emit the digital signal “Limit PM10 exceeded”
15	“USB” Port for an external device, e.g. a keyboard	16	“Ethernet” Port for a network(LAN)

* Only on certain models

3.4 Functional description

Analysis of particles in ambient air

Fine dust measurement devices in the series *Fidas 200* are aerosol spectrometers certified in accordance with EN 16450. These devices continuously analyze fine dust particles from the ambient air and simultaneously calculate the immission values $PM_{2,5}$ and PM_{10}, which require monitoring. The values PM_1, PM_4, PM_{tot}, the particle number concentration C_n and the particle size distribution are calculated and recorded. The number of particles is determined by means of optical light scattering.

Sampling and drying

The sampling head Sigma-2 draws in ambient air.
Volume flow rate: approx. 0.3 m^3/h.

The aerosol passes through the sampling tube with drying section IADS and into the aerosol sensor. The drying section dries the air that was sucked in, thus preventing distortion of the measurement by any remaining moisture or mist particles.

Weather data

The following weather-related factors have an impact on and control the drying effect:

- Air temperature
- Air pressure
- Humidity

The weather station measures this data. Additional data can be measured and taken into consideration with some models:

WS compact	WS500	WS600
Air temperature	Air temperature	Air temperature
Air pressure	Air pressure	Air pressure
Humidity	Humidity	Humidity
-	Wind direction	Wind direction
-	Wind speed	Wind speed
-	-	Precipitation

Scattered light analysis

The central element of the device is an optical aerosol sensor. Lorenz□Mie scattered light analysis of single particles is applied to determine the particle size. The single particles move through an optically differentiated measurement volume that is homogeneously illuminated with a polychromatic LED light source. Each particle generates a scattered light impulse that is detected at an angle of 85° to 95° degrees. The particle count is determined based on the number of scattered light pulses. The level of the measured scattered light pulse is a measure of the particle diameter.

Data processing

The compiled data is processed in the controller and saved. The device can be integrated into a higher ranking measurement system via the interfaces (RS-232 and Ethernet).

The measured data can also be transferred via the USB port to an external data medium. The data can then be analyzed or processed with the external device. The software *PDAnalyze* should be used to process the data with an external device. *PDAnalyze* is included in delivery.

Firmware

The device is operated via a touch screen. The touch screen shows the user interface of the firmware *Fidas*. The firmware *Fidas* runs on a Windows operating system (Windows 10 IoT).

3.5 Environmental conditions

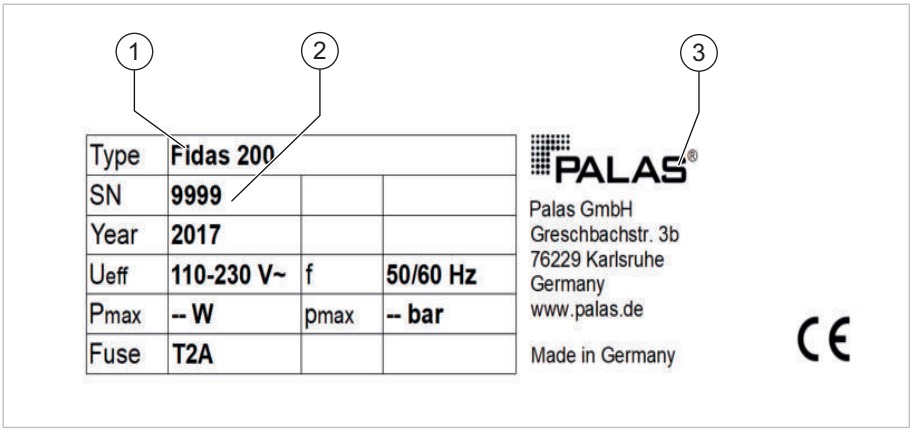
Environmental conditions affect the functionality of the device.

The following environmental conditions apply for the operation and storage of the device:

- Temperature range for Fidas 200 and Fidas 200 E:
  +5°C to +40°C
  Temperature range for Fidas 200 S:
  -20°C to +50°C
- Relative humidity: non-condensing, meaning that moisture in the air is not permitted to condense as water on or in the device
- Air pressure: atmospheric pressure

Operation and storage under other environmental conditions, for instance in corrosive or explosive environments, powerful electrical or electromagnetic fields, areas with ionizing radiation or areas subject to shocks and vibrations are prohibited.

3.6 Type plate



Type plate

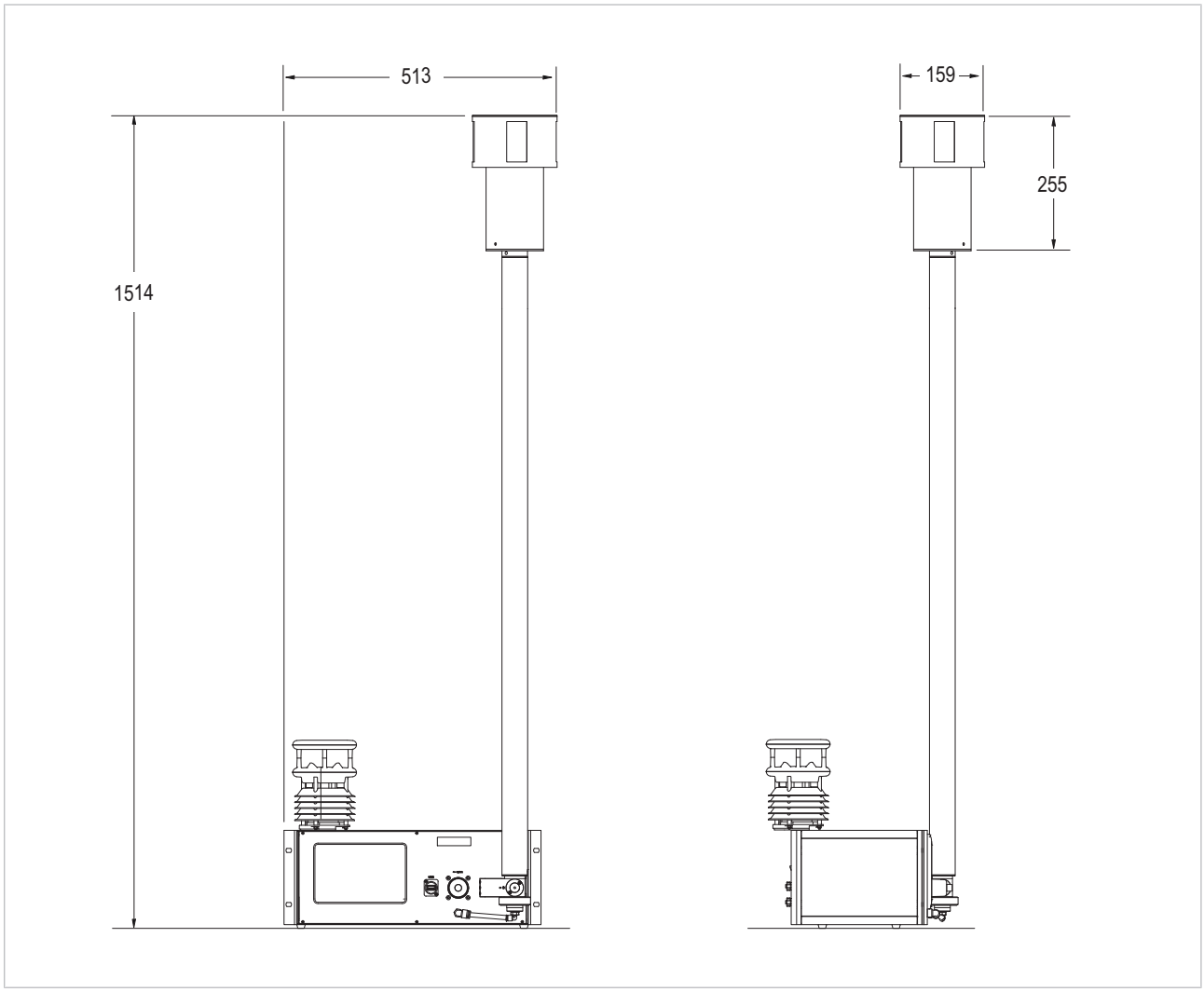
1	Product designation	2	Serial number
3	Manufacturer with address		

3.7 Conformity

As the manufacturer, we hereby declare that this product meets the fundamental directives for bringing it to market in the EU.

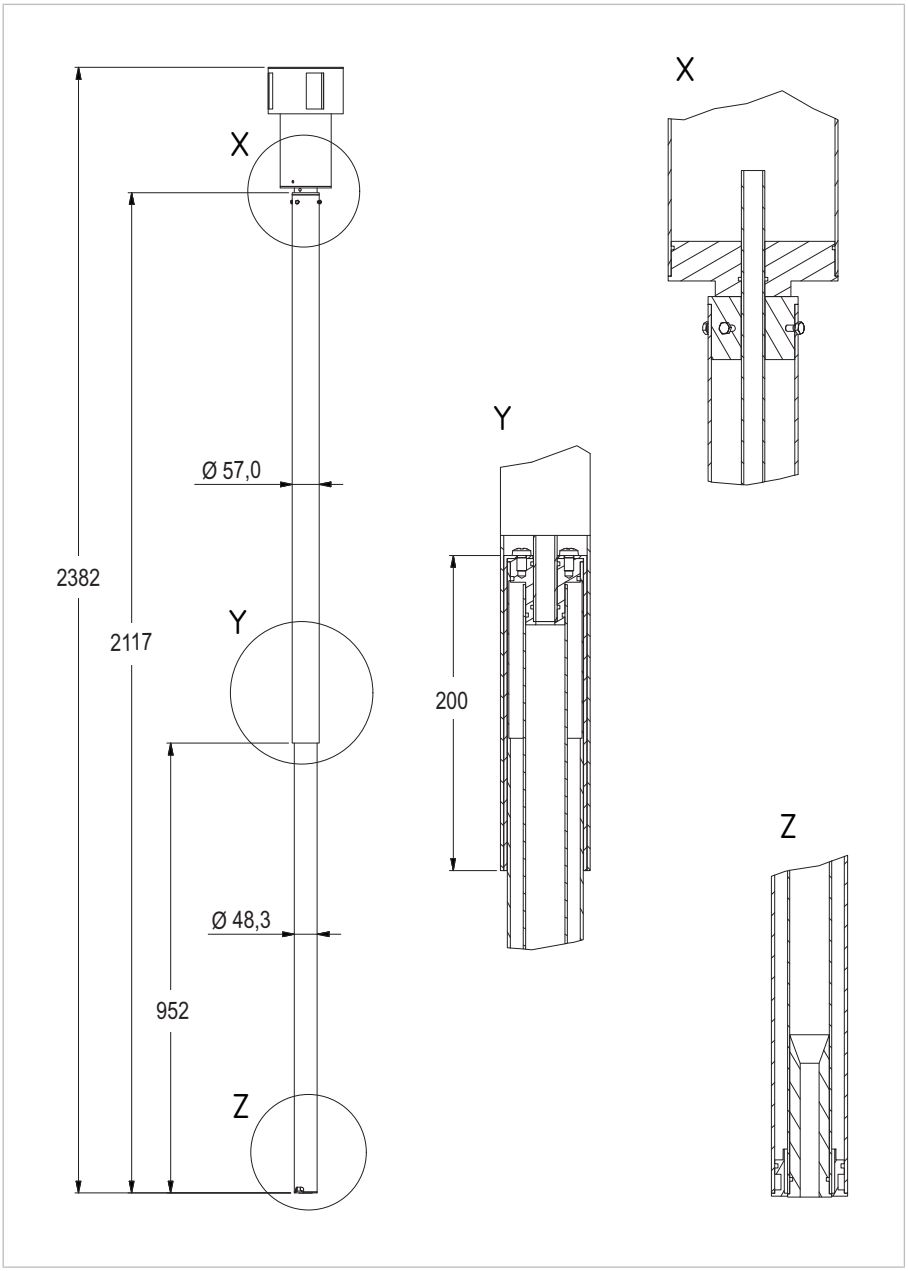
3.8 Dimensions

Main dimensions of the model Fidas 200



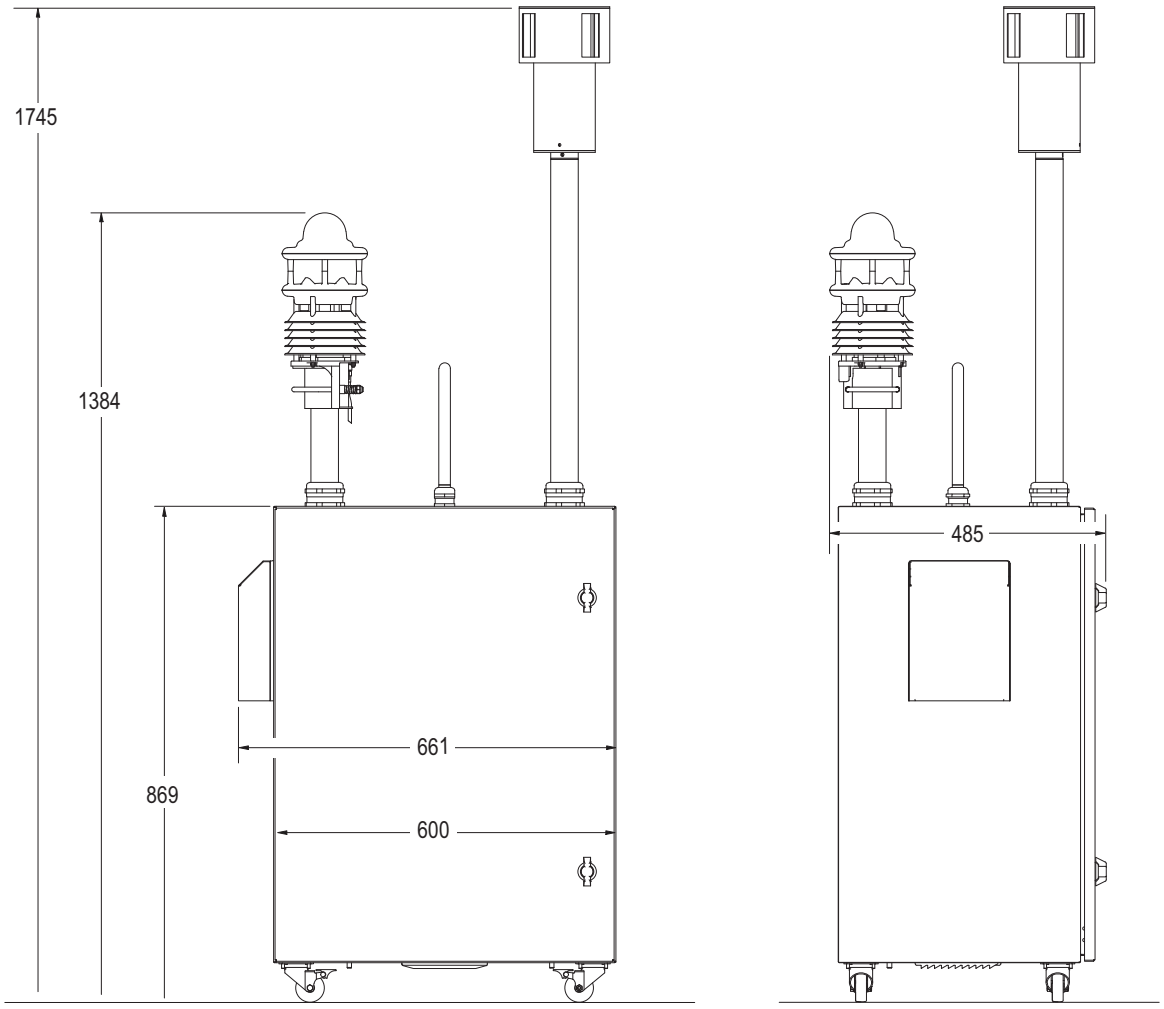
Main dimensions of the model Fidas 200 – all dimensions in millimeters (in this case with the weather station WS500)

Dimensions of IADS extended



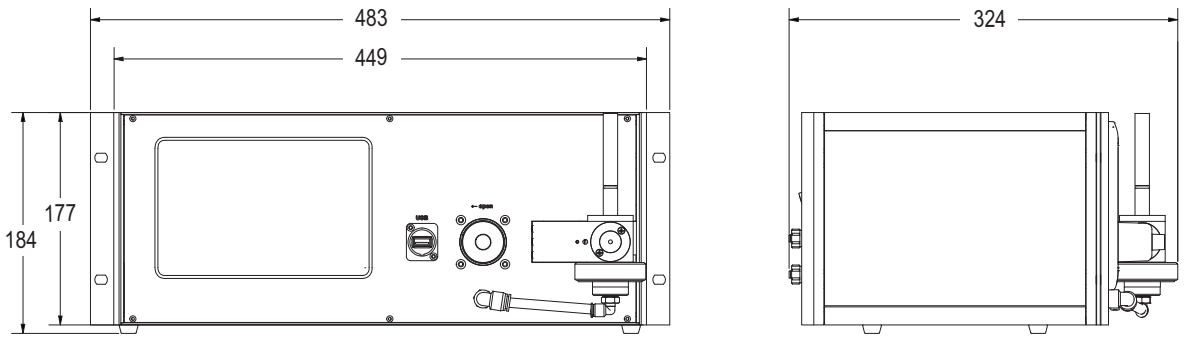
Dimensions of IADS extended

Main dimensions of the model Fidas 200 S



Main dimensions of the model Fidas 200 S – all dimensions in millimeters (in this case with the weather station WS600)

Dimensions of controller



Dimensions of controller – all dimensions in millimeters

3.9 Minimum clearance

Ensure that the front of the controller is accessible at all times for operation and maintenance of the device.

Verify that air can circulate around the back of the controller. The back must be at least 10 cm away from closed surfaces.

3.10 Scope of delivery

Inspect the delivered equipment for damage and completeness.

Basic components and basic accessories

- Controller
- Sampling head Sigma-2
- Sampling tube with drying section IADS (*IADS Standard*)
- Pipe clamp to secure the sampling tube to the wall of the measurement container
- Weather station (*WS compact*)
- Aerosol inlet tube
- Touch screen stylus
- Power cable
- Null modem cable (RS-232)
- Flash drive with software *PDAnalyze* and operating instructions in digital form
- Calibration dust *MonoDust 1500*
- Hose piece, 30 cm, for calibration
- Cleaning kit containing special cloths for optics and an Allen wrench, size 2.5 mm
- HEPA filter with hose
- WiFi stick
- Device operating instructions
- Device calibration certificate

Additional elements for Fidas 200 E

- Unit with aerosol sensor, gravimetric filter and connecting lines (3 m)

Additional elements for Fidas 200 S

- Weatherproof housing
- Tube for the weather station
- Mounting kit for attaching the tube for the weather station to the weatherproof housing
- Mounting kit for attaching the sampling tube to the weatherproof housing

3.11 Optional accessories

The following accessories are optional:

- Drying section *IADS Extended* (instead of *IADS Standard*)
- Weather station *WS500* (instead of *WS compact*)
- Weather station *WS600* (instead of *WS compact*)

4 Initial commissioning

4.1 Overview

Initial commissioning of the device includes the following tasks:

- Set up and connect the device. The process is explained over the next few pages.
- Adjust the operating system settings to suit your location. This includes:
  - Time and date settings
  - Network address
  - Number formats
- Calibrate and verify the measuring system; refer to section "Verifying and calibrating measuring system [▷ 77]"

Setup time: The tasks listed above take about two hours to complete.

4.2 Setting up and connecting Fidas 200

Setting up and connecting controller

1. Set up the controller in a suitable place within the measuring station.
2. Plug the weather station cable into the receptacle “weather station” on the back of the controller.
3. To connect to a network: Connect a network cable.
4. Connect the network cable but do not switch it on yet.

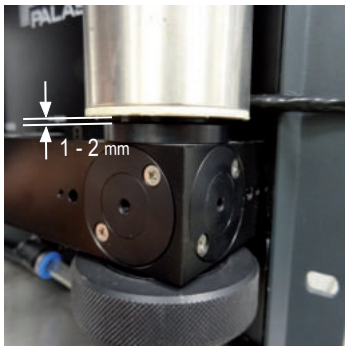
Attaching and connecting sampling tube

⚠ CAUTION

There is a risk of pinching and shearing points when placing the sampling tube on the aerosol inlet tube.

Risk of injury to unprotected fingers.

- Wear protective gloves.



1. Hold the sampling tube up to light to verify that there are no foreign objects in the tube.
2. Carefully guide the sampling tube over the aerosol inlet tube on the controller.
   Important: There should be a gap of 1 to 2 mm between the sampling tube and the contact surface. If the tube rests directly on the contact surface, it can subject the aerosol sensor to mechanical strain.
3. Secure the sampling tube with a pipe clamp (provided on site). Ensure that the tube is positioned vertically.
4. Plug the cable from the drying section IADS (on the sampling tube) into the receptacle “IADS” on the back of the controller.

Attaching sampling head

For more information, refer to "Attaching sampling head [▷ 39]."

4.3 Setting up and connecting Fidas 200 E

⚠ CAUTION

Risk of stumbling and falling

Cables and lines that are not laid properly can pose a hazard. There is a risk stumbling and falling.

- Lay cables and lines properly.

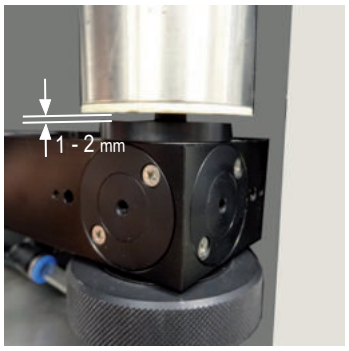
Installing sampling tube

⚠ CAUTION

There is a risk of pinching and shearing points when placing the sampling tube on the aerosol inlet tube.

Risk of injury to unprotected fingers.

- Wear protective gloves.

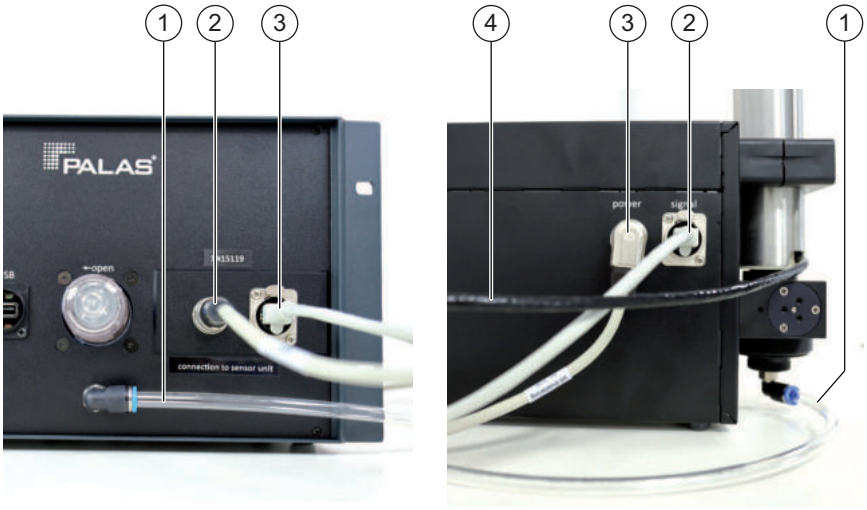


1. Set up the controller and the sensor unit in a suitable place within the measuring station.
2. Hold the sampling tube up to light to verify that there are no foreign objects in the tube.
3. Carefully guide the sampling tube over the aerosol inlet tube on the sensor unit.
   Important: There should be a gap of 1 to 2 mm between the sampling tube and the contact surface. If the tube rests directly on the contact surface, it can subject the aerosol sensor to mechanical strain.
4. Secure the sampling tube with a pipe clamp (provided on site). Ensure that the tube is positioned vertically.

Attaching sampling head

For more information, refer to "Attaching sampling head [▸ 39]."

Connecting controller and sensor unit



Hose connections and cable connections between controller and sensor unit

1	Aerosol hose	2	LAN cable (signal)
3	Power supply cable	4	Cable for drying section IADS

1. Plug the weather station cable into the receptacle “weather station” on the back of the controller.
2. Connect the LAN cable to the external sensor unit and the controller.
3. Connect the power supply cable to the external sensor unit and the controller.
4. Connect the aerosol hose to the external sensor unit and the controller.
5. Plug the cable from the drying section IADS into the receptacle “IADS” on the back of the controller.
6. To connect to a network: Connect a network cable.
7. Connect the network cable but do not switch it on yet.

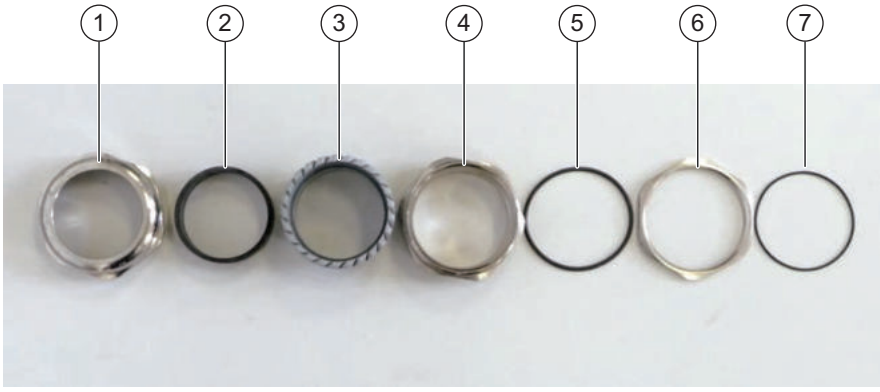
4.4 Setting up and connecting Fidas 200 S

Mounting material for weather station and sampling tube

The sampling tube and the weather station support tube are connected to the weatherproof housing with screw connections. The weatherproof housing is equipped with threaded fittings.

If any of the threaded fittings have been removed from the weatherproof housing, they must first be screwed on again. Be sure to install the seals as well. If a seal is not in place, moisture can penetrate the housing and damage the controller.

Components for the mounting set:



Mounting set for connecting tubes to weatherproof housing

1	Union nut	2	Seal for clamping ring
3	Clamping ring	4	Threaded fitting
5	Sealing ring for threaded fitting	6	Lock nut for interior
7	Sealing ring for lock nut		

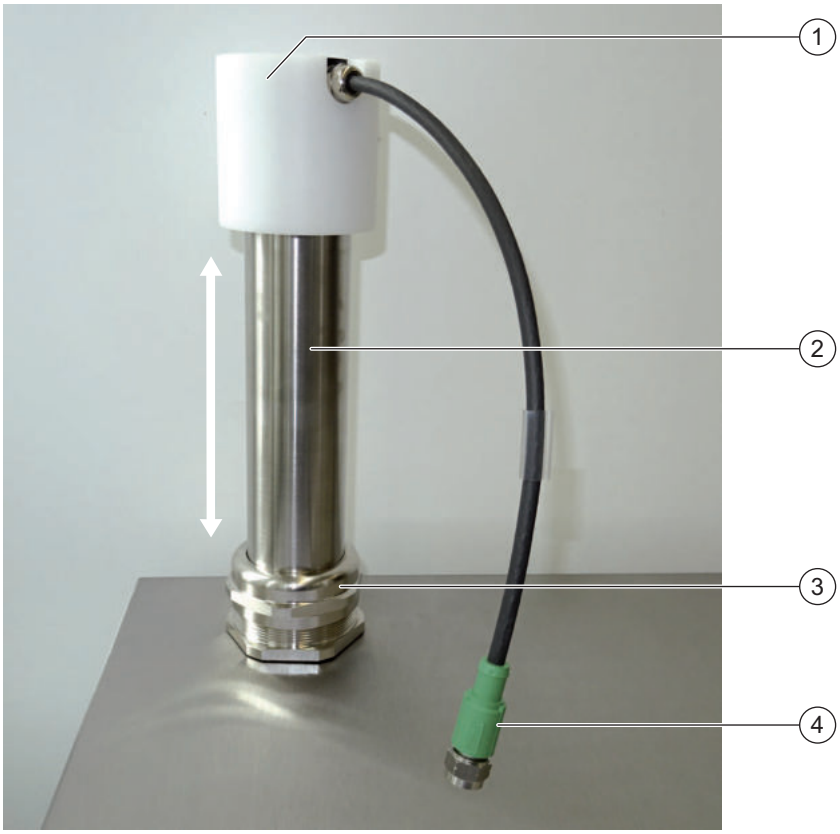
4.4.1 Installing weather station

The following tools are needed to install the weather station:

- Open-end wrench, size 13

Adjusting support tube

The support tube is inside of the weatherproof housing upon delivery. Once the union nut has been released, the support tube can be extended about 25 cm out of the housing.



Support tube with connecting cable for weather station

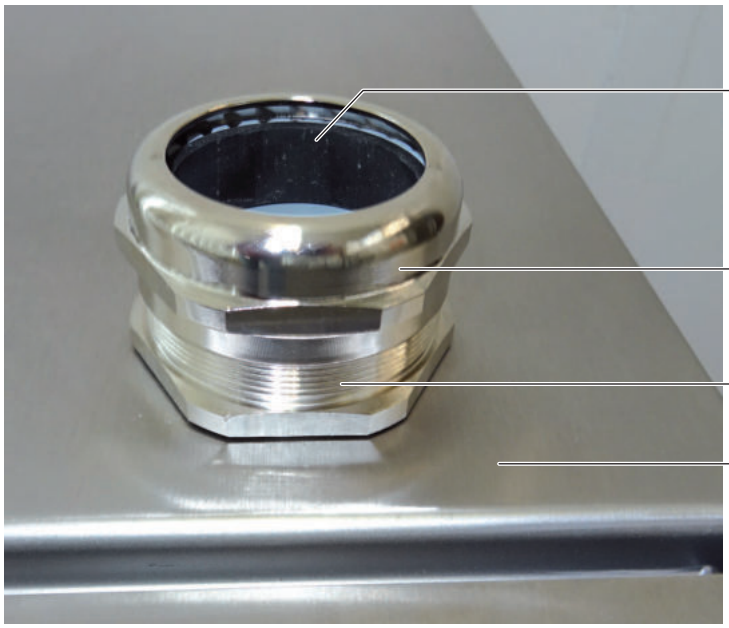
1	Protective sleeve	2	Support tube
3	Union nut	4	Connecting cable for weather station

Positioning and connecting weather station

1. Place the weather station on the protective sleeve.
2. Tighten the nuts slightly (with open-end wrench, size 13). You should still be able to turn the weather station.
3. Only for WS500 and WS600: Turn the weather station to face north.
4. Tighten the two screws alternately until the weather station can no longer be turned.
   Do not overtighten! The weather station bracket can break.
5. Connect the cable to the weather station.

4.4.2 Installing sampling tube

The fastening elements for the sampling tube are in the opening in the weatherproof housing upon delivery of the device.



Fastening elements for sampling tube in weatherproof housing

1	Clamping ring with seal	2	Union nut
3	Threaded fitting	4	Weatherproof housing

Inserting sampling tube in weatherproof housing

Inserting sampling tube in weatherproof housing

1. Release the union nut and remove it along with the clamping ring and the sealing ring on the clamping ring.
2. Slide the clamping ring with the sealing ring over the sampling tube.
3. Guide the cable from the drying section IADS into the opening in the weatherproof housing.
4. Carefully insert the sampling tube into the opening. Work carefully to avoid damaging the cable.

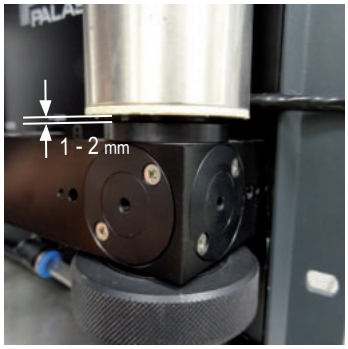
Attaching and connecting sampling tube

⚠ CAUTION

There is a risk of pinching and shearing points when placing the sampling tube on the aerosol inlet tube.

Risk of injury to unprotected fingers.

- Wear protective gloves.



1. Hold the sampling tube up to light to verify that there are no foreign objects in the tube.
2. Carefully guide the sampling tube over the aerosol inlet tube on the controller.
   Important: There should be a gap of 1 to 2 mm between the sampling tube and the contact surface. If the tube rests directly on the contact surface, it can subject the aerosol sensor to mechanical strain.
3. Secure the sampling tube with the pipe clamp. Ensure that the tube is positioned vertically.
4. Screw in the union nut and tighten by hand.
5. Plug the cable from the drying section IADS (on the sampling tube) into the receptacle “IADS” on the back of the controller.

Attaching sampling head

For more information, refer to "Attaching sampling head [▶ 39].”

4.5 Attaching sampling head

Prerequisites

Attaching the sampling head is the last step required to set up the device. Once the sampling tube is fixed in place with a pipe clamp, attach the sampling head.

Assembly

1. Place the sampling head on the sampling tube.
2. Secure the sampling head with two screws.

5 Operation and settings

5.1 Turning the device on

Turning on the power switch on the back of the controller starts the operating system and then the startup manager. After the license is verified, the firmware *Fidas* starts.

The following things occur automatically:

- The text `NaN` appears briefly on the touch screen.
- The measuring process begins. The data is automatically stored in the internal memory. It takes about two minutes before the first PM values are displayed.
- The main firmware menu appears.
  Refer to the section “Main menu [▶ 41].”

The warm-up time, from switching on the device until valid measured data is available, is about 10 to 15 minutes.

Starting firmware from operating system

If the firmware has been closed but the operating system is still running, the firmware can be started by double-clicking the file `startupmanager.exe` (`Desktop > Startup`).

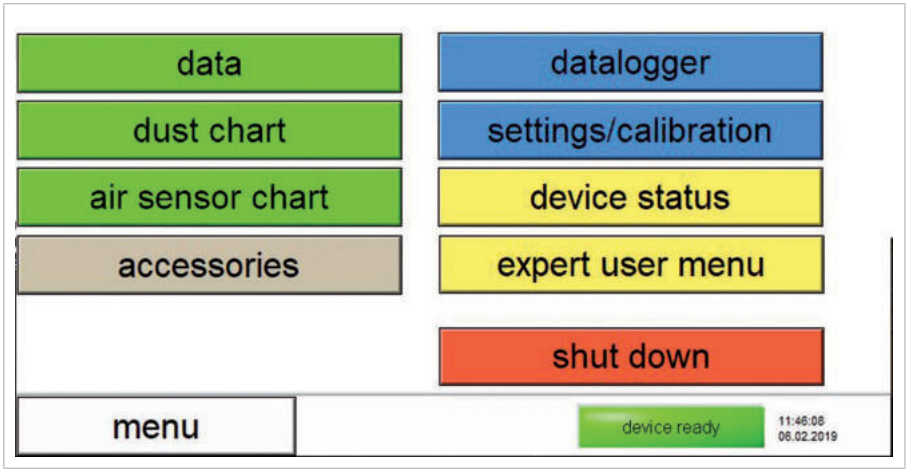
5.2 Fidas Firmware

5.2.1 Main menu

The main menu appears when the device is switched on. Subscreens can be accessed from the main menu. Touching `menu` always leads back to the main screen.

When `Device ready` appears at the bottom right, the device is ready for operation.

If `check device status` appears, the settings and states of the components have to be checked. More information can be found in the section "Device status screen [▶ 59]."



Fidas Firmware: Main menu

Button	Description	Additional information
`data`	Shows the course of the measured PM fractions and the concentrations.	Data screen – current measured values [▶ 43]
`dust chart`	Shows the course of the fine dust values measured.	Dust chart screen – course of fine dust values measured [▶ 44]
`air sensor chart`	Shows the course of the values measured by the weather station.	Air sensor chart screen – course of values measured by weather station [▶ 45]
`accessories`	Shows the menu for accessories as well as additional information (IADS, weather station, filter system, particle size distribution, PM values, set alarm, calibrate weather station).	Accessories screen – accessories and other information [▶ 46]
`datalogger`	Data transfer from the internal memory to an external storage medium (e.g. flash drive).	Datalogger screen – measured data [▶ 55]
`settings/ calibration`	• Continuous monitoring of calibration. • Switch on and off calibration features.	Settings/calibration screen [▶ 57]
`device status`	Provides an overview of critical system parameters (volume flow, coincidence, pump output, weather station, IADS, calibration, LED temperature and operating mode.	Device status screen [▶ 59]
`expert user menu`	Changes to expert mode. This mode is password-protected.	Expert mode [▶ 62]
`shut down`	Shuts down the device and the operating system.	Completely switching off device [▶ 67]
`menu`	Returns to the main menu from the various menus.	-

`device ready`
or
`check device status`
	Device status.
	device ready The device is ready for operation.
	`check device status`: System parameters have to be checked.
		Device status screen [▶ 59]

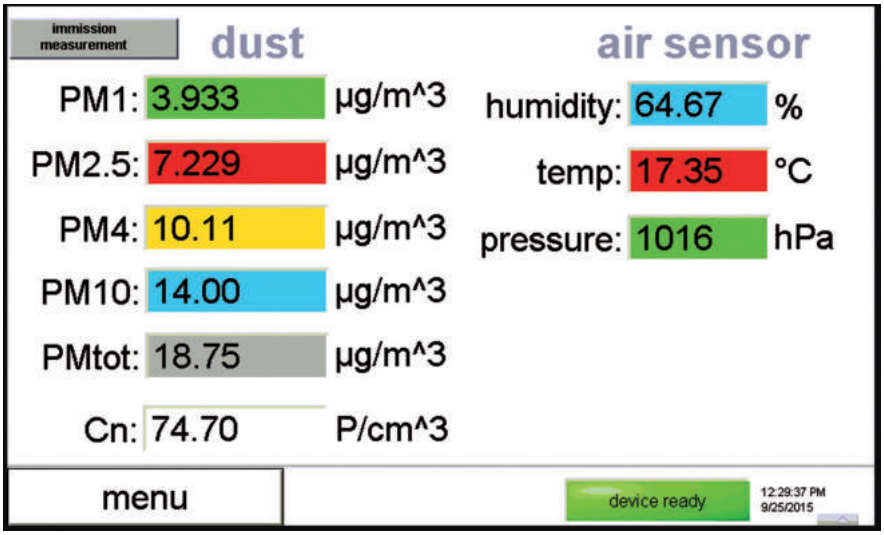
5.2.2 Data screen – current measured values

The `data` screen shows the following data:

- The measured fine dust values of the individual fractions `PM`
- The values measured by the weather station
- Particle number concentration `Cn`

All of the data is saved every minute.

Menu path `Main menu > data`



Data screen

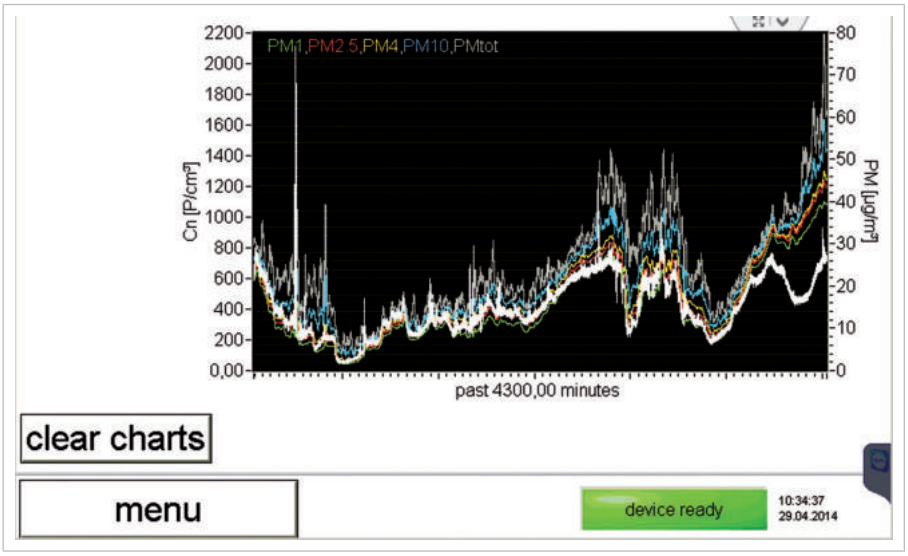
Designation	Measured value
`PM1`	Fine dust values of different fractions.
`PM2.5`	Display of sliding average (averaged over 900 seconds*).
`PM4`	Update: every 30 seconds.
`PM10`	
`PMtot`	
`Cn`	Particle number concentration. Update: every 3 seconds.
`humidity`	Relative humidity. Update: every 2 minutes.
`temp`	Air temperature. Update: every 2 minutes.
`pressure`	Air pressure. Update: every 2 minutes.

* Value specified for operation as certified measuring equipment.

5.2.3 Dust chart screen – course of fine dust values measured

The screen `dust chart` shows the course of the PM values measured and the number concentration of the particles. The longest time period that can be displayed is three days (4300 minutes).

Menu path `Main menu > dust chart`



Dust chart screen

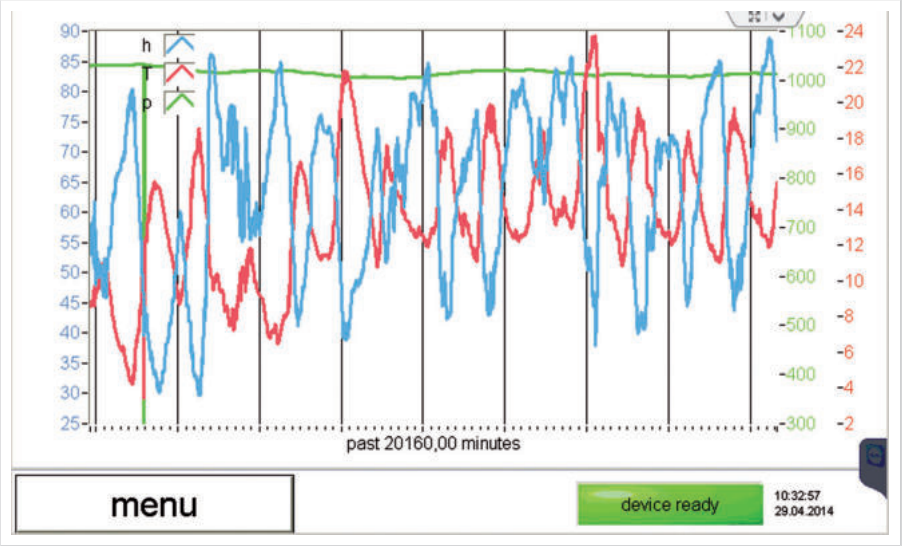
Measured value	Depiction in diagram
PM values	Colored curve. Values on right ordinate.
Number concentration of particles Cn	White curve. Values on left ordinate.

Touch `clear charts` to clear the display and start depiction of a new course of the fine dust measured values.

5.2.4 Air sensor chart screen – course of values measured by weather station

The `air sensor chart` screen shows the course of values measured by the weather station. The graph is updated every two minutes. The longest time period that can be displayed is 14 days (20160 minutes).

Menu path `Main menu > air sensor chart`



Air sensor chart screen

Measured value	Depiction in diagram
`Relative humidity [h]`	Blue curve. Values on left ordinate.
`Air temperature [T]`	Red curve. Values on right ordinate.
`Air pressure [p]`	Green curve. Values on right ordinate.

Note If the weather station provides other values, e.g. precipitation, wind direction or wind speed, this data is also saved. Graphic display of the values can be found under:

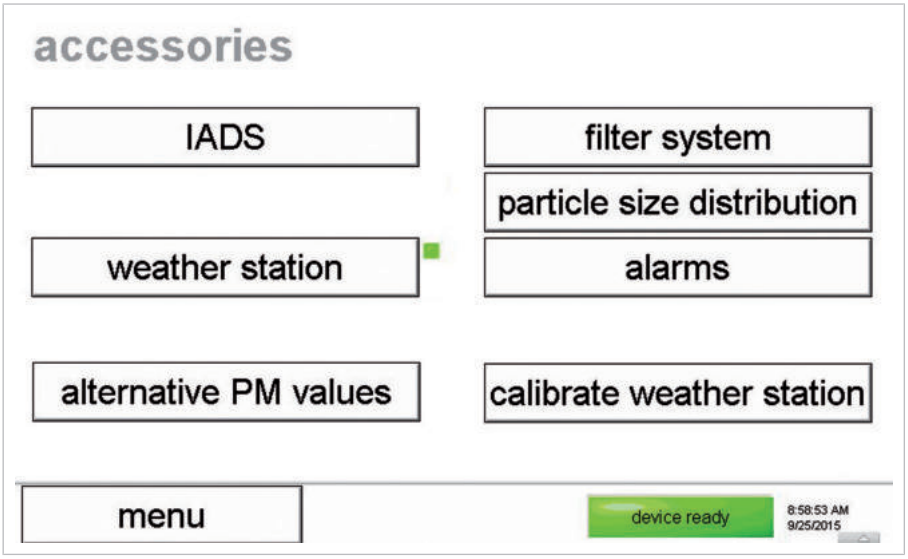
`Main menu > accessories > weather station`

Also refer to: Section "Weather station screen – data measured by weather station [▶ 49]."

5.2.5 Accessories screen – accessories and other information

Other screens can be accessed from the `accessories` screen.

Menu path `Main menu > accessories`



Accessories screen

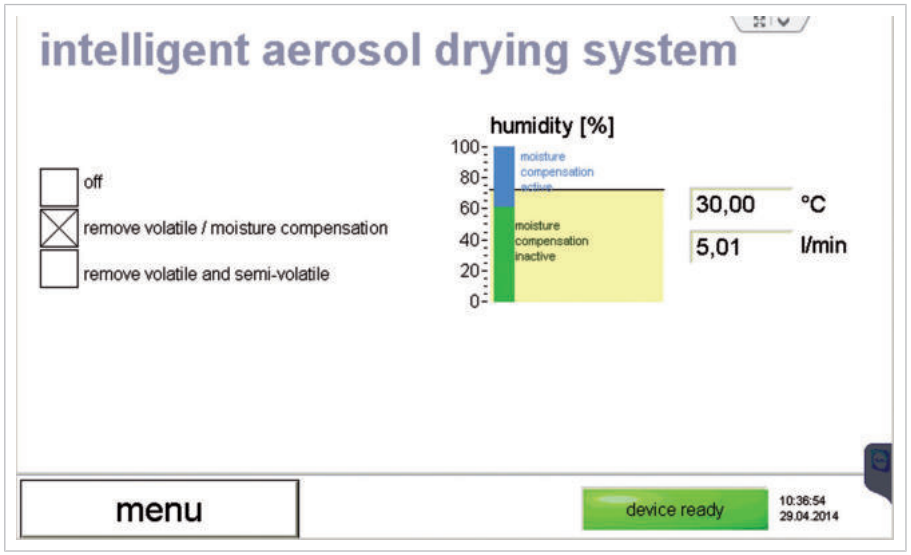
Name of button	Feature
`IADS`	Opens the screen `IADS` "Intelligent Aerosol Drying System (IADS) screen [▷ 47]."
`weather station`	Opens the screen `weather station` "Weather station screen – data measured by weather station [▷ 49]."
`alternative PM values`	Opens the screen `alternative PM values` "PM data screen (alternative PM values) [▷ 50]."
`filter system`	Opens the screen `filter system` "Filter system screen [▷ 51]."
`particle size distribution`	Opens the screen `particle size distribution` "Particle size distribution screen [▷ 52]."
`alarms`	Opens the screen `alarms` "Alarms screen [▷ 53]."
`calibrate weather station`	Opens the screen `calibrate weather station` "Weather station calibration screen [▷ 54]."

5.2.6 Intelligent Aerosol Drying System (IADS) screen

The drying section IADS extracts moisture from the aerosol. Moisture such as mist droplets could otherwise be interpreted as particles.

One of three settings can be selected in this screen. Please keep in mind: Operation as certified measuring equipment is permitted only with the default setting `remove volatile / moisture compensation`.

Menu path `Main menu > accessories > IADS`



Intelligent Aerosol Drying System (IADS) screen

Setting	Effect
`off` (for testing)	The IADS is switched off. But the internal tube in the IADS is heated to +2K, based on the ambient temperature, to prevent condensation inside of the IADS and the optical sensor.
`remove volatile / moisture compensation` (default setting for operation as certified measuring equipment)	The IADS dissolves volatile components of the aerosol and compensates the water condensation as well as the consequent particle growth when the relative humidity is greater than 60%. The setpoint temperature is set dynamically as a factor of the ambient temperature and humidity.
`remove volatile and semi-volatile` (for testing)	The IADS dissolves volatile and semi-volatile components of the aerosol and compensates the effect of humidity on particle size. The internal IADS heater is set to a constant temperature of 75 °C.

Note

The last setting is not saved. When the device is started up the next time, it is reset to the default `remove volatile / moisture compensation`.

To change the setting permanently, change the file `promo.ini`:
To do this, set the numerical value for `off` to 0 in the line `IADS-Modus=1`, and set `remove volatile / moisture compensation` to 1 and`remove volatile and semi-volatile` to 2.

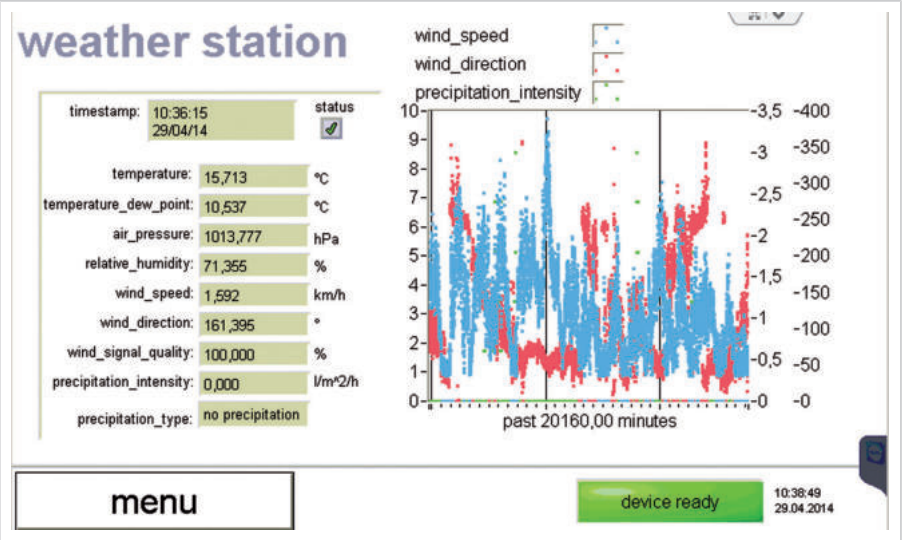
5.2.7 Weather station screen – data measured by weather station

The screen `weather station` shows all of the data measured by the weather station.

When the weather station connected to the system supplies this data, the course of the following data is displayed as a graph:

- Wind speed (with weather station WS500 and WS600)
- Wind direction (with weather station WS500 and WS600)
- Precipitation (with weather station WS600)

Menu path `Main menu > accessories > weather station`



Weather station screen

Note If the model of the weather station used cannot supply certain values, the default settings appear.

5.2.8 PM data screen (alternative PM values)

The screen `PM data` shows PM values calculated applying different algorithms.

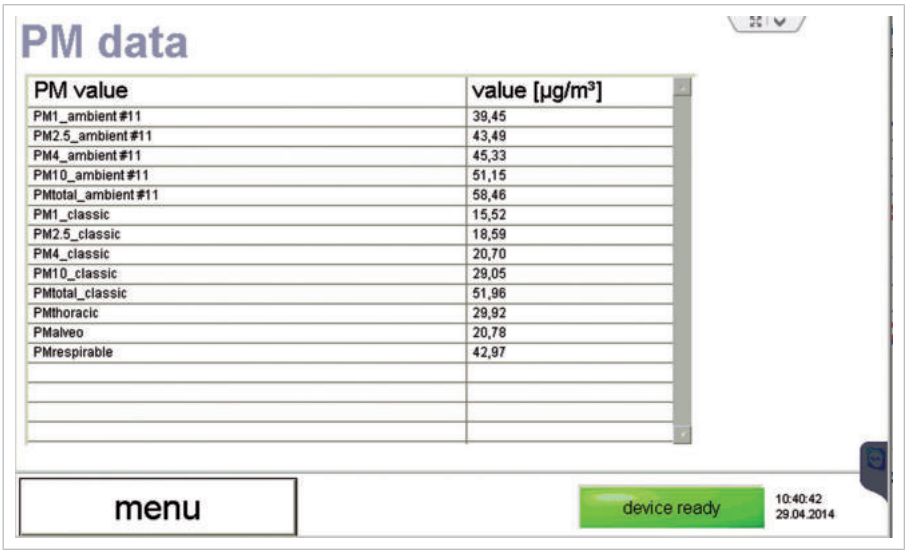
The first five PM values are identical to the values shown in the data screen, "Data screen – current measured values [▶ 43]."

The name of the fraction also contains the number of the algorithm applied. The hash tag (#) is used as the symbol for “number.”

These are followed by the PM values based on the density or the form factor specified in the screen `expert user menu > sensor/calibration`. These values are designated as “classic.”

The lower PM values are calculated pursuant to EN 481 and are applied particularly when measuring the quality of indoor air.

Menu path `Main menu > accessories > alternative PM values`



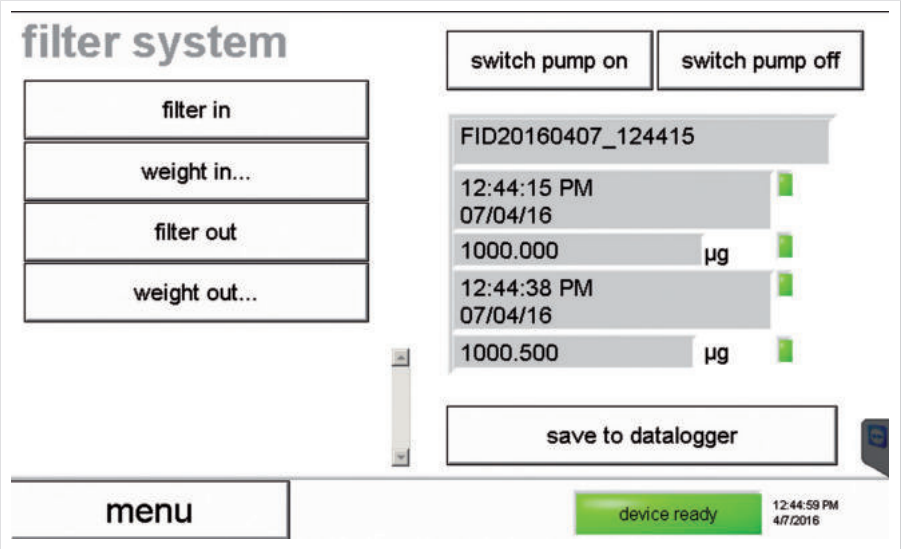
PM data screen (alternative PM values)

5.2.9 Filter system screen

The `filter system` screen enables the gravimetric filter to be used to measure the mass of the fine dust.

It also allows the aerosol pumps to be switched on and off, and a time stamp of when the filter was removed and inserted can be set.

Menu path `Main menu > accessories > filter system`



Filter system screen

Features:

Name of button	Feature
`switch pump on`	Switches the aerosol pumps on.
`switch pump off`	Switches the aerosol pumps off.
`filter in`	Saves the current time as the time when the filter was inserted. And a filter identification number (FID) is generated and displayed as well.
`weight in…`	A dialog window opens in which the net weight of the total filter can be entered. The net weight must be based on the time stamp `filter in`.
`filter out`	Saves the current time as the time when the filter was removed.
`weight out…`	A dialog window opens in which the gross weight of the total filter can be entered. The gross weight must be based on the time stamp `filter out`.
`save to datalogger`	This button appears when all of the essential values have been entered. The filter data is saved in a new file every day: `Data_auto_NNNNN_YYYY_MM_DD.data.promo` (YYYY_MM_DD = date).

5.2.10 Particle size distribution screen

The `particle size distribution` screen shows two graphs with the currently measured size distribution of the particles.

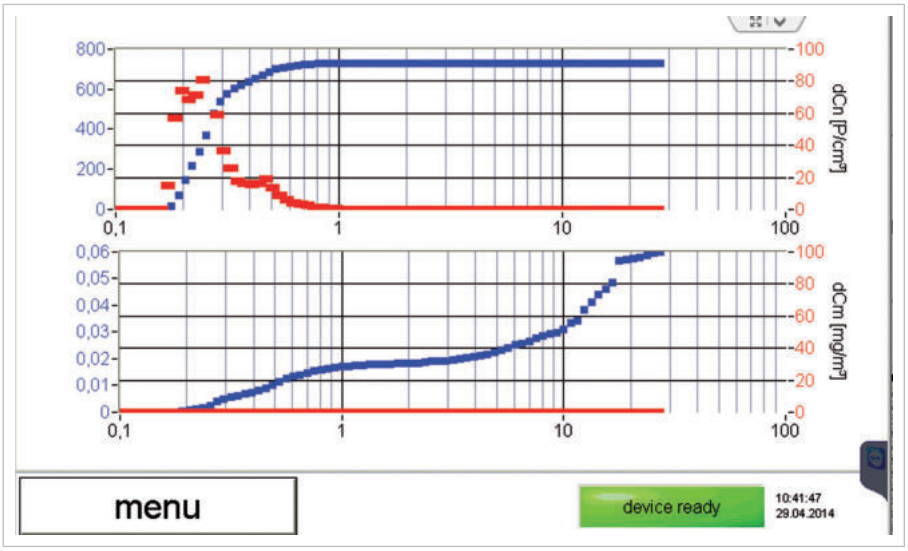
Upper graph: quantity distribution.

Lower graph: mass distribution:

Red curves: discrete distribution (value by size range)

Blue curves: cumulative distribution.

Menu path `Main menu > accessories > particle size distribution`



Particle size distribution screen

Note The end values on the Y-scales showing discrete distribution (red curves) can be adjusted as needed. To do this, select the respective scale and overwrite the value (external keyboard or soft keyboard required).

5.2.11 Alarms screen

Automatic notifications can be set up in this screen.

You can choose to receive an e-mail message or set an alarm on the digital output of the device “digital_out.”

Menu path `Main menu > accessories > alarms`

Alarms screen

Notification by e-mail

If this feature is activated (X in the box), the device sends a message to the stated address if one of the status parameters exceeds the limits. Refer to the section “Device status screen [▷ 59].”

Alarm signal at digital output

If this feature is activated (X in the box), the device sends a signal to the digital output if the limit specified in the file `promo.ini` is exceeded:

Parameters for the limit: `alarm_threshold=`

Parameters for the OM fraction: `alarm_value=`

Default setting for `alarm_threshold=` 99999

Default setting for `alarm_value =` PM10

5.2.12 Weather station calibration screen

The following weather station sensors can be calibrated in the weather station screen.

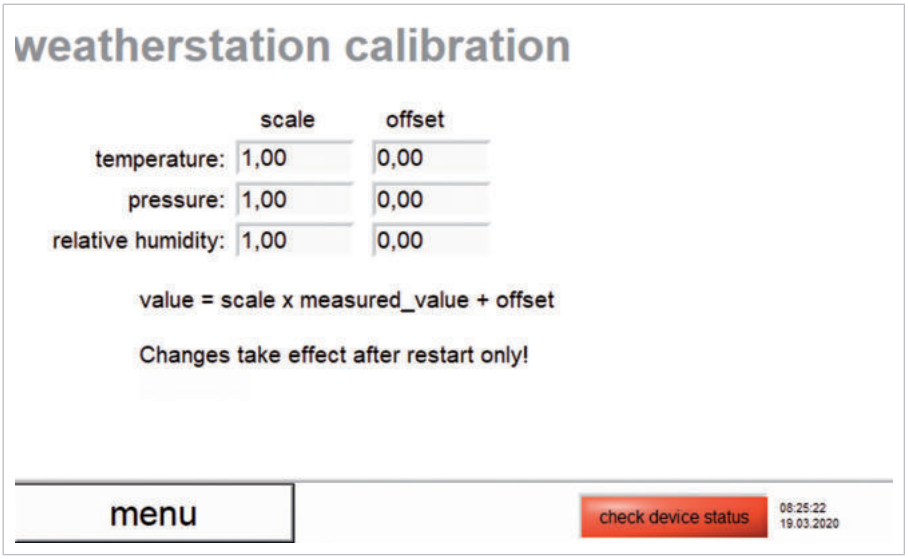
- Temperature sensor
- Air pressure sensor
- Humidity sensor

Calibration takes place by comparing the measured values to the measured values of a transfer standard.

These types of calibration are possible:

- One-point adjustment (normally under field conditions): Determination of the slope factor (scale); offset remains 0.
- Two-point or multiple-point adjustment (e.g. calibration lab): Determination of the slope factor (scale) and the offset applying regression calculation.

Menu path `Main menu > accessories > calibrate weather station`



Weather station calibration screen

Note Changes are not applied until after the system is restarted.

5.2.13 Datalogger screen – measured data

Measured data in “promo” format

The device saves the measured data in a separate file every day.
`Data_auto_NNNNN_YYYY_MM_DD.data.promo` (YYYY_MM_DD = date).

So a new file is created every day. These files can be read by the firmware and by special programs.

Storage location: `Desktop > startup > Fidas`

Measured data as readable text files

The device creates a text file every month:
`DUSTMONITOR_NNNNN_YYYY_MM.txt`.

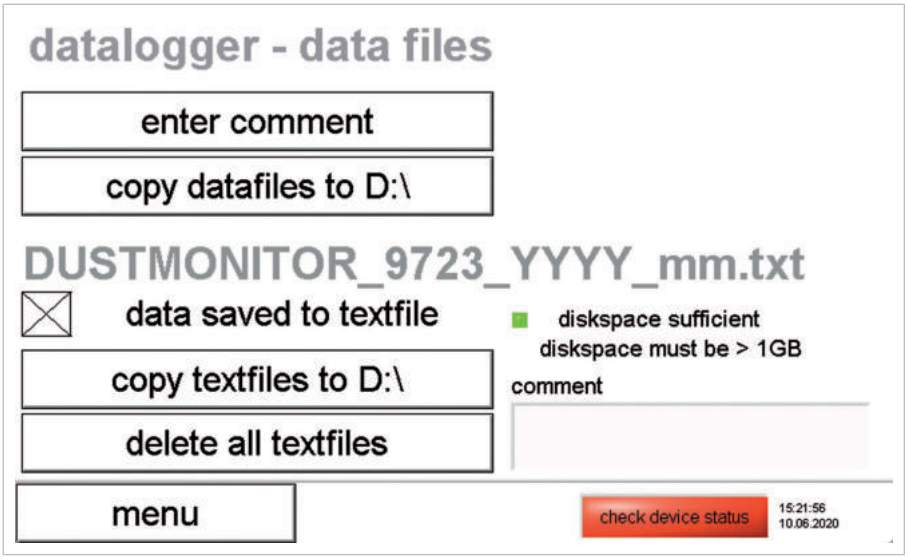
These text files contain the measured data in a readable format.

Storage location: `Desktop > startup > Fidas > textfiles`

Copying measured data

In the screen `datalogger`, measured data saved in the internal memory can be transferred to a flash drive inserted in the USB port on the front of the device.

Menu path `Main menu > datalogger`



Datalogger screen

Button	Feature
`enter comment`	Open a field in which a comment on the measured data can be entered. The comment is saved every time the the measured data is saved. This continues until the comment is deleted or changed.
`copy datafiles to D:\`	Copies measured data from the internal memory onto a flash drive.
`copy textfiles to D:\`	Copies all text files created onto a flash drive.
`delete all textfiles`	Deletes all text files created. There is no repeated query of whether the text files really should be deleted.

Note

Since measured data is not deleted automatically, we recommend regularly saving the data externally and then deleting it from the internal memory.

If data is not deleted, after a while the storage space on the hard drive can be exhausted. The indication `diskspace sufficient` is then red.

5.2.14 Settings/calibration screen

Calibration of the device is monitored online with an analysis of the measuring signal and it is shown in the graph `immission estimated channel deviation – trend 40h`. If the calibration starts to drift, the curve of the individual points between the two red horizontal lines drops sharply. The points are the result of a half-hour measurement.

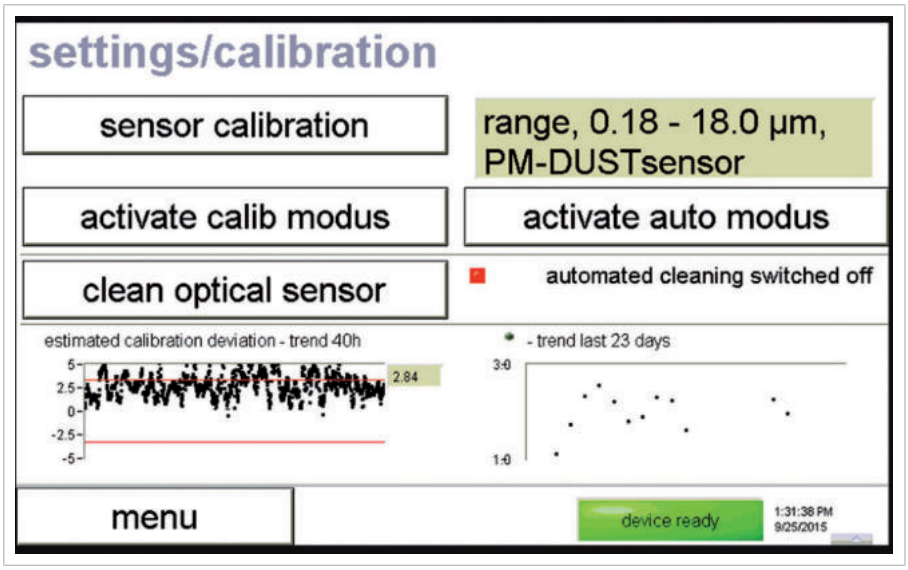
Error message

If the average deviation over the course of 40 hours is greater than 3.5 raw data channels, an error is triggered. When this happens, the device has to be verified with the MonoDust 1500; refer to the section "Verifying and calibrating measuring system [▷ 77]."

Individual points can lie outside of the limits. This can happen and is not a cause for concern. Calibration is fine in this case, too.

Menu path

`Main menu > settings/calibration`



Settings/calibration screen

Button	Meaning
`sensor calibration`	Opens a window with the aerosol sensor settings; refer to the section "Setting aerosol sensor offset [▶ 86]."
`activate calib mode`	Activates calibration mode. All subsequent data is marked as if it were measured during the calibration process. The data will not be taken into consideration for an evaluation, unless this is selected in *PDAnalyze*.
`clean optical sensor`	Routine that heats the IADS to 75°C and at the same time alternately brings the pumps from 0 l/min to the maximum flow rate. The process takes 15 minutes and cannot be interrupted.
`activate calib mode`	Ends calibration mode and activates automatic mode.

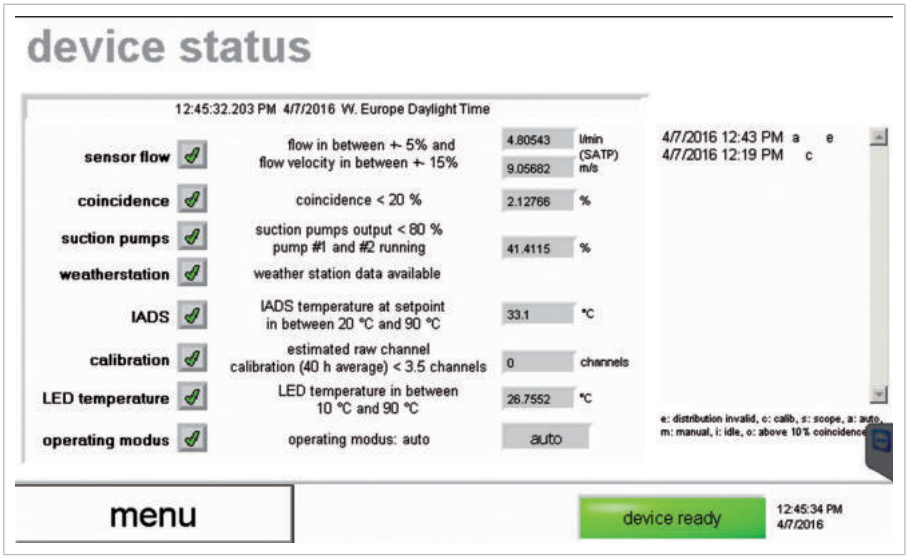
5.2.15 Device status screen

The `device status` screen shows the status of device components. The status information is saved with every data set. Observe the device status to be able to detect tendencies and properly plan maintenance.

Depending on the communication profile used, status data may be output via the interface. This is the case e.g. with the communication profile “Bayern-Hessen.”

If a value exceeds the specified limit, the device changes to “`check device status`” mode. In this case the source of the problem has to be found and remedied. The table below contains various explanations.

Menu path `Main menu > device status`



Device status screen

Parameter	Meaning	Explanation
`sensor flow`	The measured data is invalid.	`flow in between` indicates the current flow rate. The setpoint is **4.8 l/min**. The flow rate is standardized to *standard atmospheric temperature and pressure (SATP)*, i.e. based on 25°C and 1013 hPa. If the actual value deviates more than 5% from the setpoint, the measured data is invalid. An error indication appears. `flow velocity in between` shows the detection volume, which is the amount of air that is tested. An error is indicated if the particle velocity deviates more than 15% from the setpoint. The setpoint is the value `velocity_calibrated` entered in the `promo.ini` file.

Parameter	Meaning	Explanation
coincidence	The measured data is invalid.	Detection of more than one particle in the optical detection volume. An error is indicated if this occurs at a frequency greater than 20%. This error occurs after a situation that generates a large amount of fine dust, such as fireworks. If the error occurs more than once a year, it is an indication that the aerosol sensor lens is polluted.
suction pumps	Note	The value indicates the power consumption of the two aerosol pumps. If both pumps and the preceding pump are okay, the value is between 38% and 50%. If the value slowly increases over time, the filter has to be replaced to reduce the strain on the pumps. If the value increases suddenly, one of the two pumps may be defective and has to be replaced (available only from Palas or a sales partner). An error is triggered when 80% of the power is exceeded. If a flow rate of 4.8 l/min can be maintained, the device continues to provide correct results. But have the pumps replaced as soon as possible.
weather station	The measured data is invalid.	Indicates whether a weather station is properly connected and transferring the measured values.
IADS	The measured data is invalid.	Indicates whether the IADS is properly connected and the temperature is the same as the specified setpoint. If the temperature outside is below 23°C, the temperature of the IADS has to be higher than the temperature outside. If not, the probe or the IADS heater is defective. If a very low temperature is indicated, the probe is probably broken. If a very high temperature is indicated, short-circuiting is likely.
calibration	Note	Monitors calibration. If over the average of 40 hours the calibration deviates more than 3.5 raw data channels, an error is triggered. When the fine dust pollution is minimal, the value can fluctuate by more than 2.5 raw data channels. The value can be adjusted in the promo.ini file if necessary. It may be advisable to shorten the testing intervals when there is excessive air pollution at the site and the calibration status is often indicated incorrectly.
LED temperature	The measured data is invalid.	The LED light source is temperature-controlled. If a problem occurs in this control circuit, an error bit is set. The temperature is normally about 10K higher than the temperature of the device. If the temperatures are the same, the LED is defective. If the displayed temperature is significantly higher than the temperature of the device, a probe may be defective.

Parameter	Meaning	Explanation
operating mode	Note	Indicates whether the device is in auto mode. After calibration, verify that the displayed status is “auto.” Otherwise data may not be saved correctly or the device does not start up automatically after a power failure. An error is also indicated if the aerosol sensor is defective and no PM values are being measured (all values = 0).

Status log The Status log on the right side of the screen shows activities occurring on the device, along with the date and time.

Display	Meaning
a [auto mode]	Standard device operating mode
c [calibration mode]	During calibration the data is labeled as c and not considered for the evaluation.
i [idle]	The device is in idle mode and is not measuring any data.
m [manual mode]	The device is in “manual” mode.
s [scope mode]	The electronic oscilloscope, which can analyze single signals, is activated. No measurements occur during this time.
e [distribution invalid]	The measured particle size distribution is invalid.
o [above 10% coincidence]	The concentration was so high that more than 10% of the values were measured in coincidence, meaning that more than one particle was in the detection volume at the same time.

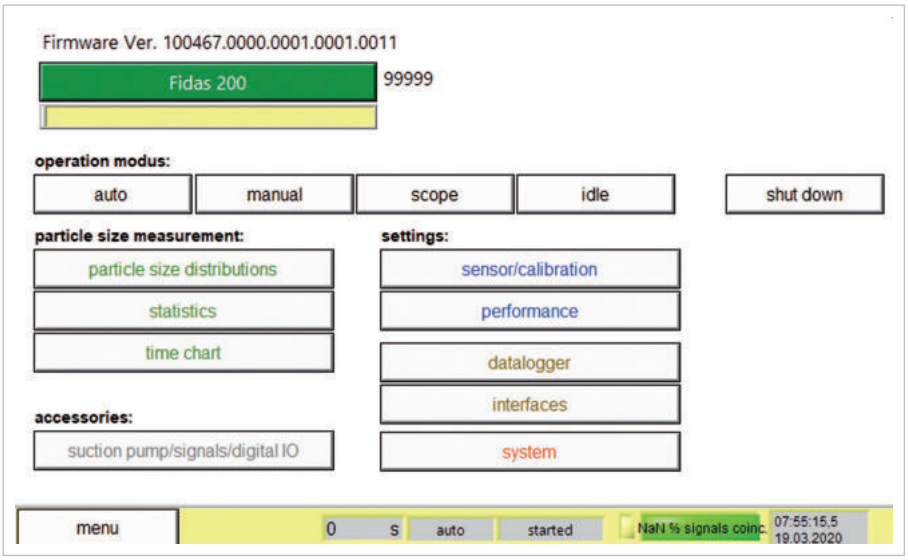
5.2.16 Expert mode

Certain tasks require that the system be switched to the firmware expert mode. Access expert mode by touching `expert user menu` in the main menu.

Expert mode is password-protected. Default password: 1-.

The password can be changed in the promo.ini control file.
Parameter: `Passwort_service=`.

Menu `Main menu > expert user menu`



Expert user mode screen

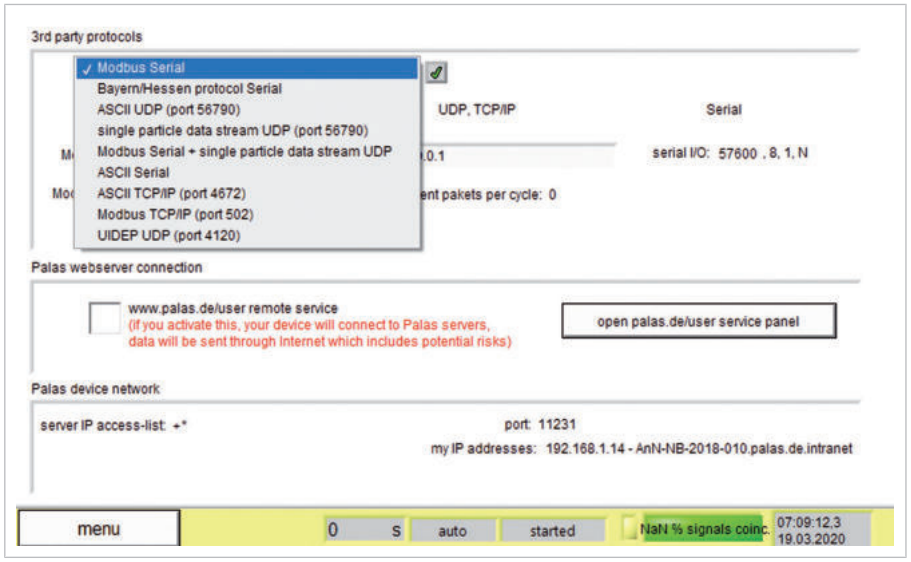
To return to the main screen of the firmware: Touch `Fidas 200`.

5.2.17 Interface screen

The communication profile to be used to transmit measured data can be selected in the `interface` screen. Or the communication profile can be defined in the `promo.ini` file. Parameter: `PLC_interface=`.

Detailed information on the various communication profiles can be found in separate documents.

Menu `Main menu > expert user menu > interface`

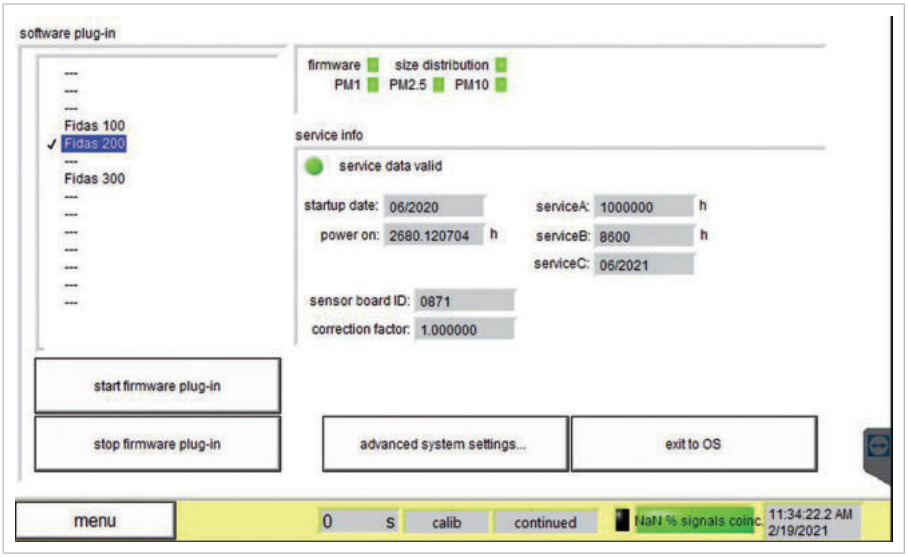


Interface screen

5.2.18 System Screen

The screen `system` shows device operating data and enables the firmware to be closed.

Menu `Main > Expert user menu > System`



Screen `system`

Operating data in the service info box

Operating data	Meaning
Startup date	Date of initial commissioning
Power on	Operating hours of device
Service A	-
Service B	Number of hours until when the next servicing is due
Service C	Date of next recommended servicing
Sensor board ID	Serial number of control board SLA
Correction factor	Correction factor set when the device was calibrated at the factory

Buttons

Button	Feature
`start firmware plugin`	Starts an installed plug-in.
`stop firmware plugin`	Stops a running plug-in.
`advanced system settings`	Opens the menu `advanced system settings`
`exit to OS`	Closes the firmware. The operating system continues to run.

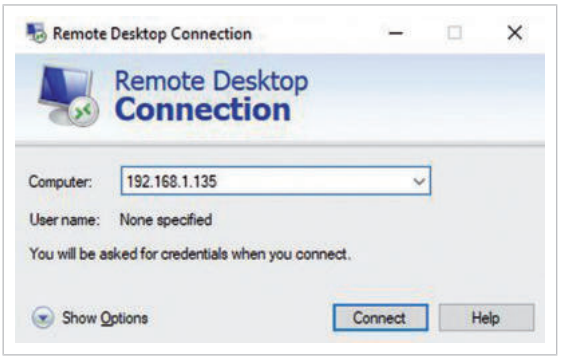
5.3 Access to firmware via Remote Desktop

The device can be operated via a Remote Desktop connection when needed. The firmware user interface can be accessed via the Remote Desktop app on a PC or mobile device (smartphone or tablet).

Prerequisite: The devices are connected to the same network.

If the device is connected, 2 IP addresses are shown in the menu `expert user menu > interface` (section `Palas device network`). The lower IP address is the decisive address.

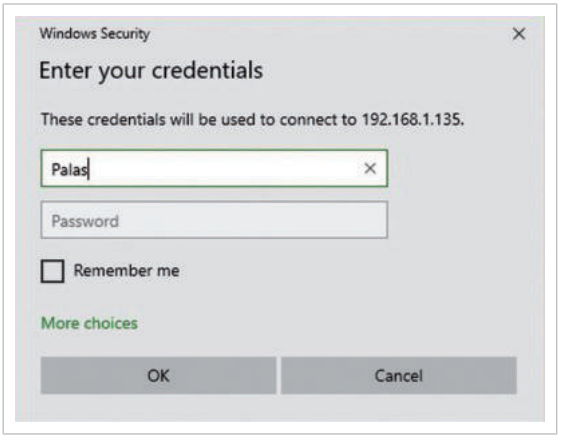
- Open the Remote Desktop app, e.g. “Remote Desktop Connection.”



Remote Desktop app “Remote Desktop Connection”

1. Enter the IP address of the device.
2. Select “Connect.”

   ⇨ The login window opens.



Login window “Windows Security - Enter your credentials”

1. Enter the user name “Palas.”
2. Select “OK” (There is no password).

⇨ The device firmware appears.

5.4 Closing the firmware and switching off the device

Important! Always shut down the firmware before turning off the power switch. If the firmware is not shut down properly, data can be lost.

5.4.1 Completely switching off device

To close the firmware as well as Windows:

1. Select `shut down`.
   ⇨ The firmware is shut down. The screen turns black.
2. Turn off the power switch (on the back of the controller).

⇨ The internal fan shuts off. The device switches off.

5.4.2 Closing the firmware but not Windows

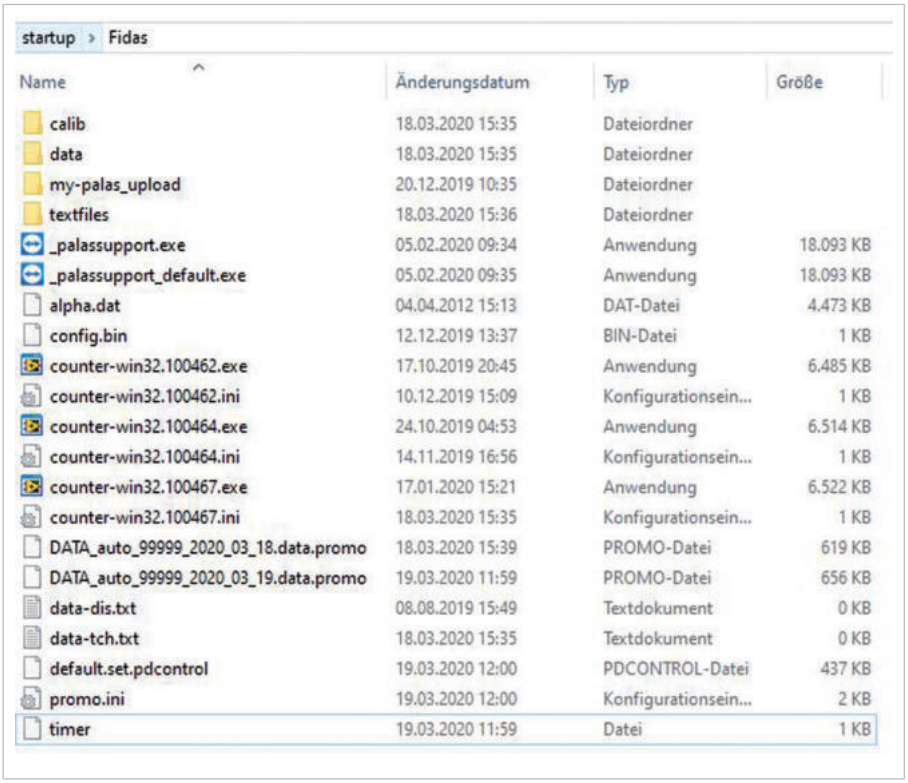
The following procedure is used to close the firmware. The user still has access to the operating system though. Choose this option to save or edit control files.

1. Select `Main menu > expert user menu` (password `1-`).
2. Touch `system`
3. Select `exit to OS` to close the firmware.
   ⇨ The firmware is closed. The user interface of the operating system (desktop) is visible.

5.5 Files in the folder Fidas

On the operating desktop there is a folder named `startup` ; it contains the folder `Fidas`.

The Fidas folder contains all of the files essential to operating the device. In addition to executable files and control files, the firmware also saves files with measured values here. The number of files increases over time.



Files in the folder `startup > Fidas`

Functions and purposes of files

The following table explains the files that have to be run or backed up by the user in certain cases.

Name of file	Function	User action
`_palassupport.exe`	Starts the Teamviewer software. The software assigns a new password every time it is started.	Open the software for remote maintenance and support.
`_palassupport_default.exe`	Starts the Teamviewer software with a standardized password.	Open the software for remote maintenance and support.
`Counter-win32.100###.exe`	Executable file. Starts the firmware. The file with the highest number starts the newest version.	Start the Fidas firmware.
`Data_auto_NNNNN_YYYY_MM_DD.data.promo`	File containing measured values. The file name contains the date on which the file was created.	Save files regularly. Delete old files regularly.
`Promo.ini`	Control file with device settings.	Save the file regularly and when settings have been changed.
`Default.set.pdcontrol`	Control file with device settings.	Save the file regularly and when settings have been changed.

5.5.1 Control file promo.ini

The control file **promo.ini** contains settings that are essential to proper functioning of the device and for the firmware user interface. The following section describes the various entries. Entries that have no impact on the device appear gray.

Important:

- Always close the firmware before editing a file. Never edit a file when the firmware is running!
- Change entries only when you are certain about about what the changes effect.

Save a copy of the originally supplied file on an external storage device and always make a copy of the file before editing it.

The file can be found on the desktop under `startup > Fidas`.

```
[system]
type=Fidas 200
ser#= XXXX
password= XXXX
user_device#=""
[plugin]
Promo 3000_enabled=no
Fidas 100_enabled=yes
Fidas 200/210_enabled=yes
Fidas 300/310_enabled=yes
Fidas mobile_enabled=no
Nanoco 100_enabled=no
Nephel 100_enabled=no
stop_enabled=yes
start_enabled=yes
[my-palas.com]
my-palas.com_autostart=no
[Fidas]
velocity_calibrated=9.3 m/s
PM10_slope=1.000
PM10_intercept=0
PM4_slope=1.000
PM4_intercept=0
PM2.5_slope=1.000
PM2.5_intercept=0
PM1_slope=1.000
PM1_intercept=0
PMtotal_slope=1.000
PMtotal_intercept=0
PM_alternative=yes
PM_volatile=no
textfile=no
textfile_interval=60s
PM_autoadjust=no
gravimetric_correction_factor=1.00
IADS_modus=1
dust_type=2
sensor_selection=2
automated_cleaning=no
alarm_threshold=99999 µg/m³
alarm_value=PM10
alarm_email_address=""
password_service=-1
calibration_IADS_restrict=yes
calibration_temperature=50
channel_deviation=3.5
[Promo3000]
interval=300
sensor1=15.000000
sensor2=33.000000
[hardware]
weatherstation_connected=yes
weatherstation_comport=4
weatherstation_scale_T=1
weatherstation_scale_p=1
weatherstation_scale_h=1
weatherstation_offset_T=0
weatherstation_offset_p=0
weatherstation_offset_h=0
weatherstation_equation=x_corr=scale*x+offset
GPS_connected=no
GPS_comport=8
discmini_connected=no
discmini_comport=81
discmini_interval=300s
[UF-CPC]
liquid_pump_impulsinterval=45 s
liquid_pump_impulsamplitude=0.5 V
[settings]
sensor_selection=2
PM_interval=900s
IP_UDP_broadcast=127.0.0.1
PLC_interface=2
temperature_compensation=yes
temperature_slope=0.17
velocity_correction=yes
velocity_calibration_enabled=no
flow_calibration_enabled=yes
server_IP-accesslist=+*
RSBaudRate=9600
BayerHessen_DA_commmand=60>60,61>61,62>62,63>63,64>64,65>65
BayerHessen_history=no
```

Example of control file promo.ini

Meaning of parameters and entries

Parameter	Entry	Meaning
Type=	Fidas 200	Type designation of device group. Includes the models Fidas 200 S and Fidas 200 E.
Ser#	XXXX	Serial number of device. Please do not change.
Password=	XXXX	Password for internal use. Please do not change.
User_device=	XXX	User-defined ID (3 characters)
Fidas 100_enabled=	yes	Plug-in for the top level user interface. Please do not change.
Fidas 200/210_enabled=	yes	Plug-in for the top level user interface. Please do not change.
Fidas 300/310_enabled=	yes	Plug-in for the top level user interface. Please do not change.
My-palas.com_autostart=	no	Initializes automatic connection of the device to the Palas website every time the device is started. Facilitates data upload and remote maintenance. Prerequisite: The device is registered on the website.
Velocity_calibrated=	9.3 m/s	Particle velocity setpoint from factory calibration
PM10_slope=	1.000	Slope of fraction PM10. Default = 1. The value can be changed on the basis of the TÜV (German technical inspection association) report 936/2122795.
PM10_intercept=	0	Axis intercept of fraction PM10. Default = 0. The value can be changed on the basis of the TÜV (German technical inspection association) report 936/2122795.
PM4_slope=	1	Slope of fraction PM4. Default = 1.
PM4_intercept=	0	Axis intercept of fraction PM4. Default = 0.
PM2.5_slope=	1	Slope of fraction PM2.5. Default = 1. The value can be changed on the basis of the TÜV (German technical inspection association) report 936/2122795.
PM2.5_intercept=	0	Axis intercept of fraction PM2.5. Default = 0. The value can be changed on the basis of the TÜV (German technical inspection association) report 936/2122795.
PM1_slope=	1	Slope of fraction PM1. Default = 1.
PM1_intercept=	0	Axis intercept of fraction PM1. Default = 0.
PMtotal_slope=	1	Slope of fraction PMtotal. Default = 1.
PMtotal_intercept=	0	Axis intercept of fraction PMtotal. Default = 0.
PM_alternative	yes / no	Yes = The mesage ”alternative PM” value is active under “accessories.”
textfile=	yes / no	Yes = saving data in a text file is activated.
textfile_interval=	60s	Interval for saving data in a text file.
PM_autoadjust=	no	Default. Please do not change.
IADS_modus=	1	Mode of drying section IADS
dusttype=	2	Default. Please do not change.

Parameter	Entry	Meaning
sensor_selection=	2	Default. Please do not change.
Automated_cleaning=	yes / no	Yes = automatic cleaning is activated.
Alarm_threshold=	99999 µg/m³	Limit of PM fraction that controls the digital alarm (digital out)
Alarm_value=	PM10	Specification of PM fraction that controls the digital alarm (digital out)
Alarm_email_address=	“”	E-mail address to which a message is sent in the event of an alarm.
Password_service	-1	Password for “Expert user mode”
Calibration_IADS_restrict=	yes / no	Yes = calibration is not enabled until the setpoint is reached.
Calibration_temperature=	50	Setpoint for drying section IADS at which calibration is enabled.
Channel_deviation=	3.5	Default. Please do not change.
Weatherstation_connected=	yes / no	Yes = the weather station is connected.
Weatherstation_comport=	4	COM port of connected weather station.
Weatherstation_scale_T=	1	Entry of possible slope scales for adjusting the weather station; obtained from comparison to transfer standard.
Weatherstation_scale_p=	1	
Weatherstation_scale_h=	1	
Weatherstation_offset_T=	1	Entry of possible offset factors for adjusting the weather station; obtained from comparison to transfer standard.
Weatherstation_offset_p=	1	
Weatherstation_offset_h=	1	
Weatherstation_equation=	X_corr = scale * x + offset	Function applied to calibrate the weather station.
Discmini_connected=	yes / no	Yes = discmini is connected.
Discmini_comport=	81	COM port for discmini.
Discmini_interval=	300 s	Interval of reported discmini files.
Sensor_selection=	2	Default. Please do not change.
PM_interval=	900 s	Interval for sliding average for PM fractions. 900 seconds pursuant to certificate.
IP_UDP_broadcast=	127.0.0.1	UDP address for data transmission.

Parameter	Entry	Meaning
PLC_interface=	0 / 1 / 2 / 3 / 4 / 5	Communication profile selected upon start. 0 = Modbus 1 = Bayern-Hessen 2 = UDP ASCII 3 = UDP single particle, data flow 4 = Modbus with UDP 5 = serial ASCII
Temperature_compensation=	yes	Temperature monitoring of LED is activated. Please do not change.
Temperature_slope=	0.15 / 0.17 / 0.19	Temperature coefficient depending on model: 0.15 for Fidas 200 S 0.17 for Fidas 200 0.19 for Fidas 200 E
Velocity_correction=	yes	Default. Please do not change.
Velocity_calibration_enabled=	no	Default. Please do not change.
Flow_calibration_enabled	yes / no	Yes = calibration of the flow rate is possible (sub-item of “sensor calibration”)
RSBaudRate=	9600	Baud rate for data transmission
BayerHessen_DA_command=	60>60,61>61,62>62,63>63,64>64,65>65	Overlay of the address for the communication profile “Bayern-Hessen”
BayerHessen_history	no	Default. Please do not change.

5.5.2 Measured Data as Text Files (Dustmonitor---.txt)

The device creates a text file every month:
`DUSTMONITOR_NNNNN_YYYY_MM.txt`.

These text files contain the measured data in a readable format.

Storage location: `Desktop > startup > Fidas > textfiles`

Structure and content of text files

Column	Title	Explanation	Range / format / unit
1	date	Date saved	mm/dd/yyyy
2	time	Time saved	hh:mm:ss
3	comment	Comment	Text
4	PM1	Fraction PM1. Average over PM_interval.	µg/m³
5	PM2.5	Fraction PM2.5. Average over PM_interval. Calculation applying certified algorithm (0011).	µg/m³
6	PM4	Fraction PM4. Average over PM_interval.	µg/m³
7	PM10	Fraction PM10. Average over PM_interval. Calculation applying certified algorithm (0011).	µg/m³
8	PMtot	Fraction PMtot. Average over PM_interval.	µg/m³
9	Cn	Particle number concentration	P/cm³
10	rH	Relative humidity	%
11	T	Air temperature	°C
12	p	Air pressure	mbar
13	status flow	Result of flow rate test	0 = no error; 1 = error
14	status coinc.	Result of coincidence test	0 = no error; 1 = error
15	status pumps	Operating status of pumps	0 = no error; 1 = error
16	status w.-station	Operating status of weather station	0 = no error; 1 = error
17	status IADS	Operating status of drying section	0 = no error; 1 = error
18	status calib.	Result of tolerance test of data channels to determine calibration value	0 = no error; 1 = error
19	status LED	Operating status of LED	0 = no error; 1 = error
20	status op.-modus	Operating status of device	0 = no error; 1 = error
21	modus	Operating mode	0 = scope; 1 = auto; 2 = manual; 3 = idle; 4 = calib; 5 = offset
22	alt. PM#1	Fraction PM1 ambient	µg/m³
23	alt. PM#2	Fraction PM2.5 ambient	µg/m³
24	alt. PM#3	Fraction PM4 ambient	µg/m³
25	alt. PM#4	Fraction PM10 ambient	µg/m³

Column	Title	Explanation	Range / format / unit
26	alt. PM#5	Fraction PMtot ambient	µg/m³
27	alt. PM#6	Fraction PM1 classic	µg/m³
28	alt. PM#7	Fraction PM2.5 classic	µg/m³
29	alt. PM#8	Fraction PM4 classic	µg/m³
30	alt. PM#9	Fraction PM10 classic	µg/m³
31	alt. PM#10	Fraction PMtot classic	µg/m³
32	alt. PM#11	Fraction PM thoracic	µg/m³
33	alt. PM#12	Fraction PM alveo	µg/m³
34	alt. PM#13	Fraction PM respirable	µg/m³
35	flowrate	Volume flow rate	l/min
36	velocity	Flow speed	m/s
37	coincidence	Coincidence	%
38	pump output	Power consumption of pumps	%
39	IADS T	Temperature of drying section	°C (318 = not connected)
40	channel deviation	Deviation of raw data channels	raw channels
41	LED T	Temperature of LED	°C
42	aux. T	Air temperature - measured by an external sensor	°C (-40 = not connected)
43	aux. h	Relative humidity - measured by an external sensor	%
44	aux. p	Air pressure - measured by an external sensor	mbar (700 = not connected)
45	bin1	Particle number concentration of size range bin1.	P/cm³
…	…		
108	bin64	Particle number concentration of size range bin64.	P/cm³

5.5.3 Adjusting measuring algorithm

The PM fractions are calculated with the slope and intercept parameters.

The defaults of the parameters are:

- Slope = 1
- Intercept = 0

TÜV Rheinland recommendation for calculation of PM fractions $PM_{2,5}$ and PM_{10}

TÜV Rheinland tested the Fidas 200 S measuring system to determine suitability for testing airborne particles of fractions $PM_{2,5}$ and PM_{10} and then issued two reports recommending the device for such testing.

Statements:

- Report, number 936/21218896/A dated September 20, 2014
- Report, number 936/21227195/A dated March 9, 2015

The reports indicate that the measurement results related to gravimetry can be optimized by modifying the slope and the intercept of data conversion.

Optimum correlation according to TÜV Rheinland:

PM_{10} slope = 1.058

PM_{10} intercept = -1.505

$PM_{2.5}$ slope = 1.076

$PM_{2,5}$ intercept = -0.339

The TÜV Rheinland recommendations can be applied by changing the respective values of the four parameters of the file `promo.ini`:

Parameters of file promo.ini	Default	Setting recommended by TÜV Rheinland
`PM10_slope=`	`1.000`	`0.945`
`PM10_intercept=`	`0`	`1.422`
`PM2.5_slope=`	`1,000`	`0.929`
`PM2.5_intercept=`	`0`	`0.315`

We recommend reading the data with the default and offsetting it in your own database and calculating the respective values.

6 Verifying and calibrating measuring system

The device’s measuring system should be verified and calibrated at least every 3 months.

Verify and calibrate the device in these cases as well:

- Upon initial commissioning
- Before beginning a measurement campaign

Resources needed

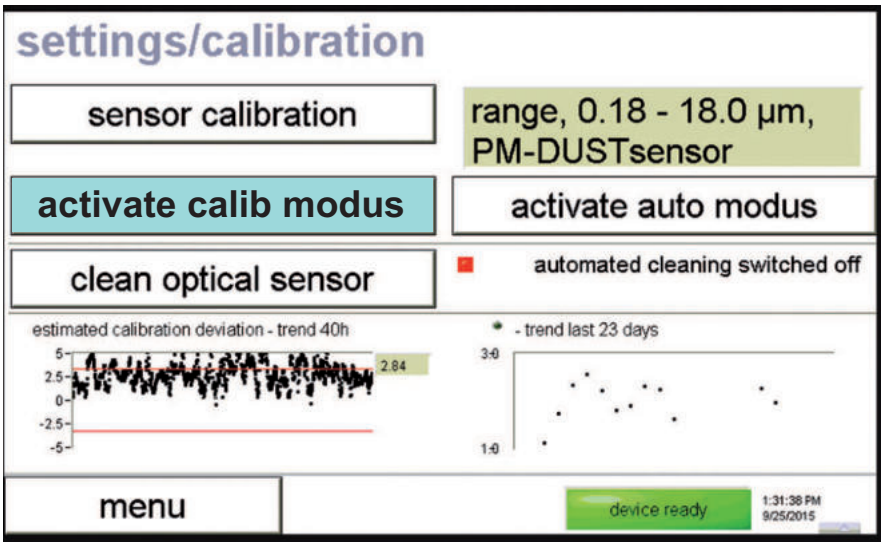
The following resources are needed:

- Calibration dust MonoDust 1500
- Fidas calibration certificate
- Plug DN 16 mm to seal the aerosol inlet
- Plug DN 12 mm to seal the IADS inlet
- Plastic hose, approx. 30 cm long
- External flow meter, set to SATP conditions (25°C, 1013 hPa)
- HEPA* filter that fits IADS tube inlet

* HEPA = High Efficiency Particular Air

Prerequisites

- Permitted temperature range during calibration: +5 to +40 °C.
- The device has to have been running for at least 1 hour before it can be calibrated. It does not reach a thermally stable state until then.
- The device has to be in calibration mode:
  `Main menu > settings/calibration > activate calib mode`



Screen `settings/calibration`

Overview of test points

Work through the following points, one after the other:

Item	Parameter	Detailed description
Check that aerosol tube and sensor unit are unobstructed	-	Checking that aerosol sensor is unobstructed [▷ 80]
Checking that controller shows no leakage	Net leakage of controller Maximum leakage permitted: 0.07 l/min	Checking that controller shows no leakage [▷ 81]
Checking device for leakage	Net leakage of total system Maximum leakage permitted: 0.49 l/min	Checking device for leakage [▷ 83]
Checking aerosol sensor zero point	`Cn` Correct value: 0.0	Checking aerosol sensor zero point [▷ 85]
Setting aerosol sensor offset	`Offset` Permitted range of compensating voltage 2.0 to 3.0 V	Setting aerosol sensor offset [▷ 86]
Calibrating flow rate	`Sensor flow rate` Maximum deviation permitted from reference measuring device value: 0.15 l/min	Calibrating flow rate [▷ 86]
Required only for initial commissioning at a new location: Set average particle velocity	`Velocity calibrated`	Setting average particle velocity [▷ 88]
Calibrating particle size	`Measured peak at` Maximum deviation permitted from `setpoint raw channel`: 0.5 channels	Calibrating particle size [▷ 89]

6.1 Checking that aerosol sensor is unobstructed

Before beginning any calibration, check that the aerosol inlet tube and the aerosol sensor are unobstructed. This can be verified visually when the sampling tube and gravimetric filter are detached. How to detach these components is described in the following section: "Cleaning aerosol sensor optical glasses [▶ 98]."

Hold a white surface under the aerosol sensor and look into the top, searching for a foreign object inside the aerosol sensor.

If there is a foreign object trapped inside: Detach the aerosol inlet tube to remove the foreign object. Do not use compressed air as long as the aerosol tube is in place.

6.2 Checking that controller shows no leakage

Net leakage of controller

The **net leakage** is the difference in the parameter `sensor flow rate` when the pump is switched on with the aerosol tube closed (= “gross leakage”) and when the pump is switched off (= “offset”).

Net leakage = gross leakage – offset

When the **net leakage** is less than **0.08 l/min**, the controller is considered to be sealed.

If leakage is greater, check the following:

- Seat of gravimetric filter
- Seals on gravimetric filter
- Hose connection between gravimetric filter and controller
- Seat of blue pump filter

When checking, the aerosol tube has to briefly be sealed with a plug (or with your thumb).

Prerequisites for testing controller leakage

- Calibration mode is activated.

Performing leakage test

1. Select `Main menu > expert user menu` (password `1-`).
2. Select the button `suction pump/signals/digital IO`.
3. Switch **off** the pump with the slider `suction pump`.
4. Write down the value of the parameter `sensor flow rate`.
   This is the **offset value.**
5. Detach the sampling head.
6. Release the bracket holding the sampling tube.
7. Slide the sampling tube up approx. 20 cm and secure it in this position.
   ⇨ The aerosol inlet tube is now accessible.
8. Seal the aerosol inlet tube with a plug.
9. Switch **on** the pump with the slider `suction pump`.
   ⇨ The pump evacuates the sampling system in the controller. The pump output increases audibly.
10. When the value has stabilized at its minimum:
    Write down the value of the parameter `sensor flow rate`.
    This is the **gross leakage of the controller**.
11. Remove the plug from the aerosol inlet tube.
12. Calculate the net leakage value.

Leave the device in this state to check leakage in the entire system next.
Refer to the section “Checking device for leakage [▶ 83].”

6.3 Checking device for leakage

Net leakage of total system

The **net leakage** is the difference in the parameter `sensor flow rate` when the pumps are switched with the IADS tube closed (= “gross leakage”) and when the pumps are switched off (= “offset”).

Net leakage = gross leakage – offset

When the **net leakage** is less than **0.5 l/min**, the entire device is considered to be sealed.

If leakage is greater, check the following:

- Seat of IADS tube in aerosol inlet
- Seals on aerosol inlet

When checking, the IADS tube has to briefly be sealed with a plug.

Prerequisites for testing device leakage

- Calibration mode is activated.
- The controller has been tested for leakage and verified.
- The screen `Main menu > expert user menu` is visible.

Performing leakage test

1. Place the IADS tube, without the sampling head, on the aerosol inlet tube.

   ⇨ The inlet of the IADS tube is accessible.

2. Seal the IADS tube with a plug.

3. Switch **on** the pumps with the slider `suction pump`.

   ⇨ The pumps evacuate the sampling system in the controller as well as the IADS tube. The pump output increases audibly.

4. When the value has stabilized at its minimum:
   Write down the value of the parameter `sensor flow rate`.
   This is the **gross leakage** of the entire system.

5. Remove the plug from the IADS tube.

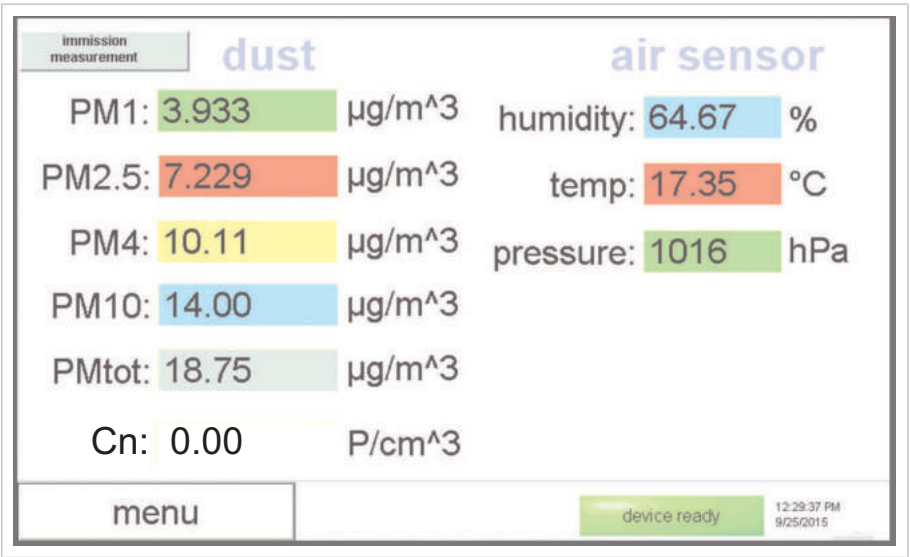
6. Calculate the net leakage value.

7. Put the sampling head back into place.

6.4 Checking aerosol sensor zero point

To check the zero point, a special filter (HEPA filter) that holds back all particles from the air is placed on the IADS tube inlet.

If there is only clean air with no particles in the measuring system, the parameter `Cn` in the screen `data` is 0.



Screen `data` with parameter `Cn`

Prerequisites for checking zero point

- Calibration mode is activated.
- The device has been tested for leakage and verified.

Performing test

1. Detach the sampling head.
2. Attach a HEPA filter to the IADS tube inlet.
3. Select `Main menu > data`.
4. Observe the value of the parameter `Cn`: The value has to return to zero within one minute.
5. Remove the HEPA filter.

If the value does not go back to zero:

1. Check that the HEPA filter is seated properly.
2. Clean the optical glasses on the aerosol sensor; refer to section "Cleaning aerosol sensor optical glasses [▶ 98]."

3. Check that there is no electronic interference that could distort the display.

4. Inform Palas or your sales partner.

6.5 Setting aerosol sensor offset

Setting the offset is an automatic process that minimizes the inherent noise of the device. The device sets an adjustment voltage for the offset. The process takes about two minutes.

Prerequisites

- Calibration mode is activated.
- The device has been tested for leakage and verified.
- The device's zero point has been checked.

Performance

1. Select `Main menu > expert user menu` (password `1-`).

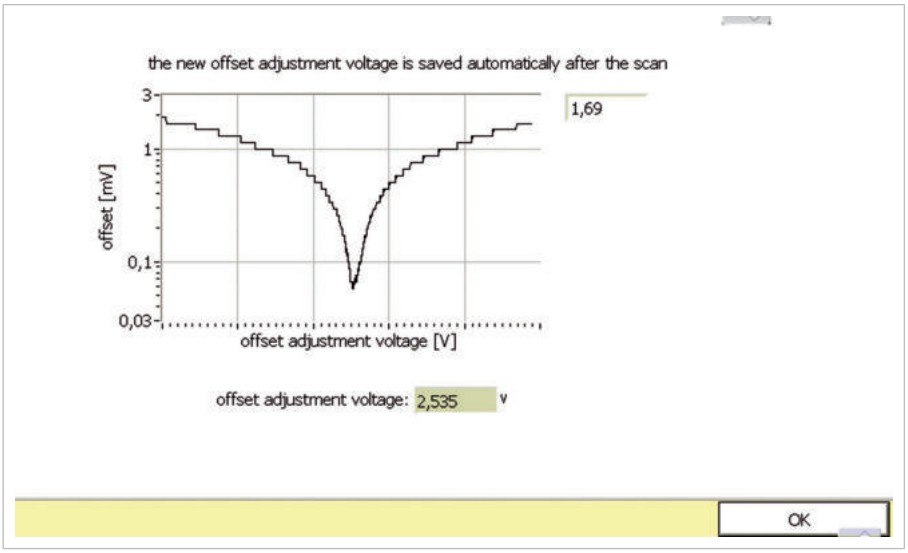
2. Select `sensor/calibration`.

3. Touch `adjust offset` to start adjustment.

4. Observe the parameter `Offset` (top right).

⇨ The value changes as the controller varies the offset adjustment voltage. When the displayed curve passes the minimum, the displayed value has to be below 0.2 mV.

When adjustment is completed, the offset adjustment voltage is calculated. The displayed value has to be between 2.0 and 3.0 V.



Screen during automatic setting of offset adjustment voltage

If the displayed values deviate:

▸ Inform Palas or your sales partner.

6.6 Calibrating flow rate

For calibration you will need a reference flow meter set to SATP (Standard Atmospheric Temperature and Pressure: 25°C, 1013 hPa) conditions. The flow rate under normal operating conditions is about 4.8 l/min.

Prerequisites

- Calibration mode is activated.
- The device has been tested for leakage and verified.
- The device's zero point has been checked.
- The aerosol sensor offset has been set.

Checking flow rate

1. Detach the sampling head.
2. Connect a suitable flow meter to the IADS tube inlet.
3. Select `Main menu > expert user menu` (password `1-`).
4. Select the button `suction pump/signals/digital IO`.
5. Compare the value `sensor flow rate` to the value measured with the flow meter.
   The flow rate under normal operating conditions is about 4.8 l/min. The value determined using the flow meter should be 4.8 ± 0.15 l/min.

If the value determined using the flow meter deviates more than 0.15 l/min.:

▸ Adjust the flow rate.

Adjusting flow rate

1. Select `Main menu > expert user menu` (password `1-`).
2. Select `sensor/calibration`.
3. Select `sensor calibration`.
4. Enter the flow rate displayed by the flow meter by `calibrate flow sensor offset`.
   Be aware of the decimal point.
5. Confirm with `accept`.
6. Check the flow rate again.
   Enter the measured value again if the flow rate is not correct.

6.7 Setting average particle velocity

The average particle size has to be set only once (when the device is commissioned in a new location for the first time).

Prerequisites

- Calibration mode is activated.
- The device has been tested for leakage and verified.
- The device's zero point has been checked.
- The aerosol sensor offset has been set.
- The flow rate has been calibrated.

Performance

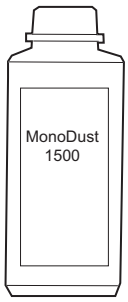
1. Select `Main menu > expert user menu` (password `1-`).
2. Select `sensor/calibration`.
3. Write down the value `velocity (average)`.
4. Navigate back to the `expert user menu`.
5. Select `System/exit to OS` to close the firmware and go to the operating system.
6. Open the file `promo.ini`.
   The file can be found on the desktop under `startup > Fidas`.
7. Overwrite the value `velocity_calibrated` with the noted value `velocity (average)`.
8. Save the file `promo.ini` and close.
9. Start the firmware *Fidas* by double-clicking on `startupmanager.exe` in the `startup` folder.

6.8 Calibrating particle size

Prerequisites

- Calibration mode is activated.
- The device has been tested for leakage and verified.
- The device's zero point has been checked.
- The aerosol sensor offset has been set.
- The flow rate has been calibrated.
- Once / upon initial startup:
  The average particle velocity has been set.

Calibration dust MonoDust 1500



A special dust with a very small monodisperse distribution and known particle size is used to calibrate the device. Delivery of the device includes one container of the calibration dust *MonoDust 1500*. Use only *MonoDust 1500* to calibrate the device.

When used properly, a single container is sufficient to calibrate the device multiple times. Only a small amount of the dust is needed for the calibration process. *MonoDust 1500* can be ordered from Palas or your sales partner.

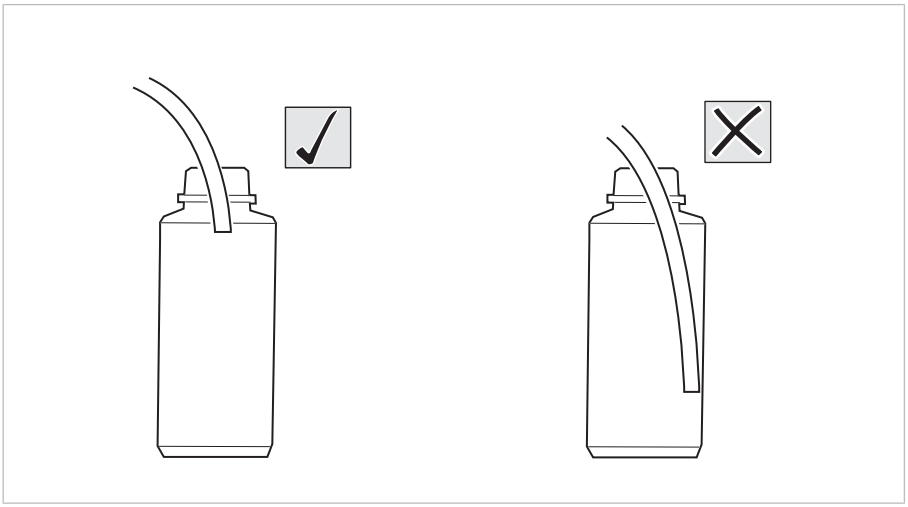
The label on the container as well as the certificate for the calibration dust indicate reference values (`setpoint raw channel`) needed to calibrate the particle size.

This is how to use the calibration dust properly:

1. Shake the closed container gently.

   ⇨ Some of the particles swirl in the air inside the container and remain in the air for a few minutes.

2. Unscrew the lid and place the end of the adapter hose in the container. The hose should protrude only a few centimeters into the container, and it should not touch the sides or bottom of the container. This is the only way to ensure that only a few dust particles are drawn into the hose.



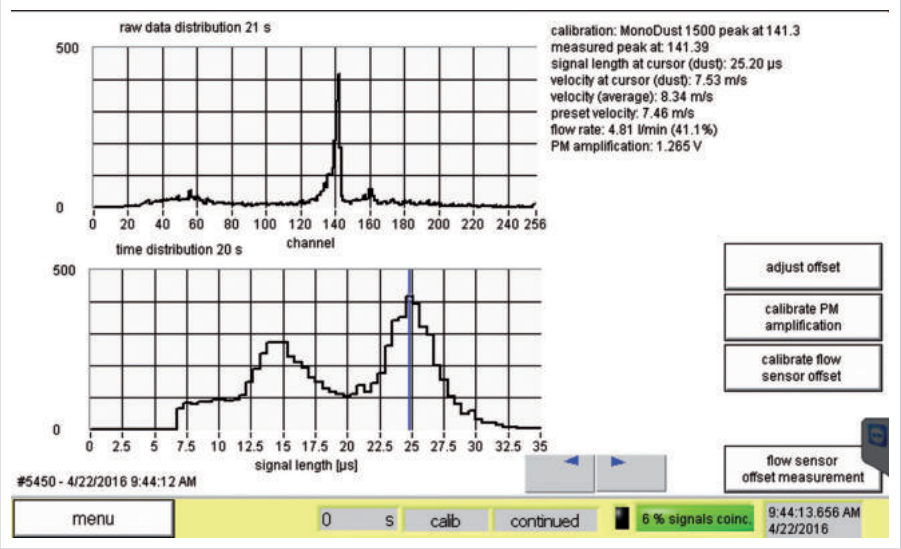
Proper handling of MonoDust 1500

Activating calibration mode

1. Select `Main menu`.
2. Select `sensor/calibration`.

   ⇨ The system heats up.
3. Detach the sampling head.
4. Connect a hose to the IADS tube.
   The hose has to be long enough that you can hold the end of the hose and see the display.
5. As soon as the IADS temperature has stabilized near the setpoint, select `continue calibration`.

   ⇨ A screen with 2 graphs appears:
   `raw data distribution` (distribution of particle sizes)
   `time distribution` (particle speed)
6. Hold the hose in the container of *MonoDust 1500*.
7. Squeeze the container gently a few times to exchange some of the air between the inside of the bottle and the environment.



Fidas firmware: Calibration mode

Calibrating particle size

Use the reference value `setpoint raw channel`, which can be found on the label of the calibration dust container and on the certificate for the calibration dust.

Calibration is successful when the `measured peak at` is identical to the value of the raw data channel, found on the label of the calibration dust (`setpoint raw channel`) container.

Maximum deviation permitted: **0.50** channels.

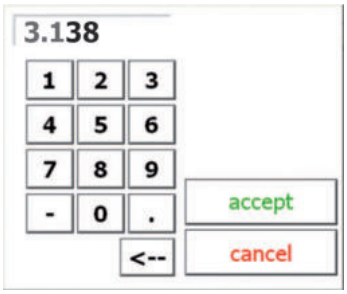
The conversion factor can be changed if deviation from the reference value is less than **1.50** channels.

If deviation is greater, the aerosol sensor optical glasses are probably polluted. If this is the case, clean the glasses before proceeding.

Apply the following procedure to change a conversion factor “amplification.” This means that even a slight change in the factor (after the decimal point) significantly impacts the result of measurement. For this reason, change only the **last two decimal places** of the factor.

The following procedure has to be repeated at least once to check if the changes have led to the desired result. The procedure may need to be repeated several times.

Proceed as follows:



1. Write down the value of the parameter `measured peak at`.
2. Touch `calibrate PM amplification`.

   ⇨ A keypad opens.
3. If the measured value is lower than the reference value, increase the value.
   If the measured value is higher than the reference value, decrease the value.

If the values are the same, calibration of the particle size is completed.

6.8.1 Correcting Channel Shift

In its report 936/21218896/A, TÜV Rheinland described the impact that shifting the signal peak in the raw data channel has on the mass concentration. The calibration dust used was *CalDust 1100* (setpoint 130).

The evaluation procedure described here also applies to the use of *MonoDust 1500*.

Analogous extract from the TÜV report:

Impact of peak shift on mass concentration

Matrix showing impact of peak shift on mass concentration:

Channel shift	$PM_{2.5}$ slope	$PM_{2.5}$ offset	PM_{10} slope	PM_{10} offset
-3	1.0860	0.03889	1.0877	0.03310
-2	1.0560	0.02500	1.0570	0.01200
-1	1.0290	0.01220	1.0280	0.04800
0	1	0	1	0
1	0.9730	-0.00785	0.9760	-0.0047
2	0.9450	-0.01970	0.9470	0.0380
3	0.9180	-0.0310	0.9224	0.0830

If e.g. there is a shift of -3 channels, the actual PM values are related to the hypothetically determined PM values like this:

$PM_{2.5\_actual} = 1.0860 \times PM_{2,5\_hypothetical} + 0.03889$

$PM_{10\_actual} = 1.0877 \times PM_{10\_hypothetical} + 0.03310$

A shift of -3 channels means that the particle size determined is too small, which leads to the value $PM_{2.5}$ being measured too low by a factor of 1.086.

For the evaluation, a hypothetical measured value for $PM_{2.5}$ of 25 µg/m³ and for PM_{10} of 40 µg/m³ were set for the ideal case (peak precisely at channel 130). Depending on the peak shift, the respectively anticipated concentration was determined applying the above matrix.

6.9 Creating backup of control files

When the device is calibrated, entries are changed in these two files:

- `promo.ini`
- `default.set.pdcontrol`

The files can be found under this path:
`Desktop > Startup > Fidas`

To create backups of these files after completing calibration:

1. Select `Main menu > expert user menu` (password `1-`).
2. Touch `system`
3. Select `exit to OS` to close the firmware.

   ⇨ The firmware is closed. The user interface of the operating system (desktop) is visible.
4. Save the copies of the two control files on an external device.
5. Restart the firmware via the command in the Windows start menu.

7 Maintenance

Regular maintenance of the device extends the service life and improves operational reliability.

The maintenance tasks described here can be performed by the customer or by the operator of the device. More extensive work, which is not described in this manual, may be performed only by Palas specialists or by persons or organizations authorized by Palas. Unauthorized changes or modifications will lead to loss of warranty. Palas will not be liable for damage caused by unauthorized changes or modifications.

Please contact Palas or a sales partner for maintenance and repairs not described in this manual.

Palas GmbH

Siemensallee 84

D-76187 Karlsruhe

Germany

www.palas.de

Updating firmware

Upon customer request, an update to the latest firmware version can be performed in the course of maintenance performed at the Palas plant. Ask us about this.

7.1 Maintenance intervals

Maintenance to be performed by operator

Qualified personnel can perform the following maintenance tasks:

Maintenance task	Interval	Additional information
Clean sampling head Sigma-2	Every 3 months	-
Calibrate device	Every 3 months	Verifying and calibrating measuring system [▶ 77]
Replace filter for the aerosol pumps	Every 12 months	Replacing filters for pumps [▶ 97]
Change sealing rings	Every 12 months	Replacing sealing rings [▶ 100]
Clean aerosol sensor optical glasses	If necessary	Cleaning aerosol sensor optical glasses [▶ 98]

Maintenance performed by Palas

It is advisable to have the device calibrated and serviced by Palas every two years. Send the device to Palas.

The device shows a message indicating maintenance is due at the following intervals:

- After 35,050 hours of operation (equal to four years of continuous operation): Message “Service B”
- Five years of continuous operation: Message “Service C”

The messages are purely informative. They have no effect on equipment functioning. The device can continue to operate as usual.

7.2 Replacing filters for pumps

The filter installed in the front plate of the controller protects the aerosol pumps from dirt. A polluted filter causes the pumps to consume more energy. So replace the filter at least every 12 months.

⚠ WARNING

Harmful substances in the filter pose a health risk.

If the cover on the filter is open, harmful substances from the filter can escape into the ambient air and endanger persons.

- Do not use compressed air when the filter cover is open.
- Close the removed filter airtight and dispose of it properly.
- Do not attempt to clean the filter. The filter cannot be regenerated.

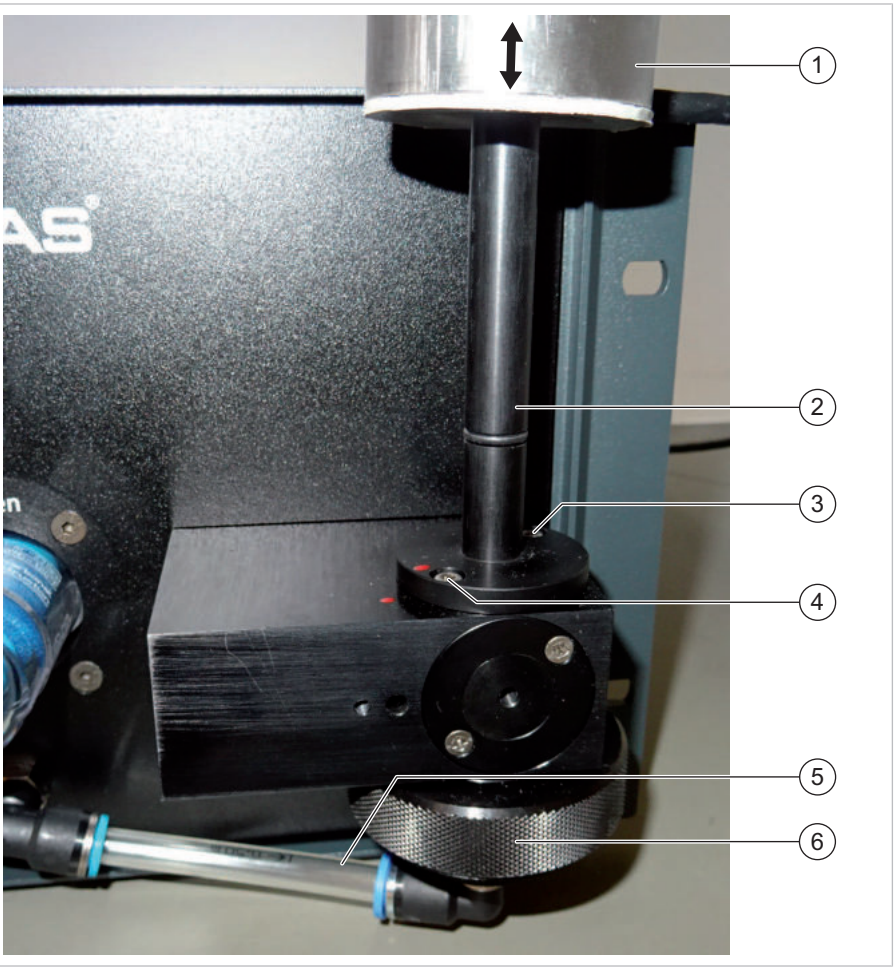
Proceed as follows:

1. Remove the clear protective cap from the filter by turning it to the left and pulling it off.
   If the cap cannot be turned by hand, use a pliers with soft contact surfaces. A cloth or a rubber mat can be used as contact surfaces.
2. Check the state of the interior sealing ring (Ø 30 mm). Replace the sealing ring if necessary.
3. Extract the filter by turning it to the left and pulling it off.
4. Insert a new filter by turning it to the right.
5. Turn the protective cap to the right by hand to put it back into place.

7.3 Cleaning aerosol sensor optical glasses

The aerosol sensor optical glasses have to be cleaned if, when calibrating the aerosol sensor, the photomultiplier voltage is more than 15% higher than the value of the last calibration.

The sampling tube, aerosol inlet tube and gravimetric filter have to be detached to access the optical glasses.



Sampling tube, aerosol inlet tube and gravimetric filter on aerosol sensor

1	Sampling tube	2	Aerosol inlet tube
3	Screw	4	Screw
5	Hose	6	Gravimetric filter

Detaching sampling tube, aerosol inlet tube and gravimetric filter

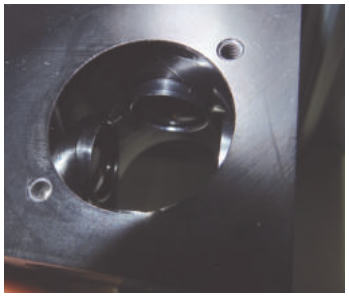
Proceed as follows:

1. Release the pipe clamp on the sampling tube slightly, allowing the tube to be moved vertically.
2. Slide the sampling tube up and place it aside.
3. Use an Allen wrench 2.5 to remove the two screws on the aerosol inlet tube.
4. Retract the ring on the plug connection to the gravimetric filter and pull the hose out of the plug connection.
5. Pull the gravimetric filter down and off.
6. Pull the aerosol inlet tube up and out.

   ⇨ The optical glass in the aerosol sensor is now accessible.

Cleaning optical glasses

	NOTICE
	Damage caused by unsuitable cleaning agents Destruction of the optical glass. ▸ Optical glass may be cleaned only with a special cloth for optics. ▸ Do **not** touch optical glass with fingers. ▸ Do **not** use cleaning agents such as acetone to clean the optical glass.



Use the included cleaning cloth to clean the optical glasses.

Attaching sampling tube, aerosol inlet tube and gravimetric filter

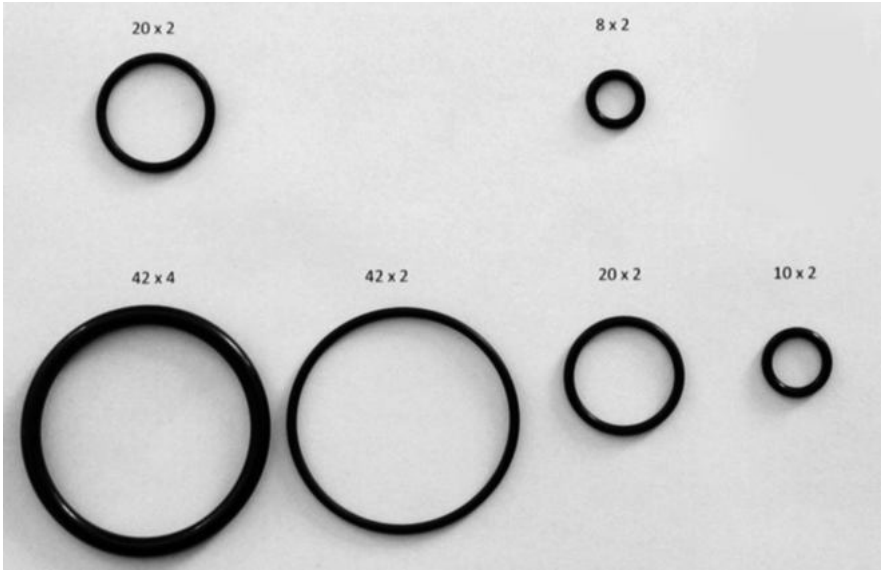
1. Place the aerosol inlet tube on the sensor housing.
2. Working from below, place the gravimetric filter on the sensor housing.
3. Secure the aerosol inlet tube to the sensor housing with the two screws.
4. Insert the hose in the plug connection.
5. Place the sampling tube on the aerosol inlet tube.
6. Secure the sampling tube with the pipe clamp.

7.4 Replacing sealing rings

If a test indicates leakage, one or more sealing rings may be damaged. In this case, replace the rings. Palas offers a set of sealing rings tailored specifically to this device.

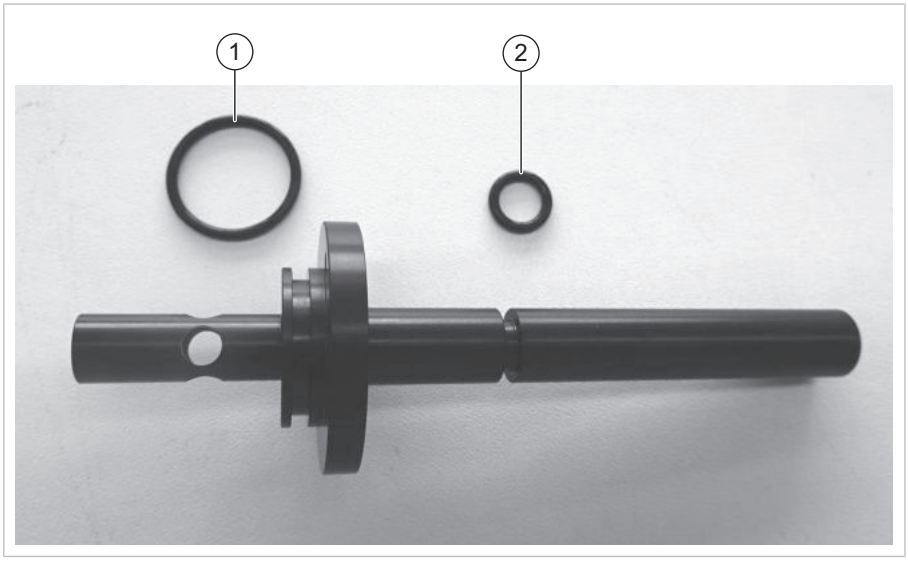
We recommend using only the sealing rings provided by Palas for this purpose.

The Palas sealing ring set 1380 contains six sealing rings:



Sealing ring set 1380

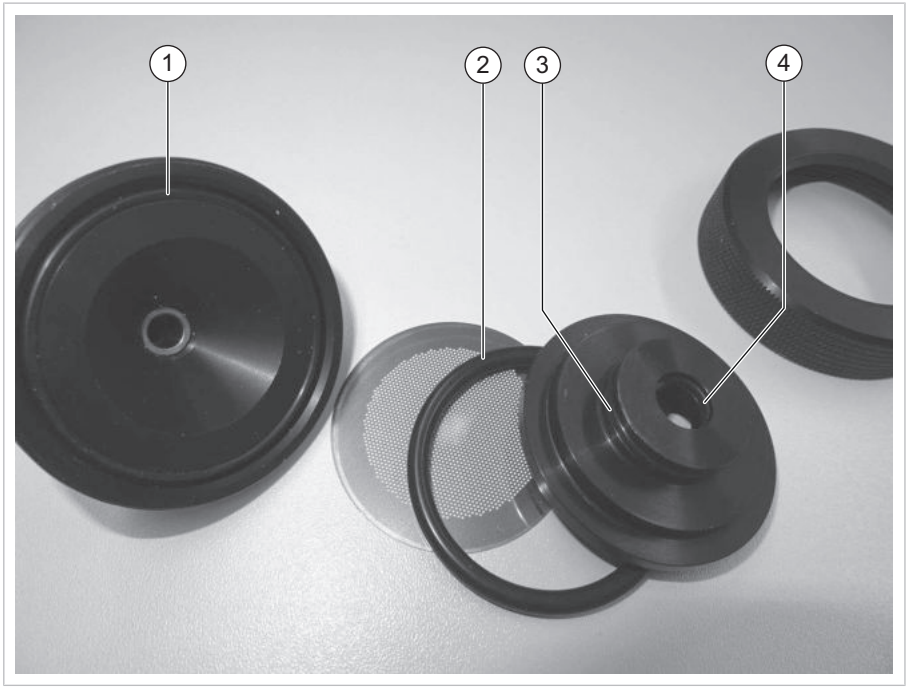
Sealing rings on aerosol inlet tube



Sealing rings on aerosol inlet tube

1	Sealing ring 20 x 2 mm	2	Sealing ring 8 x 2 mm

Sealing rings on gravimetric filter

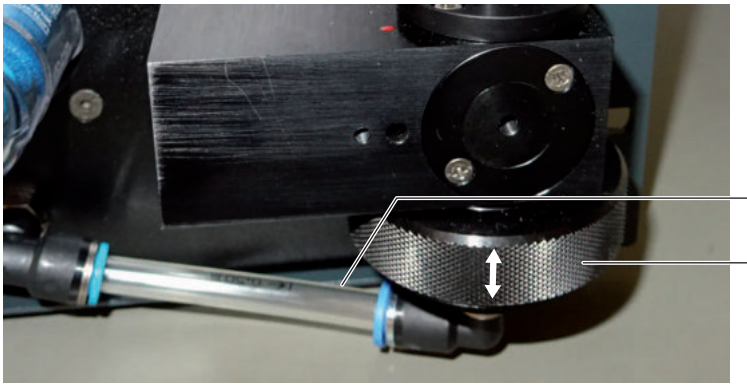


Sealing rings on gravimetric filter

1	Sealing ring 42 x 2 mm	2	Sealing ring 42 x 4 mm
3	Sealing ring 20 x 2 mm	4	Sealing ring 10 x 2 mm

7.5 Servicing gravimetric filter

The filter insert in the gravimetric filter can be removed and cleaned. The filter can be pulled out of the aerosol sensor from below without using any tools.



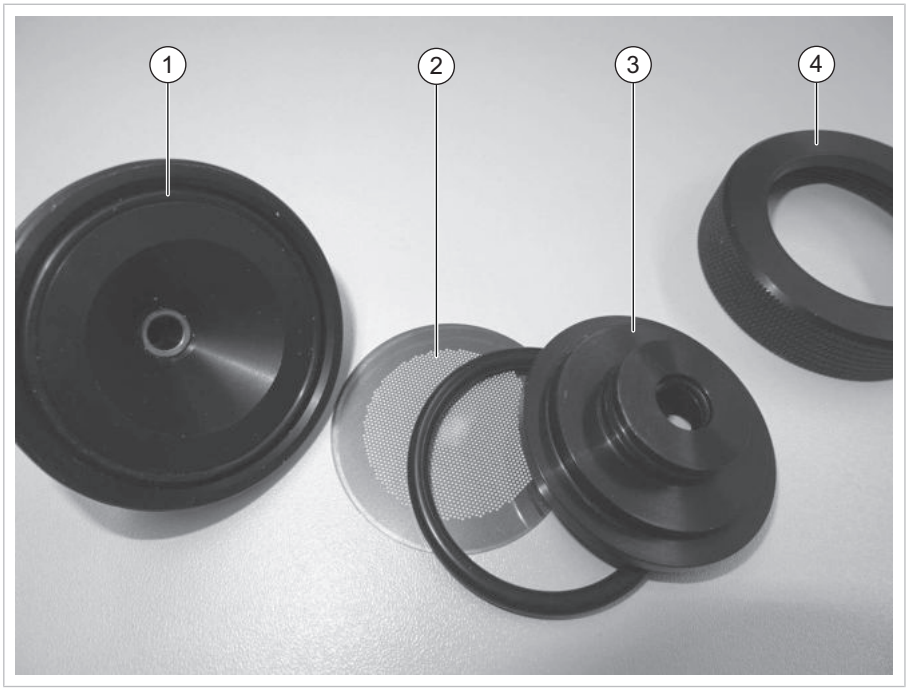
Gravimetric filter on aerosol sensor

1	Hose	2	Gravimetric filter

Disassembling gravimetric filter

1. Retract the ring on the plug connection to the gravimetric filter and pull the hose out of the plug connection.
2. Pull the gravimetric filter down and off.
3. Turn the lower part and union nut of the filter counterclockwise to open the filter. If the parts cannot be turned by hand, use a suitable pliers with a cloth as the contact surface.

⇨ The filter insert is now loose and can be cleaned.



Components on gravimetric filter

1	Lower part with seal	2	Filter insert (support screen) Ø 47 mm
3	Cover with seals	4	Union nut

Assembling gravimetric filter

1. Assemble the parts of the filter and screw them together clockwise by hand. Do not use tools.
2. Insert the gravimetric filter into the sensor housing.
3. Insert the hose in the plug connection.

7.6 Replacing the fuse

⚠ DANGER

Danger to life due to electric shock

Mains voltage is applied to the electrical connections of the device.

- Switch off the power supply
- Secure the power supply against accidental reconnection

Two fuses (fine wire fuse M2A) are built into the device to protect it against overvoltage. The fuses can be accessed on the rear of the device. The fuses are located in the fuse holder in the socket of the power plug.

To replace the fuses, proceed as follows:

1. Shut down the firmware and switch off the device.
2. Disconnect the power plug.
3. Pull out the fuse holder using a small screwdriver.
4. Replace the fuse.
5. Reinsert the fuse holder.
6. Reinsert the power plug.

Note Check whether the device starts up as usual and operates normally. Pay attention to the startup of the device in order to rule out any damage to the components – especially if the fuse was blown. If any irregularities are detected, contact the manufacturer.

7.7 Remote maintenance

We recommend registering on the Palas website to obtain access to the password-protected area.

- Log in with your user name and the corresponding password.
  This will grant access to software and firmware updates, remote device maintenance and creation of a support ticket.

8 Errors

Self-diagnostics

The device has a self-diagnostics system. Several parameters are monitored and an error is indicated if a limit is exceeded. `check device status` then appears in the screen.

The screen `device status` shows the values and the status of the individual parameters. Detailed information can be found in the section "Device status screen [▷ 59]."

Even if the device indicates `device ready`, the monitored values can be helpful in detecting tendencies. Since some values change slowly as opposed to suddenly, changes can be indications of potential problems. This is why we recommend observing the device status to be able to optimally plan maintenance.

Depending on the communication profile used, status data may be output via the interface. This is the case e.g. with the communication profile “Bayern-Hessen.”

Most of the problems related to the monitored parameters can be solved by cleaning or calibration processes.

Problems that you cannot solve yourself

Please contact Palas or your sales partner when you encounter problems that you cannot solve yourself.

State the serial number of the device when submitting a written request.

Keep the serial number handy for any queries by phone.

To receive help from our headquarters, go to:

https://www.palas.de/service

9 Decommissioning

To decommission the device when it is no longer needed, proceed as follows:

1. Switch off the device.
2. Unplug it from the power supply.
3. Disconnect all cables and lines.
4. Disassemble the device back to the components included in the delivery; refer to the section “Scope of delivery.”

10 Packaging and transportation

10.1 Preparing the device

To pack, transport, or dispatch the device, it has to be decommissioned (Refer to section Decommissioning).

10.2 Packaging and transportation

Package the device securely to exclude damage during transportation.

Original packaging

For the purpose of shipping, use the original packaging including the protective inner packaging or the original transport case (if applicable).

If you no longer have the original packaging, use packaging that securely protects the device against detrimental influences during transportation. Detrimental influences during transportation may include temperature, impacts, falling, or vibrations.

11 Disposal

The device, accessories, and transport packaging are largely made of recyclable raw materials.

Transport packaging

You can dispose of the transport packaging at collection points.

- Observe the applicable national regulations.

Device and accessories

The device and accessories must not be disposed of in household waste.

1. Ensure that the used device and any accessories are properly disposed of.
2. If a battery is installed in the device, make sure that it is properly disposed of.
3. Observe the applicable national regulations.

12 Spare parts

The following spare parts are available:

Art. no.	Designation
3688	Aerosol filter kit
1154	HEPA filter
1380	Sealing ring set
2046-001	MonoDust 1500

13 Declaration of conformity

EU-Declaration of Conformity

The Manufacturer

Palas GmbH
Greschbachstraße 3 b
76229 Karlsruhe
Germany

hereby declares that the products

Fine Dust Monitoring Devices:

Fidas 100	Fidas 200
Fidas 200 S	Fidas 200 E
Fidas mobile	DustView II

are in conformity with the following Directives:

2014/35/EU	Low Voltage Directive
2014/30/EU	Electromagnetic Compatibility (EMC)
2011/65/EU	RoHS

The following harmonized standards have been applied:

DIN EN 61010-1:2020-03	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements (IEC 61010-1:2010 + COR:2011 + A1:2016, modified + A1:2016/COR1:2019)
DIN EN 61326-1:2013-07	Electrical equipment for measurement, control and laboratory use. EMC requirements – Part 1: General requirements (IEC 61326-1:2012)
DIN EN IEC 63000:2019-05	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Karlsruhe, July 28, 2021

Dr.-Ing. Maximilian Weiß
General Manager

www.palas.de

PALASCOUNTS

14 Technical data

Interfaces	USB, LAN (Ethernet), RS-232, WLAN
Measurable particle sizes	0.18 – 18 µm 3 measuring ranges
Measurable mass concentrations	0 - 10,000 µg/m^3
Resolution	0.1 µg/m^3
Measured values	PM_1, $PM_{2,5}$, PM_4, PM_{10}, PM_{Total}, C_n Particle size distribution, air pressure, air temperature, relative humidity
Size channels	64 (32 per decade)
Measuring principle	Optical light scattering by single particles
Quantity measuring range C_n	0 - 20,000 particles/cm^3
Time resolution	1 s - 24 h In type-approved operation: 15 min
Volume flow rate	4.8 l/min □ 0.3 m^3/h
Consistency of volume flow rate	Fluctuation less than ±3% (24 h), in compliance with EN16450
Light source	LED
Data storage	Capacity for two hours of continuous operation at a storage interval of 60 seconds
Operating system	Windows 10 IoT
Electrical connection	115/230 V AC, 50/60 Hz
Electrical power	Normal operation: 60 W Maximum: 200 W (Fidas 200 and Fidas 200 E) / 300 W (Fidas 200 S)
Fuse	T2A
Dimensions of controller (W x D x H)	449 mm x 324 mm x 184 mm / Can be installed in 19“ rack.
Weight	Controller: 9.30 kg Sampling head: 2.25 kg Sampling tube: 4.50 kg
Ambient temperature during operation	Fidas 200 and Fidas 200 E: +5°C to +40 °C Fidas 200 S: -20 - +50 °C
Noise emissions	< 70 dB(A)
Sampling system	Aerosol drying with IADS (Intelligent Aerosol Drying System)
Sampling head	Passive sampler Sigma-2

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