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Installation Manual Corrodium Anodes ZBF

## Pulsing Magnesium Anodes

in sand bed filters and ozon tanks

Document Number  
**KBZBFOT**

Revision No.  
**00**

Revision Date  
**01 July 2015**

| Author/signature    | Verfier/signature  | Revision Number | Date              |
|---------------------|--------------------|-----------------|-------------------|
|                     |                    | <b>03</b>       |                   |
|                     |                    | <b>02</b>       |                   |
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## 1. Introduction

Ironhaven designs, manufactures and installs self-switching (pulsing) magnesium sacrificial anodes for sand bed filters. The switching produces the optimum current for protection against corrosion. There is no overprotection. The current also pulses. Besides preventing overprotection, the pulse also prevents the formation of a biofilm and microbiological corrosion.

Operation of the system:

The system consists of six different parts:

1. The object to be protected (the stainless steel filter).
2. The sacrificial anode (magnesium and if there is sufficient conductivity, aluminium). This anode is insulated and suspended from the stainless steel filter. There must be no electric contact between the anode and the filter.
3. A cable from the sacrificial anode to the printed circuit board (the -ve).
4. A cable from the filter to the printed circuit board (the +ve).
5. A printed circuit board with a housing.  
The printed circuit board controls the current and sends out a pulse. The anode current is also used to control the printed circuit board. Therefore, the printed circuit board does not require a battery or a separate power supply. The printed circuit board works as follows. First, a capacitor is charged to approximately 5 V (high potential). At a certain moment, the anode is short-circuited across an FET (transistor) so that the potential becomes low. This produces the pulse (see figure 1).
6. The electrolyte, which is the water.

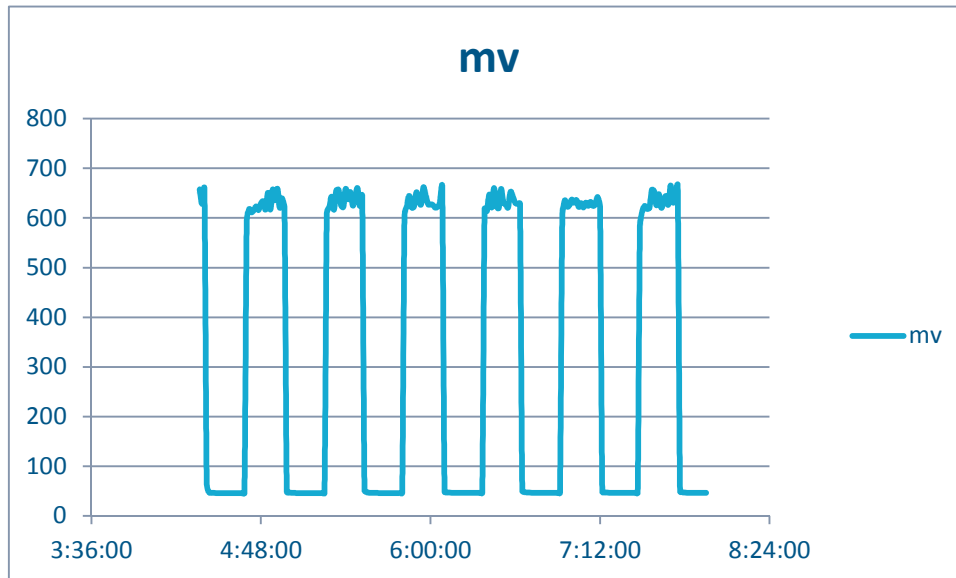
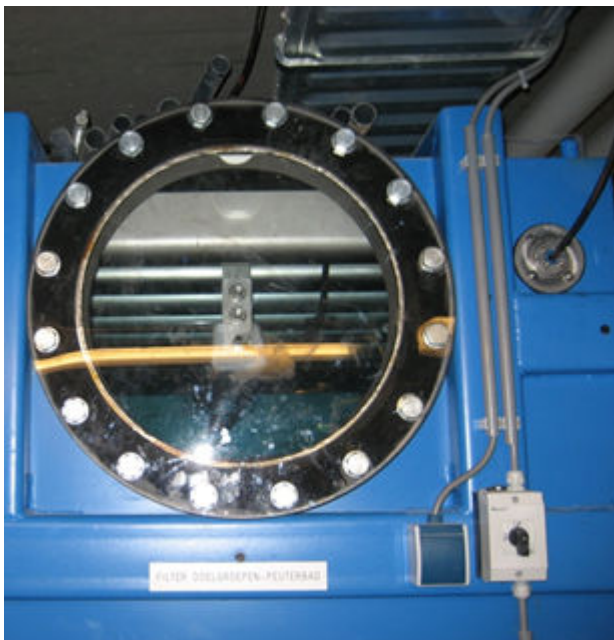


Figure 1: The pulse created between the stainless steel filter and the magnesium anode (in mV). When the mV value is low, the system is almost short-circuited and a high current flows. When the mV value is higher, the resistance is higher and no current flows. For a value of 650 mV: the system charges the capacitor, high resistance. For a value of 50 mV: the FET is short-circuited, a high current flows.



Photograph 2: The anode can be seen through the manhole.

Photograph 3: The housing, clearly indicated at the front which is the plus and the minus. Connect the plus to the RVS filter and connect the minus to the sacrificial anode.

## 2. Installation

### 2.1 Installation of the anode

The installation for single anodes is shown in diagram 99.000.001 and the installation for double anodes is shown in diagram 99.000.002.

Depending on the type of filter, either one or two magnesium anodes are installed. There are three different sizes of magnesium anode (see the table in the relevant diagram).

The method is as follows (see the relevant assembly diagram):

1. Strips (4) with 17 mm holes, according to the distances given in the relevant diagram (see the table above), are welded to the filter's ceiling.
2. The mounting bracket (5), see picture, will be attached to the welding bracket (4) with M16 nut. This mounting bracket is completely isolated. Although to prevent damages to the shrink sleeve, M16 washer need to be used.
3. The anode with the cable is suspended using nuts, bolts and sleeves as shown in the diagram.
4. The cable goes through the cable gland.
5. The housing is screwed to the outside of the filter.
6. The positive cable is secured to the stainless steel filter with an M12 or M10 bolt.
7. The positive cable and the negative cable (which is the anode cable) are connected to the housing with M10 bolts.
8. The system starts working by itself once the filter is filled with water.

## 2.2 Installation and setting of the housing

The housing will be screwed to the outside of the filter. The plus will be connected to the RVS filter. Use an M12 nut for this, or an M10. The minus needs to be connected to the cable of the sacrificial anode in the filter.

The settings are 1 and 3 up (see picture). With these settings there will be a pulse of 15 minutes on and 15 minutes off. (see label on the printplate)

## 2.3 Testing of the pulse

To quickly test the pulse, you need to put dipswitch 7 up. (see picture). Then there will be a pulse of about 1 minute. Do not forget to put the switch back after testing.

### 3. Maintenance and inspection

Since the system does not have a battery or a power supply, it requires very little maintenance. The design lifetime of the anode is more than 5 years, depending on the current strength. The design lifetime of the printed circuit board is more than 10 years.

The system must be inspected every year as follows:

1. Connect a multimeter (voltmeter) between the +ve and -ve terminals on the housing. There must be a pulse of between 50-150 mV and 500-700 mV (see figure 1). The size of the pulse depends on the size of the filter, as well as the conductivity and the temperature of the water.
2. Visually inspect the filter for corrosion. There must be no visible rust, although superficial rust is permitted. If rust is observed, the filter must be opened to check whether there is any pitting corrosion under the rust.
3. When not in use, the filter must be completely filled with water. The anodes only work when they are submerged. To prevent a build-up of pressure, do not seal the filter.

## 4. Safety measures

### 4.1 Development of hydrogen gas

Hydrogen gas can be produced as a result of the protection current produced by the anode. The volume of gas that is produced is so small that it flows away with the water and is dissolved (a balance is created with the pH value). This effect is so small that it is not measurable in the large volume of the swimming pool water.

However, a problem may arise when the filter is not in use. As a result, the following safety measures must be taken when the filter is not in use:

1. Before opening the filter, check whether it is completely filled with water. If it is not, rinse it until the filter is completely filled with water.
2. Never completely close off a filter. Since the filter is filled with water, pressure can quickly build up as a result of the development of hydrogen.
3. If the filter is not used for a long time, any gases which are produced must be removed by means of a PVC pipe.

## 5. Magnesium is a flammable metal

Never place a heat source close to a magnesium anode. The magnesium anodes must be removed before welding or working with a naked flame.



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## 6. Drawing 99.000.001 (one anode)

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## **7. Drawing 99.000.002 (two anodes)**