DATA SHEET

AQUAVENDOR AUTO

An automatic membrane solution for small scale water treatment

The Challenge

Small communities require robust, reliable water treatment solutions often from difficult water sources. These treatment systems must provide pathogen free water economically and with minimal operator attendance.

Our Solution

The AQUAVENDOR membrane filtration unit is a low cost, low maintenance water filtration solution that utilises the MEMTROL® membrane filter controller.

It affords practical, small scale potable water treatment using proven ultrafiltration (UF) membrane technology. The MEMTROL® controller provides continuous, automatic water production for extended periods, with minimal operator input.

The hollow fibre membrane filtration module is mounted inside a moulded plastic pressure housing which is compact, robust, easy to transport and simple to install.

The UF barrier filtration process provides primary disinfection by removing pathogens and particulates to supply safe drinking water from the majority of non-saline surface and ground waters.

Additional post filtration treatment including ultra violet (UV) or chlorine disinfection can be utilised if desired.

Operating Description

Raw water flows into the AQUAVENDOR filtration module housing under pressure. As it passes through the porous walls of the hollow fibre membranes, solids are retained on the membrane surface. The AQUAVENDOR is suitable for use in either pumped feed or gravity feed applications. In most systems, the flow is regulated at a constant rate by a simple flexible orifice type flow control valve.

The secret to the successful operation of the AQUAVENDOR unit is the effectiveness of its backwash process, which uses low pressure aeration to maintain a clean membrane surface.

Backwashing is initiated automatically by the controller, typically every 20 to 30 minutes of filtration.

The MEMTROL® membrane filter controller fully automates operation of the filtration and backwash cycles. Provision is made for a level switch input from a feed supply tank and a level switch input from a filtrate storage tank. This may be used to pause operation of the process as liquid levels in the feed or filtrate storage systems change. These features can be used to minimise operator attendance requirements during normal filtration service.

The unit periodically requires a chemical clean or CIP (Clean-In-Place) cycle. This removes residual fouling that cannot be removed by the backwash process alone and helps to limit biological growth in the system. Sodium hypochlorite solution (household bleach) is typically the chemical used for cleaning. The MEMTROL® membrane filter controller partially automates the cleaning process and provides guidance to the operator when manual input is required during the cycle. Cleaning frequency is application specific but is generally between weekly and monthly.

Typical Applications

- Decentralised water treatment systems
- Community small scale systems
- Remote and rural communities
- Point-of-entry filtration
- Emergency and temporary water supplies
- Hotels / restaurants / resorts
- Bottled water production
- RO (reverse osmosis) pre-treatment

MEMCOR® Membrane Modules

The membrane filtration modules use high permeability, low-fouling PVDF hollow fibre membranes for optimum performance and long life. Our modules are simple in design and easy to install and maintain. Thousands of membrane plants globally rely on Memcor membrane modules for their water filtration requirements.

Membrane Cleaning

A simple automated low pressure aerated backwash sequence (patent pending) together with periodic chemical cleaning ensure high capacity and stable performance at low differential pressure, even with highly turbid feedwaters.

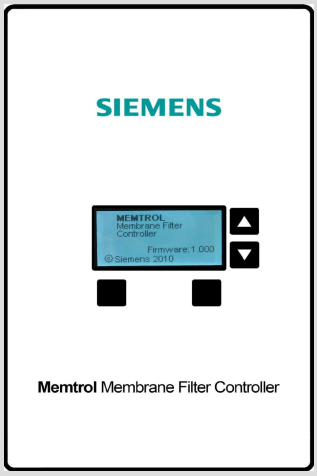
Note: *Design, data and dimensions are subject to modification without notice.*

AQUAVENDOR Technical Data	
Typical application	Filtration of potable non-saline surface water or groundwater for small communities. Not suitable for use with sea water or brackish water or other water sources containing contaminants such as heavy metals – unless used as a pre-treatment to RO or similar.
Typical AQUAVENDOR unit filtrate production capacity treating clear surface water [1]	Net 20-25 kL/day (5,280 US gallons per day) ± 15 % for 24 hour operation.
Membrane module details	MEMCOR® S10V membrane filtration module polyvinylidene fluoride (PVDF) hollow fibre ultrafiltration membrane with nominal pore size 0.04 µm
Materials of construction:	
Module housing assembly	Food grade polyethylene (PE)
Valves	Various including PVC and PP
Seals and gaskets	EPDM typical
Pipe and fittings	Various including PE, ABS, Nylon and PVC
"Filter" mode operation	Pressurised outside to inside filtration. Automatic standby on feed and filtrate storage levels via level switch inputs (where fitted). Automatic backwash at preset filtration intervals.
Standard flow control device	Fixed flow rate flexible orifice flow control valve (FCV) (nominal instantaneous flow rate approx 18 litres per minute)
Typical feed inlet pressure range for pumped feed or high head gravity feed (FCV fitted)	10 m to 15 m (100 – 150 kPa) at 18 litres per minute. 20 m (200 kPa) maximum shut-off head.
Typical feed inlet pressure range for low head gravity feed (FCV not fitted)	2 m (minimum) to 10 m (maximum) at 18 litres per minute (flow control manually adjusted).
Maximum housing operating pressure	200 kPa
Feed pre-screen mesh size requirement [2]	500 µm or finer
Maximum recommended feed turbidity [3]	50 NTU
Filtered water turbidity	< 0.1 NTU
Typical log reduction value	> 4 LRV (for particles 2 – 5 µm)
Operating feed temperature range	> 0 to 35 ^{O}C (> 32 to 95 ^{O}F)
Temperature range for transportation and storage	> 0 to 35 ^{O}C (> 32 to 95 ^{O}F) ***Note:*** *The unit must not be allowed to freeze.*
Feed pH range	6.0 to 9.0 pH ***Note:*** *Exposure to chlorine or chloramines is not recommended in feeds below 6.5 pH.*
Allowable pH range for cleaning	2 – 10 pH typical ***Note:*** *Occasional brief exposure during chlorine cleans to 10.5 pH is acceptable.*

1 Capacity based on standard size flow control valve (FCV), standard configuration settings and no cleaning cycle. Feed water quality will affect production capacity.

2 Unscreened or coarsely screened raw water may reduce membrane operating life.

3 Capacity and backwashing/cleaning frequency will typically vary with feed turbidity.

AQAUVENDOR Technical Data (continued)	
Backwash	Automatically initiated and controlled, using low pressure air scour and feed flush.
Aeration air blower	Compact linear air pump. typically Alita AL-150 standard series high capacity air pump, single phase AC power supply with rated performance 170 – 180 L/minute at 20 kPa (0.2 bar, 2.9 psig), approximately 140 Watts power consumption.
Waste water volume per backwash	Approximately 5 litres every 20 – 25 minutes. Gravity drain waste outlet to be provided adjacent to unit.
Cleaning concentrate and volume required for a chlorine cleaning cycle	Typically household liquid bleach is used. For sodium hypochlorite 5 % (or 5.0 g/L) concentration, approximately 100 – 150 mL will be used. ***Note:*** *Cleaning solution waste may require further treatment, such as neutralisation, prior to disposal.*
Typical target chlorine concentration during a chlorine clean	300 to 500 mg/L / 300 to 500 ppm
Cleaning concentrate and volume required for an acid cleaning cycle	Typically about 300 grams of citric acid powder will be used.
Typical target acid concentration during an acid clean	2.0 to 2.2 pH (not less than 2.0 pH)
Electricity supply required	95 – 260 VAC, 50 or 60 Hz single phase and earth (full sine wave only from DC to AC inverters – other inverter wave forms not suitable)
MEMTROL® membrane filter controller details 	Microprocessor controlled with battery backed clock and memory functions with 54 mm x 26 mm backlit monochrome LCD graphic display. Four pushbutton function keys for operator input by menu selection. 240 mm H x 160 mm W 120 mm D sealed polycarbonate enclosure (IP65 / NEMA 4 protection rating) with cable glands and terminal strips provided for all electrical connections. Built in 65 W switched power supply powers electronics, LCD, discrete inputs and 24 VDC solenoid valve and relay outputs. Controller protection for electronics provided by a 4 ampere glass tube (automotive type) fuse. 24 VDC powered discrete inputs provided for feed level switch and filtrate level switch. 24 VDC powered discrete outputs for AQUAVENDOR unit mounted solenoid valves. Single volt free relay contacts (250 VAC, 7.5 A inductive load rating) provided for feed pump call to run and aeration blower call to run.
Piping terminations	20 NS hose tails (typical)
Approximate unit mass	35 kg dry, 55 kg operating
Approximate unit dimensions	1,550 mm x 450 mm x 300 mm
Recommended minimum clearances (for operation and maintenance access)	Front and both sides 1,000 mm
Shipping details: Approximate dimensions Approximate mass	 1600 mm x 500 mm x 350 mm 55 kg (in timber crate)
Recommended installation location	Installed under cover with protection from direct sunlight and rainfall.

Typical Client/User Requirements for AQUAVENDOR Operation

The AQUAVENDOR unit forms the core component of a membrane filtration system. Ancillary equipment external to the unit is required to complete the system.

Requirements vary from site to site but typically the client or end user must supply the following:

- A suitable operating location plus assembly and set-up of, the AQUAVENDOR membrane filtration unit.
- The raw water feed delivery system. This typically includes:
  - Gravity feed or feed pump system within the specified flow and pressure range (including any external power supply requirements plus call-to-run signal connection via the Memtrol controller, if necessary);
  - Feed tank (where required) and feed storage level switch (where fitted, plus connection to Memtrol controller);
  - Feed supply pipe or hose connections and valves;
  - Feed strainers/pre-screens;
  - Any other feed pre-treatment requirements (such as pH correction).
- The filtrate storage or distribution system. This typically includes:
  - A filtrate storage tank and filtrate storage level switch (where fitted, plus connection to Memtrol controller);
  - Filtrate outlet pipe or hose connections and valves;
  - Filtrate disinfection system (for potable water);
  - Any other filtrate post-treatment requirements.
- The waste disposal system. This typically includes:
  - Free venting of air out of the waste outlet/vent termination point, allowing free discharge of aeration air from the top of the module housing;
  - A freely draining pipe, pit or channel that removes liquid waste, without returning it to the feed water source;
  - Pipe or hose connections from waste outlets on the unit to the waste disposal system;
  - A means of neutralising cleaning solution waste liquid.
- Electrical installation. This typically includes:
  - Power connection to the Memtrol controller from a protected (with circuit breaker or fuse) single phase power supply;
  - Protected single phase (typically) power connection through the designated Memtrol controller relay contact to operate the feed pump (where used);
  - Protected single phase (typically) power connection through the designated Memtrol controller relay contact to operate the aeration blower;
  - Installation and connection of the feed level switch (where used) to the Memtrol controller;
  - Installation and connection of the filtrate level switch (where used) to the Memtrol controller.
- An operator to monitor unit operation and to perform cleaning cycles when necessary.

Please refer to the standard AQUAVENDOR unit process and instrumentation diagram and the typical system process and instrumentation diagram for operating process requirements.

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