



**ZERO GRAVITY
FILTERS**
Brighton, MI

**MAGNETIC SEPARATOR
SEVEN CORE
Operating and Maintenance Manual**

**Maggie
Seven Core**

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Exhibit 1	Magnetic Separator, Seven Core	ZG10207

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Standard and Limited Warranty

Seller warrants that title to goods sold hereunder is unencumbered at time of sale. All other warranties are expressly disclaimed including, but not limited to, merchantability, fitness for purpose, and all other warranties, express or implied. Seller expressly disclaims any liability for damages, actual, consequential, incidental or otherwise, for injury to property of buyer, its agent or third persons in custody of goods sold hereunder. Seller may determine to repair or replace any defects in goods of its own manufacture, which arise from defective materials or workmanship during the twelve (12) months, following the date of tender of delivery to the end purchaser if buyer gives seller timely written notice with a description of the basis for claim. Seller may refund amounts paid by buyer without other liability to buyer. The buyer acknowledges and agrees that the limitations of warranty, liability and remedy are fair and not unconscionable and the sole and exclusive remedies afforded at law with all other statutory and common law remedies being hereby waived. A claim under the warranty by the buyer for repair or replacement of goods shall be timely filed with the seller in accordance with the written procedures of the seller in effect at the time of any such claim.

Maggie Seven Core

INSTALLATION GUIDE

POWER SUPPLY

The Maggie requires 110 VAC, single-phase supply at 5 Amps. A DIN plug is provided on the base of the ASCO Timer/Air Solenoid valve. The plug is to be wired according to local electrical regulations.

FLOWRATE

Maximum flowrate of 75 gpm when used with water or water based machine coolants. As the viscosity of the fluid increases the flow rate for the Maggie will decrease.

PNEUMATIC CONNECTIONS

A minimum of 80 psi, clean and dry compressed air supply should be made to the ¼” push in connector labeled # 1 on the Asco Solenoid Valve, connections 3 and 5 are exhaust and are fitted with bronze air snubbers, these are not to be removed or tampered with.

PIPE CONNECTIONS

The Maggie must be mounted in the vertical position with the two butterfly valves at the bottom.

The inlet connection is 1 1/2”ANSI flange at the top of the magnetic separator. The outlet and purge connection is a 1 ½” NPT flange at the bottom, situated at right angles to the separator.

The purge valve is the valve with the Asco solenoid and timer mounted on the actuator. The purge connection should be plumbed to a suitable drain or tank capable of handling the system’s pressure. **To avoid excessive pressure drops, which could impair the purge effectiveness, do not run the purge line more than 10 feet with the ID of the line no less than 1”.**

To suite site conditions the orientation of the outlet valve and purge valve may be changed over to ease pipe work connections. **Please note: if the valves are to be changed over, they are to be changed complete with their own actuator. Do not mix actuators and valves.**

MAGGIE SUPPORT

The Maggie should be supported by the wall mounting brackets welded to the body of Maggie.

DIMENSIONS AND WEIGHT

Weight: Dry = 70 lbs
 Wet = 80 lbs

OPERATING REQUIREMENTS

The Magnetic Separator requires a minimum system pressure of 25 psi on the inlet side of the separator at time of purge.

REGULATING VALVE

A regulating valve must be fitted on the discharge of the magnetic separator, enabling the user to balance the separator's flow rate and pressure.

ISOLATING VALVES

It is recommended that inlet and discharge isolating valves be fitted to the magnetic separator for ease of maintenance.

INLET STRAINER

A coarse strainer must be fitted to the inlet side of the magnetic separator if particulates are greater than ¼" in size.

Maggie Seven Core

OPERATING MANUAL

Description

The Maggie consists of a 5" schedule 10, stainless steel body between two 5" flanges. Inside the 5" body are seven tubes, containing eight magnet/pole combinations. The operation of the purge sequence is controlled by a small timer situated on the air solenoid valve. This timer controls the frequency at which the purge takes place in minutes and also the duration of the purge in seconds.

Operating Parameters

Power Supply:	110 VAC, 5 Amp supply
Maximum Operating Pressure:	70 psi
Static Test Pressure:	100 psi
Maximum Operating Temperature:	185° F (higher temperature ratings available)
Flow Rate:	maximum of 75 gpm
Minimum Air Pressure:	80 psi, self lubricated
Maximum Air Pressure:	100 psi

Materials Composition

Separator Body	Stainless steel 304
Flanges	Stainless steel 304
Butterfly Valves	1 ½" stainless steel disc with Viton seats operated by a double acting pneumatic actuator.
Pneumatic Actuator:	Double acting, developing 156 Lb Ins at 80 psi.
'O' Rings:	Viton throughout.

1. COMPONENTS

1.1 Magnetic Separator

Manufactured from stainless steel, consisting of a 5" pipe, seven magnetic shuttle assemblies. The inlet, outlet and purge connections are all 1 ½".

1.2 Butterfly Valves

Fitted on the outlet and purge connections of the Maggie are pneumatically operated butterfly valves.

1.3 MAGNETS/POLES

Maggie consists of seven magnetic shuttle assemblies. Each shuttle assembly is comprised of a combination of permanent rare earth magnets and pole pieces. The eight magnets are contained in each 1" diameter tube. Each magnetic core generates 9,000 Gauss on the tubes surface, giving a total magnetic surface area for a seven core of 30.0 sq.in.

1.4 CONTROLS

A small Asco timer controls the purge sequence. The timer controls the purge duration and the time between purges, operates an air solenoid valve fitted to the purge pneumatic actuator and shuttles the magnets during purge.

Please note: When the timer is first energized a purge sequence is activated.

Ensure that all pipe-work is complete before energizing the solenoid to prevent any spillages.

2.0 OPERATION GUIDELINES

The Magnetic Separator must not be put on line without POWER and AIR connected and operational. To do so, could result in malfunction of the unit and voiding of the product's warranty.

Before operating the Maggie, ensure that it has been installed per the INSTALLATION GUIDE provided. Failure to do so could affect the Maggie's performance and void the warranty.

2.1 MAGGIE OPERATION

In normal mode fluid enters the separator from the top 1 ½" port and exits via the 1 ½" port at the bottom side connection. Magnetic debris is attracted to the outside of each of the seven 1" tubes where the magnets are positioned at the bottom half of the pod, below the internal baffle plate.

On a timed interval (factory set at 10 minutes) the timer will energize the air solenoid valve. This will allow pneumatic air to first rotate and shut the 1 ½" outlet valve while opening the 1 ½" purge valve. Second, the magnets are driven upwards inside the 1" tubes above the internal baffle plate assembly. Magnetic debris cannot follow the magnets and is no longer held to the tube surface due to the XXXX of the magnets. The debris is quickly washed away via the purge port. This position is held by the timer for approximately 3 – 5 seconds depending on system pressure. When the purge time has expired, the air solenoid valve is then de-energized and the magnets are driven down below the baffle plate and the 1 ½" purge valve is closed and the outlet valve is opened. The magnetic debris trapped on the magnets cannot travel upwards due to the baffle plate and the flow of liquid from the top.

2.2 PURGE DURATION TIMER

The purge duration is the length of time that the purge valve will remain in the purge position. The purge duration timer is the timer situated on the electronic timer and is graduated in seconds. This is how adjustments are made to achieve optimum purge efficiency. The purge duration can be set as low as 5 seconds without hindering purge efficiency. The longer the duration, the longer the magnetic separator remains in purge and the longer the flow is diverted out the purge port and not to the system.

When setting the purge duration the objective is to find the optimum balance between low purge volume and full removal of fines from Maggie. For pressures lower than 25 psi the purge time will need to be between 5–8 seconds. For higher pressures the time can be as low as 2-3 seconds.

To alter the purge duration, simply turn the knob (graduated in seconds) and then press the test button.

2.3 PURGE INTERVAL TIMER

The purge of Maggie is typically operated between 10 and 45 minutes depending on the amount of debris being removed. For systems with a light load this time could be greater and for systems with a heavy load the time may be shorter.

To alter the interval time, simply turn the knob (graduated in minutes) and then press the test button.

NOTE: If the interval time is too great for the load of the system, there is the possibility that the outside of the metal tubes containing the magnets will be overburdened and the clamping force of the magnets to the tube will prevent the shuttling of magnets when in purge mode. When making adjustments to either timer ensure that the magnets move. To check for movement, the magnets will make a thud like sound when they have reached the end of their travel in either direction.

Note: Adjustments to both timers must be done when on line and not in purge mode. Therefore, it is advisable to initiate a manual purge using the TEST button on the timer before making any adjustments.

2.4 ELECTRONIC CONTROL TIMER

The timer is directly mounted on the air solenoid valve mounted to the pneumatic actuator. This timer has two functions as described in section 1.4. Power supply for the timer is 120 VAC. The timer has two ranges, which are adjustable. One is in minutes (Interval Timer) and the other in seconds (Duration Timer). There is also a TEST button, which is used to manually purge Maggie.

There are also two visual lamp indicators on the timer. The OFF lamp indicates that there is power to the timer and the ON lamp indicates that the duration timer (Purge) is in operation.

3.0 MAGGIE START-UP

Once the Maggie has been properly installed it may now be started by following the procedure below.

1. Ensure power and air is operational and connected to Maggie.
2. With the inlet valve to the separator closed, start any pumps serving the system. Slowly open the inlet Isolating valve. Check and correct for any possible leaks.
3. The discharge-isolating valve may now be slowly opened and the regulating valve adjusted to give the desired flow rate and pressure combination.
4. A final, on-line purge should be performed. Manually initiate a purge by depressing the TEST button on the timer and check for any leaks.
5. During the purge process, visually notice the indicators on each actuator rotate and listen for the shuttling of the magnets.

4.0 RECOMMENDED MAINTENANCE

The only recommended maintenance required is to verify operation of the magnetic separator on a regular basis.

5.0 FAULT FINDING

Listed below is a guide to the action required for the following faults.

INDICATION	REASON	ACTION
Timer OFF lamp not illuminated.	Loss of power.	Restore power
	Malfunction of timer.	Immediately take separator off line and replace timer. Upon remedial action, carry out a manual purge and check for correct operation of purge sequence.
Timer ON lamp illuminated but three-way valve or magnets do not move.	Loss of pneumatic air.	Restore air supply.
	Malfunction of timer.	Immediately take separator off line and replace timer. Upon remedial action, carry out a manual purge and check for correct operation of purge sequence.
Pneumatic actuator does not operate	Loss of pneumatic air pressure or Pneumatic air pressure to low.	Take separator off line and restore or increase air pressure.
	Actuator malfunction.	Replace actuator. Upon remedial action, carry out a manual purge and check for correct operation of purge sequence.
Magnets do not move.	Loss of air pressure	Immediately take separator off line.
	Magnetic tube bound with excessive fines	Restore air and check for correct air pressure of 80 psi or more.
	Loss of power to timer.	Purge interval to long. Shorten time. Purge duration to short. Lengthen time.
	Malfunction of timer	Restore power or replace timer.

6.0 Spare Parts

Recommended spare parts for the Maggie are as follows. Please call Zero Gravity Filters for pricing.

<u>Part Description</u>	<u>Part Number</u>
1 ½" butterfly valve and pneumatic actuator	4200-001
1 ½" butterfly valve	4201-000
Bray 92/63 Pneumatic actuator	4205-001
ASCO Timer kit	4211-001
ASCO control time package (solenoid valve, electronic timer, timer kit, air manifold block)	4215-001
ASCO air solenoid valve	4210-001