Biostat

HaloVac - HaloSan

Australia 61 (0) 435991950

Permanent treatment systems for control of Iron and sulphate reducing bacteria, algae and odour in water bores and wells

HaloSan/HaloVac Booklet

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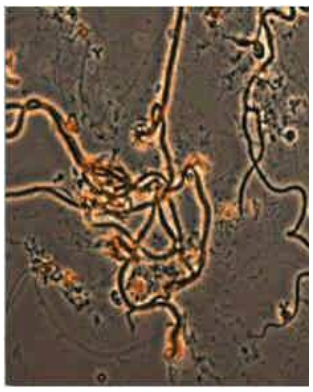
1. INTRODUCTION TO IRON BACTERIA

Throughout history, there are reports of water from wells, rivers and creeks being stained brown and becoming undrinkable presumably due to the growths of iron bacteria. Typical symptoms of iron bacterial growths in water supplies are: (a) discoloration of the waters (yellow to rust-red or brown); (b) reduction in flow rates through the system caused by coatings of iron bacteria inside the pipes, (c) development of thick red or brown coatings on the sides of reservoirs, tanks and cysterns; sometimes sloughing off to form either fluffy specks in the water or gelatinous clumps of red to brown filamentous growths: (d) rapid clogging of filter screens: (e) heavy surface and sedimented growths of a red or brown colour sometimes iridescent in water.

IRON BACTERIA may be defined as “that group of aerobic bacteria which appear to utilize the oxidation of ferrous and/or manganous ions as an essential component in their metabolic functioning.” The resultant production of ferric hydroxide and/or manganic salts within the cell or cell coatings gives the bacteria their typical brown coloration. Frequently, the heavy growths of’ iron bacteria form a substrate for other bacteria which may degrade these materials anaerobically to form acidic products and hydrogen sulphide These in turn call cause taste, odour and corrosion problems.



Gallionella ferruginea IRB

Controlling the growth of iron bacteria has always posed a problem due to the heavy deposits of aforementioned salts around the cell and the cell coatings themselves, forming a natural barrier to any bacteriocidal agent. In summary the difficulty of controlling iron bacteria by the statement “Iron bacteria are tenacious and continue to grow even after the severest kind of treatment . . . and if relief is to be had it is likely to be temporary.” Successful management of iron bacteria involves treatment of the contaminated well on a daily basis.

Chemical treatments for Iron and sulphate bacteria control are widely applied but there is a history of recolonization, of the treated wells even after a short periods of time; this has led to some doubt as to the effectiveness of control by periodical chemical means. Inadequate control practices frequently lead to a post-treatment surge in the iron bacterial populations after a few days. The mechanisms which could influence this may be postulated to be as follows.

1. (protected) cells might be more a function of the ability of the agent to become transported through the cell and the copious slime coatings than upon its toxic potential. Thus, as a result of poor penetration, very high concentrations of an agent (for example, sodium hypochlorite) could be employed without achieving adequate control.

2. Iron bacteria may be growing extensively outside of the treatment zone, and be pulled back into the treatment zone upon the resumption of pumping.

3. The control agent may become neutralized by dead organic material and non-target bacteria, thus reducing its effectiveness.

From all this, it is clear that the iron bacteria are in general very resistant to chemical methods of control, perhaps due to the protective slime layers and other coatings which surround the cells, together with the tendency for the cells to clump and/or form thick layers. Furthermore, these coatings are often heavily impregnated with ferric and manganic oxides and hydroxide deposits which could restrict the diffusion of the disinfection chemical agents and perhaps enter into some direct chemical reaction with them. Clearly the lack of or contact time to allow total penetration of the iron bacteria in the wells, or is it too little or too late for a chemical solution

IRB Clogged pump

The occurrence of iron in geological strata is already well established . Iron bacteria increasingly cause problems in water supplies. In water wells, the major problems are (a) growths clogging the screens;
(b) coating of the piped systems, impellers and motors, thereby reducing flow rates; (c) reduced potability of the water and finally; (d) total clogging of the well. Clogging of wells causes rapid decreases in yields particularly at times of maximum demand. The encrustations were considered to be caused by: (a) iron and manganese bacteria, various species of which exist in the soil and could presumably enter a well during the initial boring operations or by seepage into the aquifer feeding the well; (b) sulphate-reducing bacteria which reduce sulphates to sulphides to meet their respiratory needs (the sulphides when excreted react with the iron to form iron sulphide deposits): (c) corrosion of metallic tubing and pipes.

Prevention of biofouling in the pumping and distribution system is about control over the bacteria responsible for the problems. This cannot be achieved by periodical treatment of the well. Consideration for treatment of an Iron bacteria contaminated system comprises: the well, pump, rising main, well headwork, filters and distribution system. There is no one product or procedure currently available for this task. Biostat Engineering considers all of these aspects in a holistic approach to the problem, by supplying product/s for each of the specific requirements of treatment and ongoing management. Biostat Engineering is the only company to manufacture and supply a complete range of solutions for all the problems associated with iron, manganese and related bacteria.

HaloVac First in Iron Bacteria Treatment

HaloVac Equipment Selection		
Model	Max Flow - L/min	HaloSan Load - kg
HV25 & 40SB	150	1.00
HV25 & 40LB	200	2.00
HV700	300	10.00
HV752	40 - 400 L/hr	10.00
HV900	400	15.00
HV952	40 - 400 L/hr	15.00
HV25HPP	100	25.00
HV50HPP	200	50.00
HV100HPP	500	100.00
HV150HPP	600	150.00
Individual units can placed on a manifold to obtain greater flows		

Benefits of HaloVac:

- Easily installed
- Adaptable to existing systems
- Unobtrusive – above or below ground installation
- Easy access for refill
- Cost effective
- Full recirculation or dosing ability
- Ability to dose all irrigation system
- Low Maintenance
- Long Service life
- Multi-voltages, including solar power

AUSTRALIAN MADE & OWNED

Biostat Water

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HaloVac Canister Insert

Contact your local distributor…

Biostat Water

Biostat

HaloVac

Treatment System for Control of Iron & Sulphate Reducing Bacteria, Algae & Odour in Water Bores and Pipelines

Industrial - Mining - Agriculture - Domestic

Use our special purpose dispensers created to fit into any system. Eliminates unsightly drums etc.

HaloVac HV952CD, Dispenser 40 - 400 L/hr bore hole & well dosing system.

The HaloVac BR2000-HV50HPP system.
Supplied in a high and low pressure version.

HaloVac is a new and unique method for:

1. Controlling bacteria and algae in water tanks, dams, lakes and ponds;
2. eliminating clogging and blockages caused by iron sludge, algae and other organic material in pipes, pumps and micro-irrigation lines;
3. sanitising sensitive areas, including dairy and nursery applications;
4. management of bacteria in grey-water and other waste-water situations;
5. prevention of clogging and odour caused by iron and sulphate bacteria in wells, bores, soaks ;
6. can be used in conjunction with Municipal and private drinking water supplies. Approved by the NSF for use within these applications.

HaloSan sanitiser pellets, available in:
1kg, 5kg and 20kg pails.

HaloVac - HaloSan

Guaranteed to prevent blockages caused by iron bacteria and algae'

The HaloVac system dispenser HaloSan sanitiser by either of the following methods:

a. Inline: Treatment is accomplished when the total volume of water for treatment has passed through the HaloVac dispenser at least once.

b. Dosing: Is applied by passing water from another source through the dispenser into the water for treatment.

c. Circulation: A concentration of sanitiser is accumulated within the water being treated by multiple passes of the same water through the dispenser.

d. Hose-end: The HaloVac dispenser is installed on a valve outlet. A flexible hose is attached to the dispenser outlet.

e. BioDec: HaloSan is contained within the BioDec dispenser. The BioDec floats freely or is anchored in the body of water for treatment. HaloSan sanitiser is dispensed by dissolution of the pellets within.

HaloSan sanitiser is a safe and readily degradable compound. Treatment is effective at concentrations that do not need to exceed levels set for human consumption by the World Health organisation for safe to drink water.

Product Information

HaloSan – The Number One Oxidizing Biocide for Iron Bacteria Control in Water Wells

Description and Use
HaloSan oxidizing biocide is a safer, more effective alternative to chlorine based oxidizing biocides and non-oxidizing biocides for microbiological control in ground water wells. In water, HaloSan tablets generate hypobromous acid, a highly effective oxidizing biocide, especially at high pH.

HaloSan is registered with the United States Environmental Protection Agency and is certified to NSF/ANS Standard 60 for disinfection and oxidation of potable water. Use in once-through and recirculating cooling waters, heat exchange water systems, air washers equipped with mist eliminators, industrial water scrubbers, influent water systems, brewery pasteurizers,

Benefits

- **Broad spectrum effectiveness**. HaloSan kills a broad variety of bacteria, algae and fungi and because it is an oxidizing biocide, microorganisms cannot develop resistance.

- **Effective in a wide range of water conditions**. HaloSan provides excellent performance in alkaline water situations as well as in waters containing nitrogen and organic materials.

- **Low dose performance and safer handling**. Since HaloSan is effective at low doses, maintaining high halogen levels is unnecessary. This means less product is needed, at less expense. Its solid form also makes HaloSan is easier to handle than gas and liquid oxidizing biocides, reducing the risk chemical accidents and impact of environmental exposure.

- **Controlled dissolution**. HaloSan can be applied in easily controlled doses because of its unique solubility characteristics. Users have the freedom to decide the required dissolution rate and then select the HaloVac Dispenser to fit their needs.

HaloSan tablets dissolve more slowly that other biocides and are the product of choice where a high degree of feed control is needed.

Treatment and Dosing Requirements
HaloSan effectively controls bacterial, algal, and fungal slimes that can cause costly reductions in heat transfer efficiency.

HaloSan can either be dosed on a continuous or intermittent shock basis using A HaloVac dispenser unit.

For noticeable fouling, add 0.2 - 0.5 ppm as Cl_2 for continuous dosing, or 1 - 2 ppm as Cl_2 for intermittent shock dosing.

Typically, in well managed systems, successful control has been demonstrated with dosages in the range of 0.1 - 0.3 ppm total halogen as Cl_2.

Typical Properties of HaloSan

Active Ingredient 1 -bromo-3-chloro-5, 5- dimethylhydantoin (BCDMH).

Solubility @ 25°C:	0.2 % as BCDMH
Active Ingredient:	96%
Melting Point:	145- 150°C (decomposes)

HaloSan tablets are white to off-white in color and have a faint halogen odor.

Tablet Dimensions:	30mm x 19 mm
Tablet Weight:	20 grams

Storage and Handling Precautions
HaloSan products should be kept dry in a tightly closed container.

Avoid contamination with moisture, chemicals or any other foreign materials due to risk of explosion, fire and release of hazardous gases.

Store in a cool, dry, well-ventilated area away from heat, sunlight, open flames and organic materials such as greases, oils and solvents.

HaloSan is corrosive in solution, and may be fatal if swallowed.

Inhalation of dust may cause irritation of the nose and throat, and irritation to skin. Always wear a dust mask approved by the appropriate national authority, impact-resistant safety goggles or safety glasses, and a full-face plastic shield with forehead protection

To avoid contact with skin, wear rubber or plastic gloves, long pants, and long shirt sleeves. Always tuck gloves under shirt sleeves and leave pant legs outside of boots. Wash contaminated clothing and equipment before reuse.

Safety Precautions

Do not leave wet HaloSan exposed to air inside a HaloVac Dispenser feed system. After adding HaloSan but before replacing the top closure, refill the tank with water. Failure to do so may allow for product decomposition leading to pressure build-up in the feeder. High pressures may lead to rupture of the feeder causing serious bodily injury or property damage by explosion, fire or release of hazardous gases.

Contact of HaloSan with organic materials such as alcohols, aldehydes, and ketones or strong reducing agents may cause a chemical reaction leading to a pressure build-up in the feeder. High pressure may lead to rupture of the feeder causing serious bodily injury or property damage.

Before handling HaloSan, all persons must be thoroughly aware of the hazardous properties and have reviewed the Material Safety Data Sheet (MSDS). A MSDS may be obtained from Biostat Engineering. Always use biocides safely.

Packaging Information

HaloSan tablets are available 20 kg.

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Only clean drinking water gives good health

Biostat Engineering - HaloSan Calculator

Input

1. Well / Bore diameter (mm)	**350**	
2. Well / Bore water depth (M)	**107**	
3. HaloSan dosage rate (mg/L)	**1.5**	

Output

a. Volume of water in well (L)	**10289**	**Result**
b. Total Qty. HaloSan required (grams)	**154.3**	**Result (See chart for equipment selection)**
c. Select cell for result	**Enter**	

SEE USING THE CALCULATOR ON NEXT PAGE

Using the Calculator:

Input *(Select cell/s highlighted in yellow individually to enter the following parameters:)*

1. Enter well diameter in **millimetres** (see common sizes below)
2. Enter well / bore water depth in **metres**
3. Enter selected concentration of HaloSan (see guidelines below)

Output *(Do not enter any data into the cells highlighted grey)*

a. Displays the volume of water in **litres** in the area chosen for treatment
b. Displays the amount of HaloSan required in grams to treat the well/bore
c. Highlight **enter** (blue cell) for calculation results

Caution: *Do not clear data from the cells. Enter (type) new values over the existing data*
Do not enter data on green background area outside specified cells

Common Well/ Borehole diameters:
101mm (4"), 152mm (6"), 203mm (8"), 254mm (10"), 304mm (12")

Halosan (How much?):
The objective is to achieve a HaloSan residual conc of approximately 1.0 mg/L throughout the bore/well Additional HaloSan is required to achieve this. The amount of additonal HaloSan is dependent upon the organic and/or mineral loading of the water for treatment. After assessment of the water quality for treatment; choose and enter input **[HaloSan dosage rate mg/L]** one of the concentrations set out below:

Assessed organic loading	HaloSan mg/L
Domestic	(Input) 1
Low	(Input) 2
Medium	(Input) 4
High	(Input) 6

Further Information Contact:

Dispenser Model	HaloSan	HaloSan Approximate Dissolution Rate (g/min @ 21°C)					
	1000	25.83	51.16	66.66	102.50	155.33	366.16
	950	24.66	49.00	63.66	98.16	148.33	350.66
	900	23.50	46.66	61.00	93.66	141.66	335.16
	850	22.33	44.50	58.33	89.16	135.00	319.66
	800	21.16	42.16	55.33	84.66	128.33	304.16
HVHPP750	750	21.16	40.00	52.66	80.16	121.50	288.66
	700	19.16	37.82	50.00	75.83	114.66	273.00
	650	18.00	35.50	47.00	71.33	107.83	257.50
	600	17.00	33.33	44.33	66.83	101.16	242.00
	550	15.83	31.00	41.66	62.33	94.33	226.50
	500	14.66	28.83	38.66	58.00	87.50	211.00
	450	13.50	26.66	36.00	53.50	80.83	195.33
	400	12.50	24.33	33.33	49.00	74.00	179.83
	350	11.33	22.16	30.33	44.50	67.33	164.33
	300	10.16	20.00	27.66	40.00	60.50	148.83
	250	9.00	17.66	25.00	33.50	53.77	133.30
	200	7.83	15.50	22.00	31.16	47.00	120.00
HVHPP150	150	6.66	13.33	19.33	26.66	40.16	104.50
HVHPP100	100	5.66	11.16	16.66	22.33	33.50	89.00
HVHPP75	75	4.16	8.30	12.50	16.66	25.00	66.66
HVHPP50	50	3.33	5.50	8.33	11.16	16.66	44.50
HVHPP25	25	1.33	2.66	4.16	5.50	8.33	22.16
HVHPP10	10	0.53	1.06	1.59	2.12	3.18	8.48
HV40LB	2	0.07	0.15	0.22	0.30	0.45	1.20
HV25LB	2	0.07	0.15	0.22	0.30	0.45	1.20
	0	0.00	0.00	0.00	0.00	0.00	0.00
	(Kg)	25	50	75	100	150	400
	Pellet Load	Flow Rate (LPM)					

HALOSAN DISSOLUTION RATE

The rate at which HaloSan dissolves in water is temperature dependant. When the temperature of the water the pellets are emerged in is cold, the dissolution will be a lot less than when it is hot.

To account for this the following adjustments should be made in accordance with the various water temperatures:

Water Temp (°C)	Adjust 21°C Chart Rate (%)
10	+50
21	0
32	-80
43	-160

Use as a guidleine. Add or subtract the percentage (depending upon the temperature of the water for treatment) from the chosen data on the adjacent chart.

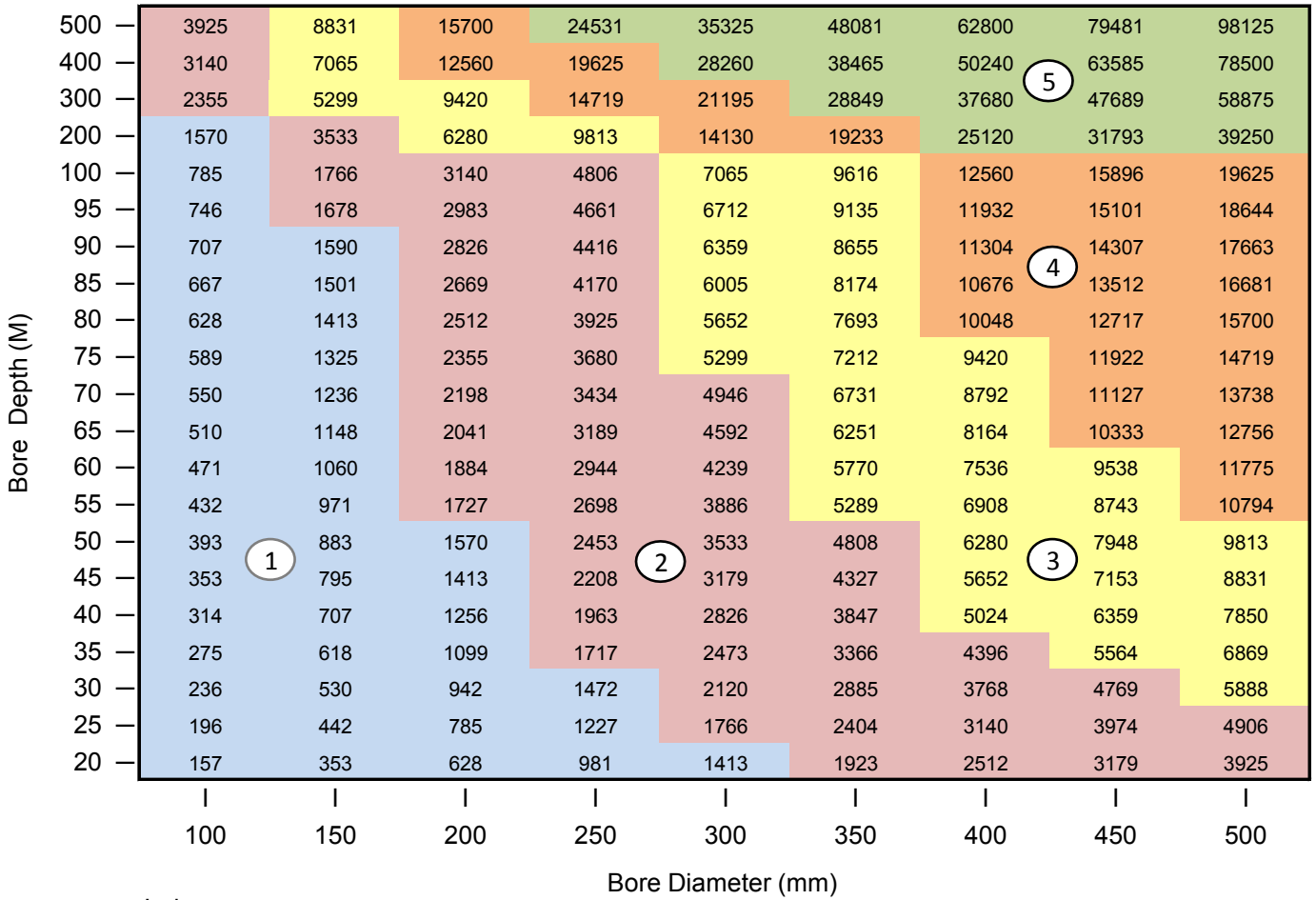
USING THE CHART

After determining the amount of HaloSan required to treat the well or borehole, and the flow of water available to return the HaloSan to the treatment area; follow up from the flow rate into the grams per minute data. Start of with the lowest number (g/min) and enter into the following calculator. The output will be pumping time in minutes required to treat the well or borehole. Times around 15-20 minutes are reasonable

HaloSan Qty (g)	**4.40**
g/min from chart	**0.45**
OUTPUT mins/dosing	**9.78**
	ENTER

After selection of a suitable dosing time move from the rate (g/min) across to dispenser model, for equipment selection

HaloVac BR Series Vessel Selection Chart



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1	Blue	1000 (L) Vessel
2	Red	2000 (L) Vessel
3	Green	3000 (L) Vessel
4	Orange	4000 (L) Vessel
5	Yellow	5000 (L) Vessel

HaloVac Systems
HV40 & 40LB

HV40LB Pictured with mounting base & Isolation-valve

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Biostat Engineering

Pumpmate HaloVac HV40 & HV40LB System

HaloVac is an inline dispenser which imparts a sanitiser into the water as it flows through the device. Agitation during water flow causes the dissolution of the sanitiser pellets. The dispenser needs recharging with pellets when the internal canister has been lowered to approximately one third or half its capacity.

The HaloVac system can be installed to dispense sanitiser by either of the following methods:

Inline: Treatment is accomplished when the total volume of water for treatment has passed through the HaloVac dispenser at least once.
Dosing: Is applied by passing water from another source through the dispenser into the water for treatment.
Circulation: A concentration of sanitiser is accumulated within the water for treatment by multiple passes of the same water through the dispenser.
Hose-end: The HaloVac dispenser is installed on a valve outlet. A flexible hose is attached to the dispenser outlet.
BioDec: HaloVac is contained within the BioDec dispenser. The BioDec floats freely or is anchored in the body of water for treatment. HaloVac sanitiser is dispensed by dissolution of the pellets within.

Equipment selection is relative to water flow rates:

Model	Normal - Max L/min	Sanitiser Load kg
HV40	100 - 200	1.50
HV40LB	100 - 200	3.00

Individual units can be installed in multiples on a manifold system for greater flows.

Installation: In general installation is completed by cutting into the water discharge pipe. The dispenser base can be installed inline for continuous sanitiser application, or onto a take-off for water and sanitiser returning to the well or borehole. Installation is correct when water flow enters the base through the side marked in (IN) and water flows upwards through the outer chamber and discharges through the inner chamber.

Installation of the dispenser should be preceded by either an electrical or manual isolation valve. Failure to complete this instruction will see premature dissolution of the pellets and continuous flow through the drain tube while the borehole pump is on, or continuous stop/start of pressure regulated systems. Borehole treatment by loop recirculation through a HaloVac dispenser requires the loop to operate at normal system pressures. A pressure regulator or a ball valve is installed prior to the loop return entering the borehole. Installation of the valve will be useful in providing a pressure head (differential) usually required to ensure adequate closure of solenoid valves.

For industrial applications we recommend the use of electrical or hydraulic operated actuator valves. The clear hose attached to the underside of the base dispenser will hang freely into the borehole or well above the static water level. Some water will discharge through the clear hose during treatment. The purpose of the hose is to drain the dispenser free of water and leave the pellets dry while not in use. HaloVac should not be exposed to a head of water or continuous flow (unless required) while not in use.

Remove the pellets from the wrapping (read handling instructions) and place into the dispenser. Locate the dispenser onto the canister base with the inlet hole over the inlet of the base centre. Place the dispenser lid over the canister and screw gently into place. Check flow rate compliance. Flow rates greater than specified for the equipment may cause reduced sanitiser in the flowing water.

Treatment run time: Sanitiser is normally produced at around 5 mg/L in a single pass through the HaloVac dispenser (This is dependant upon the amount of pellets in the system and their relevant size at the time of measurement).

Effective treatment is accomplished when the total volume of the water in the borehole has passed through the HaloVac dispenser at least once. High levels of bacterial contamination may require additional run time. Concentrations of 2 – 5 mg/L HaloVac (Br) will usually be adequate for good control.

Calculate run time by determining how much water is in the bore for treatment and how much water the borehole pump can move in one minute. Divide the pump performance into the water volume in the borehole. The answer will provide run time in minutes. Set the timer to run the pump for the required time. For good bacteria control do not under treat the borehole. 100mm borehole = 8ltrs/metre. 150mm borehole = 18ltrs/metre.

Pellet replacement: As the quantity of pellets is reduced in the HaloVac dispenser, the performance of the equipment can be reduced. For good performance do not allow the pellet dispenser to empty below half of the original sanitiser load. How frequently the dispenser needs replenishing is dependant upon use. For a time after installation check the dispenser sanitiser load regularly to determine when the pellets should be replenished. Unless there is a major change with treatment after this time less frequent checking is needed.

Replacement pellets: Order HALOSAN5K (5kg tub)
Order HALOSAN20K (20kg bucket)
Order HALOSAN50K (50kg drum)

Testing equipment: Order HALOTEST (Colour comparator 0.5 – 8.0 mg/L HaloVac)
Order HALOTAB (Replacement reagent tabs Pkt 250 tabs)

Caution: Do not use products in the HaloVac dispenser other than that supplied by your HaloVac dealer. Read instruction that accompanies HaloVac sanitiser before opening containers. For additional advice contact your dealer or Biostat Engineering

Specification:

Pumpmate HaloVac model: **HV40**
Flow rate: 100 – 200 LPM (Av. 200 LPM 12m^3/hr max)
Enclosure inlet/outlet: 40mm BSP FI thread or PVC flange
Sight glass? Optional
Dispenser: 40mm orifice with optional use 32mm insert
Sanitiser load: 1.5kg (approx 75 x 20g pellets)
Dissolution rate: Average 5mg/L continuous flow @ 12m^3/hr approx 60g/hr
Pellet load / Life 1.5kg (HL 0.9kg *) 15 hours continuous flow
HaloVac Sanitiser MSDS supplied
Water test Kit optional with system (Colour comparator & 20 test reagent tabs)

Biostat Engineering

Specification:

Pumpmate HaloVac model: **HV40LB**
Flow rate: 100 – 200 LPM (Av. 200 LPM 12m^3/hr max)
Enclosure inlet/outlet: 40mm BSP FI thread or PVC flange
Sight glass? Optional
Dispenser: 40mm orifice with optional use 32mm insert
Sanitiser load: 3.0kg (approx 150 x 20g pellets)
Dissolution rate: Average 5mg/L continuous flow @ 12m^3/hr approx 60g/hr
Pellet load / Life 3.0kg (HL 1.8kg *) 30 hours continuous flow
HaloVac Sanitiser MSDS supplied
Water test Kit optional with system (Colour comparator & 20 test reagent tabs)

* **HL** is calculated at 60% of the original Halovac load. This is only a guideline. In most case the pellets are useful long after this time.
Dissolution rate will vary with the flow rate. Calculations have been base on 5mg/L dissolution. This will vary with different flow rates.

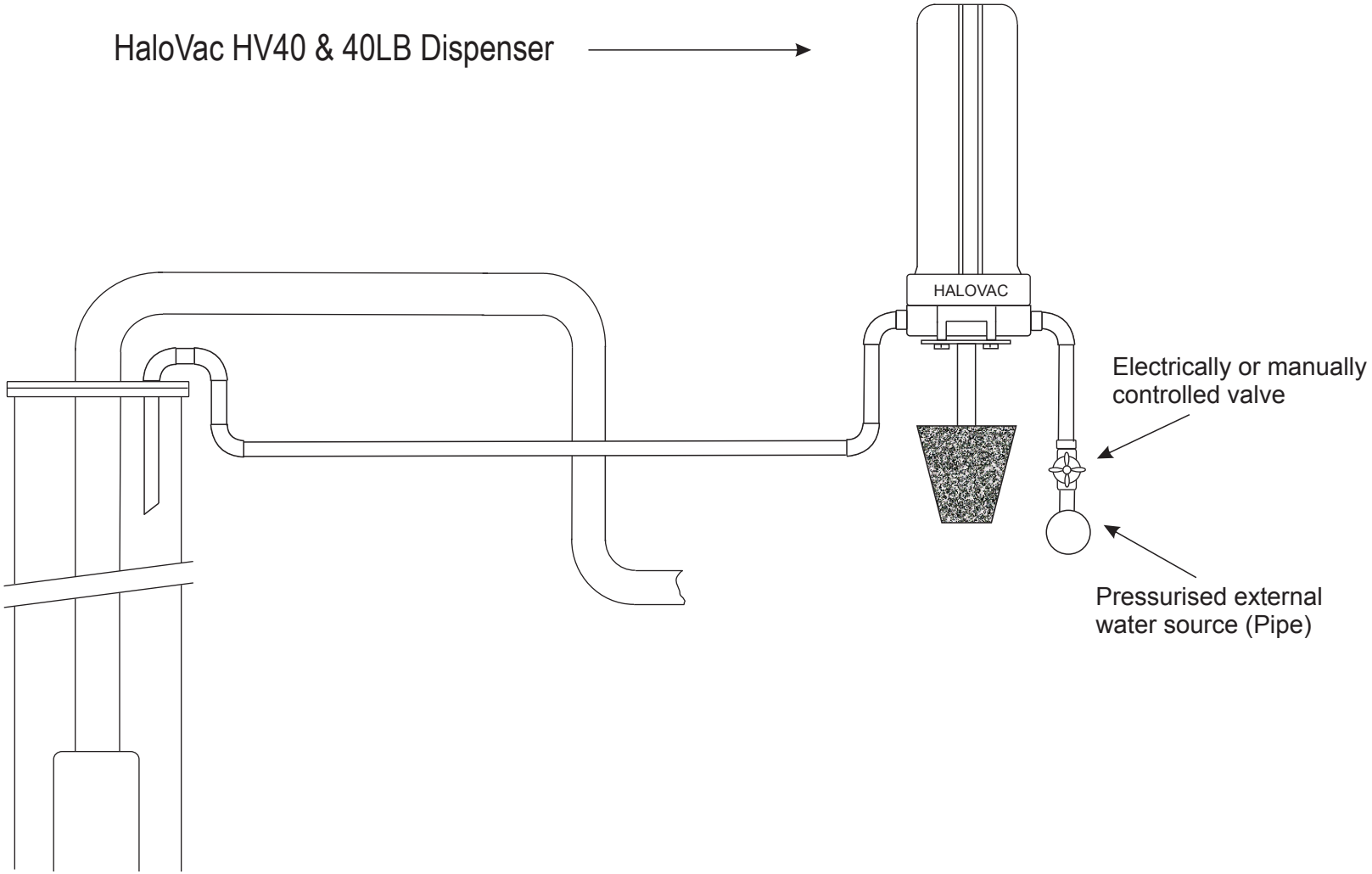
Parts List: HV40

Part No.	No.	Description
40DB	1	Dispenser base
40DL	1	Dispenser lid
40CB	1	Canister base
40CL	1	Canister lid
40SC	1	Slotted canister
40DS	1	Dispenser seal
40CS	2	Canister seals
DH305	1	Drain hose
DHSF14	1	Drain hose threaded swivel elbow

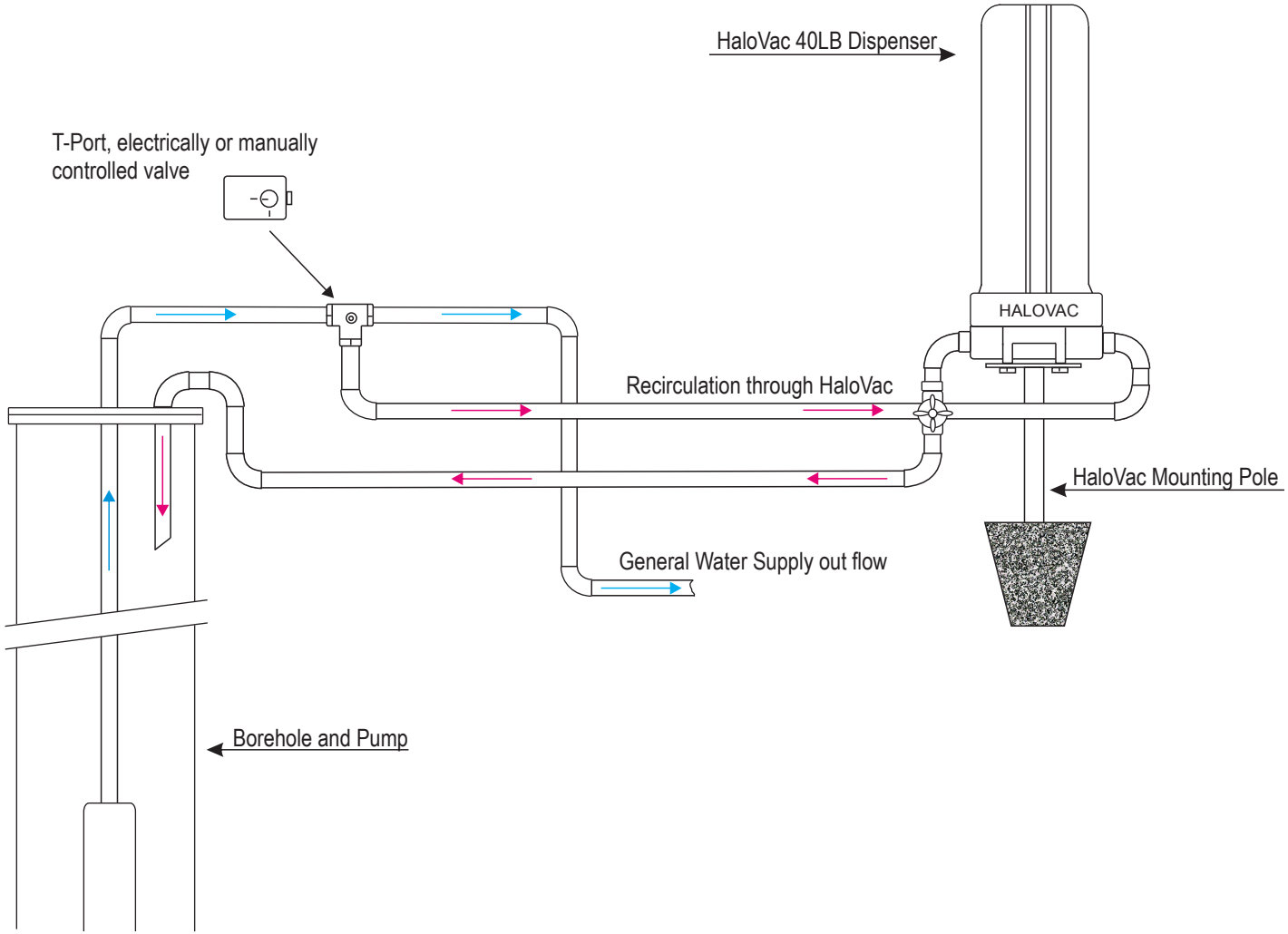
Parts List: HV40LB

Part No.	No.	Description
40DB	1	Dispenser base
40LDL	1	Dispenser lid
40CB	1	Canister base
40CL	1	Canister lid
40LSC	1	Slotted canister
40DS	1	Dispenser seal
40CS	2	Canister seals
DH305	1	Drain hose
DHSF14	1	Drain hose threaded swivel elbow

Borehole iron & sulphate bacteria control system (Dosing by pressurised external water source)



Borehole iron & sulphate bacteria control system
(Disinfection by recirculation)



HaloVac Systems

HV700

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HaloVac HV700

HaloVac is an inline dispenser which imparts a sanitiser (HaloSan) into the water as it flows through the device. Contact during water flow causes the dissolution of the HaloSan pellets. The dispenser needs recharging with HaloSan pellets when the pellets have been lowered to approximately one third or half its total capacity.

The HaloVac system can be installed to dispense HaloSan by either of the following methods:

- **Inline:** Treatment is accomplished when the total volume of water for treatment has passed through the HaloVac dispenser at least once.
- **Dosing:** Is applied by passing water from another source through the dispenser into the water for treatment.
- **Circulation:** A concentration of sanitiser is accumulated within the water for treatment by multiple passes of the same water through the dispenser.
- **Hose-end:** The HaloVac dispenser is installed on a valve outlet. A flexible hose is attached to the dispenser outlet.
- **BioDec:** HaloSan is contained within the BioDec dispenser. The BioDec floats freely or is anchored in the body of water for treatment. HaloSan sanitiser is dispensed by dissolution of the pellets within.

Equipment selection is relative to water flow rates:

Model	Normal - Max L/min	HaloSan Load kg
HV700	**<300**	**10.00**

Individual units can be installed in multiples on a manifold system for greater flows.

Installation: In general installation is completed by cutting into the water discharge pipe. The dispenser base can be installed inline for continuous sanitiser application, or onto a take-off for water and sanitiser returning to the well or borehole. Installation is correct when water flow enters the base through the side marked in and water flows upwards through the HaloSan pellets. Water exits the pellets through the slots in the centre tube. Water and sanitiser (HaloSan) exit the dispenser through the outlet marked out.

Installation of the dispenser should be preceded by either an electrical or manual isolation valve. Failure to complete this instruction will see premature dissolution of the pellets and continuous flow through the dispenser while the borehole pump is on, or continuous stop/start of pressure regulated systems. Borehole treatment by loop recirculation through a HaloVac dispenser requires the loop to operate at normal system pressures. A pressure regulator or a ball valve is installed prior to the loop return
entering the borehole. Installation of the valve will be useful in providing a pressure head (differential) usually required to ensure adequate closure of solenoid valves. For industrial applications we recommend the use of electrical or hydraulic operated actuator
valves.

Remove the pellets from the wrapping (read handling instructions) and place into the top of the dispenser. When full place the dispenser lid onto the canister and screw the retaining nut gently in place. Check flow rate compliance. Flow rates greater than specified for the equipment may cause reduced sanitiser in the flowing water.

Treatment run time: Sanitiser is normally produced at around 5 mg/L in a single pass through the HaloVac dispenser (This is dependent upon the amount of pellets in the system and their relevant size at the time of measurement).

Effective treatment is accomplished when the total volume of the water in the borehole has passed through the HaloVac dispenser at least once. High levels of bacterial contamination may require additional run time. Concentrations of 2 – 5 mg/L HaloVac (Br) will usually be adequate for good control.

Calculate run time by determining how much water is in the bore for treatment and how much water the borehole pump can move in one minute. Divide the pump performance into the water volume in the borehole. The answer will provide run time in minutes. Set the timer to run the pump for the required time. For good bacteria control do not under treat the borehole. 100mm borehole = 8ltrs/metre. 150mm borehole = 18ltrs/metre.

Pellet replacement: As the quantity of HaloSan pellets is reduced in the HaloVac dispenser, the performance of the equipment can be reduced. For good performance do not allow the pellet dispenser to empty below half of the original HaloSan load. How frequently the dispenser needs replenishing is dependant upon use. For a time after installation check the dispenser sanitiser load regularly to determine when the pellets should be replenished. Unless there is a major change with treatment after this time less frequent checking is needed.

Replacement pellets: Order HALOSAN5K (5kg tub)
Order HALOSAN10K (10kg bucket)
Order HALOSAN20K (20kg bucket)
Order HALOSAN50K (50kg drum)

Testing equipment: Order HALOTEST (Colour comparator 0.5 – 8.0 mg/L HaloSan)
Order HALOTAB (Replacement reagent tabs Pkt 250 tabs)

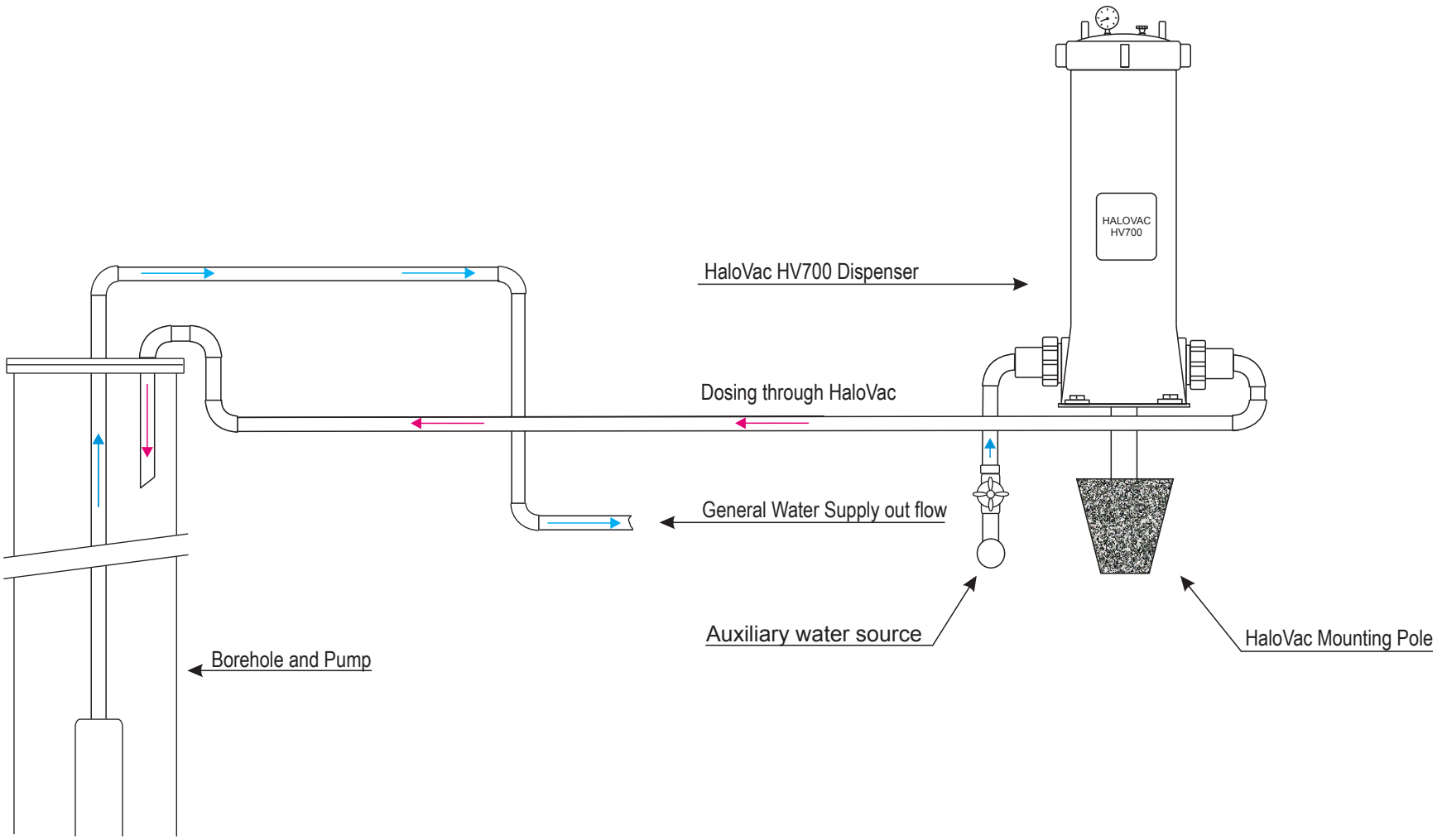
Caution: Do not use products in the HaloVac dispenser other than that supplied by your dealer. Read instruction that accompanies HaloSan sanitiser before opening containers. For additional advice contact your dealer or Biostat Engineering

Specification:

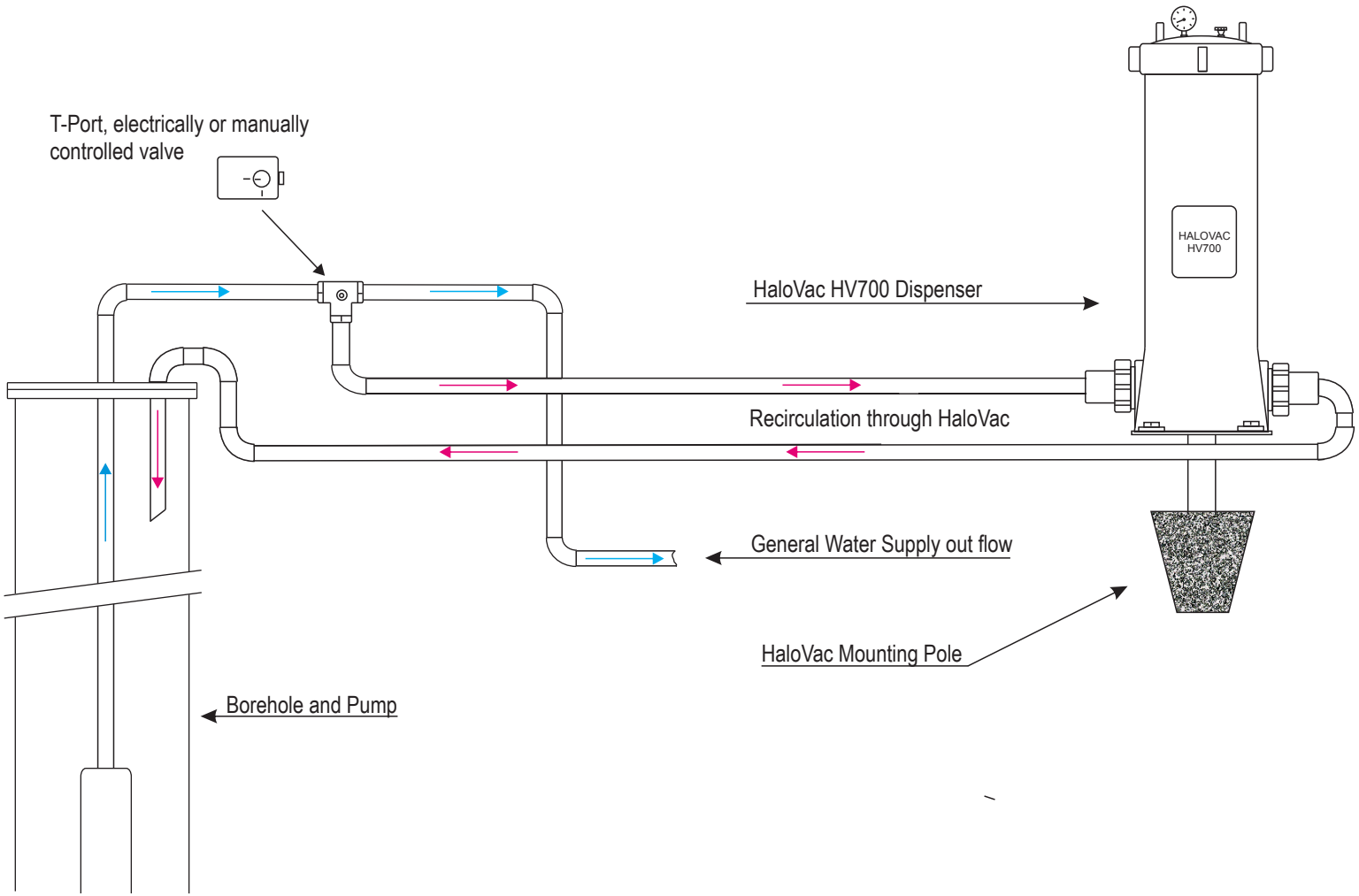
Pumpmate HaloVac model: **HV700** Flow rate: 350 LPM
(21 m^3/hr max) Enclosure inlet/outlet: 50mm OD – 40mm
ID PVC Flange
Dispenser Overall Height: 700mm
Dispenser: 45mm orifice
Sanitiser load: 10.0kg (approx 500 x 20g pellets)
Dissolution rate: Average 5mg/L continuous flow @ 21 m^3/hr approx 1 05g/hr
Pellet load / Life 10kg (HL 6.0kg *) 57 hours continuous flow
Standard treatment time 30 minutes = 114 treatment days
HaloVac Sanitiser MSDS supplied
Water test Kit optional with system (Colour comparator & 20 test reagent tabs)

*** HL** is calculated at 60% of the original HaloSan load. This is only a guideline. In most case the pellets are useful long after this time.
Dissolution rate will vary with the flow rate. Calculations have been base on 5mg/L dissolution. This will vary with different flow rates.

Borehole iron & sulphate bacteria HV700 control system
(Disinfection by auxiliary water source)



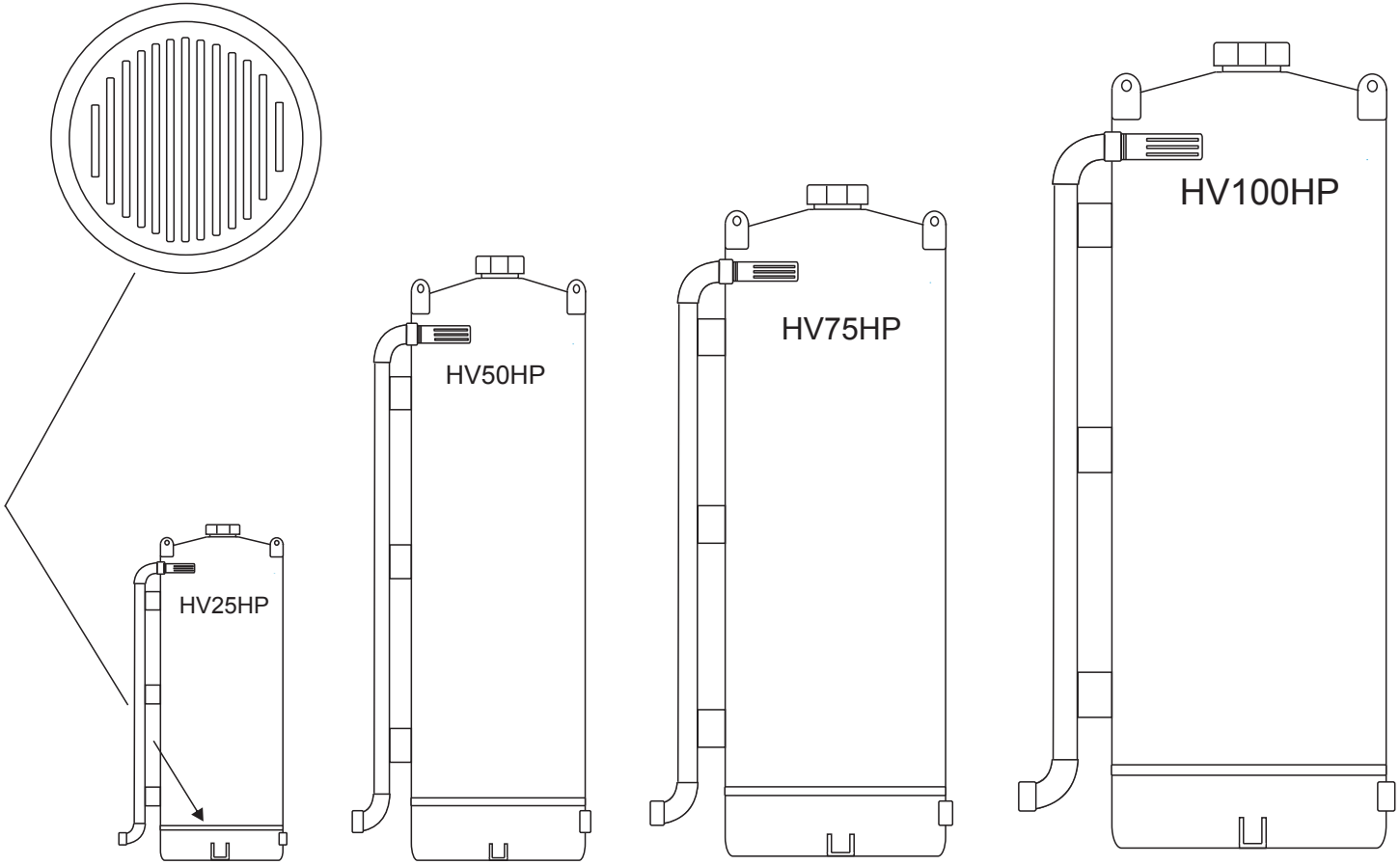
Borehole iron & sulphate bacteria HV700 control system
(Disinfection by recirculation)



BIOSTAT

HaloVac

CONTROL IRON BACTERIA



MODEL	Halosan Load (Kg)	Max Flow (L/min)	Halosan per/hr @ Max flow (Kg)	Halovac Dimensions (mm)	Halovac Dispenser Cap. (Lts)	Inlet-Outlet (mm)
HV25HP	25	100	0.33*	H 500 W 250	24	40
HV50HP	50	200	1.34*	H 900 W 355	80	50
HV75HP	75	300	2.01*	H 1000 W 450	159	75
HV100HP	100	500	3.35*	H 1200 W 560	295	100

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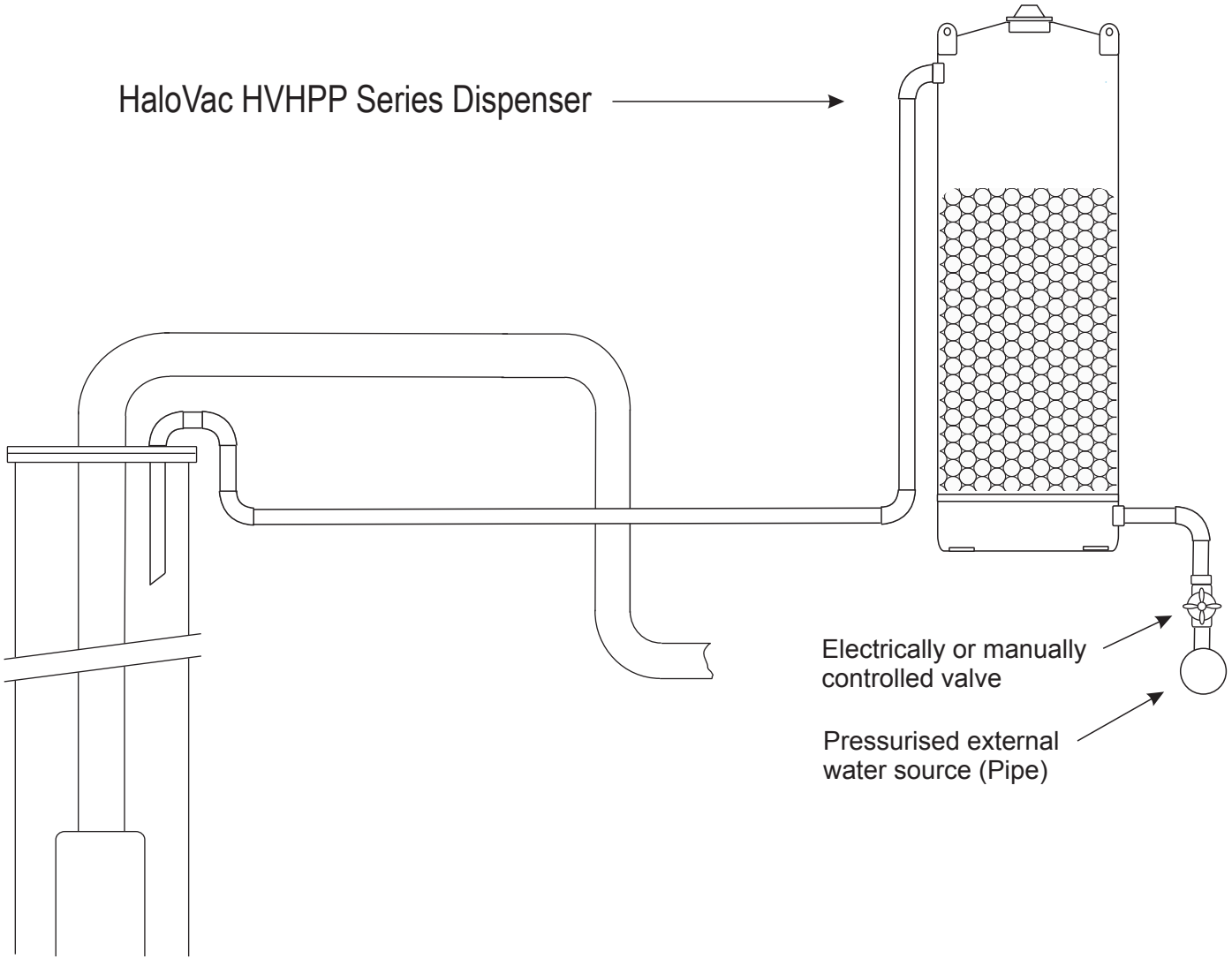
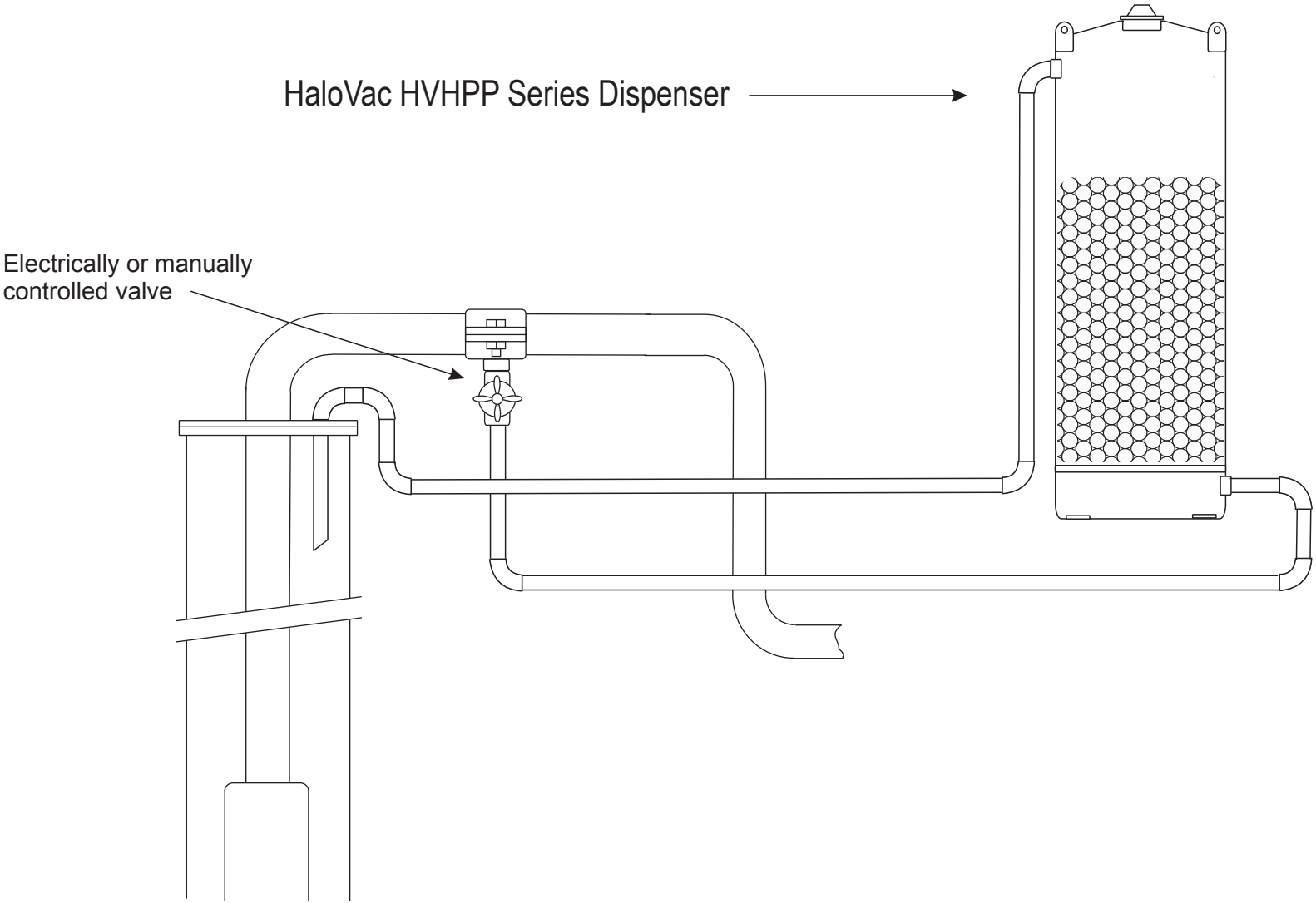
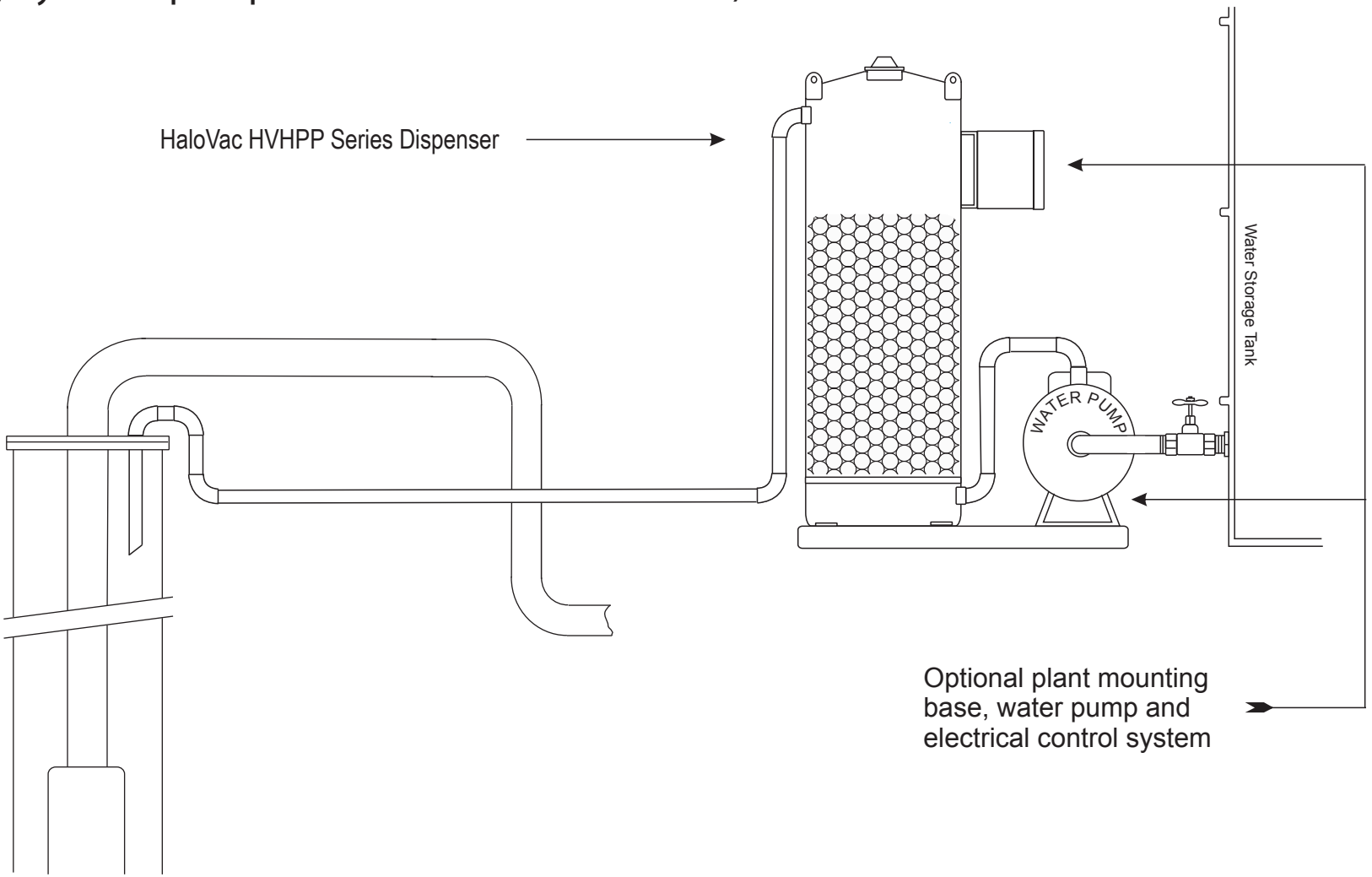
Borehole iron & sulphate bacteria control system
(Dosing by pressurised external water source)



Borehole iron & sulphate bacteria control system
(Dosing by recirculation)



Borehole iron & sulphate bacteria control system
(Dosing by water pump from external water source)



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CONTROL IRON BACTERIA

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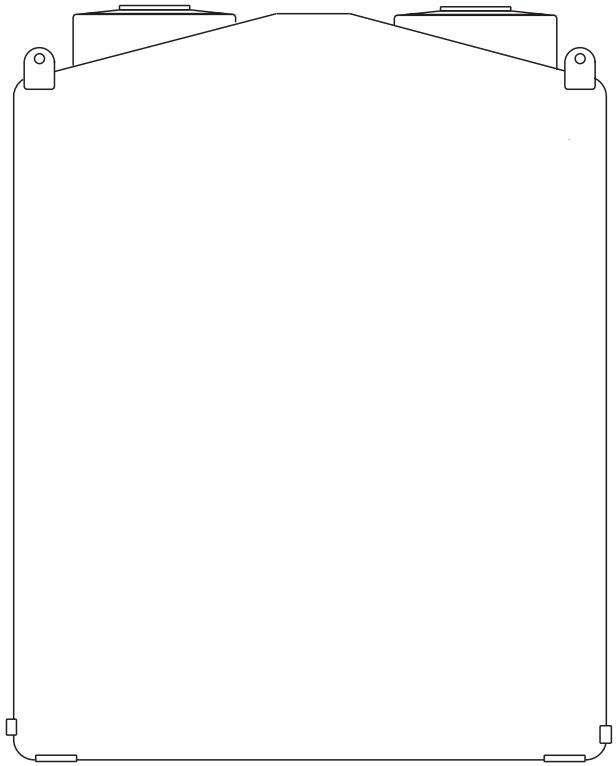
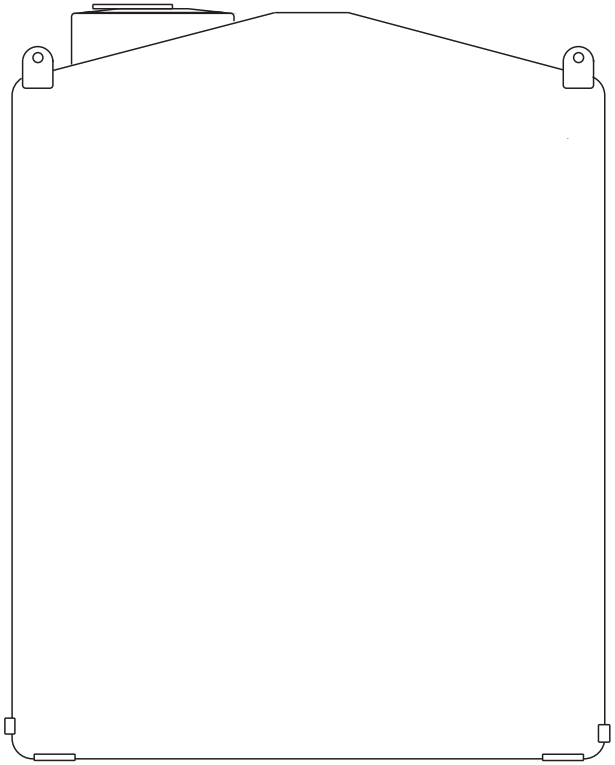
HaloVac BR Series
HVP25 - 100 Tank



HaloVac BR Series
HVHP25 - 100 Tank



Model	Tank Capacity (L)	Tank Dimensions (mm)	Construction Material	Inlet-Outlet Optional (mm)	Tank Base Mount Options
BR1000	1000	H 1200 W 1200	PE	40-50	Steel or PE
BR2000	2000	H 1500 W 1300	PE	40-75	Steel or PE
BR3000	3000	H 1800 W 1500	PE	40-75	Steel or PE
BR5000	5000	H 2000 W 1800	PE	40-100	Steel or PE

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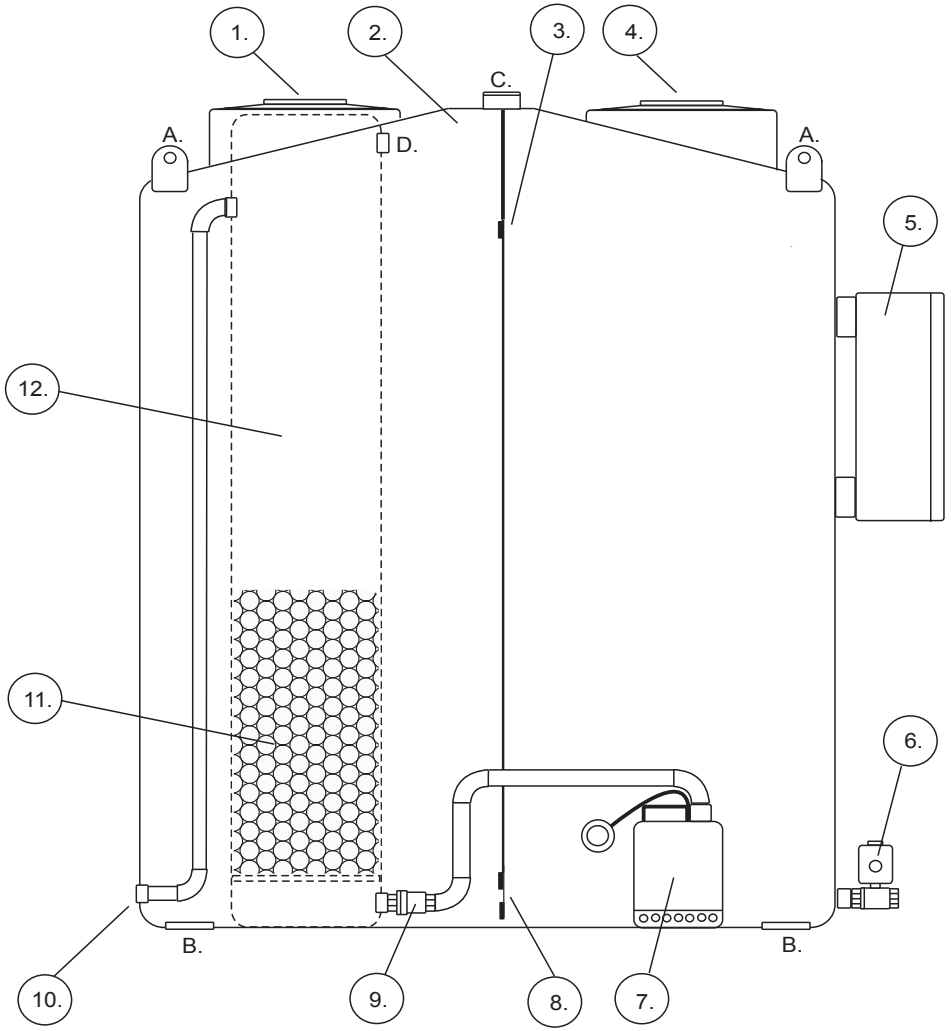
CONTROL IRON BACTERIA

HaloVac BR1000 HVP50



HaloVac BR1000 HVP50	
1	Tank access 455mm (HaloVac dispenser)
2	Tank PE H1.2M x W1.2M (1000L)
A	Tank lifting lugs (4)
B	Tank tie-down lugs (3)
3	High level probe
4	Tank access 455mm (2)
5	Electrical cubicle (Aluminium) 600mm x 600mm x 200mm
C	Junction box (water level cables)
6	Tank iso valve 40mm electrically operated 10W (24VDC)
7	Grundfos sub-pump (600W) AP12-40-06 240VAC
8	Low level probe
9	Non-return valve (40mm) PVC (Spring loaded)
10	HaloVac inlet/outlet (40mm)
11	HaloVac haloSan capacity (50Kg)
12	Halovac dispenser PVC 280mm x 1200mm
D	HaloVac dispenser over-flow

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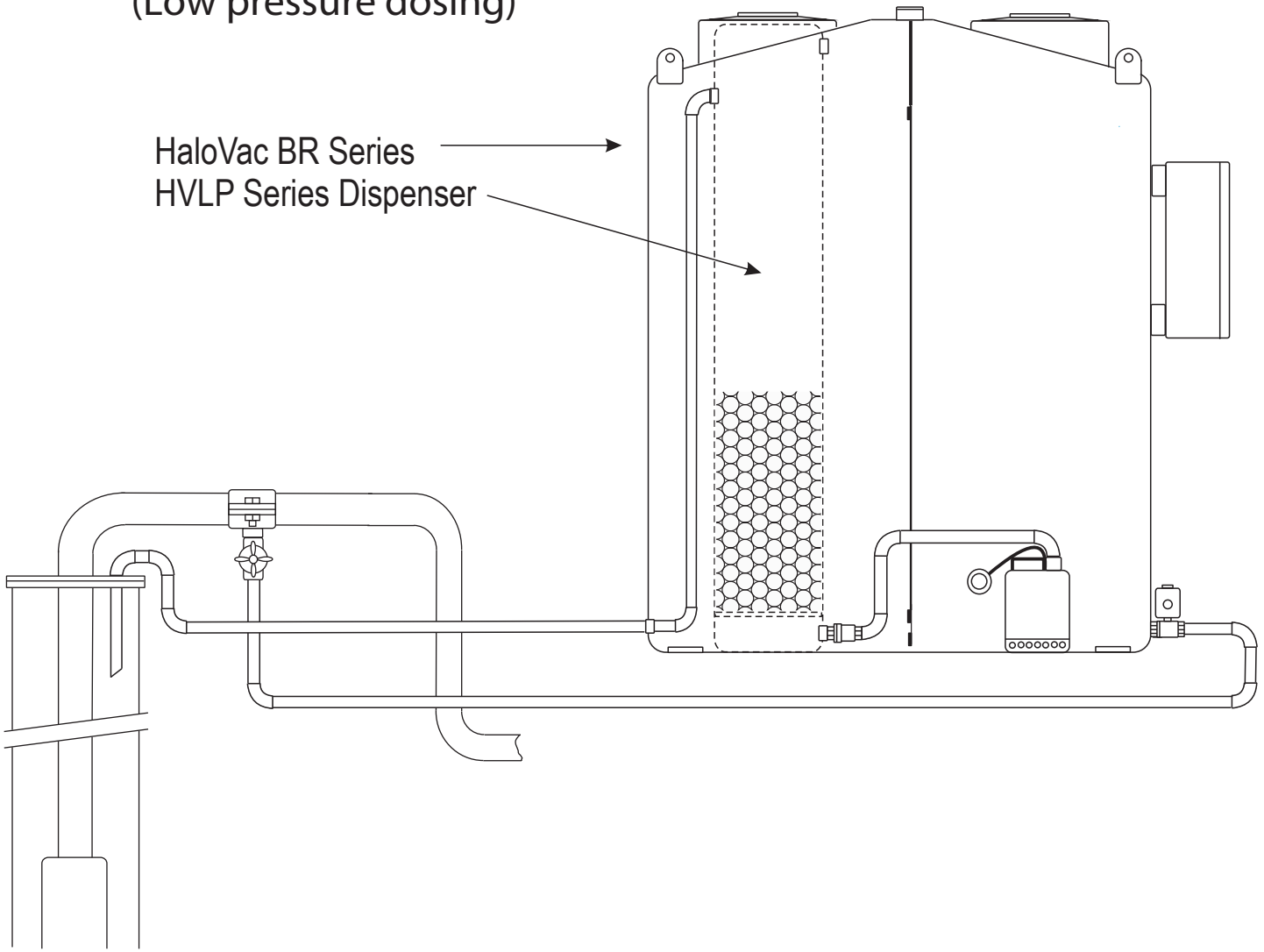
Borehole iron & sulphate bacteria control system
(Low pressure dosing)



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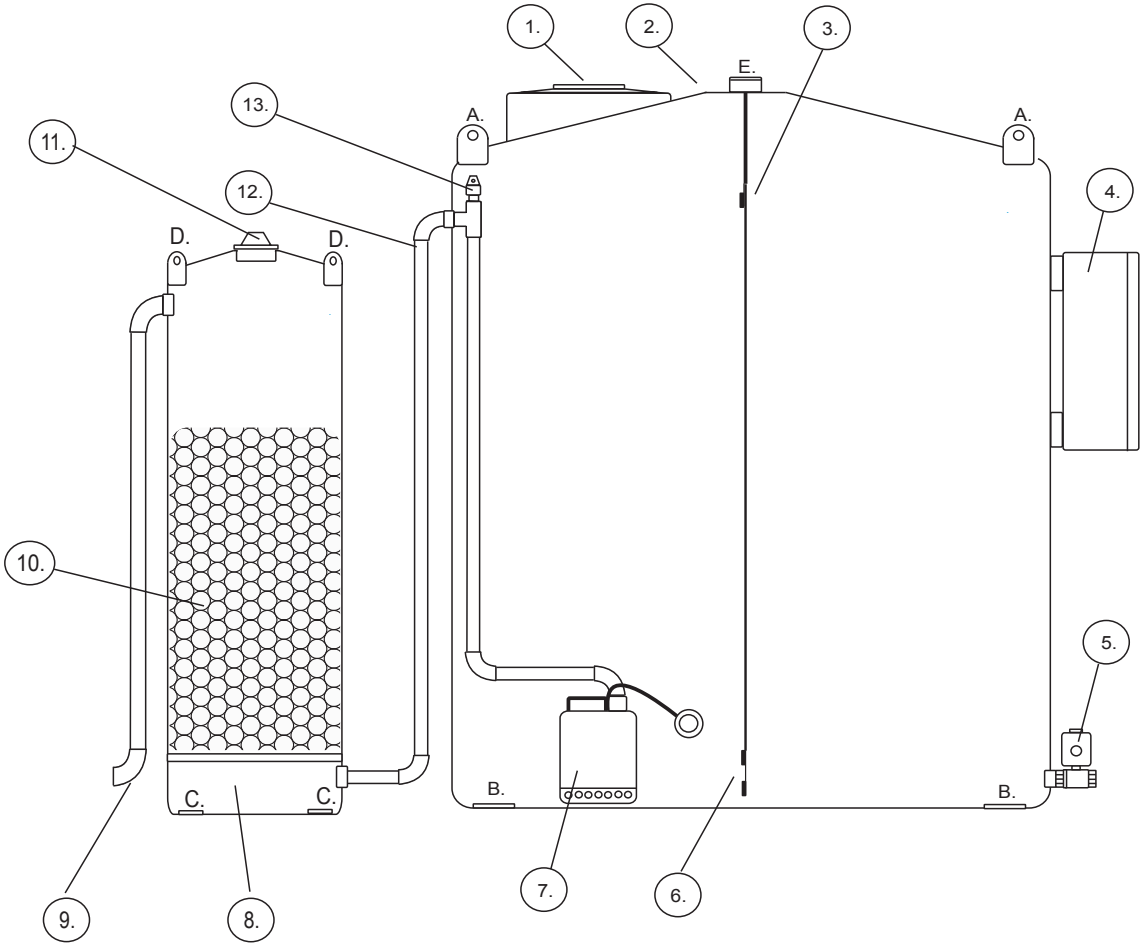
CONTROL IRON BACTERIA

HaloVac BR1000 HVHP50



HaloVac BR1000 HVHP50	
1	Tank access 455mm
2	Tank PE H1.2M x W1.2M (1000L)
A	Tank lifting lugs (4)
B	Tank tie-down lugs (3)
3	High level probe
4	Electrical cubicle (Aluminium) 500mm x 500mm x 200mm
E	Junction box (water level cables)
5	Tank iso valve 40mm electrically operated 10W (24VDC)
6	Low level probe
7	Grundfos sub-pump (600W) AP12-40-06 240VAC
8	Halovac HVHP50 dispenser PE 355mm x 900mm
C	Tank tie-down luge (3)
D	Tank lifting lugs (3)
9	Halovac inlet/outlet (50mm)
10	Halovac halosan capacity (50Kg)
11	Halovac access (100mm)
12	Tank inlet/outlet 50mm
13	Anti-syphon air release (40mm)

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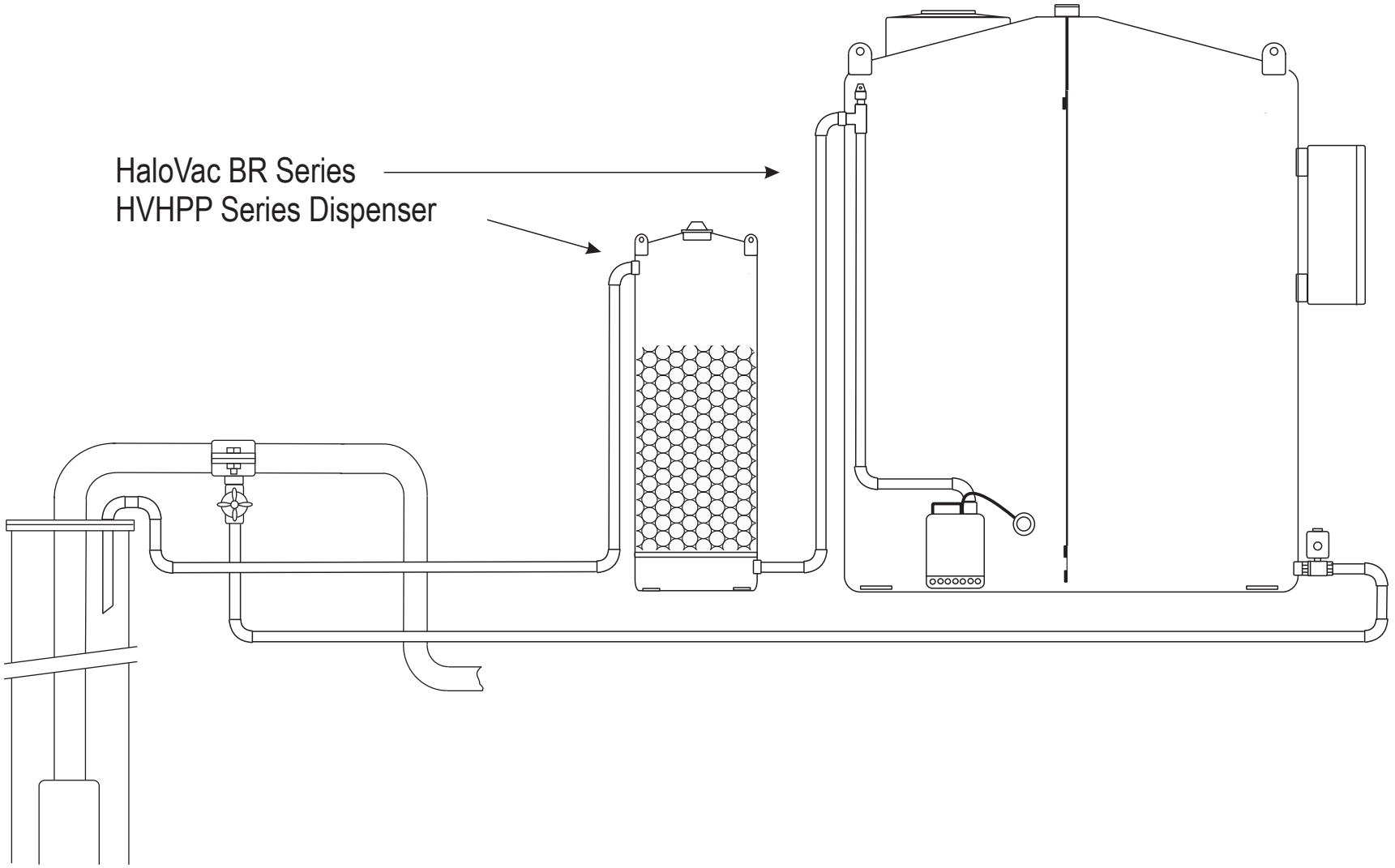
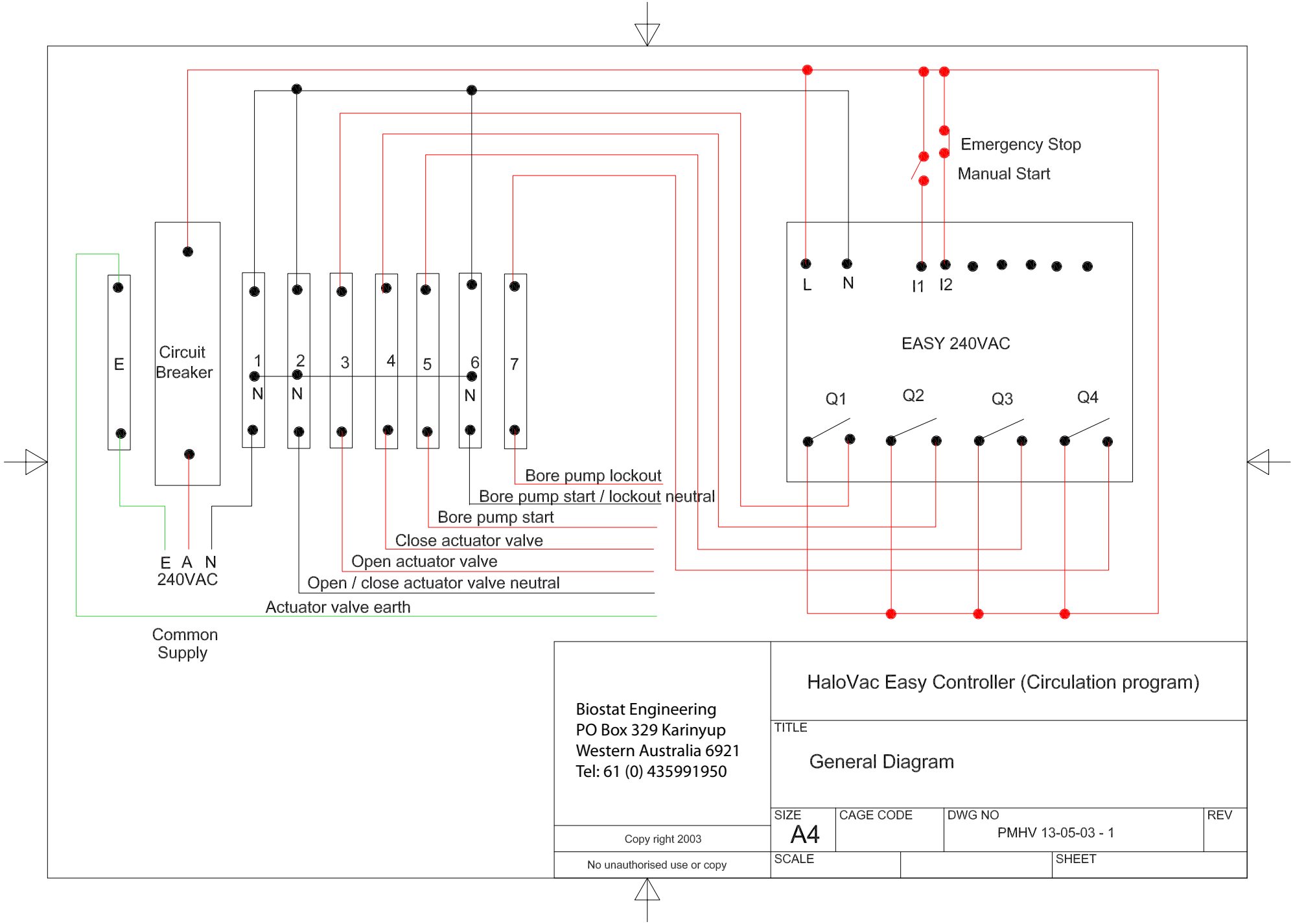
Borehole iron & sulphate bacteria control system
(High pressure dosing)





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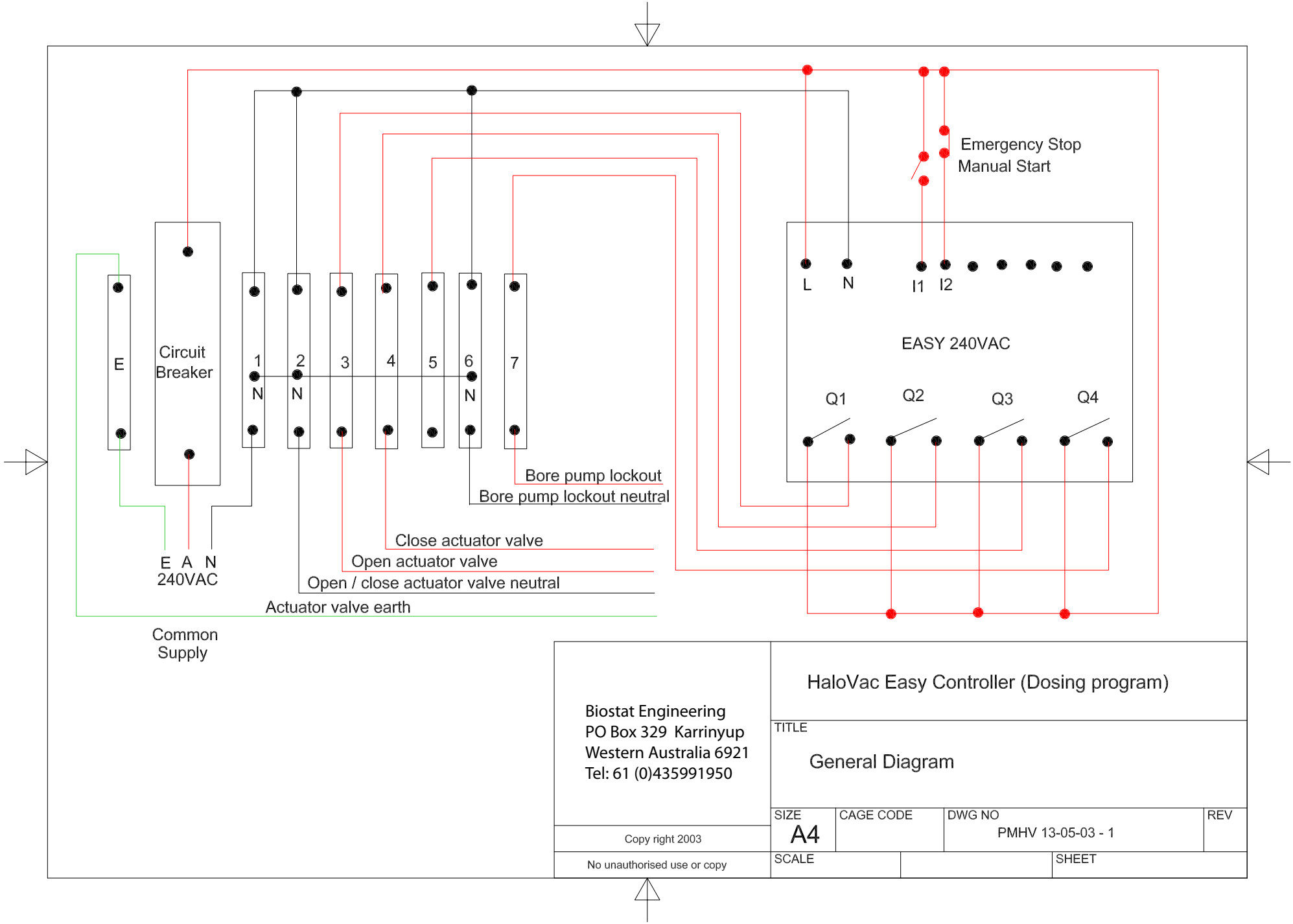
HaloVac Easy Controller (Circulation program)

TITLE: General Diagram

SIZE	CAGE CODE	DWG NO	REV
A4		PMHV 13-05-03 - 1	

SCALE

SHEET



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HaloVac Easy Controller (Dosing program)

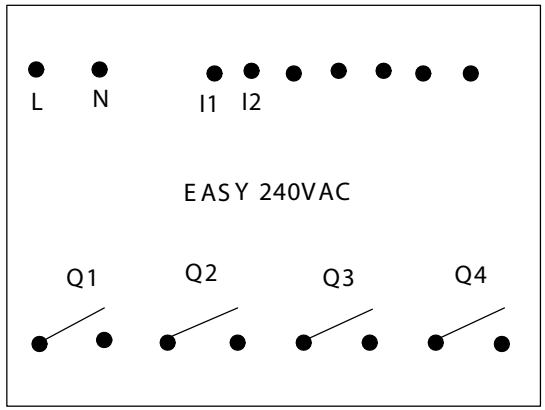
TITLE: General Diagram

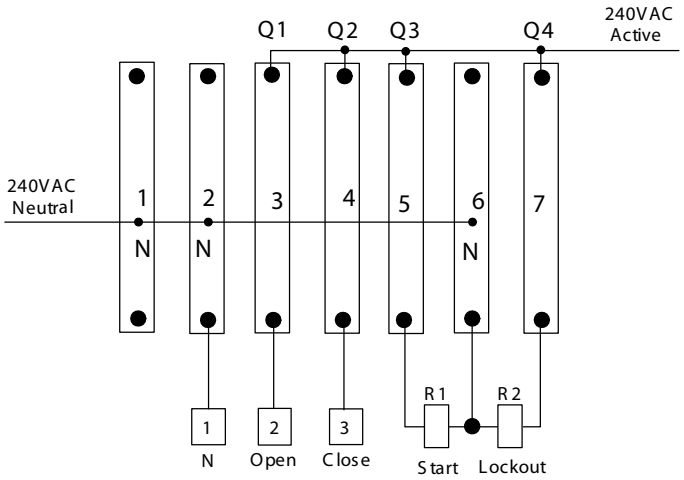
SIZE	CAGE CODE	DWG NO	REV
A4		PMHV 13-05-03 - 1	

SCALE

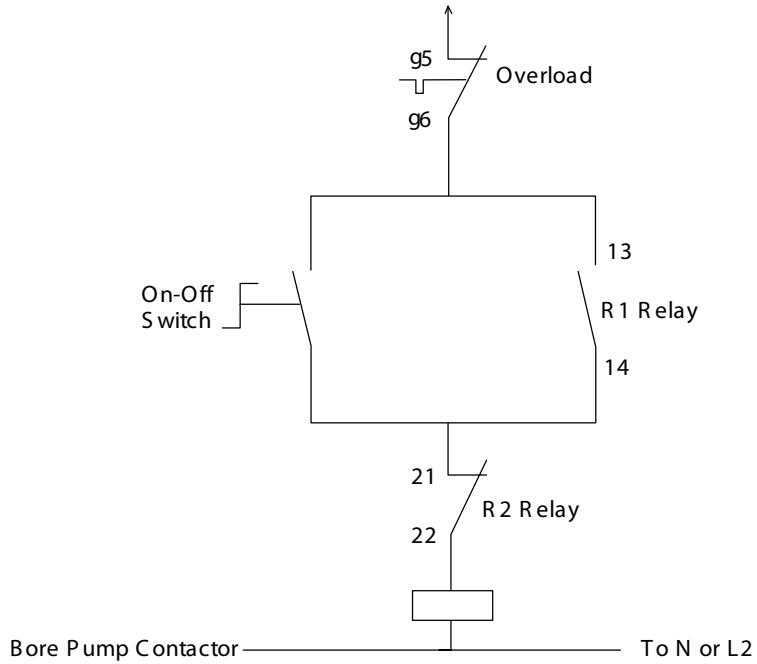
SHEET

Two relays to be installed in bore pump starter to facilitate HaloVac EASY control over Bore Pump

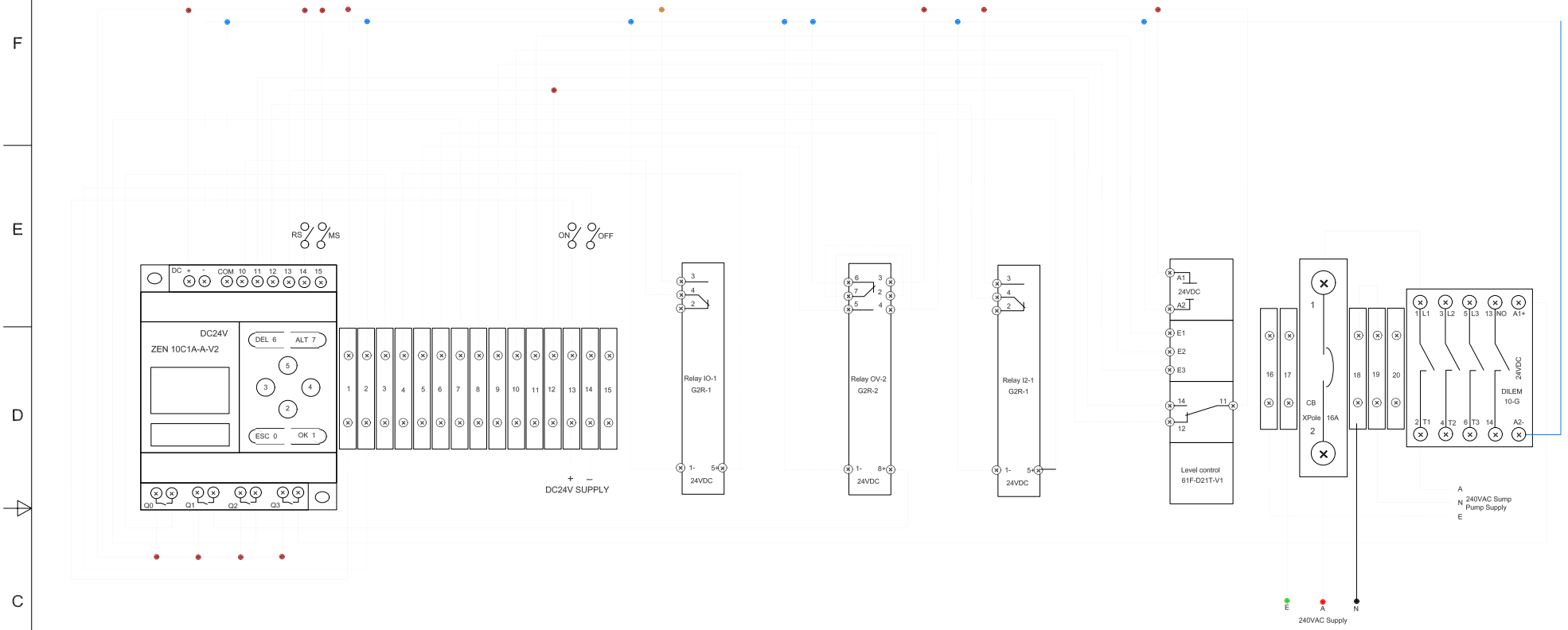




(Actuator wiring) (Bore pump enclosure wiring)



	HaloVac - Easy Controller Interface Wiring			
	TITLE General Diagram			
	SIZE A4	CAGE CODE	DWG NO HVECIW 12-01-03 - 1	REV
	SCALE		SHEET	



TC1: DC24V (PLUS) LINK		
TC2: DC24V (MINUS) LINK		
TC3: Q0 DC24V OUT TO CONTROL CENTRE		
TC4: DC24V FROM CONTROL CENTRE		
TC5&6: DC24V TO TANK FILL ISO VALVE		
(REVERSE POLARITY TO OPEN /CLOSE VALVE)		
TC7: Q2 DC24V OUT TO CONTROL CENTRE		
TC8: DC24V FROM CONTROL CENTRE		
TC9: TANK LEVEL REFERENCE (E3)	1: TWO POLE ON/OFF ISOLATION SWITCH DC24V	BROWN WIRE: 1.5MM MULTICORE TINNED DC24V (POS)
TC10: TANK LEVEL LOW (E2)	1: RS SYSTEM RESET (RETURN TO STANDBY) MOMENTARY PRESS	BLUE WIRE: 1.5MM MULTICORE TINNED DC24V (NEG)
TC11: TANK LEVEL HIGH (E1)	1: MS MANUAL START (MOMENTARY PRESS)	PURPLE WIRE: 1.5MM MULTICORE TINNED DC8V (POS)
T12: DC24V TANK EMPTY OUTPUT TO CENTRAL CONTROL	1: OMRON CPU ZEN 10C1A-A-V2 DC24V	GREEN WIRE: 1.5MM MULTICORE TINNED AC240V (EARTH)
TC13: DC24V (PLUS) SUPPLY INPUT	2: OMRON SINGLE POLE RELAY & BASE G2R-1-SND DC24V	BLACK WIRE: 1.5MM MULTICORE TINNED AC240V (NEUTRAL)
TC14: DC24V (MINUS) SUPPLY INPUT	1: OMRON TWO POLE RELAY & BASE G2R-2-SND DC24V	RED WIRE: 1.5MM MULTICORE TINNED AC240V (ACTIVE)
T15: NO CONNECTION	1: OMRON LEVEL CONTROLLER 61F-D21T-V1 DC24V	
T16&17: AC240V EARTH	1: MOELLER CIRCUIT BREAKER XPOLE 16A	
T18: AC240V NEUTRAL INPUT	1: MOELLER CONTACTOR DILEM-10-G DC24V	
TC19: AC240V NEUTRAL OUTPUT TO PUMP	18: DIN MOUNT 2.5MM CONNECTORS	
TC20: NO CONNECTION	2: DIN MOUNT 2.5MM CONNECTORS (EARTH)	

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PROJECT: FMG: Control SRB in Production Boreholes

TITLE: BR2000-HV50P-24ZEN-24ACT
HaloVac Borehole Dosing System
Control panel schematic layout

DRAWN:	SIZE	CAGE CODE	DWG NO	REV
DWA	A3	-	FMG-BR2-HV50P-P-ES	VER.1
19TH NOV 2009	SCALE NA	-	SHEET 1 - 1	

MATERIAL SAFETY DATA SHEET

Product	**HaloSan**	Date: 12/07/04
MSDS code: HALO	Version: 2	Supplied: 07/12/10

1. Identification of the substance & the company

Chemical name	Bromochloro-5,5-dimethylhydantoin
CAS number	2718-18-6
Chemical formula	C5H6BrClN2O2
Chemical family	Halogenated hydantoin
Molecular weight	241.5
Type of product and use	A biocide used to control bacteria, algae, yeast and fungi in industrial water systems.
Company identification	Biostat Engineering
Address and telephone	Post Office Box 329 Karrinyup Western Australia 6921
Emergency telephone number:	All Hours 61 (0) 435991950

2. Composition / information on ingredients

Hazardous component(s)	Bromochloro-5,5-dimethylhydantoin - 98% [32718-18-6]

3. Hazards identification (*)

Important hazards	Oxidizer
Adverse human health effects	Causes burns. HaloVac may cause skin sensitization.
NFPA Ratings (Scale 0-4) (*)	Health = 3, Fire = 0, Reactivity = 1

4. First-aid measures

Eye contact	Holding the eyelids apart flush eyes promptly with copious flowing water for at least 20 minutes. Get medical attention immediately.
Skin contact	Remove contaminated clothing. Wash skin thoroughly with mild soap and plenty of water for at least 15 minutes. Wash clothing before re-use. Get medical attention immediately.
Inhalation	In case of dust inhalation or breathing fumes released from heated material, Remove person to fresh air. Keep him quiet and warm. Apply artificial respiration if necessary and get medical attention immediately.
Ingestion	If swallowed, wash mouth thoroughly with plenty of water and give water to drink. Get medical attention immediately.

****
NOTE: Never give an unconscious person anything to drink.
****

Note to the physician

No specific antidote.

Treat symptomatically and supportively.

In case of ingestion do not induce vomiting.

5. Fire - fighting measures

Flash point None

Flammable/Explosion limits Not flammable

Auto-ignition temperature Not applicable

Extinguishing media Dry powder, carbon dioxide or water spray

Fire fighting procedure Cool containers with water spray. In closed stores, provide fire fighters with self-contained breathing apparatus in positive pressure mode.

Unusual fire and explosion hazards When heated to decomposition, may release poisonous and corrosive fumes of HBr, NOx and HCl. Strong oxidizing agent. Forms explosive mixtures with combustible, organic or other easily oxidizable materials.

6. Accidental release measures

Personal precautions Evacuate area

Use dust respirator, rubber gloves and chemical safety goggles.

After spillage / leakage Sweep up, place in a suitable container and hold for waste disposal. Avoid raising dust.

Ventilate area and wash spill site after material pickup is complete.

Avoid access to streams, lakes or ponds.

7. Handling and storage

Handling Keep containers tightly closed.

Storage Keep away from all sources of ignition.

The minimum recommended storage temperature for this material is 20°C

The maximum recommended storage temperature for this material is 30°C.

Store in a dry, well-ventilated area away from incompatible materials (see "materials to avoid").

MATERIAL SAFETY DATA SHEET

Product	**HaloSan**	Date: 12/07/04
MSDS code: HALO	Version: 2	Supplied: 07/12/10

8. Exposure controls / personal protection

Exposure limits	TLV -TWA Not established
Ventilation requirements	Use local exhaust as necessary, especially under dusty conditions.
Personal protection equipment	Respiratory protection Approved respirator - Gloves PVC gloves - Eye protection. Chemical safety goggles - Others Body covering clothes and boots Industrial hygiene. Safety shower and eye bath should be provided. Do not eat, drink or smoke until after-work. showering and changing clothes.

9. Physical and chemical properties

Appearance	White to off-white tablet with faint halogenous odour
Melting point/range	123 - 125°C
Boiling point/range	Not determinable, decomposes above 160°C
Vapour pressure	9.35x10(-3) Pa at 25°C
Relative vapour density (air=1)	Not applicable under standard conditions
Evaporation rate (ether=1)	Not applicable under standard conditions
Solubility	Solubility in water 0.2 g/100ml at 25°C
	Solubility in other solvents Benzene: 2.5 g/100g at 25°C
Specific gravity	1.8-2.0
Thermal decomposition	Above 160°C

10. Stability and reactivity

Stability	Stable under normal conditions
Materials to avoid	Oxidizing agents
	Combustible organic materials
	Bases
Conditions to avoid	Heating above 160°C
Hazardous decomposition products	HBr, Br2, HCl
Hazardous polymerization	Will not occur

MATERIAL SAFETY DATA SHEET

Product	**HaloSan**	Date: 12/07/04
MSDS code: HALO	Version: 2	Supplied: 07/12/10

11. Toxicological information (*)

Acute toxicity	Rat oral LD50 (*) 929 mg/kg
	Rat inhalation LC50 (*) 1.1 mg/l/4 hour (powder)
	Dermal irritation (rabbit) (*) Corrosive
Dermal sensitization	(guinea pig) (*) Sensitizer
Effects of overexposure	Ocular Severe irritant
	May cause temporary or even permanent eye damage
	Dermal Exposure to wet skin may cause severe irritation
	Inhalation Irritant to upper respiratory tract
	Shortness of breath, headache and nausea
	Sensitization Prolonged skin contact may cause sensitization
Chronic toxicity	Not available
Mutagenicity Mutagenic	by the Ames Test
Carcinogenicity	Not known to be a carcinogen
	Not included in NTP 9th Report on Carcinogens
	Not classified by IARC

12. Ecological information

Aquatic toxicity	96 Hour-LC50 - Fish 0.4 mg/l (Rainbow trout, Static)
	0.46 mg/l (Bluegill sunfish, Static)
	1.6 mg/l (Sheeps head minnow, Acute flow through)
	1.2 mg/l (Eastern oyster, Acute flow through)
	1.9 mg/l (Mysid shrimp, Acute flow through)
	48 Hour-LC50, Daphnia magna 0.75 mg/l (Static)
Avian toxicity	Bobwhite quail, acute oral LD50 1839 mg/kg
	Mallard duck, dietary LC50 >5620 ppm
	Bobwhite quail, dietary LC50 >5620 ppm

MATERIAL SAFETY DATA SHEET

Product **HaloSan** Date: 12/07/04
MSDS code: HALO Version: 2 Supplied: 07/12/10

13. Disposal considerations

Waste disposal Dispose of in approved landfill sites or an approved incinerator.

Crush and bury empty containers.

Avoid access to streams, lakes or ponds.

Observe all federal, state and local environmental regulations when disposing of this material.

14. Transportation information

UN No.	1479
IMO-IMDG code Proper shipping name	oxidizing solid, n.o.s
Class	5.1 - Oxidizing substances
Packing Group	I
Label	OXIDIZING AGENT (5.1)
Marking	MARINE POLLUTANT (IMDG CODE - page 5163, amdt.29-98)
ICAO/IATA Class	5.1
Packing group	II
Label	OXIDIZER (5.1)

RID/ADR	Class and Item Nos.: 5.1, 27°(b)
	Danger Label Model No.: 5.1
	Hazard/Substance Nos.: 50/1479
	Proper shipping name: Oxidizing solid, n.o.s
	Class: 5.1 - Oxidizing substances
	Label: OXIDIZER (5.1)
	Packing Group: II

15. Regulatory information (*)

EEC Reported in EINECS (No. 2511715)

- Classification	Corrosive (C) and Oxidizer (O) symbols required.
- R Phrase(s)	R 8 :Contact with combustible material may cause fire.
	R 31 :Contact with acids liberates toxic gas.
	R 34 :Causes burns.

MATERIAL SAFETY DATA SHEET

	R 22 :Harmful if swallowed. R 43 :May cause sensitization by skin contact.
- S Phrase(s)	S 26 :In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S 28 :After contact with skin, wash immediately with plenty of water and soap. S 45 :In case of accident or if you feel unwell, seek medical advice immediately (show the label when possible). S 36/37/39 :Wear suitable protective clothing, gloves and eye/face protection.

Other Information

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