

FRIDURIT® Fume Scrubber

*The spray mist
technique makes
it unique*



Technical Description

April 2003

FRIDURIT® Fume Scrubber

April 2003

1.	_____	On the safe side with FRIDURIT® fume scrubber	page 3
2.	_____	System and function description	page 5
3.	_____	Material	page 6
4.	_____	Control unit	page 6
5.	_____	Water connections	page 6
6.	_____	Fire safety	page 6
7.	_____	Quality assurance	page 7
8.	_____	Equipment supplied	page 7
9.	_____	Recommended water quality	page 7
10.	_____	Accessories	page 8
11.	_____	Technical data at a glance	page 9
12.	_____	Pressure loss	page 10
13.	_____	Drawings	page 10
14.	_____	Built-in examples	page 16
15.	_____	Specifications	
15.1	_____	Fume Scrubber C54	page 19
15.2	_____	Fume Scrubber C90	page 20
15.3	_____	Fume Scrubber C75	page 21
15.4	_____	Fume Scrubber C180	page 22

On the safe side with FRIDURIT® Fume Scrubber

The law requires:

Staying within given values for gaseous or vaporous inorganic materials (see also TA Air)

Minimising environmental damage

Cleaning of exhaust air immediately at outlet (see DIN 12924, part 2)

Minimising emissions from laboratory fume hoods (see guidelines for laboratories)

High environmental standards and low emissions

No poisonous fumes in event of fire

The solution for decentralised application:

FRIDURIT® Fume Scrubber



To protect laboratory and building material

Prevention of corrosion damage

On exhaust pipe system, fire prevention and regulating valves as well as noise insulators

On roof and other parts of the building

In the event of fire the FRIDURIT® Fume Scrubber acts as a flame trap and explosion prevention.

Innovative solutions:

- modular system
- Accessories

Quality based on advanced technology

patented atomised spray system guarantees maximum collection efficiency

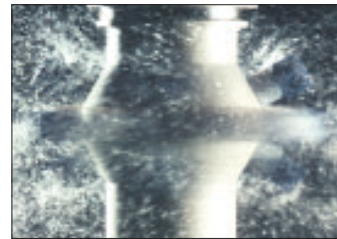
minimum noise levels

economical operation

- 30 % less energy required than with similar systems
- uses fresh water

Quality and safety

- certified according to DIN ISO 9001
- internal 100% testing before delivery
- TÜV-certificates for collection efficiency
- DVGW-certificate
- years of experience as market leader



high quality components by leading manufacturers

low-service design

continuous development and improvements through close co-operation with laboratory staff

customer references nationally and internationally (reference list on request)

a time-based mechanism replaces the scrubbing fluid automatically

compact / space saving

User friendliness and service

- Options for diagnosis of important parameters
- Operation, service and fast technical support are provided by the FRIDURIT® service organisation if necessary

FRIDURIT® Fume Scrubber
the fully automatic environmental protection

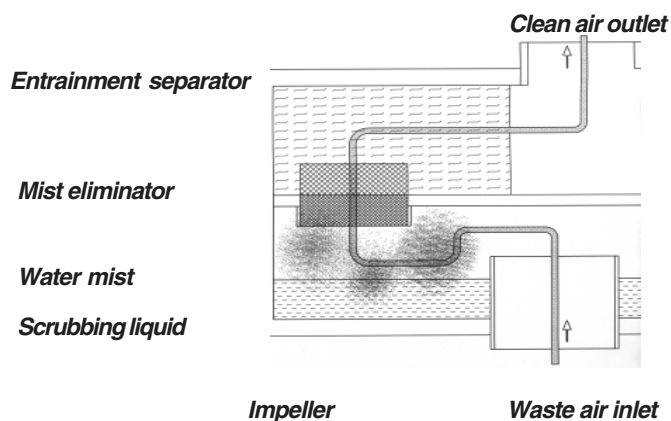
System and function description

2.

FRIDURIT® fume scrubbers have been specially designed for laboratory fume cupboards and are therefore kept as compact as possible. They are usually fitted directly on top of, or next to, the fume cupboard, and can therefore be installed in existing extraction systems without difficulty.

FRIDURIT® fume scrubbers absorb aggressive and toxic gases and vapours, such as perchloric acid, hydrogen fluoride, sulphuric acid, hydrogen chloride and nitric acid and the vapours of such mixtures as aqua regia immediately after they are formed. They thus make an active contribution to the reduction of atmospheric pollution.

Between 54 and 56 dB(A) they add virtually nothing to laboratory noise levels.

Schematic diagram

The air carrying the gases and vapours from the fume cupboard is drawn into the scrubbing chamber through the waste air connectors, suction being provided by the extractor fan connected to the outlet tube at the top of the scrubber.

Within the chamber, the air passes through a fine mist of liquid produced by a rotary atomiser unit (German Patent No. P 38 05 445). This unit performs two functions:

- it raises scrubbing liquid from the integral reservoir in which its base is immersed.
- it forces the liquid through fine nozzles in a rotating head, forming a highly uniform mist throughout the chamber.

The substances to be removed are thus thoroughly mixed with the scrubbing liquid and absorption is very efficient.

The level of the scrubbing liquid in the absorption chamber is regulated by means of float switches. On a time-based mechanism, the scrubbing fluid is replaced automatically. Even during the replacement of the scrubbing liquid, the FRIDURIT® fume scrubber remains fully operational.

Material

3.

The material polypropylene (PP) is a thermoplastic polymer which is highly resistant to chemical attack, does not deteriorate with age and has excellent mechanical and physical properties. Polypropylene is also completely harmless physiologically, easy to recycle and resistant to all forms of chemical attack encountered in the laboratory. In case of exceptionally aggressive materials please contact our department for application technology or consult the current resistance lists. In case of fire no toxic gases are given off.

Control Unit

4.

All the control and drive components required for operation of the fume scrubber are built into one compact plastic switch box which has been fully integrated into the fume scrubber housing. In the event of a fault the motor of the rotary atomiser unit is protected by a thermal motor protection switch. Safe running of the unit is provided by a modern control system which can be programmed into memory. Numerous interfaces enable the controlling device to be connected easily and flexibly to fixtures in the building (such as centralised ventilation controls, centralised failure indicators etc.) and to optional components (at the moment these are: operating module and conductance meter).

Water connections

5.

Feed: Solenoid valve, normally closed, size 10, pressure range 0.2 - 16 bar, servo controlled, 230 V, 50 Hz.
Drain: Solenoid valve, normally closed, DN 20 (DN 32)*, pressure range 0 - 0.15 bar (0.02 bar)*, direct control, 230 V, 50 Hz.
Overflow: size 32

* Because there are different versions of C54/90 and C 75 / 90, please note current specification of individual fume scrubbers, or contact our department for application technology.

Fire safety

6.

The water-filled FRIDURIT® fume scrubber acts as a fire barrier, i.e. it hinders the spread of flame from the fume cupboard to the extraction system, the water in the absorption chamber providing cooling by evaporation.

Quality assurance

7.

Each individual FRIDURIT® fume scrubber is set for optimum performance before it leaves our works. This is ensured by a test run and by checking electrical and control functions. The equipment satisfies current VDE and DVGW regulations.

Equipment supplied

8.

The FRIDURIT® fume scrubber is supplied ready for use, complete with control cabinet. Vital elements for operation such as switch and control lights need to be installed in the fume cupboard. A suitable operating module is available as an option which can be easily installed and connected. This module contains the components necessary for operation. Operating instructions are supplied.

Recommended water quality

9.

The given (maximum) values for the quality of the fresh water must be adhered to, as malfunction of the fume scrubber may otherwise result. We would point out that no liability is accepted for damage to materials or persons if these instructions are not observed!

Appearance:	as colourless as possible, clear and without deposits
PH-value	6.5 to 9.5
Total solidity	10° dH
Calcium Ca ₂₊	400 mg/l
Magnesium Mg ₂₊	50 mg/l
Sodium Na ₊	150 mg/l
Potassium K ₊	12 mg/l
Ammonium NH ₄₊	0.5 mg/l
Iron Fe _{2+/3+}	0.1 mg/l
Manganese Mn ₂₊	0.05 mg/l
Chloride Cl ₋	250 mg/l
Nitrate NO ₃	50 mg/l
Nitrite NO ₂	0.1 mg/l
Sulphate SO _{4 2-}	240 mg/l
Fluoride F ₋	1.5 mg/l
Phosphate PO _{4 3-}	6.7 mg/l
Cinc Zn	1.0 mg/l
Copper Cu	0.5 mg/l



Important:

On exceeding total solidity in particular, we recommend the use of a decalcification plant or the use of de-ionised water.

Accessories

10.

The following options are not part of the standard equipment of the FRIDURIT® Fume Scrubber:

Conductivity

Electrical conductivity of the washing liquid is measured in milli Siemens (mS). Its value determines the absorbing ability of the washing liquid. Once the set value is reached, the washing liquid is replaced fully automatically and the used liquid must be neutralised. Conductivity values are calculated using a conductivity analyser.

Washing liquid - pre-alkalisation application

In order to achieve higher collection efficiency with special applications, the washing liquid is mixed in the fume scrubber with alkaline solution. The plant for making alkaline solution includes an alkaline tank, a metering pump and a pH-electrode for the fume scrubber.

FRIDURIT® Water Neutraliser C100

The unit automatically neutralises spent scrubbing liquid or any other acid or alkaline waste water produced in the laboratory.

Operating module

Compact module for installation on site, with On/Off membrane key for fume scrubber and Operation/Failure control lights.

Additional accessories

We supply connection and cable sets suitable for the application.

Additional information on request.

Technical data at a glance

11.

	FRIDURIT® Fume Scrubber C54	FRIDURIT® Fume Scrubber C90	FRIDURIT® Fume Scrubber C75	FRIDURIT® Fume Scrubber C180
General:				
Placement:	built-in unit in the top compartment of the fume cupboard		stand-alone unit beside the fume cupboard	
Materials used Parts in contact with media:	casing and spray wheel polypropylene, fittings PVC-U, seals EPDM / PTFE			
Air flow data:				
Air flow in m ³ /h:	480 - 900	600 - 1400	480 - 750	600 - 1800
Pressure loss in Pa:	200 - 530	260 - 1140	320 - 540	160 - 1020
Air inlet:	2 tubes AvDia 200 (underside)	2 tubes AvDia 200 (underside)	flanged tube AvDia 200 ⁽²⁾	flanged tube AvDia 250 ⁽²⁾
Air outlet:	1 tube AvDia 250	1 tube AvDia 250	1 flange AvDia 200	1 flange AvDia 315
Weights and dimensions:				
Width in mm ⁽¹⁾	950	1220	550	850
Depth in mm ⁽¹⁾	710	710	750	750
Height in mm ⁽¹⁾	550	550	1535	1535
Water volume in litre:	45	60	45	70
Dead weight in kg:	90	110	90	120
Gross weight in kg (filled):	135	170	135	190
Water connection:				
Feed:	AvDia 10	AvDia 10	AvDia 10	AvDia 10
Drain:	AvDia 32	AvDia 32	AvDia 20	AvDia 20
Overflow:	AvDia 32	AvDia 32	AvDia 32	AvDia 32
Inspection openings:				
Inspection covers:	2	2	1	2
window to the absorption chamber:	yes	yes	no	no
Sound pressure:				
Sound pressure level dB(A) m ³ /h:	54 600	55 1200	56 600	56 1500
Electric control:				
Control unit:	Plastic shell with control system which can be programmed into memory (SPS), switch unit for spray wheel motor, operating switch, repair switch, push-fit connection for adding accessories			
Power supply:	Rotary current 400/230 Volt, 50 Hz, 3L/N/PE, 0.75 kW-connection-plug ⁽³⁾			
Level control system:	2 float switches for minimum and maximum filling levels 1 magnetic inlet valve with dirt trap and hand ball valve, 1 magnetic outlet valve			
Replacement of scrubbing liquid:	Control system linked to timer, times can be set within wide parameter ⁽⁴⁾ , optionally via measuring conductance			
Optional accessories:	Probe with integrated measuring amplifier for measuring electric conductivity, control unit with membrane keyboard, washing water pre-alkalisation device. For additional accessories see the appropriate section.			
Protection class:	Motor IP 54, control system IP 40 on the back, IP 54 at the front with closed cover			

(1) For detailed measurements see drawings

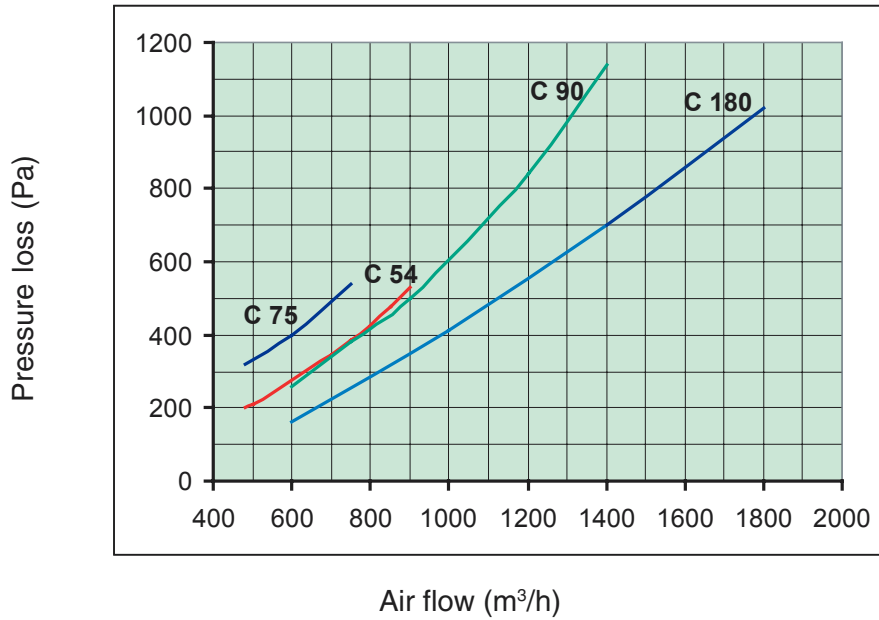
(2) For position of connections see drawing

(3) Depends on fume cupboard

(4) Set by Fridurit service personal only

Pressure loss

12.

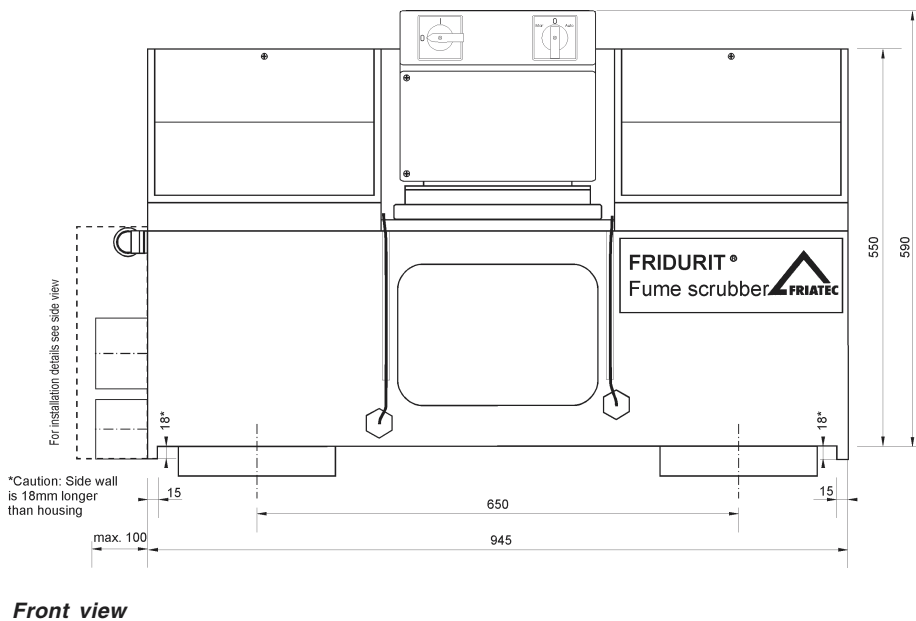


Measurements under conditions of certified test equipment.

Drawings

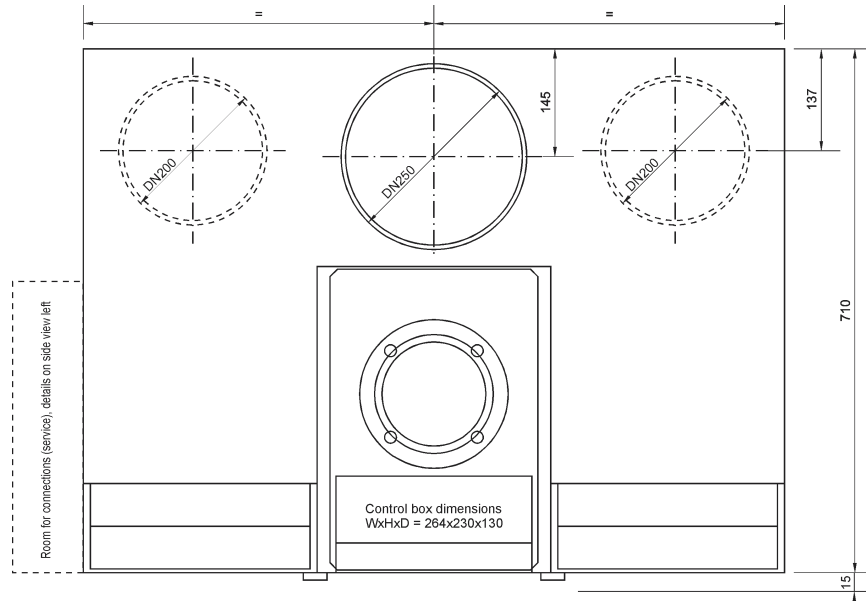
13.

Fume Scrubber C54

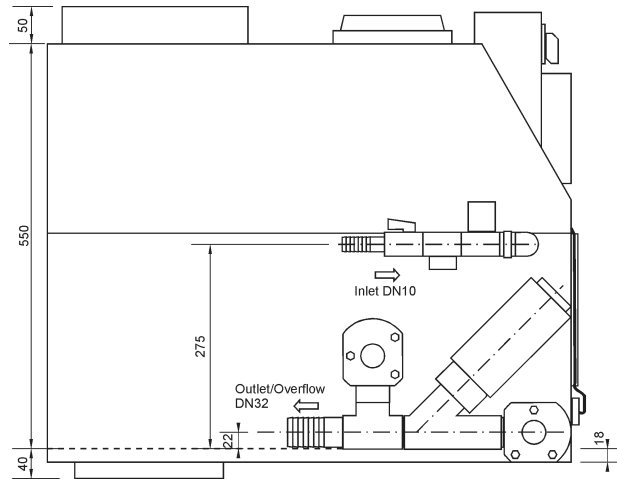


FRIDURIT® Fume Scrubber

April 2003

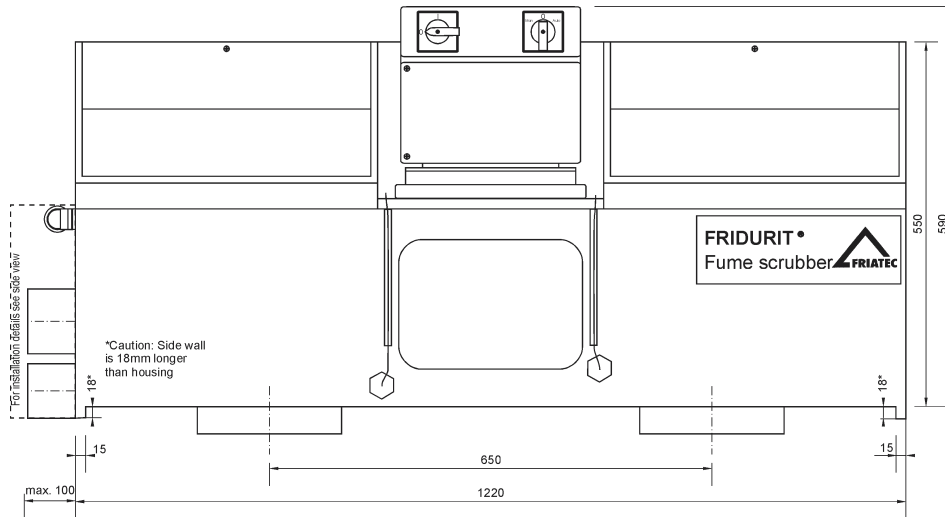


Top view

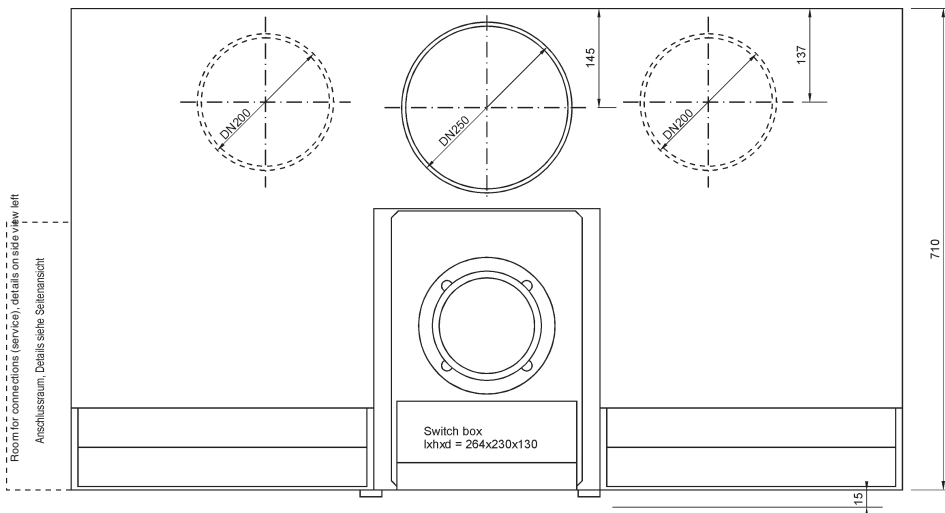


Side view left

Fume Scrubber C90



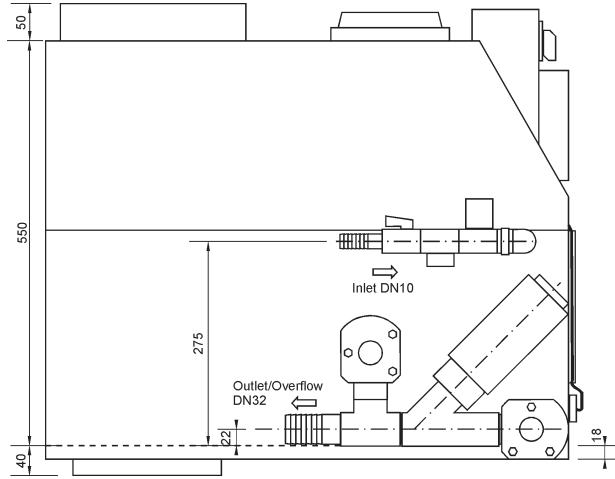
Front view



Top view

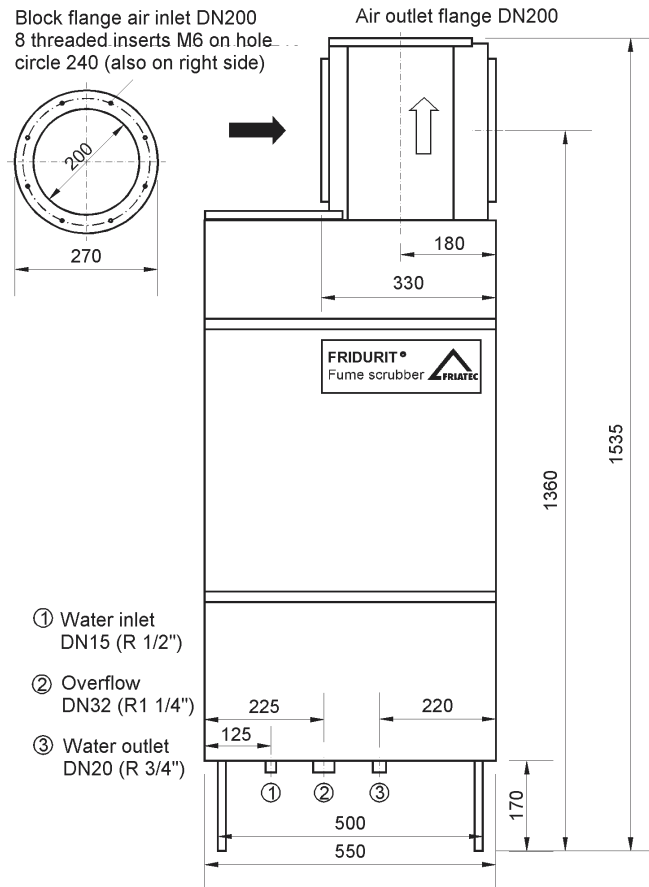
FRIDURIT® Fume Scrubber

April 2003

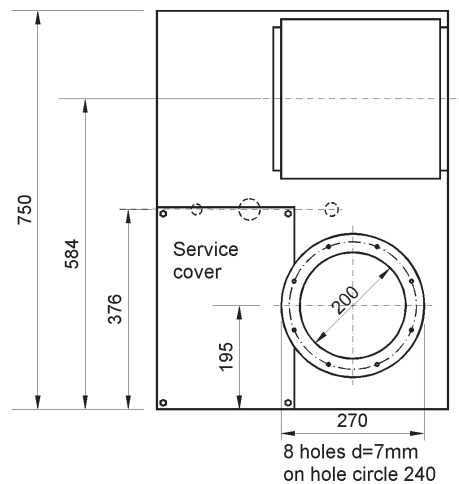


Side view left

Fume Scrubber C75

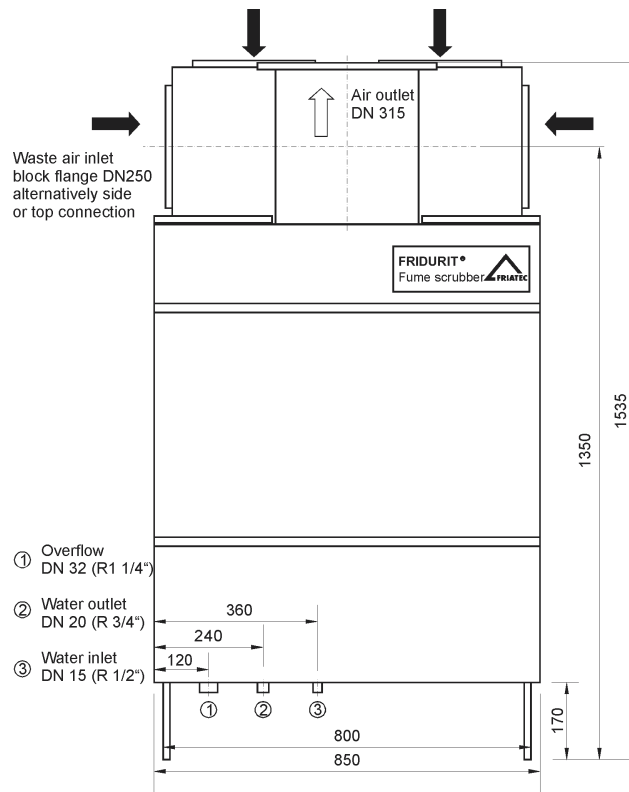


Front view
(dimensions in mm)

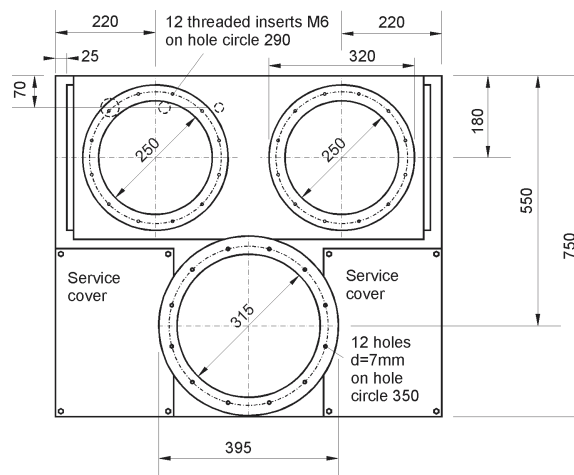


Plan view

Fume Scrubber C180



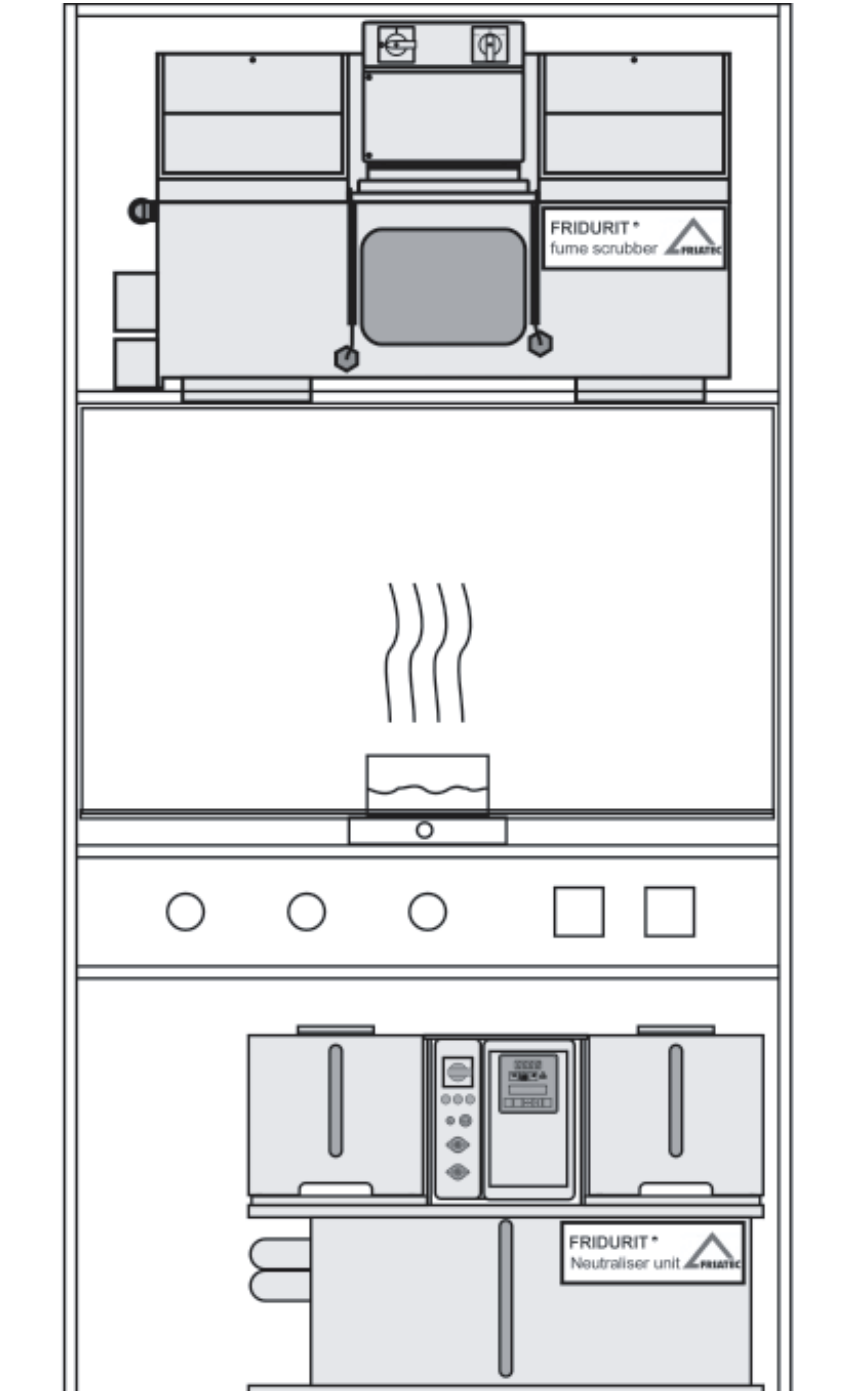
Front view



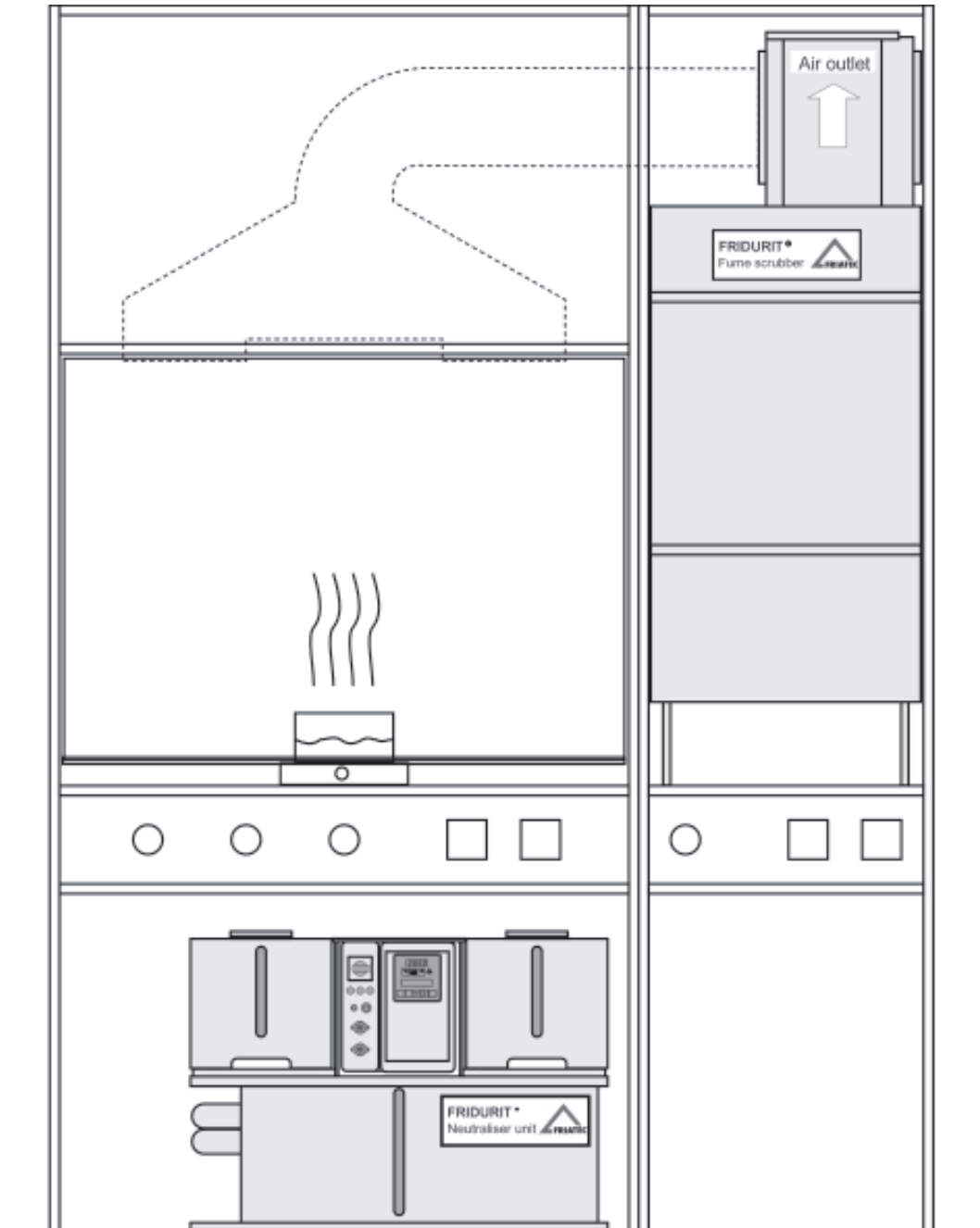
Top view

Built-in examples

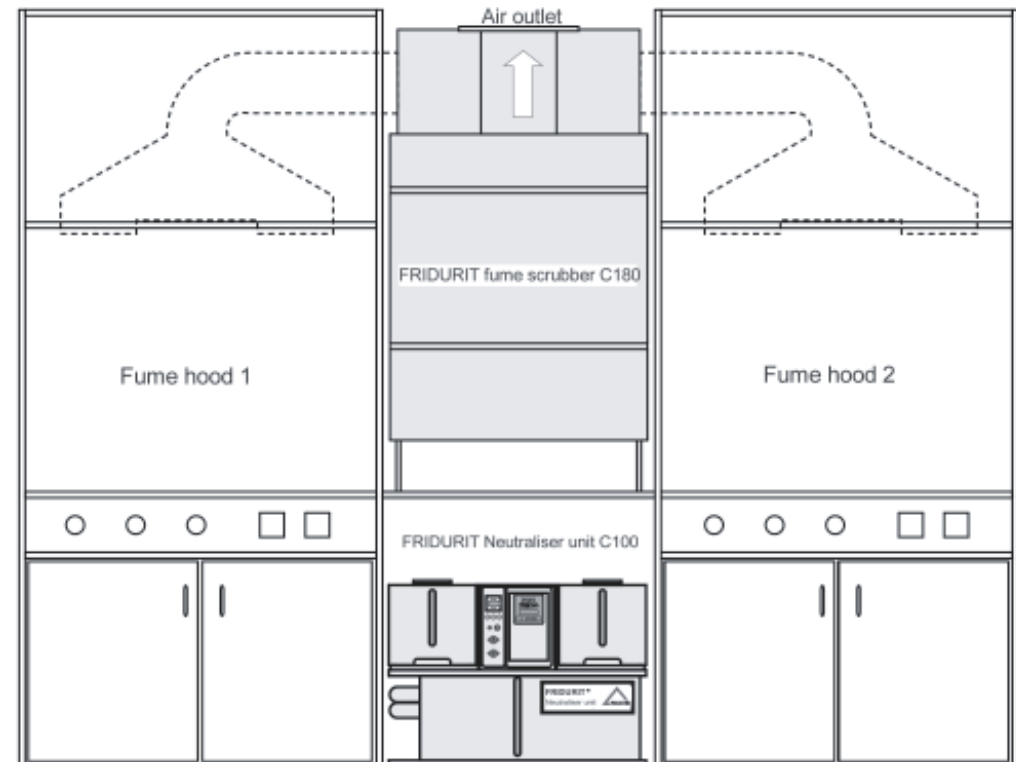
14.



Fume hood with Fume Scrubber C54 and Water Neutraliser C100



Fume hood with Fume Scrubber C75 and Water Neutraliser C100



Fume hood with Fume Scrubber C180 and Water Neutraliser C100

The specifications of our products are based on extensive technical development and on the results of stringent tests. We have experience in diverse areas of application over many years with FRIDURIT® environmental equipment.

However, the user is responsible for checking our specifications and recommendations as to his own application and, if necessary, confirming the suitability by conducting his own tests.

15.1 Specification

April 2003

- 1.0** _____ 1 FRIDURIT® fume scrubber C54, DP 38 05 445 fabricated completely from polypropylene and including a fully automatic scrubbing liquid replacement unit, comprising:
- 1.1** _____ 1 lower chamber section with 2 air inlet tubes AvDia 200
1 flanged air outlet tube AvDia 250x50
- 1.2** _____ min/max floating switch
- 1.3** _____ 1 spray unit complete with drive motor
- 1.4** _____ 1 assembly aperture with view window, 2 inspection covers
- 1.5** _____ 1 water inlet Av Dia 10 complete with manual ball valve, soil trap, 4 mm diaphragm and solenoid valve
- 1.6** _____ combined scrubbing liquid drain and overflow AvDia 32 complete with solenoid valve
- 1.7** _____ 1 switch box inc. PLC control, integrated in fume scrubber
- 1.8** _____ Dimensions: width = 950 mm depth = 710 mm height= 590 mm
for external dimensions please see drawings)
Weight: approx. 90kg empty - 135 kg filled
Absorption efficiency: > 90%
- | | | |
|--------------|-----------------------|---|
| Techn. Data: | Air flow: | 480 to 900 m ³ /h |
| | Pressure loss: | 200 to 530 Pa |
| | Rotation speed: | 1410 r.p.m. |
| | Capacity: | 0.75 kW |
| | Voltage: | 400/230 V |
| | Frequency: | 50 Hz |
| | Protection class: | IP 54 |
| | Water volume: | ca. 45 l |
| | Sound pressure level: | approx. 54 dB(A) at 600 m ³ /h |
- 1.9** _____ Options:
- remote control unit with key and control lights
 - conductivity measurement unit with amplifier, contained within a protective sheath
 - inlet and outlet tubes, each 3 m, with stainless steel adjustable clips
 - alkalisation unit with pH measuring device
 - initial operating instructions, available on request, from our after sales service team (not available in every country)

Connection to fume cupboard and waste air conduction on site. Test runs and inspection of electrical control functions are carried out in our factory.
Complete operating instructions supplied.

We reserve the right to make technical alterations

15.2

Specification

Mai 2003

- 1.0 _____ 1 FRIDURIT® fume scrubber C90, DP 38 05 445 fabricated completely from polypropylene and including a fully automatic scrubbing liquid replacement unit, comprising:
- 1.1 _____ 1 lower chamber section with 2 air inlet tubes AvDia 200
1 flanged air outlet tube AvDia 250 x 50
- 1.2 _____ min/max floating switch
- 1.3 _____ 1 spray unit complete with drive motor
- 1.4 _____ 1 assembly aperture with view window, 2 inspection covers
- 1.5 _____ 1 water inlet AvDia 10 complete with manual ball valve, soil trap, 4 mm diaphragm and solenoid valve
- 1.6 _____ combined scrubbing liquid drain and outlet AvDia 32 complete with solenoid valve
- 1.7 _____ 1 switch box inc. PLC control, integrated in fume scrubber
- 1.8 _____ Dimensions: width = 1,220 mm depth = 710 mm height= 590 mm
(for external dimensions please see drawings)
Weight: approx. 110 kg empty - 170 kg filled
Absorption efficiency: up to 97%
- | | | |
|--------------|-----------------------|---|
| Techn. Data: | Air flow: | 600 to 1 400 m ³ /h |
| | Pressure loss: | 260 to 1 140 Pa |
| | Rotation speed: | 1410 r.p.m. |
| | Capacity: | 0.75 kW |
| | Voltage: | 400/230 V |
| | Frequency: | 50 Hz |
| | Protection class: | IP 54 |
| | Water volume: | 60 l |
| | Sound pressure level: | approx. 55 dB(A) at 1,200 m ³ /h |
- 1.9 _____ Options:
- remote control unit with key and control lights
 - conductivity measurement unit with amplifier, contained within a protective sheath
 - inlet and outlet tubes, each 3 m, with stainless steel adjustable clips
 - alkalisation unit with pH measuring device
 - initial operating instructions, available on request, from our after sales service team (not available in every country)

Connection to fume cupboard and waste air conduction on site. Test runs and inspection of electrical control functions are carried out in our factory.
Complete operating instructions supplied.

We reserve the right to make technical alterations

15.3

Specification

April 2003

- 1.0 _____ 1 FRIDURIT® fume scrubber C75, DP 38 05 445 fabricated completely from polypropylene and including a fully automatic scrubbing liquid replacement unit, comprising:
- 1.1 _____ 1 lower chamber section with 1 flanged air inlet tube AvDia 200, on the right and left side or on the top, 1 flanged air outlet tube AvDia 200, 1 seal cover
- 1.2 _____ min/max floating switch
- 1.3 _____ 1 spray unit complete with drive motor
- 1.4 _____ 1 inspection cover
- 1.5 _____ 1 water inlet AvDia 10 complete with solenoid valve AvDia 13
- 1.6 _____ 1 scrubbing liquid drain AvDia 20 with solenoid valve AvDia 20 and 1 overflow outlet AvDia 32
- 1.7 _____ 1 switch box inc. PLC control, integrated in fume scrubber
- 1.8 _____ Dimensions: width = 550 mm depth = 750 mm height= 1535 mm
(for external dimensions please see drawings)
Weight: approx. 90 kg empty - 135 kg filled
Absorption efficiency: up to 97%
- | | | |
|--------------|-----------------------|---|
| Techn. Data: | Air flow: | 480 to 750 m ³ /h |
| | Pressure loss: | 320 to 540 Pa |
| | Rotation speed: | 1410 r.p.m. |
| | Capacity: | 0.75 kW |
| | Voltage: | 400/230 V |
| | Frequency: | 50 Hz |
| | Protection class: | IP 54 |
| | Water volume: | 45 l |
| | Sound pressure level: | approx. 56 dB(A) at 600 m ³ /h |
- 1.9 _____ Options:
- remote control unit with key and control lights
 - conductivity measurement unit with amplifier, contained within a protective sheath
 - alkalisation unit with pH measuring device
 - initial operating instructions, available on request, from our after sales service team (not available in every country)

Connection to fume cupboard and waste air conduction on site. Test runs and inspection of electrical control functions are carried out in our factory.
Complete operating instructions supplied.

We reserve the right to make technical alterations

15.4

Specification

April 2003

- 1.0 _____ 1 FRIDURIT® fume scrubber C180, DP 38 05 445 fabricated completely from polypropylene and including a fully automatic scrubbing liquid replacement unit, comprising:
- 1.1 _____ 1 lower chamber section with 4 air inlet tubes AvDia 250, situated on the right, left and top, 1 flanged air outlet tube AvDia 315, 2 seal covers
- 1.2 _____ min/max floating switch
- 1.3 _____ 1 spray unit complete with drive motor
- 1.4 _____ 2 inspection covers
- 1.5 _____ 1 water inlet AvDia 10 complete with solenoid valve AvDia 13
- 1.6 _____ 1 scrubbing liquid drain AvDia 20 with solenoid valve AvDia 20 and 1 overflow outlet AvDia 32
- 1.7 _____ 1 switch box inc. PLC control, integrated in fume scrubber
- 1.8 _____ Dimensions: width = 850 mm depth = 750 mm height= 1,535 mm
(for external dimensions please see drawings)
Weight: approx. 120 kg empty - 190 kg filled
Absorption efficiency: up to 97%
- | | | |
|--------------|-----------------------|---|
| Techn. Data: | Air flow: | 600 to 1800 m ³ /h |
| | Pressure loss: | 160 to 1020 Pa |
| | Rotation speed: | 1410 r.p.m. |
| | Capacity: | 0.75 kW |
| | Voltage: | 400/230 V |
| | Frequency: | 50 Hz |
| | Protection class: | IP 54 |
| | Water volume: | 70 l |
| | Sound pressure level: | approx. 56 dB(A) at 1,500 m ³ /h |
- 1.9 _____ Options:
- remote control unit with key and control lights
 - conductivity measurement unit with amplifier, contained within a protective sheath
 - alkalisation unit with pH measuring device
 - initial operating instructions, available on request, from our after sales service team (not available in every country)

Connection to fume cupboard and waste air conduction on site. Test runs and inspection of electrical control functions are carried out in our factory. Complete operating instructions supplied.

FRIDURIT® system solutions

To protect the environment and the laboratory -
and for your safety.



Laboratory benchtops and sinks made from FRIDURIT® Industrial Ceramics

Perfect safety for you and your laboratory, the highest resistance against virtually all chemicals commonly used in the laboratory. Easily cleaned and safe thanks to the jointless scratch and abrasion proof surface. Resistant to high temperatures, non combustible, and of course 100% recyclable.

FRIDURIT® Fume scrubber

Absorbs inorganic contaminants in the waste air from the laboratory safely and reliably. A mature solution to the problem.

FRIDURIT® Water neutraliser

For safe neutralisation of all laboratory effluent. Fully automatic, quiet as a whisper, and reliable.

FRIDURIT® Fume filter

For the adsorption of organic solvents in waste air from the laboratory. With continuous filter check. The FRIDURIT® Service Dept. will undertake the changing of the filter. Environmental protection thought through to the end.



FRIATEC Aktiengesellschaft - Bereich FRIDURIT® Labortechnik

Steinzeugstraße 50 - D-68229 Mannheim
P.O. Box 710261 - D-68222 Mannheim
phone +49-(0) 62 14 86 18 79 - fax +49-(0) 62 14 86 16 05
e-mail: info-fridurit@friatec.de - Internet: <http://www.friatec.de>