

# Arrayforce™ Membrane Contactor

Gas-Liquid Separation for Process Water

**MF**  
Masterfilter

## Masterfilter Arrayforce™ series

Process water in many industries require dissolved gases removal or gases injections. The Arrayforce™ gas-liquid membrane contactor a highly efficient, energy-saving and environmental friendly gas-liquid separation/mix for various industries by utilising hollow fiber membrane with excellent hydrophobic property.

The Arrayforce™ hydrophobic membrane lumen allows only gas molecules to penetrate freely, but not water or other liquids to go through. Special manufacturing technology provides uniform small pore channels that the hollow fiber can effectively increase the contact area and improve the transfer efficiency and maximum utilisation of the membrane area.



## Applications

- Deoxygenation for ultrapure water
- Decarbonation for ultrapure water
- De-ammonia for waste water
- De-bubble for inks and electroplate liquids
- Carbon dioxide injection into pure water
- Oxygen injection into pure water

## Features and Benefits

- Excellent hydrophobic property
- Precise hollow fiber arrangement
- Highly efficient gas-liquid contact

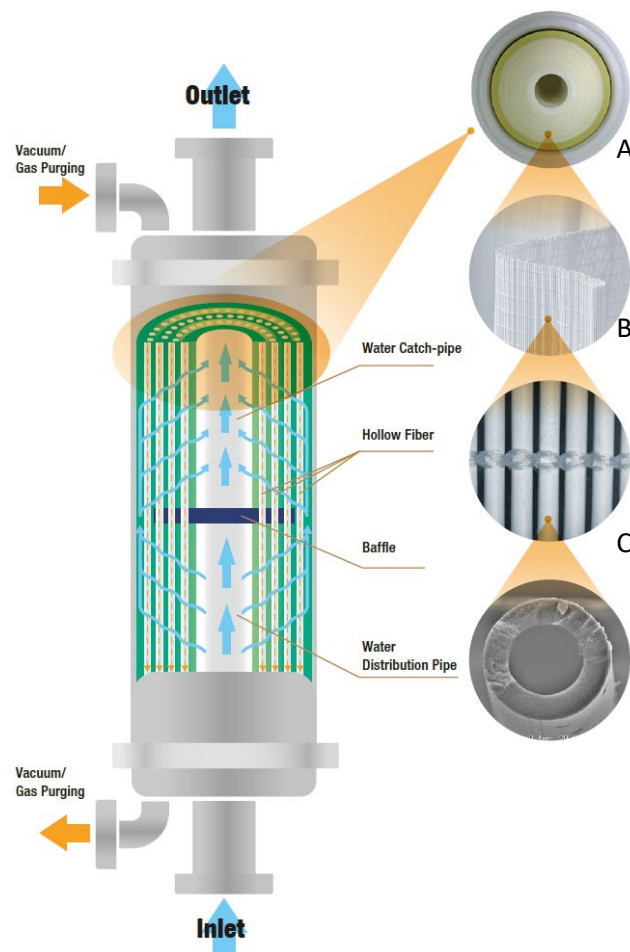
## Materials of Construction

- Lumen material: PP, PP/PMP
- Shell material: Stainless Steel AISI 316L, PSU, PP, ABS, PVC, FRP+PVDF, FRP+PP
- Potting material: Epoxy Resin
- O-ring material: EPDM, FKM, Silicone, FFKM

## Operating Parameters

- Range of Flow Rate: 300 ml/min up to 91 m<sup>3</sup>/h
- Surface Area: 0.18 up to 230 m<sup>2</sup>
- Max. Operating Temperature and Pressure:
  - Shell side: 5 to 50 °C at 7.2 bar, 70 °C at 2.1 bar
  - Lumen side: 25 °C at 4.1 bar

## Characteristics



(A) Unique weaving technology makes hollow fibers into a silk cloth. The cloth is wound into a columnar shape and loaded into the shell, which increase the effective contact area.

(B) Each hollow fiber is fixed, that it will not swing with the flow of water and avoid breakage and ensure stable quality of outflow water.

(C) The technology of weaving membrane precisely and uniformly guarantees the membrane contactor consistency.

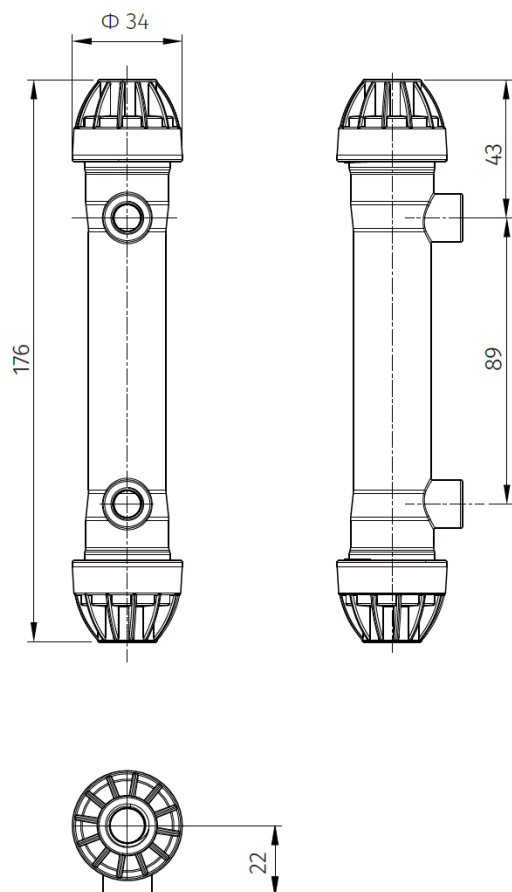
### Arrayforce™ Membrane Contactor Overview

Type	Hollow Fiber Material	Shell Material	Range of Flow Rate	Connections	
				Shell side	Lumen side
1 x 7	PP	AISI 316L, PSU	< 500 ml/min	1/8" FNPT	1/4" FNPT
2 x 7	PP	AISI 316L, PSU	300 to 3000 ml/min	1/4" FNPT	1/4" FNPT
2.5 x 8	PP/PMP	AISI 316L, PP	0.1 to 0.7 m³/h	1/4" FNPT	1/4" FNPT
4 x 13	PP/PMP	AISI 316L, PP	0.5 to 3.4 m³/h	3/4" FNPT 1" GF	3/4" FNPT
6 x 20	PP/PMP	AISI 316L, PP	1 to 7.2 m³/h	2" GF	3/4" FNPT
6 x 28	PP	AISI 316L, ABS	1 to 11 m³/h	2" Flange	1" Flange
8 x 20	PP	AISI 316L, PVC	1 to 11 m³/h	2" Flange	1" Flange
10 x 28	PP	AISI 316L, FRP+PVDF / FRP+PP	10 to 57 m³/h	3" Flange	1" Flange
14 x 28	PP	AISI 316L, PCV	16 to 91 m³/h	4" Flange	2" Flange

### Arrayforce™ 1 x 7 Membrane Contactor

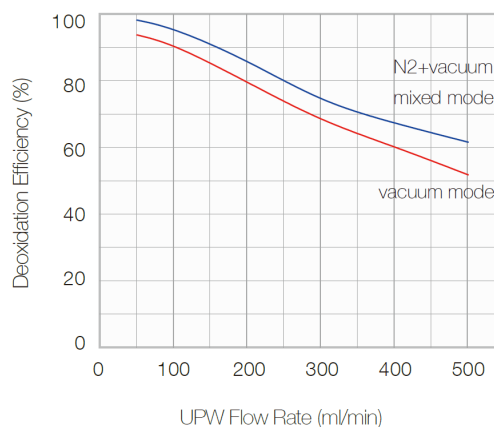
<b>Type</b>	1 x 7
<b>Product Structure Feature</b>	Internal pressure type, lumen side liquid, shell side vacuum
<b>Range of Flow Rate</b>	< 500 ml/min
<b>Lumen Material</b>	PP
<b>Shell Material</b>	AISI 316L, PSU
<b>Potting Material</b>	Epoxy Resin
<b>Max. Operating Temperature and Pressure</b>	5 to 20 °C at 4 bar, 40 °C at 2 bar
<b>Surface Area</b>	0.18 m <sup>2</sup>
<b>O-ring Material</b>	EPDM, FKM, Silicone
<b>Connections</b>	Liquid Inlet / Outlet: 1/4" FNPT Vacuum Port: 1/8" FNPT
<b>Storage Suggestion</b>	If it won't be used for a long time, recommended to store it in dry vacuum environment.
<b>Characteristics</b>	The PP material lumen has similar surface energy to water. It is suggested to be used in water-based liquid. The product has relatively good strength and can provide good flux.

### Dimensions [mm]

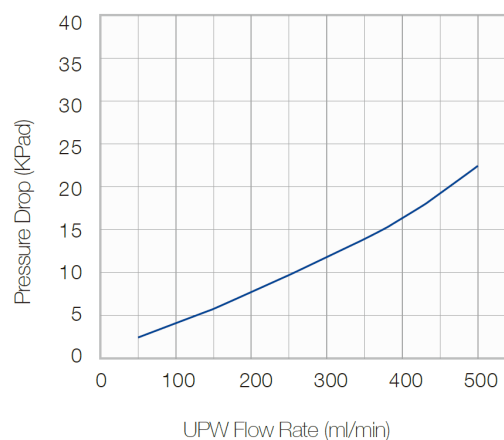


Dimensions apply to PSU Shell material.

### Deoxidation Efficiency Curve



### Flow Rate Curve



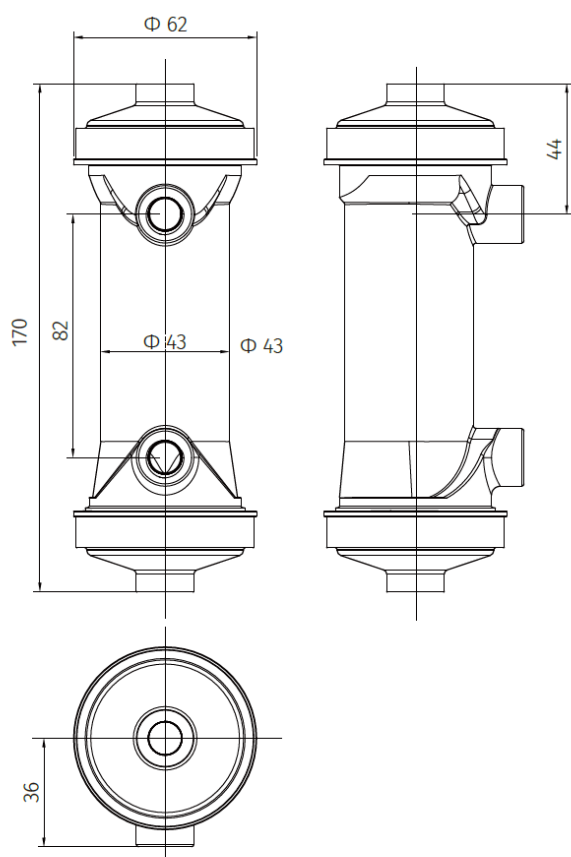
### Test Conditions:

Temperature: 25 °C, Vacuum: 66 mbar, Liquid: Ultrapure water, Pipe size:  $\varnothing 8$  mm soft pipe  
The deoxidation efficiency curve data and flow rate curve are average values for this membrane contactor. The membrane contactor data deviation is controlled within  $\pm 3$  %.

### Arrayforce™ 2 x 7 Membrane Contactor

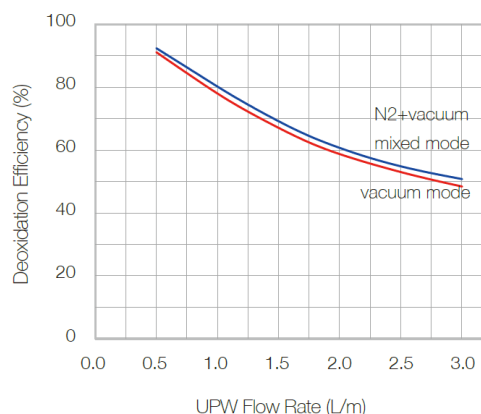
<b>Type</b>	2 x 7
<b>Product Structure Feature</b>	Internal pressure type, lumen side liquid, shell side vacuum
<b>Range of Flow Rate</b>	300 to 3000 ml/min
<b>Lumen Material</b>	PP
<b>Shell Material</b>	AISI 316L, PSU
<b>Potting Material</b>	Epoxy Resin
<b>Max. Operating Temperature and Pressure</b>	5 to 20 °C at 4 bar, 40 °C at 2 bar
<b>Surface Area</b>	0.75 m <sup>2</sup>
<b>O-ring Material</b>	EPDM, FKM, Silicone
<b>Connections</b>	Liquid Inlet / Outlet: 1/4" FNPT Vacuum Port: 1/4" FNPT
<b>Storage Suggestion</b>	If it won't be used for a long time, recommended to store it in dry vacuum environment.
<b>Characteristics</b>	The PP material lumen has similar surface energy to water. It is suggested to be used in water-based liquid. The product has relatively good strength and can provide good flux.

### Dimensions [mm]

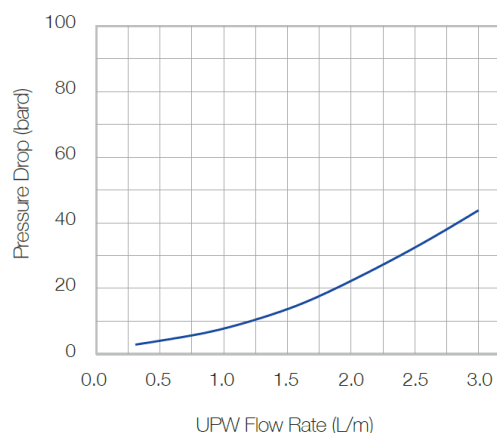


Dimensions apply to PSU Shell material.

### Deoxidation Efficiency Curve



### Flow Rate Curve



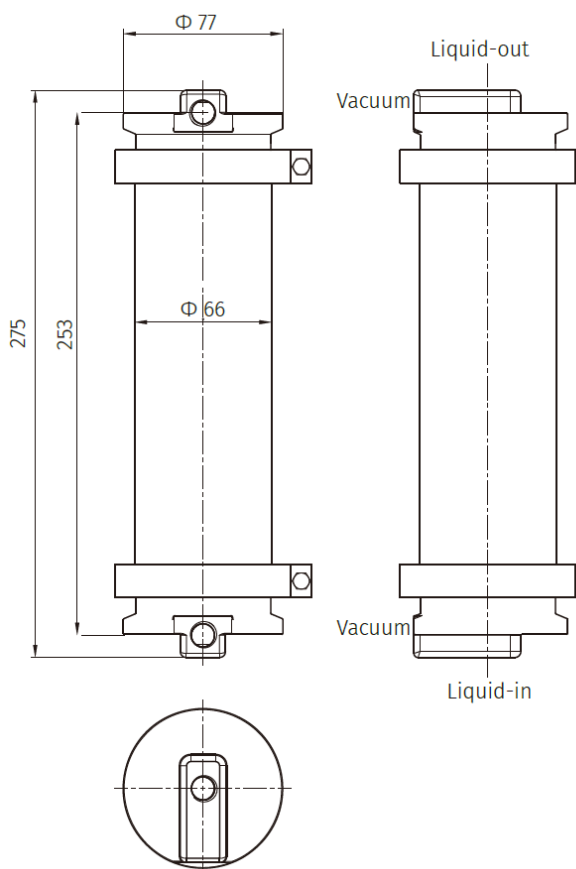
### Test Conditions:

Temperature: 25 °C, Vacuum: 66 mbar, Liquid: Ultrapure water, Pipe size:  $\varnothing 8$  mm soft pipe  
The deoxidation efficiency curve data and flow rate curve are average values for this membrane contactor. The membrane contactor data deviation is controlled within  $\pm 3$  %.

### Arrayforce™ 2.5 x 8 Membrane Contactor

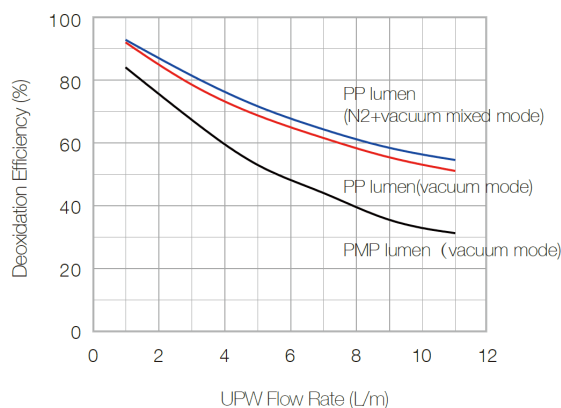
<b>Type</b>	2.5 x 8
<b>Product Structure Feature</b>	External pressure type, lumen side liquid, shell side vacuum
<b>Range of Flow Rate</b>	0.1 to 0.7 m³/h
<b>Lumen Material</b>	PP/PMP
<b>Shell Material</b>	AISI 316L, PP
<b>Potting Material</b>	Epoxy Resin
<b>Max. Operating Temperature and Pressure</b>	Shell side: 5 to 35 °C at 6 bar, 50 °C at 2 bar Lumen side: 25 °C at 4 bar
<b>Surface Area</b>	1.55 m²
<b>O-ring Material</b>	EPDM, FKM
<b>Connections</b>	Liquid Inlet / Outlet: 1/4" FNPT Vacuum Port: 1/4" FNPT
<b>Storage Suggestion</b>	If it won't be used for a long time, recommended to store it in dry vacuum environment.
<b>Characteristics</b>	The PP material lumen has similar surface energy to water. It is suggested to be used in water-based liquid. The PMP material lumen is suggested to be used in water-based liquid with a surface energy over 30 mN/m. The product has relatively good strength and can provide good flux.

### Dimensions [mm]

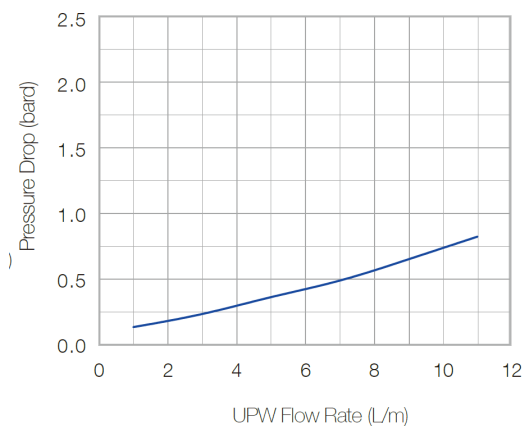


Dimensions apply to PP Shell material.

### Deoxidation Efficiency Curve



### Flow Rate Curve



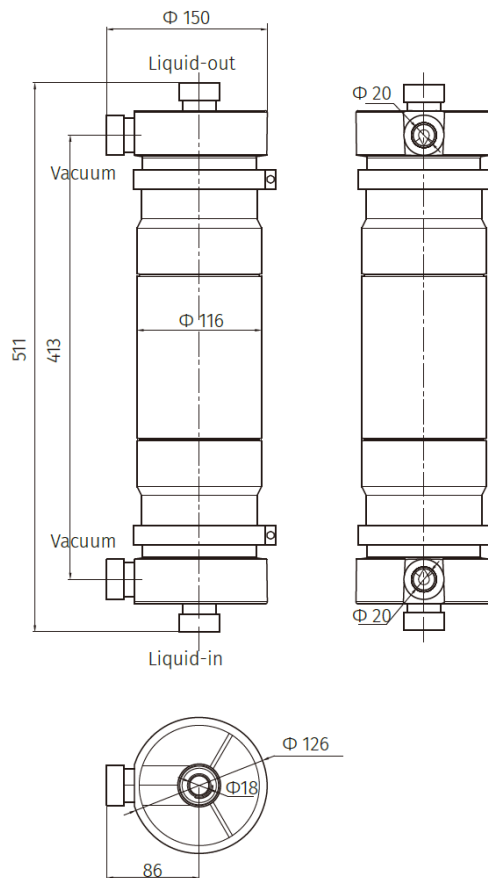
### Test Conditions:

Temperature: 25 °C, Vacuum: 66 mbar, Liquid: Ultrapure water, Pipe size:  $\varnothing 8$  mm soft pipe  
The deoxidation efficiency curve data and flow rate curve are average values for this membrane contactor. The membrane contactor data deviation is controlled within  $\pm 3$  %.

### Arrayforce™ 4 x 13 Membrane Contactor

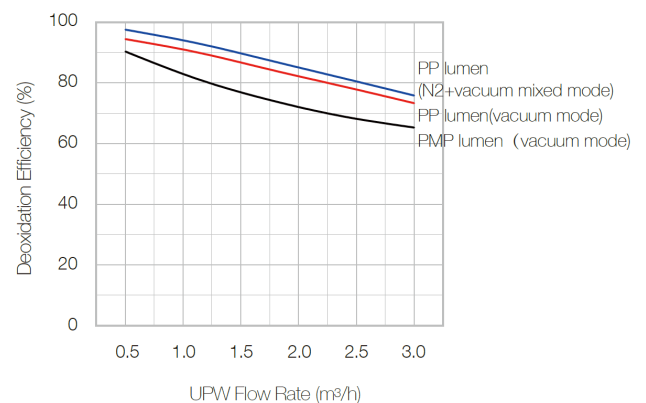
<b>Type</b>	4 x 13
<b>Product Structure Feature</b>	External pressure type, lumen side liquid, shell side vacuum
<b>Range of Flow Rate</b>	0.5 to 3.4 m <sup>3</sup> /h
<b>Lumen Material</b>	PP/PMP
<b>Shell Material</b>	AISI 316L, PP
<b>Potting Material</b>	Epoxy Resin
<b>Max. Operating Temperature and Pressure</b>	Shell side: 5 to 35 °C at 6 bar, 50 °C at 2 bar Lumen side: 25 °C at 4 bar
<b>Surface Area</b>	9.0 m <sup>2</sup>
<b>O-ring Material</b>	EPDM, FKM
<b>Connections</b>	Liquid Inlet / Outlet: 3/4" FNPT, 1" GF Vacuum Port: 3/4" FNPT
<b>Storage Suggestion</b>	If it won't be used for a long time, recommended to store it in dry vacuum environment.
<b>Characteristics</b>	The PP material lumen has similar surface energy to water. It is suggested to be used in water-based liquid. The PMP material lumen is suggested to be used in water-based liquid with a surface energy over 30 mN/m. The product has relatively good strength and can provide good flux.

### Dimensions [mm]

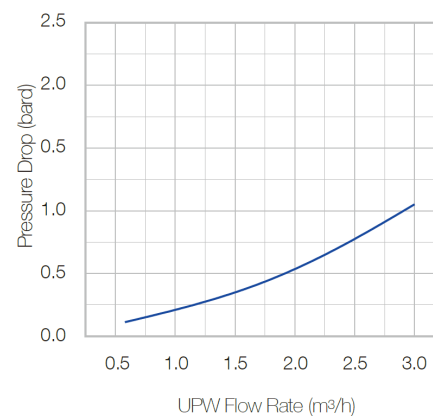


Dimensions apply to PP Shell material.

### Deoxidation Efficiency Curve



### Flow Rate Curve



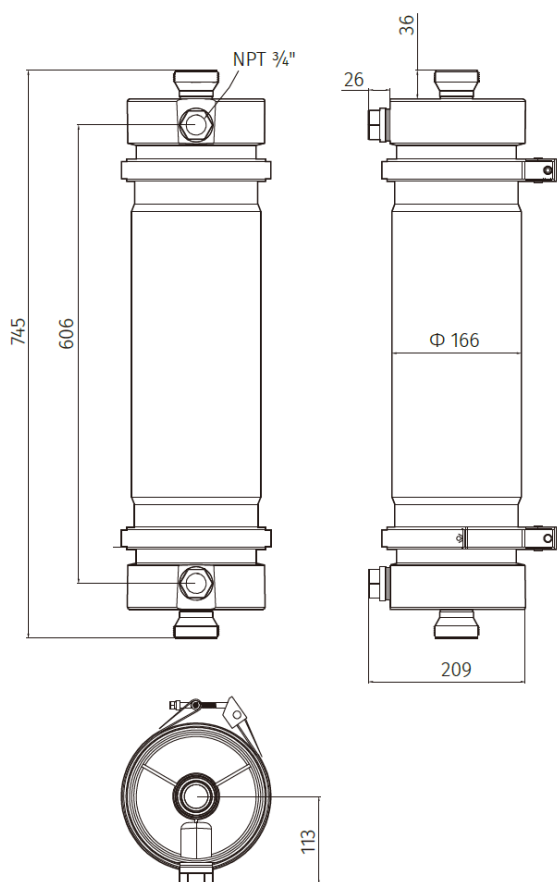
### Test Conditions:

Temperature: 25 °C, Vacuum: 66 mbar, Liquid: Ultrapure water, Pipe size: Ø8 mm soft pipe  
The deoxidation efficiency curve data and flow rate curve are average values for this membrane contactor. The membrane contactor data deviation is controlled within ±3 %.

### Arrayforce™ 6 x 20 Membrane Contactor

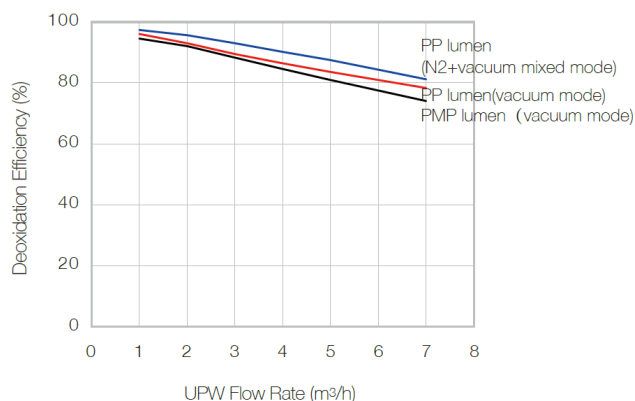
<b>Type</b>	6 x 20
<b>Product Structure Feature</b>	External pressure type, lumen side liquid, shell side vacuum
<b>Range of Flow Rate</b>	1 to 7.2 m <sup>3</sup> /h
<b>Lumen Material</b>	PP/PMP
<b>Shell Material</b>	AISI 316L, PP
<b>Potting Material</b>	Epoxy Resin
<b>Max. Operating Temperature and Pressure</b>	Shell side: 5 to 35 °C at 6 bar, 50 °C at 2 bar Lumen side: 25 °C at 4 bar
<b>Surface Area</b>	27.3 m <sup>2</sup>
<b>O-ring Material</b>	EPDM, FKM
<b>Connections</b>	Liquid Inlet / Outlet: 2" GF Vacuum Port: 3/4" FNPT
<b>Storage Suggestion</b>	If it won't be used for a long time, recommended to store it in dry vacuum environment.
<b>Characteristics</b>	The PP material lumen has similar surface energy to water. It is suggested to be used in water-based liquid. The PMP material lumen is suggested to be used in water-based liquid with a surface energy over 30 mN/m. The product has relatively good strength and can provide good flux.

### Dimensions [mm]

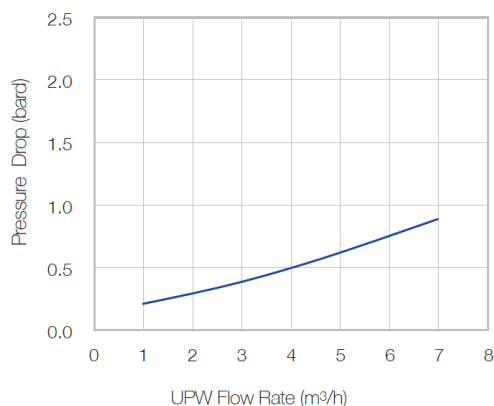


Dimensions apply to PP Shell material.

### Deoxidation Efficiency Curve



### Flow Rate Curve



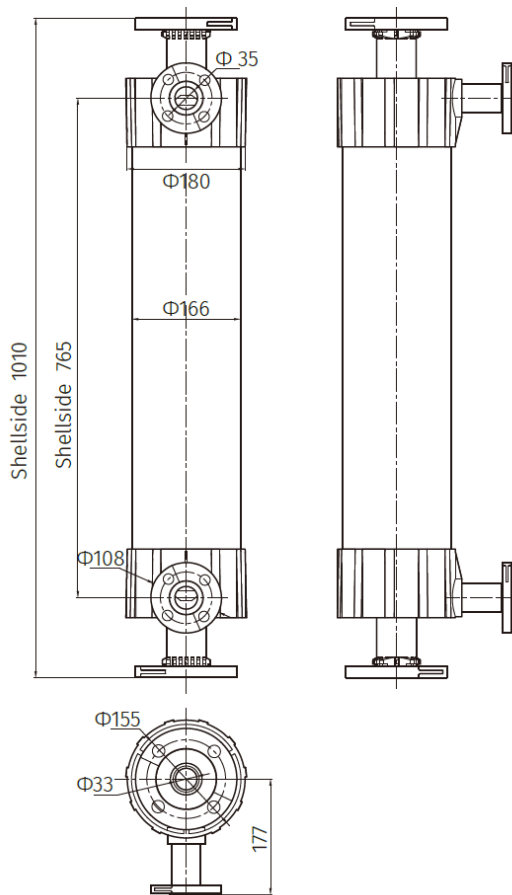
### Test Conditions:

Temperature: 25 °C, Vacuum: 66 mbar, Liquid: Ultrapure water, Pipe size: Ø8 mm soft pipe  
The deoxidation efficiency curve data and flow rate curve are average values for this membrane contactor. The membrane contactor data deviation is controlled within ±3 %.

### Arrayforce™ 6 x 28 Membrane Contactor

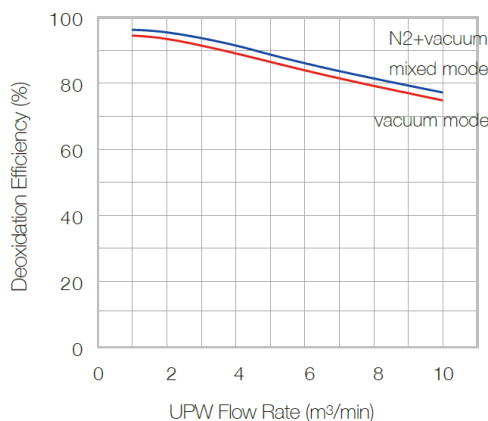
<b>Type</b>	6 x 28
<b>Product Structure Feature</b>	External pressure type, lumen side liquid, shell side vacuum
<b>Range of Flow Rate</b>	1 to 11 m <sup>3</sup> /h
<b>Lumen Material</b>	PP
<b>Shell Material</b>	AISI 316L, ABS
<b>Potting Material</b>	Epoxy Resin
<b>Max. Operating Temperature and Pressure</b>	Shell side: 5 to 35 °C at 6 bar, 50 °C at 2 bar Lumen side: 25 °C at 4 bar
<b>Surface Area</b>	50 m <sup>2</sup>
<b>O-ring Material</b>	EPDM, FKM
<b>Connections</b>	Liquid Inlet / Outlet: 2" Flange (GB, ANSI, JIS) Vacuum Port: 1" Flange (GB, ANSI, JIS)
<b>Storage Suggestion</b>	If it won't be used for a long time, recommended to store it in dry vacuum environment.
<b>Characteristics</b>	The PP material lumen has similar surface energy to water. It is suggested to be used in water-based liquid. The product has relatively good strength and can provide good flux.

### Dimensions [mm]

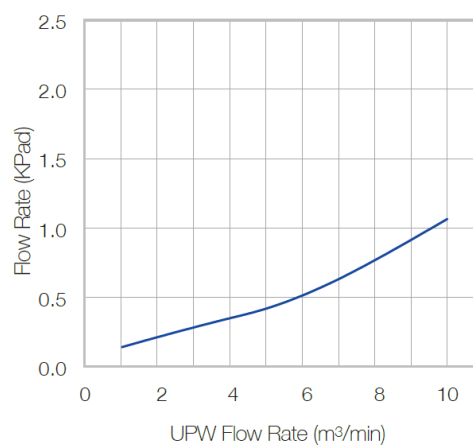


Dimensions apply to ABS Shell material.

### Deoxidation Efficiency Curve



### Flow Rate Curve



### Test Conditions:

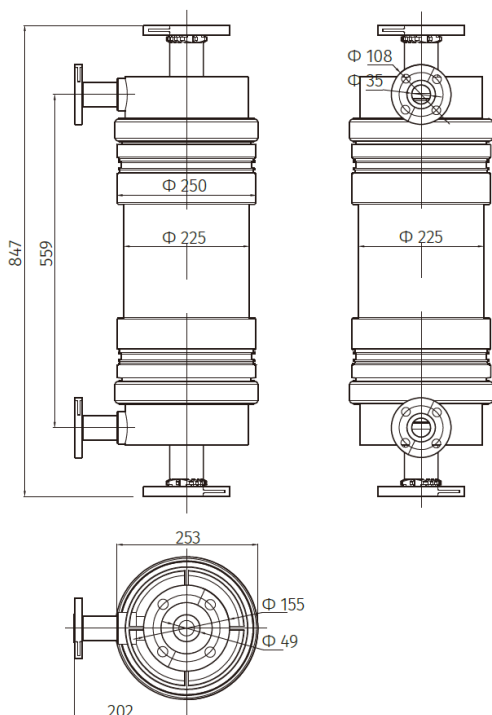
Temperature: 25 °C, Vacuum: 66 mbar, Liquid: Ultrapure water, Pipe size: Ø8 mm soft pipe  
The deoxidation efficiency curve data and flow rate curve are average values for this membrane contactor. The membrane contactor data deviation is controlled within ±3 %.



### Arrayforce™ 8 x 20 Membrane Contactor

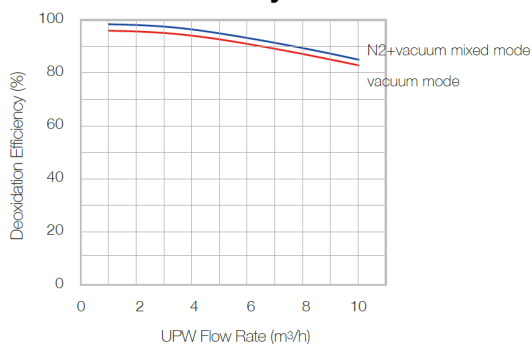
<b>Type</b>	8 x 20
<b>Product Structure Feature</b>	External pressure type, lumen side liquid, shell side vacuum
<b>Range of Flow Rate</b>	1 to 11 m <sup>3</sup> /h
<b>Lumen Material</b>	PP
<b>Shell Material</b>	AISI 316L, PVC
<b>Potting Material</b>	Epoxy Resin
<b>Max. Operating Temperature and Pressure</b>	Shell side: 5 to 35 °C at 6 bar, 50 °C at 2 bar Lumen side: 25 °C at 4 bar
<b>Surface Area</b>	52 m <sup>2</sup>
<b>O-ring Material</b>	EPDM, FKM
<b>Connections</b>	Liquid Inlet / Outlet: 2" Flange (GB, ANSI, JIS) Vacuum Port: 1" Flange (GB, ANSI, JIS)
<b>Storage Suggestion</b>	If it won't be used for a long time, recommended to store it in dry vacuum environment.
<b>Characteristics</b>	The PP material lumen has similar surface energy to water. It is suggested to be used in water-based liquid. The product has relatively good strength and can provide good flux.

### Dimensions [mm]

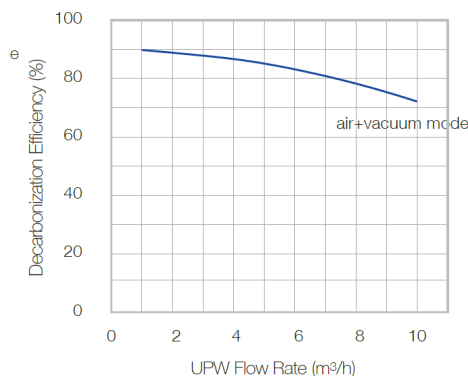


Dimensions apply to PVC Shell material.

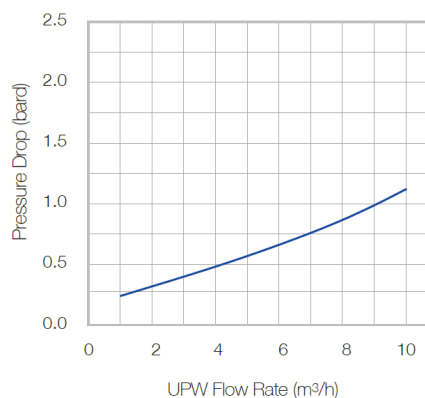
### Deoxidation Efficiency Curve



### Decarbonisation Efficiency Curve



### Flow Rate Curve



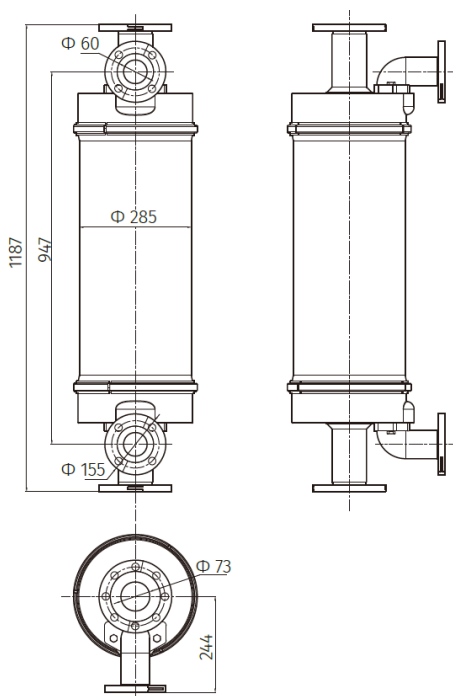
### Test Conditions:

Temperature: 25 °C, Vacuum: 66 mbar, Liquid: Ultrapure water, Pipe size:  $\varnothing 8$  mm soft pipe  
The deoxidation efficiency curve data and flow rate curve are average values for this membrane contactor. The membrane contactor data deviation is controlled within  $\pm 3$  %.

### Arrayforce™ 10 x 28 Membrane Contactor

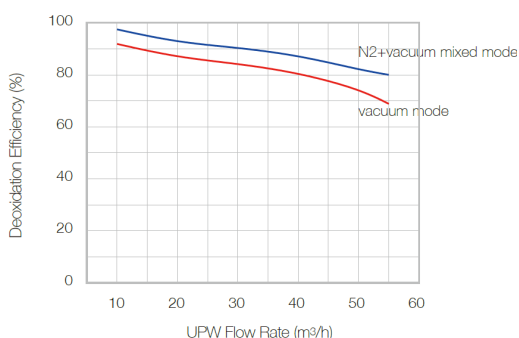
<b>Type</b>	10 x 28
<b>Product Structure Feature</b>	External pressure type, lumen side liquid, shell side vacuum
<b>Range of Flow Rate</b>	10 to 57 m <sup>3</sup> /h
<b>Lumen Material</b>	PP
<b>Shell Material</b>	AISI 316L, FRP+PVDF, FRP+PP
<b>Potting Material</b>	Epoxy Resin
<b>Max. Operating Temperature and Pressure</b>	Shell side: 5 to 50 °C at 7.2 bar, 70 °C at 2.1 bar Lumen side: 25 °C at 6.2 bar
<b>Surface Area</b>	128 m <sup>2</sup>
<b>O-ring Material</b>	FFKM, EPDM, FKM
<b>Connections</b>	Liquid Inlet / Outlet: 3" Flange (GB, ANSI, JIS) Vacuum Port: 1" Flange (GB, ANSI, JIS), 2" Flange (GB, ANSI, JIS)
<b>Storage Suggestion</b>	If it won't be used for a long time, recommended to store it in dry vacuum environment.
<b>Characteristics</b>	The PP material lumen has similar surface energy to water. It is suggested to be used in water-based liquid. The product has relatively good strength and can provide good flux.

### Dimensions [mm]

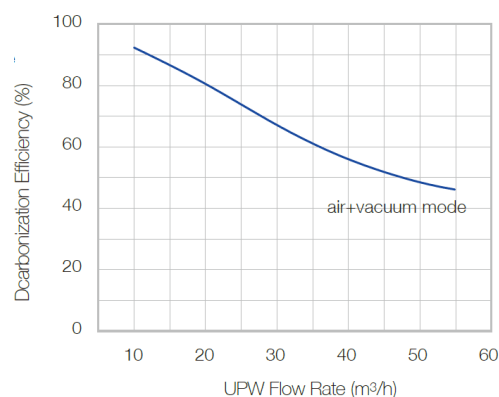


Dimensions apply to FRP+PVDF and FRP+PP Shell material.

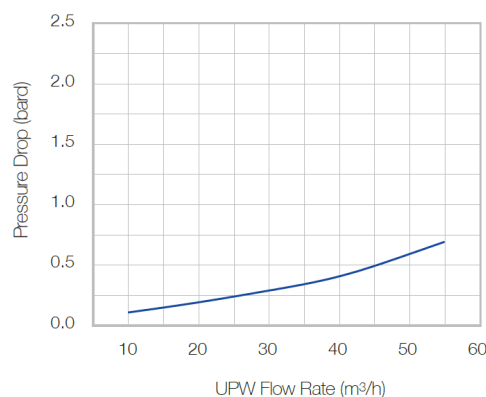
### Deoxidation Efficiency Curve



### Decarbonisation Efficiency Curve



### Flow Rate Curve



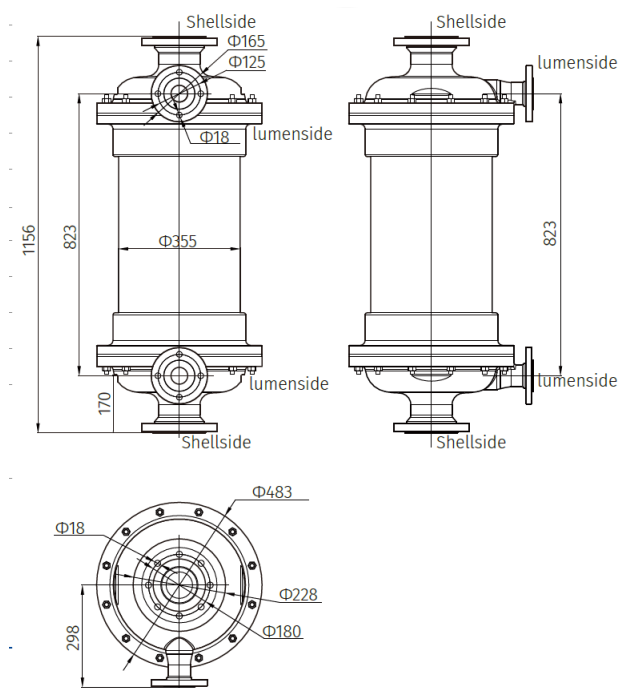
### Test Conditions:

Temperature: 25 °C, Vacuum: 66 mbar, Liquid: Ultrapure water, Pipe size: Ø8 mm soft pipe  
The deoxidation efficiency curve data and flow rate curve are average values for this membrane contactor. The membrane contactor data deviation is controlled within ±3 %.

### Arrayforce™ 14 x 28 Membrane Contactor

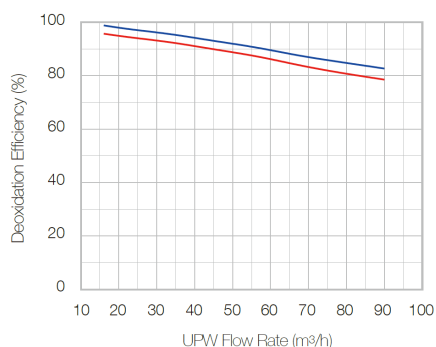
<b>Type</b>	14 x 28
<b>Product Structure Feature</b>	External pressure type, lumen side liquid, shell side vacuum
<b>Range of Flow Rate</b>	16 to 91 m <sup>3</sup> /h
<b>Lumen Material</b>	PP
<b>Shell Material</b>	AISI 316L, PVC
<b>Potting Material</b>	Epoxy Resin
<b>Max. Operating Temperature and Pressure</b>	Shell side: 5 to 25 °C at 7.2 bar, 50 °C at 2.1 bar Lumen side: 25 °C at 4.1 bar
<b>Surface Area</b>	230 m <sup>2</sup>
<b>O-ring Material</b>	EPDM, FKM
<b>Connections</b>	Liquid Inlet / Outlet: 4" Flange (GB, ANSI, JIS) Vacuum Port: 2" Flange (GB, ANSI, JIS)
<b>Storage Suggestion</b>	If it won't be used for a long time, recommended to store it in dry vacuum environment.
<b>Characteristics</b>	The PP material lumen has similar surface energy to water. It is suggested to be used in water-based liquid. The product has relatively good strength and can provide good flux.

### Dimensions [mm]

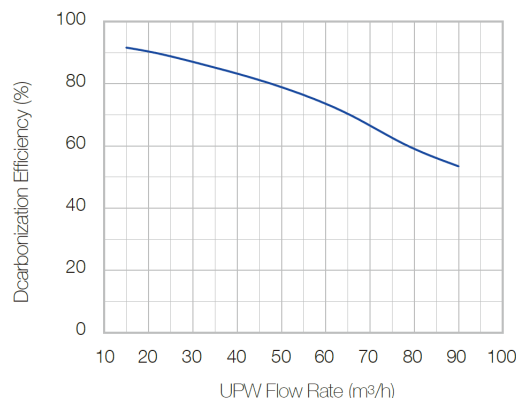


Dimensions apply to PVC Shell material.

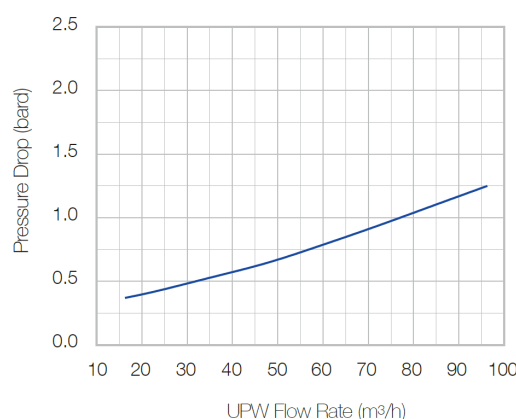
### Deoxidation Efficiency Curve



### Decarbonisation Efficiency Curve



### Flow Rate Curve



### Test Conditions:

Temperature: 25 °C, Vacuum: 66 mbar, Liquid: Ultrapure water,  
Pipe size: Ø8 mm soft pipe  
The deoxidation efficiency curve data and flow rate curve are average values for this membrane contactor. The membrane contactor data deviation is controlled within ±3 %.

**Arrayforce™ Membrane Contactor**

Gas-Liquid Separation for Process Water

