FZ2 VARIOmatic®

Operating Instructions

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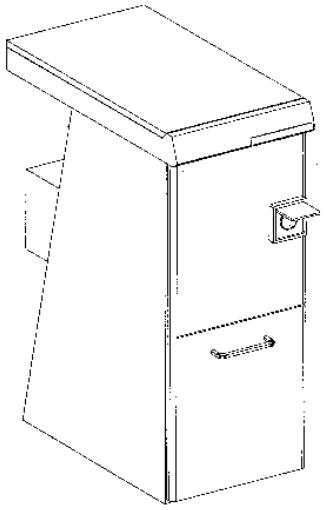

EG- Conformity declaration

We, Zubler Gerätebau GmbH
Buchbrunnenweg 26
89081 Ulm Jungingen

declare, that the product Dust Vacuum - System

FZ 2 VARIOmatic®

corresponds to the regulations of the following directives in regard to protective requirements

89/336/EWG	EMV-Directive
73/23/EWG	Low-voltage Directive
93/68/EWG	CE-Sign
89/392/EWG	Directive machines

Any modification not specifically approved by us voids the validity of this declaration.

Kurt Zubler
Managing Director

Dear customer !

We are happy that you have decided to purchase a Zubler vacuum system and we hope you enjoy working with this instrument. The **FZ2 VARIOmatic®** is especially quiet and long-lived because we use three-phase turbines without carbon brushes. A powerful filter system with a large area, combined with an automatic air capacity control, allows very economical operation with low energy consumption. It is equally suitable for daily professional use or jobs with high dirt accumulations.
The constant developement of our technology is based on cooperative work with experienced dental technicians. Our main target is to create a quieter and more comfortable vacuum technology. Performance and economy are always basic requirements.

Note!

These operating instructions do not contain a description of installation. Its premise is that the vacuum system has already been installed and connected in your laboratory by experienced personnel. This is only required initially. Since the installation work can sometimes be very complex, and the customer can seldom do it himself, there is a separate set of instructions which is available to the dental commercial companies. It is only given out when required.

Claims cannot be made because of the drawings and technical descriptions. We reserve the right to make changes and improvements, with or without corrections to these instructions.

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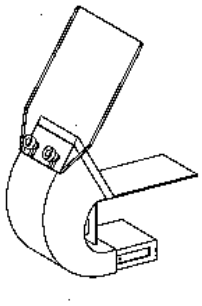
2. Accessories

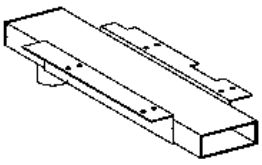
Vacuum solutions are determined by many factors. The vacuum machine is normally not responsible for air noises of the vacuum system. All system parts must be optimally matched with each other. The smallest air inlet noise, effective use of the air capacity and the best possible dirt acquisition, are as equally important as the quality characteristics of the vacuum machine.

For hand nozzle work stations, we recommend only the use of a modern vacuum system and the installation of noise dampers. We offer the corresponding accessories in our program.



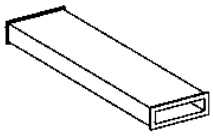
R 1200 Vacuum funnel

N° 825/241



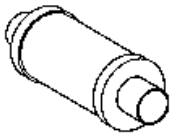
R 1000 Rectangular pipe

N° 570/065



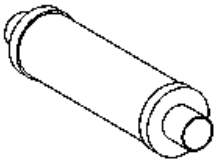
R 1100 Noise damper for rectangular pipe

N° 825/261



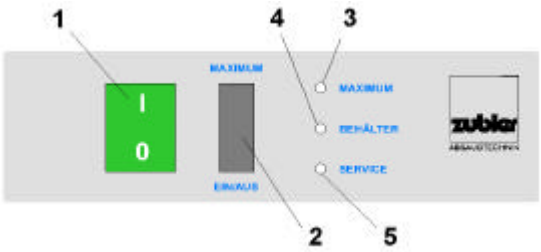
R 1101 Round noise damper L = 270 mm

N° 825/282



R 1102 Round noise damper L = 350 mm

N°825/260



Operating elements

1 Mains switch ON „I“ Off „0“
2 Button for Maximum
3 LED Maximum
4 LED Container
5 LED Service

3. Starting operation

Switching on the vacuum system

Turn on the mains switch (1) on the vacuum.
It is possible to leave the mains switch of the vacuum system in the on position, and perform the switching via the central voltage supply (laboratory main switch).

Mains switch (1) glows green.
After being switched on, the vacuum system first conducts a self- test. One after another, all internally connected vacuum paths are checked with maximum vacuum performance.
Then the filter cartridge is cleaned off.
This operation takes approx. 2 minutes.

The vacuum system is now operational ready. The connected instruments receive mains voltage.

Start blockade (blinking LED Service (5)

The vacuum system does not start and waits, if:

1. the required pressure of min. 5 bar is not present at the compressed air connection,
2. the Timer for controlling the dirt container has run out, (see Chapter 5)
3. a vacuum position opener is not closed because an instrument on an external vacuum position is switched on or a manual switch is in the ON position (vacuum).

Switching off the vacuum system

The vacuum system can be switched off by the central laboratory switch or the built-in mains switch.

Note:

Connected instruments and technical machines can remain switched on and they will also be without power when the vacuum system is switched off.

4. Use of the vacuum outlet

The vacuum outlet has been foreseen in order to clean the surrounding working area and the laboratory floor.
Any vacuum cleaner hose with a connecting piece of 40mm outside diameter can be used. Special solutions, with longer hose lengths of high quality, are available from our accessories program.
The vacuum system switchs itself on as soon as the lid of the vacuum outlet has been opened.

Maximum - Function

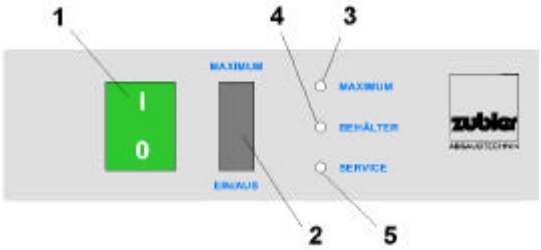
The Maximum - Function works only when the vacuum outlet is being used. The control operation of the vacuum system is switched off and a higher under-pressure is created (vacuum cleaner - principle).

The Maximum - Function is activated with the push of a button (2). LED Maximum (3) lights.
Pushing the button (2) again, deactivates the Maximum-Function.

Note:

The activated Maximum - Function (LED 3) does not have an effect on the vacuum operation at the individual vacuum stations ! As long as even one of the vacuum stations of the work areas is active, the Maximum - Function remains inactive for the vacuum outlet.
If the Maximum operation is to be allowed for the vacuum stations of the work areas, the blocking function must be released (see Part 6).

5. Maintenance



Checking the dirt container

When the dirt container requires checking, the LED, Container (4) blinks. Start will be blocked at the next switching on of the vacuum system. (LED Container (4) and LED Service (5) blink at the same time. Vacuum system does not start.)

Note

A check of the container is necessary after each sequence of a Timer. The adjustment of various time intervals can be read in Chapter 6, „Adjustments of the vacuum system.

Dirt container removal and replacement

1. leave the vacuum system switched on
2. take the front cover off
3. release the clamp strap
4. pull the container out and empty it
5. push the container in to the limit stop
6. push the clamp strap upwards (only until limit stop on the handle !). The LED Container (4) goes out. The LED Service (5) continues blinking
7. replace the front cover
8. turn the mains switch (1) off and then on again
9. wait for the operational readiness of the vacuum system (approx. 2 min)

Emptying not necessary

If emptying is not necessary, perform the above without steps 4 and 5. When the clamp strap is released, the Timer is reset to 0 and the next check will be due after the new cycle of the set time interval..
Lengthening the time interval should be carefully considered since a check takes very little effort and can prevent an over-fill.

Filter change

The filter cartridge of the vacuum system is a long-term filter which retains its filtering ability for several months or even years depending on the amount of dirt accumulated.
We recommend to replace the protective flat-filter when replacing the filter cartridge.

Attention !

Filter changing should only be performed by trained personnel !
If declining vacuum power or other reasons raise the suspicion that there is a filter problem, a telephone consultation is necessary before loosening or removing the filter.

Removing the filter cartridge

1. switch off the vacuum system
2. block the compressed air or remove the vacuum system from the compressed air supply
3. take out the dirt container (as described in Part 5 „Check dirt container“)
4. take the sheet metal cover out. Loosen 2 screws to do this (see drawing)

5. remove air container transport protector
6. Take out the air drums by loosening the quick-release coupling

7. unscrew the grip screw below the filter cartridge while firmly holding the filter cartridge.
8. pull the filter cartridge downwards while holding the clamping strap upwards or unhinging it.

Replacing the filter cartridge

Attention must be paid that there is a central seating when replacing the filter !
After replacement, turn the cartridge lightly on the threaded rod in order to guarantee the correct seating.
Then tightly fasten the gripping screw.
Replacement is similar to removal except in the reverse order (please see steps 1-8).

Replacing the protective flat-filter

The FZ2 is equipped with an additional flat-filter which is protecting the motors from being polluted in case of a wrong inserted or broken filter cartridge.
We recommend to replace this filter when replacing the filter cartridge.

1. Remove the rubber plated cover by unscrewing the screws to get acces to the flat-filter.
2. Remove the flat-filter by pulling it upwards.
3. Insert a new flat-filter and press the filter tight into the frame.
4. Ensure that there is no gap or leak where dust could bypass the filter.
5. Close the front cover again and tighten the screws.

Exchanging a vacuum port opener

The vacuum stations of a vacuum system are opened and closed with a pneumatically operated rubber membrane. These are subject to a lot of stress. After a few 100,000 loading cycles, cracks can appear in even high quality rubber materials. In this case, the vacuum station does not close any more and it blows compressed air into the vacuum lines.

The vacuum port openers are plug-type components and are found in the intake pipes on the back side of the instrument (picture at left).
With additional vacuum stations and some special installations, some of the valves can be found within the vacuum lines to the work station. (picture at right).

1. switch off the vacuum system.
2. In order to determine which valve is defective, follow the hose from defective work station to the vacuum system.

3. loosen vacuum hose (left picture)
4. loosen the white PA - compressed air hose by turning back the nipple cap (right picture)
5. remove valve (lower picture)

6. replace with new valve
7. push the white PA - compressed air hose in until the limit stop (you must overcome a light resistive pressure)
8. connect vacuum hose
9. switch on the vacuum system

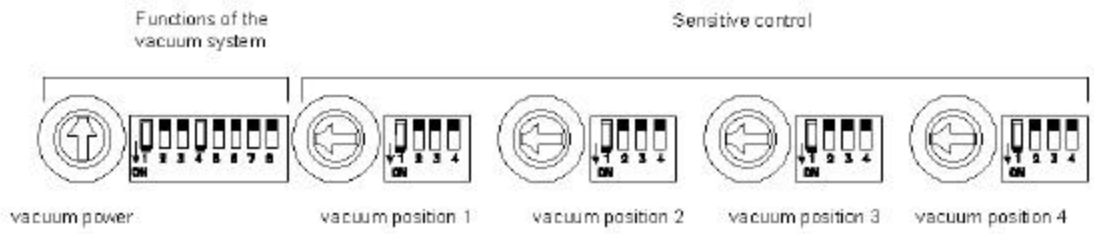
Adjustment of the FZ 2 VARIOmatic®:

Note:

All adjustments are only made once during the commissioning of the vacuum system. Later adjustments are only necessary if the connected instruments, application, or amount of dirt accumulation changes.

Remove the rubber cover on the top of the instrument.
Use the hex keys delivered with the instrument.
2 screws on the underside have to be loosened.

Total view:

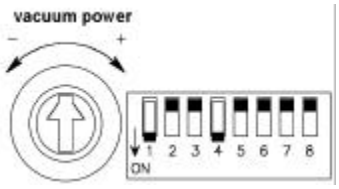


6. Adjustment of the functions of the vacuum system

Basic factory settings:

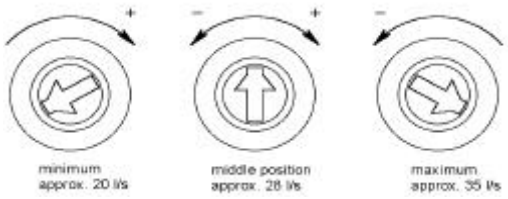
Potentiometer = Middle position 12 O´clock
25-30 l/s each vacuum position

Switch



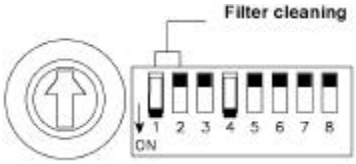
1/2 OFF / ON = filter cleaning every 2 hours
3/4 OFF / ON = check container every 30 days
5 OFF not used
6 OFF = maximum RPM 300 Hz
7 OFF = Maximum only for front plug
8 OFF = 50 Hz (Europe)

Vacuum power



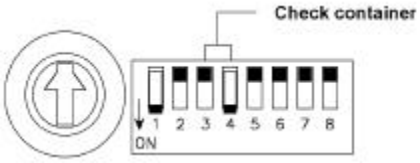
The vacuum power can be set in the range of approx. 20 to 40 liters per second with the trimming potentiometer to the far left.

This changes the strength of the controlled vacuum in the vacuum system.
All vacuum stations are affected the same.



Cleaning intervals

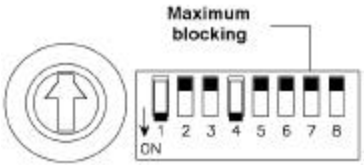
The filter cartridge is cleaned with compressed air. The frequency of the air bursts for cleaning can be set according to the amount of dirt accumulation.
Select position of switches 1 and 2 from the chart.



Frequency of checking the dirt container

The dirt container is to be checked or emptied in regular intervals. To protect the system, the vacuum is blocked after a programmable Timer cycle has elapsed.
The blocking is released as soon as the clamping of the dirt container has been released and replaced.

Time sequences can be set according to amount of dirt accumulation. 1 day corresponds to 8 working hours.
Select position of switches 3 and 4 from the chart.



Blocking of the maximum vacuum power at a work station.

In the standard adjustment, it is only possible to use the maximum vacuum power of the vacuum system from the front vacuum plug (see Chapter vacuum plug)
It is possibe to turn off this Blocking action.
When the maximum operation is turned on (LED Maximum (3) lights), every vacuum position is furnished with maximum vacuum power.

To release Blocking, place switch 7 in the ON position.

When the maximum operation is turned off, the vacuum system functions as it normally does in controlled operation. The Blocking has no influence.

Maximum operation for instruments

If the vacuum power of the automatic control operation is not adequate for instruments with higher dirt accumulation, work can be performed with the uncontrolled maximum operation. Requirement is that the Block is released with switch 7 (see above) and the maximum operation is turned on.

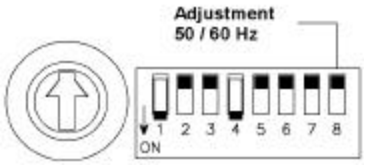
For a vacuum power of 50-60 l/s, switch 6 to ON position.

Note:

Maximum operation means uncontrolled operation. If several vacuum positions are operated at the same time, the available vacuum power is divided.

A reduced Maximum with switch 6 means:

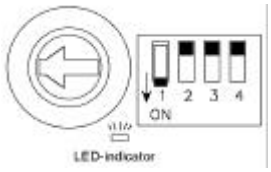
reduced Maximum = Maximum



Adjustment 60 Hz for theUSA

In Europe switch 8 must always be in the OFF position ! (50 Hz)

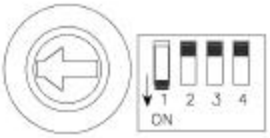
7. Adjustment of sensitivity



It is easy to determine which working position is connected to which vacuum position number:

1. Switch off all connected instruments.
2. Turn on the instrument to be adjusted. Run the hand nozzle at a high RPM or under load.

LED under the dedicated switch group with potentiometer lights.



Basic settings from factory:

Switch 1	ON	(high sensitivity)
Switch 2-4	OFF	
Pot	9:00	O´clock

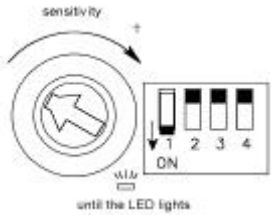
This adjustment can be used for most technical machines such as Schick C1-C3 , KaVo K9-K11.

Exact Tuning

1. Place the Pot to left full stop (Position 8:00 O´clock)
2. With technical machines, use the pre-selecter to set the lowest RPM, e.g. 5000.
3. Operate knee or foot switch and keep depressed. Turn on the function instrument without variable RPM or power setting.

The LED should not light, or must go out after only lighting shortly.

If the LED still lights at this Pot setting while the hand nozzle is running, then switch 1, in the OFF position, must be pushed upwards (lower sensitivity).

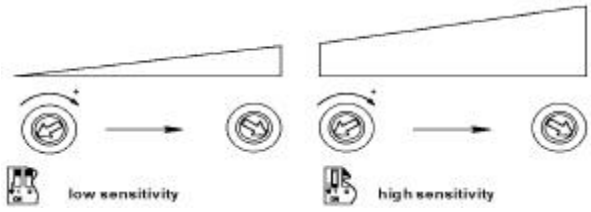


Turn the Pot slowly in a clockwise direction (+), until the LED lights. Leave the Pot in this position.

Adaptation of the instruments on the other vacuum positions should be performed in the same manner (see above).

Importand basic rule :

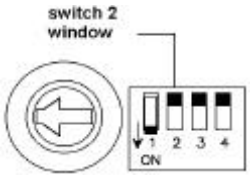
Sensitivity not higher than necessary !
Otherwise, voltage line interferences or power fluctuations at the working position could cause an independent starting of the vacuum (ghost effect).
It should be checked to see if the sensitivity with the same threshold value can be reduced with switch 2 (Window, see below).



Switch 1 divides the adjustment of the threshold sensitivity in 2 areas.
This doubles the Pot - travel for fine adjustment.

OFF (up) = low sensitivity
ON (down) = high sensitivity

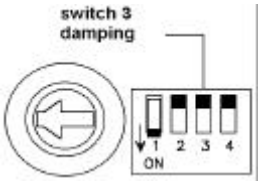
Window



With switch 2, on the 4-switch block of every vacuum position, the width of the characteristic segment effective for automatic recognition can be changed.
If the vacuum position only opens automatically with an extremely high sensitivity setting, an attempt can be made with the be switch position ON and reduction of the sensitivity by turning the Pot back.

OFF (up) = Window narrow
ON (down) = Window wide

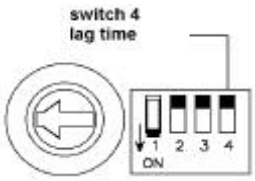
Damping



An attempt can be made to suppress short interference pulses, which cause an independent release of the vacuum, by changing switch 3 (position ON).

OFF (up) = lower damping
ON (down) = higher damping

Lag time



With some applications, such as sand blasting, it might be useful to increase the lag time of the vacuum in order to to vacuum the remaining dust in the chamber or immediate area.

OFF (up) = lag time 3 seconds
ON (down) = lag time 8 seconds

8. Functional faults

1

Vacuum does not function when the power has been switched on. Service- LED (5) blinks.

Cause:
Start blocking (see Part 3)
Compressed air connection does not have the necessary pressure of minimum 5 bar yet.
An externally connected instrument on the 5th or 6th vacuum position is switched on.

Remedy:
Wait until the compressor has built up pressure or set the laboratory pressure higher.
Control to see if externally connected instruments and switches on vacuum positions 5 and 6 are switched off.

2

Vacuum does not function when the power has been switched on. Container -LED (4) and Service -LED (5) blink at the same time.

Cause :
the pre-set time for checking the dirt container has elapsed (see Part 5 „Check of dirt container“).

Remedy:
Pull the clamp strap of the container down and then push it back up again.

3

After manipulation of the clamping strap for the dirt container, the Service -LED (5) still blinks and the vaccum system does not work.

Remedy:
After manipulating the strap, the vacuum system must be restarted with the mains switch (see Part 5 „Check of dirt container“).

4

Instrument or technical machine does not operate (no power)

Causes:
a) The vacuum system is not switched off.
b) The vacuum system has not finished its initialising sequence.
c) The vacuum system is not ready (Fault or start blocking)

Remedy:
Check the vacuum system, wait for complete initializing sequence, corresponding to the LED display in the operating instructions.

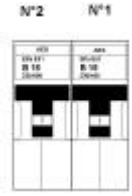
5

Vacuum system does not start, no LEDs light, green mains switch does not light.

Cause:
No mains voltage. Instrument or house circuit breaker switched off.

Remedy:
Check circuit breaker on rear of Vacuum system and house circuit breaker.

6



Vacuum system does not start or stops working, connected instruments do not have power, the Service -LED (5) is constantly lit (no blinking!)

Cause:
Automatic fuse Nr. 1 released or major fault on the frequency converter, burned-out motor or electronics fault.

Remedy:
Check automatic fuse Nr. 1, call Customer Service.

7

Vacuum system performs initialialization after being switched on but then automatic fuse Nr. 2 releases and possibly the corresponding house circuit breaker also.

Cause:
Several instruments with very high starting power are connected to the vacuum system, and all of these instruments were in the switched on condition.

Remedy:
Turn off at least one of the connected instruments to the vacuum system and do not turn it back on until the initializing of the vacuum system has been completed. Switch on the automatic fuse and start the vacuum system again. Pay attention that not all instruments connected to the vacuum system are left switched on when work is completed and the system is turned off.

8

Vacuum system does not start automatically

Cause:
Threshold sensitivity is set too low for the connected instrument.

Remedy:
Readjust the threshold sensitivity.
(see Part 7)

9

Vacuum system starts automatically but stops itself after a time although the instrument is still in use.

Cause:
Threshold sensitivity is set too low.

Remedy:
Slightly increase the threshold sensitivity.
(see Part 7)

10

Vacuum system switches itself on, runs constantly or runs for a long time even after the motor of the connected working instrument is standing still

Cause:
Threshold sensitivity set too high.

Remedy:
Reset the threshold sensitivity
(see Part 7)

11

Vacuum system turns itself on and off at various working places. Vacuum positions open simultaneouly when other instruments are turned on in the laboratory (Ghost - Effect)

Cause:
a) several instruments with very little basic current, motor current, separation, or the sensitivity is set too high at several vacuum positions.
b) Current circuit of the on-site installation is overloaded, or the vacuum system does not have the specified, separately fused, 16 A - plug, and it is connected together with other users on one line.

Remedy:
- Lower threshold sensitivity
- Place damping switch (3) to the ON position (see Chapter on adjustments)
- Check on-site mains installation and improve

Note:
Thecontrol instrument of the Schick C3 can be equipped with a data connection which is already installed at the vacuum system. The instrument can then be operated absolutely dependably and fault free, via switch contacts, with the vacuum system.

12

Vacuum power is too low or too high

Remedy:
The vacuum power can be generally increased or reduced (see Chapter on adjustments).

13

Without any changes being made, the vacuum power is noticably weaker than in the beginning. Vacuum power falls off with simultaneous opening of 2 or 3 vacuum positions.

Cause:
Cleaning frequency is too low
Technical fault in the filter system

Remedy:
Never release the filter cartridge without consultation with Zubler!
Force initialization, (including 3 filter cleanings), by turning the vacuum system on and off.
If improvement occurs, shorten the cleaning interval (see Part: adjustments).
Request Customer Service!

14

Vacuum system works at all 4 vacuum positions simultaneously, even though only one connected instrument is in use.

Cause:
Compressed air supply has failed

Remedy:
Check the compressed air supply of the vacuum system.

15

A constant air noise is heard at one vacuum position as soon as the vacuum system is turned on via other instruments and vacuum power is present at this place.

Cause:
Rubber membrane of the vacuum position valve is defective.

Remedy:
Request a new vacuum position valve. Check Chapter 8

9. Technical data

4-Position Vacuum system **FZ 2 VARIOmatic®**				
Number of vacuum inlets		4 (automatically opening)		
Dimensions				
Width:		334 mm		
Depth:		600 mm		
Height:		810 mm		
Voltage		230V~ 50/60 Hz		
Power		1900 W		
Maximum total power		3000 W		
Required connection value		16 A		
Vacuum turbines		2 each, three phase, without collector		
Max. total vacuum power		approx. 100 l/s		
Air capacity per vacuum position controlled		18-40 l/s one adjustment for all positions		
Average sound pressure level * at 0.5m / 1m distance to instrument			0,5m	1m
1 Vacuum position at	approx. 30 l/s	Lp (A)	53 dB	49 dB
2 Vacuum positions at	approx. 60 l/s	Lp (A)	59 dB	55 dB
3 Vacuum positions at	approx. 90 l/s	Lp (A)	61 dB	57 dB
Volume of the dirt container		12 l		
Filter use category		BIA C		
effective filter area		2.3 m²		
Required compressed air connection		min. 5 bar		
Weight		72 kg		

10. Spare parts

	Order No.
Vacuum Port Opener	752/060
Main Filter Cartridge	556/034
Protective Flat Filter	556/070

* all noise emission values are only for the vacuum system **FZ 2 VARIOmatic®**
Air inlet noises at the work place are dependent on vacuum systems and instruments and are not considered in the measurements.
Sound pressure levels are based on the acoustic power measurements according to ISO Standard 9614-2 (Accuracy class 2)