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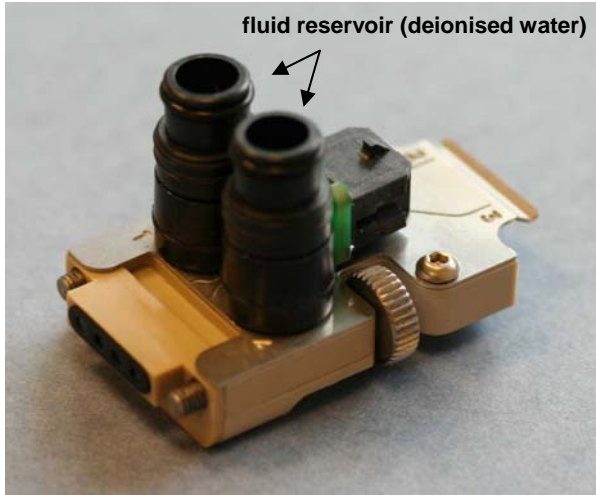
**The Dolomite Centre Limited**  
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# INFORMATION SHEET

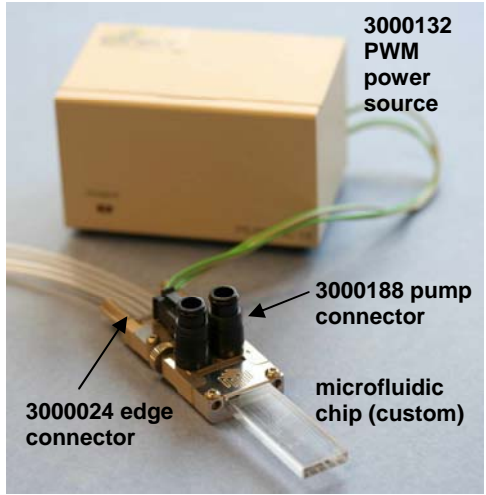
|           |                                      |             |         |
|-----------|--------------------------------------|-------------|---------|
| Part name | Micro electro-osmotic pump connector | Part number | 3000188 |
|-----------|--------------------------------------|-------------|---------|

## Description

The micro electro-osmotic pump connector is a 2-channel miniature pumping solution for direct integration with dolomite microfluidic chips. The low internal volume (8  $\mu$ l) between pump and chip ensures that sample volumes required are minimal. As an example, a complete microfluidic system can be created by linking a dolomite chip, a pump-connector module and a dolomite edge connector (part number 3000024). This provides 2 pump inputs to the chip and 2 fluid outputs. The unique feature of the electro-osmotic pump technology is the smoothness of flow that is obtained and the precise control that can be achieved in the low flow rate range.



3000188 micro electro-osmotic pump connector



example of a complete microfluidic system

Electro-osmotic flow is generated in the pump by applying a low voltage across the two electrodes. This may be implemented using a battery or DC power supply unit. For advanced flow rate control a PWM (Pulse Width Modulated) power source can be supplied (part number 3000132). The PWM power source can be connected to a flow rate sensor enabling closed loop control of flow rate.

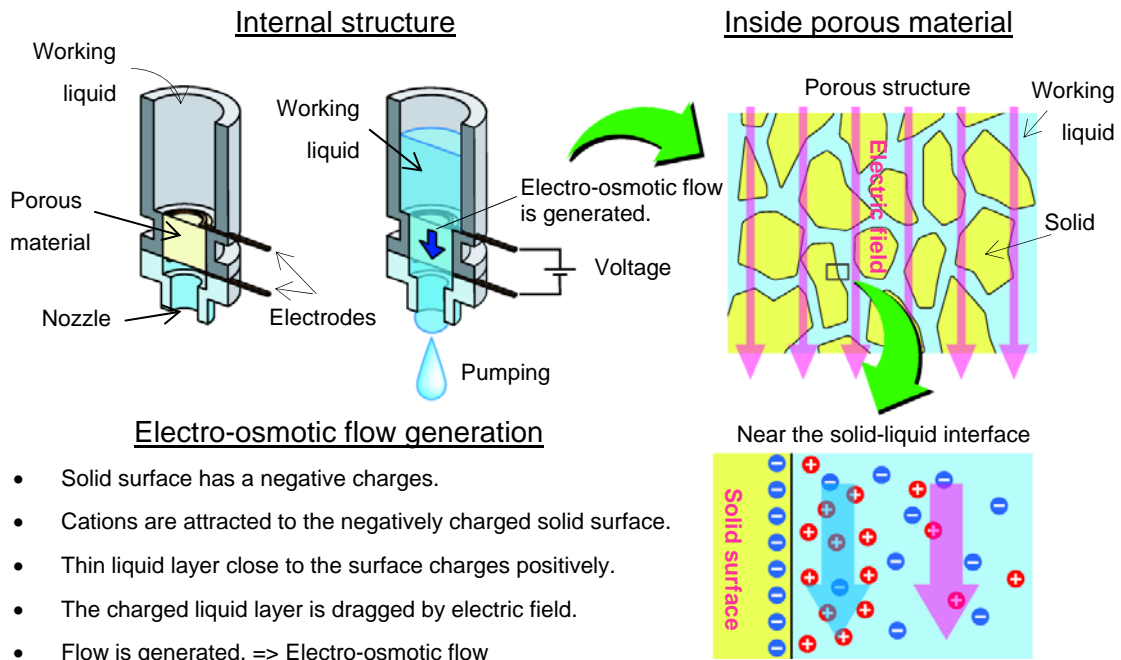
The working liquid for direct pumping is deionised water. However, by using a sample loop it is possible to pump any liquid including aggressive media and cell suspensions.

## Benefits

- Easy to integrate with microfluidic chips
- Edge connector port for fluid outputs
- No pulsation
- No moving parts
- Small size
- High pressure performance
- Simple to control flow rate
- Connect directly to a DC supply or battery to pump fluid



## Working Principle



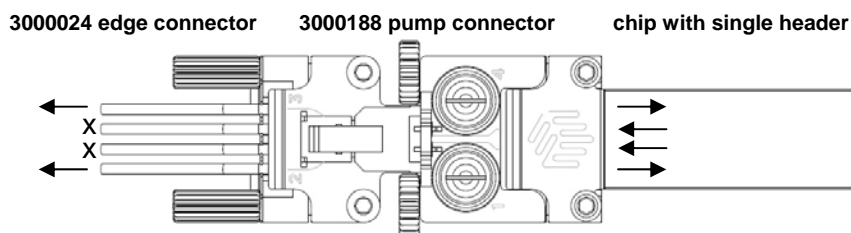
## Direct and Indirect Pumping

For working liquids passing directly through the pump, de-ionised water is recommended to give optimum performance (pumps for operation with methanol available on request).

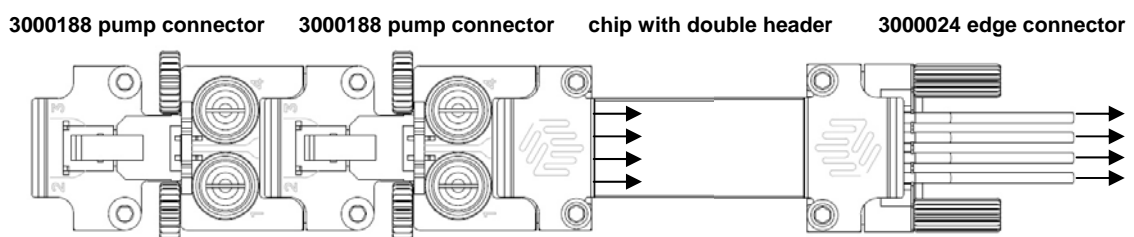
Using an indirect pumping system, the micro electro-osmotic pump can be used with any liquid. This is achieved with a sample loop between the pump and the on-chip working area. Please contact dolomite to discuss your specific application.

*Notes: The micro electro-osmotic pump is sensitive to impurities in the liquid. Impurities can cause degradation of EO material performance. Flow rate performance of the pump is dependent on the kind of working liquid. The flow rate is also inversely proportional to the viscosity of the liquid. Ambient temperature also has an impact on the performance.*

## Microfluidic System Configurations



**Configuration 1:** Microfluidic system with 2 pump channel inputs to chip and 2 fluid outlets



**Configuration 2:** Microfluidic system with 4 pump channel inputs to chip and 4 fluid outlets

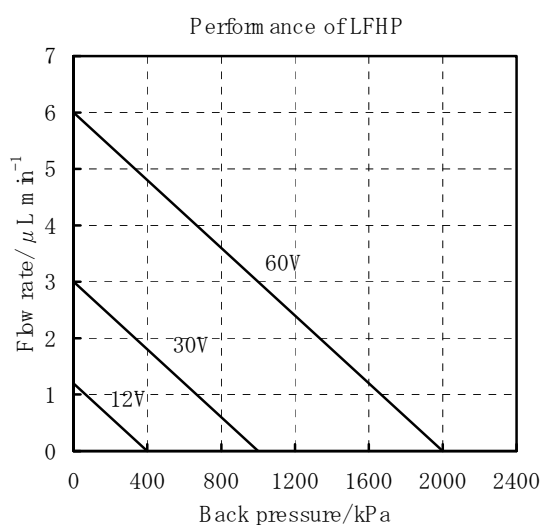
## Specification

| Pump connector specification |                                       | 3000188                             |                           |
|------------------------------|---------------------------------------|-------------------------------------|---------------------------|
| 1                            | Pumping principle <sup>(1)</sup>      | Electro-osmosis                     |                           |
| 2                            | Max. flow rate <sup>(2)</sup>         | 6 $\mu\text{l}/\text{min}$          | @60V <sup>(5)</sup><br>DC |
| 3                            | Max. pressure <sup>(3)</sup>          | 2000 kPa                            |                           |
| 4                            | Power consumption <sup>(4)</sup>      | 7 mW                                |                           |
| 5                            | Min. flow rate <sup>(6)</sup>         | 0.1 $\mu\text{l}/\text{min}$        |                           |
| 6                            | Working liquid <sup>(7)</sup>         | De-ionized water                    |                           |
| 7                            | Pump connector material               | PEEK, Stainless Steel 316, PPS      |                           |
| 8                            | Wetted materials                      | Glass, PTFE, and perfluoroelastomer |                           |
| 9                            | Internal volume to pump (ports 1 & 4) | 8 $\mu\text{l}$                     |                           |
| 10                           | Internal volume through (ports 2 & 3) | 1.9 $\mu\text{l}$                   |                           |
| 11                           | Reservoir capacity <sup>(8)</sup>     | 250 $\mu\text{l}$                   |                           |
| 12                           | Chip thickness options                | 4 mm                                |                           |
| 13                           | Chip width options                    | 15 mm                               |                           |
| 14                           | Chip length options                   | 10 mm – 90 mm                       |                           |

1. The pump utilizes electro-osmotic flow, which is induced by applying an external electric field on a charged solid-liquid interface. This occurs in narrow channels inside porous material.
2. The max. flow rate is defined as the flow rate at zero back pressure.
3. The max. pressure is defined as the pressure to make the net flow zero.
4. Power consumption is roughly proportional to the square of the voltage.
5. Values at 60V DC are specified for reference. Max. flow rate and max. pressure are roughly proportional to the applied voltage. Applied voltage is recommended to be less than 60V.
6. Lower flow rates are theoretically possible
7. Alternative versions are available on request, which use methanol as the working liquid.
8. Reservoir can be sized to customer requirements on request

## Technical Data

### Performance of electro-osmotic pump



## Geometry

