

DUSTHUNTER SB30

Dust Concentration Monitor

Installation, Operation, Maintenance

SICK
Sensor Intelligence.



Described Product

Product name: DUSTHUNTER SB30

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Original document

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1 Important Information

1.1 Main hazards

1.1.1 Hazard through hot and/or aggressive gases and high pressure

The optical subassemblies are fitted directly on the gas-carrying duct. On equipment with low hazard potential (no danger to health, ambient pressure, low temperatures), the installation or removal can be performed while the equipment is in operation providing the valid regulations and equipment safety notices are observed and suitable protective measures are taken.

1.1.2 Hazards through electrical equipment



WARNING: Danger through power voltage

The DUSTHUNTER SB30 measuring system is classified as electrical.

- ▶ Disconnect power supply lines before working on power connections or parts carrying power voltage.
 - ▶ Refit any contact protection removed before switching the power voltage back on again.
-

1.1.3 Hazards through laser beam





WARNING: Hazards through laser beam

- ▶ Never look directly into the beam path
 - ▶ Do not point the laser beam at persons
 - ▶ Pay attention to laser beam reflections.
-

1.2 Symbols and document conventions

1.2.1 Warning Symbols

Symbol	Significance
	Hazard (general)
	Hazard by voltage

1.2.2 Warning levels and signal words

DANGER

Risk or hazardous situation which *will* result in severe personal injury or death.

WARNING

Risk or hazardous situation which *could* result in severe personal injury or death.



CAUTION

Hazard or unsafe practice which *could* result in less severe or minor injuries.

NOTICE

Hazard which *could* result in property damage.

1.2.3 Information symbols

Symbol	Significance
	Important technical information for this product
	Important information on electric or electronic functions

1.3 Intended use

Purpose of the device

The DUSTHUNTER SB30 measuring system only serves continuous measurement of dust concentrations in exhaust gas and exhaust air plants.

Correct use

- ▶ Use the device only as described in these Operating Instructions. The manufacturer bears no responsibility for any other use.
- ▶ Observe all measures necessary for conservation of value, e.g., for maintenance and inspection and/or transport and storage.
- Do not remove, add or modify any components to or on the device unless described and specified in the official manufacturer information. Otherwise
 - the device could become dangerous
 - the manufacturer’s warranty becomes void

Restrictions of use

- The DUSTHUNTER SB30 measuring system is not approved for use in potentially explosive atmospheres.

1.4 Responsibility of user

1.4.1 General information

Designated users

The measuring system DUSTHUNTER SB30 may only be installed and operated by skilled technicians who, based on their technical training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the hazards involved.

Special local conditions

- ▶ Observe the valid legal regulations as well as the technical rules deriving from implementation of these regulations applicable for the respective equipment during work preparation and performance.
- ▶ Carry out work according to the local conditions specific for the equipment as well as operational hazards and regulations.

Retention of documents

Keep the Operating Instructions belonging to the measuring system as well as equipment documentation onsite for reference at all times. Pass the respective documentation on to any new owner of the measuring system.

1.4.2 Safety information and protective measures

Protection devices

**NOTE:**

Depending on the particular hazard potential, an adequate number of suitable protection devices and personal safety equipment must be available and used by the personnel.

Behavior during purge air failure

The purge air supply serves to protect optical subassemblies fitted on the duct against hot or aggressive gases. Leave the supply switched on when the equipment is at a standstill. Optical subassemblies can be severely damaged in a short time if the purge air supply fails.

**NOTE:**

When no fail-safe shutters are fitted:
The user must ensure that:

- ▶ The purge air supply runs reliably and continuously
 - ▶ Failure of the purge air supply is immediately detected (e.g., by using pressure monitors)
 - ▶ Optical subassemblies are removed from the duct if the purge air supply fails and the duct opening is closed off (e.g. with a flange cover).
-

Preventive measures for operating safety

**NOTE:**

The user must ensure that:

- ▶ Neither failures nor erroneous measurements can lead to operational states that can cause damage or become dangerous
 - ▶ The specified maintenance and inspection tasks are carried out regularly by qualified, experienced personnel.
-

Recognizing malfunctions

Every deviation from normal operation is to be regarded as a serious indication of a functional impairment. These are, amongst others:

- Warning displays
- Significant drifts in measured results
- Increased power consumption
- Higher temperatures of system components
- Monitoring devices triggering
- Smells or smoke emission
- Heavy contamination.

Avoiding damage

**NOTE:**

In order to avoid malfunctions that can cause direct or indirect personal injury or property damage, the operator must ensure:

- ▶ The responsible maintenance personnel are present at any time and as fast as possible
 - ▶ The maintenance personnel are adequately qualified to react correctly to malfunctions of the measuring system and any resulting operational interruptions (e.g., when used for measurement and control purposes)
 - ▶ The malfunctioning equipment is switched off immediately in case of doubt and that switching off does not cause collateral malfunctions.
-

Electrical connection

Ensure the device can be switched off with a power isolating switch/circuit breaker in accordance with EN 61010-1.

2 Product Description

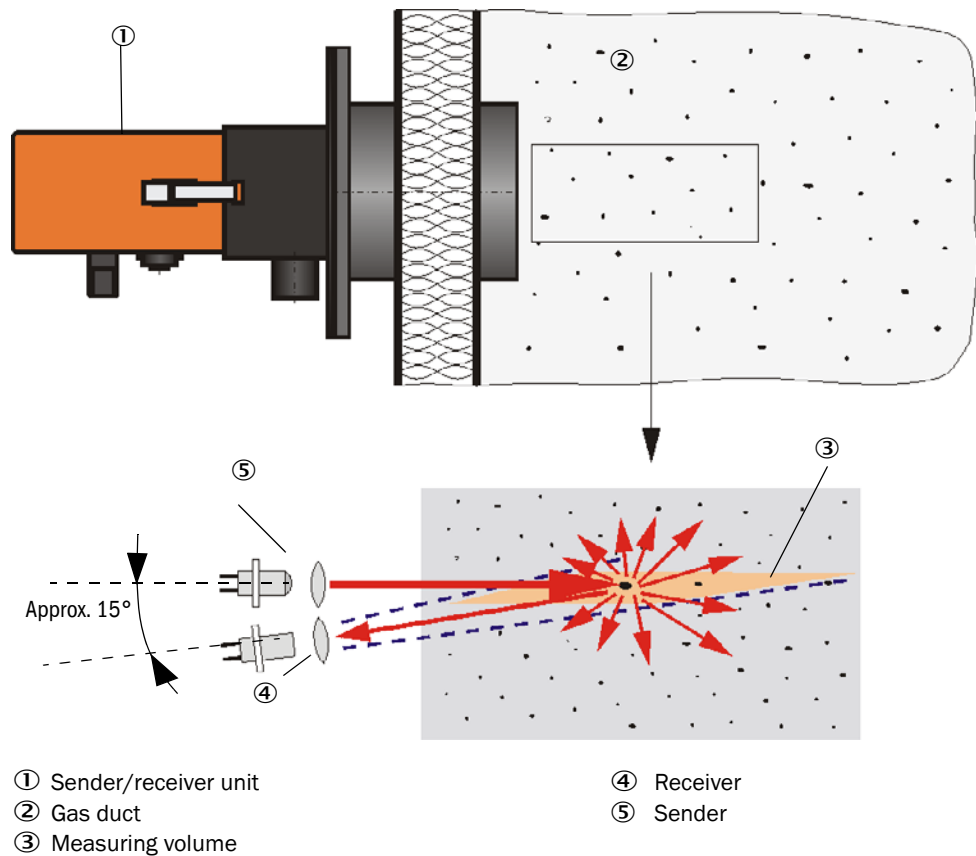
2.1 Measuring principle, measured variables

2.1.1 Functional principle

The measuring system works according to the scattered light measurement principle (backward dispersion). A laser diode beams the dust particles in the gas flow with modulated light in the visual range (wavelength approx. 650 nm). A highly sensitive detector registers the light scattered by the particles, amplifies the light electrically and feeds it to the measuring channel of a microprocessor as central part of the measuring, control and evaluation electronics. The measuring volume in the gas duct is defined through the intersection of the sender beam sent and the receive aperture.

Continuous monitoring of the sender output registers the smallest changes in brightness of the light beam sent which then serves to determine the measurement signal.

Fig. 1: Measuring principle



The incline of the control receiver can be modified for differing internal duct diameters. A small light trap may be required in certain cases for very narrow internal duct diameters (most unfavorable conditions for background light).

Determining the dust concentration

Measured scattered light intensity (SI) is proportional to dust concentration (c). Scattered light intensity not only depends on the number and size of particles but also on the optical characteristics of the particles and therefore the measuring system must be calibrated using a gravimetric comparison measurement for exact dust concentration measurement. The calibration coefficients determined can be entered directly in the measuring system as

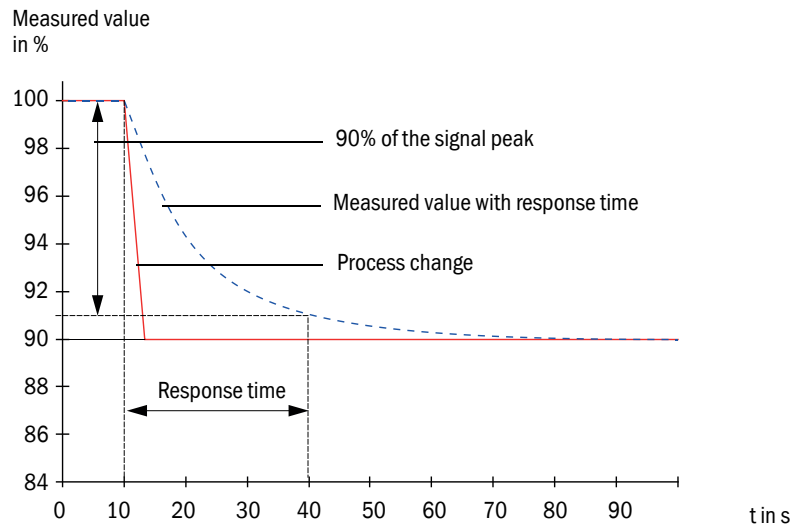
$$c = cc2 \cdot SI^2 + cc1 \cdot SI + cc0$$

(Entry see [“Calibration for dust concentration measurement”](#), page 46; standard factory setting: cc2 = 0, cc1 = 1, cc0 = 0).

2.1.2 Response time

The response time is the time required to attain 90% of the signal peak after a sudden change in the measurement signal. It can be set anywhere between 1 and 600 s. As the response time increases, transient measured value fluctuations and interruptions are damped stronger and stronger which “smooths out” the output signal.


Fig. 2: Response time



2.1.3 Function check

The measuring system has an integrated function check with selectable interval times allowing an automatic check for correct function (necessary settings see “[Factory settings](#)”, page 44). Any unallowed deviations from normal behavior that may occur are signaled as errors.

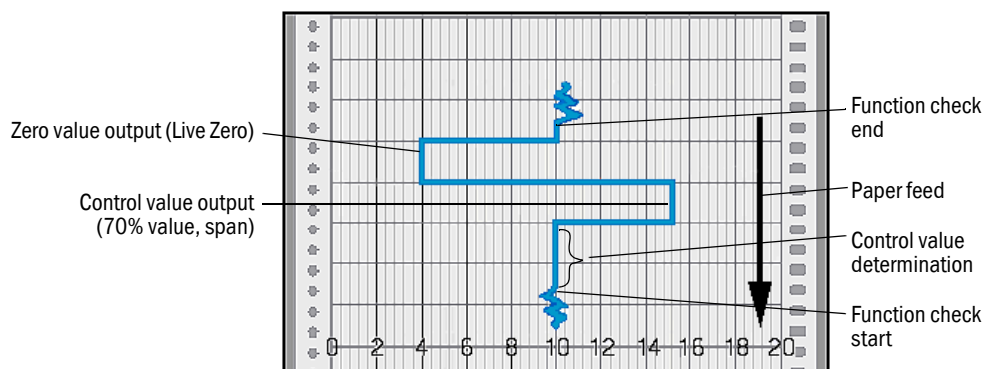
The function check can also be triggered manually by switching the supply voltage off and on again.

 Further information → Service Manual

The function check comprises:

- Approx. 30 s measurement of zero and control value
- Every 90 s (standard value), output of values determined.

Fig. 3: Function check output on a plotter





- The analog output must be activated to output control values on the analog output (see “[Factory settings](#)”, page 44).
- The value measured last is output on the analog output during control value determination.
- If the control values are not output on the analog output, the current measured value is output when control value determination has completed.
- A function check is not started automatically when the measuring system is in “Maintenance” mode.

Zero value measurement

The sender diode is switched off for zero point control so that no signal is received. This means possible drifts or zero point deviations are detected reliably in the overall system (e.g., due to an electronic defect). A warning signal is generated when the “zero value” is outside the specified range.

Control value measurement (Span test)

Sender beam intensity changes between 70 and 100% during control value determination. The light intensity received is compared against the standard value (70%). The measuring system generates an error signal for deviations greater than $\pm 2\%$. The error message is cleared again when the next function check runs successfully. The control value is determined with high precision through statistical evaluation of a high number of intensity changes.

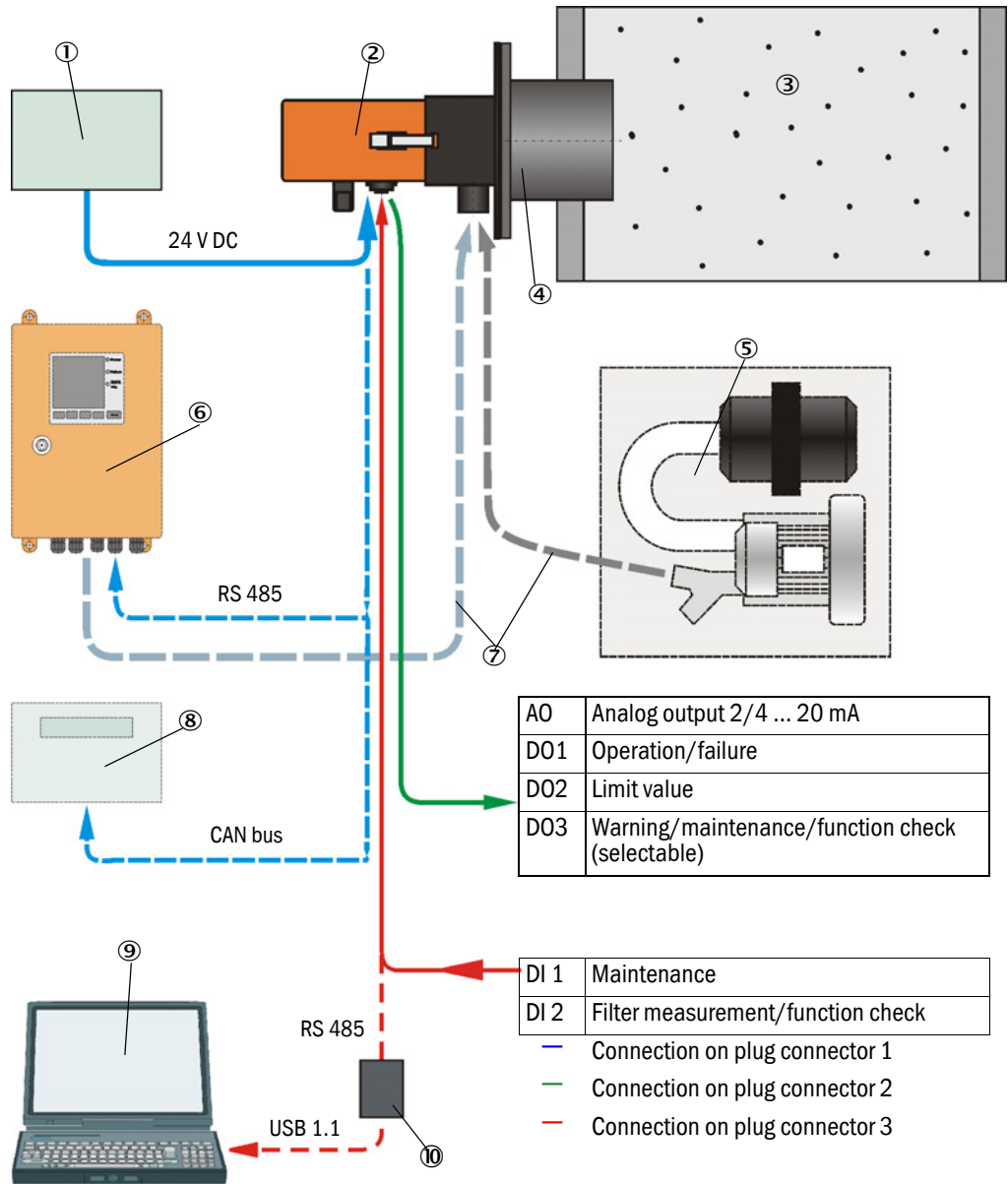
The value calculated theoretically (70%) is output for very low dust concentrations (< approx. 1 mg/m^3).

2.2 Device components

Measuring system DUSTHUNTER SB comprises the components:

- Sender/receiver unit DHSB30
- Flange with tube
- Optional MCU control unit MCU (details upon request)
to control, evaluate and output the data of the sender/receiver unit connected via the RS485 interface
 - With integrated purge air supply, for internal duct pressure -50 ... +2 hPa
 - Without purge air supply, therefore additionally required:
- Optional external purge air unit, for internal duct pressure -50 ... +30 hPa
- Optional SCU (details on request)
for operating several measuring systems

Fig. 4: DUSTHUNTER SB30 device components



- ① External voltage supply*
- ② Sender/receiver unit
- ③ Duct
- ④ Flange with tube
- ⑤ External purge air unit (option)
- ⑥ MCU (with or without purge air supply) (option) **
- ⑦ Purge air hose DN40
- ⑧ SCU (option) **
- ⑨ Operating and parameter program SOPAS ET
- ⑩ Service adapter

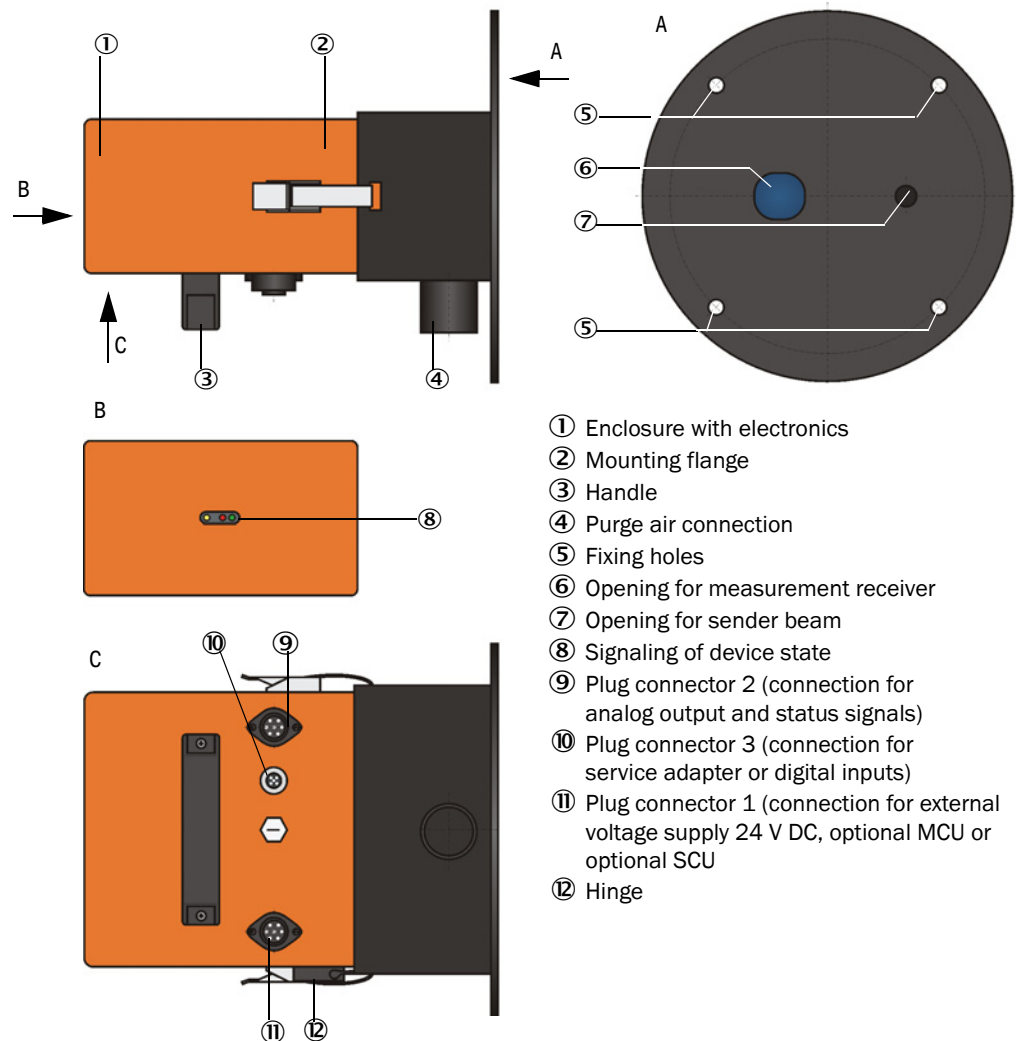
* Not required when optional MCU is present ** Information on request

2.2.1 Sender/receiver unit

The sender/receiver unit contains the optical and electronic subassemblies to send and receive the light beam as well as to process and evaluate the signals. An RS485 interface is available for service purposes. Clean air to cool the device and keep the optical surfaces clean is fed via a purge air connection.

The sender/receiver unit is fastened to the duct with a flange with tube (see “DUST-HUNTER SB30 device components”, page 14).

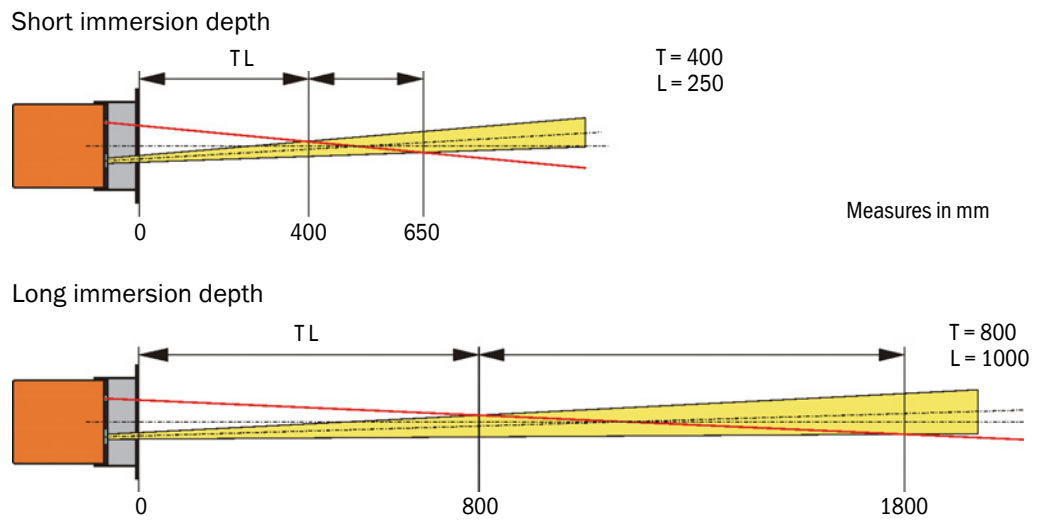
Fig. 5: Sender/receiver unit DHSB-T



The current device state (operation/failure, maintenance/maintenance request) is signaled on the rear side of the enclosure (green = operation, red = failure, yellow = maintenance).

The enclosure with fitted sender/receiver unit can be swiveled to the side after the CAMLOCK clips have been loosened. Optics, electronics and mechanical components can then be easily accessed for maintenance work.

Fig. 6: Relation between scattering angle, immersion depth (T) and measuring volume length (L)

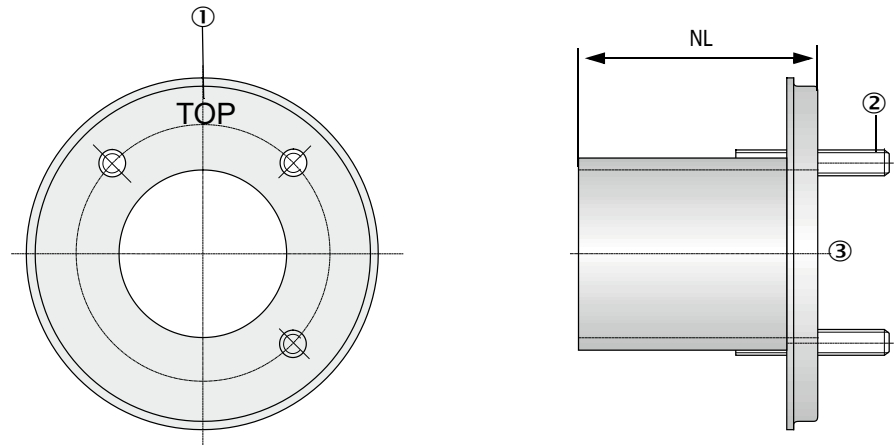


Immersion depth and measuring volume length can be changed easily onsite (see [“Adapting the sender/receiver unit to the duct diameter”](#), page 34)

2.2.2 Flange with tube

The flange with tube is available in different steel grades and dimensions (see “Flange with tube”, page 64). Selection depends on the wall and isolation thickness of the duct wall (→ nominal length) and the duct material.

Fig. 7: Flange with tube

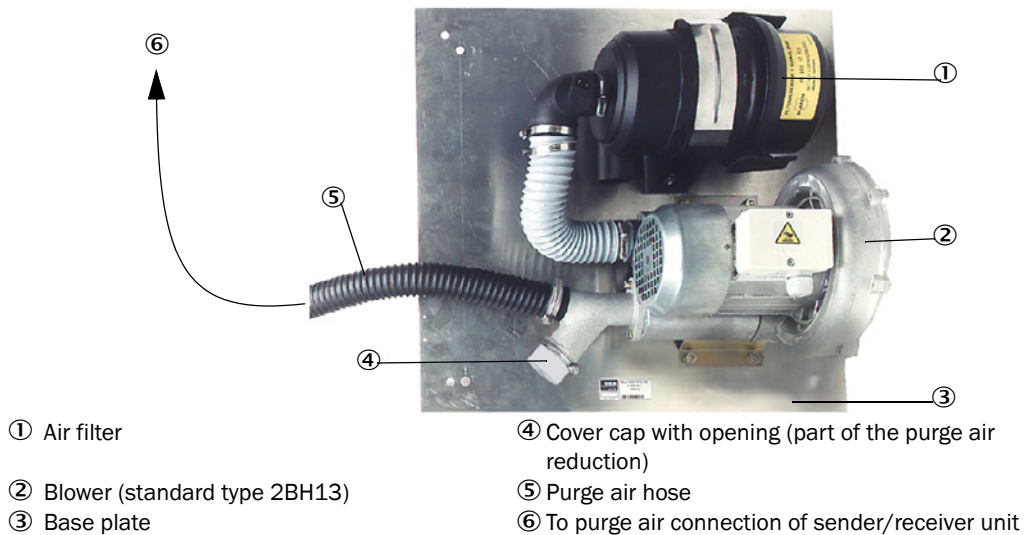


- ① Marking for assembly position
- ② Securing bolt
- ③ Material St 37 or 1.4571

2.2.3 Optional external purge air unit

The MCU control unit with integrated purge air supply cannot be used when the internal duct pressure is greater than +2 hPa. Use the optional external purge air unit in this case. It has a powerful blower and can be used for excess pressure in the duct up to 30 hPa. The scope of delivery includes a purge air hose with 40 mm nominal diameter (length 5 m or 10 m).

Fig. 8: Optional external purge air unit



A weatherproof cover is available for use outdoors (see “Weatherproof covers”, page 68).

2.2.4 Voltage and purge air supply

Internal duct pressure [hPa]	Connection and supply components	
	Purge air	Voltage
-50 ... +2	MCU-P + purge air hose DN40	
-50... +30	Optional external purge air unit	MCU-N

+i We recommend using the optional external purge air unit when the sender/receiver unit is more than 10 m away from the MCU control unit.

2.2.5 Installation accessories

Separate parts of the measuring system (order separately) are:

- Purge air hose with 40 mm nominal diameter for purge air supply to the sender/receiver unit from the MCU-P control unit,
- Connection line from the MCU to the sender/receiver unit.

Weatherproof cover

A weatherproof cover is available when using the sender/receiver unit outdoors (see “Weatherproof covers”, page 68).

Purge air heater

It is recommended to use an optional purge air heater available for delivery (see “Purge air supply”, page 69) to prevent condensation in the device or flange tube when the measuring system is operated at gas temperatures close to the dew point or very low ambient temperatures



The purge air heater can only be used for purge air supply with an external purge air unit.

Optional non-return valve

When the measuring system is used in applications with overpressure in the duct, it is possible to protect the sender/receiver unit, external purge air unit and the environment against the consequences of purge air supply failure by installing a non-return valve on the purge air connection of the sender/receiver unit (see “Installation of non-return valve”, page 31).

2.2.6 Test equipment for linearity test

A linearity test can serve to check the correct measurement function (see Service Manual). In this case, filter glasses with defined transmission values are positioned in the beam path and the values compared against those measured by the measuring system. Compliance within the allowed tolerance means the measuring system is working correctly. The filter glasses with holder required for the check are deliverable including a carrying case.

2.3 SOPAS ET (PC program)

SOPAS ET is a SICK Software for easy operation and configuration of the DUSTHUNTER.

SOPAS ET runs on a laptop/PC connected to the DUSTHUNTER via an RSB adapter or Ethernet interface (option).

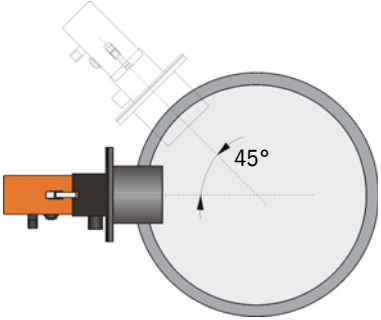
The menu structure simplifies changing settings. Further functions are also available (e.g., data storage, graphic displays).

SOPAS ET is delivered on the product CD. Alternatively, you can download SOPAS ET free of charge from the SICK homepage (“Downloads”).

3 Assembly and Installation

3.1 Project planning

The following Table provides an overview of the project planning work necessary as prerequisite for trouble-free assembly and subsequent device functionality. You can use this Table as a Checklist and check off the completed steps.

Task	Requirements	Work step	<input checked="" type="checkbox"/>	
Determine measuring location and fitting locations for the device components	Inlet and outlet paths according to DIN EN 13284-1 (inlet at least 5x hydraulic diameter d_h , outlet at least 3x d_h ; distance to stack opening at least 5x d_h)	For round and square ducts: d_h = duct diameter For rectangular ducts: d_h = 4x cross-section divided by circumference	<ul style="list-style-type: none"> Follow specifications for new equipment Select best possible location for existing equipment; For too short inlet/outlet paths: Inlet path > outlet path 	<input type="checkbox"/>
	Homogeneous flow distribution Representative dust distribution	Whenever possible, no deflections, cross-section variations, feed and drain lines, flaps or fittings in the area of the inlet and outlet paths	If conditions cannot be ensured, define flow profile according to DIN EN 13284-1 and select best possible location	<input type="checkbox"/>
	Fitting position for the sender/receiver unit		Select best possible location	<input type="checkbox"/>
	Accessibility, accident prevention	The device components must be easily and safely accessible	Provide platforms or pedestals as required	<input type="checkbox"/>
	Installation free of vibrations	Acceleration < 1 g	Eliminate/reduce vibrations through suitable measures	<input type="checkbox"/>
	Ambient conditions	Limit values according to Technical Data	If necessary: <ul style="list-style-type: none"> Provide weatherproof covers/sun protection Enclose or lag device components 	<input type="checkbox"/>
	Select the purge air supply	Sufficient primary purge air pressure depending on internal duct pressure	Plan a purge air heater for gas temperatures close to the dew point or very low ambient temperatures	Select supply type
Clean intake air		Whenever possible, low amount of dust, no oil, moisture or corrosive gases	<ul style="list-style-type: none"> Select best possible location for air intake Determine required purge air hose length 	<input type="checkbox"/>
Select device components	Duct wall thickness with isolation	Flange with tube	Set the immersion depth depending on the internal duct diameter (see "Adapting the sender/receiver unit to the duct diameter", page 34) If necessary, plan additional measures to fit the flange with tube (see "Fitting the flange with tube", page 23)	<input type="checkbox"/>
	Internal duct pressure	Type of purge air supply		
	Fitting locations	Line and purge air hose lengths		

3 ASSEMBLY AND INSTALLATION

Task	Requirements		Work step	<input checked="" type="checkbox"/>
Plan calibration openings	Access	Easy and safe	Provide platforms or pedestals as required	<input type="checkbox"/>
	Distances to measuring level	No mutual interference between calibration probe and measuring system	Plan sufficient distance between measuring and calibration level (approx. 500 mm)	<input type="checkbox"/>
Plan the voltage supply	Operating voltage, power requirements	According to Technical Data (see "Technical Data" , page 61)	Plan adequate line cross-sections and fuses	<input type="checkbox"/>

3.2 Assembly

Carry out all assembly work onsite. This includes:

- ▶ Fitting the flange with tube
- ▶ Fitting the MCU control unit,
- ▶ Fitting the optional external purge air unit.



WARNING:

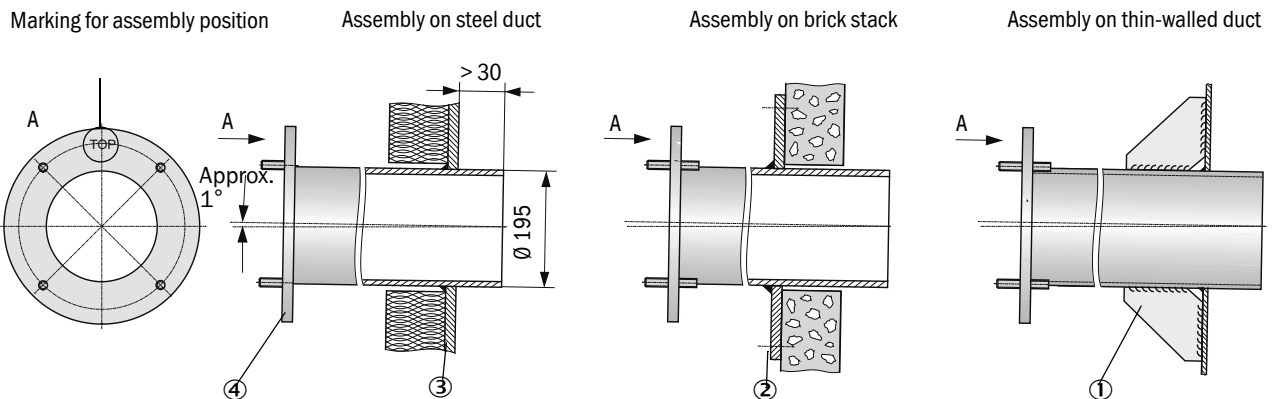
- ▶ Observe the relevant safety regulations as well as the safety notices during all work: see “Important Information”, page 6
- ▶ Consider the equipment weight specifications when planning the mounting brackets.
- ▶ Only carry out assembly work on equipment with hazard potential (hot or aggressive gases, higher internal duct pressure) when the equipment is at a standstill.
- ▶ Take suitable protection measures against possible local hazards or hazards arising from the equipment.



All dimensions specified in this Section are shown in mm.

3.2.1 Fitting the flange with tube

Fig. 9: Fitting the flange with tube



- ① Junction plate
- ② Anchor plate
- ③ Duct wall
- ④ Flange with tube



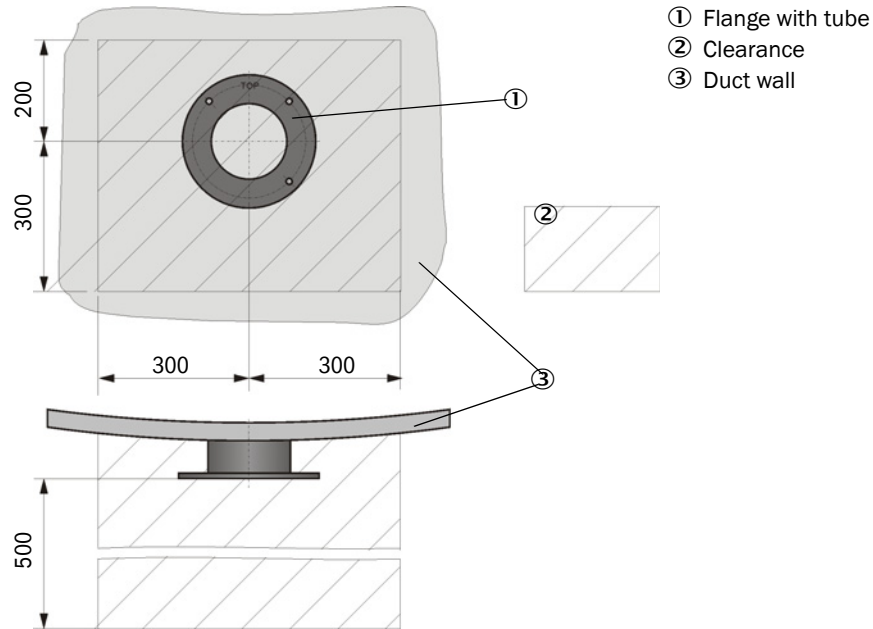
NOTE:

Maximum wall and isolation thickness are derived from the flange tube length (350 mm or 700 mm) less the distance between flange and stack outer wall, and stack immersion depth (> 30 mm).

3.2.2 Work to be performed

- ▶ Measure the fitting location and mark the assembly location.
Leave enough clearance around the flange with tube to fit the sender/receiver unit.

Fig. 10: Clearance for sender/receiver unit (dimensions in mm)



- ▶ Remove insulation (when fitted)
- ▶ Cut suitable openings in the duct wall; bore large enough holes in brick or concrete stacks (flange tube diameter (see “Flange with tube”, page 64))



NOTE:

- ▶ Do not let separated pieces fall into the duct.
-
- ▶ Insert the flange with tube in the opening slanting slightly downwards (1 to 3°, see “Fitting the flange with tube”, page 23) so that the “Top” marking points upwards and any condensate that may collect in the duct can drain off.
 - ▶ Weld the flange with tube on using an anchor plate for brick or concrete stacks, insert junction plates for thin-walled ducts (see “Fitting the flange with tube”, page 23).
 - ▶ Close off the flange opening after fitting to prevent gas escaping.

3.2.3 Fitting the optional external purge air unit.

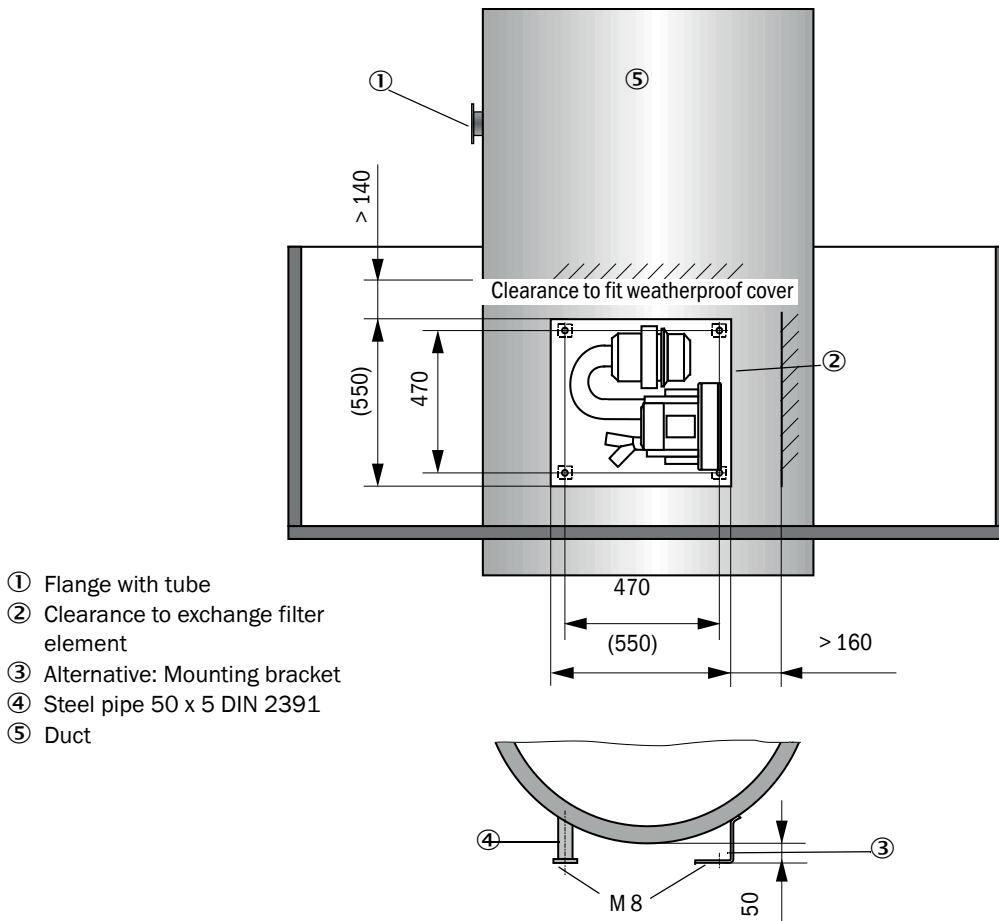
Consider the following points when selecting the assembly location:

- ▶ Install the purge air unit at a location with clean air whenever possible. The air intake temperature must correspond to specifications in the Technical data (see [“Technical Data”, page 61](#)). In unfavorable conditions, lay an air intake hose or pipe to a location with better conditions.
- ▶ The fitting location must be easily accessible and meet all safety regulations.
- ▶ Install the purge air unit only as far as necessary below the flange with tube so that the purge air hoses can be laid downwards (avoids water collecting).
- ▶ Provide sufficient clearance to exchange the filter element.
- ▶ Provide sufficient space to attach and remove the weatherproof cover when installing the purge air unit outdoors see [“Purge air unit layout and assembly dimensions \(dimensions in mm\)”, page 26](#)).

3.2.4 Assembly work

- ▶ Prepare holder (see “Purge air unit layout and assembly dimensions (dimensions in mm)”, page 26).
- ▶ Fasten purge air unit with 4 M8 screws.
- ▶ Check whether the filter element is fitted in the filter housing otherwise fit when necessary.

Fig. 11: Purge air unit layout and assembly dimensions (dimensions in mm)



3.2.5 Fitting the weatherproof cover

Weatherproof cover for external purge air unit

The weatherproof cover (see [“Weatherproof covers”, page 68](#)) comprises a cover and locking set.

Assembly:

- ▶ Mount the locking pins from the locking set on the base plate.
- ▶ Put the weatherproof cover on from above.
- ▶ Insert the holding catches into the counterpieces from the side, twist and lock in.

3.3 Electrical installation

3.3.1 Electrical safety



WARNING:

- ▶ Observe the relevant safety regulations as well as the safety notices in [see “Important Information”, page 6](#) during all installation work.
 - ▶ Take suitable protection measures against possible local hazards or hazards arising from the equipment.
-

3.3.1.1 Properly installed power isolating switches



WARNING:

- Endangerment of electrical safety during installation and maintenance work when the power supply is not switched off.
An electrical accident can occur during installation and maintenance work when the power supply to the device or lines is not switched off using a power isolating switch/circuit breaker.
- ▶ Before starting work on the device, ensure the power supply can be switched off using a power isolating switch/circuit breaker in accordance with DIN EN 61010.
 - ▶ Make sure the power isolating switch is easily accessible.
 - ▶ An additional disconnecting device is mandatory when the power isolating switch cannot be accessed or only with difficulty after installation.
 - ▶ The power supply may only be activated again after the work or for test purposes by personnel carrying out the work under consideration of valid safety regulations.
-

3.3.1.2 Lines with correct rating



WARNING:

- Endangerment of electrical safety through power line with incorrect rating. Electrical accidents can occur when the specifications for replacement of a removable power line have not been adequately observed.
- ▶ Always observe the exact specifications in the Operating Instructions (Technical Data Section) when replacing a removable power line.
-

3.3.1.3 Grounding the devices



CAUTION:

- Device damage through incorrect or missing grounding.
- ▶ During installation and maintenance work, it must be ensured that the protective grounding to the devices and/or lines involved is effective in accordance with EN 61010-1.
-

3.3.1.4 Responsibility for system safety



WARNING:

- Responsibility for the safety of a system.
- ▶ The person setting the system up is responsible for the safety of the system in which the device is integrated.
-

3.3.2 General information, prerequisites

All assembly work previously described must be completed (as far as applicable) before starting installation work.

Carry out all installation work onsite unless otherwise explicitly agreed with SICK or authorized representatives. This includes laying and connecting the power supply and signal lines, installing switches and power fuses and connecting the purge air supply.



- Plan adequate line cross-sections (see [“Technical Data”, page 61](#)).
- Line ends with plugs to connect the sender/receiver unit must have sufficient free length.

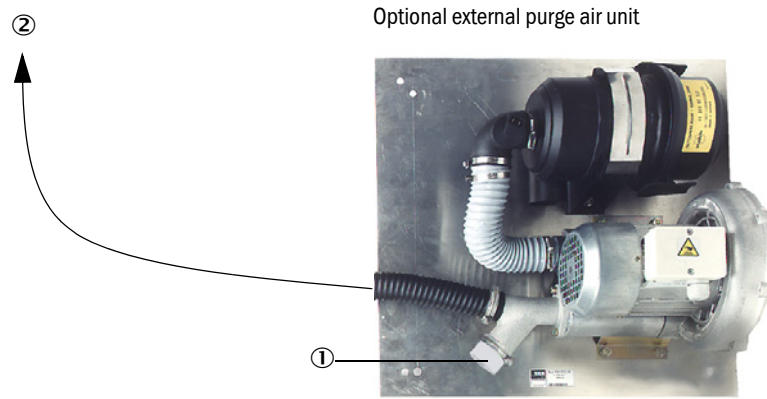
3.3.3 Installing the purge air supply

- ▶ Lay the purge air hoses with shortest paths and free of bends, shorten as required.
- ▶ Maintain sufficient distance from hot duct walls.

3.3.3.1 Optional external purge air unit

- 1 Connect the purge air hose
 - ▶ Connect the DN 40 purge air hose to the Y-distributor of the purge air unit and secure with a D32-52 hose clamp.
 - ▶ Close off the second outlet opening on the Y-distributor with the cover cap.

Fig. 12: Optional external purge air unit connection



- ① Cover cap with opening (part of the purge air reduction)
- ② To the purge air connections of the sender/receiver unit

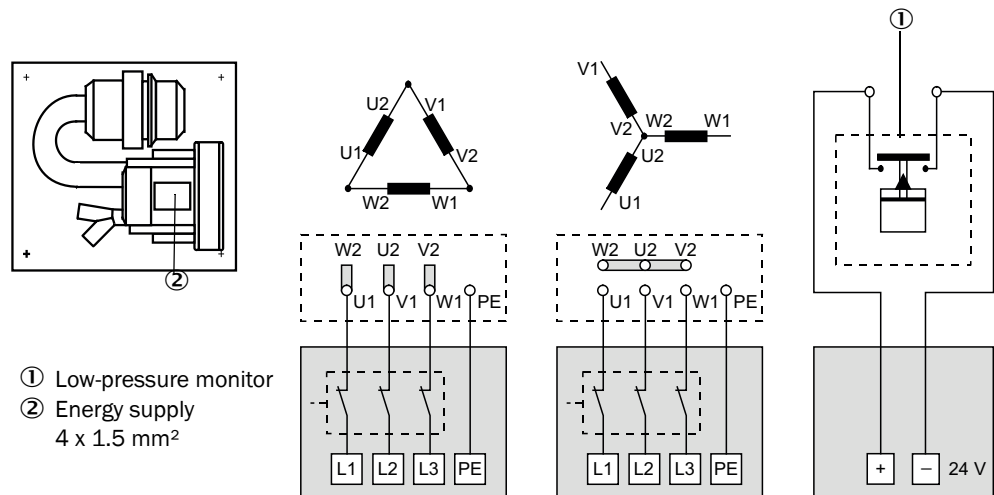
- 2 Electrical connection
 - ▶ Compare power voltage and frequency with the specifications on the type plate on the purge air motor.



CAUTION:
▶ Only connect when these match!

- ▶ Connect the power supply line to the purge air motor terminals (refer to the supplementary sheet on the purge air motor and lid of the motor terminal box for terminal allocation).

Fig. 13: Electrical connection of the external purge air unit



- ▶ Connect protective conductor to terminal.
- ▶ Set motor circuit breakers according to the blower connection data (see Technical Data for purge air unit) to a value 10% above the rated current.

**NOTE:**

In case of doubt or when using a special motor version, the operating instructions supplied with the motor have priority over any other information.

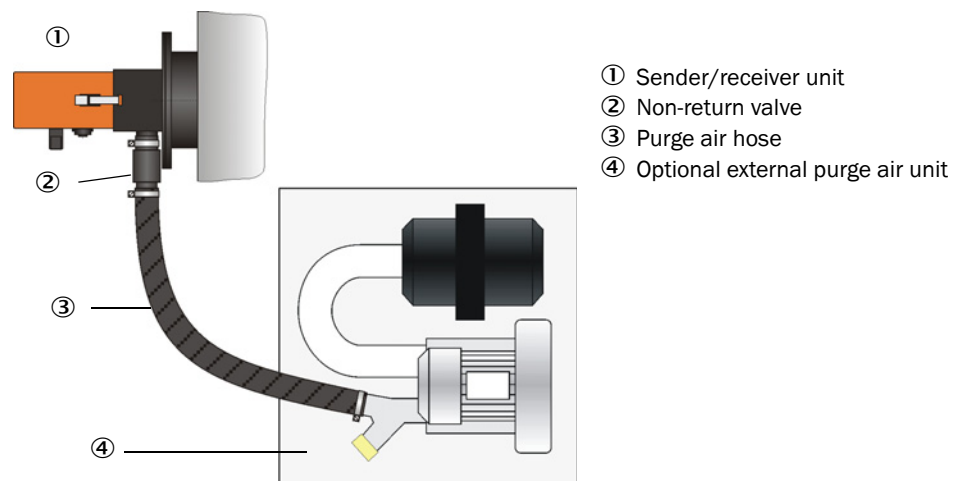
- ▶ Check the function and running direction of the blower (purge air flow direction must match the arrows on the inlet and outlet openings on the blower). For wrong direction on 3-phase motors: Swap power connections L1 and L2.
- ▶ Connect the pressure controller (option) to monitor purge air feed.

**NOTE:**

- ▶ Use a fail-safe power supply (standby unit, rails with redundant supply)
- ▶ Fuse the purge air unit separate from the other system components. The fuse type must match the rated current (see technical details of purge air unit). Fuse each phase separately.
Use circuit breakers to prevent phase failures on one side.

3.3.3.2 Installing the non-return valve option

Fig. 14: Installation of non-return valve



- ① Sender/receiver unit
- ② Non-return valve
- ③ Purge air hose
- ④ Optional external purge air unit

3.3.4 Connecting the sender/receiver unit

3.3.4.1 Work to be done

- ▶ Connect the connection line.

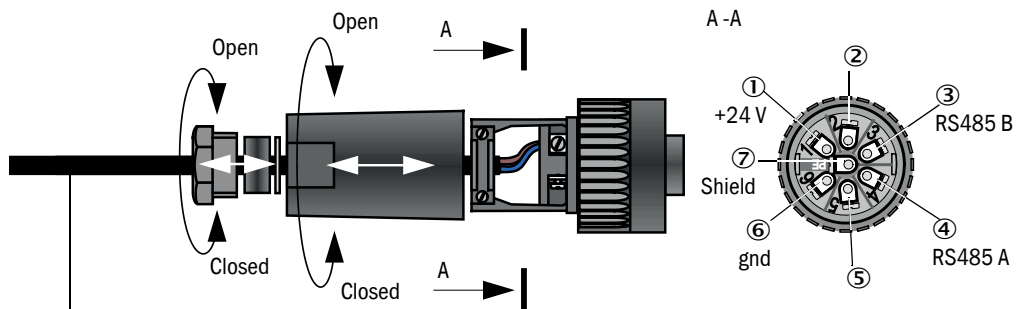


NOTE:

- ▶ Only use shielded lines with twisted pairs (e.g. UNITRONIC LiYCY (TP) 4 x 2 x 0.25 mm² from LAPPKabel; not suitable for underground laying).

3.3.4.2 Connection of connection line

Fig. 15: Plug connector connection to onsite line



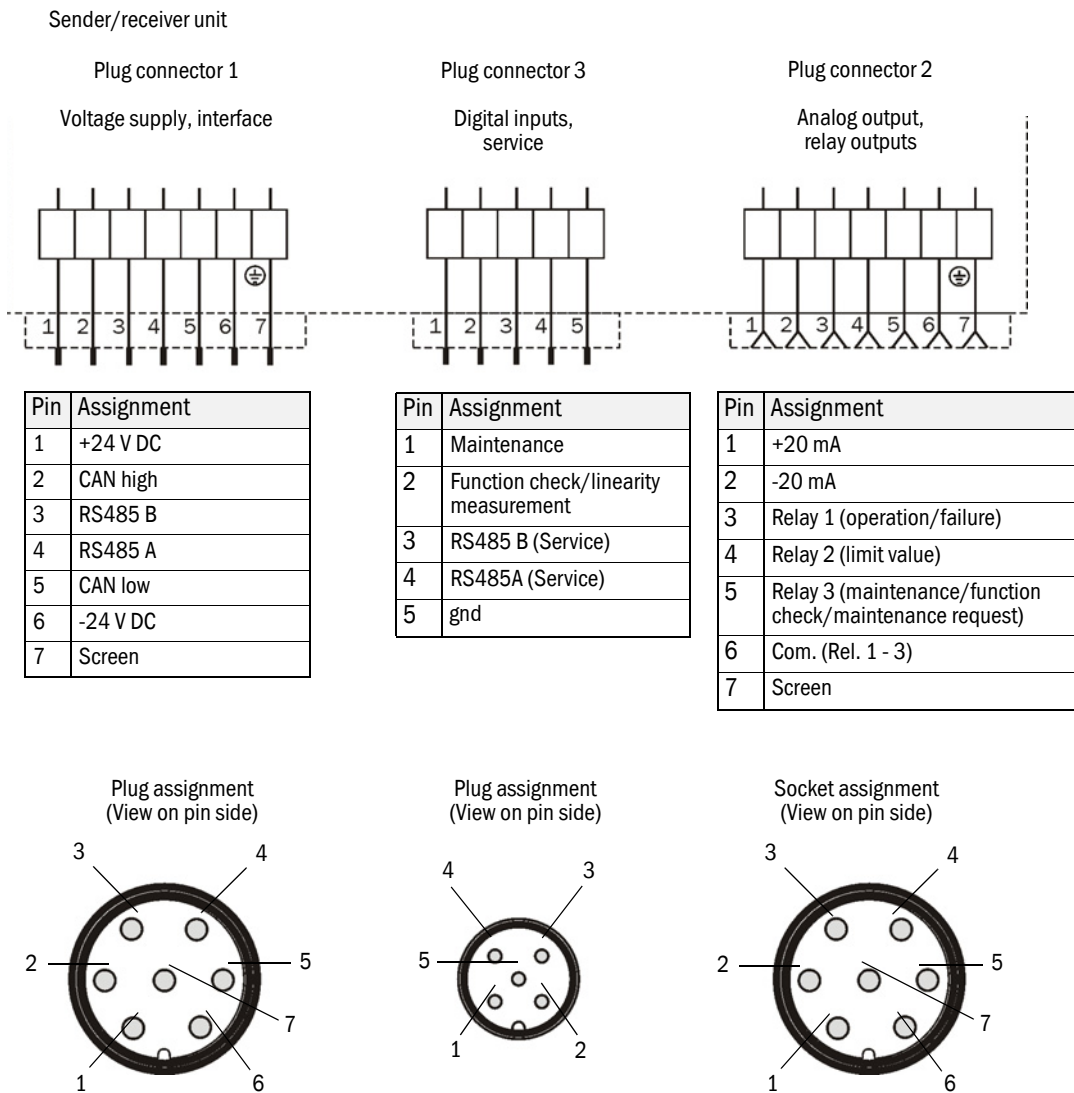
Cable provided by customer according to page 29, §3.3.2

Note

To open, connect the plug connector to the plug on the sender/receiver unit.

3.3.4.3 Standard connection (without options)

Fig. 16: Standard connection



NOTE:

Only one RS485 interface may be connected each time (either to plug connector 1 or to plug connector 3). Otherwise communication malfunctions can result.

4 Start-up and Parameter Settings

4.1 Fitting the sender/receiver unit

Assembly and installation must have been completed according to Section 3 before starting the work described in the following.

4.1.1 Adapting the sender/receiver unit to the duct diameter

The sender/receiver unit is delivered with the short immersion depth (400 mm, see “Relation between scattering angle, immersion depth (T) and measuring volume length (L)”, page 16) set at the factory.

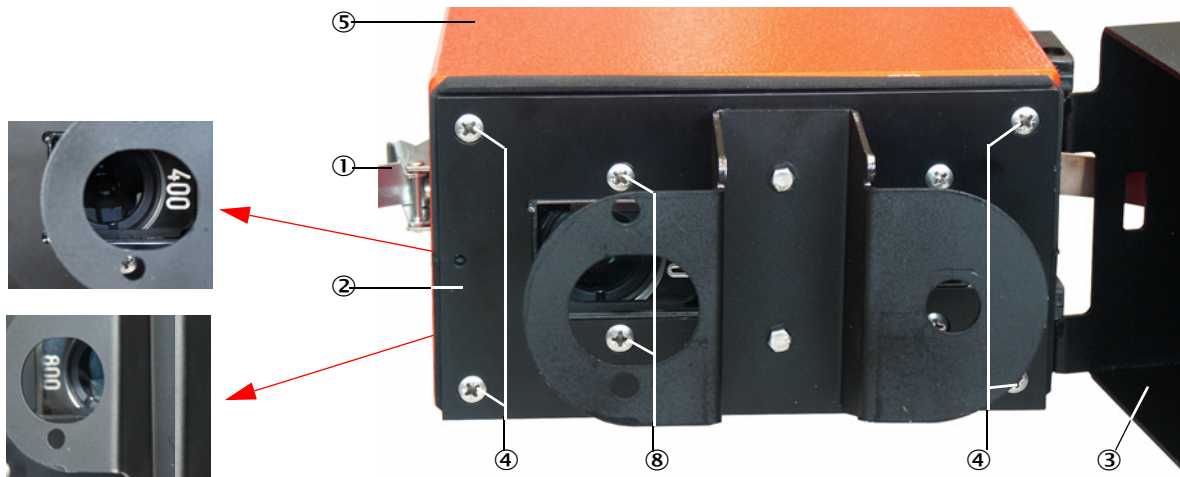


The immersion depth set is displayed in the window for the measurement receiver (see “Sender/receiver unit opened”, page 34).

For duct diameters larger than approx. 3 m, we recommend converting the sender/receiver unit to the long immersion depth (800 mm). The following steps are then necessary:

- Loosen CAMLOCK clips (1) of the sender/receiver unit, swivel electronics unit (2) to the side and take off from mounting flange (3).

Fig. 17: Sender/receiver unit opened

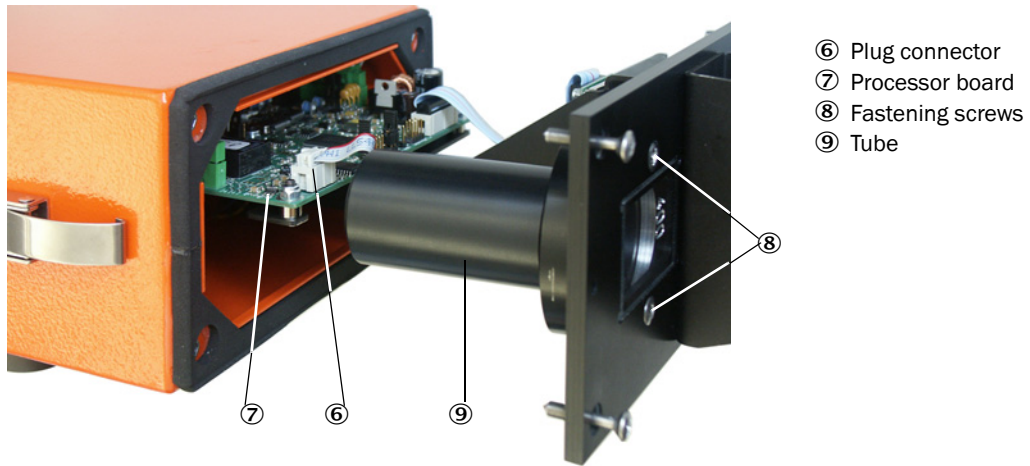


- ① CAMLOCK clips
- ② Electronics unit
- ③ Mounting flange
- ④ Fastening screw

- ⑤ Cover
- ⑥ Plug connector
- ⑦ Processor board
- ⑧ Fastening screws

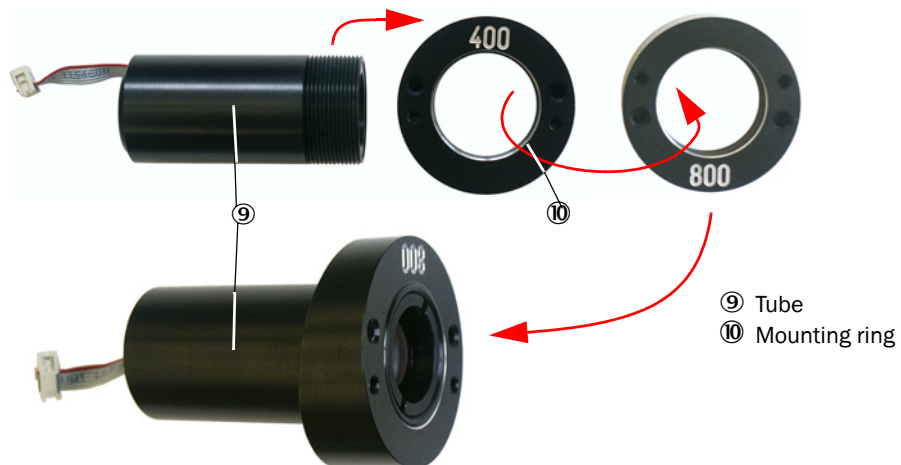
- Loosen fastening screws (4) on the electronics unit, carefully pull the electronics unit out of cover (5) and loosen plug connector (6) for the measurement receiver from processor board (7).

Fig. 18: Electronics unit opened



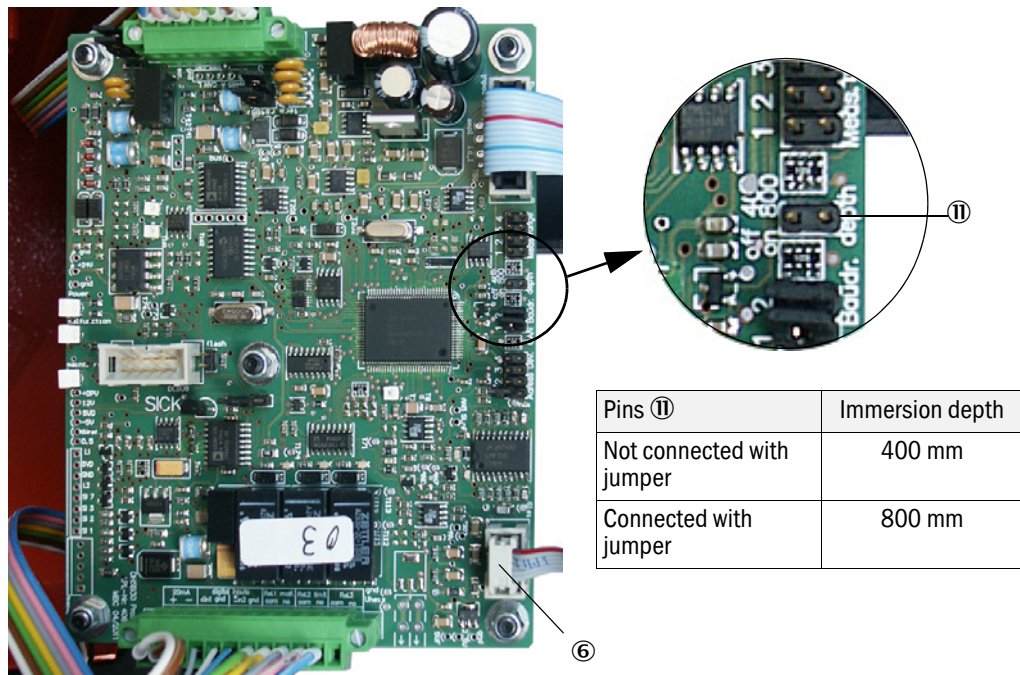
- ▶ Loosen fastening screws (8) for tube (9) and take the tube off (see “Electronics unit opened”, page 35).
- ▶ Unscrew mounting ring (10) from the tube, turn it round and screw it back on again.

Fig. 19: Tube with mounting ring



- ▶ Connect the pins for immersion depth adjustment (11) on the processor board with a jumper.

Fig. 20: Processor board



Pins II	Immersion depth
Not connected with jumper	400 mm
Connected with jumper	800 mm

- ▶ Plug plug connector (6) for the measurement receiver on the processor board.
- ▶ Reassemble the sender/receiver unit in reverse sequence.

4.1.2 Fitting and connecting the sender/receiver unit on the duct

Connecting the sender/receiver unit to the purge air supply

- ▶ Check whether the purge air supply is available (the flow direction must be correct and the purge air hose fits tight on the connection).
- ▶ Push the DN 40 purge air hose onto the sender/receiver unit connection and secure with a strap retainer.

Assembly without weatherproof cover

- ▶ Lay the seal on the flange with tube, position the sender/receiver unit in the flange with tube and fasten with the assembly kit.



Connections for connection line and purge air hose must always be at the bottom (see “DUSTHUNTER SB30 device components”, page 14).

- ▶ Connect the connection line to the plug connector and screw tight.

4.2 Setting the measuring system parameters

4.2.1 Factory settings

The measuring system is delivered with the default settings shown in the following Table.

Parameter		Value
Measured variable		Scattered light intensity (SI); after dust concentration calibration (see "Calibration for dust concentration measurement" , page 46) in mg/m ³
	Value at LZ	0 SI
	Value at MBE	3000 SI
Coefficients set		0.00 / 1.00 / 0.00
Analog output (AO)	Live zero (LZ)	4 mA
	Upper measuring range value (MBE)	20 mA
	Current during maintenance	4 mA
	Current by malfunction	4 mA
	Output current by malfunction	Yes
Response time		60 s
Function check	Interval	Every 8 h
	Output of control values on AO	Yes
	Output duration	90 s
Limit value	Relay 1	1500 SI
	Switching direction	Value exceeded
CAN bus baud rate (see "DUSTHUNTER SB30 device components" , page 14)		125 kBd

Two options are available for setting the parameters:

- Change settings using the jumper on the processor board (see ["Changing settings using the jumper on the processor board"](#), page 38).
This change can be made without a laptop/PC and user program.
- Further parameter settings using SOPAS ET
The menu structure simplifies changing settings. Further functions are also available (e.g., data storage, graphic displays).

4.2.2 Changing settings using the jumper on the processor board

The following steps are then necessary (see ["Adapting the sender/receiver unit to the duct diameter"](#), page 34):

- ▶ Loosen CAMLOCK clips of the sender/receiver unit, swivel the electronics unit to the side and take off from the mounting flange.
- ▶ Loosen the fastening screws on the electronics unit, carefully pull the electronics unit out of the cover.
- ▶ After changing the settings, reassemble the sender/receiver unit in reverse sequence.

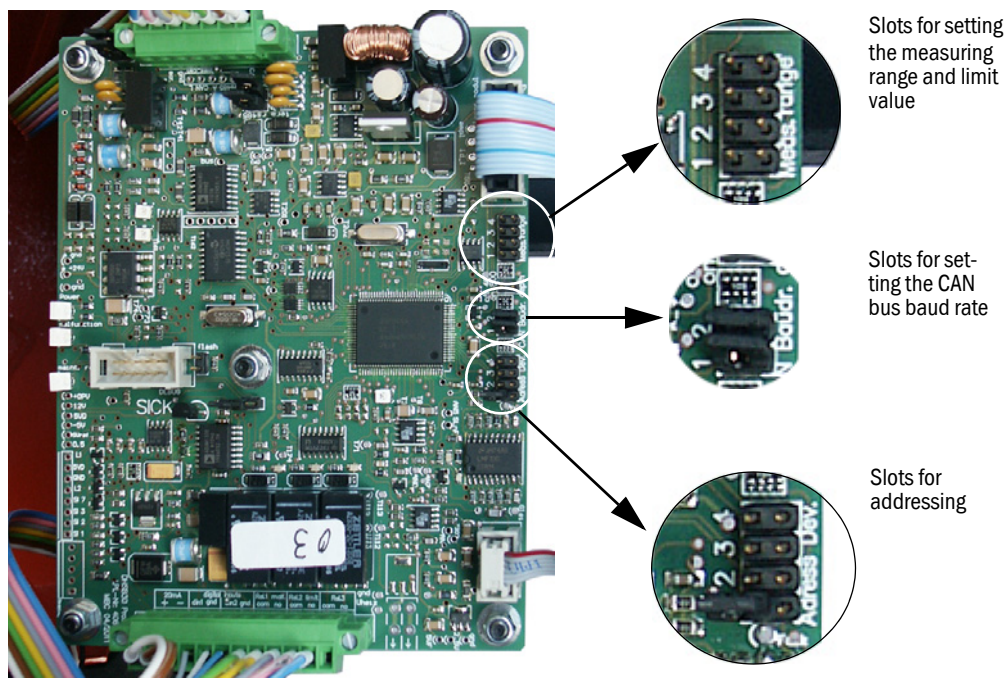
4.2.2.1 Setting measuring range and limit value

- ▶ Plug the jumper in the slot for the setting desired for the measuring range and limit value.

Parameter	Slot 1	Slot 2	Slot 3 (default)
Value at LZ	0 SI	0 SI	0 SI
Value at MBE	30 SI	500 SI	3000 SI
Limit value	15 SI	250 SI	1500 SI

+i Slot 4 is not used.

Fig. 21: Slots on processor board



Slots for setting the measuring range and limit value

Slots for setting the CAN bus baud rate

Slots for addressing

4 START-UP AND PARAMETER SETTINGS

4.2.2.2 Addressing

For operation of the measuring system with option MCU (see “Device components”, page 13), an address must be assigned to the sender/receiver unit.

- Connect the jumpers to the corresponding slots for addressing according to the following Table (see “Slots on processor board”, page 39).

	Slot				Address	
	1	2	3	4	RS485 (for MCU connection)	CAN bus (for SCU connection)
Jumper connected	No	No	No	No	1 (default)	0 → 0x10 (hex)
	Yes	No	No	No	1	1 → 0x11 (hex)
	No	Yes	No	No	2	2 → 0x12 (hex)
	Yes	Yes	No	No	3	3 → 0x13 (hex)
	No	No	Yes	No	4	4 → 0x14 (hex)
	Yes	No	Yes	No	5	5 → 0x15 (hex)
	No	Yes	Yes	No	6	6 → 0x16 (hex)
	Yes	Yes	Yes	No	7	7 → 0x17 (hex)
	No	No	No	Yes	8	8 → 0x18 (hex)
	Yes	No	No	Yes	1 (default)	9 → 0x19 (hex)
	No	Yes	No	Yes	1 (default)	10 → 0x1a (hex)
	Yes	Yes	No	Yes	1 (default)	11 → 0x1b (hex)
	No	No	Yes	Yes	1 (default)	12 → 0x1c (hex)
	Yes	No	Yes	Yes	1 (default)	13 → 0x1d (hex)
	No	Yes	Yes	Yes	1 (default)	14 → 0x1e (hex)
	Yes	Yes	Yes	Yes	1 (default)	15 → 0x1f (hex)

4.2.2.3 Adapting the CAN bus baud rate

When the measuring system is operated with option SCU (see “Device components”, page 13), it may be required to reduce the baud rate set at the factory (see “Factory settings”, page 38).

The following settings are possible (slots for setting the CAN bus baud rate, see “Slots on processor board”, page 39):

	Slot 1	Slot 2	Baud rate
Jumper connected	No	No	20 kBd
	Yes	No	50 kBd
	No	Yes	100 kBd
	Yes	Yes	125 kBd

4.2.3 Installing SOPAS ET

- Install SOPAS ET on a laptop/PC.
- Start SOPAS ET.
- Following the installation instructions of SOPAS ET.

4.2.3.1 Password for SOPAS ET menus

Certain device functions are first accessible after a password has been entered.

User level		Access to
0	Operator	Displays measured values and system states No password required
1	Authorized operator	Displays, inquiries as well as start-up or adjustment to customer-specific demands and diagnosis of necessary parameters. Preset password: sickoptic

4.2.4 Connection to the device via USB line

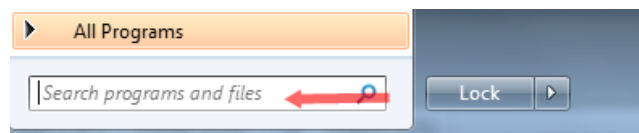
Recommended procedure:

- 1 Connect the RS485 line to the sender/receiver unit (see “DUSTHUNTER SB30 device components”, page 14) and the laptop/PC (accessories see “Accessories”, page 69).
- 2 Switch the device on.
- 3 Start SOPAS ET.
- 4 “Search settings”
- 5 “Device family oriented search”
- 6 Click the desired MCU.
- 7 Make the settings:
 - Ethernet communication (always clicked)
 - USB communication (always clicked)
 - Serial communication: Click
- 8 Do not specify IP addresses.
- 9 A list of COM ports is shown.
Specify the COM port of the DUSTHUNTER.
If you do not know the COM port: see “Finding the DUSTHUNTER COM port”, page 41
- 10 Assign a name for this search.
- 11 “Finish”

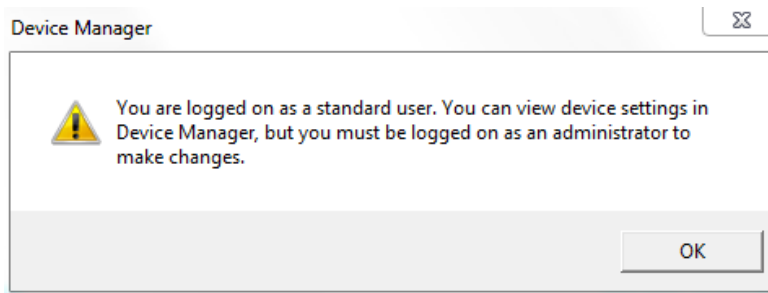
4.2.4.1 Finding the DUSTHUNTER COM port

If you do not know your COM port: You can find the COM port with the Windows Device Manager (Administrator rights are not required).

- 1 Disconnect the DUSTHUNTER from your laptop/PC.
- 2 Input: `devmgmt.msc`

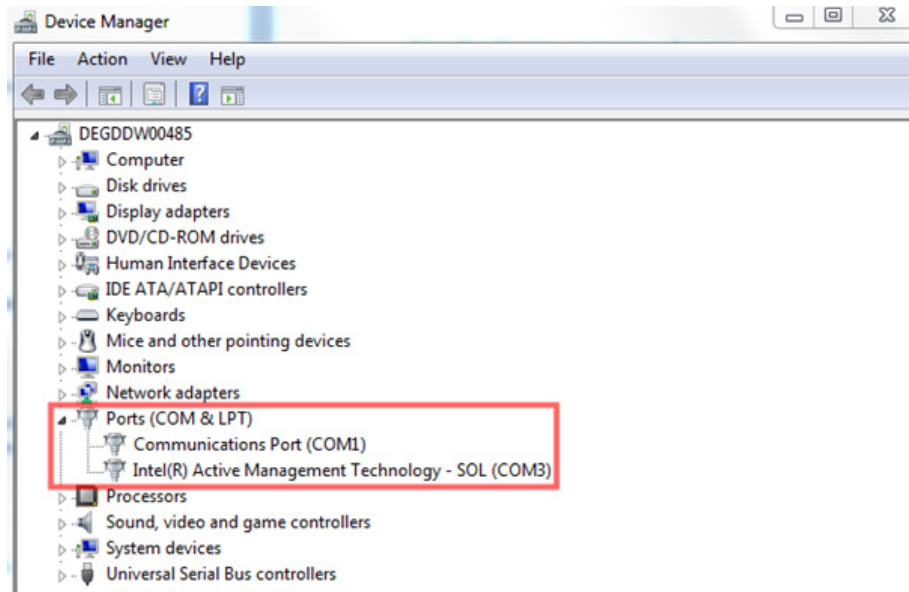


3 This message is shown:

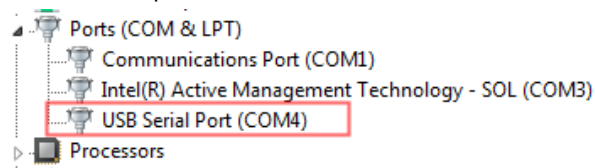


4 "OK"

5 The Device Manager opens.
See: "Ports (COM & LPT)"



6 Now connect the MCU with the laptop/PC.
A new COM port is shown.



Use this COM port for communication.

4.2.5 Connection to the device via Ethernet (option)



To connect to the measuring system via Ethernet, the Ethernet interface module must be installed on the MCU and the parameters set.

Recommended procedure:

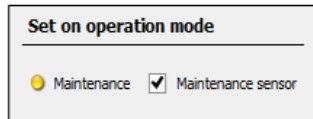
- 1 The MCU must be switched off.
- 2 Connect the MCU with the network.
- 3 Connect the PC to the same network.
- 4 Switch the MCU on.
- 5 Start SOPAS ET.
- 6 “Search settings”
- 7 “Device family oriented search”
- 8 Click the desired MCU
- 9 Make the settings:
 - Ethernet communication (always clicked)
 - USB communication (always clicked)
 - Serial communication: Do *not* click
- 10 Specify the IP addresses
 - IP address: see [“Setting the Ethernet module parameters”](#), page 50
- 11 Do not click a COM port
- 12 Assign a name for this search
- 13 “Finish”

4.2.6 Factory settings

The steps required to modify these settings are described in the following Sections. For this purpose, the devices must be connected in SOPAS ET (see “[Connection to the device via USB line](#)”, page 41), the Level 1 password set and the “Maintenance” mode set.

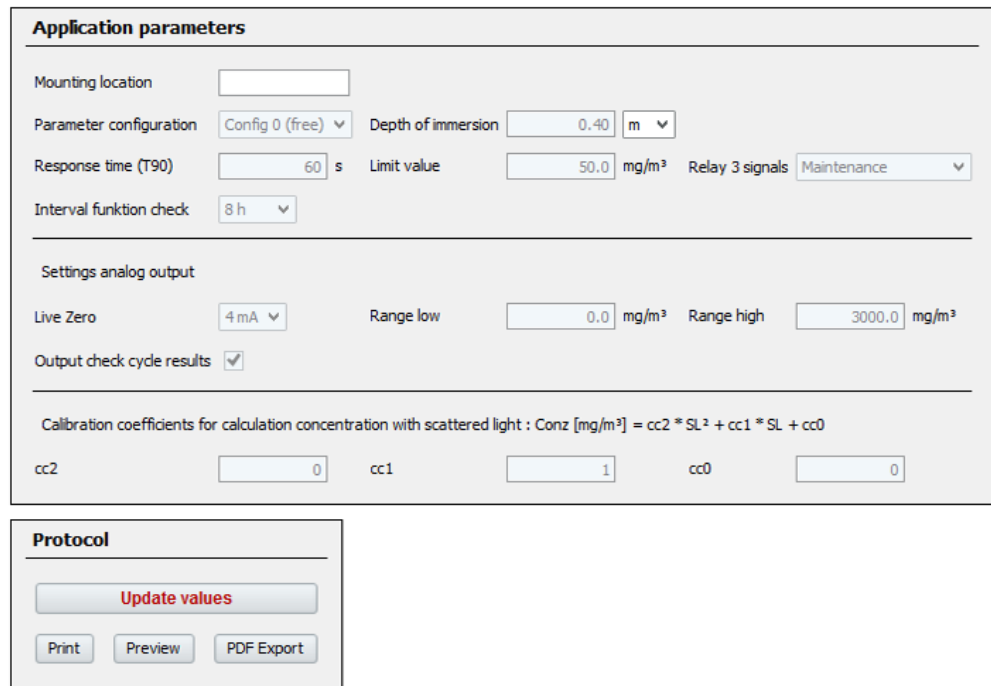
- ▶ Connect the measuring system to the SOPAS ET program.
- ▶ Enter the Level 1 password (see “[Password for SOPAS ET menus](#)”, page 41).
- ▶ Set the measuring system to “Maintenance” mode.

Fig. 22: SOPAS ET menu: DHSB30/Maintenance/Maintenance



- ▶ Switch to directory “Application Parameters” and set the desired parameters.

Fig. 23: SOPAS ET menu: Configuration/Application parameter (example)



Entry field	Parameter	Remark
Mounting location	Name of the measuring location	Sender/receiver unit assignment to the respective measuring location
Response time (T90)	Value in s	Response time for the measured variable (see “ Response time ”, page 11) Setting range 1 ... 600 s
Limit value	Value	The limit value relay switches when the value entered is overflown or underflown.
Relay 3 signals	Maintenance	The relay switched on when “Maintenance” mode is set.
	Function check	The relay switches on during a function check procedure.
	Maintenance request	The relay switches on for “Maintenance” mode.
Interval function check	Time between two check cycles	see “ Function check ”, page 12

Entry field	Parameter	Remark
Live zero	Zero point (2 or 4 mA)	Select 2 or 4 mA to ensure being able to differentiate between measured value and switched off device or interrupted current loop.
Range low	Lower Measuring Range Limit	Physical value at live zero
Range high	Upper Measuring Range Limit	Physical value at 20 mA
Output check cycle results	Inactive	Control values (see "Function check", page 12) are not output on the analog output.
	Activated	Control values (see "Function check", page 12) are output on the analog output.
cc2	Quadratic	Entry of the regression factors determined using gravimetric comparison measurement during a calibration (see "Calibration for dust concentration measurement", page 46)
cc1	Linear	
cc0	Absolute	

4.2.7 Calibration for dust concentration measurement

For exact dust concentration measurement, the relation between the primary measured variable scattered light intensity and the actual dust concentration in the duct must be established. To do this, the dust concentration must be determined based through a gravimetric comparison measurement according to DIN EN 13284-1 and set in relation to the values measured at the same time by the measuring system.



NOTE:

Carrying out a gravimetric comparison measurement demands special knowledge that cannot be described in detail here.

Steps to be carried out

- ▶ Select device file “MCU”, set the measuring system to “Maintenance” mode
- ▶ Enter the Level 1 password (see “Password for SOPAS ET menus”, page 41).
- ▶ Estimate the measuring range required for the dust concentration in operational state and enter the upper and lower end values.
- ▶ Deactivate “Maintenance” mode.
- ▶ Carry out the gravimetric comparison measurement according to DIN EN 13284-1.
- ▶ Determine regression coefficients from the mA values of the analog output for “Scattered light intensity” and the actual dust concentrations measured gravimetrically.

$$c = K2 \cdot I_{out}^2 + K1 \cdot I_{out} + K0 \quad (1)$$

c: Dust concentration in mg/m³

K2, K1, K0: Regression coefficients of the function $c = f(I_{out})$

I_{out}: Current output value in mA

$$I_{out} = LZ + SL \cdot \frac{20mA - LZ}{MBE} \quad (2)$$

SI: Measured scattered light intensity

LZ: Live Zero

MBE: Defined upper range limit value
(value entered for 20 mA;
normally 2.5 x fixed limit value)

► Enter the regression coefficients

There are two options:

- Direct input of K2, K1, K0 in a measured value computer.



NOTE:

In this case, the regression coefficients set in the sender/receiver unit and the measuring range set in the MCU (option) may not be changed anymore. On the LC-Display of the MCU (option), the dust concentration is shown in mg/m³ as uncalibrated value.

- Use the regression function of the measuring system (use without measured value computer).
In this case, the correlation to the scattered light intensity has to be determined. To do this, calculate the regression coefficients cc2, cc1, cc0 to be entered in the measuring system from K2, K1, K0.

$$c = cc2 \cdot SL^2 + cc1 \cdot SL + cc0 \quad (3)$$

Using (2) in (1), the result is as follows:

$$c = K2 \cdot \left(LZ + SL \cdot \frac{20mA - LZ}{MBE} \right)^2 + K1 \cdot \left(LZ + SL \cdot \frac{20mA - LZ}{MBE} \right) + K0$$

Using (3), the result is as follows:

$$\begin{aligned} cc0 &= K2 \cdot LZ^2 + K1 \cdot LZ + K0 \\ cc1 &= (2 \cdot K2 \cdot LZ + K1) \cdot \left(\frac{20mA - LZ}{MBE} \right) \\ cc2 &= K2 \cdot \left(\frac{20mA - LZ}{MBE} \right)^2 \end{aligned}$$

Now enter the regression coefficients cc2, cc1 and cc0 determined in directory "Configuration/Application parameters" (see "SOPAS ET menu: Configuration/Application parameter (example)", page 44) (set sender/receiver unit to "Maintenance" state and enter the Level 1 password.

Reset the sender/receiver unit back to "Measurement" state afterwards).



This method allows changing the parameters for the selected measuring range as desired.

4.2.8 Data backup in SOPAS ET

All parameters relevant for recording, processing and input/output of measured values as well as current measured values can be saved in SOPAS ET and printed. This allows easy reentering of set device parameters as needed or registering device data and states for diagnostic purposes.

The following options are available:

- Saving as a project
Not only device parameters but also data logs can be saved.
- Saving as a device file
Saved parameters can be processed without a device connected and transferred to the device again later.



Description, see SOPAS ET Help menu and DUSTHUNTER Service Manual.

- Saving as a protocol
Device data and parameters are registered in the Parameter protocol.
A Diagnosis protocol can be created for analysis of the device function and recognition of possible malfunctions.

Parameter protocol example

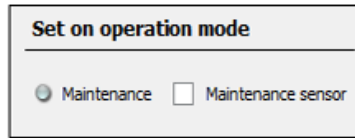
Fig. 24: DUSTHUNTER SB30 Parameter protocol (example)

Dusthunter - Parameter and Diagnosis protocol		
Type of device: DH SB30		
Mounting location:		
Sensor 1		
Device information		
Device version		
Firmware version		
Serial number	00008700	
Identity number	00000	
Hardware version	1.0	
Firmware bootloader	V00.99.15	
Installation parameter		
Address RS485	1	
Address CAN (hex)	10	
Baudrate CAN	125 kBit	
Parameter of the selected parameter configuration		
Parameter configuration	Config 0 (free)	
Depth of immersion	0.40m	
Relay 3 signals	Maintenance	
Limit value	0.0mg/m ³	
Response time sensor	60.0s	
Function check interval	8 h	
Analog output settings		
Live Zero	0 mA	
Range low	0.0mg/m ³	
Range high	0.0mg/m ³	
Output control values	enabled	
Calibration coefficients for calculation of concentration		
cc2	0.0000	
cc1	0.0000	
cc0	0.0000	
Device parameter		
Factory settings		
Correction factor depth of immersion	0.9	
Response time diagnosis values	10.0s	
Burst frequency	10000Hz	
Triggerpoint	39µs	
Factory settings		
Scattered light (SL)		
cc2	0.0000	
cc1	1.0000	
cc0	0.0000	
Laser current		
cc2	0.0000	
cc1	30.3000	
cc0	0.0000	
Device temperature		
cc2	0.0000	
cc1	100.0000	
cc0	-275.1500	
Power supply		
cc2	0.0000	
cc1	11.0000	
cc0	0.0000	
Analog output		
cc2	0.0000	
cc1	179.9600	
cc0	0.0000	
System state		
Operation		inactive
Error		inactive
Maintenance request		inactive
Maintenance		inactive
Function check		inactive
Limit value		inactiv
Error		
EEPROM		inactive
CRC sum parameter		inactive
Version Parameter		inactive
CRC sum factory settings		inactive
Version factory settings		inactive
Span test		inactive
Overflow measured value		inactive
Overflow constant light		inactive
Monitor signal		inactive
Laser current to high (>100mA)		inactive
Power supply (24V) < 18V		inactive
Power supply (24V) > 30V		inactive
Warnings		
Default factory parameter		inactive
Test mode		inactive
Power supply (24V) < 19V		inactive
Power supply (24V) > 29V		inactive
Laser current to high (>60mA)		inactive
Measured value		
Concentration		0.0mg/m ³
Scattered light		0.000
Diagnosis value		
Monitor		0.000V
Laser current		0.0mA
Constant light		0.0V
Device temperature		0.0°C
Power supply (24V)		0.0V
Laserbyte		0
Monitor factor		1.000
Peak value device temp.		0°C
Check values		
Span 70		70.00%
Span 70 drift		+0.00%
Zero point		0.00%
Zero point drift		+0.00%
Filter check		
Nominal value Filter 1		0.00%
Measured value Filter 1		0.00%
Nominal value Filter 2		0.00%
Measured value Filter 2		0.00%
Nominal value Filter 3		0.00%
Measured value Filter 3		0.00%
Nominal value Filter 4		0.00%
Measured value Filter 4		0.00%
Nominal value Filter 5		0.00%
Measured value Filter 5		0.00%

4.2.9 Starting measurement mode

Set the measuring system to “Measurement” mode after entering/modifying parameters. To do so, cancel “Maintenance”: Deselect “Maintenance sensor”.

Fig. 25: SOPAS ET menu: MCU/Maintenance/Maintenance



Standard start-up is now completed.

4.2.10 Setting the Ethernet module parameters



NOTICE:

The risk of undesired access to the measuring system is inherent when communicating via Ethernet.

- ▶ Operate the measuring system only behind suitable protection (e.g., Firewall).



The configuration of interface module Ethernet type 2 is not possible with program SOPAS ET. A special software with description is supplied with the program.

Standard setting: 192.168.0.10

A predefined IP address is set on request.

To change the settings:

- ▶ Select directory “Configuration / I/O Configuration / Interface Module”.
- ▶ Set the desired network configuration in the “Expansion module information” field and click “Reset module”.

Fig. 26: SOPAS ET menu: MCU/Configuration/IO configuration/Interface Module

Expansion module information				
Module type	No module found			
Reset module	When this button is clicked, the connection will be reseted			

Ethernet Interface Configuration				
IP Address	192	168	0	10
Subnet mask	255	255	255	0
Gateway	0	0	0	0
TCP port	2111			

5 Maintenance

5.1 General

The maintenance work to be carried out is limited to cleaning work and securing the purge air supply function.

Take the following steps to set the measuring system to “Maintenance” mode before starting maintenance work.

Set the measuring system to “Maintenance” state before starting maintenance work. This can be done using either an external contact on pins 1 and 6 of plug connector 3 (see “Sender/receiver unit”, page 15, see “Connecting the sender/receiver unit”, page 32) or with SOPAS ET.

- ▶ Connect the MCU to the laptop/PC using the USB line and start program SOPAS ET.
- ▶ Connect with the MCU (see “Connection to the device via USB line”, page 41).
- ▶ Enter the Level 1 password (see “Password for SOPAS ET menus”, page 41).
- ▶ Set the measuring system to “Maintenance” mode.

Fig. 27: SOPAS ET menu: DHSB30/Maintenance/Maintenance



WARNING:

Observe the relevant safety regulations as well as the safety notices (see “Responsibility of user”, page 8) during all work.

Resume measuring operation after completing the work (deactivate the “Maintenance on/off” checkbox in the “Maintenance sensor” window)



- An automatic function check is not carried out during “Maintenance”.
- The value set for “Maintenance” is output on the analog output (see “Factory settings”, page 38, see “Factory settings”, page 44). This is also applicable when a malfunction is present (signaled on relay output).
- The “Maintenance” mode is reset when there is a voltage failure. In this case, the measuring system switches automatically to “Measurement” after the operating voltage is switched on again.

Maintenance intervals

The equipment operator must specify the maintenance intervals. The period depends on existing operating parameters such as dust content and state, gas temperature, how the equipment is run and ambient conditions. Therefore only general recommendations can be made here. Normally, the maintenance intervals are about 4 weeks during the initial period and can be steadily incremented to up to a year depending on the respective conditions.

The equipment operator must specify the specific work to be carried out and its performance in a Maintenance Manual.

Maintenance contract

Scheduled maintenance work can be carried out by the equipment operator. Only qualified personnel according to Section 1 should be allowed to do the work. If requested, all maintenance activities can also be performed by SICK Service or an authorized Service partner. Any repairs will be made by specialists onsite whenever possible.

Auxiliary means required

- Brush, cleaning cloth, cotton swabs
- Water
- Replacement air filter, preliminary filter (for suction)

5.2 Maintenance on the sender/receiver unit



NOTE:

- ▶ Do not damage any device parts during maintenance work.
- ▶ Do not interrupt the purge air supply.

Clean the outside of the sender/receiver unit in regular intervals. Remove deposits with water or mechanically using suitable auxiliary means.



WARNING: Danger from exhaust gas

The sender/receiver unit must be opened for cleaning. It is possible that gas escapes in plants with overpressure in the duct.

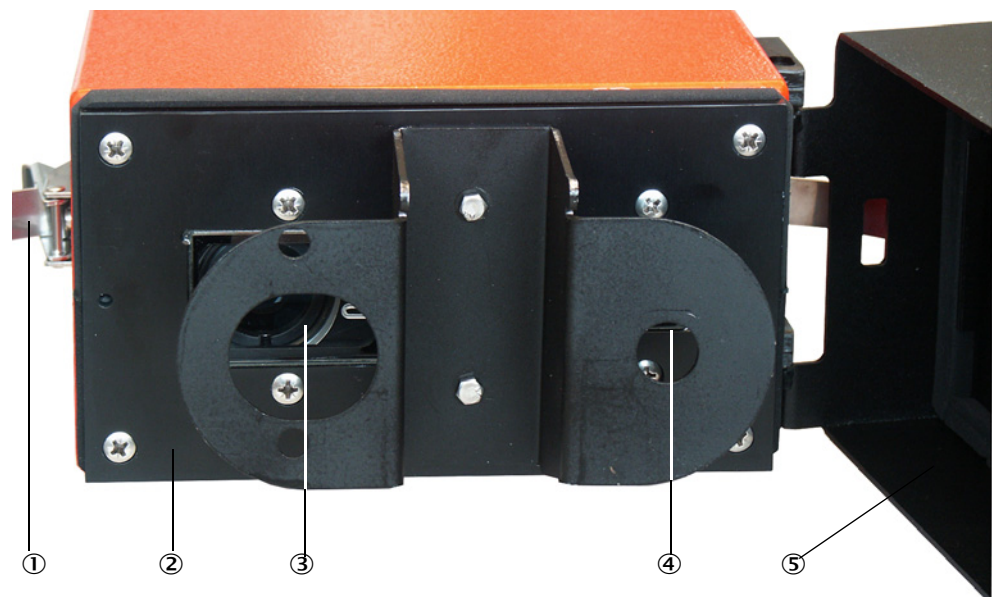
- ▶ Take suitable protection measures or open the sender/receiver unit only when the plant is at a standstill.

Work to be performed

- ▶ Loosen CAMLOCK clips (1) of the sender/receiver unit and swivel electronics unit (2) to the side.
- ▶ Check mounting flange (5) and purge air connections (see “Sender/receiver unit DHSB-T”, page 15) for contamination and clean when necessary.
- ▶ Carefully clean sender optics (3) and receiver optics (4) with an optics cloth or cotton swabs.
- ▶ Reassemble the sender/receiver unit again.
- ▶ Resume Measuring mode.

Figure 28

Cleaning the optical interfaces



- ① CAMLOCK clips
- ② Electronics unit
- ③ Sender optics

- ④ Receiver optics
- ⑤ Mounting flange

5.3 Maintenance on the purge air supply

Maintenance work to be carried out:

- Inspecting the entire purge air supply
- Cleaning the filter housing
- Replacing the filter element, if necessary.

The dust load and wear on the filter element depend on the degree of contamination of the intake ambient air. It is therefore not possible to specify precise time intervals for these tasks. We recommend inspecting the purge air supply at short intervals (approx. 2 weeks) and then optimizing maintenance intervals over a longer period of operation.



NOTE:

Irregular or insufficient maintenance of the purge air supply can cause it to fail and thus cause severe damage to the sender/receiver unit.

- ▶ Always ensure the purge air supply when the optical component sender/receiver unit is fitted on the duct.
 - ▶ Disassemble the connected components before exchanging damaged purge air hoses (see “Shutdown”, page 57).
-

Inspection

- ▶ Check the running noise of the blower at regular intervals; increases in the noise level can indicate a blower failure.
- ▶ Check that all hoses are secure and free of damage.
- ▶ Check the filter element for contamination.
- ▶ Exchange the filter element when:
 - Severe contamination (deposits on the filter surface) is visible
 - The purge air volume is reduced considerably as compared to operation with a new filter.



The purge air supply does not have to be switched off to clean the filter housing or to replace the filter element, i.e. the components can remain on the duct.

5.3.1 Control unit MCU with integrated purge air supply

Cleaning or replacing the filter element

- ▶ Open the door of the MCU with the appropriate key.
- ▶ Loosen strap retainer (1) on the filter outlet and pull filter housing (2) off the connection piece.
- ▶ Remove the filter housing.
- ▶ Rotate filter housing cover (3) in the “OPEN” arrow direction and remove the cover.
- ▶ Take out the filter element and replace with a new element.
- ▶ Clean the inside of the filter housing and the filter housing cover with a cloth and brush.

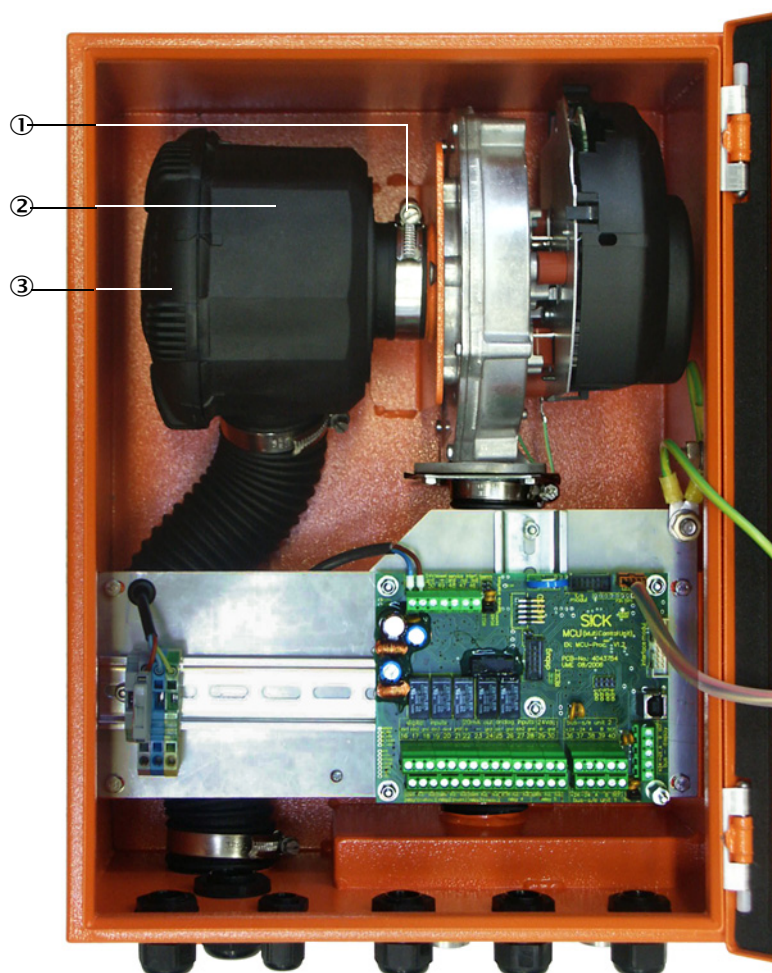


NOTICE:

- ▶ For wet cleaning, use only a water-soaked cloth and then dry the parts well.

- ▶ Insert new filter element.
Spare part: Filter element C1140, Part No. 7047560
- ▶ Mount the cover on the filter housing cover and rotate opposite to the direction of the arrow until it clicks into place.
- ▶ Reinstall the filter housing in the control unit.

Fig. 29: Exchanging the filter element for the control unit with purge air supply



- ① Strap retainer
- ② Filter housing
- ③ Filter housing cover

5.3.2 Optional external purge air unit

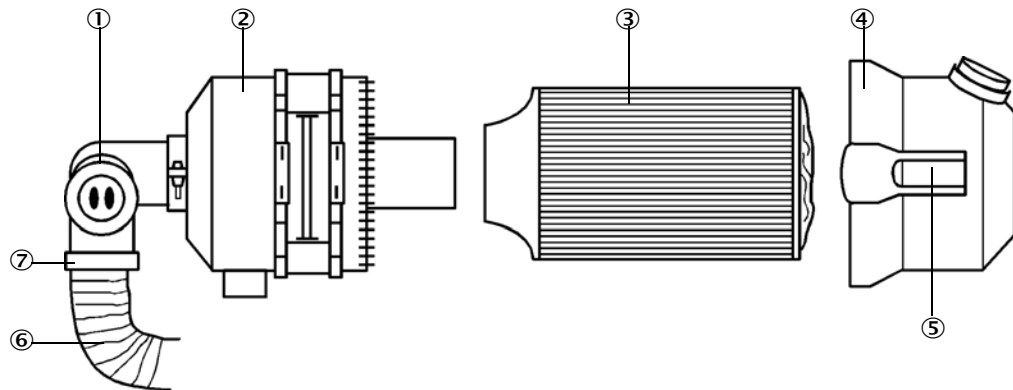


NOTICE:

The purge air unit must be serviced at the latest when the low-pressure monitor (7) at the filter outlet triggers (see “Replacing the filter element”, page 56).

Replacing the filter element

Fig. 30: Replacing the filter element



- ① Low-pressure monitor
- ② Filter housing
- ③ Filter element
- ④ Filter housing cover
- ⑤ Snap lock
- ⑥ Purge air hose
- ⑦ Strap retainer

- ▶ Switch the fan off for a short time.
- ▶ Clean outside of filter housing (2).
- ▶ Loosen strap retainer (7) and clamp purge air hose (6) to a clean location.



NOTICE:

▶ Place the end of the hose in a safe place so that foreign objects cannot be sucked in (this will cause irreparable damage to the blower), but do not close the end of the hose! During this time, the purge air entering the purge air connection pieces is unfiltered.

- ▶ Press snap locks (5) together and take off filter housing cover (4).
- ▶ Remove filter element (3) with twisting-pulling movements.
- ▶ Clean the inside of the filter housing and the filter housing cover with a cloth and brush.



NOTICE:

▶ For wet cleaning, use only a water-soaked cloth and then dry the parts well.

- ▶ Insert the new filter element with twisting-pressing movements.
Spare part: Filter element Micro-Top element C11 100, Part No. 5306091
- ▶ Mount the filter housing cover, ensuring that it is aligned correctly with the housing, and snap the snap locks into place.
- ▶ Reconnect the purge air hose to the filter outlet using the hose clamp.
- ▶ Switch the fan on again.

5.4 Shutdown

The measuring system must be shut down:

- Immediately when the purge air supply fails
- If the equipment is to be put out of operation for a longer period of time (as from approx. 1 week)

**NOTE:**

Never switch off or interrupt the purge air supply when the sender/receiver unit is fitted on the duct.

Work to be performed

- ▶ Loosen the connection line to the MCU.
- ▶ Dismantle the sender/receiver unit from the duct.

**WARNING: Hazard through gas and hot parts**

- ▶ Observe the relevant safety regulations as well as the safety notices in Section 1 during all disassembly work.
 - ▶ Only remove the sender/receiver unit on equipment with hazard potential (higher internal duct pressure, hot or aggressive gases) when the equipment is at a standstill.
 - ▶ Take suitable protection measures against possible local hazards or hazards arising from the equipment.
 - ▶ Secure switches that should not be switched on again for safety reasons with signs and safeguards to prevent unintentional switching.
-
- ▶ Close off the flange with tube with a blind plug.
 - ▶ Switch off the purge air supply
 - ▶ Loosen the hose clamps and pull the purge air hose off the connections and secure the hose ends against dirt and moisture
 - ▶ Disconnect the MCU control unit from the supply voltage.

Storage

- ▶ Store dismantled device parts in a clean, dry location.
- ▶ Use suitable auxiliary means to protect the connection line plug connectors against dirt and moisture.
- ▶ Secure purge air hoses against penetration by dirt and moisture.

6 Troubleshooting

6.1 General

“Diagnosis / Error messages/warnings” provides detailed information on the current device state. To display, connect the measuring system to SOPAS ET and start the device file “DH SB30”.

Move the mouse to the respective message to display more details on the significance of individual messages in a separate window. Clicking on the display shows a short description of possible causes and corrections under “Help” (see [“Warning and error messages in SOPAS ET”, page 59](#)).

Warning messages are output when internal limits for individual device functions/components are reached or exceeded which can then lead to erroneous measured values or an imminent failure of the measuring system.



Warning messages do not imply a malfunction of the measuring system. The current measured value continues to be output on the analog output.



See the Service Manual for a detailed description of messages and options for clearance.

6.2 Sender/receiver unit

Malfunctions

Symptom	Possible cause	Action
<ul style="list-style-type: none"> LEDs of the sender/receiver are not on 	<ul style="list-style-type: none"> No supply voltage Connection line not connected correctly or defective Defective plug connector 	<ul style="list-style-type: none"> Check plug connectors and lines. Contact SICK Customer Service.

Warning and error messages in SOPAS ET

Fig. 31: SOPAS ET menu: DH SB30/Diagnosis/Error messages/Warnings

Device identification

DH_SB30 Mounting location

Error

Error selection:

EEPROM
 Checksum parameter
 Version parameter
 Checksum factory settings
 Version factory settings
 Filter measurement threshold value
 Span test
 Monitor signal
 Overflow measured value
 Overflow constant light
 Power supply (24V) < 18V
 Power supply (24V) > 30V
 Laser current to high
 Connector amplifier

Warnings

Warnings selection:

Default factory parameter
 Power supply (24V) to low
 Power supply (24V) to high
 Laser current to high

Current warning or error messages, or earlier messages stored in the error memory, can be shown by selecting “actual” or “memory” in the “Error selection” or “Warnings selection” window.

- Display of error or warning: With LED symbol
- Description of error or warning: In the description field of SOPAS ET

Malfunctions listed below can probably be cleared onsite.

Message	Significance	Possible cause	Action
Span test	Deviation from nominal value above $\pm 2\%$	Sudden changes in measuring conditions during determination of control values	<ul style="list-style-type: none"> Repeat the function check. Contact SICK Customer Service.
Overflow constant light	Constant light signal > 3.5 V; measured values invalid	Extraneous light share too high	<ul style="list-style-type: none"> Reduce incidence of extraneous light (select different fitting location, sun protection, ...).
Measurement amplifier	Measurement not possible	Measurement receiver not connected	<ul style="list-style-type: none"> Check connection to processor board and connect plug connector, if necessary (see “Adapting the sender/receiver unit to the duct diameter”, page 34).

7 Specifications

7.1 Compliances

The technical design of this device complies with the following EU directives and EN standards:

- EU Directive: LVD (Low Voltage Directive)
- EU Directive: EMC (Electromagnetic Compatibility)

Applied EN standards:

- EN 61010-1, Safety requirements for electrical equipment for measurement, control and laboratory use
- EN 61326, Electrical equipment for measurement technology, control technology and laboratory use - EMC requirements
- EN 14181, Stationary source emissions - Quality assurance of automated measuring systems

Electrical protection

- Insulation: Protection class 1 according to EN 61010-1.
- Insulation coordination: Measuring category II according to EN 61010-1.
- Contamination: The device operates safely in an environment up to degree of contamination 2 according to EN 61010-1 (usual, not conductive contamination and temporary conductivity by occasional moisture condensation).
- Electrical energy: The wiring system to the power supply voltage of the system must be installed and fused according to the relevant regulations.

Approvals

The DUSTHUNTER SB30 version is TÜV type-tested.

7.2 Technical Data

Measuring Parameters			
Measured variable	Scattered light intensity (SI) Dust concentration output in mg/m ³ after gravimetric comparison measurement		
Measuring range	Can be preset with a jumper	Measuring range 1	Measuring range 2
		0...30 SI	0...500 SI
		Measuring range 3	
		0...3000 SI	
	Freely adjustable via program SOPAS ET		
Limit values for corrosive gas composition .	HCl:	10 mg/Nm ³	
	SO ₂ :	800 mg/Nm ³	
	SO ₃ :	300 mg/Nm ³	
	NO _x :	1000 mg/Nm ³	
	HF:	10 mg/Nm ³	
Measurement uncertainty ¹⁾	±2% of MBE	Repeat accuracy at zero point 0.1%	
Response time	60 s; preset	1...600 s, freely selectable via program SOPAS ET	
Measuring Conditions			
Gas temperature ²⁾	-40...600 °C		
Sample gas pressure	-50 hPa ... +2 hPa -50 hPa... +30 hPa	Purge air supply with optional MCU-P control unit (or others) Purge air supply with optional external purge air unit (or others)	
Internal duct diameter	> 500 mm		
Ambient temperature	-40...+60 °C -40...+45 °C	Sender/receiver unit, optional MCU-N control unit Optional MCU-P control unit, intake temperature for purge air	
Function Check			
Automatic self-test	Linearity, drift, aging		
Manual linearity check	Using a reference filter		
Output Signals			
Analog output	2/4 ... 20 mA, max. load 750 Ω; resolution 10 bits; electrically isolated		
Relay output	3 potential-free outputs (N/O contact) for status signal; load 48 V, 1 A		
Input signals			
Digital input	2 inputs to connect potential-free contacts (e.g. for external maintenance switch, triggering function check or linearity measurement)		
Communication Interfaces			
RS485	To connect Service adapter or optional MCU		
CAN bus	To connect optional SCU		
Power supply			
Sender/receiver unit	Voltage supply: Power consumption:	24 V from external voltage supply or optional MCU Max. 4 W	
Optional MCU control unit	Voltage supply: Power consumption:	90...250 V AC, 47...63 Hz; opt. 24 V DC ± 2 V MCU-N: max. 15 W MCU-P: max. 70 W	
Optional external purge air unit (with blower 2BH13)	Voltage supply (3 ph): Rated current: Motor rating:	200...240 V/345...415 V at 50 Hz 220...275 V/380...480 V at 60 Hz 2.6 A/Y 1.5 A 0.37 kW at 50 Hz; 0.45 kW at 60 Hz	
MCU connection line	Only use shielded lines with twisted pairs (e.g. UNITRONIC LiYCY (TP) 4 x 2 x 0.25 mm ² from LAPPKabel; not suitable for underground laying)		
	1):	In temperature range - - 20 °C ... +50 °C	
	2):	In temperature range - - 20 °C ... +50 °C	

7 SPECIFICATIONS

Weight		
Sender/receiver unit	7 kg	
MCU installed	13.5 kg 3.7 kg	Optional MCU-P control unit Optional MCU-N control unit
Optional external purge air unit	14 kg	

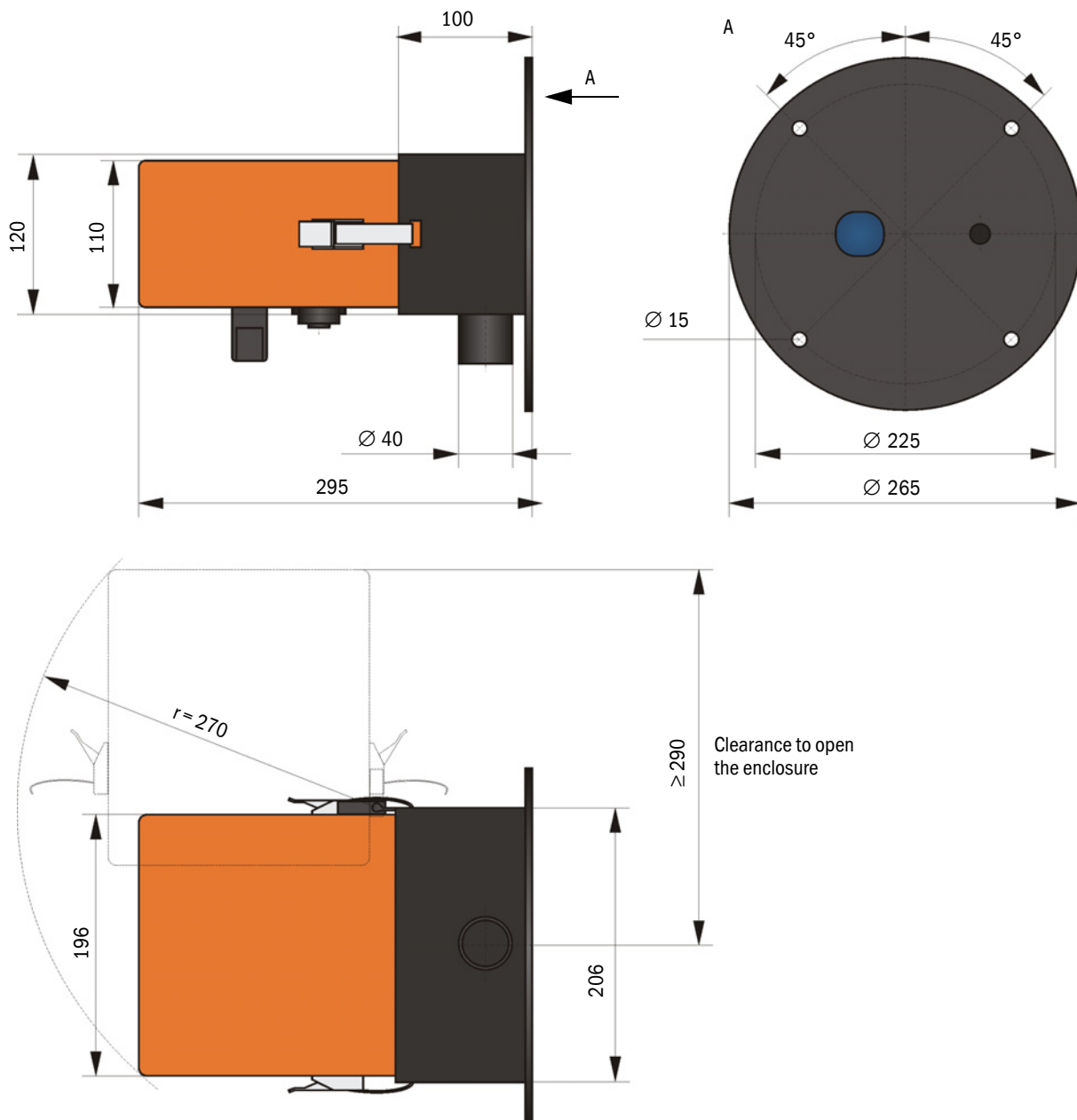
Miscellaneous		
Protection class	IP 66 IP 54	Sender/receiver unit, optional MCU control unit Optional external purge air unit
Connection line length	5 m, 10 m	Other lengths on request
Purge air hose length	5 m, 10 m	Other lengths on request
Laser	Degree of protection 2; capacity < 1 mW; wavelength between 640 nm and 660 nm	
Purge air feed volume	Max. 20 m ³ /h Max. 63 m ³ /h	Optional MCU-P control unit Optional external purge air unit

7.3 Dimensions, part Nos.

All measures are specified in mm.

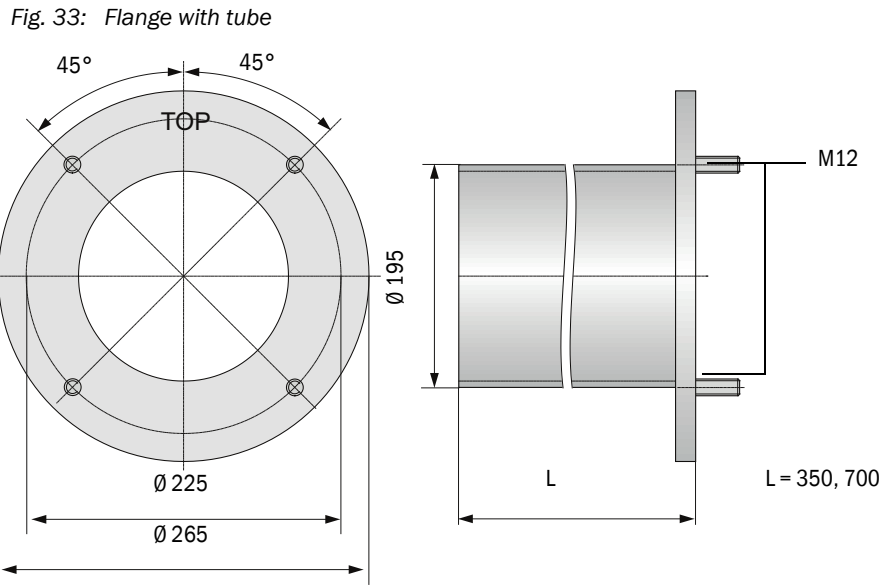
7.3.1 Sender/receiver unit

Fig. 32: Sender/receiver unit



Designation	Part No.
Sender/receiver unit DHSB-T30 400 mm ET	1054351
Sender/receiver unit DHSB-T30 800 mm ET	1077661

7.3.2 Flange with tube

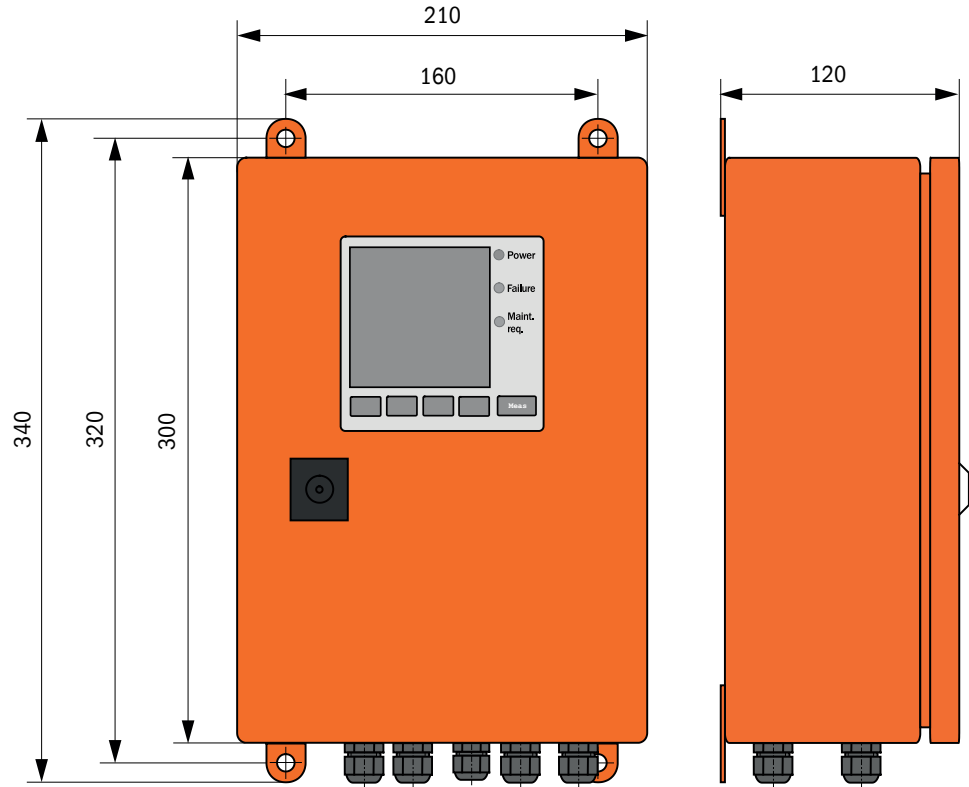


Designation	Part No.
Flange with tube, DN195, length 350 mm, St37	2046526
Flange with tube, DN195, length 700 mm, St37	2046492
Flange with tube, DN195, length 350 mm, 1.4571	2047288
Flange with tube, DN195, length 700 mm, 1.4571	2047287

7.3.3 MCU control unit

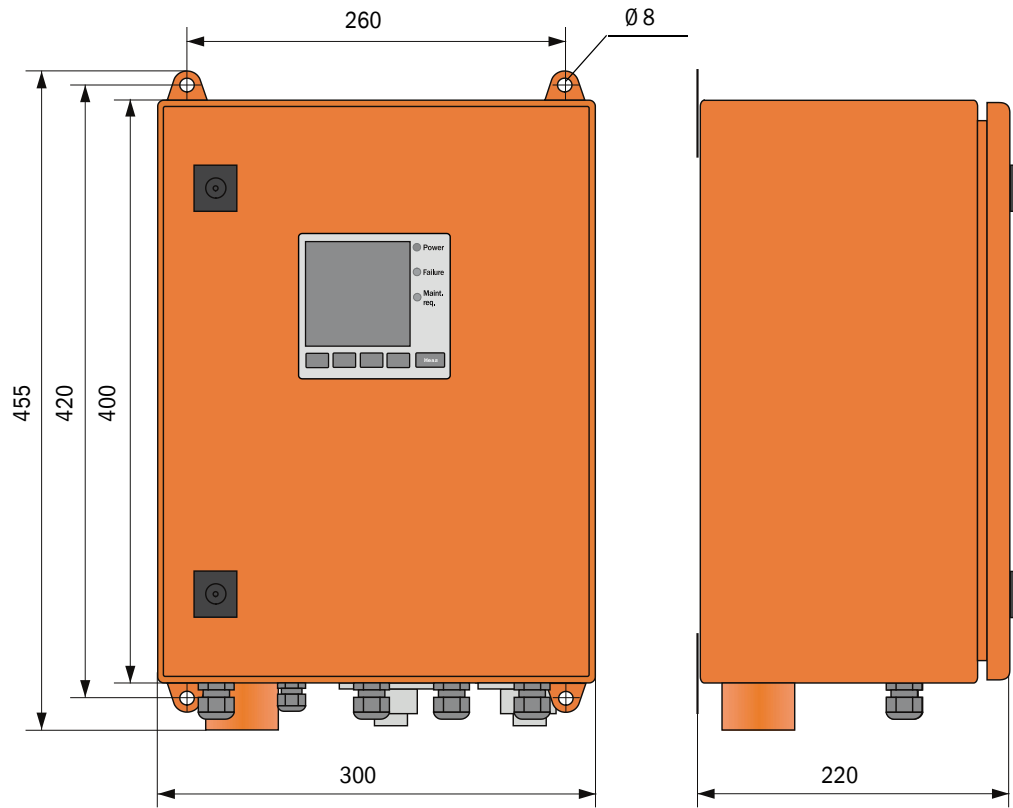
Optional MCU control unit

Fig. 34: MCU-N control unit



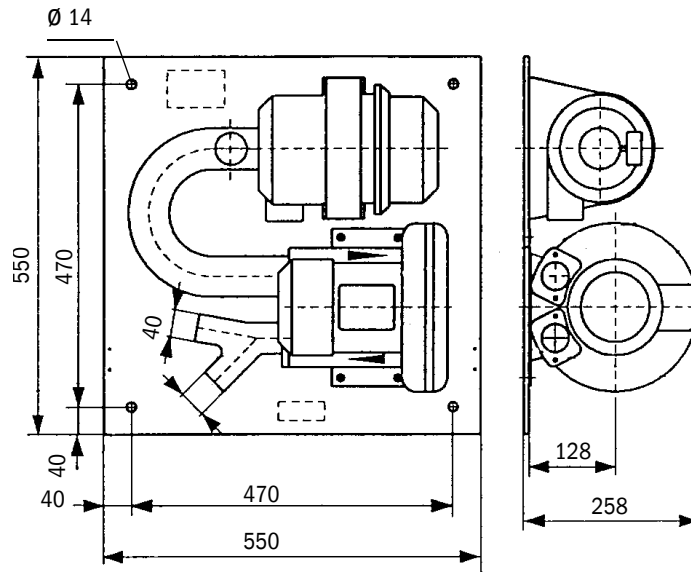
Designation	Part No.
MCU-N control unit	
Control unit MCU-NWONN00000NNNE in wall-mounted enclosure (orange), Supply voltage 90 ... 250 V AC, without purge air unit, without display	1040667
Control unit MCU-N2ONN00000NNNE in wall-mounted enclosure (orange), Supply voltage 24 V DC, without purge air unit, without display	1040669
MCU-P control unit	
Control unit MCU-PWONN00000NNNE in wall-mounted enclosure (orange), Supply voltage 90 ... 250 V AC, with purge air unit, without display	1040668
Control unit MCU-P2ONN00000NNNE in wall-mounted enclosure (orange), Supply voltage 24 V DC, with purge air unit, with display	1040670
MCU remote control unit without power supply unit	2075567
MCU remote control unit with power supply unit	2075568

Fig. 35: MCU-P control unit



7.3.4 Optional external purge air unit

Fig. 36: Optional external purge air unit

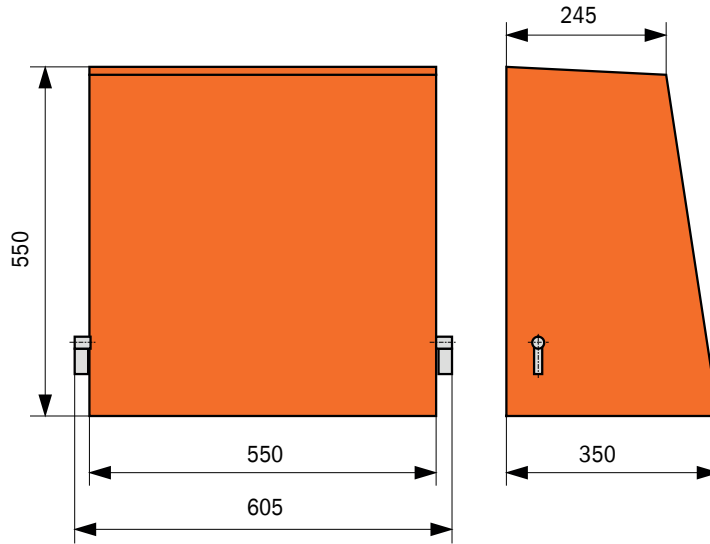


Designation	Part No.
Purge air unit with blower 2BH13 and purge air hose, length 5 m	1012424
Purge air unit with blower 2BH13 and purge air hose, length 10 m	1012409

7.3.5 Weatherproof covers

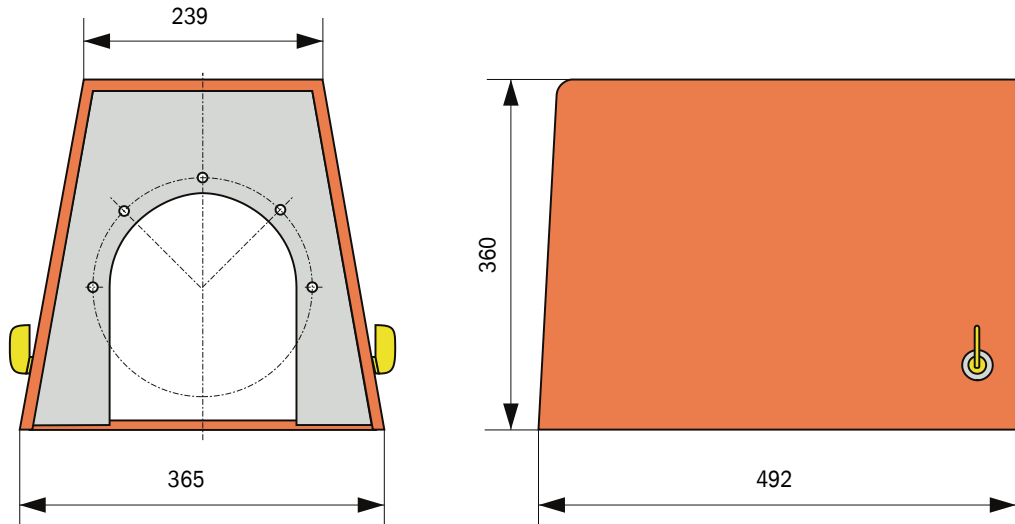
Weatherproof cover for external purge air unit

Fig. 37: Weatherproof cover for external purge air unit



Designation	Part No.
Weatherproof cover for purge air unit	5306108

Fig. 38: Weatherproof cover for sender/receiver unit



Designation	Part No.
Weatherproof cover flange k225	2048657

7.4 Accessories

7.4.1 Connections for sender/receiver unit

Designation	Part No.
7-pole socket for connection of power supply (plug connector 1)	6049886
7-pole plug for connection of AO and status signals (plug connector 2)	6049036
5-pole socket for connection of DI and Service (plug connector 3)	6009719

7.4.2 Line sender/receiver unit - MCU

Designation	Part No.
Connection line, length 5 m	7042017
Connection line, length 10 m	7042018
Connection line, length 5 m for CAN bus connection	2043678
Connection line, length 10 m for CAN bus connection	2043679

7.4.3 Purge air supply

Designation	Part No.
Non-return valve DN40	2035098
Purge air hose DN 40, sold by the meter	5304683
Hose clamp D32-52	5300809
Purge air heater with enclosure for fitting outdoors 230 V AC, 50/60 Hz, 3000 W, 1 ph	2021514
Purge air heater with enclosure for fitting outdoors 120 V AC, 50/60 Hz, 2200 W, 1 ph	2021513

7.4.4 Assembly parts

Designation	Part No.
Assembly kit	2048677

7.4.5 Device check accessories

Designation	Part No.
USB-RS485 adapter	2040718
Check filter set	2042339
Optic carrier for linearity test DUSTHUNTER SB50	2048281
Adjusting stand	2042907
7-pole connection line for CAN bus, length 5 m	2043678

7.5 Consumable parts for 2-years operation

Designation	Number	Part No.
Filter element Micro-Topement C11 100	4	5306091
Optics cloth (for optional external purge air unit)	4	4003353

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