

# Arkal 4" Spin Klin Twin Apollo Filtration Battery User Guide

## Installation and Operation Instructions



## **2. Safety Instructions**

Prior to installation or handling of the filter, read carefully the Installation and Operation Instructions carefully.

1. Confirm filter draining prior to service.
2. Take precautions while lifting, transporting or installing the filter.
3. Installation of the filter should be performed so as to avoid direct water splashing on any of the filter parts and especially on the electronic control unit.
4. Confirm that filter weight, when full, meets the support construction requirements.
5. Prior to installation confirm that line pressure matches filter's operational pressure.
6. During installation, use standard flanges and connections only.
7. Check that all filter flange bolts are properly secured.
8. Please note, the filter enters a flushing mode automatically, without prior warning.
9. Use original parts only when servicing the filter.
10. Arkal cannot accept responsibility for any changes or modifications to the equipment.

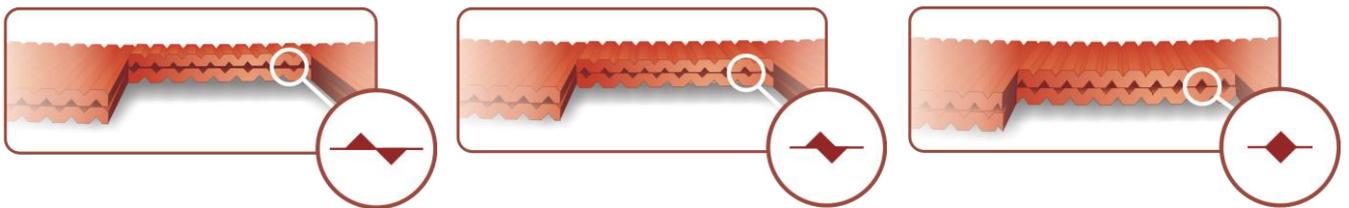
### **Special Note**

Before opening the filter lock, check that there is no pressure in the filter.

### 3. Description and Operation

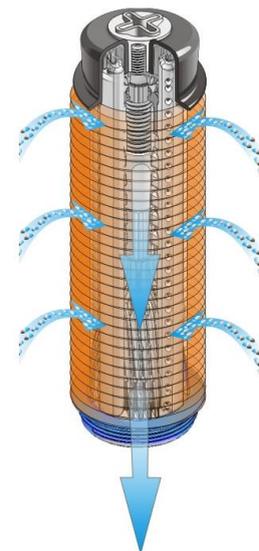
**Table of Filtration Degree of the Discs and Color Code**

Color Code	Blue	Yellow	Red	Black
Mesh	40	80	120	140
Micron	400	200	130	100



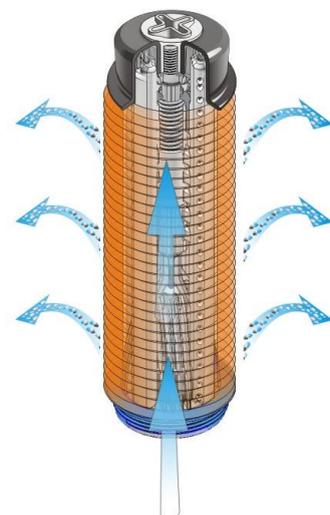
#### Spin Klin Spine - The Core of the Spin Klin Filtration System

The Spin Klin® discs are stacked on the Spin Klin® spine. The discs are color-coded according to micron size, and are assembled to suit your water filtration requirements. The spine assembly has a spring compression unit and an internal piston, which operate during alternate filtration or backwash modes. The spine assembly is specially designed to compress the micron housing. Inside the housing a spring and the pressure difference compress the discs tightly during the filtration process, forcing the water to flow between the grooves and trap the solids.



#### Spin Klin Automatic Backwash Operation

Activated by a predefined command (differential pressure or time) alternate units of the Spin Klin® system go into backwash mode. The inlet valve is shut as the drain is automatically opened. During the backwash process, the compression spring is released and the pressure difference is eliminated. The spine piston rises up, releasing the pressure on the discs. Tangential jets of clean water are pumped at high pressure in the opposite direction through nozzles at the center of the spine. The discs spin free and clear, loosening the trapped solids. Solids are quickly and efficiently flushed out through the drain.



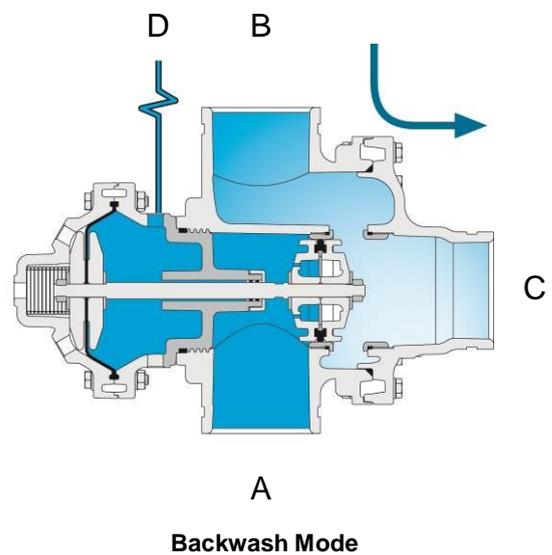
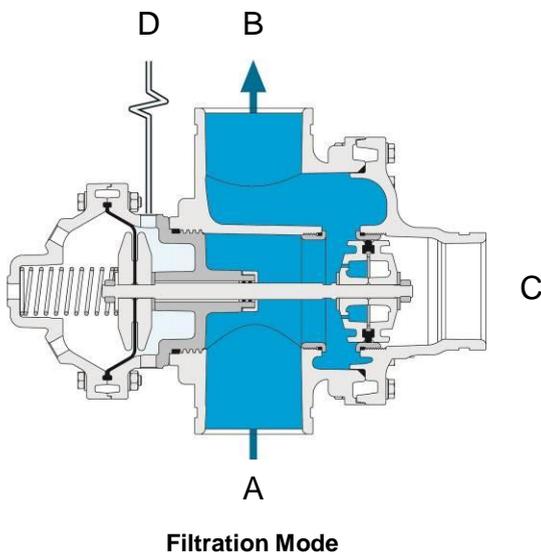
**Modes of the filter's Control valve**

**Filtration Position:**

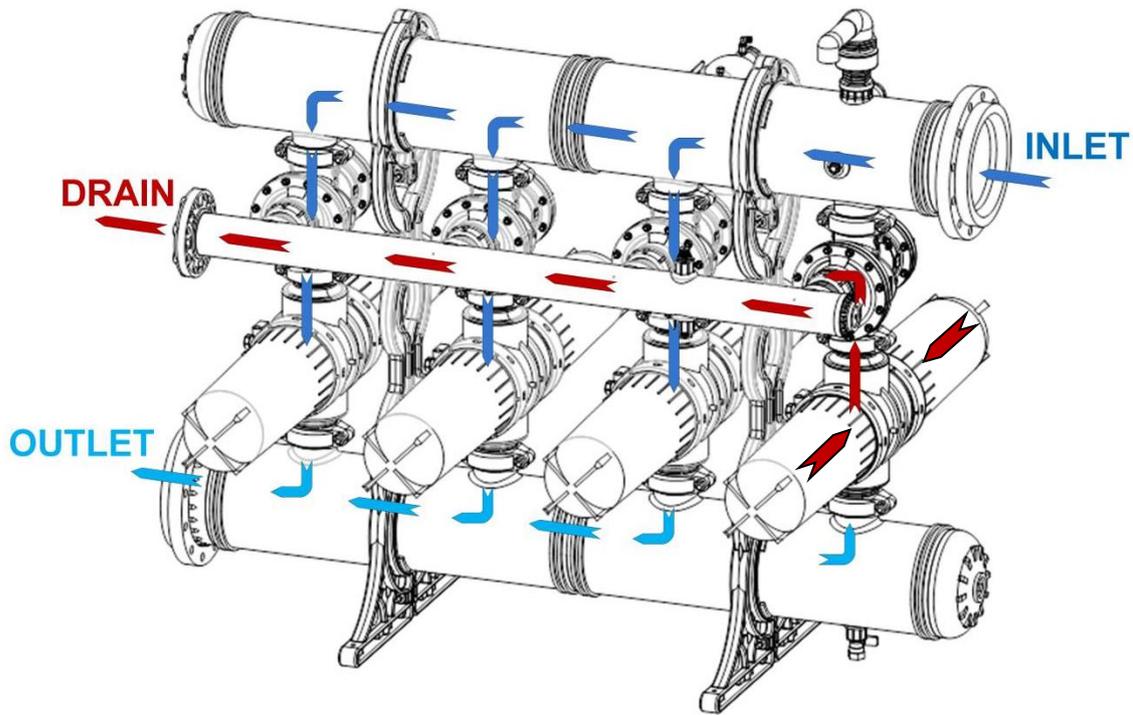
Water flows from port [A] (main supply) to port [B] (filter connection). Port [C] (drain water outlet) is closed by the seal.

**Backwash Position:**

Command pressure is applied to the diaphragm's control chamber through port [D]. The diaphragm moves the sealed shaft, port [A] closes, preventing flow to the filter. Port [C] opens, allowing flushing water to flow from port [B] (filter connection) to the drain.



### Mode of Operation



### Filtration Process

During the filtration process the water flows through the inlet manifold, reaching the filters through the backwash valves. The filtered water flow through the outlet manifold into the system.

### Backwash Process

The backwash process begins with a signal from the control unit activated by the pressure difference between the inlet and outlet or by time.

This signal is transported to the booster valve (assembled on 4"x 3" inlet valve No.1).

The booster valve opens, causing the No.1 valve to close the 4" inlet to the filter and open the 3" drain port.

Filter No.1 is now in a backwash mode.

The Spin Klin spine in filter No.1 operate simultaneously, releasing the compressed discs. Tangential jets of water are pumped against the discs, causing them to spin fast and free, flushing trapped solids out to the drain.

The filtered backwash water is supplied from the other filters through the outlet manifold.

The contaminated water from the backwashed filter drains through the drainage manifold.

Backwash time per filter is between 20 -25 seconds. When the time elapses the control unit stops the backwash signal to the solenoid.

The solenoid releases the water pressure signal allowing the inlet valve and the discs of the spine to return to filtration mode.

Once filter No.1 is in the filtration position again the control unit sends a signal to begin the backwash process in filter No.2.

#### 4. Technical Data - 4" Spin Klin Twin Apollo

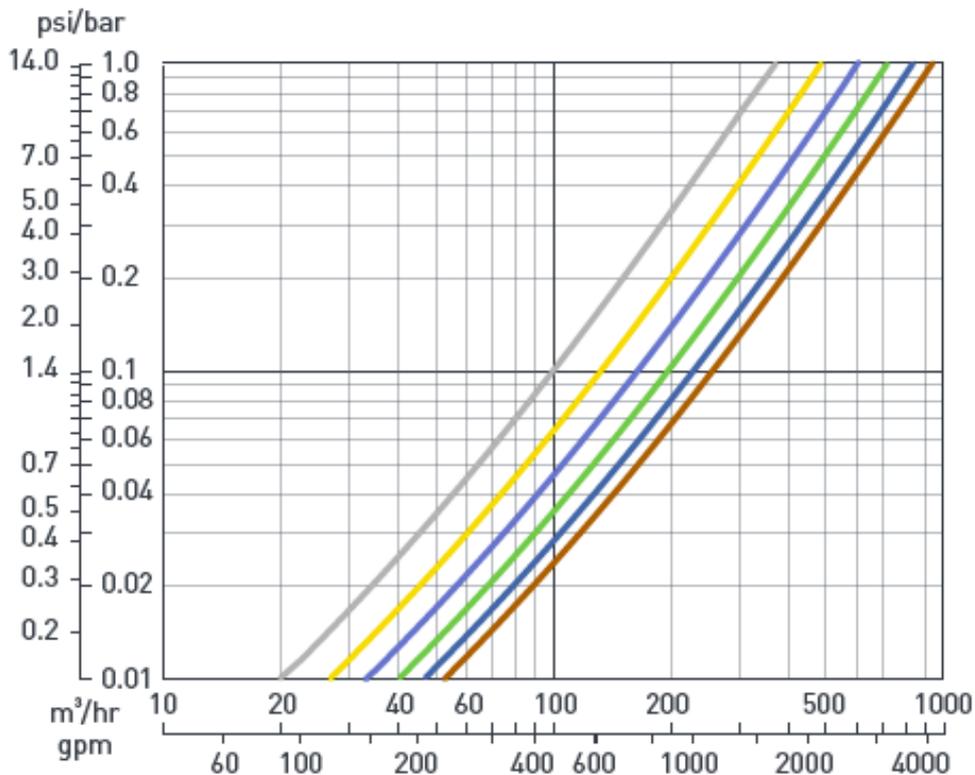
			3 Units	4 Units	5 Units	6 Units	7 Units	8 Units
<b>Max. pressure *</b>		bar/psi	10/145	10/145	10/145	10/145	10/145	10/145
<b>Min. backwash pressure **</b>		bar/psi	2/29	2/29	2/29	2/29	2/29	2.0/29
<b>Max. recommended flow rate</b>	400-130 $\mu$	m <sup>3</sup> /h/gpm	225/990	300/1,320	375/1,650	450/1,980	525/2,300	600/2,640
	100 $\mu$	m <sup>3</sup> /h/gpm	215/947	290/1,277	360/1,585	430/1,894	505/2,224	580/2,554
<b>Filtration surface area</b>		cm <sup>2</sup> /in <sup>2</sup>	15,720/2,435	20,960/3,245	26,200/4,055	31,440/4,865	36,680/5,675	41,920/6,485
<b>Filtration volume</b>		cm <sup>3</sup> /in <sup>3</sup>	18,852/1,150	25,136/1,534	31,420/1,917	37,704/2,301	43,988/2,684	50,272/3,068
<b>Backwash flow per filter</b>		m <sup>3</sup> /h/gpm	48/210	48/210	48/210	48/210	48/210	48/210
<b>Backwash volume</b>		m <sup>3</sup> /gallon	0.8/210	1/265	1.3/340	1.6/420	1.9/500	2.1/550
<b>System length - L</b>		mm/inch	1,450/57	2,240/88	2,740/108	3,240/128	3,740/147	4,240/167
<b>System width - W</b>		mm/inch	1,533/60	1,533/60	1,533/60	1,533/60	1,533/60	1,533/60
<b>System height - H</b>		mm/inch	1,699/67	1,833/72	1,833/72	1,833/72	1,930/76	1,930/76
<b>Standard diameter</b>		mm/inch	200/8	280/10	280/10	280/10	315/12	315/12

\* Max. pressure 10 bar - 25° t

\*\* depended on the water quality

#### 5. Batteries Headloss Chart - 130 micron, 4" Spin Klin Twin Apollo

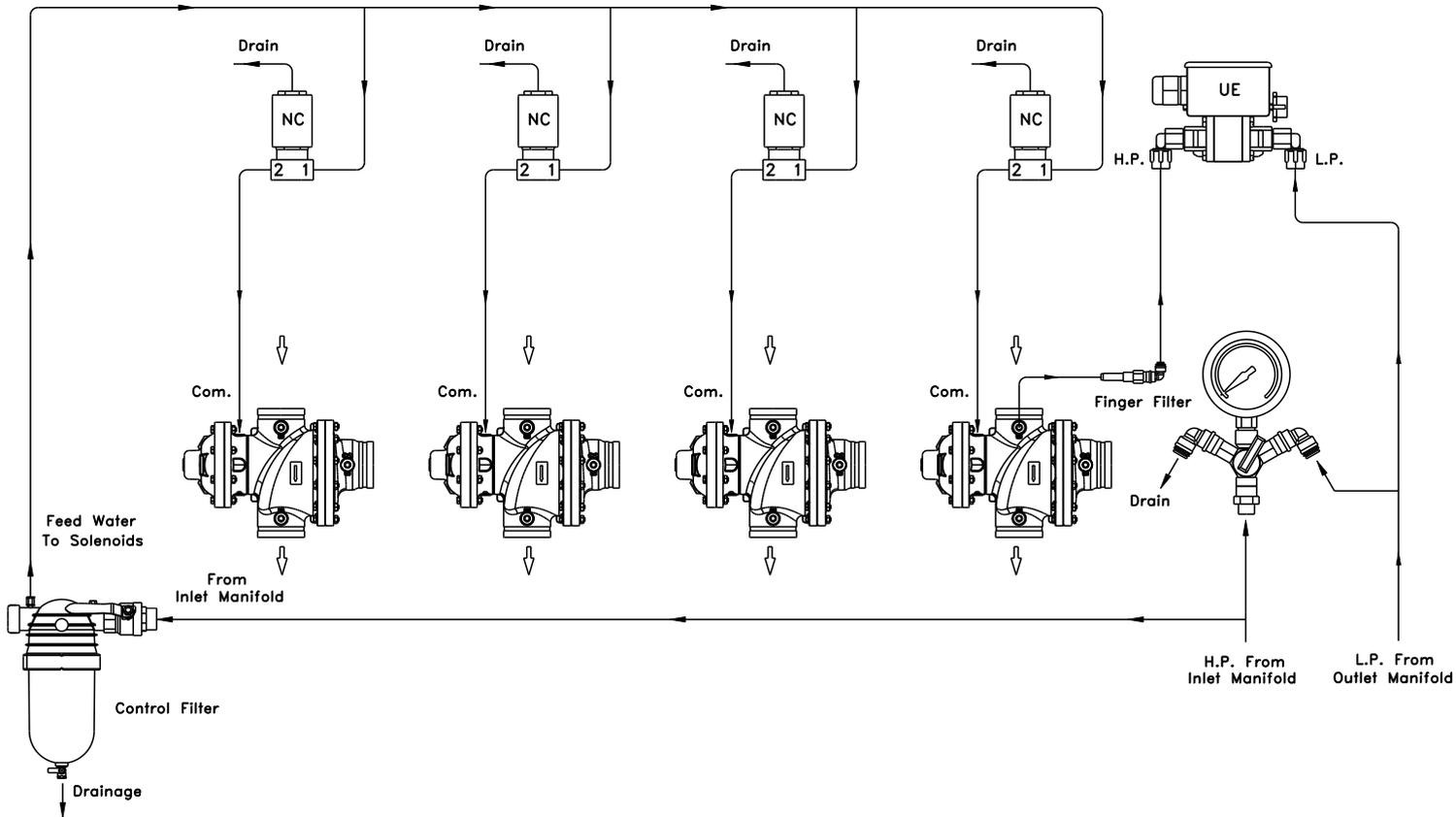
### Head Loss Graphs (in clean water)



\*head loss is based on a 130 micron disc

— 3 unit — 4 unit — 5 unit — 6 unit — 7 unit — 8 unit

**6. P & ID**



**Control**

- ❑ Refer to the manufacturer's handbook before installing the controller.
- ❑ Make sure that the voltage of both the solenoid unit and controller are correct.
- ❑ Set the manual operation button to automatic.
- ❑ Check that the  $\Delta P$  hydraulic switch HIGH and LOW pressure lines are correctly connected to the appropriate ports.
- ❑ Set the starting backwash switch to  $\Delta P$  5-7 meters (6 - 8 psi).
- ❑ Set the controller to a flush time of 20-25 seconds and a dwell time of 10 seconds. These settings may require adjustment to conform to local water conditions. Typically, a 1 to 3 hour interval between backwashes is recommended.

## **7. Apollo Spin Klin - System Maintenance**

### **Monthly Maintenance**

#### **Check inlet /outlet pressures:**

In case the pressure differential is above 5 m / 7 PSI.

Activate automatic backwash of the Spin Klin filter battery.

In the event that the pressure differential remains high check for possible failures.

#### **Check for leakages from the drain manifold:**

In case there is a leakage of water during the filtration stage, check for possible failure at the backwash valve seals.

#### **Backwash controller performance:**

Check that the controller timing parameters are correctly adjusted and activate automatic backwash cycle. In the event of possible failure at the backwash controller, check for possible failures.

#### **Cleaning of the Command Filter:**

Close the command filter inlet valve. Release the static pressure by opening the drain valve. Remove the cover. Thoroughly clean the filter element and then reassembly the command filter element and cover, then open the inlet valve.

#### **Winterization:**

In order to prevent the filter battery becoming damaged during water freezing – drain all the water from the filter battery, the command filter and the backwash valves.

## Seasonal Maintenance - Discs

To guarantee thorough cleaning the following steps should be taken:

Close the water inlet after backwashing the systems. Make sure that there is no pressure in the system, pull out the safety pin, open the clamp and remove the cover. **(Figure 1, 2)**

Unscrew the butterfly nuts on the filtration elements.

Remove the tightening cylinders. **(Figure 3, 4)**

Remove the disc sets (for convenience we recommend using a plastic bag). **(Figure 5, 6)**

Tie each set on a string and place them in a cleaning solutions (HCL, Chlorine, or other) refer to "Cleaning Recommendations Clogged Filtration Discs". **(Figure 7)**

Ensure that the correct quantities of discs are assembled on the spines: when the discs are pressed with two hands, the top disc should be level with the imprinted circle on the outside of the spine. **(Figure 8)**

Tighten the butterfly nut until the stopping point. **(Figure 9)**

Place the filter cover on the filter body and secure it with a slight clockwise rotation. Reposition clamp onto the cover and close using the lever. **(Figure 10)**

Tighten the clamp. Insert the safety pin. **(Figure 11)**

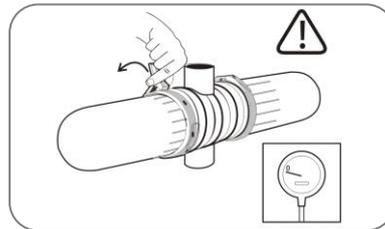


Figure 1

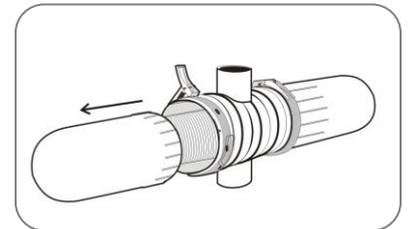


Figure 2

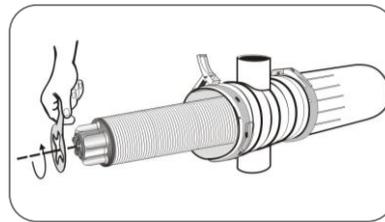


Figure 3

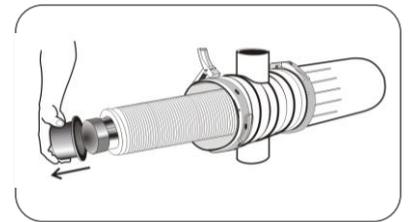


Figure 4

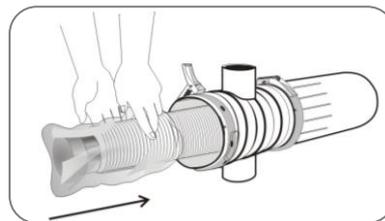


Figure 5

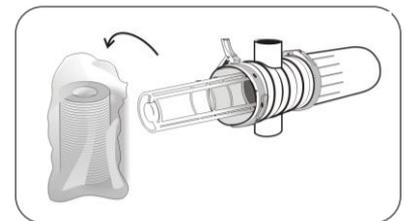


Figure 6

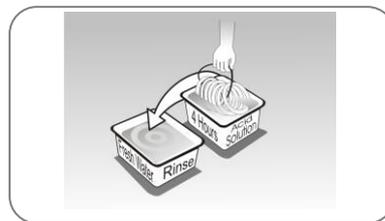


Figure 7

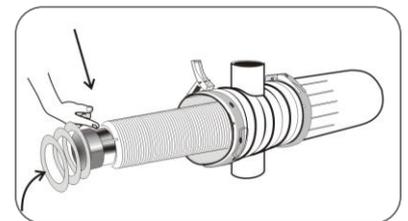


Figure 8

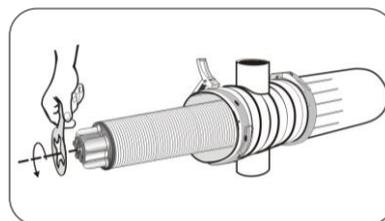


Figure 9

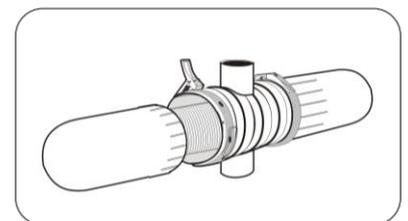


Figure 10

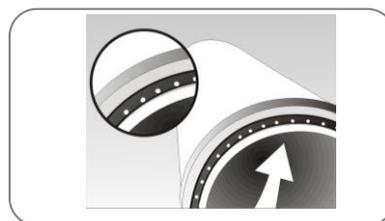


Figure 11

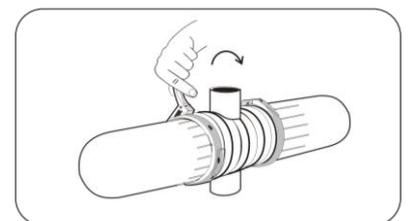


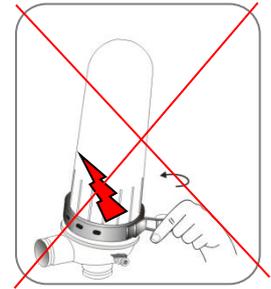
Figure 12

**Attention:**

When carrying out any of the following seasonal maintenance, service, or cleaning the discs – After backwashing the system and after closing the water inlet, **make sure that there is no pressure in the system!**

**Please Note:**

- Before removing the cover you may experience the vacuum phenomenon – which will make the removing of the cover very difficult or almost impossible.
- **Do Not** - insert any sharp tools (objects) in between the cover and the body! You may damage the hydraulic seal and the cover!
- In order to remove the cover easily – **you should drain the water from the filter!**
- You may drain the filter through the drain valve located on the filter body, once the filter is empty the cover can then be removed safely and easily.



**Cleaning Recommendations for Clogged Filtration Discs**

Water-formed deposits may cause clogging of the filter discs. The formation of these deposits depends on the quality of the filtered water and environmental conditions like temperature, pH, light, duration of filtration and more.

**Common water-formed deposits are:**

- Biological or organic deposits (mostly mucous or oily to the touch, beige, brown or green in color)
- Iron oxide (rust) or other metal oxides
- Carbonates (white or gray deposit)
- Combinations of the above

If these deposits cannot be eliminated by pretreatment of the water, we recommend the following cleaning procedure:

### **Material and Equipment**

- A well ventilated working place.
- 2 small containers (1 liter), 2 large containers (15 liter) and a stirring stick, all resistant to chemicals, preferably of polypropylene.
- Plastic rope to tie up the disc.
- Sodium Hypochlorite NaOCl -  
Strong oxidizing liquid, commercial concentration: 10%.  
Oxidizes and removes organic and biological deposits.
- Hydrochloric Acid HCl -  
Very corrosive liquid, commercial concentration: 30%.  
Dissolves and removes carbonates, iron oxide, and other deposits.
- Safety equipment: safety glasses, gloves, long pants, long sleeved shirt and shoes.

### **ATTENTION!**

While working with chemicals protect yourself with the necessary safety equipment:

- Safety glasses, gloves, protective clothing
- Work in a well ventilated area
- Follow the manufacturer's instructions

### **Cleaning Organic and Biological Deposits**

- Open the filter and remove dirty discs.  
Attention – Never open the filter before the pressure has been released.
- Arrange the discs loosely on the plastic rope
- Prepare a 5% Sodium Hypochlorite solution:
  - 1) Pour 5 liters of water into one of the large containers.
  - 2) Add 5 liters of Sodium Hypochlorite (10%) into the water.
- Soak the discs in the solution so that both sides are covered. To achieve maximum cleaning, agitate the discs several times with a stirring stick.
- Contact time with cleaning solution: up to 8 hours
- Remove the discs carefully from the solution, put them in the second large container and rinse them very well with clean water before placing them back in the filter.
- We recommend flushing the cleaned discs again in the filter to ensure that all chemical residues are removed.

The cleaning solution can be used for several sets of discs. As the cleaning activity of the solution deteriorates, it may be necessary to soak the discs for a longer time.

### **Cleaning Carbonates and Iron Deposits**

- Open the filter and remove the dirty discs.
- Arrange the discs loosely on the plastic rope.
- Prepare a 5% Solution of Hydrochloric Acid:
  - 1) Pour 10 liters of water into one of the large containers.
  - 2) Carefully add 2 liters of Hydrochloric Acid (30%) into the water.Soak the discs in the solution so that both sides will be covered.  
PLEASE NOTE: Carbonates react violently with hydrochloric acid (foaming, gas evolution).  
To achieve maximum cleaning, agitate the discs several times with a stirring stick.
- Contact time with cleaning solution: 1 - 8 hours.
- Remove the discs carefully from the solution and rinse them well with clean water before placing them back in the filter.
- We recommend flushing the cleaned discs again in the filter to ensure that all chemical residues are removed.

The cleaning solution can be used for several sets of discs. It may be necessary to soak the discs for a longer period of time as the cleaning activity of the solution deteriorates.

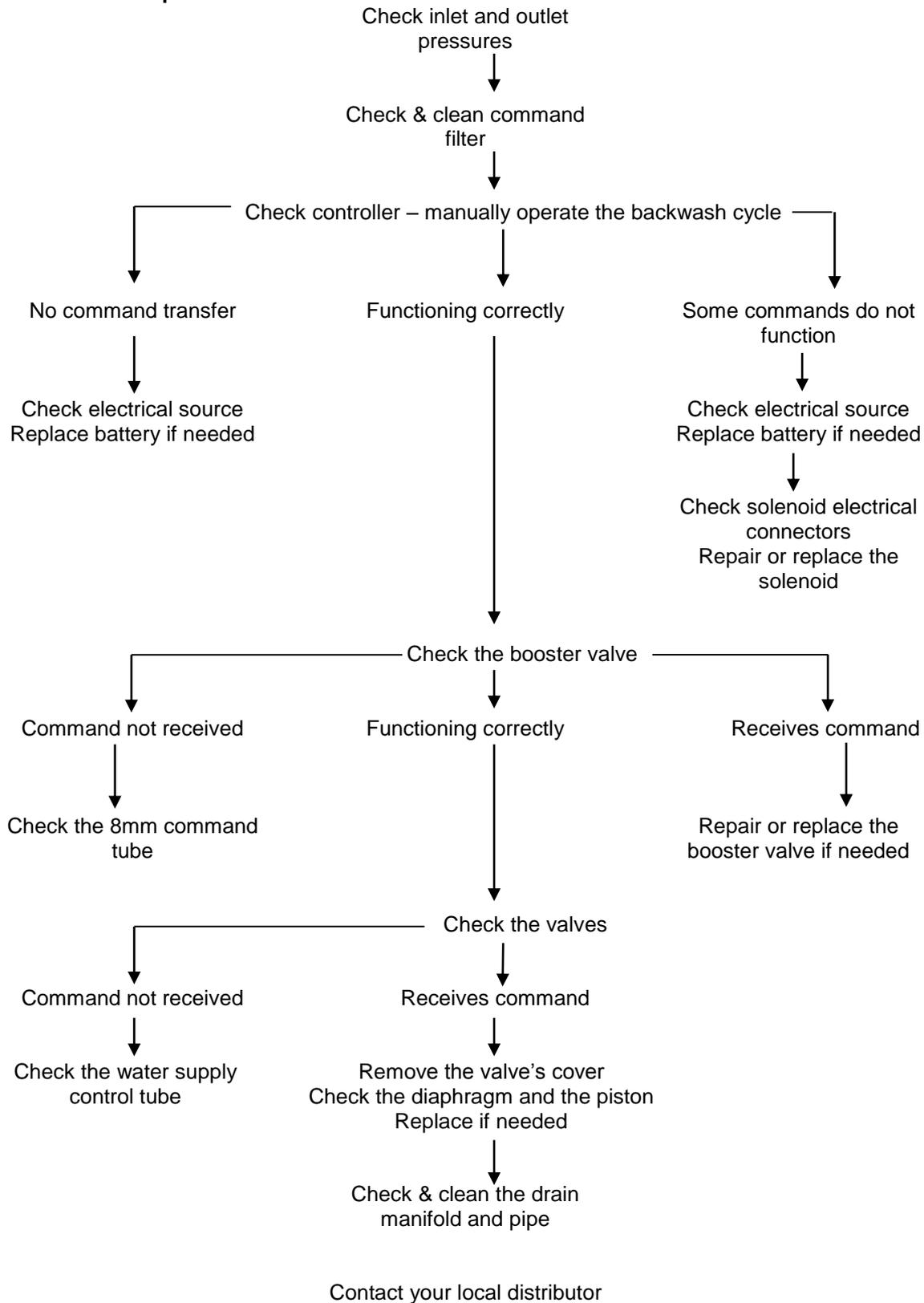
### **Cleaning Complex Deposits**

If the composition of the deposit is not known, perform the following test:

- Take 5 discs for the test.
- Soak 2 discs in a 5% Sodium Hypochlorite Solution.  
Preparation of the solution:  
Pour 1 cup of water into a small container, then add 1 cup of Sodium Hypochlorite (10% NaOCl).
- Soak 2 discs in a 5% Hydrochloric Acid Solution.  
Preparation of the solution:  
Pour 2½ cups (= 500ml) of water into a small container, then add carefully ½ cup (= 100ml) of Hydrochloric Acid (30% HCl).
- Keep one disc as a control.
- Observe the cleaning process:  
If one of the solutions removes all of the deposit, clean the discs in that solution according to the instructions above.  
If neither solution removes the deposit completely, continue with the test procedure.
- Remove the discs from both solutions, rinse them well with water and soak them in the second solution: put the two discs, which have been in the Sodium Hypochlorite Solution, in the Hydrochloric Acid Solution, and the other way round.
- Check the cleaning process:  
If one of the treatments removes all of the deposit, clean all of the discs following the same two-step procedure in the exact same order. Rinse the discs well between the two cleaning processes. If the deposit hasn't been completely removed, send a set of untreated discs to the laboratory for further examination.

**8. Troubleshooting**

**No Backwash Operation**



**Identifying Malfunctions in the Apollo system**

**Continuous or Non-stop Backwashing**

