Vibratory Sieve Shaker

for wet and dry sieving, convertible to micro-precision sieve shaker or micro-mill

FRITSCH

®analysette 3 Pro

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Area of Application

The "analysette 3" PRO is a multifunctional vibratory sieve shaker for use with woven analytical sieves measuring up to 200 mm (8") in diameter and 25 mm to 20 µm mesh width. Dry bulk materials or sludges can be analysed by utilising metallic woven mesh sieves, plastic sieves or **galvanised micro-precision sieves** at a broad range of heights and mesh apertures.

Description and Operation

The housing of the "analysette 3" contains a sturdy cast base with an electronically controlled electromagnet. Three permanent-elastic springs support the armature of this magnet together with a vibrating plate fastened to it. When the magnet is switched on, the vibrating plate is attracted. When it is switched off, the plate bounces back. This forms a vibrating system in which the cast base and magnet are on one side and the armature and vibrating plate are on the other.

Up to 10 analytical sieves 50 mm high, the sieve pan and sieve head are securely clamped onto this vibrating plate. When sieving two separate samples, it is also possible to stack two smaller sieve towers. Altogether, nine sieves each 50 mm high and two sieve pans can be used to receive the samples.

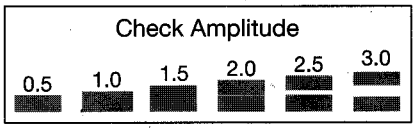
The micro-processor controlled electronic system integrated into the vibratory sieve shaker, produces reproducible sieve movements as the result of frequency tuning. In this approach, the natural frequency is adapted to the requirements of the movement of the substance to be sieved, as a result of the constant mass of the cast element on one hand, and the different weight/number of sieves on the other.

The "analysette 3" has the advantage that it requires considerably less power input than comparable instruments, consequently no overheating occures, even during continuous operation. The setting button for the sieving amplitude does not simply increase the power of the electromagnet, as with a phase control for example. To increase the amplitude, it shifts the frequency of the exciting voltage in the direction of the natural vibrating frequency and vice versa.

The adjustment to the natural vibrating frequency of the current sieving arrangement also accounts for the sieve shaker's reliable, reproducible sieving results: The desired vibrating amplitude of the sieve tower between 0.5 and 3.0 mm is achieved **under all operating conditions**, irrespective of the load.

The integrated timer makes it possible to set sieving times from 3 to 60 minutes. The amplitude can be read and monitored at the indicator on the sieve head with no chance of confusion and without electronic aids.

The lines which optically converge show the amplitude that is set (e.g. 2.0 mm):



A function switch permits you to select between 4 operating modes:

"Permanent": The sieve shaker operates continuously. This mode is used primarily with material that is easy to sieve.

"Interval": The sieve shaker operates at the set amplitude; the vibration of the sieve tower can be interrupted with a potentiometer for about 0.5 seconds after an operation time which can be selected by the operator in the range 3 - 10 seconds. This operation mode eliminates any resonance which may develop between sieve and material to be sieved and also accelerates the sieving process.

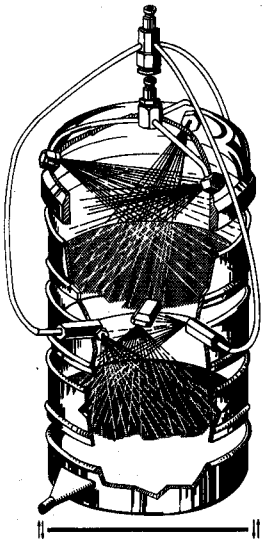
"Micro Permanent": The shaker oscillates at about 4,500 vibrations per minute at a slightly varying vibration level. This setting is selected for sieving with micro-precision sieves.

"Micro Interval": The shaker oscillates at about 4,500 vibrations. The vibrations can be interrupted intermittently, as described under "Interval".

Sieving aids which can be placed in the sieves are available for dry sieving of sample with a high percentage of fine material: either 10 agate balls 10 mm in diameter or 5 agate balls 20 mm in diameter. The effect of these sieving aids largely prevents blockage of the sieves.

Wet sieving with suitable liquids (water, alcohol, etc.) has advantages in special cases. In particular, this is very helpful in case of electrostatic charging or a very high percentage of fine material:

The wet sieve head features three full-cone nozzles which spray the entire interior chamber, thus helping to flush the material through the mesh openings. One or two interposed sieve rings are installed to avoid deposits or blockage on the lower sieve levels. These rings are also fitted with three full-cone nozzles and simultaneously spray the sieves above and below. A wet sieve pan with drain closes off the sieve stack at the bottom.



Wet sieving of difficult materials with interposed ring

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for wet and dry sieving, convertible to micro-precision sieve shaker or micro-mill

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Modular system

"Micro-Precision Sieving": With the "analysette 3" vibratory sieve shaker it is possible to sieve small quantities of material (wet or dry), using micro-precision sieves 100 mm diameter and 100 to 5 µm mesh width. The accessories required for micro-precision sieving and the mesh widths available, are described in a separate brochure: "Micro-Precision Sieving".

"Grinding of Samples": Using a conversion kit consisting of a grinding mortar, grinding ball and cover (Order No. 31.201.00) it is possible to crush and homogenize small amounts of sample (sample quantities 0.1 to 10 ml) with an initial size < 5 mm edge length. For more detailed information about this and the various grinding sets, see the separate brochure for "pulverisette 0".

Automatic evaluation

The evaluation of the results from a sieve analysis are greatly improved and simplified by using the sieve programme "autosieve" in combination with a standard computer and electronic balance.

When the sieve shaker is used with the "autosieve" programme the serial interface integrated into the shaker permits all its functions to be controlled by a computer. The sieving time, for example, can be controlled with the high accuracy of a microprocessor-controlled clock. During process monitoring or routine measurements in the laboratory, the "remote control" of the sieve shaker improves operator efficiency whilst simultaneously ensuring reproducibility of the sieving operation.

Sieving time and sieving amplitude, interval control and sieving with micro-precision sieves can be initiated under programme control. Immediately after weighing the sieve stack at the end of the sieving process, the results can be viewed in various forms.

Advantages

- Capable of wet and dry sieving.
- Convertible to micro-precision sieving and milling of small laboratory samples.
- **Serial interface and micro processor-controlled sieving.**
- **Automatic sieving evaluation with evaluation programme "autosieve".**
- Sieve head for analytical sieves 200 mm (8") in diameter with three full-cone nozzles for wet sieving.
- Interposed sieve ring for wet sieving of highly adhesive dusts and for simultaneous sieving of several fractions.
- High capacity, since 10 analytical sieves and a sieve pan - each 50 mm high - can be placed under the sieve head (sample quantity approx. 100 ml).
- Due to the special design of the sieve pan, it is possible to perform 2 sieving operations (2 stacked sieve sets) in a single process.
- Optical control of the oscillation amplitude with calibration mark on sieving head.
- No additional weight necessary.
- Variable, reproducible oscillation amplitude.
- Reproducible sieving conditions as a result of direct display of vibration intensity.
- Quiet running.
- Levelling by adjusting height of the feet to uniformly distribute the material being sifted.
- Spring loaded feet dampen vibrations transmitted through laboratory table.
- Transparent sieve head to observe the sieving operation.
- Low power input
- Maintenance-free
- 2 year guarantee

Vibratory Sieve Shaker "analysette 3" Spartan

The priceworthy alternative to the vibratory sieve shaker „analysette 3" PRO. The efficiency as well as the ordering data can be read in the separate leaflet vibratory sieve shaker "analysette 3" Spartan.

Article	Order No.
Sieving head, perspex, for dry sieving (contained in basic equipment)	31.202.00
Sieving head, perspex, with 3 spray nozzles for wet sieving	31.203.00
Replacement seal ring	31.001.16
sieving aids: rubber ball 20 mm diameter (5 per sieve)	31.018.15
sieving aids: Agate ball 10 mm diameter (10 per sieve)	55.010.05

Article	200 mm inner upper diameter Order No.	8" diameter Order No.
Sieve pan, stainless steel (dry sieving), 50 mm high	31.100.03	31.102.03
Interposed sieving with 3 spray nozzles	31.024.00	31.025.00
Sieve pan, stainless steel with outlet (wet sieving)	31.110.03	31.112.03
Sieve cover, stainless steel	31.120.03	31.122.03

Analytical Sieves

for Vibratory Sieve Shaker
Frame and mesh of stainless steel,
200 mm or 8" diameter

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®analysette 3
Pro

DIN ISO 3310 part 1 mesh width mm	200 mm Ø 50 mm high Order No.	8" Ø 2" high Order No.	ASTM E-11-1986	BS 410 1986 Table 3.1+2 mesh
25 mm	30.020.03	30.022.03	≡ 1" = 25,0 mm	
22,4 * mm	30.030.03	30.032.03	≡ 7/8" = 22,4 mm	
20 mm	30.040.03	30.042.03		
18 mm	30.060.03	30.062.03	~ 3/4" = 19,0 mm	
16 * mm	30.080.03	30.082.03	≡ 5/8" = 16,0 mm	
14 mm	30.090.03	30.092.03	~ 0,530" = 13,2 mm	
12,5 mm	30.100.03	30.102.03	~ 1/2" = 12,5 mm	
11,2 * mm	30.110.03	30.112.03	≡ 7/16" = 11,2 mm	
10 mm	30.120.03	30.122.03	~ 3/8" = 9,5 mm	
9 mm	30.130.03	30.132.03		
8 * mm	30.140.03	30.142.03	≡ 5/16" = 8 mm	
7,1 mm	30.150.03	30.152.03	~ 0,265" = 6,7 mm	
6,3 mm	30.160.03	30.162.03	≡ 1/4" = 6,3 mm	
5,6 * mm	30.170.03	30.172.03	~ no. 3 1/2 = 5,6 mm	3 = 5,6 mm
5 mm	30.180.03	30.182.03	~ no. 4 = 4,75 mm	3 1/2 = 4,75 mm
4,5 mm	30.190.03	30.192.03		
4 * mm	30.200.03	30.202.03	≡ no. 5 = 4 mm	4 = 4 mm
3,55 mm	30.210.03	30.212.03	≡ no. 6 = 3,35 mm	5 = 3,35 mm
3,15 mm	30.220.03	30.222.03		
2,8 * mm	30.230.03	30.232.03	≡ no. 7 = 2,8 mm	6 = 2,8 mm
2,5 mm	30.240.03	30.242.03	~ no. 8 = 2,36 mm	
2,24 mm	30.250.03	30.252.03		7 = 2,36 mm
2 * mm	30.260.03	30.262.03	≡ no. 10 = 2 mm	8 = 2 mm
1,8 mm	30.270.03	30.272.03		10 = 1,7 mm
1,6 mm	30.280.03	30.282.03	~ no. 12 = 1,7 mm	
1,4 * mm	30.290.03	30.292.03	≡ no. 14 = 1,4 mm	12 = 1,4 mm
1,25 mm	30.300.03	30.302.03	~ no. 16 = 1,18 mm	14 = 1,18 mm
1,12 mm	30.310.03	30.312.03		
1 * mm	30.320.03	30.322.03	≡ no. 18 = 1 mm	16 = 1 mm
900 µm	30.330.03	30.332.03		18 = 0,85 mm
800 µm	30.340.03	30.342.03	~ no. 20 = 0,85 mm	
710 * µm	30.350.03	30.352.03	≡ no. 25 = 0,71 mm	22 = 0,71 mm
630 µm	30.360.03	30.362.03	~ no. 30 = 0,6 mm	25 = 0,6 mm
560 µm	30.370.03	30.372.03		
500 * µm	30.380.03	30.382.03	≡ no. 35 = 0,5 mm	30 = 0,5 mm
450 µm	30.390.03	30.392.03		36 = 0,425 mm
400 µm	30.400.03	30.402.03	~ no. 40 = 0,425 mm	
355 * µm	30.410.03	30.412.03	≡ no. 45 = 0,355 mm	44 = 0,355 mm
315 µm	30.420.03	30.422.03	~ no. 50 = 0,3 mm	52 = 0,3 mm
280 µm	30.430.03	30.432.03		
250 * µm	30.440.03	30.442.03	≡ no. 60 = 0,25 mm	60 = 0,25 mm
224 µm	30.450.03	30.452.03		72 = 0,212 mm
200 µm	30.460.03	30.462.03	~ no. 70 = 0,212	
180 * µm	30.470.03	30.472.03	≡ no. 80 = 0,18 mm	85 = 0,18 mm
160 µm	30.480.03	30.482.03	~ no. 100 = 0,15 mm	100 = 0,15 mm
140 µm	30.490.03	30.492.03		
125 * µm	30.500.03	30.502.03	≡ no. 120 = 0,125 mm	120 = 0,125 mm
112 µm	30.510.03	30.512.03		150 = 0,106 mm
100 µm	30.520.03	30.522.03	~ no. 140 = 0,106 mm	
90 * µm	30.540.03	30.542.03	≡ no. 170 = 0,09 mm	170 = 0,09 mm
80 µm	30.560.03	30.562.03		
71 µm	30.580.03	30.582.03	~ no. 200 = 0,075 mm	200 = 0,075 mm
63 * µm	30.600.03	30.602.03	≡ no. 230 = 0,063 mm	240 = 0,063 mm
56 µm	30.620.03	30.622.03	~ no. 270 = 0,053 mm	300 = 0,053 mm
50 µm	30.640.03	30.642.03		
45 * µm	30.660.03	30.662.03	≡ no. 325 = 0,045 mm	350 = 0,045 mm
40 µm	30.680.03	30.682.03		
36 µm	30.700.03	30.702.03	~ no. 400 = 0,038 mm	400 = 0,038 mm
32 µm	30.720.03	30.722.03	≡ no. 450 = 0,032 mm	440 = 0,032 mm
25 µm	30.760.03	30.762.03	≡ no. 500 = 0,025 mm	
20 µm	30.780.03	30.782.03	≡ no 635 = 0,020 mm	

* ISO 565 R20/3 (Main Series)

The listed analytical sieves and sieve pans are available from stock. Analytical sieves and attachments in other diameters, mesh widths and material on request. For micro-precision sieves, see separate brochure. For cleaning the analytical sieves, we recommend the Ultrasonic Cleaner "laborette 17".

"analysette 3" PRO
Order No. 03.501.00 for 115 V A.C., 115 W
Order No. 03.502.00 for 230 V A.C., 115 W

Weight: net 25 kg, gross 40 kg
Space requirement: 40 x 35 x 20 cm
Packing:
1 wooden case 65 x 45 x 55 cm

Fritsch GmbH, Manufacturers of Laboratory Instruments
Industriestr. 8, D-55743 Idar-Oberstein
Phone (67 84) 70-0, · Fax (67 84) 70 11
Telex 426 203 frits d

94-12-5/M

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Operating Instructions

Vibratory Sieve Shaker

"analysette 3"

Vibratory Micro-Mill

"pulverisette 0"

The "analysette 3" is a vertically vibrating laboratory sieve shaker for the exact separation and classification of grain sizes. Dry powders as well as particles suspended in a liquid can be analysed as to their size. Depending upon the charged quantity and particle size distribution, sieves and pans with different diameters and heights can be placed on the sieve shaker. Dry and wet sieving are possible with metallic woven mesh sieves, plastic sieves or galvanized micro-precision sieves.

The vibratory sieve shaker can be converted into a "pulverisette 0" micro-mill and is therefore also suitable for the micro-milling of laboratory samples ("pulverisette 0": see Section 10 on page 10).

1. Method of operation

The attractive plastic housing contains a sturdy cast base with an electronically controlled electromagnet. Three permanent-elastic leaf springs support the armature of this magnet together with a vibrating plate fastened to it. When the magnet is switched on, the vibrating plate is attracted and when it is switched off the plate bounces back. This forms a vibrating system in which the cast base and magnet are on one side and the armature and vibrating plate are on the other.

The processor-controlled electronic system integrated into the vibratory sieve shaker produces reproducible sieve movements as the result of frequency tuning. In this approach the natural frequency resulting due to the constant mass of the cast element on one hand and the different weight/number of sieves on the other is adapted to the requirements of the movement of the substance to be sieved.

The results obtained with sieve shaker are reliable and reproducible because its frequency is tuned to the natural frequency of the current sieve structure. The desired oscillation amplitude (vibration intensity) of the sieve tower, between 0.5 and 3.0 mm, is achieved under all operating conditions. And this is not the result of excitation at high power; it is achieved by tuning the frequency of the frequency generator to that of the sieve shaker. Exciting a vibrating system at its natural frequency requires only an insignificant amount of energy.

The "analysette 3" has the advantage that it can be operated with far less power input than comparable units. Continuous operation is therefore possible without heating the entire sieve system. Thus the setting button for the sieving amplitude does not simply increase the power of the electromagnet, as with a phase control for example. To increase the amplitude it shifts the frequency of the exciting voltage in the direction of the natural frequency and vice versa.

An integrated additional electronic system can interrupt the sieving process for about 1 second after an adjustable sieving time. This greatly accelerates the sieving process when particularly light substances are to be sieved (e.g. grain or plastic). *(Not with „SPARTAN"-Version)*

When the sieve shaker is used with the program package "autosieve" the serial interface integrated into the shaker permits all its functions to be controlled by a computer and the sieving time, for example, also to be observed with accuracy of a crystal control. During process monitoring or routine measurements in the laboratory, the remote control of the sieve shaker greatly facilitates work while simultaneously ensuring reproducible sieving operations. Sieving time and sieving amplitude, interval control or sieving with micro-precision sieves can be initiated under program control. *(Not with „SPARTAN"-Version)*

In automatic evaluation of sieving results the simultaneous computer control of the sieve shaker greatly reduces the work required. With the "autosieve" program package it is possible to view the sieving results in the various forms of representations immediately after weighing the individual sizes.

2. Setting up the sieve shaker

The sieve shaker should be placed on a level, stable surface. It is not necessary to fasten it in position, but the instrument must be easily accessible and sufficient space must be available to place the sieves next to the shaker.

The instrument rests on three spring-loaded feet (16). These feet can be used to level the shaker in order to obtain a uniform sieving substance distribution over the entire sieving surface.

3. Power supply

3.1 Checking for proper voltage and current

Before connecting the sieve shaker, compare the voltage and current given on the serial plate of the instrument with the values of your network:

120/230 V A.C. with earth, 50 or 60 Hz;
fuse max. 16 A

3.2 Electric fuse

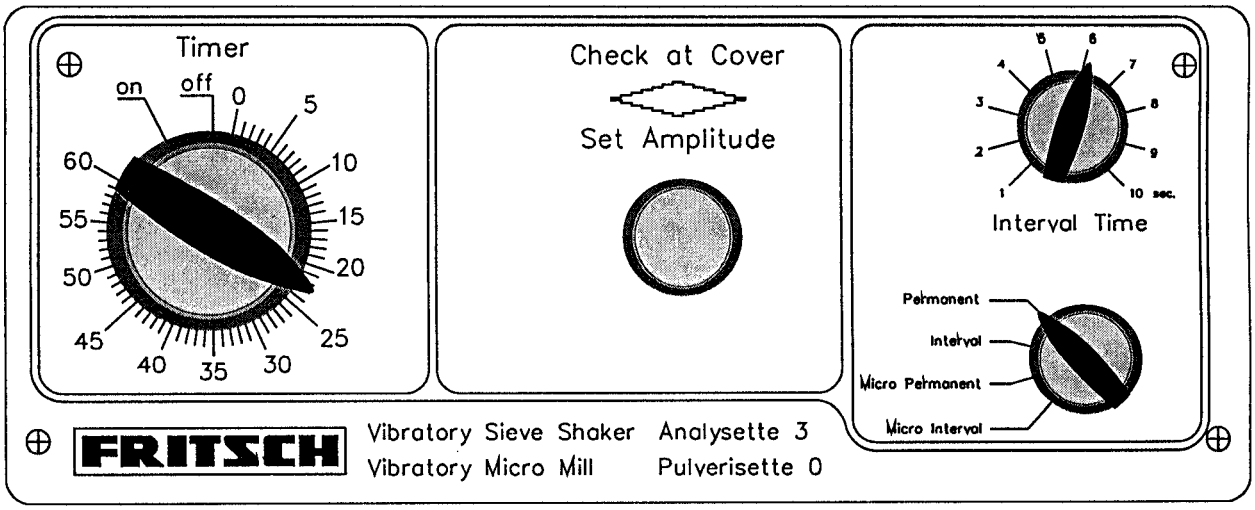
A fuse is located on the PC board in the instrument. In case the sieve shaker is damaged, this fuse isolates the shaker from the mains at a single pole to preclude any consequential damage.

Replacement: fine-wire fuse 4 A 5 x 20

3.3 Serial interface

We supply an interconnecting cable with circular round plug, safety coupling and 9-pole serial connector. It is used to connect the instrument's serial interface to the computer. The circular connector is securely bolted in the sieve shaker. The 9-pole connector is plugged into the computer's serial interface. (Not with „SPARTAN"-Version)

4. Operating elements

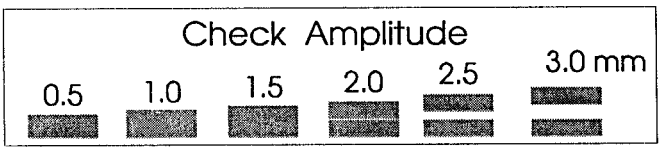


Timer:

position "off"	=	off
position "on"	=	continuous operation
position "0-60"	=	sieving time 0 to 60 minutes

Set Amplitude:

Vertical vibration intensity can be continuously selected (0 to 3 mm)
Can be read from the indicator on the sieve head
The touching lines indicate the amplitude set (e.g. 2.0 mm).



Interval Time: Interruption of sieving for approx. 1 sec, adjustable in intervals of 1 to 10 sec.
(Not with „SPARTAN"-Version)

Function switch:

"Permanent":	approx. 3000 vibrations per minute, amplitude variable, no interval control
"Interval":	approx. 3000 vibrations per minute, amplitude variable, interval control variable
"Micro Permanent":	approx. 4500 vibrations per minute, amplitude constant, no interval
"Micro Interval":	approx. 4500 vibrations per minute, amplitude constant, interval variable.

5. Positioning the sieve stack

The vibrating plate can accept up to

9 sieves 50 mm (or 2") high or
16 sieves 25 mm (or 1") high

between sieve pan and sieve head. The sieves are stacked loosely one upon the other with seals between them
(mesh openings increasing in size to the top).

After the sieve tower has been placed on the vibrating plate (5), the tension belt system (11) is hooked into the sieve head (4), the toothed belts are inserted through the bracket (14) and fastened in place with the clamping lever (13). Turning the knurled knobs (11) to the right (clockwise) uniformly tightens the sieve tower (the toothed straps should then be firmly tight).

Attention:

For safety sake, reduce the oscillation amplitude of the sieve shaker to the lowest setting before switching it on. Once it is switched on the timer will ensure that the amplitude intensity is slowly increased to the optimal level. Very fine sieves are particularly susceptible to damage due to a sieve vibration intensity which is too high.

6. Dry sieving

When dry sieving the sieves are placed on the dry sieve pan (without outlet). The substance to be sieved is placed on the top sieve, the sieve head is placed on the top sieve and the sieve tower is fastened (see Section 5).

To reduce the sieving time, sieving aids can be placed in every sieve with meshes larger than 30 μm.

Agate balls 10 mm in dia., 10 per sieve, Order No. 55.010.05
or
Rubber balls 20 mm in dia., 5 per sieve, Order No. 31.018.15

7. Wet sieving

For wet sieving the sieves are placed on the wet sieve pan (with outlet and evacuation tube). The substance to be sieved should have been dispersed in suspension as well as possible, using a wetting agent if necessary. It is poured onto the top sieve and the wet sieve head is fastened in place.

Attention: Make certain that sieve rings provide a tight seal.

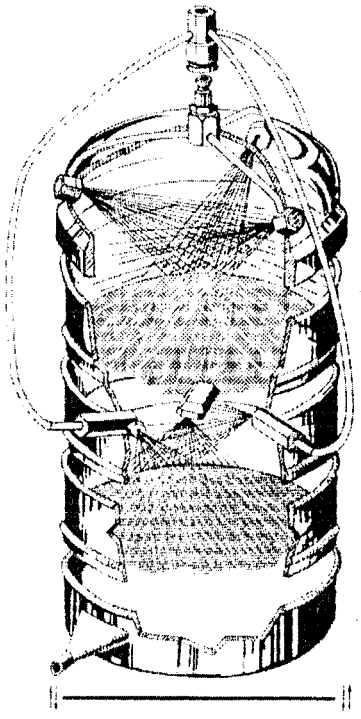
7.1 Supplying the rinsing liquid

The rinsing liquid is supplied to the fast locking clamp on the wet sieve head by connecting a tube (with tube clamp) to it. Supply just enough water or alcohol to prevent blockage.

The maximum amount of liquid is determined by the three nozzles on the sieve head (approx. 1.5 L/min at approx. 2 bar).

A uniform drainage of water from the wet sieve pan indicates that the substance to be sieved and the liquid are well dispersed.

If the liquid fails to run out, this indicates a blockage in a sieve. The resultant overpressure may damage the woven mesh of the sieve.



Remark:

Make sure that the small opening in the wet sieve head is free - only then the overpressure could be avoided.

If necessary, this opening in the wet sieve head can also be used to replenish the wetting agent in the event it is washed out during protracted sieving.

7.2 Wet sieving of substances difficult to sieve

When wet sieving a substance difficult to sieve, reduce the quantity of substance and select sieves with a narrower range of mesh openings.

When sieving a suspension smaller than 200 μm it is advisable to sieve the individual grain sizes separately with just one sieve (with two sieves and an interposed spray ring).

Even if a sieve tower has already been put in place and the sieving has been initiated, it is still possible to change to sieving individual sizes:

After the top sieve is finished (no particles smaller than the mesh openings remain on the sieve), remove the sieve head, take off the sieve and fasten the sieve head on the next test sieve. This ensures that the sprays of the nozzles are directly concentrated on the next size (fraction) of the substance to be sieved.

Proper procedure ensures that every sieve in the sieve tower is sieved under the direct action of the rinsing jets. The jets are aligned in such a manner that the substance to be sieved is rinsed from the edge of the sieve towards the centre. In this process the perspex cover is also sprayed and kept free of deposits of substances.

7.3 Wet sieving with interposed spray ring

When wet sieving substances difficult to sieve, an interposed spray ring can be placed on a lower sieve in order to avoid blockage. After this ring has been connected to the tube system, three spray nozzles additionally spray liquid in, thus countering a possible blockage. These nozzles are arranged in such a manner that both the sieve surfaces above and below it are sprayed.

If necessary, a second interposed spray ring can be inserted over a sieve with a tendency to clog and connected to the liquid supply.

7.4 Collecting the smallest particles

If it becomes necessary to collect the smallest particle size, the one coming through the bottom sieve, the evacuation tube can be connected to, for example, a suction filter.

8. Cleaning the sieves

To ensure that the sieves are thoroughly cleaned, we recommend using the **ultrasonic bath "laborette 17"**; the sieves can be placed in it upright or upside down. Using a brush may damage the woven mesh and should be restricted to the stronger, large-mesh sieves.

Wherever possible, the sieves should be cleaned after each use.

To dry the sieves they can be placed in a drying oven at max. 95øC (rinsing the sieves beforehand with alcohol reduces the drying time).

9. Sieving with micro-precision sieves *(Not with „SPARTAN"-Version)*

Only small quantities can be sieved with micro-precision sieves:
A few hundred milligrams to no more than a few grams can be sieved, depending on the particle size distribution and the mesh size of the sieve. The suitable feed quantity is ascertained through experimentation.

When sieving with micro-precision sieves, set the function switch to the position "Micro Permanent" or "Micro Interval". Sieving is carried out at constant vibration intensity.

9.1 Assembling the sieve tower

Before placing the funnel (sieve pan) on the tower, turn the rubber ring on the vibrating plate until the three threaded holes covered with caps are visible.

Once the caps have been removed the funnel can be centered on the vibrating plate and bolted down with the spanners and knurled knobs. The three spanners rest on the lower edge of the funnel and on the vibrating plate.

Fasten the first spacer ring (and its seal) on the funnel with a fast locking ring. The sieves, with one seal at the top and one at the bottom, are placed between two fast locking rings and fastened with one fast locking ring.

To seal the sieve tower, the cover is placed on the top fast locking ring and is also fastened with a fast locking ring.

This cover is lifted off to feed in the sample and is then replaced, before switching on the sieve shaker.

9.2 Wet Sieving

Special instructions must be observed when wet sieving with micro-precision sieves:

Mount funnel and spacer ring as for dry sieving. Close the evacuation hose with a tube clamp.

Switch the instrument on with timer 1.

Attention:
Set the function switch for sieve types to the position
"Micro Permanent" or
"Micro Interval".

Afterwards fill funnel and spacer ring with liquid to the spacer ring and insert the sieve at an angle - sieve foil down.

If a sample is to be sieved in the sieve tower with a number of sieves, insert them in the same manner.

Attention:
The flow of liquid in and out must be controlled so that the sieve tower remains full during the entire sieving process.

The substance to be sieved is poured onto the top sieve, in suspension, and the sieve is then covered with the sieve cover.

After the sieving in the top sieve is finished, the liquid level is lowered to the level of the sieve foil, the outlet is again closed and the sieve cover is removed complete with nozzle, spacer ring and sieve. Afterwards the cover is replaced, fastened and the next sieve is processed.

9.3 Cleaning the micro-precision sieves

Attention: Handle the sieves very gently.

The **ultrasonic bath "laborette 17"** is recommended to thoroughly clean the sieves. It is not permissible, however, to place the micro-precision sieves directly in the ultrasonic bath. Instead they are placed in a glass container (5 litre glass beaker with walls approx. 4 mm thick). If placed directly into the bath or if a glass beaker with thinner walls is used, the sieve foil may be destroyed during ultrasonic cleaning. The micro-precision sieves are placed in the cleaning liquid - **with sieve foil up.**

The glass beaker with sieve is placed in the wire basket of the ultrasonic bath. Before switching the bath on, you must check the level of the liquid in the "laborette 17": it should be about 3 to 5 cm below the upper edge of the bath to be certain to achieve a good coupling with the ultrasonic energy.

Never operate the ultrasonic bath longer than 3 minutes when cleaning micro-precision sieves.

10. Converting to the micro-mill

When using the sieve shaker as a micro-mill, the grinding mortar is placed on the vibrating plate of the sieve shaker in place of a sieve pan. The mortar fits into the recess of the plate and is subsequently fastened to the cover and the tightening belts.

After the grinding balls are inserted and the substance to be ground is filled in, the cover is put on, the toothed belts are hooked in and the cover fastened by turning the star knobs to the right.

The best possible grinding results are obtained at low to middle amplitude setting, since the milling frequency of the grinding ball is then at its highest.

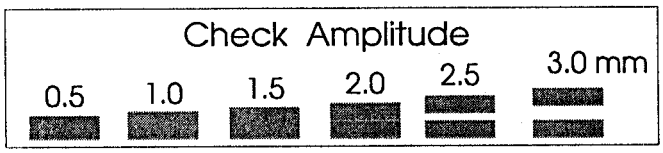
Attention:

For safety sake, the amplitude setting is set to the lowest value before switching on the micro-mill.

The amplitude setting is not increased slowly to the optimal value until after the timer switches the mill on. Otherwise the grinding ball lying on the substance to be ground could bounce against the cover and break it. The oscillation amplitude selected for grinding samples must permit the ball to bounce on the substance to be ground.

The amplitude is controlled at the indicator on the cover:

Two lines in contact indicate the amplitude (see page 3).



Between 0.1 cc to 5 cc of the substance to be ground can be poured into the mortar bowl dry or in suspension. When put on properly and tightened, the cover is tight and prevents material losses as the result of splashing or dust formation.

Depending on the grindability of the sample and the milling time, up to 95% of the substance ground is smaller than 10 to 20 μm. In some cases, final sizes of less than 10 μm are achieved.

11. Maintenance

Apart from the regular cleaning, sieve shaker and micro-mill require no maintenance.

The following situation may arise after protracted operating time:

The material to be sieved no longer distributes uniformly over the sieving surface.

This difficulty can be rectified by adjusting the spring-loaded feet so that the level of the sieve shaker can be adjusted.

12. Guarantee

The guarantee card supplied with this instrument must by returned to the manufacturer completely filled out, otherwise the guarantee will not become effective.

FRITSCH GmbH, manufacturers of laboratory instruments in Idar-Oberstein, Germany, and our Application Laboratory or our agent in your country will be pleased to assist you in word and deed.

If you have any queries, do not forget that we need the serial number stamped on the nameplate.

Ersatzteil-Liste Grundgerät A3/P0 110V/230V
04.01.93
Spare part list basic appliance A3/P0 110V/230V
04.01.93

Pos	Art.Nr.	Bezeichnung	Description
1	03.116.00	Steuerung A3/P0 kpl	control system A3/P0 cpl.
	81.479.00	Zeitschalter	Timer
2	03.109.09	Federhalterung B, unten	support for spring B, below
3	03.101.12	Ständer A3/P0	stanchion A3/P0
4	03.102.13	Teller A3/P0	plate A3/P0
5	03.133.15	Federnde Unterlegplatte	springing spacer
6	03.134.10	Unterlegplatte Stahlblech	spacer sheet steel
7	93.110.09	Tellerfedern di=8,2/da=20/t=1	belleville Spring washer di=8,2/da=20/t=1
8	91.514.09	Zyl. Schraube M8x25 DIN 912-12.9	cylinder head stud M8x25 DIN 912-12.9
9	03.123.00	Federkreuz kpl. 220V/50Hz	spring assembly 220V/50Hz
10	91.515.09	Zyl. Schraube M8x30 DIN 912	cylinder head stud M8x30 DIN 912
11	91.515.09	Zyl. Schraube M8x30 DIN 912	cylinder head stud M8x30 Din 912
12	03.104.09	Magnetbefestigung B	magnetfixing B
13	03.103.09	Magnetbefestigung A	magnetfixing A
14	91.519.09	Zyl. Schraube M8x80 DIN 912	cylinder head stud M8x80 DIN 912
15	91.522.09	Senkschraube M8x16 DIN 7991	countersunk scr. M8x16 DIN 7991
16	03.100.16	Gehäuse A3/P0	cage A3/P0
17	93.100.09	Druckfeder Enden angelegt, geschl.	spring
18	03.108.09	Federhalterung A, oben	spring support A, top
19	92.134.09	Gewindestift M8x35 DIN 553	setscrew M8x35 DIN 553
20	03.121.00	Spanner für Spanngurt A3	tightener for tension thread A3
21	03.120.00	Spanngurt mit Kordelgriff	tension thread with knurled knob
22	03.130.13	Frontplatte A3/P0	frontpanel A3/P0
23	92.106.10	Blechschraube B3,9x16 DIN 7981	sheet metal scr.B3,9x16 DIN 7981
24	81.403.00	Knebelknopf D=40mm kpl.	knob for timer
25	81.562.00	Drehknopf D=23 kpl.	control knob
26	81.405.00	Drehknopf D=23 kpl.	control knob
27	81.405.00	Drehknopf D=23 kpl.	control knob
28	81.002.00	Elektromagnet 220V/50Hz	electromagnet 220V/50Hz
29	91.310.09	Zyl. Schraube M5x8 DIN 912	cylinder head stud M5x8 DIN 912
30	86.936.00	Gerätebuchse 3-polig	apparatus plug

FRITSCH GmbH
Laborgeraetebau

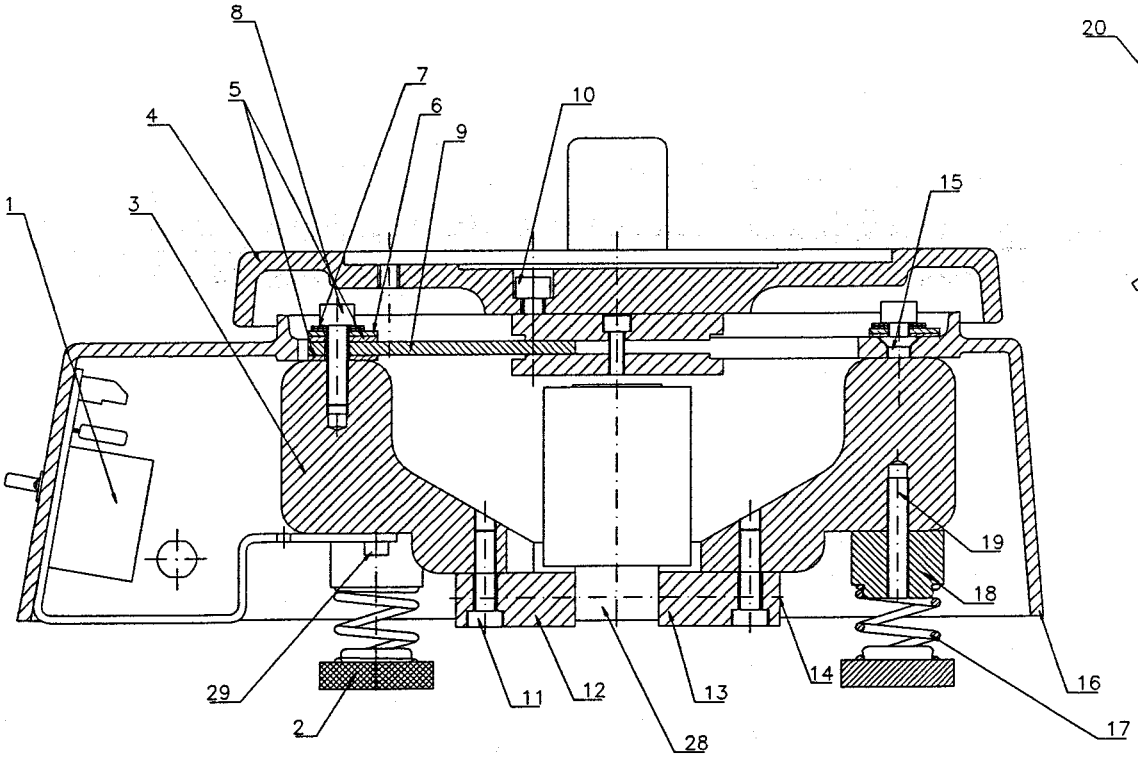
Vibrations–Siebmaschine
Vibratory sieve shaker
Analysette 3

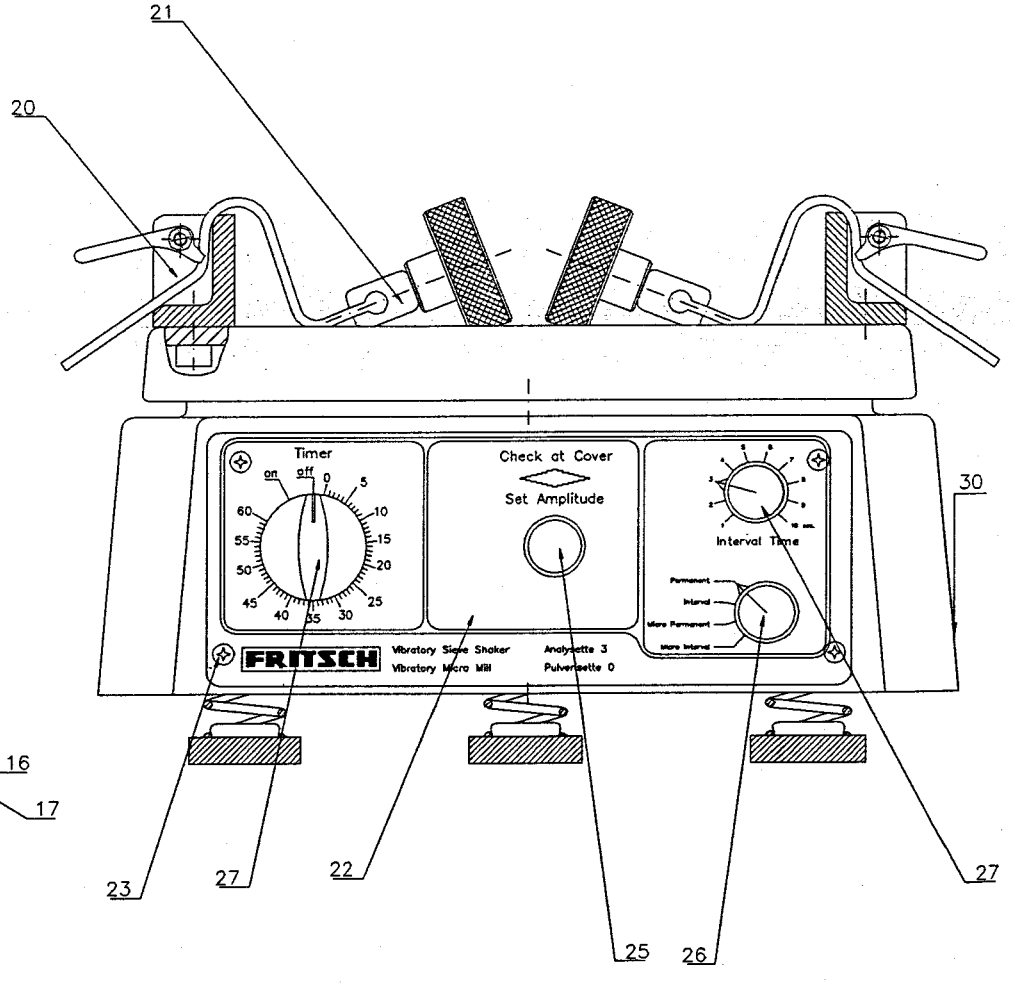
Laenge/length : 335mm

Breite/width : 270mm

Hoehe/height : 200mm

Stand : 01.04.94





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Ersatzteil-Liste Grundgerät A3/P0 110V/230V
(Spar-Version)
04.01.93

Spare part list basic appliance A3/P0 110V/230V
(Economy-Version)
04.01.93

Pos	Art.Nr.	Bezeichnung	Description
1	03.117.00	Steuerung A3/P0 kpl	control system A3/P0 cpl.
	81.479.00	Zeitschalter	Timer
2	03.109.09	Federhalterung B, unten	support for spring B, below
3	03.101.12	Ständer A3/P0	stanchion A3/P0
4	03.102.13	Teller A3/P0	plate A3/P0
5	03.133.15	Federnde Unterlegplatte	springing spacer
6	03.134.10	Unterlegplatte Stahlblech	spacer sheet steel
7	93.110.09	Tellerfedern di=8,2/da=20/t=1	belleville Spring washer di=8,2/da=20/t=1
8	91.514.09	Zyl. Schraube M8x25 DIN 912-12.9	cylinder head stud M8x25 DIN 912-12.9
9	03.123.00	Federkreuz kpl. 220V/50Hz	spring assembly 220V/50Hz
10	91.515.09	Zyl. Schraube M8x30 DIN 912	cylinder head stud M8x30 DIN 912
11	91.515.09	Zyl. Schraube M8x30 DIN 912	cylinder head stud M8x30 Din 912
12	03.104.09	Magnetbefestigung B	magnetfixing B
13	03.103.09	Magnetbefestigung A	magnetfixing A
14	91.519.09	Zyl. Schraube M8x80 DIN 912	cylinder head stud M8x80 DIN 912
15	91.522.09	Senkschraube M8x16 DIN 7991	countersunk scr. M8x16 DIN 7991
16	03.100.16	Gehäuse A3/P0	cage A3/P0
17	93.100.09	Druckfeder Enden angelegt, geschl.	spring
18	03.108.09	Federhalterung A, oben	spring support A, top
19	92.134.09	Gewindestift M8x35 DIN 553	setscrew M8x35 DIN 553
20	03.121.00	Spanner für Spanngurt A3	tightener for tension thread A3
21	03.120.00	Spanngurt mit Kordelgriff	tension thread with knurled knob
22	03.130.13	Frontplatte A3/P0	frontpanel A3/P0
23	92.106.10	Blechschraube B3,9x16 DIN 7981	sheet metal scr.B3,9x16 DIN 7981
24	81.403.00	Knebelknopf D=40mm kpl.	knob for timer
25	81.562.00	Drehknopf D=23 kpl.	control knob
26	81.002.00	Elektromagnet 220V/50Hz	electromagnet 220V/50Hz
27	91.310.09	Zyl. Schraube M5x8 DIN 912	cylinder head stud M5x8 DIN 912

FRITSCH GmbH
Laborgeraetebau

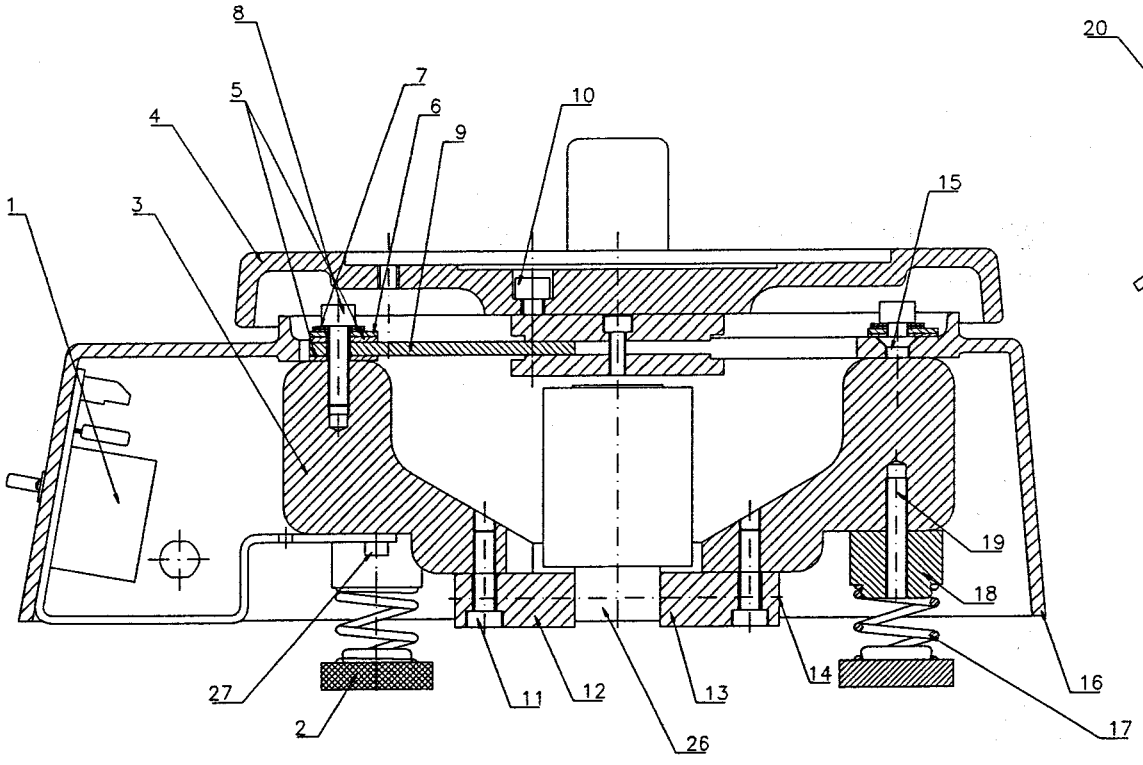
Vibrations–Siebmaschine
Vibratory sieve shaker
Analysette 3

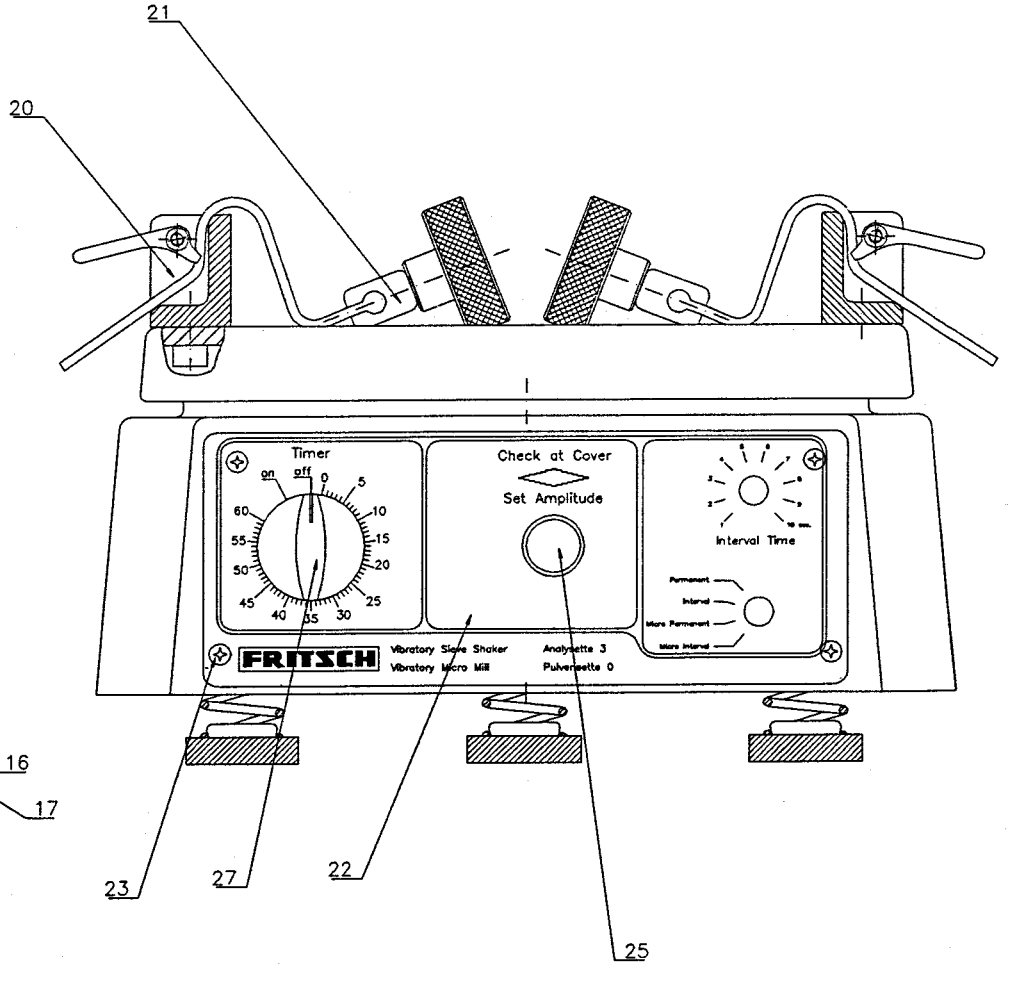
Laenge/length : 335mm

Breite/width : 270mm

Hoehe/height : 200mm

Stand : 01.04.94





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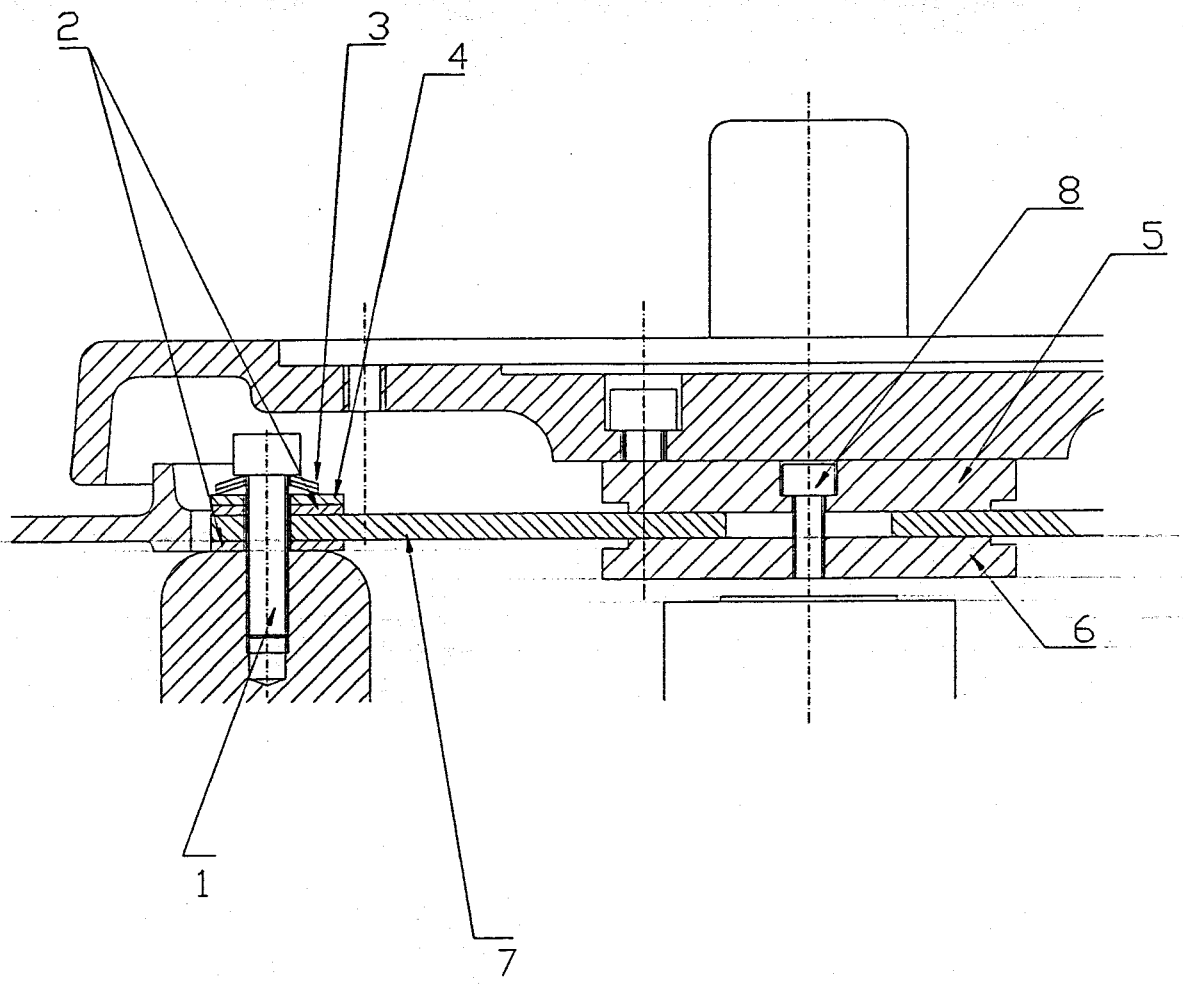

pos. drawing	no.	order no.	designation
		90.040.00	screw set A3/P0 with frequency regulation
1	3	91.514.09	cyl.head screw M8x25 DIN 912-12.9
2	6	03.133.15	springing spacer
3	6	93.110.09	belleville spring washer 8,2mm
4	3	03.134.10	spacer sheet steel
		03.123.00	spring assembly cpl.
5	1	90.007.09	upper spring grip
6	1	90.008.09	under spring grip
7	3	93.301.16	laminated spring 5,15mm
8	1	91.412.09	cyl.head screw M6x16 DIN 912

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Verwendung: A3/P0

Freimasstoleranzen nach DIN 7168: ☐ fein ☒ mittel ☐ grob

Oberfläche DIN ISO 1302

Mass-Stab 1:1

Gewicht

Rohmaterial

	Tag	Name
Bearb.	25.05.94	Baer
Gepr.		
Norm		

Benennung: screwing spring assembly

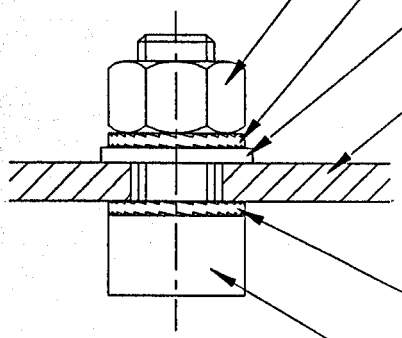
Zeichn.-Nr.

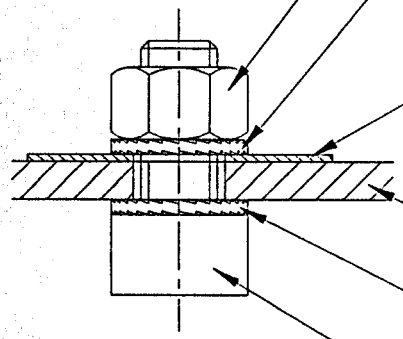
Blatt 1

1 Bl.

Ausgabe	Aenderung	Tag	Name

(Ers. f.) (Ers. d.)





Änderungsindex	Bezugsschlüssel	Oberfläche
Änderungsindex A0	Kaufteil	t:\acad\draw\a3n\earth.dwg

Verwendung: 03.116.00 Steuerung A3/P0 115/230V
03.117.00 Steuerung A3/P0 115/230V Sparversion

Freimaßtoleranzen nach DIN 7168: ☐ fein ☒ mittel ☐ grob

Oberfläche DIN ISO 1302

Maßstab 1 : 1

Gewicht

Rohmaterial

	Tag	Name
Bearb.	23.09.94	Bör
Gepr.		
Norm		

Benennung: earthing of the electronics

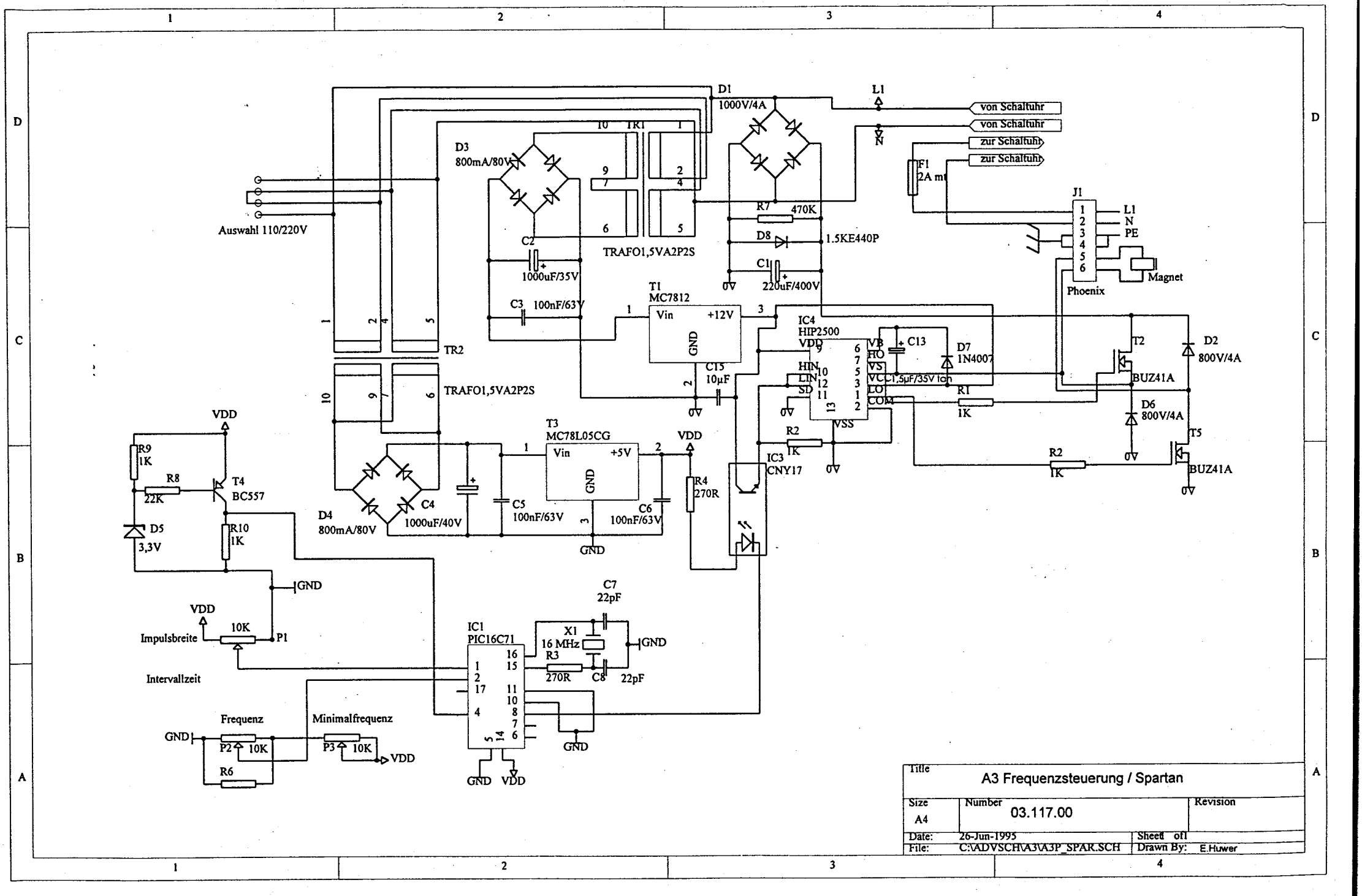
Ausgabe	Änderung	Tag	Name

FRITSCH GmbH
Industriestraße 8
D-55743 Idar-Oberstein

Zeichn.-Nr.

Blatt 1
1 Bl.

(Ers. f.) (Ers. d.)


Auswahl 110/220V
TRAFO1,5VA2P2S
TR2
TRAFO1,5VA2P2S
D3
800mA/80V
D4
800mA/80V
C2
1000uF/35V
C3 100nF/63V
C4
1000uF/40V
C5
100nF/63V
C6
100nF/63V
D1
1000V/4A
R7 470K
D8 1.5KE440P
C1
220uF/400V
T1
MC7812
Vin +12V
GND
C15
10µF
T3
MC78L05CG
Vin +5V
GND
R4
270R
L1
N
von Schaltuhr
von Schaltuhr
zur Schaltuhr
zur Schaltuhr
F1
2A mt
J1
L1
N
PE
Phoenix
Magnet
IC4
HIP2500
VDD
HIN
LIN
SD
VB
HO
VS
VCC
LO
COM
VSS
C13
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D7
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R1
1K
R2
1K
IC3
CNY17
T2
BUZ41A
D2
800V/4A
D6
800V/4A
T5
BUZ41A
R2
1K
VDD
R9
1K
R8
22K
T4
BC557
D5
3,3V
R10
1K
GND
VDD
Impulsbreite
10K
P1
Intervallzeit
Frequenz
Minimalfrequenz
GND
P2
10K
P3
10K
VDD
R6
C7
22pF
IC1
PIC16C71
X1
16 MHz
R3
270R
C8
22pF
GND
GND
GND
VDD
Title
A3 Frequenzsteuerung / Spartan
Size
A4
Number
03.117.00
Revision
Date:
26-Jun-1995
Sheet of1
File:
C:\ADVSCH\A3\A3P_SPAR.SCH
Drawn By:
E.Huwer