



Hodge Clemco Ltd

Auto MZ Filter Units Owners Manual

TSOM 535

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Installation Operation and Maintenance Instructions for Auto M Z-Series mechanically cleaned Dust Control Units, suitable for use with potentially explosible dusts.

Unit designation:

The product range comprises eight basic unit sizes: -

Auto M Z 7.5, -Z 15, -Z 25, -Z 30, -Z 50, -Z 60, -Z75 and Auto M Z 90.

Exhaust ventilation fans, ranging from 0.75kW to 15.0kW, may be fitted, with the kW rating added to the unit designation thus: - for example Auto M Z 25/7.5.

Description of Unit and its intended use.

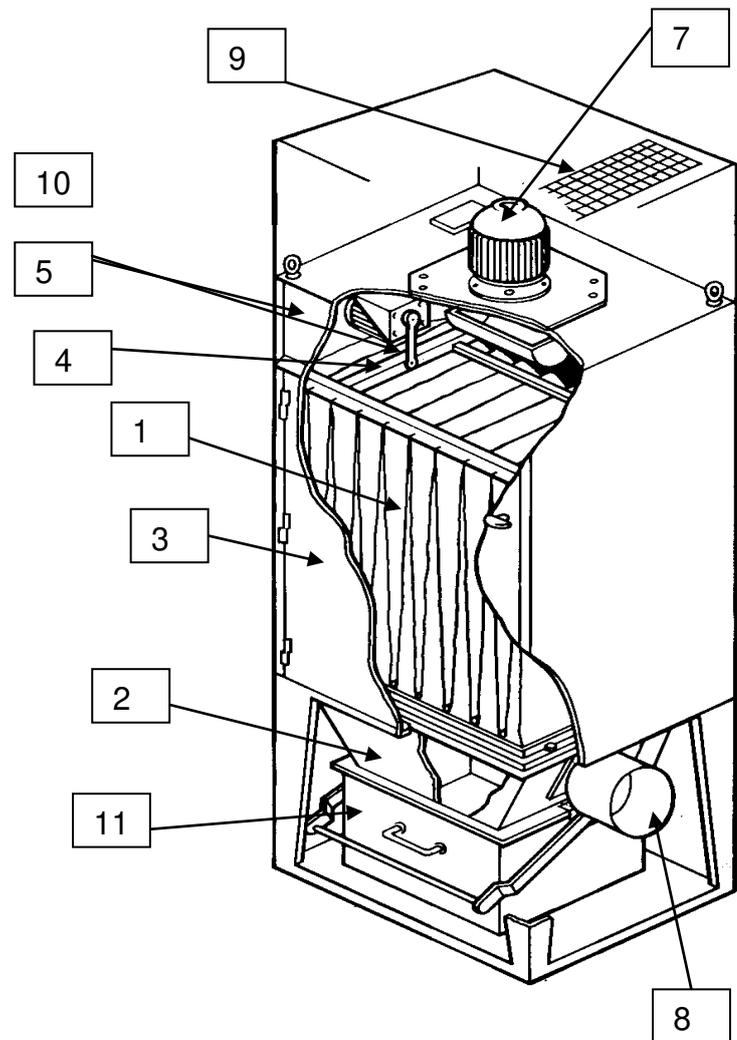
The Auto M Z Series is a range of robust, self contained mechanically cleaned dust filter / collector units. It is designed to extract dust laden air from non-continuous processes, that is, so that the fan can be temporarily stopped from time to time to allow the mechanical cleaning to operate.

The unit may also be supplied without hopper, for direct fixing to a silo or container to ventilate displaced air, either naturally or with the aid of an exhaust ventilation fan.

Main Features

1. Filter body with filter bags
2. Hopper section
3. Access door
4. Shaker frame and linkage
5. Internally mounted shaker motor
6. Electrical controller (separate item)
7. Fan
8. Dirty air inlet
9. Cleaned air outlet from silencer
10. Top discharge air silencer *
11. Quick release dust collection bin

*Note other silencer configurations available

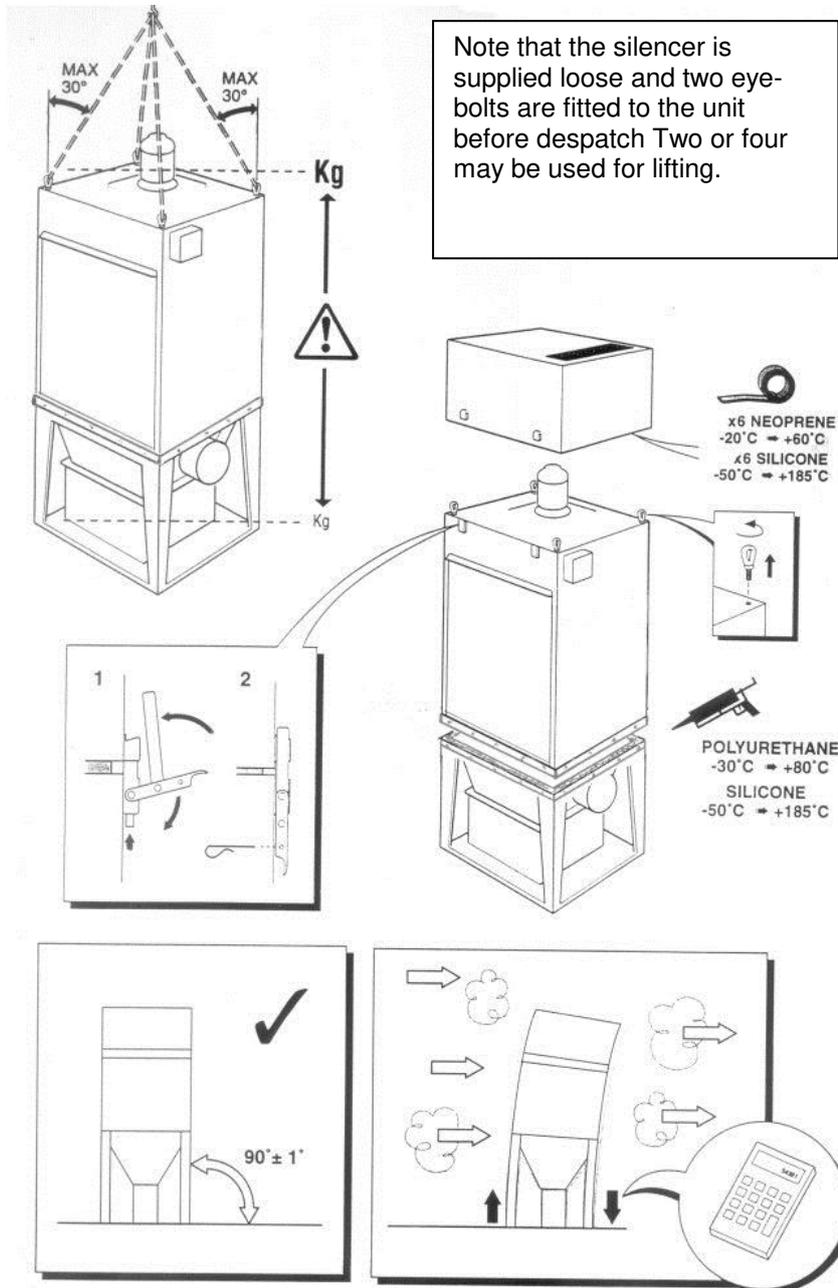


Shipment.

Normally the filter is delivered in two parts with a bolted joint between the filter body and hopper. Smaller units may be manufactured and shipped as a single complete unit.

Unit assembly.

If the unit is supplied in one piece, then transport upright and lift as shown below.

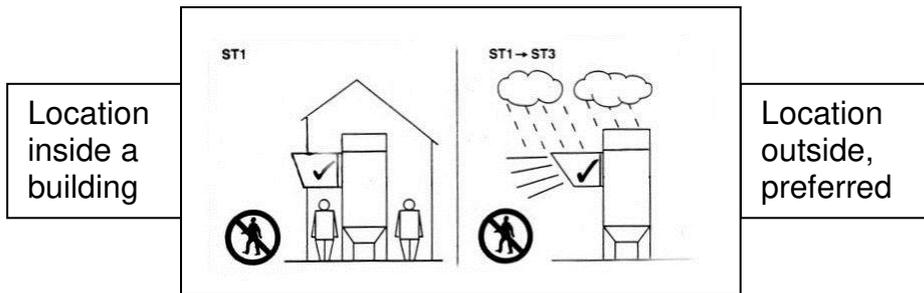


Installation.

- **Safety note:** Installation should be performed only by suitably qualified and experienced personnel.

The unit should be positioned according to the installation drawing, ensuring that space is allowed for access to the front and to the electrical terminal box.

Particular care should be taken when siting a filter fitted with an **explosion relief panel** so that it complies with national regulations. **Please also see Appendix 1** below. It must be free to open with no obstructions. A safety exclusion zone outside the relief panel must be established. If in doubt, please contact.



If the hopper is supplied as a separate item, lift into position with a suitable crane or forklift onto a prepared base. If required, it may be bolted to the ground. Units fitted with **explosion panels** or in exposed locations should be fixed to their foundations.

Add mastic sealant to the hopper top flange then position the filter top section complete with fan, but with the silencer removed, using a crane or forklift truck. Refer to the diagram above for sling angles etc.

Insert screws into the vertical joining flange.

Remove the lifting eyebolts and position the silencer (if supplied).

Ductwork connections.

Duct connections within work places must comply with current local regulations. In some applications with explosive dust types, explosion vents or non-return dampers in the inlet and outlet ducts may be required.

- **Safety note:** In order to prevent unintentional access to rotating parts all duct joints up to 1 meter from rotating elements (e.g. screw conveyor, rotary valve) should have flanged joints or similar so that access is only possible by using tools.

Electrical connections.

Normally Auto M units are supplied with a combined fan and shaker controller.

Important: this controller must not be mounted directly onto the filter unit because of vibration during the cleaning cycle. Typically it would be mounted on an adjacent wall.

For filters with a controller not supplied by, an exact equivalent approved by should be used. If not, then please consult or the guarantee on the product may become void.

The Auto M fan and shaker motors are pre-wired to a terminal box mounted on the unit. Specific connections are shown in the circuit diagram supplied with the controller. Check correct rotation of the fan. A symbol on the fan case indicates correct direction of rotation. Direction of rotation of the shaker is not important. All associated electrical installations must comply with national wiring regulations.

If the filter is normally out of site of the operators....

If the dust control unit is part of a plant where the filter is normally out of sight and where a defective filter function may lead to a dangerous situation, the operation of the filter must be monitored by means of a differential pressure indicator located in a prominent position, or an alarm switch, so that any malfunction can be notified immediately.

Operation.

First start.

Before using the Auto M for the first time, check that the installation is sound and ductwork complete.

Start the fan and check that its operation is smooth. Measure the fan motor current and check this against the motor full load current. If the current is too high, stop the fan immediately, check for correct fan rotation or refer to the fault-finding section in the Operating Instructions.

The Auto M unit may have a sliding damper on the cleaned air side, fitted to the fan or silencer outlet. This should be set to regulate the airflow when commissioning.

Stop the fan in order to check the operation of the shaker. There should be a time delay of approximately 2 minutes before the shaker starts, to allow the fan to stop. The shaker should then run for approximately 8 seconds.

Normal operation.

1. Check that dustbins are not overfilled. They would normally be emptied at the end of each operating period, when the automatic after-cleaning has finished and the dust has settled. If the bin is fitted with a "bin-balance" connecting pipe to the filter body, then it is essential that a plastic bin liner is fitted before use.
2. Start the fan by pressing the "start" button on the controller.
3. After use press the "clean" button on the controller. This will de-energise the fan and start the cleaning cycle.

If in doubt, please refer to the Technical Office for assistance.

Maintenance

- **Safety note:** All maintenance operations should be performed only by suitably qualified and experienced personnel. Isolate electrical supply before commencing. Use only original spare parts for repairs.

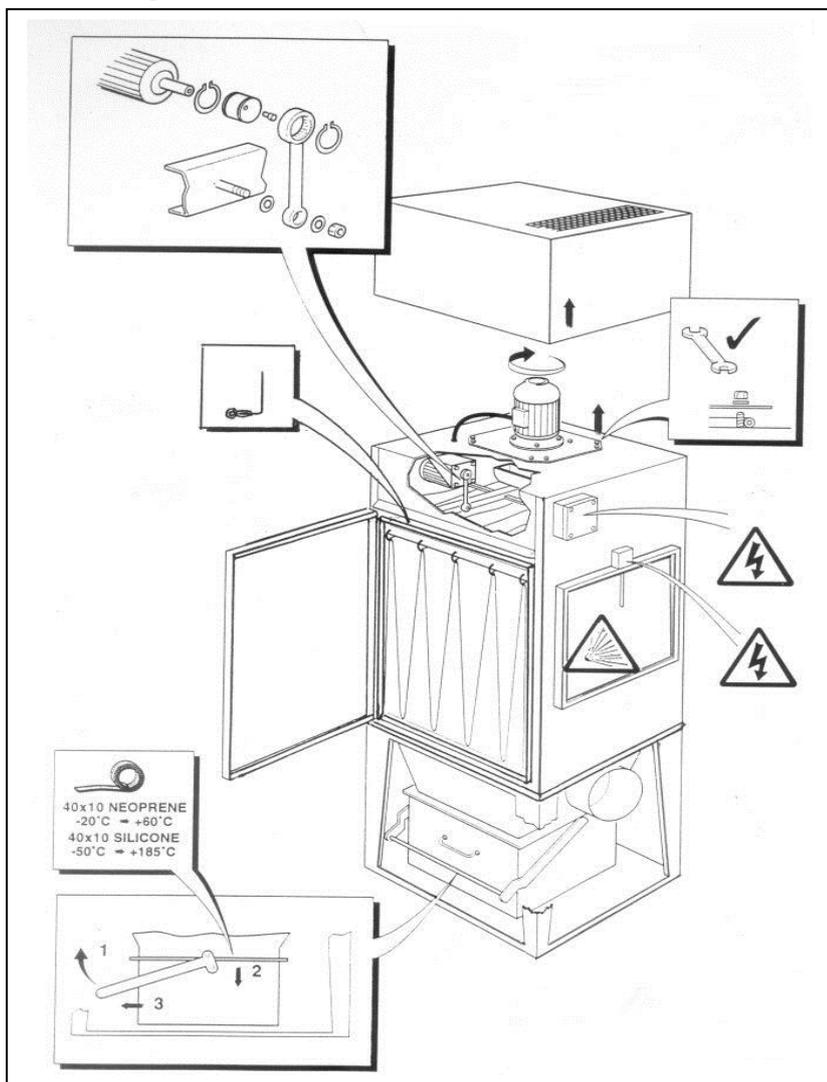
Filter housing. No maintenance is required other than normal occasional cleaning.

Integral fan. The built in fan requires no regular maintenance. If any vibration arises during operation, this will probably be caused by dust deposits on the fan impeller. The fan impeller should be cleaned and the source of the dust leakage investigated. Do not allow persistent vibration as damage will result.

Fan and shaker motors. These motors are maintenance free. For special motors, maintenance instructions will be supplied as appropriate.

Planned Maintenance. The Auto M Dust Control Unit and its electrical controller should be maintained at the intervals stated, to ensure long term reliability.

Worn or damaged parts should be replaced as soon as possible, to minimise the risk of injury or greater damage.



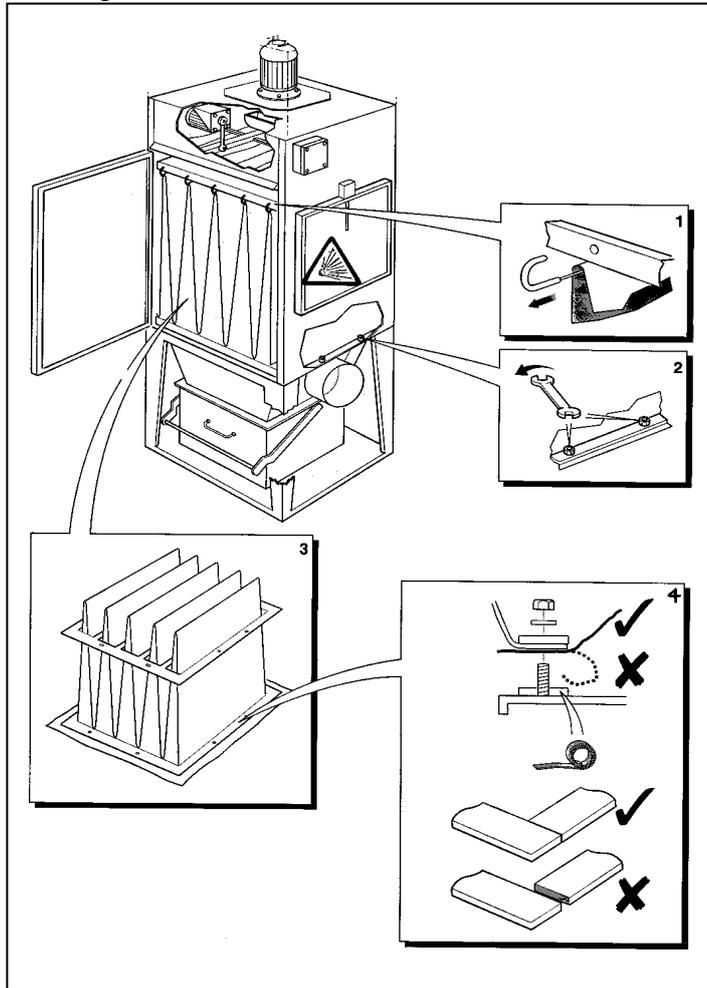
Recommended Interval:	months	hours
1. Empty dust collection bins		Daily or as necessary
2. Check the pressure drop on manometer if fitted*		Daily when unit starts
3. Check that the cleaning cycle operates		Daily when unit stops.
4. Check for dust emissions from the filter or fan		Daily
5. Check mechanical dust disposal features, if fitted		Daily
6. Check fan for wear and corrosion	6	1000
7. Check duct connections for wear and leakage 500	3	
8. Check condition of electrical connections and anti-static earth bonding, if fitted 1000		6
9. Check motors for signs of overheating		1 or as necessary
10. Check collection bins for damage and effective sealing	6	1000
11. Inspect filter bags for damage or dust penetration	6	1000
12. Check flaps and dampers for operation and wear	6	1000
13. Check filter housing and hopper for leakage and wear	6	1000
14. Clean exterior of controller with a moist cloth	1	300
15. Check tightness of flange connections	6	1000
16. Check, clean, or replace secondary filters, if fitted	1	300
17. Check operation of the electrical controls, including safety features	6	1000

* After an initial running-in period, the differential pressure should generally settle within the range 500Pa (50mm) to 1250Pa (125mm).

When restarting after maintenance work, start the fan and check direction of rotation. Run the fan for a few minutes and check filter differential pressure manometer reading, if fitted. Reading should be less than 100 Pa (10 mm) for a new bag. Press "clean" button on controller and check time delay before clean starts, then duration of clean cycle. These times should be approx. 2 minutes delay followed by 8 seconds clean. Check that unit will re-start after this cleaning cycle, by pressing "start" button.

Replacement of filter bag(s).

- **Safety note.** Stop and isolate the plant and use suitable personal safety equipment before performing maintenance work on the filter unit.



Removal of filter bag:

1. Open front access door and release bag from shaker frame by unhooking the suspension grips. Let the bag fall down onto the filter frame at its base.
2. Remove the nuts and washers from the lower bag mounting frame.
3. Lift the mounting frame complete with the filter bag from the studs.
4. Lift the frame and filter bag carefully out of the filter unit.
5. Separate the frame from the bag. Clean the frame.

Check bag for abrasion, dust penetration or other damage. A faulty bag should be replaced with a new one.

Fitting a new filter bag:

1. Fit the bag mounting frame over bag, pulling a vee-pocket through each slot. Stretch out the bottom skirt so that it does not fold under the bag.
2. Replace the self adhesive sealing strip around the filter mounting area.

3. Fit the filter bag and mounting frame into the filter, over the locating studs. Ensure bag material flange is securely trapped under the mounting frame, with the skirt not trapped (see diagram 3 above); replace nuts and washers.
4. Thread the suspension grips through the top of each vee-pocket and hook the grips onto the shaker frame

Replacement of the Fan Impeller (Integral fan)

1. Isolate the electrical supply.
2. Remove silencer, if fitted.
3. Disconnect the electrical cable to the motor terminal box.
4. Release the screws securing the motor mounting plate unit top.
5. Withdraw the motor/mounting plate/fan impeller assembly and lower to the ground.
6. Remove the screw and washer at the end of the motor shaft and withdraw the fan impeller, retaining the shaft key for re-use.
7. Re-assemble as above, but in reverse order. Ensure that motor shaft, keyway, key and fan impeller boss are completely clean before putting these parts together.

Check again, once the fan assembly has been mounted, that the fan impeller rotates freely without rubbing against anything. Any defects must be corrected before the fan is put into use again.

Replacement of internally mounted shaker motor.

Removal:

1. Isolate the electrical supply.
2. Open front access door and release sufficient bag suspension grips to gain access to shaker motor.
3. Disconnect shaker motor cable from filter unit terminal box.
4. Remove nut and washer from shaker frame pin.
5. Remove circlip from shaker motor cam and slide linkage free.
6. Release face mounting screws to remove motor from mounting bracket and withdraw motor complete with its cable..

Before re-assembly check pivots and bearing surfaces for wear or damage. Replace if necessary.

Replacement:

1. Fit shaker motor and pass cable back into terminal box. Re-connect cable to terminals marked "shaker". When fixing motor face mounting screws, apply Loctite or similar to threads to prevent shaking loose.
2. Reassemble linkage to pin and cam, securing with nut and washer to pin and circlip to cam.
3. Attach bag suspension grips.
4. Close and secure front access door.

Replacement of externally mounted shaker motor (optional arrangement).

Proceed generally as above but note that the shaker motor is located on a bracket on top of the unit case. To gain access, remove the plate on the front of the bracket.

Fault location and suggested remedies.

Fault	Possible cause	Recommended activity
Blocked filter / low airflow	Filter not cleaned frequently enough No cleaning on filter "clean" operation Filter bags are saturated with fine dust	<ul style="list-style-type: none"> * Cleaning cycle after stop: Stop the filter more frequently * / check that cleaning does in fact take place * Check that the emergency stop is not activated on normal stop / check that the electrical connection is correct so that the cleaning operates <ul style="list-style-type: none"> * Clean / replace the filter bags
Material accumulates in filter bottom	Blocked emptying system, if other than bin Wet waste sticks to the walls Air circulation in filter bottom prevents the waste from being transported to the outlet opening	<ul style="list-style-type: none"> * Check, possibly that the emptying system works correctly * Check that the dust collection bin is not full * Seal filter housing * Insulate the filter and hopper against condensation * Reduce water content of waste * Fit pre-separation section after seeking advice from technician
The sacks or quick release bins are not equally filled	Natural phenomenon which depends on the composition of the waste	<ul style="list-style-type: none"> * Accept this condition
The filter doors are leaking or are blown open	The door is not closed correctly Internal operating pressure is higher than specified (positive pressure operation)	<ul style="list-style-type: none"> * Close the door correctly * Lower the operating pressure or reinforce filter and access door
The filtered air contains dust	Damaged filter bag(s) The filter bag(s) are not fitted or sealed correctly Wrong filter material The waste container is intended for use with a plastic liner but no plastic liner is used	<ul style="list-style-type: none"> * Replace defective filter bag * Mount the filter bag(s) correctly * Contact technician * Use a plastic bag or disconnect and seal the connection for the bin balancing pipe

Dust emerges from the extraction duct connection during the filter shaking process	A very short duct system has been connected to the filter's inlet opening * Leaking return flap	* Make the duct system longer * Mount a return flap in the inlet duct * Check that the closing flap is level and shuts tight
The fan vibrates	* The fan impeller is rotating in the wrong direction * Dust on the fan impeller * The fan impeller is damaged and thus not in balance * The fan is loose	* Reverse motor direction * Clean the fan wheel * Balance or replace the fan impeller * Check and fasten the fan
The motor is burnt out	* A defective or wrongly adjusted protective overload	* Adjust or replace the overload
Too high power consumption	* The fan operates at too low a system resistance or too high airflow volume	* Increase the system resistance * Reduce airflow volume by closing volume control dampers * Close suction points not in use
Noise from inlet	* The fan impeller rubs against the inlet	* Adjust or replace inlet fitting
The cleaning is not effective	* Filter bag blinded * Shaker running slow	* Clean manually or replace bag * Check mechanism of shaker

Re-location or disposal of units.

- **Safety note.** Stop and isolate the plant and use suitable personal safety equipment before commencing this work on the filter unit. All operations should be performed only by suitably qualified and experienced personnel. Isolate electrical supply before commencing. To remove large assemblies or components, a crane should be used.

Clean the unit as far as possible before dismantling. Dispose of waste matter in accordance with the guidelines for the type of waste present.

After dismantling, the filter may be separated into:

1. Filter bags
2. Electrical motors
3. Electrical components
4. Steel parts

Filter bags containing dust must be disposed of in accordance with appropriate standards. In addition to the above parts, the units contain plastic parts and rubber seals, (for high-temperature units, silicone seals).

The filter materials are normally composed of :

Polyester needlefelt, perhaps with antistatic, ptfе or other chemical treatment.

Other: Please request data sheet for filter material.

Other technical information.

Operating pressure. Auto M Z-Series: -

Max. positive pressure: + 500 Pa (50mm water) in clean air chamber

Max. negative pressure: - 5000 Pa (500mm water)

The normal operating differential pressure across the filter material depends upon the load, dust type and concentration. It will normally be less than 1500 Pa (150mm water).

Maximum continuous running time. This will depend upon the quantity and type of dust. Stop and clean when either the bin is full or the airflow volume reduces noticeably. Typically this should allow at least 4 hours-continuous running.

Operating temperature: Auto M Z-Series

Standard Unit Gas temperature 80°C maximum -10°C minimum

Ambient temperature 40°C maximum -10°C minimum

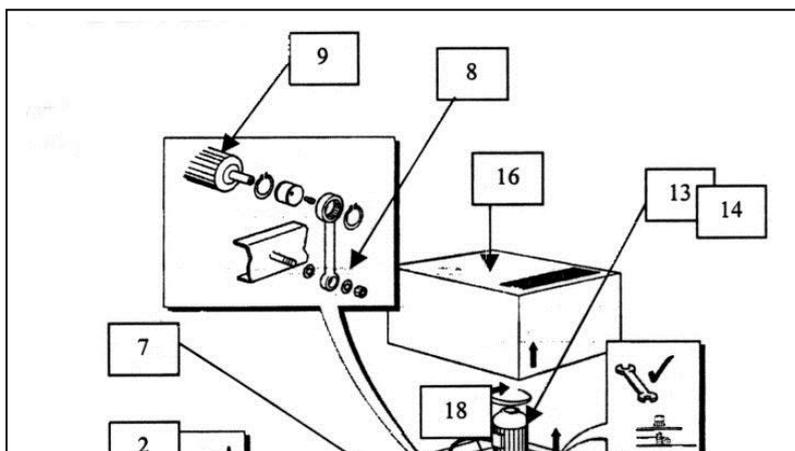
Higher operating temperatures may be possible with specially modified units.

SPARE PARTS LIST. Auto M Z-Series and integral NF Fan.

Please state unit type and serial number when ordering spare parts. This data can be found on the type plate of the filter.

Auto M Z-Series components: -

- 1 Access door
- 2 Sealing for side access door
- 3 Lock for access door, (not shown)
- 4 Hinge for access door, (not shown)
- 5 Filter bag
- 6 Bag sealing gasket



- 7 Shaker frame
- 8 Shaker linkage
- 9 Shaker motor
- 10 Terminal box (Option)
- 11 Explosion safety switch,
if fitted
- 12 Bag suspension grips
- 13 Fan motor
- 14 Fan impeller
- 15 Fan inlet
- 16 Silencer box
- 17 Dirty air inlet
- 18 Cleaned air outlet
- 19 Bin, 75 or 150litre.
- 20 Bin handle, clamp
- 21 Manometer, if fitted
- 22 Filter type plate
- 23 Electrical controller,
remote fixing only, (not shown)

For orders, please indicate the item numbers shown above, in addition to unit type and serial number.

Electrical Controller

See separate instructions supplied with controller.

NF Fan

When ordering spare parts, please state motor size in kW and the serial number of the filter.

The following components may be ordered spare parts (the numbers refer to diagram above):-

- 13 Electric motor and shaft key
- 14 Fan impeller
- 15 Fan inlet assembly

When ordering a motor, please also state make, type, voltage, insulation class etc.

MODEL RANGE DESIGNATION.

Auto M = model range title

Z = suitable for explosible dusts, when fitted with explosion relief.

7.5, 15, 25 etc = filter area in sq.m.

Final number eg. /2.2 = fan motor power in kW.

Examples: -

For explosible dust: - Auto M Z 25/2.2 (25 sq.m, 2.2kW fan, explosion panel)).

APPENDIX 1 for ATEX Certified Auto M units for use with potentially explosive dust. Supplementary information.

Guidance on siting filter units fitted with explosion relief panels.

The final position of a filter or other vessel fitted with explosion ventilation should be decided following a careful risk assessment. The key risks arise from the emerging combusting dust cloud causing direct damage to people and property, together with the risk of secondary effects. These could include a secondary explosion or fire within a building caused by the initial explosion ventilation.

In order to comply with the Directive on Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres (94/9/EC), the “ATEX Directive” and its associated harmonised standards, makes use of the VDI-Richtlinien VDI 3673 method and guidance.

The required explosion ventilation area is based upon the explosion strength of the vessel (Pred) and its volume (V). This data is linked with the explosibility of the dust (kSt), the maximum possible explosion pressure for the dust (Pmax typically measured using standard 20 litre sphere test method) and the maximum release pressure for the ventilation device. This data is combined graphically in VDI 3673 by nomographs, which are then used to determine the area of the ventilation panels.

Unit located outdoors.

Unless it is technically impossible this is the preferred location. A safe area should be established in front of the explosion vents if these discharge horizontally.

The minimum distance for safety may be assessed using an empirical formula:

Distance = $8 \times \sqrt[3]{\text{vessel volume}}$. The units are metres.

This is valid for most common situations.

Unit located indoors.

If this is unavoidable, then the dust explosion may be ventilated through a short duct (preferably less than 1 metre) to a safe outdoor area.

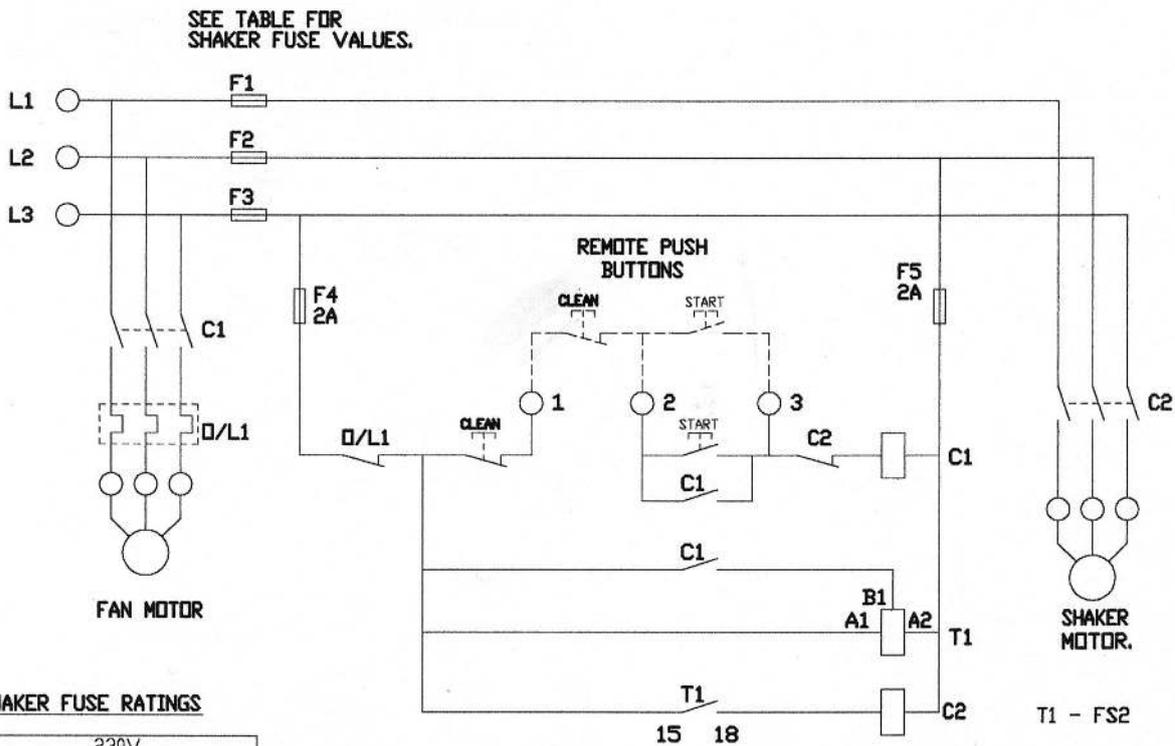
Guidance from VDI warns of the risks of fitting such a duct, particularly if it is long or contains a bend. This increases the risk of a secondary explosion within the duct and also increases the maximum pressure suffered by the vessel being ventilated. If this pressure exceeds the stated value of Pred, then the vessel may rupture allowing the explosion to partially ventilate into the building, in an uncontrolled manner.

If a duct is fitted to the explosion ventilation panels, then its effect on Pred must be considered at the design stage to. The explosion relief area must then be increased to limit the reduced explosion pressure Pred. Whilst some research work and papers (G. Lunn and others) have been produced in the past, there is no unified guidance available on this subject and therefore a very conservative approach should be taken.

If the explosion is ventilated within a building there is also an enhanced risk of a secondary explosion occurring, caused by the pressure wave from the primary explosion dislodging dust from walls, beams and other surfaces. The result of such a secondary explosion could be catastrophic.

General recommendation.

It is always recommended to place filter units outdoors when they are fitted with explosion relief ventilation panels. If indoors, then only a short straight duct should be fitted, to ventilate to an external safe area.



SHAKER FUSE RATINGS

230V			
kW	H.P	AMPS	FUSE
0.18	0.25	1.00	4
0.22	0.33	1.20	6
0.37	0.50	1.75	10

380V			
kW	H.P	AMPS	FUSE
0.18	0.25	0.60	2
0.22	0.33	0.75	4
0.37	0.50	1.10	6

415V			
kW	H.P	AMPS	FUSE
0.18	0.25	0.57	4
0.25	0.33	0.76	4
0.37	0.50	1.05	6

440V			
kW	H.P	AMPS	FUSE
0.18	0.25	0.50	2
0.22	0.33	0.60	2
0.37	0.50	0.95	4

460V			
kW	H.P	AMPS	FUSE
0.18	0.25	0.50	2
0.22	0.33	0.60	2
0.37	0.50	0.90	4

480V			
kW	H.P	AMPS	FUSE
0.18	0.25	0.45	2
0.22	0.33	0.55	2
0.37	0.50	0.90	4

FS2 FAN SHAKER TIMER SETTING	
FAN RUN DOWN TIME (128 SECS)	<input type="checkbox"/> 4
	<input type="checkbox"/> 8
	<input type="checkbox"/> 16
	<input type="checkbox"/> 32
	<input type="checkbox"/> 64
	<input type="checkbox"/> 128
SHAKE TIME (8 SECS)	<input type="checkbox"/> 4
	<input type="checkbox"/> 8
	<input type="checkbox"/> 16
	<input type="checkbox"/> 32
	<input type="checkbox"/> 64
	<input type="checkbox"/> 128

This is a direct on line starter for one fan, up to 7.5 KW, housed in a steel enclosure, incorporating a 'FAN START' button and a 'CLEAN' button.

The controller includes a shaker contactor and a clean cycle timer.

In operation, the 'FAN START' button starts the fan. The 'CLEAN' button stops the fan, allows the fan time to stop, (normally 128 seconds), then runs the shaker mechanism for approximately 8 seconds.

NOTE: For larger fans the rundown time may be set for up to 4 min 12 sec to allow enough time for the fan to stop before shaking commences.

TITLE.

CONTROL CIRCUIT FOR TYPE G1 CONTROLLER WITH FS2 TIMER.