

Glass Static Mixers (GSM)

Microfabricated glass mixers and reactors



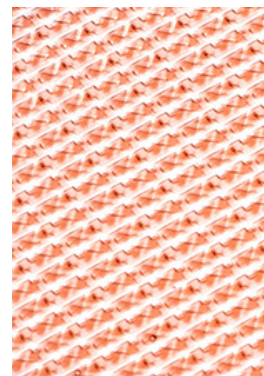
Glass Static Mixer/Reactor Blocks

1. COMPACT glass static mixer (GSM) blocks for flow chemistry

Our 'compact format' GSMs all share the same external dimensions (110 x 57 x 7.5mm). They have smooth input pre-equilibration domains ensure that reagent solutions are all at the same temperature as the glass prior to mixing. Fluidic connections are conveniently made using standard HPLC fittings.

A single compact GSM can be fitted to the column reactor heating position of the FlowSyn using the GSM holder (UQ1073 or UQ5111), or to the Cold Coil and Polar Bear *Plus* Flow reactor modules using their respective holders (UQ1071 and UQ1053-001).

Up to 2x compact GSMs can be fitted to the HotChip™, ColdChip™ and Polar Bear GSM™ reactor modules. Compact GSMs are available in volumes of 0.27 to 5.0ml and all utilise the same efficient 3D chicane mixing geometry that is effective at lower flow rates. The channel dimensions are approximately 1.0mm ID (or less for the 0.27ml GSM), but vary along the flow path to constitute many 'chicane' mixing domains.



COMPACT GSM 3D mixing channel geometry

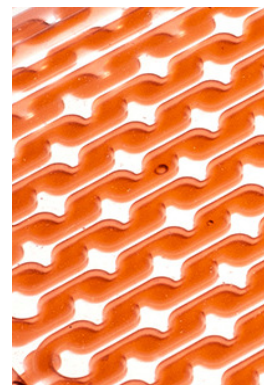
Whilst compact GSMs can be attached as efficient pre-mixers inline with a coil reactor to extend residence times, the 5.0ml and 1.6ml versions are very effective as reactor modules in which static mixing is maintained throughout the whole flow path (e.g. nanoparticle formation) and for rapid exothermic reactions such as metallation or nitration.

2. LARGE glass static mixer (GSM) blocks for flow chemistry

Asynt's 'LARGE' format' GSMs also all share the same external dimensions (140 x 130 x 7.5mm) and have smooth temperature equilibration domains prior to the mixing point. Fluidic connections are conveniently made using standard HPLC fittings.

These GSMs are designed for larger scale applications using either the HotChip™, ColdChip™ or Polar Bear *Plus* GSM™ reactor modules.

They utilise either the same 3D chicane geometry and nominal 1.0mm channel ID as the COMPACT GSMs (5.0ml and 10ml) or broader channels (nominally approximately 1.7mm ID wide x 1.1mm depth) with a 2D chicane geometry (10ml and 20ml) that requires higher flow rates for efficient mixing (>5ml/min).



LARGE GSM 2D mixing channel geometry

The larger 2D channels are able to withstand a lower maximum pressure rating in comparison to the narrower 3D channels, but conversely, much higher flow rates.

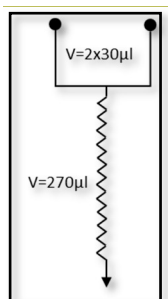
Dependent upon the viscosity of the reaction mixture, this can be as high as 100ml/min (subject to not exceeding the P_{max} rating of the GSM).

The 10ml and 20ml GSMs are a 2 layer design, the others are single layer GSMs.

1. COMPACT glass static mixer (GSM) blocks for flow chemistry

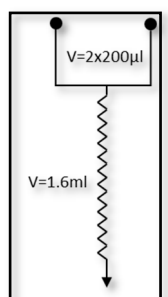
UQ5101

2 inlet channels {A+B}
2x 30 μ L pre-mix tempering channels
270 μ L mixing domain
 P_{\max} =40bar; size: 56 x 110 x 7.0mm



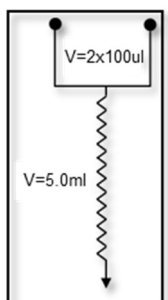
UQ5102

2 inlet channels {A+B}
2x 200 μ L pre-mixing channels
1.6ml mixing domain
 P_{\max} =40bar; size: 56 x 110 x 7.0mm



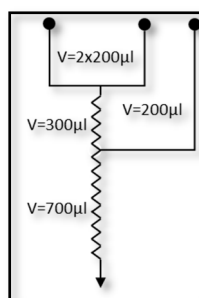
UQ5202

2 inlet channels {A+B}
2x 100 μ L pre-mix tempering channels
5.0ml mixing domain
 P_{\max} =25bar; size: 56 x 110 x 7.0mm



UQ5106

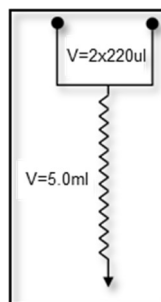
3 inlet channels {[A+B]+C}
3x 200 μ L pre-mix tempering channels
1.0ml mixing domain [300 μ L/700 μ L]
 P_{\max} =40bar; size: 56 x 110 x 7.0mm



2. LARGE glass static mixer (GSM) blocks for flow chemistry

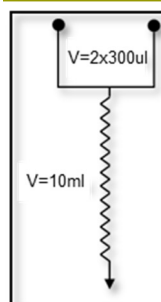
UQ5100

2 inlet channels {A+B}
2x 220 μ L pre-mix tempering channels
5.0ml mixing domain
 P_{\max} =20bar; size: 140 x 130 x 7.5mm



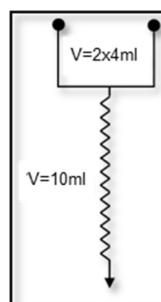
UQ5201

2 inlet channels {A+B}
2x 300 μ L pre-mixing channels
10ml mixing domain
 P_{\max} =20bar; size: 140 x 130 x 7.5mm



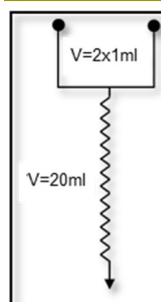
UQ5107

2 inlet channels {A+B}
2x 4.0ml pre-mix tempering channels
10ml mixing domain
 P_{\max} =10bar; size: 140 x 130 x 7.5mm



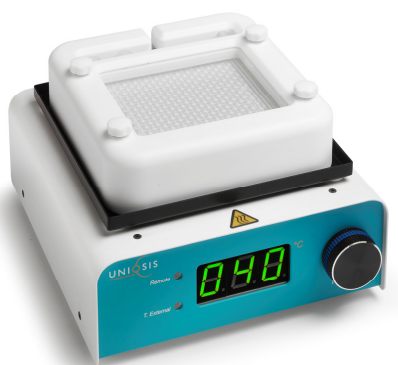
UQ5108

2 inlet channels {[A+B]+C}
2x 1.0ml pre-mix tempering channels
20ml mixing domain
 P_{\max} =10bar; size: 140 x 130 x 7.5mm



3. GSM Product Summary

Part No.	Dimensions (mm)	No. of Inputs	Pmax (bar)	Volume (ml)	Mixing Geometry	Approx Channel Dimensions (mm)	COMPATIBILITY					
							FlowSyn	Cold Coil*	Cold Chip	HotChip	Polar Bear Plus Flow*	Polar Bear Plus GSM
COMPACT FORMAT												
UQ5101	56x110x7.0	2	35	0.27	3D	0.5 x 0.5mm	✓	✓	✓ (x2)	✓ (x2)	✓	✓ (x2)
UQ5102	56x110x7.0	2	35	1.6	3D	1.0 x 1.0mm	✓	✓	✓ (x2)	✓ (x2)	✓	✓ (x2)
UQ5202	56x110x7.0	2	30	5.0	3D	1.0 x 1.0mm	✓	✓	✓ (x2)	✓ (x2)	✓	✓ (x2)
UQ5106	56x110x7.0	3	35	1.0 [3:7]	3D	1.0 x 1.0mm	✓	✓	✓ (x2)	✓ (x2)	✓	✓ (x2)
LARGE FORMAT												
UQ5100	140x130x7.5	2	20	5.0	3D	1.0 x 1.0mm	X	X	✓	✓	X	✓
UQ5201	140x130x7.5	2	20	10	3D	1.0 x 1.0mm	X	X	✓	✓	X	✓
UQ5107	140x130x7.5	2	10	10	2D	1.0 x 1.5mm	X	X	✓	✓	X	✓
UQ5108	140x130x7.5	2	10	20	2D	1.1 x 1.65mm	X	X	✓	✓	X	✓
* When fitted with optional GSM Holder Adapter												



HotChip™ reactor module



ColdChip™ reactor module



Polar Bear GSM™



Cold Coil MkII
(with GSM adaptor UQ1053-001)