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# МЕМБРАННЫЕ ФИЛЬТРЫ

## Alfa Laval LabStak™ M10 module and LabUnit M10

### LabStak™ modules and LabUnits for membrane filtration

#### Introduction

Alfa Laval offers a range of self-contained small-scale LabUnits based on the unique LabStak™ (plate-and-frame) modules.

The Alfa Laval LabStak™ M10 is the smallest and most compact cross-flow membrane filtration module available from Alfa Laval. It is available as a separate LabStak™ M10 module or as an integrated part of the complete Alfa Laval LabUnit M10 system.

Both models are simple to operate and provide reliable results. They can be equipped with the entire range of flat sheet membranes from Alfa Laval for ultrafiltration and microfiltration.

#### Applications

The Alfa Laval LabStak™ M10 module and the Alfa Laval LabUnit M10 system are ideal tools for quick and reliable research and development work, membrane testing, process optimization and up-scaling. They are also popular choices for quality assurance and educational work etc. while keeping equipment and set-up costs to a minimum.

#### Scope of supply

The Alfa Laval LabStak™ M10 module comprises spacer plates and support plates for a total of four flat sheet membranes.



The Alfa Laval LabUnit M10 comprises one Alfa Laval LabStak™ module as well as cross-flow pump, heat exchanger, valve and pressure gauges.

Detailed information is available under Components.

#### Benefits

- membrane area of only 336 cm<sup>2</sup>
- easy exchange of flat sheet membranes
- transparent plate for observation of cross-flow
- simultaneous test of two different membrane types
- high operating temperature (up to 80°C)
- low internal volume in the LabStak™ module (57 ml)
- testing volume of 1 – 3 litres
- flow pattern similar to that of large modules
- all components manufactured in compliance with FDA and EEC regulations

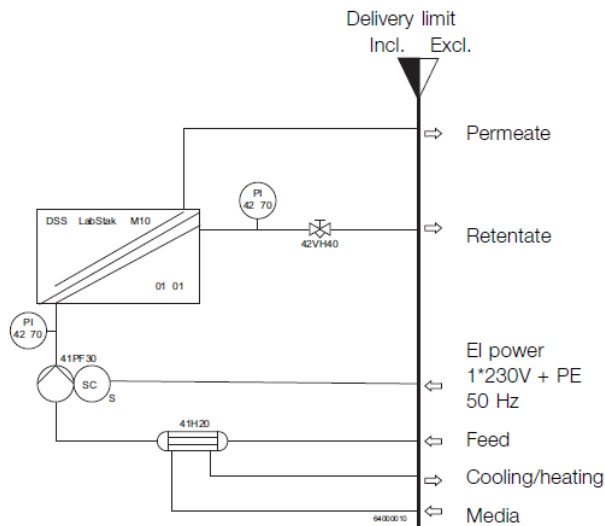
## Technical data

Model	Alfa Laval LabStak™ M10 module	Alfa Laval LabUnit M10
Code number <sup>1</sup>	516652	517551
Membrane area, m <sup>2</sup>	0.036	0.036
Max. inlet pressure, bar <sup>2</sup>	7	7
Operating pH range <sup>2</sup>	1 – 14	1 – 14
Max. operating temperature, °C <sup>2</sup>	80	80
Cross-flow range, l/min.	3 – 10	3 – 10
Liquid capacity, ml	57	500
Number of support plates	4	4
Number of spacer plates	2 / 2	2 / 2
Number of flat sheet membranes	4	4
Number of permeate outlets	2	2
Length x width x height, mm	200 x 190 x 130	500 x 380 x 435
Weight, kg	3	30

<sup>1</sup> Please specify code number when ordering

<sup>2</sup> For detailed information about operating conditions, please see the specifications for the membrane type applied

## Flow diagram



## Components

Module	Alfa Laval LabStak™ M10
Support and spacer plates	Polysulphone (PSO)
Cross-flow pump	Eco 0.37 kW with rpm control
Heat exchanger	Alfa Laval, 0.079 m <sup>2</sup>
Valve	Gemü
Pressure gauges	Tempress
Permeate outlet, hose	Silicone rubber
O-ring set	Viton
Internal, product wetted steel parts	AISI 316L
External steel parts	AISI 304

## Connections

Feed inlet	1/4" / 1/2" hose connection
Retentate outlet	1/4" / 1/2" hose connection
Permeate outlet, hose	ID 4.0, OD 7.4 mm
Cooling/heating water in/out	ID 6 mm hose / 1/4" BSP female
Electrical power	1 x 230 V + PE, 50 Hz



## Alfa Laval LabStak™ M20 module and TestUnit M20

### LabStak™ modules and LabUnits for membrane filtration

#### Introduction

To select the optimum process solution it is often advisable to conduct trials on a small scale.

The range of small-scale units offered by Alfa Laval is based on the unique plate-and-frame modules or the full-fit sanitary spiral membranes — or even a combination of both.

The unit sizes vary from only a few litres of test media volume in the Alfa Laval LabUnits to more than 1,000 litres in the Alfa Laval PilotUnits.

#### Applications

The Alfa Laval TestUnit M20 is the ideal tool for quick and reliable research and development work, membrane testing, process optimization and up-scaling. It is also a popular choice for quality assurance, educational work, small-scale production etc. while keeping equipment and set-up costs to a minimum.

It is possible to test all filtration processes: Reverse osmosis, nanofiltration, ultrafiltration and microfiltration.

#### Benefits

- fully integrated system on a wheeled stainless steel table
- compact and space-saving design
- unique combination of plate-and-frame and spiral wound technologies in one unit
- easy exchange of spiral and flat sheet membranes
- simultaneous test of different membrane types
- separate permeate outlet from each individual membrane pair
- flexible membrane areas from 0.036 m<sup>2</sup> to 0.72 m<sup>2</sup>
- high operating temperature and pressure
- testing volume of 5–50 litres
- all components manufactured in compliance with FDA and EEC regulations

#### Scope of supply

The Alfa Laval TestUnit M20 is a fully integrated and wheeled plate-and-frame system for operation with the entire range of Alfa Laval flat sheet membranes.

The unit comprises an Alfa Laval LabStak™ M20 module, high-pressure pump, tank, heat exchanger, valve, pressure gauges and hydraulic hand pump for module compression.



#### Option

As an option a special design **Alfa Laval M20–2517 housing** can be inserted between the flanges of the Alfa Laval LabStak™ M20 module for spiral membrane screening in continuation of preceding flat sheet membrane screening.



## Technical Data

Model	Alfa Laval LabStak™ M20 module	Alfa Laval TestUnit M20	Alfa Laval M20–2.5 housing
Code number <sup>1</sup>	517100	531010	531601
Membrane area, m <sup>2</sup>	0.036 – 0.72	0.036 – 0.72	0.5 – 1
Max. inlet pressure, bar <sup>2</sup>	60	60	60
Operating pH range <sup>2</sup>	1 – 13	1 – 13	1 – 13
Max. operating temperature, °C <sup>2</sup>	80	80	80
Cross-flow range, l/min.	5 – 10	5 – 24	15 – 24
Hold-up volume, l	0.27 + 2.14 l/m <sup>2</sup> membrane area	3 + 2.14 l/m <sup>2</sup> membrane area	2
Number of support plates	1 – 20	1 – 20	—
Number of spacer plates	2 – 21	2 – 21	—
Number of flat sheet membranes	2 – 40	2 – 40	—
Number of permeate outlets	1 – 20	1 – 20	—
Tank size, l	—	7.5	—

<sup>1</sup> Please specify code number when ordering

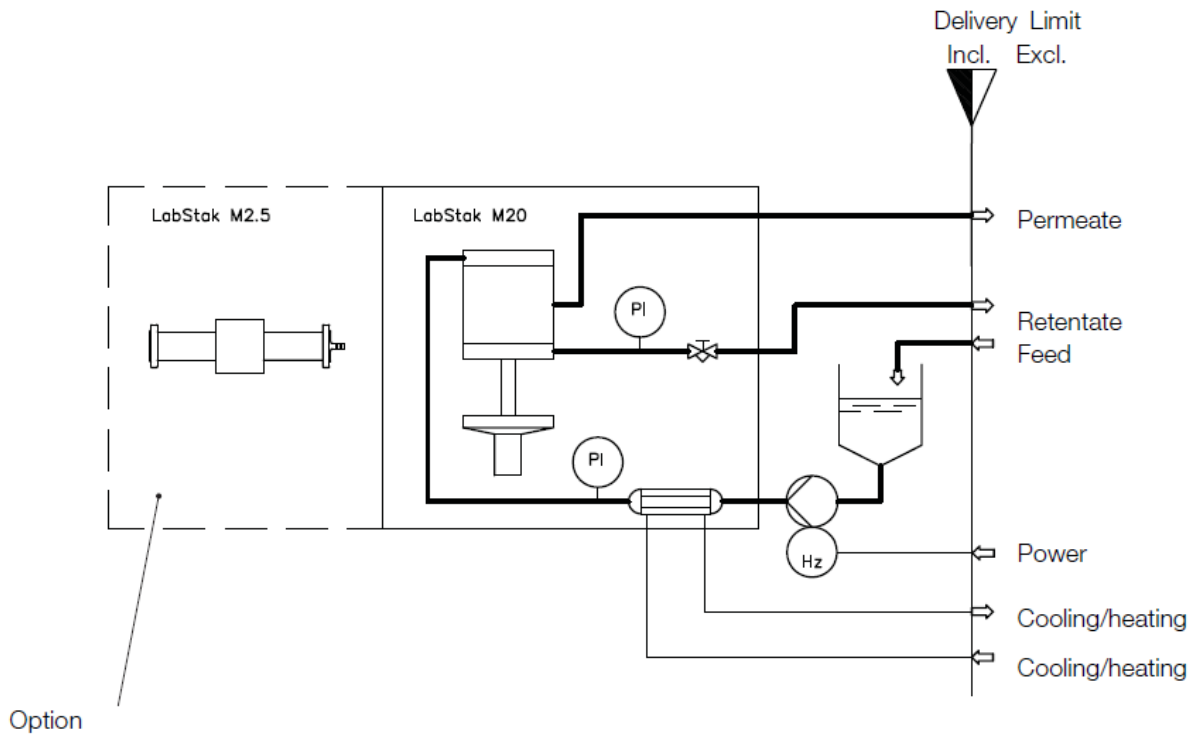
<sup>2</sup> For detailed information about operating conditions, please see the specifications for the membrane type applied

Dimensions	Alfa Laval LabStak™ M20 module	Alfa Laval TestUnit M20	Alfa Laval M20–2.5 housing
Length x width x height, mm	200 x 190 x 130	1090 x 590 x 1480	500 x 380 x 435
Weight, kg	90	205	12

## Components

Item	Alfa Laval LabStak™ M20 module	Alfa Laval TestUnit M20	Alfa Laval M20–2.5 housing
Module	—	Alfa Laval LabStak™ M20 module	Optional for spiral membranes size 2517
Support and spacer plates	Polysulphone (PSO)	Polysulphone (PSO)	—
Cross-flow pump	—	Wanner	—
Heat exchanger	Alfa Laval	Alfa Laval	—
Valve	Alfa Laval	Alfa Laval	—
Pressure gauges	Baumer	Baumer	—
Permeate outlet hose	Silicone rubber	Silicone rubber	—
O-ring set	EPDM	EPDM	EPDM
Internal, product wetted steel parts	AISI 316L	AISI 316L	AISI 316L
External steel parts	AISI 304	AISI 304	AISI 304
Wheels	—	Plastic/chromium-plated steel	—

## Connections



Connections	Alfa Laval TestUnit M20	Alfa Laval LabStak™ M20 module	M20-2.5 housing
Feed inlet	Tank	3/8" female	Tank
Retentate outlet	1/2" hose connection	1/2" hose connection	1/2" hose connection
Permeate outlet, hose	ID 1.3, OD 3.5 mm	ID 1.3, OD 3.5 mm	1/2" hose connection
Cooling/heating water in/out	1/4" female	1/4" female	—
Electrical power	320-550 V + PE, 45-65 Hz	—	—



# Alfa Laval LabStak™ M37/38 module

## LabStak™ modules for membrane filtration

### Introduction

The Alfa Laval LabStak™ M37/38 module is designed to provide quick and precise evaluations in laboratories or other test facilities, while keeping equipment and set-up costs to a minimum.

It utilizes the same size support plates and membranes as those found in the full-scale plate-and-frame systems.

The Alfa Laval LabStak™ M37/38 module can be equipped with the whole range of flat sheet membranes from Alfa Laval for ultrafiltration and microfiltration.

### Applications

The Alfa Laval LabStak™ M37/38 module is an ideal tool for process development, scale-up and membrane testing. It is also a popular choice for quality assurance and small-scale production.

### Benefits

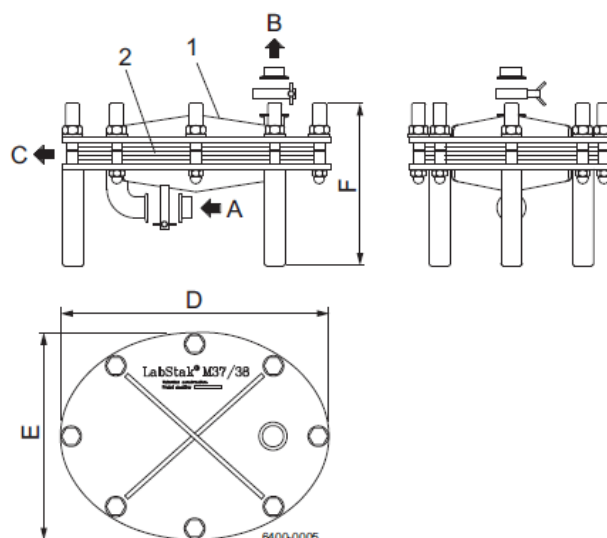
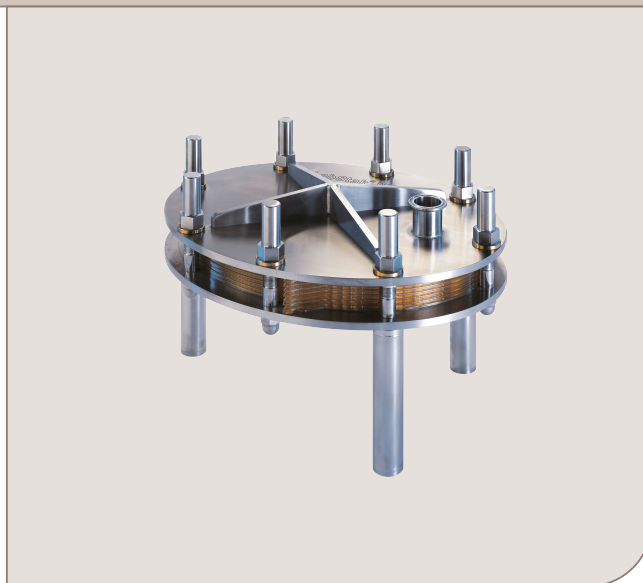
- easy exchange of flat sheet membranes
- can be coupled to the by-pass stream of an industrial plant
- different channel height options to optimize flow and pressure
- simultaneous test of up to seven different membrane types
- high operating temperature (up to 80°C)
- low internal volume
- flexible system design
- flexible membrane area between 0.11 and 1.05 m<sup>2</sup>
- all components manufactured in compliance with FDA and EEC regulations

### Scope of supply

The Alfa Laval LabStak™ M37/38 module consists of a full-size plate-and-frame module for cross-flow membrane filtration.

The LabStak™ M37/38 module can be equipped with alternative plate set configurations, according to use.

Plate set options	Applications	Code No.
M37	Ideal for highly viscous liquids	PL745
M38L (Low channel)	Ideal for low viscous liquids	PL741
M38H (High channel)	Ideal for medium viscous liquids	PL777



- 1: Steel frame
- 2: Support plates and membranes
- A: Feed inlet
- B: Retentate outlet
- C: Permeate outlet
- D: 483 mm
- E: 373 mm
- F: 350 mm

## Technical Data

Model	Alfa Laval LabStak™M37 module	Alfa Laval LabStak™M38L module	Alfa Laval LabStak™M38H module
Code number <sup>1</sup> ,	108664	108664	108664
Code number <sup>1</sup> , plate set	PL745	PL741	PL777
Membrane area, m <sup>2</sup>	0.11 — 0.77	0.15 — 1.05	0.15 — 1.05
Max. inlet pressure <sup>2</sup> , bar	6	6	6
Operating pH range	1 — 14	1 — 14	1 — 14
Max. operating temperature <sup>2</sup> , °C	80	80	80
Cross-flow range, l/min.	20 — 35 / support plate in one section	5 — 15 / support plate in one section	10 — 35 / support plate in one section
Liquid capacity, l	0.2 + 2.1 l/m <sup>2</sup> membrane area	0.2 + 1.2 l/m <sup>2</sup> membrane area	0.2 + 1.4 l/m <sup>2</sup> membrane area
Number of support plates	1 — 7	1 — 7	1 — 7
Number of sections	1, 2 or 3 uniform sections in series	1, 2 or 3 uniform sections in series	1, 2 or 3 uniform sections in series
Number of section stop discs	2, or 1 less than number of sections	2, or 1 less than number of sections	2, or 1 less than number of sections
Number of end plates	2	2	2
Number of flat sheet membranes	2 per support plate	2 per support plate	2 per support plate
Weight, kg	30 + 4.3 kg/m <sup>2</sup>	30 + 3.2 kg/m <sup>2</sup>	30 + 3.3 kg/m <sup>2</sup>

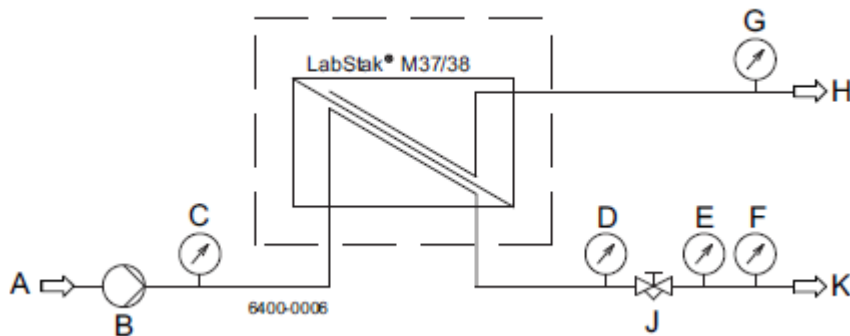
<sup>1</sup> Please specify code number when ordering

<sup>2</sup> depending on membrane type

## Components

Item	Alfa Laval LabStak™M37 module	Alfa Laval LabStak™M38L module	Alfa Laval LabStak™M38H module
Support and spacer plates	Polysulphone (PSO)	Polysulphone (PSO)	Polysulphone (PSO)
Permeate outlet hose	Silicone rubber (Si)	Silicone rubber (Si)	Silicone rubber (Si)
Gasket and o-ring	Nitrile rubber (NBR)	Nitrile rubber (NBR)	Nitrile rubber (NBR)
Internal, product wetted steel parts	Acid resistant, AISI 316L	Acid resistant, AISI 316L	Acid resistant, AISI 316L
External steel parts	Stainless AISI 304	Stainless AISI 304	Stainless AISI 304
Cross-flow in/outlet connections	DN 38, ISO 2852 clamp	DN 38, ISO 2852 clamp	DN 38, ISO 2852 clamp
Permeate hose outlet connections, mm	ID 4.0, OD 7.4	ID 4.0, OD 7.4	ID 4.0, OD 7.4

## Connections



A = Feed

B = Pump

C = Pressure

D = Pressure

E = Temperature

F = Flow

G = Flow

H = Permeate

J = Control valve

K = Retentate



# Alfa Laval LabStak™ M39L/H module

## LabStak™ modules for membrane filtration

### Introduction

The Alfa Laval LabStak™ M39L/H module is specially developed for ultrafiltration and microfiltration of highly viscous products and fermentation broths.

The module is designed to provide quick and precise process evaluations in laboratories or other test facilities, while keeping equipment and set-up costs to a minimum. It is ideal for process development, scale-up, membrane testing, quality assurance and small-scale production.

The Alfa Laval LabStak™ M39L/H module utilizes the same size support plates and membranes as those found in the full-scale plate-and-frame systems.

It can be equipped with the whole range of flat sheet membranes from Alfa Laval for ultrafiltration and microfiltration.

### Applications

The Alfa Laval LabStak™ M39L/H module is a popular choice for use within a range of industries which includes biotech and pharmaceuticals as well as food and beverages.

To meet the demands experienced here, the module is designed for optimized flow dynamics, low energy consumption and pressure operation.

### Benefits

- easy exchange of flat sheet membranes
- can be coupled to the by-pass stream of an industrial plant
- different channel height options to optimize flow and pressure
- simultaneous test of up to five different membrane types
- high operating temperature (up to 80°C)
- low internal volume
- flexible system design
- flexible membrane area between 0.2 and 1.0 m<sup>2</sup>
- all components manufactured in compliance with FDA and EEC regulations

### Scope of supply

The Alfa Laval LabStak™ M39L/H module consists of a full-size plate-and-frame module for cross-flow membrane filtration. It can be equipped with alternative plate set configurations, according to use.

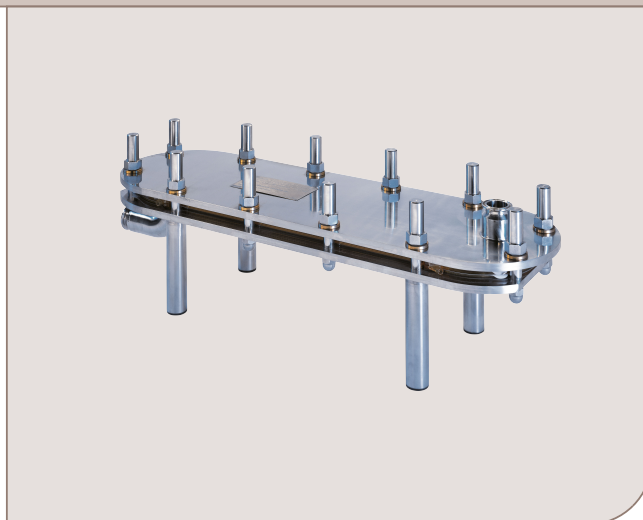
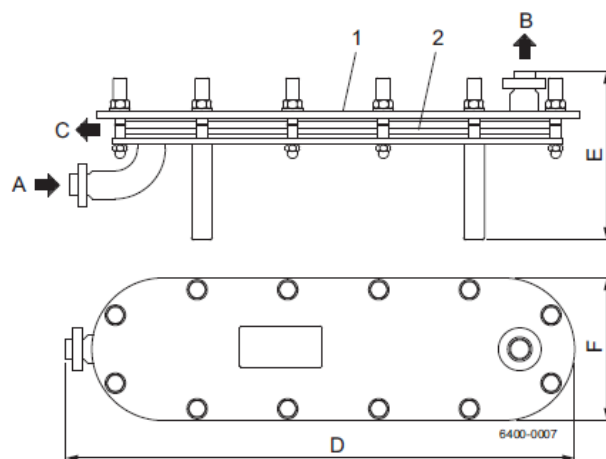


Plate set options	Applications	Code No.
M39L (Low channel)	Ideal for low and medium viscous liquids	PL835
M39H (High channel)	Ideal for highly viscous liquids	PL836



- 1: Steel frame
  - 2: Support plates and membranes
- A: Feed inlet  
 B: Retentate outlet  
 C: Permeate outlet  
 D: 928 mm  
 E: 307 mm  
 F: 260 mm



## Technical Data

Model	Alfa Laval LabStak™M39L module	Alfa Laval LabStak™M39H module
Code number <sup>1</sup> ,	515496	515496
Code number <sup>1</sup> , plate set	PL835	PL836
Membrane area, m <sup>2</sup>	0.2 — 1.0	0.2 — 1.0
Max. inlet pressure <sup>2</sup> , bar	7	7
Operating pH range	1 — 14	1 — 14
Max. operating temperature <sup>2</sup> , °C	80	80
Cross-flow range, l/min.	5 — 20 / support plate in one section	20 — 50 / support plate in one section
Liquid capacity, l	0.4 + 2.0 l/m <sup>2</sup> membrane area	0.4 + 2.5 l/m <sup>2</sup> membrane area
Number of support plates	1 — 5	1 — 5
Number of sections	1	1
Number of end plates	2	2
Number of flat sheet membranes	2 per support plate	2 per support plate
Weight, kg	30 + 3.8 kg/m <sup>2</sup>	30 + 3.5 kg/m <sup>2</sup>

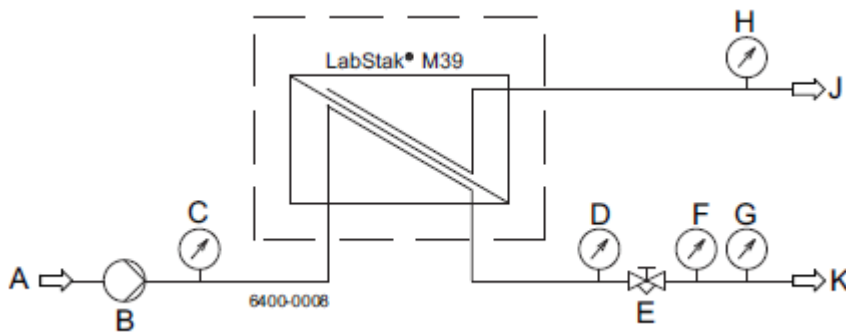
<sup>1</sup> Please specify code number when ordering

<sup>2</sup> depending on membrane type

## Components

Item	Alfa Laval LabStak™M39L module	Alfa Laval LabStak™M39H module
Support and spacer plates	Polysulphone (PSO)	Polysulphone (PSO)
Permeate outlet hose	Silicone rubber (Si)	Silicone rubber (Si)
Gasket and o-ring	Nitrile rubber (NBR)	Nitrile rubber (NBR)
Internal, product wetted steel parts	Acid resistant, AISI 316L	Acid resistant, AISI 316L
External steel parts	Stainless AISI 304	Stainless AISI 304
Cross-flow in/outlet connections	DN 38, ISO 2852 clamp	DN 38, ISO 2852 clamp
Permeate hose outlet connections, mm	ID 4.0, OD 7.4	ID 4.0, OD 7.4

## Connections



A = Feed

B = Pump

C = Pressure

D = Pressure

E = Control valve

F = Temperature

G = Flow

H = Flow

J = Permeate

K = Retentate

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