Hodge Clemco Ltd

MJC Cartridge Filter Unit
Operation & Maintenance

Owner's Manual

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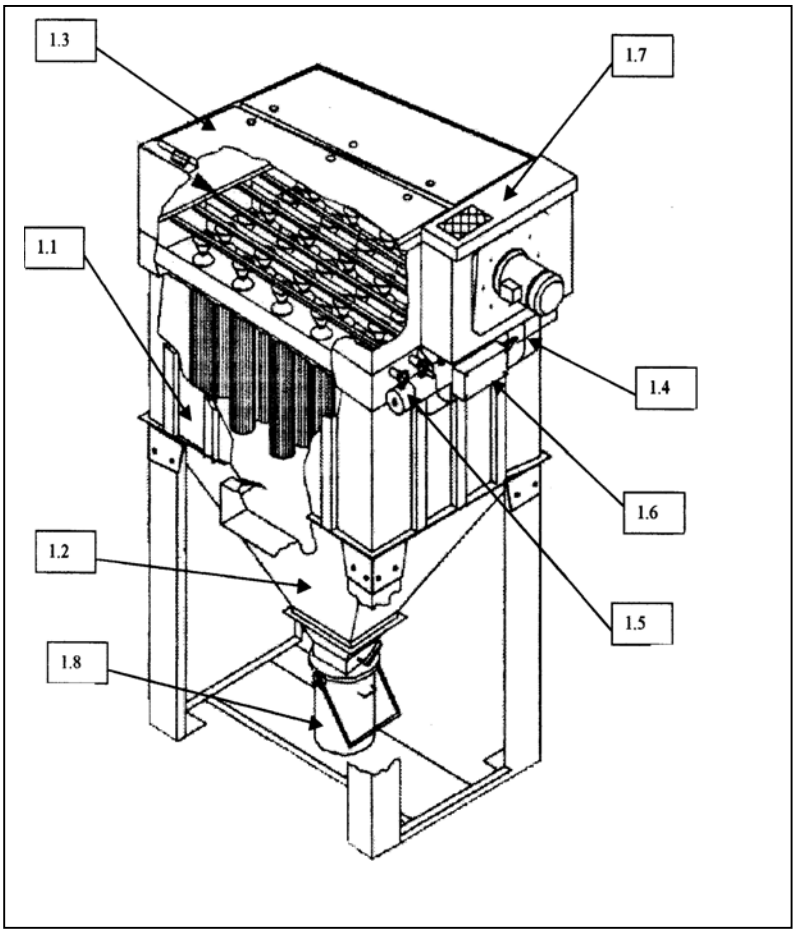
Please read the Safety Guidance Notes carefully before commencing work on the unit. If the safety instructions are not followed, serious personal injury may result.
Access doors may only be opened in accordance with the safety instructions.
Before starting the plant, all guards, doors etc. must be closed and locked.

Adjustment of the electrical controls without cover in place must only be carried out by authorised, qualified personnel. Appropriate safety precautions must be taken.

Unit designation.
A typical unit may have an identity such as MJC 80/66/34 or MJC 264/44/10-6. MJC indicates that it is a reverse jet cleaned cartridge filter; the number (80 or 264) is the area of filter media (m^2); the number (66 or 44) is the cartridge size; the last number indicates the number of valves / cartridges per valve (3 valves, 4 cartridges per valve, or 10 valves, 6 cartridges per valve).
The MJC is designed for continuous operation and may be fitted with integral or remote mounted fans, hoppers with various disposal methods and alarm and indication instruments. The reverse jet cleaning controls are normally mounted on the unit.

The Main Components of the Filter: -



1.1 Filter top section and case with cartridges(s)
1.2 Filter hopper
1.3 Top Access door
1.4 Compressed air tank
1.5 Diaphragm valve for cartridge cleaning
1.6 Electrical controls
1.7 Fan (Optional)
1.8 Waste bin

Operation.

The Initial Start.

The initial start-up must take place in accordance with the installation or the maintenance instructions for MJC filters and must be performed by authorised personnel.

Normal Start.

A normal start is made by pressing the START button on the control panel. This will energise the fan and cleaning system. If a clean on demand control is fitted, the cleaning system will start only when the set differential pressure has been reached. If a remote control station is fitted, the filter may be started from this.

Normal Stop.

A normal stop is made by pressing the STOP button on the control panel. The controller will usually be set to enable the cleaning system to operate off-line for a period after the fan has stopped.

A normal stop should not be made by means of an emergency stop button!

Please follow the SAFETY INSTRUCTIONS NF10 in the case of a stop for inspection.

Emergency Stop.

In the case of an emergency, the plant is stopped by activation of the emergency stop.

Emptying.

The filters must be inspected in accordance with the maintenance instructions.

Any waste containers must be emptied when necessary. If a damper is mounted, it must be closed before emptying to isolate the bin from the hopper.

Dust must not be stored for long periods of time in the hopper or waste containers of the filter. These containers are emptied after each operation period once the automatic after-cleaning cycle has been completed. It is recommended that you allow as much time as possible after the cleaning has stopped, for inhalable dust to settle.

When using waste containers with a bin balance device, the connection hose should be checked and a new plastic liner **must** be placed in the waste container.

Maintenance.

Please see the maintenance instructions for MJC.

Fault-Finding.

Fault finding may be helped by reference to the fault finding tables on page 07.05.

Adjustments, Readings etc.

See specific instructions for filter controller as appropriate.

Areas of Application.

The MJC filters have been designed to extract and filter air with a content of dry dust. The airflow volume and dust loading permissible would depend upon the filter type, dust characteristics, filter media and other process conditions.

The NF fans have been designed for the purpose of transporting clean air with a very low content of dust.
The size etc. of the fan appears on the unit identity plate.

Damage may result to the fan if air being handled contains dust or foreign bodies.
The MJC filter type appears on the filter identity plate.

MJC is especially suited for application in connection with a wide range of dry dusts including those in explosion classes St1, St2 and St3 (optional).

If material-filled air is supplied steadily, the maximum limits for the MJC filters' application are given below.

Filter type	MJC-1	MJC-2	MJC-44	MJC-66
Normal maximum dust load g/m^3	30	30	20	20

Higher dust loads may be possible with high density, free flowing materials. Consult technical staff. Certain dusts, however, demand lower dust loads.

At an air velocity of 20 m/s, the maximum amount of material corresponds to the below mentioned material amounts. Normally, the air velocity in ducts for dust extraction systems will be at least 20 m/s and the max. permitted amount of material will, therefore, sometimes be bigger than the values listed in the table below in the case of a steady supply of material.

Duct diameter mm	20 g/m^3 or 0,02 kg/m^3	30 g/m^3 or 0,003 kg/m^3
ø100	< 11 kg/h	< 16 kg/h
ø200	< 44 kg/h	< 66 kg/h
ø315	< 110 kg/h	< 165 kg/h
ø400	< 180 kg/h	< 270 kg/h
ø500	< 280 kg/h	< 420 kg/h

Limits for operating pressure:

MJC Standard:- Max. over pressure: + 2000 Pa , Max. under pressure: - 8000 Pa

MJC Optional:- Max. over pressure: + 8000 Pa , Max. under pressure: - 15000 Pa

The pressure drop across the filter material depends on the load, the type of dust as well as the dust concentration. During operation, the pressure drop may normally not exceed 2200 Pa. (220mm water)

Limits for operating temperature:

Standard Unit	Gas Temperature	80ºC Maximum	-10ºC Minimum
	Ambient Temperature	40ºC Maximum	-10ºC Minimum
Special Units (optional)	Gas Temperature	120ºC Maximum	-20ºC Minimum
	Ambient Temperature	60ºC Maximum	-10ºC Minimum

Connection of compressed air.
The pressure tank should regain its operating pressure after each cleaning pulse within a few seconds.
Dry, clean and oil-free compressed air must be connected to the filter. If not otherwise specified, the pressure in the compressed air tank before each cleaning impulse must be 6.0 to 6.2 barg. for Type 1 & 2; 5.0 to *5.5* barg. for Type 44 & 66.

Condensation should not be allowed to accumulate in the compressed air tank. In extreme cases where dust or filter materials are sensitive to humidity, the compressed air must be absorption dried.

Normal maximum operating pressure: as above. The max. permitted pressure for the compressed air tank appears on the type plate. (typically 8.0 bar).

Function Description.

The filter cartridges consist of pleated filter media supported on a stiff tubular structure suitably sealed. Cleaning is by means of pulses of compressed air in the reverse direction to the airflow, during normal operation, or off-line, after the fan has stopped.

The dirty air enters the filter at the inlet connection piece. The air passes through a pre-separation chamber where its velocity is reduced and larger dust particles fall directly into the bottom of the hopper without reaching the filter surface.

The air is distributed in such a way as to achieve an equal load on all the cartridge elements of the filter. The air will move between the cartridge rows and pass through the filter surface. Thus the material is deposited on the exterior of the cartridges and falls down into the hopper when the cleaning pulses occur.

The cleaned air leaves the filter through the integral fan, or an outlet connection piece.

The cleaning of the filter cartridges takes place during normal operation by discharge of compressed air pulses down into the clean air outlets of the cartridges. One row of cartridges is normally cleaned at a time, except for the largest filters, when two rows may be cleaned. The same cleaning cycle may also take place after the fans have stopped (after cleaning). The interval between cleaning pulses is adjustable and depends upon the dust type and load.

The duration of the cleaning pulses is controlled by the electrical controller, which is pre-set during manufacture and should not be altered.

Fault Finding Table.

Fault	Possible cause	Recommended activity
Blocked filter / low airflow	• Insufficient cleaning	• In the case of time relay control (Delta p-OFF): smaller intervals between the commencement of each cleaning cycle. • In the case of pressure controlled cleaning (Delta p-ON): Lower the value at which the cleaning starts. • Cleaning cycle after stop: Stop the filter more frequently / check that cleaning does in fact take place / increase the length of the cleaning period.
	• Defective pressure pulse	• Check compressed-air supply / cleaning pressure in tank / bleed the compressed-air system. • Check the pilot voltage on the electrical control. • Check the control voltage to the solenoid valves. • Check that all cleaning valves open in the Delta p-OFF position. • Replace the valve diaphragm, solenoid valve, electrical control. • Check that the compressed-air tank manometer readings are correct.
	• No cleaning on filter stop	• Check that the emergency stop is not activated on normal stop / check that the electrical connection is correct so that the cleaning on pause is commenced.
	• Too large amount of material supplied in too short time • Filter cartridges are saturated with fine dust • Cartridges blocked with damp or sticky dust	• Lower the material supply per time unit or increase plant capacity. • Clean / replace the filter cartridges. • Identify source of damp, reduce it and replace cartridges.
Defective filter cleaning in Delta p-ON setting	• Wrong reading from the pressure differential meter	• Check the hose connections to the pressure differential meter. • Check and clean the protective filters by means of

		compressed air. • Check the hose connections inside the electrical control.
Material accumulates in filter bottom	• Blocked emptying system • Ascending air flow in the emptying opening prevents the material from falling out • Wet waste sticks to the walls • Air circulation in the filter bottom prevents the waste from being transported to the outlet opening	• Check, possibly after a cleaning cycle, that the emptying system works correctly. • Check that the waste container is not full. • Replace sealing elements in rotary valve and the like in the outlet channel • Check bin balance hose connections • Seal filter housing. • Insulate the filter bottom against condensation. • Supply drier waste. • Insert guide plates so that the air leads the waste towards the outlet opening. • Lock the dust bin correctly – no leaks • Contact a technician.
The sacks / waste containers are not filled equally	• Natural phenomenon which depends on the composition of the waste	• Insertion of guide plates in the filter bottom above the waste containers can often solve this problem. • Accept this condition.
The filter doors are leaking / fly open	• The door is not closed correctly • Filter outlet closed during the cleaning process • Internal operating pressure is higher than specified	• Close the door correctly. • Change control so that the gate in the outlet channel is open during the cleaning process after stop. • Lower the operating pressure or reinforce filter and access door.
The filtered air contains dust	• Defective filter cartridge • The filter cartridges are not sealed correctly • Unsuitable filter material used • The waste container is intended for use with a plastic bag but no plastic bag is used	• Replace defective filter. • Mount the filter cartridge correctly. • Contact technician. • Use a plastic bag or disconnect and seal bin balance hose connection.
Dust emerges from the duct connections during the after-cleaning 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 rotates in the wrong direction • Excess dust in the fan • The fan impeller is damaged and thus not in balance • The fan is loose or out of alignment	• Reverse fan motor direction. • Clean the fan impeller • Balance the fan impeller or fit a new one. • Check end re-fit fan.

Fault	**Possible cause**	**Recommended activity**
The motor is burned out	• A defective or wrongly adjusted 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 dampers in duct.
Noise from inlet	• The fan impeller rubs against the inlet	• Adjust the inlet.
No performance	• The fan impeller is rotating in the wrong direction • Coating / blocking of the fan impeller with dust • The duct system is blocked	• Reverse fan motor direction • Clean the fan impeller. • Locate the blockage and remove it.
The fan runs hot	• The fan wheel rotates in the wrong direction	• Reverse fan motor direction
Light-emitting 1.1 does not light up	• No mains voltage • Defective fuse in the electrical control • Plant emergency stop is activated • Internal control error	• Check the mains voltage • Check fuses. • Replace the fuse. • Check emergency stop. • Contact service.
No valve activation	• Wrong setting of number of valves • Defective cable connection • Defective magnet coil • Cycle interrupted /Light-emitting diode 1.3 lights up)	• Check filter controller. • Check cables and cable connections. • Replace magnet coil. • Disconnect the differential pressure meter, change value settings, check hose connections etc.
No after-cleaning	• Wrong setting • No signal connection from fan	• Check filter controller. • Establish a signal to clamps E1 and E2.
The cleaning is not effective	• The pause is too long • Too low cleaning pressure • Defective valve • The pulse is too short	• Make pause shorter • Set the pressure to 6,2 for type 1 & 2; 5,5 bar for type 44 & 66 • Check / replace valve. • May be changed if agreed with service.

	• The cleaning cycle is often interrupted • Large scale filter (>160 valves) where only half of the filter is cleaned	• Check the differential pressure meter and the hose connections. • Set the two main controls to the same values. • Check that the contact points Delta p-MAX and Delta p-MIN are identical on the 2 controls

Wrong reading for differential pressure	• Defective hose connection	• Empty the hoses. • Clean the connection points on the filter housing by means of compressed air (only in the filter housing direction – never in the sensor direction). • Remove bends on the hoses • Check the hoses internally in the controller for water, bends and the like.

MAINTENANCE INSTRUCTIONS for MJC Filter and NF Fan.

Please read the "SAFETY INSTRUCTIONS NF10" carefully before commencing any type of activity. If the safety instructions are not followed, serious personal injury may result.

Adjustment of the electrical controls with the cover removed may only be performed by authorised, suitably qualified personnel. Appropriate safety precautions should be taken.

Please note the following in particular:

Before any types of inspection or maintenance activities are commenced, the plant must be completely stopped and the electrical supply must be isolated in accordance with electrical regulations.
The plant may not be started again until all guards; doors etc. has been restored correctly.

Only use original spare parts for repairs.

MJC is normally fitted with an electrical control type NF-8H/250. The surface of this electrical controller is, except for the connection terminals for the supply voltage, protected low voltage.

Filter Housing.

The filter housing is made from painted, cold reduced sheet steel. Any maintenance activities beyond the normal care and cleaning will appear in the section about maintenance in these instructions.

Integral Fan.

The fan impeller has been carefully balanced at the factory in order to ensure a vibration-free function. If any vibrations occur during the operation, dust deposits on the fan impeller will normally cause them. These vibrations will stop once the fan impeller has been cleaned.
If the vibrations do not stop after cleaning of the fan impeller, a service technician must be contacted.

Motor.

Normally, the motor is maintenance free. Please see the maintenance instructions for the motor.

The maintenance instructions for the motor are delivered together with the motor. If you have not received the maintenance instructions for the motor, you may request these from. Please state motor type, make etc. and filter unit serial number.

Planned Maintenance.

The MJC filter and electrical control must be maintained at the intervals stated. The shortest interval in terms of time is the one to go by.
Also the maintenance instructions for rotary valve, conveyor, any other fans, the electrical control of the plant etc. must also be followed where such components form part of the plant. The motor must be checked in accordance with the maintenance instructions for the motor.

If damage is found, the defective parts must be replaced as soon as possible. As safety hazards may arise as a consequence of defective parts, the company safety manager should evaluate the soundness of continued operation with defective parts.
Only use original spare parts for repairs.

	Intervals: -months / operating hours	
1. Empty any waste containers	Daily or as necessary	
2. Check the pressure drop on the control display*	Daily on plant start	
3. Check that the pressure in the compressed air tank before each cleaning impulse has recovered	Daily	
4. Check that the cleaning valves work	Daily	
5. Check that no dust emerges from the filter / fan outlet	Daily	
6. Check the emptying function	Daily	
7. Check that the entire filter is cleaned by listening to each cleaning valve operating in turn	1	300
8. Fan housing, fan outlet must be checked for signs of wear and corrosion	6	1000
9. Flexible duct connections must be checked for wear and leakage	3	500
10. Electrical connections for discharge of static electricity must be checked for signs of corrosion	6	1000
11. Check that the motor cooling fan is not obstructed	1 or as necessary	
12. Filter and hopper body, check for wear and accumulated material	6	1000
13. Filter cartridges, check for leakage and secure mounting	6	1000

* After a running-in period, the pressure drop must not differ from the normal value by more than 500 Pa (50mm water)

14. Any return flaps, check for function and wear	6	1000
15. Filter housing, check tightness of flange connections	6	1000
16. Secondary filters, if fitted, check, clean or replace	1	300
17. Test electrical control function, especially safety functions	6	1000
18. Check that “after cleaning” of cartridges takes place	1	300

19. Clean controller on the outside by means of a moist cloth	1	300
20. Check connection at Delta p-MAX and disconnection at Delta p-MIN	1	300

The Initial Start or Start after Big Maintenance Jobs.

The filter / duct system etc. are to be checked for foreign matter etc.

Start the compressor / activate the supply of compressed air. Check that the pressure in the filter compressed air tank is 6.2 barg. for Type 1 & 2; 5.5 barg. for Type 44 & 66.

Check that the dust containers are not too full. Normally, dust may not be stored in the containers and never in the hopper.

Start the fan and check the direction of rotation. The reverse jet-cleaning timer should be energised when the fan starts.

For NF-8H/250 electrical control, the setting Delta p-OFF should be selected, to allow the cleaning system to be tested.

Check the cleaning function for the entire filter.
For NF-8H/250 electrical controller, the setting Delta p-ON may now be selected.

Replacement or inspection of filter cartridges.
Stop and isolate the plant and use the safety equipment prescribed by the safety instructions before carrying out **any** maintenance work on the filter unit.

Top (standard) cartridge removal:- see fig. 2.
1. Isolate electrical supply.
2. Open top access lids; latch in open position.
3. Unscrew and remove retaining knob at jet tube end.
4. Withdraw jet tube from front socket and remove.
5. Unscrew and remove cartridge clamp plate retaining knobs.
6. For anti-static cartridges only, remove earthling wire after removing knobs (above).
7. Lift off clamping plates, with attached venturis.
8. Withdraw cartridges, first shaking off loose dust.

Before refitting any cartridge, the following must be checked:

- Check cartridge filter material and general construction. If any damage is found, the cartridge must be replaced.

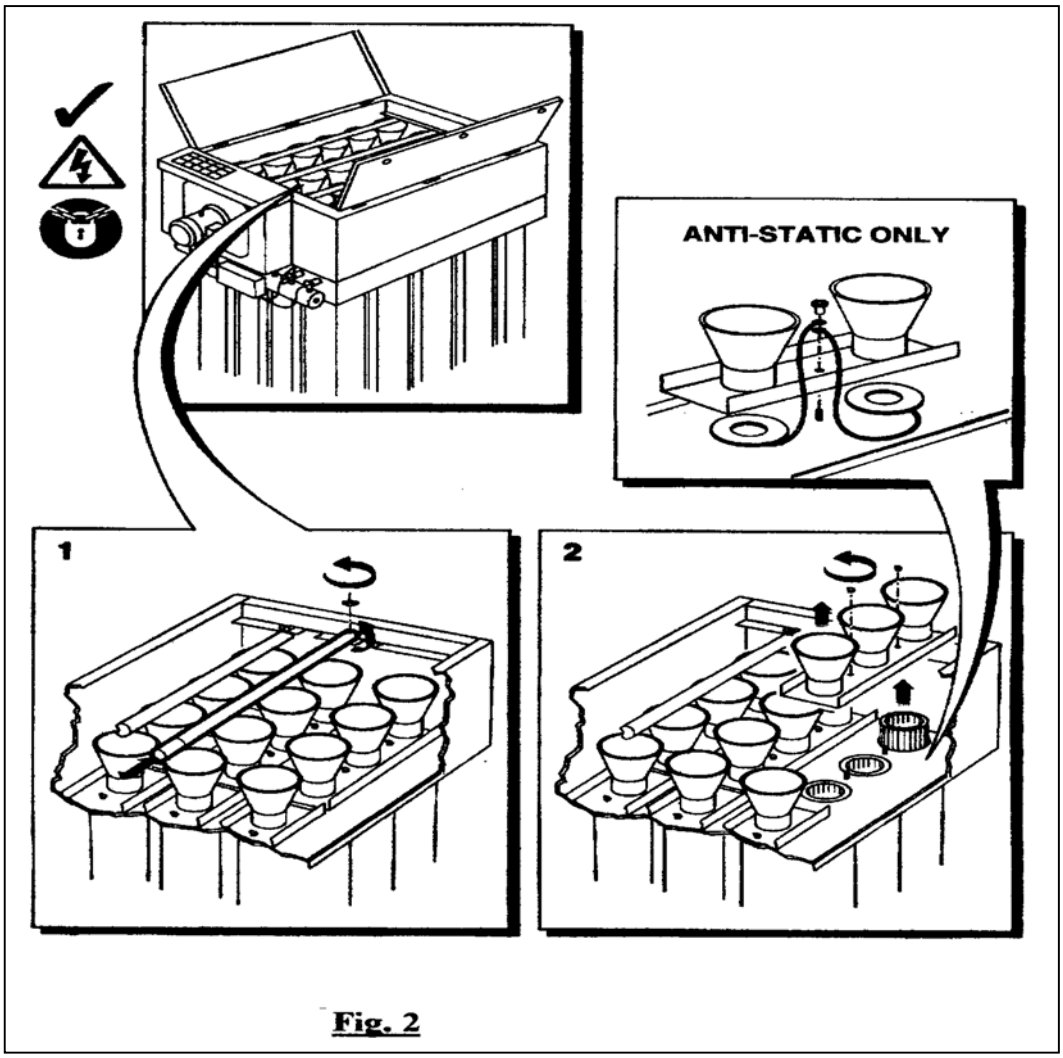


Fig. 2

Top (standard) cartridge replacement:- see fig. 2

1. Clean area around cartridge floor aperture.
2. Ensure sealing ring is in place under top flange of cartridge. **Important!!-** if a used cartridge is to be re-fitted, always use a new sealing ring.
3. Locate and lower the cartridge into place. If an anti-static cartridge, ensure that the earth wire is above the cartridge support floor.
4. Replace the clamp plate / venturi assembly and locate earth wires, where present, onto the locating studs. Replace knobs tightly.
5. Replace the jet tube and secure tightly with retaining knob. **Note** that there must be a shake-proof washer under the knob!!
6. Clean area around access lid.
7. Close and secure lids

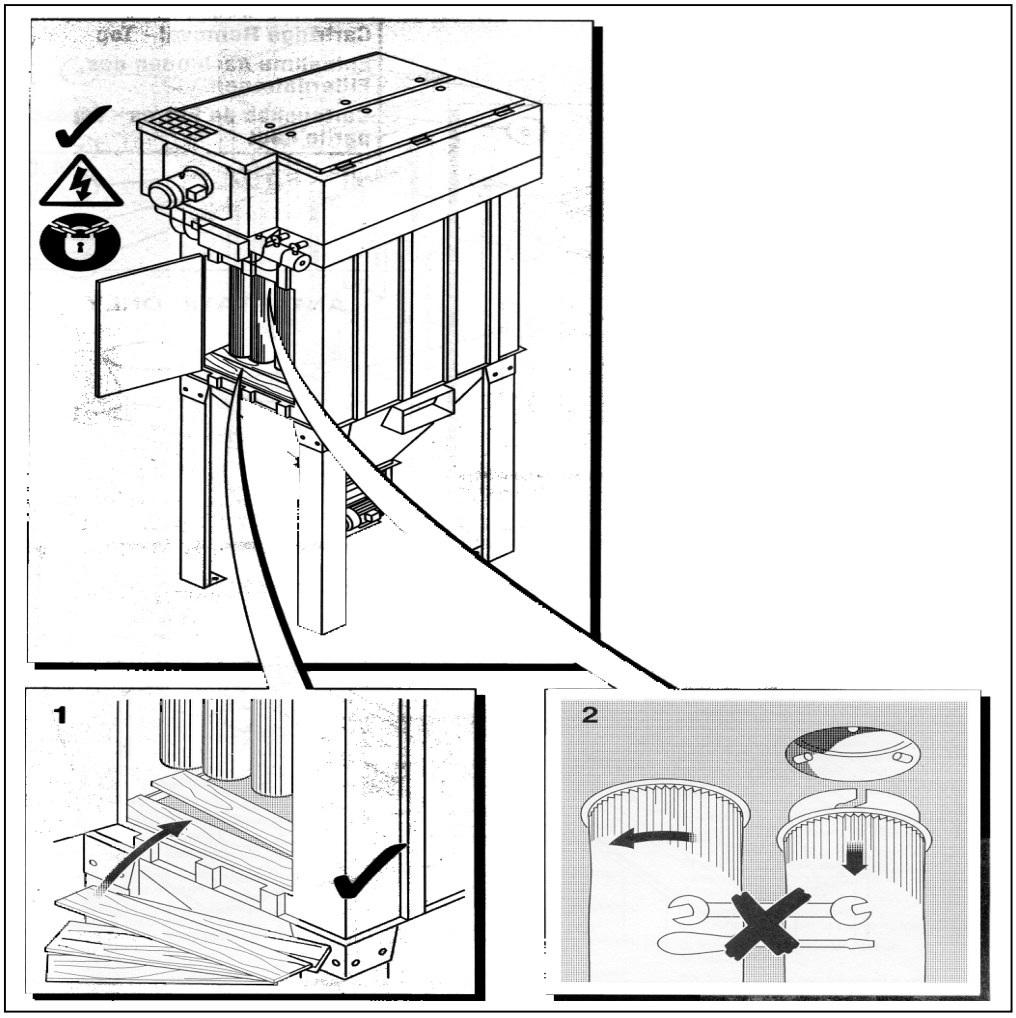
The plant may now be started again.

Side removal (alternative) cartridge removal:- see fig. 3

1. Isolate electrical supply.
2. Open side access door(s). **Note** this gives access to the dirty air chamber.
3. Grasp the nearest cartridge, rotate anti-clockwise, whilst exerting upward pressure, to release cartridge from bayonet fitting. Remove complete row of cartridges nearest to the doors.
4. Insert boards across the inside of the unit successively, as each row of cartridges is removed, to establish a safe working platform. Perimeter supports for these boards are a built-in feature.

Before refitting any cartridge, the following must be checked:

- Check cartridge material and general construction. If any damage is found, the cartridge must be replaced.



Side removal (alternative) cartridge replacement:- see fig. 3

1. Clean underside of cartridge support floor, particularly the area where the cartridge sealing rings fit.
2. Ensure that **new** sealing rings are always fitted. Each cartridge may have an inner and an outer sealing ring. **Important!! –** Smear aqueous grease on the mating surface of each sealing ring to act as a lubricant.
3. Insert a cartridge into the bayonet tube, turning clockwise with upward pressure until the cartridge is felt to drop slightly into its retained position. Start at the remote corners of each row and work towards the centre. Remove one row of safety boards as each cartridge row is completed.
4. Clean the area around the door seals; close and secure the access doors.
5. Remove any spilt dust from around the front of the filter.

The plant may now be started again.

Replacement of the Fan Impeller. (Integral fan).

1. Isolate the electrical supply.
2. Disconnect the electrical cable to the motor terminal box.
3. Support the motor and release the screws securing the motor mounting plate to the fan case.
4. Withdraw the motor/mounting plate/fan impeller assembly and lower to the ground.
5. Remove the screw and washer at the end of the motor shaft and withdraw the fan wheel, retaining the shaft key for re-use.
6. 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 once the fan assembly has been refitted, that the fan impeller rotates freely without rubbing against anything. Any defects must be corrected before the fan is put into use again.

Repair of diaphragm valve.

Disconnect the compressed air supply. Open the tank drain valve slowly, until the compressed air tank is empty and the tank pressure gauge reads zero.
Remove the cover of the diaphragm valve (pos. 15) and remove the diaphragm.
Check that there is no condensed water, oil etc. in the compressed air tank; drain by means of drain tap pos. 21.
Check that the mating surfaces between the diaphragm, the valve body and the valve cover are clean and free from dust.
Fit the diaphragm and the diaphragm valve cover. The screws are tightened diagonally.
Turn on the compressed air supply and follow the procedure for filter start.

Dismantling, relocation or disposal of units.

Before dismantling of the filter plant is commenced, the “SAFETY INSTRUCTIONS NF10” must be read carefully.
The dismantling must be performed safely. In the case of large filters, a crane must be used.

Before the work is commenced, the filter must be cleaned on the outside and on the inside. The accumulated dust must be disposed of in accordance with the guidelines for the type of waste in question.

After total disassembly, the filter is separated into:

1. Filter cartridges
2. Electric motors
3. Electrical components
4. Steel parts

Filter cartridges containing dust must be disposed of in accordance with the rules for the filtered dust in question. In addition to the above parts, the filters contain plastic parts and rubber seals, (for high-temperature constructions, silicone seals are used).

The filter materials are normally composed of:

Thermal bonded polyester, perhaps with antistatic, ptfe or other chemical treatment.
Other: Please request data sheet for filter material

The materials must be disposed of in accordance with the current rules for the materials in question

SPARE PARTS LIST for MJC Filter and NF (built-in) Fan.

Please state filter type and production number when ordering spare parts. These data can be found on the type plate of the filter.

The filter components (The pos. numbers refer to figure 1):

Pos. 1. Access door / lid
* Pos. 2. Sealing for side access door (not shown)
Pos. 3. Fan and motor
Pos. 4. Hinge for side access door (not shown)
* Pos. 5. Filter cartridge (not shown)
* Pos. 6. Cartridge sealing ring (not shown)
Pos. 7. Sealing for lid
Pos. 8. Lock for lid, if any
Pos. 9. Hinge for lid (not shown)
Pos. 10. Jet tube
Pos. 11. Clamping knob with shake-proof washer
Pos. 12. Cartridge clamping plate with venturis
Pos. 13. Valve pipe
* Pos. 14. Diaphragm (located inside valve body
Pos. 15. Diaphragm valve
* Pos. 16. Coil for solenoid valve
Pos. 17. Solenoid valve
Pos. 18. Rotary valve (if fitted)
Pos. 19. Bin, bin seal (if fitted)
* Pos. 20. Explosion relief membrane (if fitted)
* Pos. 21. Drain tap
Pos. 22. Electrical controller
Pos. 23. Pipe connection for pressure switch
* Pos. 24. Explosion microswitch (if fitted)
Pos. 25. Filter serial plate (on unit front)
Pos. 26. Type plate for compressed air tank (on comp. air tank)

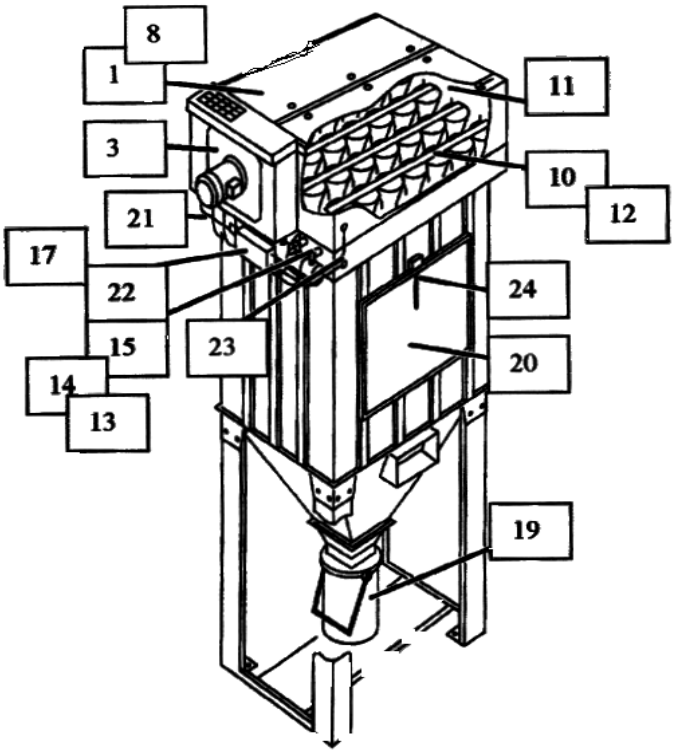


Fig. 1

The components marked with * are regarded as spare parts. Other items may be ordered.

For orders, please state (in addition to the data mentioned in the introduction) the above-mentioned pos. numbers. For solenoid valves, make, type, voltage, insulation class etc. must also be stated. For filter cartridges it is essential that the serial number be stated.

Electrical Control.

See separate instructions for NF-8H/250 controller or later NF-8HD/250 controller with digital display.

NF Fan.

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

The following components are also available as spare parts.

Pos. 3.1 Fan impeller
Pos. 3.2 Electric motor and shaft key
Pos. 3.3 Fan inlet

For orders, please state (in addition to the data mentioned in the introduction) the above-mentioned pos. numbers.
For the electrical motor, pos. 3.2, please also state make, type, voltage, insulation class etc.

Other Accessories.

Please see the separate spare parts lists for rotary valve, conveyor, fans, electrical controls etc.