For sale, rent and/or lease

Now you can filtrate better, deeper, finer…

June, 2015

All-in-one membrane units for lab and industrial tests
(PMS series)

These turnkey versatile test units are designed for the lab and on-site industrial testing of the filterability of various liquids.

If you plan to apply your unit for the treatment the dangerous liquids (radioactive, biological, chemical or off-shore use) we propose highly reliable Ethernet as well as Wireless connectivity devices (IoT devices) in order to organize a remote control of the unit.
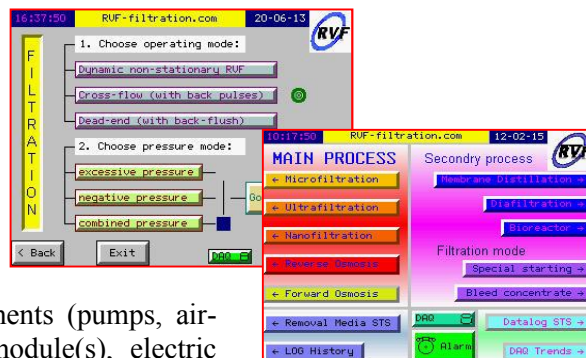
These state-of-the-art units are equipped with all necessary equipments (pumps, air-driven, solenoid or manula valves, sensors, tank(s), membrane module(s), electric cabinet, PLC, DAQ system) in order to work under heavy laboratory or industrial conditions during short or long time filtration cycles. The client has only to provide: the feed liquid; the electric power; the compressed air; the water and chemicals for CIP and rinsing; the water for cooling (if necessary); to dispose permeate and concentrate.

All our turnkey units include: design, manufacturing, integration, installation supervision, commissioning, training, maintenance contract, IOM manual.

Design of the system:

- Membrane modules which may be used onto the unit:
   - Hollow fiber modules (inside-to-outside or outside-to-inside)
   - Tubular module: organic, ceramic, stainless steel membrane
   - Dynamic filtration RVF modules (www.rvf-filtration.com)
   - Spiral wound module with organic membranes
   - Flat sheet membrane module

- Membrane processes that can be carried out on the unit:
   - **MF, UF, NF**   Micro-, ultra-, nanofiltration
   - **Dis/Pyr**   Disinfection, pyrogen (endotoxins) removal
   - **RO**   Reverse osmosis
   - **FO**   Forward osmosis
   - **DiaF**   Diafiltration (size exclusion MF or UF)
   - **MBR or IEMBR** Coupling with your bioreactor or contactor: the unit is able to operate using either pressure driven (i.e. when trans-membrane pressure > 0) or ion exchange & size exclusion mechanisms (in the last two cases the trans-membrane pressure has to be close to 0)

- Modes of functioning:
   - special starting mode preventing the initial membrane clogging/fouling (very important for MF & UF)
   - dead-end (for hollow fiber MF & UF)
   - cross-flow (onto hollow fiber, tubular, spiral wound, flat sheet and dynamic RVF modules)
   - cross-flow (onto both sides of the membrane, if necessary)
   - under excessive pressure: when the membrane module is positioned onto the discharge pipe of the pump (gauge pressures onto the module: $P_{in} > 0$ and P_{out}

> or = 0)
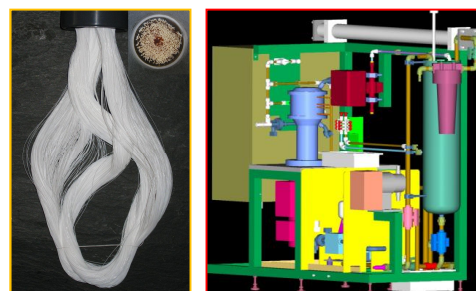
- o under negative pressure: when the membrane module is positioned onto the suction pipe of the pump (gauge pressures onto the module: $P_{in} = \sim 0$ and $P_{out} < 0$)
- o under combined pressure mode (gauge pressures onto the module: $P_{in} > 0$ and $P_{out} < 0$)

- Intermittent automatic cleaning tools:
  - o back-flush of the permeate,
  - o the combination of the permeate & filtrated air to sweep the fouling components,
  - o chemically enhanced back-flush of the permeate & chemical agents
  - o back-pulse generator (coupled chemical enhancement, if necessary)
  - o reverse flow of the permeate for crossflow micro- and ultrafiltration
  - o raise in the speed of the rotating bodies for RVF modules (dynamic filtration)
  - o raise in the pressure drop: retro-filtration (tubular and hollow fiber membranes)
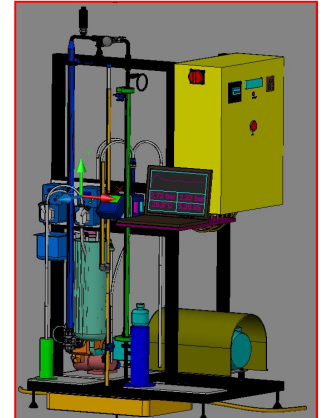
- Membranes' relaxation before and after back-flushes, back-pulses or reverse flows

- CIP system (heating, temperature regulation, automatic stop)

- System for integrity testing: for membrane & module

- Sensors and transmitters (analog 2-wire or digital output for pressure sensors: in the last case the accuracy is better than 0.05% FS), *non exhaustive list*:
  - o pressure at the concentrate side before the module
  - o pressure at the concentrate side after the module
  - o pressure of the permeate or average trans-membrane pressure
  - o flow rate for cross-flow on the feed side
  - o flow rate for permeate
  - o flow rate for draw solution or distillate on the permeate
  - o flow rate for concentrate bleed (working at constant VRF)
  - o temperature in the tank and in the concentrate's loop
  - o temperature on the permeate side
  - o level in the feed tank(s) and measuring column(s)
  - o special standard (conductivity, pH, ORP), ion-specific or optical sensors
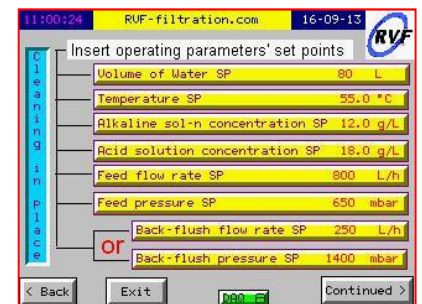
- Possibility to control and (to monitor) the following parameters:
  - o level in the tank(s)
  - o mean (inlet/outlet the module) pressure of the concentrate
  - o permeate pressure or trans-membrane pressure
  - o back-flush pressure or flow rate
  - o permeate flow rate
  - o concentrate circulation flow rate or crossflow velocity (if necessary)
  - o VRF (volume reduction factor) or recovery factor under continuous bleed of the concentrate
  - o number of the diafiltration volumes (using a known initial volume of the liquid inside the piping)
  - o temperature in the concentrate and permeate circulation loops (cooling or heating by the heat transfer fluid)
  - o temperature during CIP procedure (control by the electric heater)
  - o concentration of the chemicals during back-flushes and CIP
  - o back-flush flow rate or back-flush pressure
  - o minimization (automatic or manual) of the concentrate volume at the end of filtration cycle
  - o possibility for the operator to select the adapted regulation (control) parameter(s)

- Screening system (if needed) onto the liquid supply piping (with manual or automatic cleaning of the screen)

- Data acquisition (DAQ) system with software:
  - o resolution   16 bits
  - o number of channels   8 channels

- o data storage onto   µSD card
- o history of the unit functioning   yes
- o online (remote) access to the data & to the other parameters   possible
- o real-time data and curves   yes

- PLC controlling the unit (permits various degrees of automation: manual, semi- and fully automated working):
  - o Color or black touch screen   to choose
  - o Screen size   3.5 inch or higher
  - o Analog inputs number   4, 8 or 16
  - o Analog outputs number   2, 4 or 6
  - o Online (remote) access   to choose
  - o Data log function   yes
  - o Memorization of the unit's activity during   months / years
  - o Online modification of several parameters   possible
  - o Ethernet and Wireless connectivity devices for remote control (if needed)   possible

Specifications (can be modified to fit your special application(s)):

1. Membrane surface area in the modules is as follows:
   - Hollow fiber module   0.05 - 12 m^2
   - Tubular module   0.05 - 0.7 m^2
   - Dynamic RVF module   0.015 - 0.05 m^2
   - Spiral wound module   2.5 or 7 m^2
   - Flat sheet module   0.01- 1 m^2
2. Temperature of the fluids   max 90   °C
3. Maximum pressure of the fluid   to provide by a client
4. pH range of the fluid (including CIP)   to provide by a client
5. CIP system with temperature control (operator has to add the chemicals)   yes
6. Storage (logging) the data from analog and digital sensors   yes
7. Handling the alarms (real-time and history of the alarms)   yes
8. Automatic cutoff (if one of the limits is over passed) with the description on screen   yes
9. Automatic "stair" test for the fast studies the membrane/liquid pairs (Fig. 1)   possible
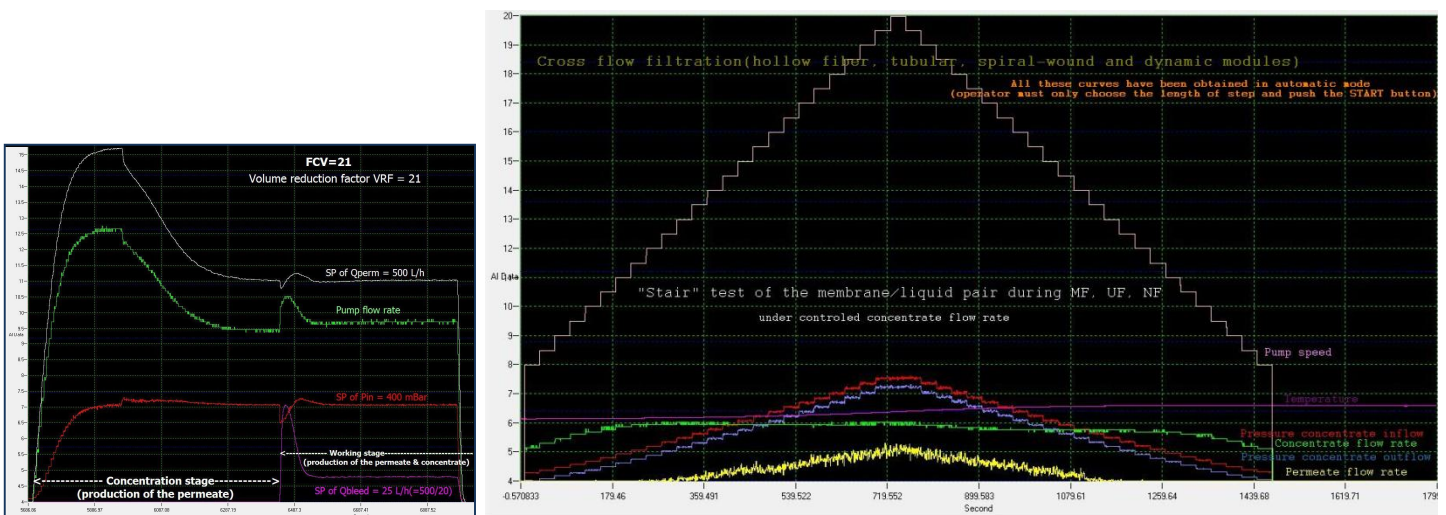
Fig.1. Examples of the real-time datalog screens (you'll need a PC connected to the unit)

And also:

- Development & design of the automation control system for your existing test units (retrofitting, upgrade)
- Extensive testing onto our PLC controlled test bench is carried out for the optimum design of your unit
- Procurement, installation of all necessary additional equipments.
- Rent (followed by a purchasing) of the unit which was configured by yourself.