

### *Introduction*

An approach to low water availability is to inject fire-retardant gel into the water stream prior to the tank becoming empty. This approach is being experimented with and there is provision in the plumbing for it to be added if it proves practical. The retardant under active consideration is Barricade gel.

The water supply level is measured directly when the tank sensor is working, but if in the face of a firefront the cable to the sensor is destroyed, the water level is calculated on the basis of the measured total flow of water out of the tank since the last direct level reading.

Gel injection is controlled by a normally closed solenoid valve which when open allows water from the system to activate an injector, drawing gel from a sealed barrel of gel. The concept for such a system is one deployed by Matt Wegener (Managing Director of bushfiredefence.com.au (0424-872790).

A Barricade Gel Home Kit has already been obtained which contains  $4 \times 3.81 = 15.21$  of gel which at a 2% conc in water covers some 400 square meters of surface.

The experience of Matt Wegener is that the percent concentration of Barrier Gel in water after mixing should be no greater than 2%, probably around 1%, and it would be sensible to first trial it with a intended percent of about 0.6%. At a notional minium flow rate of 100 l/min this would amount to a dosing addition of 0.6l (ie 600ml) /min (36l/h) of gel delivered against a pressure of say 50 m (5 Bar) head.



Dosatron utilised by Matt Wegener bushfiredefence.com.au  
(in this approach the full flow of water passes through the Dosatron)

A venturi injector does not work when there is back pressure. Other options not adopted but considered are examined in Appendix 11.

For a variety of reasons indicated, we are experimenting with a Dosatron which is a pump, powered by water flow, and designed to add to the flow an additional stored liquid at a measured concentration. The level of concentration is able to be set, and is not affected by the inlet pressure (provided it is within the specified range.) Maximum operating temperature is typically 40 deg C. By maintaining it in the pump shed the over-shed sprinkler should allow it to cope with temperature but some measures should be applied in case of failure.

Mat Wegner used a full-flow Dosatron. For example, we could have used the full-flow D14MZ2 (0.19-50 lpm) Fertiliser pump with an operating pressure is 30-600 kPa (0.3-6 bar) which would be OK for our system at reduced flow which in actual operating conditions with all sprinklers running produces a pressure of 4.5 bar.<sup>4</sup> But the cost of over \$AU 2,500 was prohibitive.

A system using four D25RE2 pumps installed in parallel at \$135 each from Aliexpress was considered but but rejected on the basis of additional complications.

### *The two branch single Dosatron gel injection approach.*

The approach currently being explored is to regulate the dosing through diversion of an adjustable proportion of the flow through a Dosatron pump with compatible specifications. The approach involves providing adequate pressure to the inlet of the Dosatron above the pressure of the system, by means of a small inline 12V electric pump, plus a basic application of fluid dynamics to create the required level of dilution, as follows:

Consider dividing the fluid flow from the 50mm main pipe into two streams along pipes diameter D1 and D2. A pressure fed Dosatron is mounted on pipe 2 and the two streams then re-join with the Dosatron having added a required dosage to produce the total dosage after they rejoin.

After consideration of available Dosatron style pumps on Aliexpress the Huiji DN009 Dosatron was chosen out of:

Dosatron pumps	Op. Press (bar)	Dilution %	Flow (l/min)	Thread	Inlet/outlet	No required	Price
DI16 (used by Wegner, now obsolete)	0.3-6	0.2-1.6					
D14MZ2 replaces DI16	0.3-6	0.2-1.6	0.19-50	NPT		1	1568
D8	0.34-8	0.2-5	120			1	\$1,530 Aliexpress
D25RE2	0.3-6	0.5-2	0.6-41		25 4?		135 Aliexpress
Huiju DN009		0.2-1	0.4-42				
Huiju DN009		0.2-2	0.4-42				
Huiju DN009	0.2-6	1.0-10	0.8-42	??		1	\$223.31 (inc GST and freight)
Huiju DN009	0.02-0.8	1.0-5	0.8-208		40??		
Huiju DN009	0.2-6	0.4-4	0.4-42		25/32		
							Aliexpress
NPT-BSP Adaptor 32mm	\$4.82						<a href="https://www.aliexpress.com/">https://www.aliexpress.com/</a>

The Huiji DN009 Dosatron gives 1-10% dilution, for an operating pressure of 0.2-6 bar, and flow rate of 50-2500 l/hr for \$135 + GST + Freight as highlighted above.

The operating pressure of the Dosatron is between 0.2 and 6 bar and accommodates a flow of 0.8-42 l/min. The inlet of the Dosatron thus needs to be pressurised to a pressure of this above the ambient pressure of the system (which when in full operation with all sprinklers working, measures at 4.5 bar). Thus we need a small inline 12V electric pump able to boost the inlet pressure to the Dosatron by 0.2-6 bar whilst delivering adequate flow for the required dilution.

<sup>4</sup> [https://shop.landwater.com.au/collections/dosatron-injectors/products/dosatron-d9gl2-0-2-2-0-irrigation-dosing-pump-500-9000l-h?gad\\_source=1&gclid=CjwKCAjw1K-zBhBIEiwAWeCOF3euzIx3VhZ2MyW3n--6WpOSvKeXe5nOmI2ODTVBg5udfaNK\\_I-AHRoCxAQAaVd\\_BwE](https://shop.landwater.com.au/collections/dosatron-injectors/products/dosatron-d9gl2-0-2-2-0-irrigation-dosing-pump-500-9000l-h?gad_source=1&gclid=CjwKCAjw1K-zBhBIEiwAWeCOF3euzIx3VhZ2MyW3n--6WpOSvKeXe5nOmI2ODTVBg5udfaNK_I-AHRoCxAQAaVd_BwE)

Confirming the above, at reduced flow, the system pumps approx 180 l/min. At 2% this requires an input of gel at 3.6 l/min. The max dilution from the Dosatron is 10%. So the minimum flow is 36 l/min through the Dosatron. The dilution may then be dialled down (eg to 0.2%) by dialling down the dilution on the Dosatron (for example to 1%) At 2% dilution with the Dosatron set at 10% dilution, the electric pump needs to support a maximum flow of approx 36 l/min withstanding a pressure of about 4.7-6 bar and delivering an additional pressure of 0.2-1.5 bar.

A seemingly suitable pump is the [Bringsmart JT-1000A3-24 DC 12V 24V Water Pump](#) 1800-2600 l/h (= 30-50l/min) 4.2-6m head (= 0.42-0.6 bar) 12V DC Brushless Booster Pump available at a sale price in March 2025 at \$54.99+21.52 shipping + GST. For the 12V version the current draw is 3.0 Amp which is tolerable since the pump will only be operating to inject gel for a short time at the very lowest limit of water availability. The pump can be adjusted via a dialable speed control from 30-43 l/hr.

On the input side of the Bringsmart will be water with a pressure of 4.5 bar. To operate the Dosatron a pressure needs to be applied above the inlet pressure of between 0.2 and 6 bar. The Bringsmart has a dialable speed between 1800-2600 l/h (= 30-42l/min) generating pressure at a 4.2-6m head (= 0.42-0.6 bar) So if dialled up at full speed, and assuming a roughly linear pump performance curve (flow vs pressure) we might expect for a 0.2 bar pressure above the inlet a flow of 2/3 of max speed = 28 l/min. Pipes are short and pipe friction is assumed to be minimal.

However, there are some concerns:

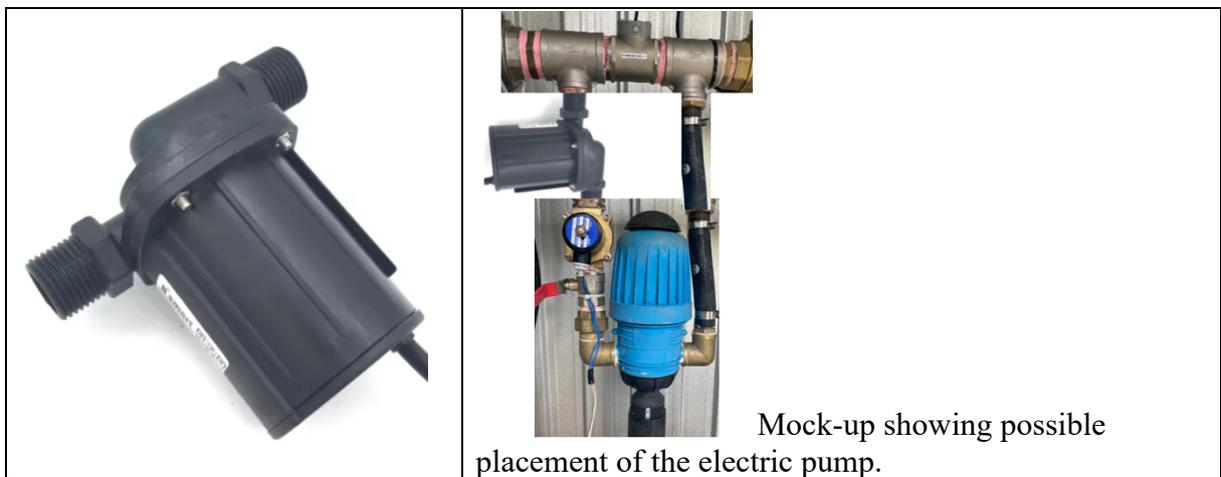
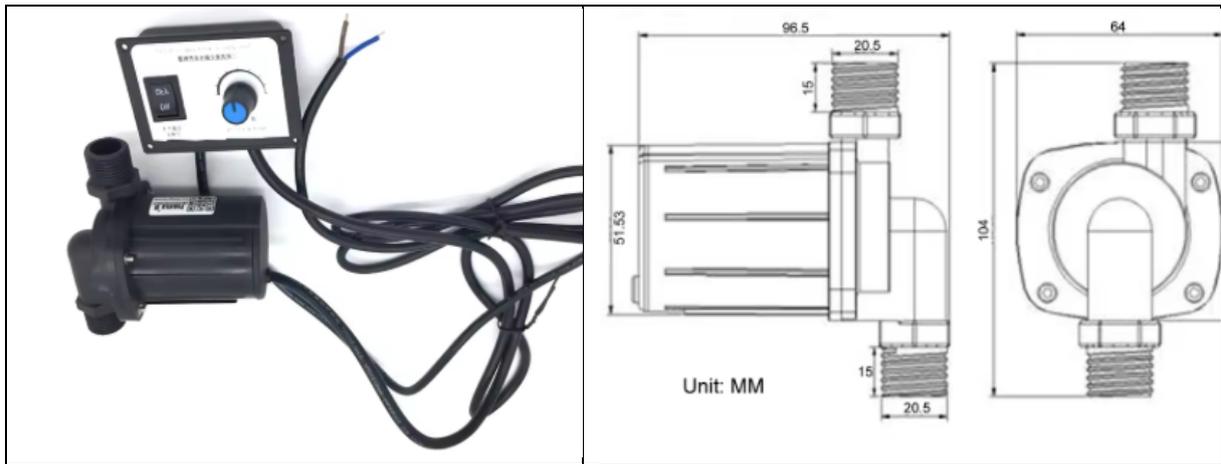
- **Non-Linear Performance:**

Most pump curves aren't strictly linear. The drop in flow with increasing pressure isn't always a neat fraction (like 2/3 of no-load flow). The actual relationship often follows a more complex (sometimes quadratic-like) trend. Of course that might work in my favour since the resistance of flow against pressure in pumps often increases more steeply at higher pressure. If only a 0.2 increase in pressure is required to get the flow going through the dosatron then that may be operating in the normally flat portion of the pump's performance curve.

- **Inlet Pressure Effects:**

The pump's rated flow and head are usually determined with a low suction pressure (often near atmospheric). Feeding it water at 4.5 bar might change its operating point. It might not simply "add" 0.2 bar to the system as the simple calculation suggests. The pump's internal dynamics (like cavitation risks or altered efficiency) might come into play when working with a high inlet pressure.

Given the reasonably low cost of the pump, and the above, it was felt to be a reasonable gamble to acquire one and test it in situ. Total length of the unit is 104 mm which should fit into the left inlet branch of the Dosatron.



The Dosatron inlet is 32 mm M external diameter and 25 mm internal. The pump has 20.5 mm M inlet and outlet and they are offset by ~15mm with the inlet and outlet mounted on one side. Therefore it may be able to be mounted immediately above the Dosatron inlet brass elbow with the pump itself horizontally extending to the left .

A 25mm – 20mm M-F reducer and a 20mm F-F barrel union should allow a neat and maintainable connection. Above the pump a 20mm-25mm F-F sleeve will allow connection to the remaining silicone rubber hose. The pump can be turned on by the relay controlling the solenoid valve. To ensure the system remains useable during this installation two 25mm plugs can be utilised.

If it works it would be smart to fit a one-way valve and union on the outlet (\$14 Valve Warehouse), and shift the solenoid valve to the inlet, so that if the plastic components prove a point of failure (giving a rapid drop in the sensed flow) the control system can set it to be bypassed.

Notes developed in interaction with ChatGPT model 5.0 gives the following summary of the setup selected:

**Objective:**

Deliver a consistent **1% to 2% final gel dilution** into the sprinkler water line using a **Huiji DN009 Dosatron** and **Bringsmart 12V inline pump**.

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## System Architecture

### Main Flow Path

- Feeder pipe: 50mm internal brass pipe from main pump to sprinkler manifold.
- Flow control devices (in order):
  - Inline water flow meter (pulse-type)
  - 32mm stainless steel tee junction #1 (feeds Dosatron #1)
  - 32mm stainless steel tee junction #2 (feeds Dosatron #2)
  - Manual ball valve (diverts water back to tank for testing)
  - Sprinkler feed hose

### Dosatron Injection Subsystem (x2)

- Each Tee outlet (32mm) connects to:
    - Normally closed 12V solenoid valve
    - Bringsmart 12V inline pump:
      - Flow rate: 1800–2600 L/hr (30–43.3 L/min)
      - Pressure head: 4.2–6 m (0.42–0.6 bar)
      - Dialable speed control
    - Huiji DN009 Dosatron:
      - Operating range: 0.2–6 bar, 0.8–42 L/min
      - Adjustable dilution: 1–10%
      - Draws gel from container below via suction port
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## Dilution Logic & Calculations

**Target Range:** 1%–2% final gel dilution

- Dosatron setting: Fixed at 10% (injects 1 part gel per 10 parts water)
- Resulting total Dosatron output:
$$F_d + 0.10F_d = 1.10F_d$$
- To achieve final dilution percentage (e.g. 1% to 2%):
$$F_d = (C \times F_t) / 0.10 = 10C \times F_t$$

→ Bringsmart flow = 10 × target % × total feeder flow

**Target Gel % Bringsmart Flow Gel Flow Dosatron Output Final Conc.**

1.0%	17.0 L/min	1.7 L/min	18.7 L/min	1.0%
1.5%	25.5 L/min	2.55 L/min	28.05 L/min	1.5%
2.0%	34.0 L/min	3.4 L/min	37.4 L/min	2.0%

## Possible Gel Containers

The gel needs to be consolidated into a single airtight container – There is an 18l Airtight stainless steel Milk Can Storage Bucket for sale for \$102 on Amazon.com.au which could suffice<sup>5</sup>. Alternatively since the dosatron is plastic we might use a plastic container (\$43 Temu)<sup>6</sup> but protect both with a spray as well as heat wrap if the temperature in the shed rises above 50 deg C.

The gel needs to be agitated, ideally every month, but no less than every three months. Under consideration is incorporating a cheap electric paint mixer into the container so that the mixing can be automated on a monthly basis and also immediately prior to use. A 24V mixer with a 10 cm impeller is available on Aliexpress.<sup>7</sup> for \$AUD \$19.79 and may be suitable.

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<sup>5</sup> [https://www.amazon.com.au/Airtight-Stainless-Container-Transporting-Restaurant/dp/B09D85RB5K/ref=asc\\_df\\_B09D89NPJK/?tag=googleshopsdk-22&linkCode=df0&hvadid=687818277742&hvpos=&hvnetw=g&hvrnd=6041915958010109892&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9071344&hvtargid=pla-2316836806213&mcid=be860dcef07238c2a7933a92954bc96b&th=1](https://www.amazon.com.au/Airtight-Stainless-Container-Transporting-Restaurant/dp/B09D85RB5K/ref=asc_df_B09D89NPJK/?tag=googleshopsdk-22&linkCode=df0&hvadid=687818277742&hvpos=&hvnetw=g&hvrnd=6041915958010109892&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9071344&hvtargid=pla-2316836806213&mcid=be860dcef07238c2a7933a92954bc96b&th=1)

<sup>6</sup> [https://www temu.com/ul/kuiper/un9.html?subj=goods-un&bg\\_fs=1&p\\_jump\\_id=894&x\\_vst\\_scene=adg&goods\\_id=601099545149510&sku\\_id=17592338121082&adg\\_ctx=a-257f4d7f~c-24c01b0e~f-818ed33a&x\\_ads\\_sub\\_channel=shopping&p\\_rfs=1&x\\_ns\\_prz\\_type=1&x\\_ns\\_sku\\_id=17592338121082&x\\_ns\\_gid=601099545149510&mrk\\_rec=1&x\\_ads\\_channel=google&x\\_gmc\\_account=710728018&x\\_login\\_type=Google&x\\_ads\\_account=5483888441&x\\_ads\\_set=21725437591&x\\_ads\\_id=166374071654&x\\_ads\\_creative\\_id=714166496608&x\\_ns\\_source=g&x\\_ns\\_gclid=Cj0KCQjwUrS3BhCGARIsADdUH504uoWo0pyHcdJKAUWYT6ySWyYBmwuuCLJoDn4ZJYN2M\\_UVjzw0Jq0aAgPDEALw\\_wcB&x\\_ns\\_placement=&x\\_ns\\_match\\_type=&x\\_ns\\_ad\\_position=&x\\_ns\\_product\\_id=710728018-17592338121082&x\\_ns\\_target=&x\\_ns\\_devicemodel=&x\\_ns\\_wbraid=Cj4KCAjwUrS3BhBmEi4AYLZWyaK9Ofd3PJEf5KNSbRZoNKxRgC\\_-nDdWfGGsHEij91\\_DsnCnGUsKwMEHGgJteg&x\\_ns\\_gbraid=0AAAAAo4mICEmO6E3-ZUICBBW1XIFgW4VZ&x\\_ns\\_targetid=pla-2307621698784&gad\\_source=1&gbraid=0AAAAAo4mICEmO6E3-ZUICBBW1XIFgW4VZ&gclid=Cj0KCQjwUrS3BhCGARIsADdUH504uoWo0pyHcdJKAUWYT6ySWyYBmwuuCLJoDn4ZJYN2M\\_UVjzw0Jq0aAgPDEALw\\_wcB](https://www temu.com/ul/kuiper/un9.html?subj=goods-un&bg_fs=1&p_jump_id=894&x_vst_scene=adg&goods_id=601099545149510&sku_id=17592338121082&adg_ctx=a-257f4d7f~c-24c01b0e~f-818ed33a&x_ads_sub_channel=shopping&p_rfs=1&x_ns_prz_type=1&x_ns_sku_id=17592338121082&x_ns_gid=601099545149510&mrk_rec=1&x_ads_channel=google&x_gmc_account=710728018&x_login_type=Google&x_ads_account=5483888441&x_ads_set=21725437591&x_ads_id=166374071654&x_ads_creative_id=714166496608&x_ns_source=g&x_ns_gclid=Cj0KCQjwUrS3BhCGARIsADdUH504uoWo0pyHcdJKAUWYT6ySWyYBmwuuCLJoDn4ZJYN2M_UVjzw0Jq0aAgPDEALw_wcB&x_ns_placement=&x_ns_match_type=&x_ns_ad_position=&x_ns_product_id=710728018-17592338121082&x_ns_target=&x_ns_devicemodel=&x_ns_wbraid=Cj4KCAjwUrS3BhBmEi4AYLZWyaK9Ofd3PJEf5KNSbRZoNKxRgC_-nDdWfGGsHEij91_DsnCnGUsKwMEHGgJteg&x_ns_gbraid=0AAAAAo4mICEmO6E3-ZUICBBW1XIFgW4VZ&x_ns_targetid=pla-2307621698784&gad_source=1&gbraid=0AAAAAo4mICEmO6E3-ZUICBBW1XIFgW4VZ&gclid=Cj0KCQjwUrS3BhCGARIsADdUH504uoWo0pyHcdJKAUWYT6ySWyYBmwuuCLJoDn4ZJYN2M_UVjzw0Jq0aAgPDEALw_wcB)

<sup>7</sup> [https://www.aliexpress.com/item/1005005909657513.html?src=google&pdp\\_npi=4%40dis!AUD!17.79!17.79!!!%40!12000034805518258!ppc!!!&src=google&albch=shopping&acnt=742-864-1166&isdl=y&slnk=&plac=&mtctp=&albt=Google\\_7\\_shopping&aff\\_platform=google&aff\\_short\\_key=UneMJZVf&gclsrc=aw.ds&albagn=888888&&ds\\_e\\_adid=&ds\\_e\\_matchtype=&ds\\_e\\_device=c&ds\\_e\\_network=x&ds\\_e\\_product\\_group\\_id=&ds\\_e\\_product\\_id=en1005005909657513&ds\\_e\\_product\\_merchant\\_id=746835509&ds\\_e\\_product\\_country=AU&ds\\_e\\_product\\_language=en&ds\\_e\\_product\\_channel=online&ds\\_e\\_product\\_store\\_id=&ds\\_url\\_v=2&albc=21819463808&albag=&isSmbAutoCall=false&needSmbHouyi=false&gad\\_source=1&gbraid=0AAAAA99aYpemVVg0IYuNzNY4P-lxB8Ok4&gclid=CjwKCAiAk8G9BhA0EiwAOQxmfgw-bygwCih19udZ9VgF-IK3\\_zjWY3Gd7jas3arMKInK7DShrvuEgBoCp-AQAvD\\_BwE](https://www.aliexpress.com/item/1005005909657513.html?src=google&pdp_npi=4%40dis!AUD!17.79!17.79!!!%40!12000034805518258!ppc!!!&src=google&albch=shopping&acnt=742-864-1166&isdl=y&slnk=&plac=&mtctp=&albt=Google_7_shopping&aff_platform=google&aff_short_key=UneMJZVf&gclsrc=aw.ds&albagn=888888&&ds_e_adid=&ds_e_matchtype=&ds_e_device=c&ds_e_network=x&ds_e_product_group_id=&ds_e_product_id=en1005005909657513&ds_e_product_merchant_id=746835509&ds_e_product_country=AU&ds_e_product_language=en&ds_e_product_channel=online&ds_e_product_store_id=&ds_url_v=2&albc=21819463808&albag=&isSmbAutoCall=false&needSmbHouyi=false&gad_source=1&gbraid=0AAAAA99aYpemVVg0IYuNzNY4P-lxB8Ok4&gclid=CjwKCAiAk8G9BhA0EiwAOQxmfgw-bygwCih19udZ9VgF-IK3_zjWY3Gd7jas3arMKInK7DShrvuEgBoCp-AQAvD_BwE)

<b>Fertilizer Injector</b>		
<b>Model No.</b>	<b>Specification</b>	<b>Picture</b>
HJ-DN009 (0.2-1%)	automatic Proportional Pump Dilution 0,1-1%. Flow rate 25-2500 l/h	
HJ-DN009 (0.2-2%)	automatic Proportional Pump Dilution 0,2-2%. Flow rate 25-2500 l/h	
HJ-DN009 (1-10%)	automatic Proportional Pump Dilution 1-10%. Flow rate 50-2500 l/h	
HJ-DN009 (1-5%)	automatic Proportional Pump diameter :40 mm Proportion 1%--5%, flow rate 50--12500 l/h, water pressure 0.2-8 pa	
HJ-DN009 (0.4-4%)	automatic Proportional Pump Dilution 0,4-4%. Flow rate 25-2500 l/h	

Alternative gel injection approaches considered, but currently not being taken further forward.

#### 1. Electric dosing pump

An alternative approach could have been to use a battery powered 12 V electric dosing pump Examples:

- (i) \$18.74 with maximum outlet pressure of 800 kPa – max flow 5 l/min<sup>8</sup> which could produce a dilution of  $5/120 = 0.8\%$ .
- (ii) the STARFLO 12V high pressure diaphragm pump<sup>9</sup>. 4 l/min at open flow, and pressure up to 5.5 bar drawing 2.6 A. Would have to determine flow vs pressure curve. USD 9.00
- (iii) LEF00 high pressure 200GPD diaphragm water pressure pump.<sup>10</sup> 220W, 24V DC, working pressure 0.5Mpa, 1.9A, 1900 ml/min working, 2500 ml/min opening. Dilution potentially  $1.9/120 = 1.5\%$  with a fraction of that able to be returned to the barrel if necessary.
- (iv) 12V high pressure irrigation pump BLD-09: 3-7 bar, 60W, largest flow 6 l/min. USD 5.80.<sup>11</sup>
- (v) 2V 100W Miniature High Pressure Diaphragm Pump Self-Priming Pump 8L/Min For Agriculture Sprayer Drones Parts USD 58.90. 12V, 70m head, max flow 8 l/min. 100W.<sup>12</sup>
- (vi) RANKING FL86 12V DC 220PSI 220W 5 -chamber Diaphragm Pump – FL8 - 15LPM Self-Priming High Pressure Chemical Pump For Pesticide. 50m head, 220W
- (vii) OSPump 150m head, max flow 9.5l/min, Flow vs pressure curve displayed.<sup>13</sup> 12V DP-60 delivers a max pressure of 60psi gives 4 l/min at 45 psi at 40W. Dilution =  $4/120$  say = 3.3% or  $3.2/120 = 2.6\%$  at 60 psi. That could be about where it needs to be. However, the need to draw power, and uncertainty in what dosage would be delivered, compared with the Dosatron which draws no electric power and is directly proportional and adjustable as to dose, speaks in favour of the use of a Dosatron, especially as we have now demonstrated a method which appears to require one at reasonable cost.

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[https://www.aliexpress.com/item/1005005556174695.html?spm=a2g0o.productlist.main.5.666b6b36t0Pil2&algo\\_pvid=8d990273-9296-4a6a-846e-1ecf15b5a149&algo\\_exp\\_id=8d990273-9296-4a6a-846e-1ecf15b5a149-2&pdp\\_npi=4%40dis%21AUD%2155.08%213.97%21%21%21256.88%2118.51%21%4021032e4e17116231532963602eb67b%2112000033530015589%21sea%21AU%213010160845%21&curPageLogUId=aMvkBhtPKYks&utparam-url=scene%3Asearch%7Cquery\\_from%3A#nav-description](https://www.aliexpress.com/item/1005005556174695.html?spm=a2g0o.productlist.main.5.666b6b36t0Pil2&algo_pvid=8d990273-9296-4a6a-846e-1ecf15b5a149&algo_exp_id=8d990273-9296-4a6a-846e-1ecf15b5a149-2&pdp_npi=4%40dis%21AUD%2155.08%213.97%21%21%21256.88%2118.51%21%4021032e4e17116231532963602eb67b%2112000033530015589%21sea%21AU%213010160845%21&curPageLogUId=aMvkBhtPKYks&utparam-url=scene%3Asearch%7Cquery_from%3A#nav-description)

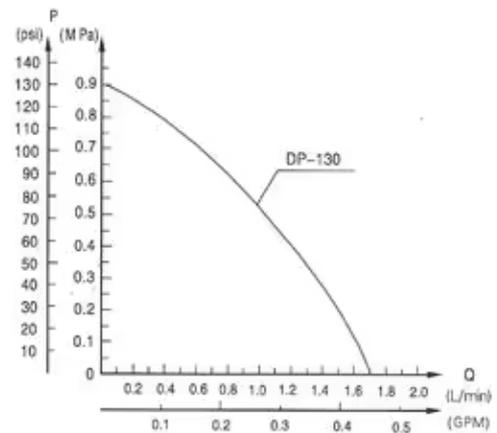
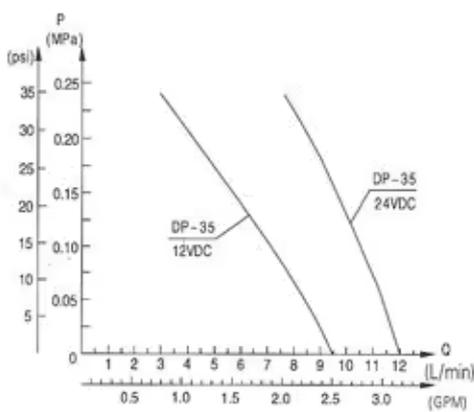
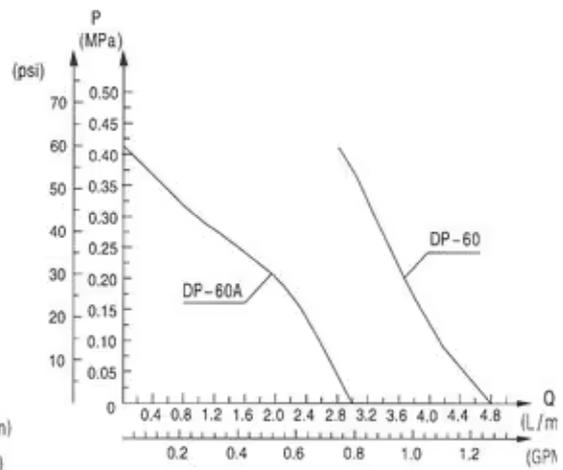
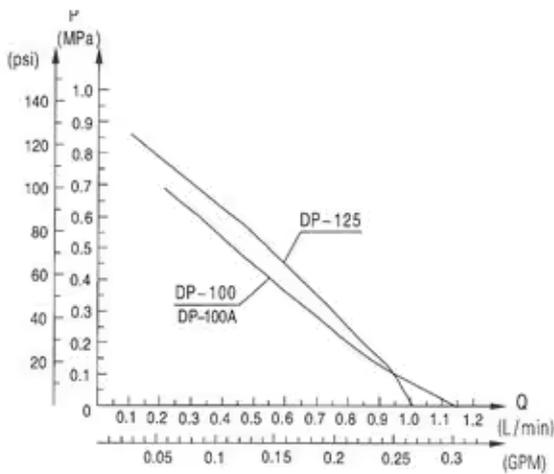
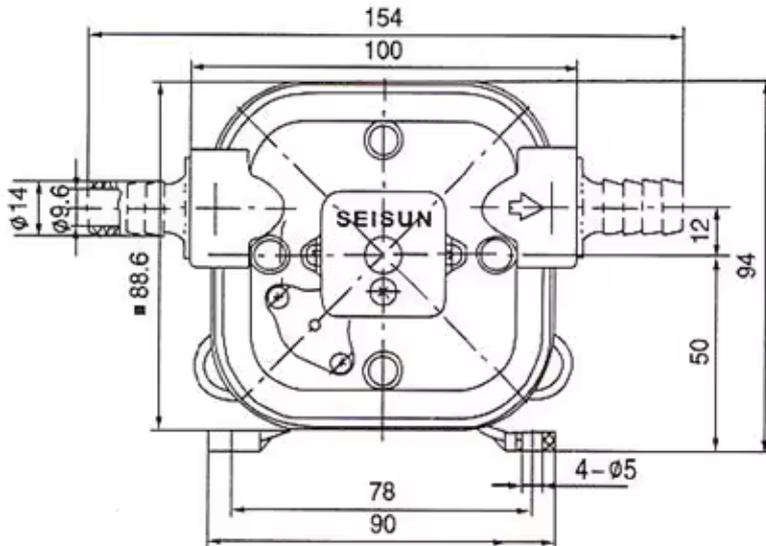
<sup>9</sup> [https://www.alibaba.com/product-detail/STARFLO-dc-high-pressure-battery-diaphragm\\_1601104438234.html?spm=a2700.galleryofferlist.topad\\_classic.d\\_title.7e763ef7P4ZSYG](https://www.alibaba.com/product-detail/STARFLO-dc-high-pressure-battery-diaphragm_1601104438234.html?spm=a2700.galleryofferlist.topad_classic.d_title.7e763ef7P4ZSYG)

<sup>10</sup> [https://www.alibaba.com/product-detail/LEFOO-High-Pressure-Economic-200-GPD\\_1601057828248.html?spm=a2700.galleryofferlist.p\\_offer.d\\_title.596a107eWnfr9z&s=p](https://www.alibaba.com/product-detail/LEFOO-High-Pressure-Economic-200-GPD_1601057828248.html?spm=a2700.galleryofferlist.p_offer.d_title.596a107eWnfr9z&s=p)

<sup>11</sup> [https://www.alibaba.com/product-detail/China-12V-Flow-High-Pressure-Irrigation\\_1600431864704.html?spm=a2700.galleryofferlist.normal\\_offer.d\\_title.596a107eWnfr9z](https://www.alibaba.com/product-detail/China-12V-Flow-High-Pressure-Irrigation_1600431864704.html?spm=a2700.galleryofferlist.normal_offer.d_title.596a107eWnfr9z)

<sup>12</sup> [https://www.alibaba.com/product-detail/12V-100W-Miniature-High-Pressure-Diaphragm\\_1600978472558.html?spm=a2700.galleryofferlist.normal\\_offer.d\\_title.596a107eWnfr9z](https://www.alibaba.com/product-detail/12V-100W-Miniature-High-Pressure-Diaphragm_1600978472558.html?spm=a2700.galleryofferlist.normal_offer.d_title.596a107eWnfr9z)

<sup>13</sup> [https://www.alibaba.com/product-detail/12V-24V-Diaphragm-Pumps-High-Pressure\\_60421616133.html?spm=a2700.galleryofferlist.normal\\_offer.d\\_title.596a107e0tK1iq](https://www.alibaba.com/product-detail/12V-24V-Diaphragm-Pumps-High-Pressure_60421616133.html?spm=a2700.galleryofferlist.normal_offer.d_title.596a107e0tK1iq)



## 2. Venturi approaches.

There are in fact a number of venturi approaches where a constriction in the feed line is used to create a partial vacuum to draw dosing fluid into the water line.

A good listing of options can be found at the Land&Water Technology website.<sup>14</sup> Of these either the Amiad 4-01 fertiliser injector kit (\$1260.05) or the 50mm Mazzei Venturi Fertilizer injector (\$712.25) look promising.

Finally, and perhaps most promisingly, since we have a pressure reduction valve for the low flow mode it might be possible to simply put a valve controlled loop around it and draw fluid from a barrel. The whole system would need to withstand the operating pressure of the system – say 15x7= 105 psi.

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<sup>14</sup> <https://shop.landwater.com.au/collections/dosing-pumps#:~:text=Dosing%20pumps%20are%20used%20in,mineral%20acids%20during%20crop%20production.>

