

# Non-Modular Ultrafiltration: When Larger Means Better

Ultrafiltration has gained more popularity in recent decades. Although ultrafiltration is recognized as one of the best options for low-cost drinking water production, it does have to answer the sceptical economic perspective. In this article, GDP Filter gives an overview on this technology yet challenge the world to move forward. Could ultrafiltration be a sustainable solution for clean water production on larger capacity?

Over years, more appreciations have endorsed ultrafiltration as one of the best options for low-cost drinking water production. Low operating power and relatively chemical-free operating process while able to remove turbidity yet disinfect water, advocates of ultrafiltration claimed it is absolutely superior than conventional filtration and disinfection technology. GDP Filter, an experienced membrane player, especially South East Asia, share lessons from ultrafiltration application and the problems.

## What is ultrafiltration?

Ultrafiltration (UF) is a pressure driven membrane separation process. Thanks to its nano-sized pores, UF membrane is widely known as a powerful system for turbidity removal and disinfection in water treatment. Since it is operated in low pressure, which means low energy consumption, and yet relatively chemical-free, UF seems to be both economically and environmentally feasible.

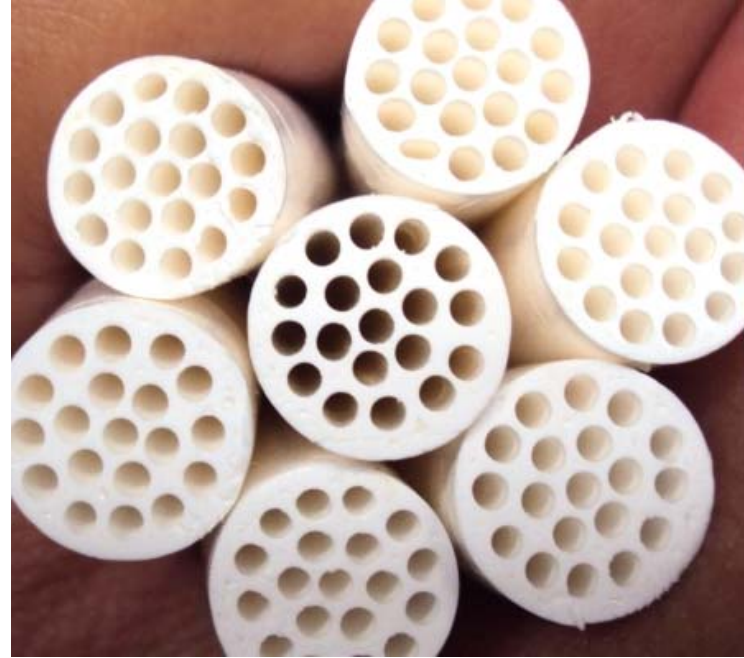
The most essential advantage of ultrafiltration compared with other technologies is the independency of bacteria, virus and pathogenic substances removal from feed water quality. UF delivers high quality output for following treatment steps, e.g. reverse osmosis for industrial water purposes and sea water desalination.



Multi-bore hydrophilic ultrafiltration membrane used on non-modular unit has self-supporting system

### Modularity: Double-Edge Sword

UF membrane are most commonly available in commercial hollow fiber or capillary fiber membrane module. Given the demands of reliable long term application, in addition to chemical and biological resistance, the membrane should also has high mechanical stability. A single fiber breakage, e.g. due to water hammer, will simply cause the whole system lost disinfection and selectivity – contaminates all of the product.



19-bores ultrafiltration membrane provide larger cross section on single polymeric fiber

The first pre-requisite for non-modularity lays on multi-bores capillary membrane. Multi-bores capillary membrane offers greater robustness and better packing density than the conventional single bore capillary membrane.

Second essential thing is the unique-patented potting system which enables any desired amount of multi-bores capillary membrane to be constructed into a single large module. The larger capacity, means the larger and longer module.

Based on those system, GDP Filter has successfully constructed large non-modular module since 2009, i.e. 12-inch diameter with 4-meter length, and 16-inch diameter with 4-meter length. Arguably among the largest modules in the world, GDP Filter firmly believes that this modules will replace modular-concept.

### Non-Modularity Ultrafiltration: Simple and Attractive

Non-modular UF enhance cost-efficiency yet greatly simplify piping and instrumentation system of membrane plant. In addition, space saving become inherent quality of this non-modular UF. The latter quality will be very helpful when conventional water treatment or even modular UF because it often should be integrated in existing building. For new water treatment facilities, it would reduce the building cost.

Due to simple piping system, energy cost for UF operation is also significantly reduced. Further innovation of GDP Filter is a unique backwash-system incorporating only single pump for either filtration and backwash operation. Consequently, plant investment will be much more economically attractive, the effect of cost reduction will be much more pronounced in larger plant.



Modular Ultrafiltration Plant Needs Complex Piping System and Requires More Instruments

Since a single membrane module serves some particular capacity – depends on its type (read: dimension), larger capacity can be achieved by multiply amount of the modules to work in parallel configuration. Into the topic of modularity, perspective about "double-edge sword". Even though it enables easier scale-up and replacement, it's not economically attractive and give high complexity in instrumentation and piping system.

### Robust Multi-Bores Capillary Membrane and Unique Potting System: Aiming Non-Modularity

As stated above, a single UF module usually serve a particular capacity, limited in specific dimension. In order to have larger capacity per module, the directions for research and development are better membrane and larger modules. Given those facts, GDP Filter has developed several unique system since 2009 to start breakthrough in non-modularity.

### Non-Modular Ultrafiltration as Pretreatment for Reverse Osmosis Desalination Plant

Over the last decades, desalination plant with Reverse Osmosis (RO) as the core-process emerged as popular water supply system, where UF enjoys reputation as reliable pretreatment for RO membrane. Given that facts, the RO desalination plant would be much more feasible due to cost reduction by means of Non-Modular UF.

In third world country with enormous amount of water supply with low total dissolved solid content but high in organics, i.e. Indonesia, Non-Modular UF will serve as powerful pre-treatment. Either used as sole treatment for drinking water supply (in case of low organic content and no heavy-metals pollution) or as pre-treatment for RO desalination plant, Non-Modular UF will help third world country to benefit from modern technology of water treatment. ●

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Non-modular Ultrafiltration has been used as pretreatment for LPRO on industrial water treatment unit