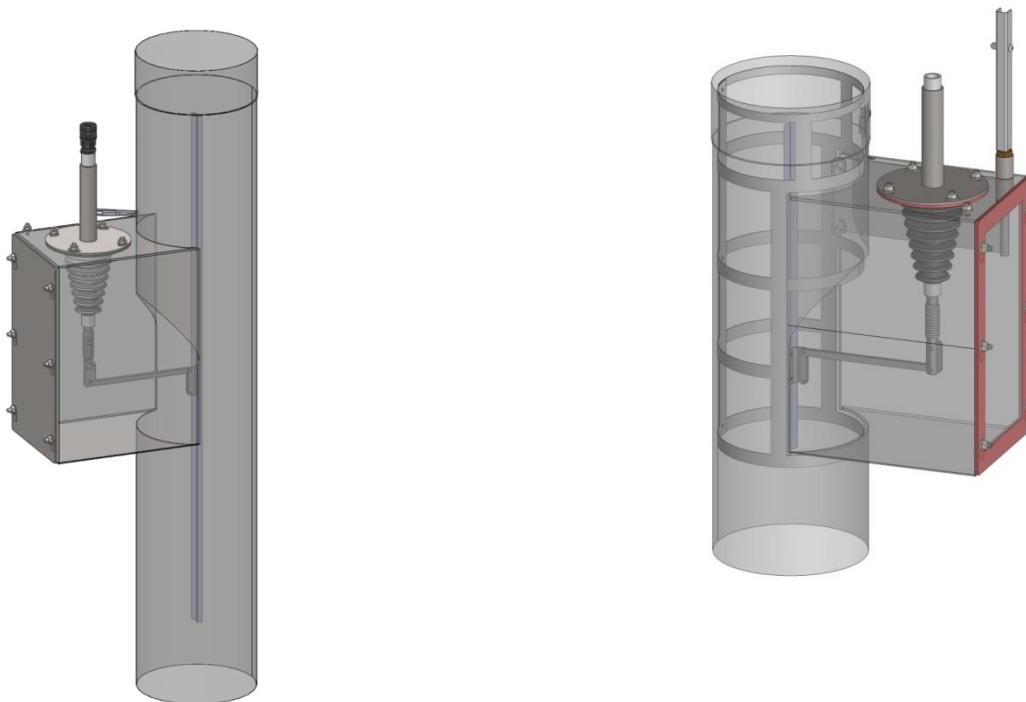


Electrostatic micro-dust filter OekoTube-Inside for wood fire

Installation, operating, maintenance and service instruction



Manufacturer:

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Approval number Z-7.4-3451



Table of contents

1	General information.....	4
1.1	Safety notes.....	4
1.2	General description	Fehler! Textmarke nicht definiert.
1.3	Advantages of an electro filter	4
1.4	Notes on cleaning	4
1.5	Notes on maintenance	4
1.6	Operating principle	4
1.7	Switch-on	5
2	Description of the filter.....	5
2.1	Scope of delivery	6
2.2	General view isolator and electrode	8
2.3	General view exhaust pipe with isolator chamber	8
3	Installation instruction.....	9
3.1	Fireplace construction.....	9
3.2	Installation of the OekoTube-Inside tube	9
3.3	Mounting the OekoTube-Inside retrofit	10
3.4	Mounting the controller.....	10
3.5	Connecting the high voltage cable	10
3.6	Installation of the temperature sensor.....	11
3.7	Grounding.....	11
3.8	Affix the appropriate warning signs	11
3.9	Power supply.....	12
3.10	On switch control	12
4	LED-Signal: Test mode and normal mode (HV=high voltage)	12
5	Electrical connection	13
5.1	General information.....	13
5.2	Power connection	13
6	Maintenance and cleaning	13
6.1	Safety indication:.....	13
6.2	Cleaning	14
7	Dust measurement.....	15
7.1	Cleaning of the filter	15
7.2	Position of the weld socket	15
7.3	One week before the measurement	15
7.4	Preparation	16

8	Fault indication / fault reason	16
9	Dip-Switches approaches.....	17
9.1	Readjusting of the Dip-Switches.....	18
9.2	Recommendation for the high voltage setting	18
10	Data sheet	19
11	Dimensions	20
12	Recommended installations.....	21
13	Special layout	22
14	Type plate	23
15	EC declaration of conformity.....	24
16	Protocol commissioning / service / measurement OekoTube-Inside	25
17	Drilling gauge for the controller	26
18	Pipe opening gauges for the OekoTube-Inside retrofit	26

1 General information

1.1 Safety notes



Please read these instructions carefully before installing the OekoTube-Inside.

- The installation may only be performed by authorized and skilled personnel.
- The separating module should be installed at least 40 cm from combustible materials.
- The statics of the exhaust system should be analysed prior to the installation.
- Check the exhaust system for deposits and fire safety prior to the installation.
- When the temperature in the exhaust system increases, the high voltage automatically switches on. Touching the electrode or the electrode holder during operation is prohibited!
- Make sure you observe the relevant policies and regulations when carrying out any work on the roof.
- Disconnect (power plug) from the mains before start working.
- The filter must be accessible for maintenance.

No liability is assumed for accidents or damage caused by failure to follow these instructions.

1.2 Advantages of an electrostatic precipitator

Electrostatic precipitators offer opposite to other dust removal filters like wet scrubbers and traditional filters several advantages:

- High efficiency also if you have little particles
- Little back end loss or rather drop in pressure
- Low Maintenance- and operating costs
- No expendable parts

1.3 Inform your chimney sweeper

The owner has to inform the chimney sweep about the installation of an OekoTube-Inside.

1.4 Notes on maintenance

Depending on the capacity and the frequency of using the wood heating, maintenance may need to be carried out on the filter from every 2 - 5 years. The OekoTube-Inside should therefore be easily accessible.

1.5 Operating principle

The OekoTube-Inside functions on the electrostatic principle. The micro-dust particles are flowing through the air channel. A high voltage electrode is releasing electrons.

Due to the electrostatic force, the electrons move towards the chimney wall. During this process, the micro-dust will get electrostatic polarized and is also moving towards the chimney wall.

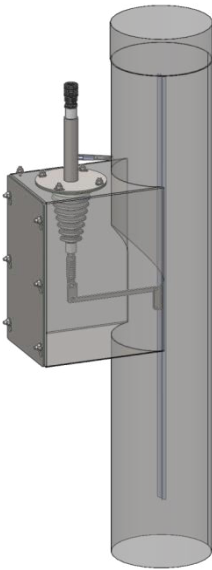
The micro-dust particles are collected on the inside wall of the chimney and clog together into coarse flakes. This particulate matter will be removed by the chimney sweeper at the annual chimney inspection.

1.6 Switch-on

The OekoTube-Inside switches on automatically when the exhaust gas temperature rises. It switches off when the temperature falls below a certain threshold.

2 OekoTube-Inside: The different models

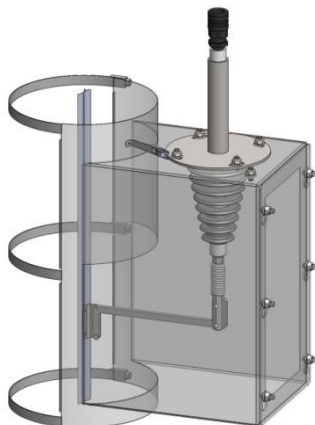
2.1 OekoTube-Inside Standard



The OekoTube-Inside Standard consists of a separation tube, an insulator chamber, an insulator and an electrode (without a cleaning basket).

Recommendation: Mount it vertically, with a dust collecting tray below the filter.

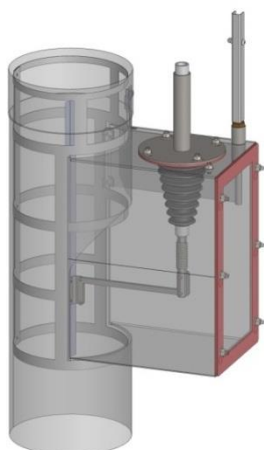
2.2 OekoTube-Inside retrofit



The OekoTube-Inside retrofit kit consists of an insulator chamber, an insulator and an electrode (without a cleaning basket). It is attached to an existing chimney pipe with buckles. The corresponding opening must be cut out on the chimney pipe. The template is included.

Recommendation: Mount vertically, if possible with a dust collector below the filter.

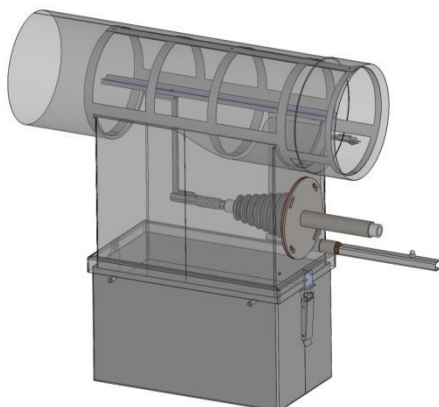
2.3 OekoTube-Inside with semi-automatic cleaning



The OekoTube-Inside with semi-automatic cleaning consists of a separation tube, a cleaning basket, an insulator chamber, an insulator and an electrode. The cleaning basket inside the separation tube is activated manually by an actuator. This removes dust from the separation surface and the electrode.

Recommendation: Mount vertically, if possible with a dust collector below the filter.

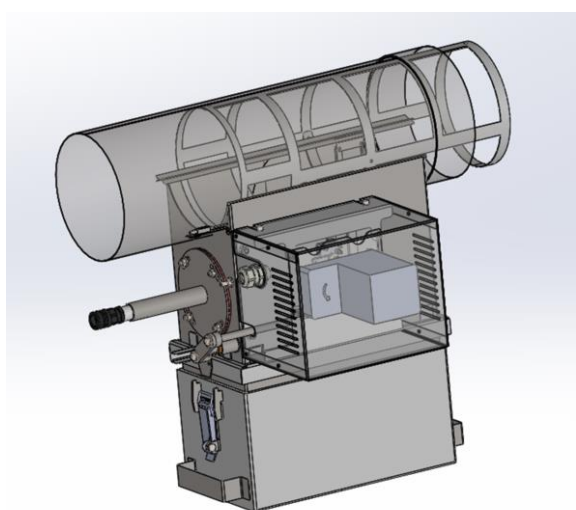
2.4 OekoTube-Inside with semi-automatic cleaning and ash box



The OekoTube-Inside with semi-automatic cleaning and ash box consists of a separation tube, a cleaning basket, an insulator chamber, an insulator, an electrode and an ash box. The cleaning basket inside the separation tube is activated manually by an actuator. This removes dust from the separation surface and the electrode. The dust falls into the ash box.

Recommendation: Only for horizontal installation.

2.5 OekoTube-Inside with automatic cleaning and ash box

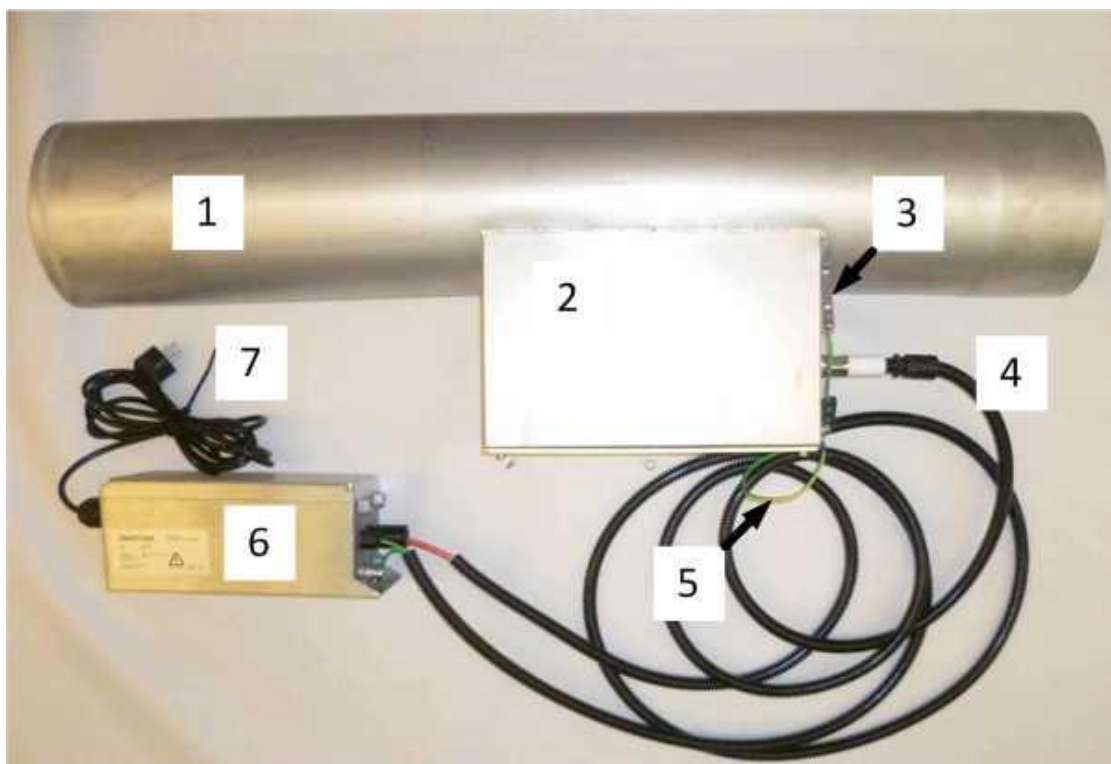


Der OekoTube-Inside mit automatischer Reinigung und Staubsammelbox besteht konstruktiv aus einem Abscheiderohr, einem Reinigungskorb, einem Motor, einer Isolator-kammer, einem Isolator, einer Elektrode und optional einer Staubsammelbox. Der Motor aktiviert regelmässig den Reinigungskorb im Innern des Abscheiderohrs. So werden die Abscheidefläche und die Elektrode vom Staub befreit. Der Staub fällt in die Staubsammelbox.

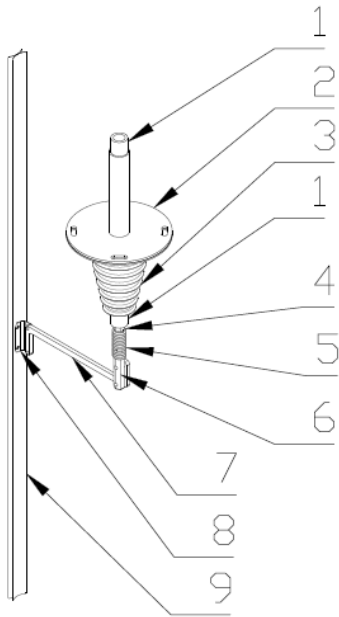
Recommendation: With ash box only for horizontal installation. kj

Ohne Staubsammelbox nur für senkrechte Montage.

1. Exhaust pipe (with flexible electrode and electrode holder)
2. Insulator chamber (with insulator)
3. Temperature sensor with cable (2.5 m)
4. High voltage cable (2.5 m) with protection tube and cable glands
5. Grounding (bolt)
6. Electronic box incl. high voltage module with LED signal
7. Power cable (230 V AC)

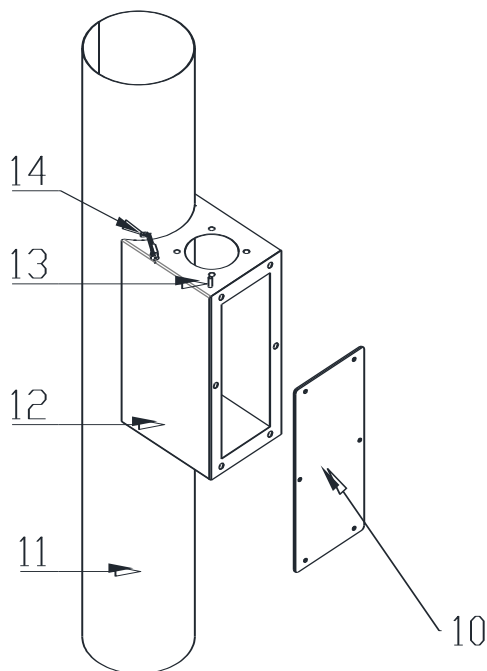


2.6 General view isolator and electrode



1. Teflon isolator
2. Load attachment plate isolator
3. Slats isolator
4. Hexagonal electrode holder
5. Tension spring
6. Adjustment angle
7. Electrode holder
8. Mounting bracket
9. Electrode

2.7 General view exhaust pipe with isolator chamber



10. Inspection cover
11. OekoTube-Inside tube
12. Insulator chamber
13. Earth connection
14. Mount of the temperature sensor

3 Installation instruction

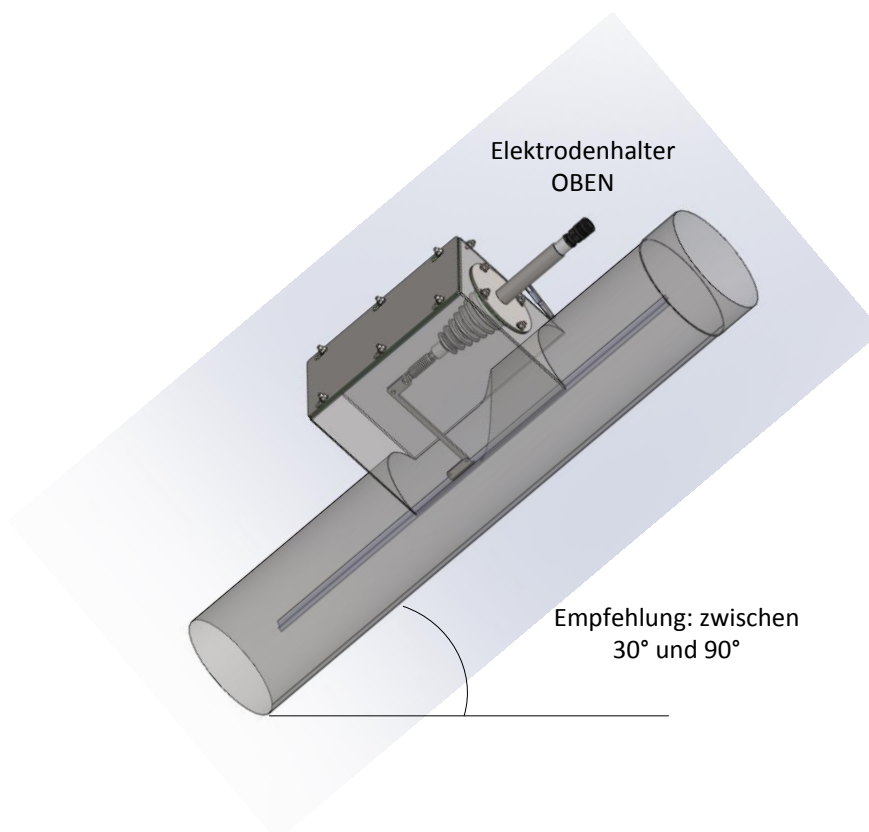
3.1 Fireplace construction

The OekoTube-Inside is a piece of chimney flue. It will be installed after the boiler as a fixed component of the exhaust system. An opening for cleaning must be set up before and/or after the OekoTube-Inside.

See point 11 for measurements (page 20ff.)

3.2 Installation of the OekoTube-Inside tube

The OekoTube-Inside must be mounted horizontally between 30° und 90. Below 45° shortens the cleaning intervals. The insulator chamber must be mounted horizontally between 30° und 90°.

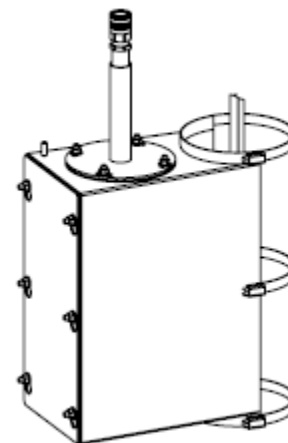


3.3 Mounting the OekoTube-Inside retrofit

The OekoTube-Inside retrofit is identical to the OekoTube-Inside, except that the pipe is not welded to the insulator chamber, but is strapped to the existing tube.

Assemble it as follows:

1. Mark and flatten the existing chimney pipe with the appropriate gauge. The gauge is diameter specific.
2. Open the buckles and bend the flexible electrode to insert it in the exhaust duct.
3. Check that the gasket is correctly placed everywhere.
4. Tighten the three buckles around the pipe.
5. Check whether the electrode is centred via the cleaning opening.



3.4 Mounting the controller

1. The high voltage cable and the cable for the temperature sensor are 2.5m in length. The controller can be fixed to a nearby wall.
2. Attach the controller with screws. The drilling gauge of the control box can be found at the end of this document.
3. The highest permitted ambient temperature is 40°C.
4. The controller must not be attached to the chimney pipe.

3.5 Connecting the high voltage cable

1. Clean banana plug and high voltage cable with spirit/brake cleaner.
2. Then plug the high voltage cable into the insulator. The banana plug must be plugged in correctly. If pulled back slightly, resistance must be felt.
3. Tighten the cable gland.



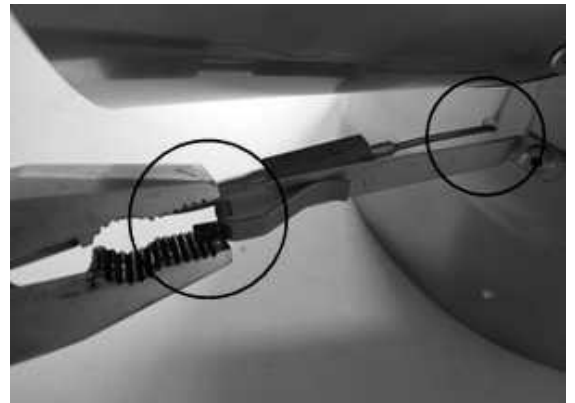
- The high voltage cable must be routed correctly.



!!! When laying the high voltage cable, small radii and kinking the cable should be avoided !!!

3.6 Installation of the temperature sensor

- The temperature sensor is mounted above the insulator chamber.
- Insert the tip of the temperature sensor through the hole. The tip must be protrude by 3mm into the chimney pipe. Check this in the chimney pipe.
- Gently squeeze the two tips on the temperature sensor mount with pliers (see image).
- The cable for the temperature probe must be laid correctly.





3.7 Grounding

Ground the OekoTube-Inside to the insulator chamber via the ground connection.

3.8 Affix the appropriate warning signs

Affix a „warning sign“ on all access doors. Exhaust system with the OekoTube-Inside micro-dust precipitator.

OekoTube	 	OekoSolve
<p>Achtung! Abgasanlage mit Feinstaubabscheider OekoTube</p>	<p>Attenzione! Sistema di scarico con estrattore di polveri sottili OekoTube</p>	<p>Attention! Conduit équipé d'un filtre électrostatique</p>
<p>Hochspannung! Vor allen Arbeiten an der Abgasanlage Merkblatt beachten!</p>	<p>Alta Tensione! Consulti la scheda d'istruzione prima di lavorare alla sistema!</p>	<p>Haute tension! Consulter la notice avant toute intervention sur le conduit!</p>
<p>Manufacturer: OekoSolve AG, Schmelziweg 2, CH-8889 Plons +41(0)81 511 63 00</p>		

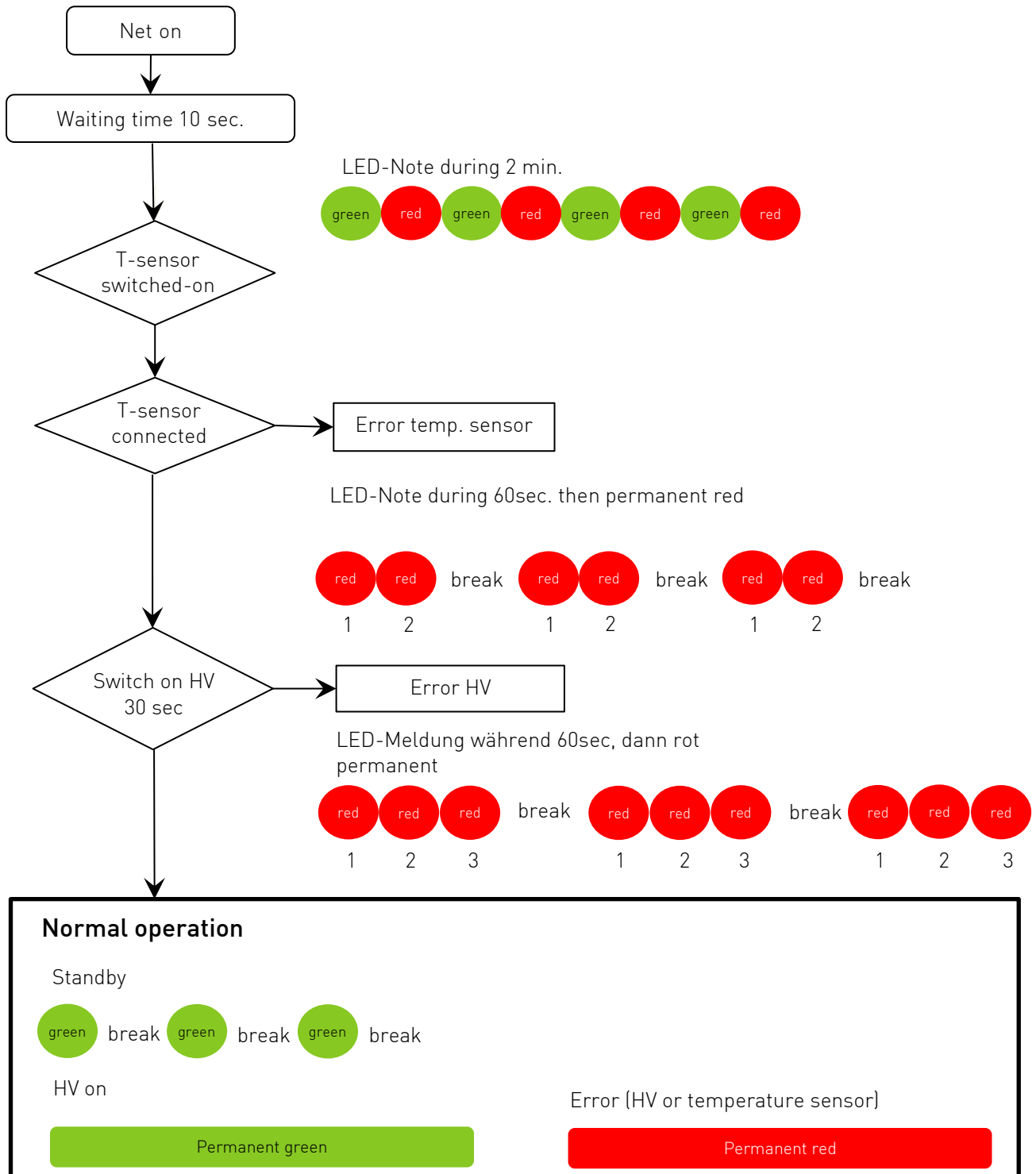
3.9 Power supply

A test is carried out automatically (about 1 minute). The OekoTube-Inside then begins normal operation (green flashing every 5 seconds in standby).

3.10 On switch control

Burn and check that the OekoTube-Inside LED is permanently switched to green.


4 LED-Signal: Test mode and normal mode (HV=high voltage)



5 Electrical connection

5.1 General information

The electrical installation must be performed by a qualified electrician. Pull out the plug from the OekoTube-Inside so it is disconnected from the mains.

Connection: 230 V AC / 0.2 A / 30W, 50 Hz 

5.2 Power connection

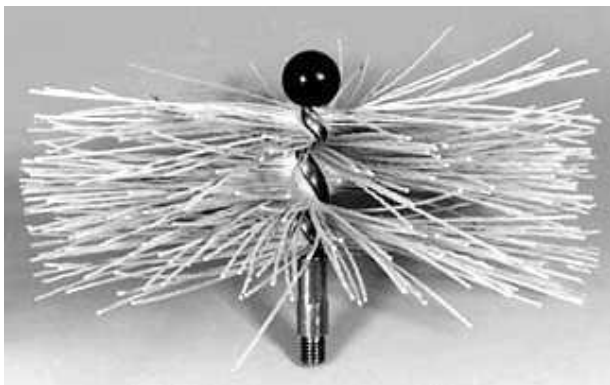
The power plug or the isolation switch must be accessible to the chimney sweep.

6 Maintenance and cleaning

The cleaning interval varies depending on the system / fuel. Care should be taken to avoid short circuits between the electrode and the flue pipe. Otherwise it can lead to functional failures or defects.

6.1 Safety indication:

- Before you do any kind of work on the OekoTube, switch it off (mains plug, eventually switch in the house).
- The cleaning has to be operated only by skilled and certified expert staff.
- By a temperature increase into the exhaust installation the high voltage switches on automatically. During operation, the touching of the electrode or the electrode holder is dangerous!
- The precipitator consists of acid-proof and rust-free steel. Do not use a metal brush for the cleaning.



We do not take liabilities for accidents or damages caused by inobservance of this instruction.



For the standard cleaning do not remove or open any piece of the filter!

6.2 Cleaning

1. Switch-off the filter.
2. Operate the cleaning with a synthetic brush.
3. Unscrew the inspection cover of the insulator chamber.
4. Clean the insulator chamber and the opening towards the exhaust pipe.
5. Clean insulator (vacuum cleaner, cloth with spirit/brake cleaner).
6. Screw on the inspection cover of the insulator chamber.
7. Set up the power supply. Check whether the LED changes to green (5 second intervals) after the test phase (see point 4).



7 Dust measurement

In order to measure the dust according to the fine dust filter, the following points should be considered:

7.1 Cleaning of the filter

Clean the filter before each measurement. The safety instructions from point 6.1 must be observed here.

7.2 Position of the weld socket

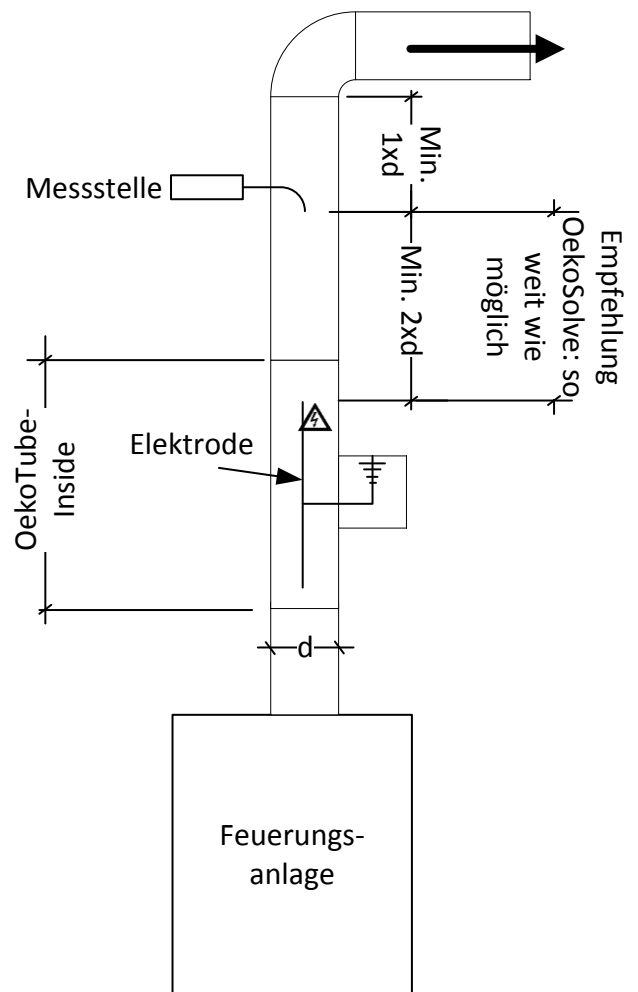
In general, the distance between the electrostatic precipitator and the measuring point should be as long as possible. The regional recommendations and regulations must be taken into account.

Germany: According to VDI 4207 sheet 2, the distance between the filter and the measuring point must be at least twice the diameter of the flue pipe. The distance between the measuring point and the next bend should be at least the length of a smoke tube diameter.

Recommendation from the manufacturer OekoSolve:

Try to position the measuring point as far away from the electrode as possible in order to minimise the electrostatic influences and maximise the separation distance.

Warning: If the measuring probe (measuring dust collector) of the dust measuring device is positioned very close (less than 25cm) to the electrode for the OekoTube-Inside in the chimney, there is a short circuit risk between the electrode (high voltage) and the measuring probe.



7.3 One week before the measurement

Clean the whole heating installation.

7.4 Preparation

1. Disconnect the power supply.
2. Open the maintenance opening.
3. Clean the isolator with a cloth and eventually ethyl alcohol.
4. Clean the electrode.
5. Check the positioning of the electrode (must be in the middle).
6. Close the maintenance opening.
7. Check if the LED is green.

ATTENTION: Don't start cleaning during the measurement: Flocculation!

8 Fault indication / fault reason

Symptom	Fault	Action (always disconnect the electricity supply)
Standby despite of temperature rising into the exhaust canal	Temperature sensor isn't inserted in the exhaust canal.	Fix it correctly.
Never or too late in operation after the firing	The high voltage isn't switched-on or was switched-on too late.	Open the control box, choose the operating temperature.
LED permanent red	Electrode not centred	Centre the electrode
	Dirty isolator chamber	Clean it
	Dirty exhaust canal	Clean it
	Damaged high voltage cable (sight control, noises in the teflon stick)	Clean it
	Damaged high voltage module into the electronic box (hearable breakdown into the box)	Replace the box
	Dirty isolator	Clean it
	Problem with the temperature sensor: damaged cable	Replace the cable / temperature sensor / box
LED permanent red after cleaning	Manipulated electrode	Centre / replace it
	Ash accumulation into the opening between isolator chamber and exhaust canal.	Clean
	Temperature sensor isn't connected	Check the connection / damaged cable
LED without colour	Plug isn't connected	Connect it
	No power on the plug	Check the electrical connection / fuse in your house
	Wire into the control box isn't connected correctly	Connect it in the right way
	No power on the ACDC / ACDC damaged	Replace the control box

9 Dip-Switches approaches

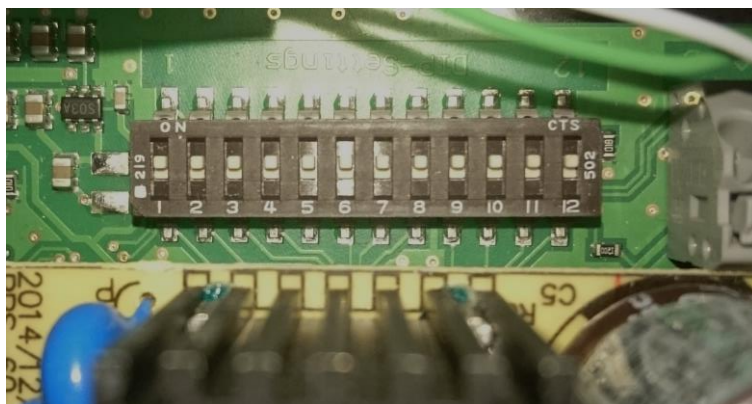
Through the dip-switches, parameters like the high voltage or the starting temperature can be adjusted.

1. Disconnect the OekoTube-Inside.
2. Open the control box cover.



9.1 Readjusting of the Dip-Switches

1. Look at the label on the inside of the cover.
2. Readjust the Dip-Switch (1=ON / 0=OFF).



1 = on
0 = off

OekoTube Settings

1	2	3	4	5	6	7	8	9	10	11	12	
address				RS485 Abschluss	u.limit			temp.				1 = enable 0 = disable
"1111 = 31"					111 = 30			111 = +ΔT°C				
0111 = 14					011 = 26			011 = 50°C				
..					101 = 25			101 = 70°C				
..					001 = 24			001 = 60°C				
..					110 = 22			110 = 45°C				
0100 = 2					010 = 20			010 = 40°C				
1000 = 1					100 = 18			100 = 35°C				
0000 = 0				000 = Soft			000 = (ON)					

9.2 Recommendation for the high voltage setting

The high voltage setting depends on the diameter, the composition of the fine dust and the desired separation effect.

Diameter	Smaller separation and maintenance intervals	Normal separation and maintenance intervals	Increased separation and shorter maintenance intervals
130 mm	20 kV	22 kV	24 kV
150 mm	22 kV	24 kV	26 kV
180 mm	24 kV	26 kV	30 kV
200 mm	26 kV	30 kV	

10 Data sheet

Performance data						
Separating effect Efficiency	%	70 - 80				
max. exhaust temperature	°C	250				
Space requirement						
Service space		<ul style="list-style-type: none"> - The insulator chamber must be easily accessible - An opening for cleaning should be set up before and after the filter 				
Weight						
Weight (without control unit and isolation)	kg	8				
Chimney connection						
Wall thickness	mm	1				
Chimney tube entry inside diameter	mm	130	150	180	180	200
Chimney tube exit inside diameter	mm	131	151	181	181	201
Länge	mm	500	500	500	1000	1000
Pressure loss	Pa	0				
Cleaning opening		before and / or after the filter				
Scoot catcher		below the filter				
Weld socket (for measurable boiler systems)		After the filter, as far as possible				
Electrical connection						
Power connection		230 AC / 13 A				
max. power consumption	W	30				
High voltage						
max. tension electrode	V	30'000				
Length high voltage cable	m	2.5				
General information						
Sound pressure level	dB (A)	0				
Option: Isolation (rock woll)	mm	30				
Material		Stainless steel 1.4404				
Max. ambient temperature	°C	40				

11 Dimensions

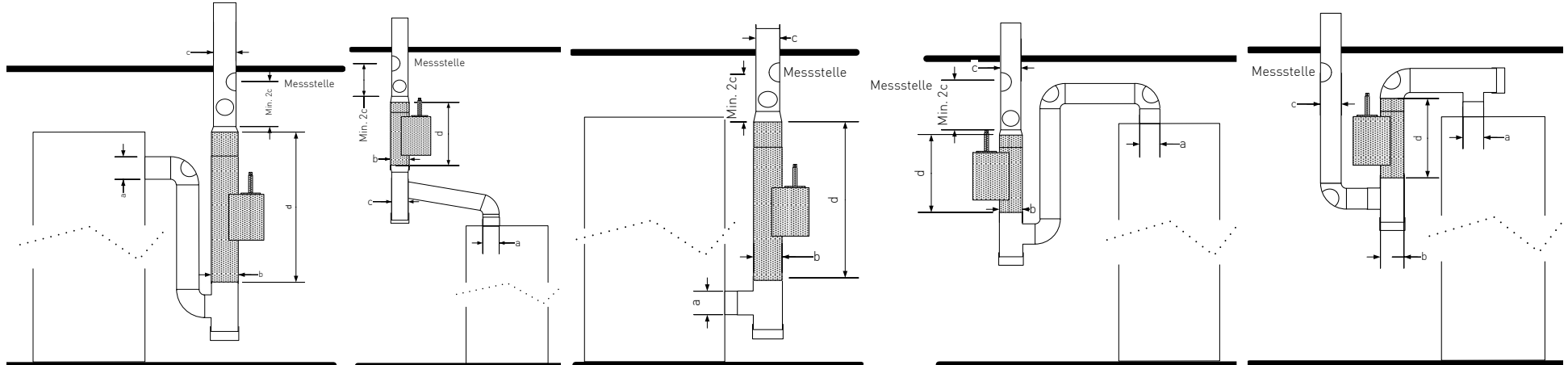
Typ	D1	D2	A	B	C	L	M	N
DTI 130	130	131	152	171	301	500	79	312
DTI 150	150	151	152	171	321	500	79	312
DTI 180	180	181	170	171	351	500	409	312
DTI 180	200	201	170	171	371	1000	409	312
DTI 200	200	201	170	171	371	1000	409	312

Allgemeintoleranzen nach DIN ISO 2768 mittel

Firma OekoSolve OekoSolve AG Schmelzweg 2 CH-6800 Rorschach +41 81 511 63 00 www.oekosolve.ch			Titel OekoTube inside Abmessungen		Revision
NUMER ---			Dokumentnummer		
Erstellt	NAME	Datum	Gezeichnet	Notiert	
Freigegeben				Multiw. U00	Formw. #
Status					Blatt 1

With OekoTube-Inside retrofit, the mass is the same as the OekoTube-Inside, simply without a pipe.

12 Recommended installations



[a] Ø Boiler outlet [mm]	130	130	130	130	130	130	130	130	130	130	150	150	150	150	150	180	180
[b] Ø OT-I [mm]	130	150	150	180	180	180	180	180	180	180	150	180	180	180	180	180	180
[c] Ø Chimney tube [mm]	130	130	150	130	130	130	150	180	180	180	150	150	150	180	180	180	180
[d] Length OT-I [mm]	500	500	500	500	1000	500	1000	500	1000	500	500	1000	500	1000	500	1000	500
Length electrode [mm]	400	400	400	400	800	400	800	400	800	400	400	800	400	800	400	800	400
min. distance to measuring point after the OT-I [mm]	260	260	300	260	260	260	300	360	360	300	300	300	360	360	360	360	360
Cleaning interval																	
Pellet until 30 kW	-	+	+	+	+	+	++	+	++	-	+	+	+	++	+	+	
Pellet from 30 to 50 kW										-	+	+	+	++	-	-	
Wood logs until 30 kW	-	+	+		+		++		++	-	+	+	+	++	+	+	
Wood logs from 30 to 50 kW										-	+	+	+	++	-	-	
Wood chips until 50 kW										--	-	--/-	-	-	--	--	

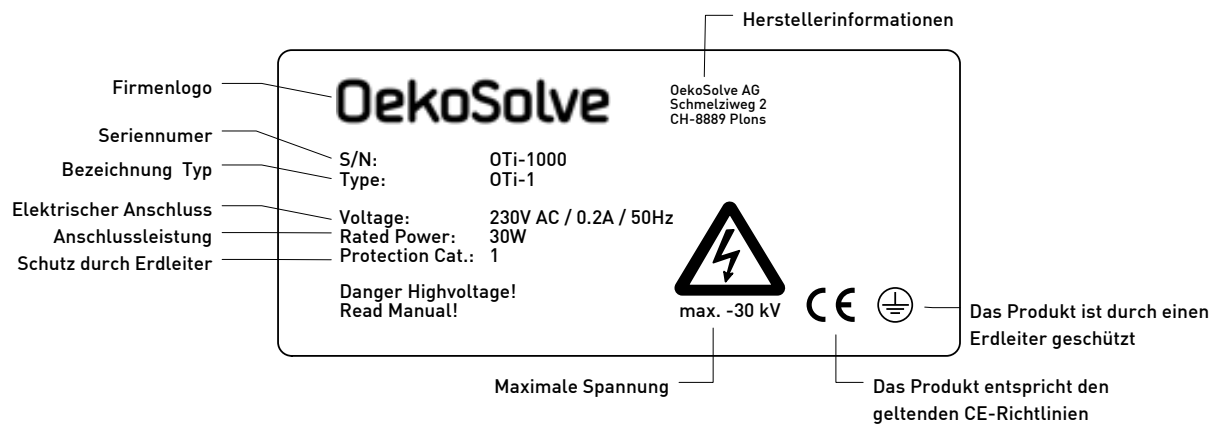
Cleaning intervals: ++ = Expected: constant additional sweeping expenditure / + = An additional sweeping date / - = two to three additional sweeping dates / -- = intensive sweeping expenditure

13 Special layout

→ Attention: The customer must be informed of the higher cleaning costs and accept this!

	<p>Horizontal installation: This setup can lead to an impairment of energy production, since the cross-section of the chimney pipe is rapidly reduced by the dust separation.</p> <p>The separated dust accumulates, which can lead to flashovers between the electrode and the chimney pipes. The separation effect of the filter sinks and the separator breaks down faster. To avoid defects, the cleaning interval must be greatly reduced.</p>
	<p>Vertical installation directly at the boiler outlet: The fine dust collects in the exhaust duct and can slip into the boiler fan. This contamination of the fan can cause problems with the boiler.</p>
	<p>Diagonal installation: Diagonal installation can lead to an impairment of energy production, since the cross-section of the chimney pipe reduces rapidly due to the dust separation.</p> <p>The separated dust accumulates, which can lead to flashovers between the electrode and the chimney pipe. The separation effect of the filter sinks and the separator breaks down faster.</p> <p>If the separator is installed directly at the boiler outlet, the fine dust collects in the exhaust gas duct and can slip into the boiler fan. This contamination of the fan can cause problems with the boiler.</p>

14 Type plate



15 EC declaration of conformity

The manufacturer:

OekoSolve AG
Schmelziweg 2
CH-8889 Plons-Mels SG

Tel. +41 (0)81 511 63 00

info@oekosolve.ch
www.oekosolve.ch

hereby declares that the following product:

Product name: OekoTube-Inside, Micro-dust filter for wood boilers
Type designation: OTi-1 (D130 bis D200)

Conforms to all the requirements of the directives electrical equipment (2006/95/EC) and electromagnetic compatibility (2004/108/EC).

The following harmonised standards were applied:

EN 61000-6-1: 2007	Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Interference immunity – Residential, commercial and light-industrial environments
EN 61000-6-2: 2005	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Interference immunity – Industrial sector
EN 61000-6-3: 2007	Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Generic standard emitted interference – residential, commercial and light-industrial environments
EN 61000-6-4: 2007	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Generic standard emitted interference – Industrial sector
EN 60335-1: 2007-02	Electrical safety, Part 1: General requirements

Responsible for the documentation: Beat Müller, Tel. +41 (0)81 511 63 00

Plons, 21 May 2015



Beat Müller, Manager

16 Protocol commissioning / service / measurement OekoTube-Inside

Date: _____

Installation

Commissioning

Service

Measurement

Address / Client / Operator _____

Contact on site _____

Boiler _____ Type _____ Rated power _____ kW Combustion power _____ kW

Year _____ Fuel _____

Electrostatic precipitator

OekoTube-Inside

130

150

180

200

Signal boiler

yes

no

Serial No. OS-Ctrl _____

Year _____

Mechanical control

Insulator flange fixed correctly

Screwing the electrode holder screws tightly

Electrode centred

High voltage cable (banana plug) inserted correctly

Cable routed correctly between filter and control box

Seal at the service plate of the insulator chamber available

Service plate of the insulator chamber fixed correctly

Condensate bowl accessible

Service openings accessible

The system operator has been instructed in operating the filter and given the safety instructions. See point 1.1 and point 6.1 for this.

Automatic test

Insert plug: The automatic test is carried out

Test passed

yes

no

Comments

Work carried out

Responsible: _____

Client: _____

17 Drilling gauge for the controller

The drilling gauge for the controller will be supplied with the filter.

18 Pipe opening gauges for the OekoTube-Inside retrofit

The pipe opening gauges for the OekoTube-Inside retrofit at the respective diameters will be supplied with the filter.

Construction and demonstration changes are reserved on behalf of the technical development.

OekoSolve

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