1

Gentle pumping

This pump-head is gentle enough for pumping highly concentrated viable cells

Pro-280 0.49–3700 ml/min

Order No. **ISM 785**

- Coated aluminum pump-head
- **Can be dismantled for cleaning**
- Self-centering tube-track thanks to concave tube-bed and convex rollers, which lengthens the tube-life
- 2 stainless steel rollers (higher max. flow rate but more pulsation than with 3 rollers)
- For tubing with 1.6 mm wall thickness
- 1.5 bar differential pressure[1]

Pro-281 3.6–3100 ml/min

Order No. **ISM 793**

Same pump-head as Pro-280, but

- For tubing with **2.4 mm wall thickness**
- 2.5 bar differential pressure[1]

Flow rates/ Tubing			Model Pro-280	
Tygon®ST R-3603/R-3607	Wall	Tubing	ml/min	
Order No.	(mm)	i.d. (mm)	min.	max.
MF0028	1.6	1.6	0.49	120
MF0030	1.6	3.2	1.9	450
SC0379	1.6	4.8	4.2	1000
MF0031	1.6	6.4	7.2	1700
MF0032	1.6	8.0	11	2600
SC0383	1.6	9.5	14	3300
SC0384	1.6	11.1	16	3700

Flow rates/ Tubing			Model Pro-281	
Tygon ST R-3603/R-3607	Wall	Tubing	ml/min	
Order No.	(mm)	i.d. (mm)	min.	max.
MF0029	2.4	4.8	3.6	870
MF0033	2.4	6.4	6.5	1600
SC0502	2.4	8.0	9.9	2400
SC0503	2.4	9.5	13	3100

Instantly interchangeable pump system

Especially suitable for:

- Chemical, biotechnological and pharmaceutical applications
- Food industry
- Elevated differential pressures (Pro-281 and Pro-381)
- Viscous fluids
- Fluids containing a high content of sensitive solids
- Applications requiring hygienic conditions, durability and reliability

Comparisons to gear, piston and centrifugal pumps proved that peristaltic pumps are the only suitable and sterilisable pump system for gently pumping media containing living cells.

[1] Differential pressure depends on tubing material; tubing with small i.d.'s enable higher pressures.

The flow rates are based on a drive speed of 1 (or 2.4) to 240 rpm. For the BVP Standard drive the indicated min. flow rates must be multiplied by factor 2.4.
Approx. values: determined with water, at 22° C, no differential pressure, Tygon tubing.

Pro-380 0.45–3400 ml/min

Order No. **ISM 791**

Same pump-head as Pro-280, but

- 3 stainless steel rollers (less pulsation but lower max. flow rate than with 2 rollers)

Pro-381 3.3–2900 ml/min

Order No. **ISM 797**

Same pump-head design as Pro-280, but

- 3 stainless steel rollers (less pulsation but lower max. flow rate than with 2 rollers)
- For tubing with **2.4 mm wall thickness**
- 2.5 bar differential pressure[1]

Flow rates/ Tubing			Model Pro-380	
Tygon ST R-3603/R-3607	Wall	Tubing	ml/min	
Order No.	(mm)	i.d. (mm)	min.	max.
MF0028	1.6	1.6	0.45	110
MF0030	1.6	3.2	1.7	400
SC0379	1.6	4.8	3.7	890
MF0031	1.6	6.4	6.5	1600
MF0032	1.6	8.0	9.7	2300
SC0383	1.6	9.5	13	3000
SC0384	1.6	11.1	14	3400

Flow rates/ Tubing			Model Pro-381	
Tygon ST R-3603/R-3607	Wall	Tubing	ml/min	
Order No.	(mm)	i.d. (mm)	min	max
MF0029	2.4	4.8	3.3	800
MF0033	2.4	6.4	5.8	1400
SC0502	2.4	8.0	8.8	2100
SC0503	2.4	9.5	12	2900

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Application

Pumping animal cell cultures

A comparison between different peristaltic pump systems was made by Ms Fan Guo and Prof. Dr. U. Graf-Hausner of Zurich Technical University Winterthur, and Dr. Joanne Laukart of Ismatec.

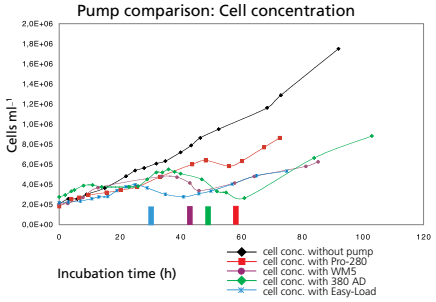
Experimental target: Gentle cell delivery

– Cell viability remains high
– Cell damage remains low

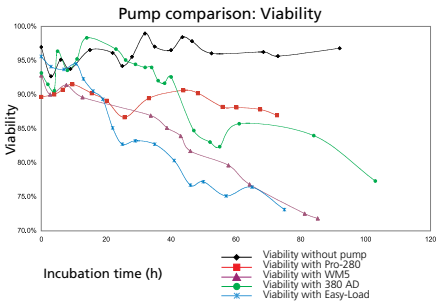
Pumping application

Production monitoring by analyzing by-pass cell streams and reactor innoculation.

Test results



With the pump-head Pro-280 cell death was observed only after 56 hours whilst with the Easy-Load® pump-head death occured already after 29 hours.



With the pump-head Pro-280 a viability of 87% was observed after **56 hours**. With the Easy-Load head a viability of only 72% was observed already after 29 hours.

Pumps tested

(Colors according to diagram)

MCP *Process* Pro-280 2 convex, non-spring-loaded rollers	MCP *Process* WM5 2 straight, spring-loaded rollers
MCP *Process* 380AD 3 convex, non-spring-loaded rollers	MCP *Process* Easy Load 3 straight, non-spring-loaded rollers

Comparative parameters

1. **Number of pump rollers**: 2 or 3
2. **Rollers**: spring-loaded vs. non-spring- loaded
3. **Tube-bed / roller geometry:** convex vs. straight rollers

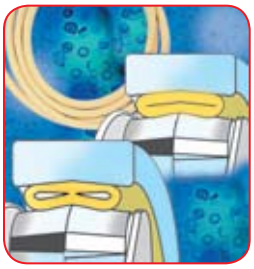
The winner: Pro-280

Thanks to convex rollers and a concave tube-bed, the MCP Process **Pro-280** proved to be the gentlest pump system with respect to cell viability and cell concentration.

Method

Cultivation of hybridoma cells in spinner bottles.

The cells are continuously pumped through an external loop at a constant flow rate (½ reactor volume / hour = 250 ml/h) until a identifiable cell death is observed.



The secret of the Pro-280

Before the roller totally closes the squeezed tubing, the cells can escape through a gap towards the tubing wall and, hence, are neither «squashed» nor damaged.

The pump-head Pro-280 has 2 convex rollers and the tube-bed is concave.

Conclusion

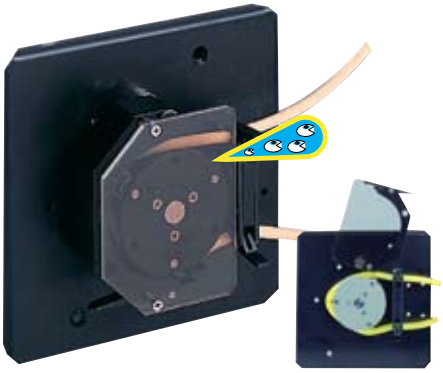
The Pro-280 (mounted either on an MCP or BVP Process drive) is a uniquely designed pump system especially suited for use in biotechnology. It has been tested for **use in laboratory scale and small production scale up to 30 liters**.

1

Multi-purpose single-channel pump-heads

For MCP and BVP drives

Change the pump-heads within seconds without the use of tools



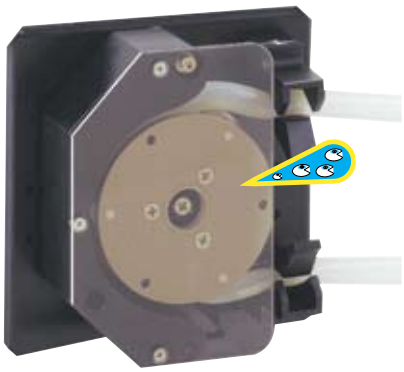
360 [1] 0.072–530 ml/min

Order No. **ISM 719**

- Easily accessible flip-up tube-bed guarantees easy and rapid tube change-over
- Transparent protection cover allows monitoring the tube and the revolving rotor
- Self-centering tube-track design thanks to the **concave tube-bed** and **convex rollers** (lengthens tube-life)
- Rotor for tubing i.d. from 0.8 to 6.4 mm with 1.6 mm wall thickness
- 3 stainless steel rollers
- 1.5 bar differential pressure [2]

Flow rates / Tubing			Model 360	
Tygon®ST R-3603/R-3607	Wall	Tubing	ml/min	
Order No.	(mm)	i.d. (mm)	min.	max.
MF0001	1.6	0.8	0.072	17
MF0028	1.6	1.6	0.26	62
MF0030	1.6	3.2	1.0	240
SC0379	1.6	4.8	2.2	530

[1] An OEM version of this pump-head is also available. Ask for the detailed data sheet.



380 [1] 0.44–2800 ml/min

Order No. **ISM 718**

Same design as pump-head 360, but larger size

- For tubing i.d. from 1.6 to 9.5 mm with 1.6 mm wall thickness
- 1.5 bar differential pressure [2]

Ideal for sterile media

Flow rates / Tubing			Model 380	
Tygon ST R-3603/R-3607	Wall	Tubing	ml/min	
Order No.	(mm)	i.d. (mm)	min.	max.
MF0028	1.6	1.6	0.44	100
MF0030	1.6	3.2	1.7	400
SC0379	1.6	4.8	3.6	860
MF0031	1.6	6.4	6.0	1400
MF0032	1.6	8.0	8.8	2100
SC0383	1.6	9.5	12	2800

[2] Differential pressure depends on tubing material; tubing with small i.d.'s may enable higher pressures.

380AD 0.41–3600 ml/min

Order No. **ISM 725**

- Pressure on tubing adjustable via rollers
- Rotor accepts tubing with1.6 and 2.4 mm wall thickness and 1.6 to 11.1 mm i.d.
- 3 stainless steel rollers
- 1.5 bar differential pressure [2] (with tubing wall thickness 1.6 mm)
- 2.5 bar differential pressure [2] (with tubing wall thickness 2.4 mm)

Ideal for media with high viscosity or a certain level of solid content

Flow rates / Tubing			Model 380AD	
Tygon ST R-3603/R-3607	WS	Tubing	ml/min	
Order No.	(mm)	iØ (mm)	min.	max.
MF0028	1.6	1.6	0.4	99
MF0030	1.6	3.2	1.5	370
SC0379	1.6	4.8	3.4	830
MF0031	1.6	6.4	6.2	1500
MF0032	1.6	8.0	9.5	2300
SC0383	1.6	9.5	13.0	3000
SC0384	1.6	11.1	15.0	3600
MF0029	2.4	4.8	3.4	830
MF0033	2.4	6.4	6.2	1500

The flow rates are based on a drive speed of 1 (or 2.4) to 240 rpm. For the BVP Standard drive the indicated min. flow rates must be multiplied by factor 2.4. Approx. values: determined with water, at 22° C, no differential pressure, and Tygon tubing.

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The pump-head for PTFE tubing

Easy-Load® [3] 0.07–1100 ml/min

Order No. **MF 0313/ISM738**

- Easily accessible pump-head
- Allows rapid tube change-over
- PSF housing (Polysulfone)
- Rotor for tubing with 1.6 mm wall thickness
- Rotor with 3 stainless steel rollers
- 0.7 bar differential pressure[2]

Flow rates / Tubing			Model Easy-Load	
Tygon® ST R-3603/R-3607	Wall	Tubing	ml/min	
Order No.	(mm)	i.d. (mm)	min.	max.
MF0001	1.6	0.8	0.066	16
MF0028	1.6	1.6	0.25	59
MF0030	1.6	3.2	0.91	220
SC0379	1.6	4.8	1.9	450
MF0031	1.6	6.4	3.1	730
MF0032	1.6	8.0	4.7	1100

[2] Differential pressure depends on tubing material; tubing with small i.d.'s may enable higher pressures.

Easy-Load II [3] 0.24–1000 ml/min

Order No. **MF 0446/ISM738**

Same specifications as Easy-Load, but

- Adjustable pressure setting
- Improved, automatic tubing retention
- PPS housing (Polyphenylene sulfide)
- Rotor with 4 stainless steel rollers
- 0.7 bar differential pressure[2]

Flow rates / Tubing			Model Easy-Load II	
Tygon ST R-3603/R-3607	Wall	Tubing	ml/min	
Order No.	(mm)	i.d. (mm)	min.	max.
MF0028	1.6	1.6	0.24	58
MF0030	1.6	3.2	0.92	220
SC0379	1.6	4.8	1.9	460
MF0031	1.6	6.4	3.0	730
MF0032	1.6	8.0	4.2	1000

[3] 2 pump-heads can be mounted on one drive. (Special mounting sets must be ordered separately).

PTFE-Tube 0.07–45 ml/min

Order No. **MF 0330/ISM727**

Pump-head for PTFE tubing

- 6 stainless steel rollers
- Stainless steel rotor
- Anodized aluminum body
- Adjustable tube-bed pressure with locking knob
- Up to **6.9 bar** differential pressure

Ideal for dispensing and pumping aggressive chemicals and for the filtration of organic solvents.

Flow rates for PTFE-Tubing

Tubing i.d.	Flow rates ml/min
2 mm	0.07 to 15
4 mm	0.19 to 45

See ordering information and tubing below.

Ordering information for pump-head PTFE tubing

Article	Specifications	Order No.	Pack size
PTFE pump tubing, 38 cm long	**2 mm i.d.** / 4 mm o.d., for 0.07 – 15 ml/min	MF 0331	2 pieces
PTFE pump tubing, 38 cm long	**4 mm i.d.** / 6 mm o.d., for 0.19 – 45 ml/min	MF 0332	2 pieces
Tube connectors (straight) (2 connectors are needed for one tube)	for tubing with **2 mm i.d.**	MF 0333	3 pieces
Tube connectors (straight) (2 connectors are needed for one tube)	for tubing with **4 mm i.d.**	MF 0334	1 pieces
PTFE extension tubing, 3.65 m long	for tubing with **2 mm i.d.**	SC 1017BO	1 x 3.65 m
PTFE extension tubing, 3.65 m long	for tubing with **4 mm i.d.**	SC 1016BO	1 x 3.65 m
Tubing grooving tool (Use only tubing with 4 mm i.d.)	Important for connections which must withstand 2.8 bar (40 psi) or greater.	MF 0337	1 pieces