

# 3M Purification

## Zeta Plus™ Single-Use Depth Filtration Product Brochure

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# Zeta Plus™ Encapsulated Filter System

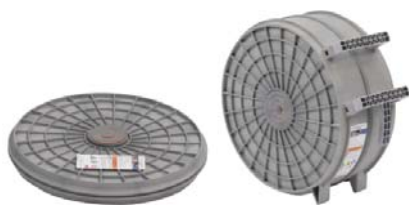
Innovative Filtration.

Fast, easy and clean.





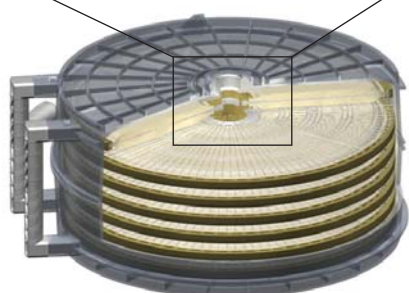
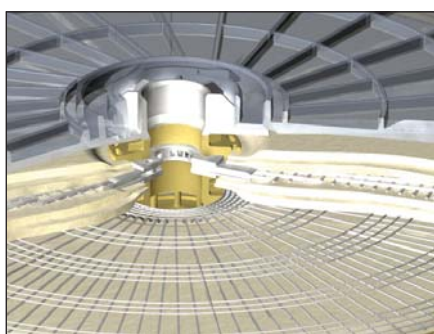
Zeta Plus™ Encapsulated standard capsule offering with translucent polycarbonate shells



Zeta Plus™ Encapsulated capsule offering with alkaline resistant\* polyphenylene/polystyrene shells



Self guiding locking mechanism enables fast and robust capsule-to-capsule connection



## The system of choice for single-use depth filtration

The Zeta Plus™ Encapsulated System is a single-use depth filtration system designed for the bioprocessing industry where upstream cell culture clarification and impurity removal or downstream impurity reduction is required. The Zeta Plus Encapsulated System consists of a small system (model 16EZA) that is ideal for lab scale production or scale up studies and a large system that is designed for production scale biomanufacturing. Each system is comprised of a filter holder, top and bottom manifolds and the required number of capsules.

The Zeta Plus Encapsulated Systems for production scale biomanufacturing feature an ergonomically designed large holder (model 16EZB) that can be pivoted between horizontal and vertical positions, allowing for convenient loading and unloading, minimal footprint during filtration, minimal fluid spills during unloading and full utilisation of the filter media.

The capsule design features a translucent plastic shell (standard capsules) for easy liquid level detection. A self guiding locking mechanism enables fast and robust capsule-to-capsule connection and the industry leading 3M Purification Zeta Plus depth filter media provides superior filtration performance. If sanitation using NaOH solution is required, capsules with alkaline-resistant shells are available.

## Features and benefits

Ergonomically designed holder system:

**Large holder (model 16EZB) can be pivoted between horizontal and vertical positions**

- Enables loading and unloading at waist height
- Minimal fluid spills when handling spent capsules
- Single or two-stage depth filtration within one filter holder

**Vertical flow path**

- Full utilisation of the filter media
- Small footprint during filtration

Innovative capsule/manifold design:

**Translucent plastic shell (standard capsules)**

- Easy detection of the liquid level inside, providing real time monitoring of the filtration process

**Solid core design with fully encapsulated shell**

- Eliminates the need for a stainless steel housing and the cleaning step after filtration
- Low hold-up volume

**Self guiding locking mechanism**

- Fast, reliable and robust capsule-to-capsule connectivity

**Lenticular style capsule design**

- Linear scalability from small to large system
- Consistency between single-use and conventional depth filtration

Zeta Plus™ filter media:

**Both double-layer EXT and single-layer Zeta Plus™ filter media are available**

**Superior performance in throughput and filtration efficiency**

\* Based on testing with 1M NaOH and 5% NaClO (Bleach). Ask for Chemical Compatibility Guide for more information.

## High performance filter media

The Zeta Plus Encapsulated System utilises the industry leading Zeta Plus depth filter media, including the double layer Zeta Plus EXT Series filter media and many popular single layer Zeta Plus media options including SP and ZA media grades. The Zeta Plus EXT Series is a family of advanced dual zone depth filters designed to provide optimal clarification of bioprocess and biological fluids. Most Zeta Plus products using EXT Series filter media consist of two distinct layers or “zones” of filter media with the upstream zone more open than the downstream one. This structure enhances the contaminant holding capacity of the filter media, reduces premature plugging and helps extend service life. All Zeta Plus EXT media grades are available in single-use format including a special grade (DEL108A) that is designed for lipid and surfactant removal (see page 9).

## Applications

- Clarification of mammalian cell culture harvest
- Enhanced protection of downstream processes
- Clarification of bacteria, yeast and insect cell lysates
- Host Cell Proteins (HCPs) reduction
- Viruses and DNA reduction
- Protein aggregates reduction
- Endotoxin reduction
- Anti-foaming agents reduction

The primary application for the Zeta Plus Encapsulated System is the cell culture clarification after fermentation. The System can be employed alone or in combination with centrifugation or Tangential Flow Filtration (TFF). An alternative application for the Zeta Plus Encapsulated System is downstream impurity reduction. Taking advantage of its positive charge capacity, Zeta Plus filter media has been shown to be effective in removing contaminants such as host cell proteins (HCP), viruses, DNA, protein aggregates and endotoxins.

In monoclonal antibody production, Zeta Plus filter media is increasingly being used as a polishing step after Protein A column capture step, replacing traditional anion exchange chromatography.

**Table 1: Recommended operating parameters**

|                               | Zeta Plus™<br>Encapsulated System | Zeta Plus™<br>Scale-Up capsules |
|-------------------------------|-----------------------------------|---------------------------------|
| Maximum operating pressure    |                                   |                                 |
| Inlet pressure                | 3.4 bar                           | 3.1 bar                         |
| Differential pressure         | 2.4 bar                           | 2.4 bar                         |
| Maximum operating temperature | 40 °C                             | 40 °C                           |
| Recommended pre-use rinse     | 54 L/m <sup>2</sup>               | 54 L/m <sup>2</sup>             |



Zeta Plus™  
EZ16A  
System



Zeta Plus™  
EZ16B  
System



Zeta Plus™  
Multi-Round  
bespoke  
customised  
system

**Figure 1: Zeta Plus™ Encapsulated large holder loading process**



### Ergonomically designed filter holders

Traditional depth filtration systems utilise lenticular style cartridge filters and a vertical filtration flow path to allow easy access to process liquids and efficient utilisation of filter media. However, stacking cartridges from bottom to top can be cumbersome and dismantling used cartridges is often labour intensive. Furthermore, fluid spills during the unloading process could be problematic and, in some instances, might expose the operators to the process fluids.

Recognising the need for a depth filtration system that is fast, easy and clean, 3M Purification designed filter holders (Model 16EZB) that can be pivoted between the horizontal position for loading and unloading the capsules and manifolds and the vertical position for filtration. Allowing loading and unloading at waist height eliminates the need for operators to lift capsules above their heads and reduces the risk of fluid spills when handling used capsules. The use of the vertical flow path allows for full media utilisation and a small system footprint during filtration.

#### Small holder (model 16EZA)

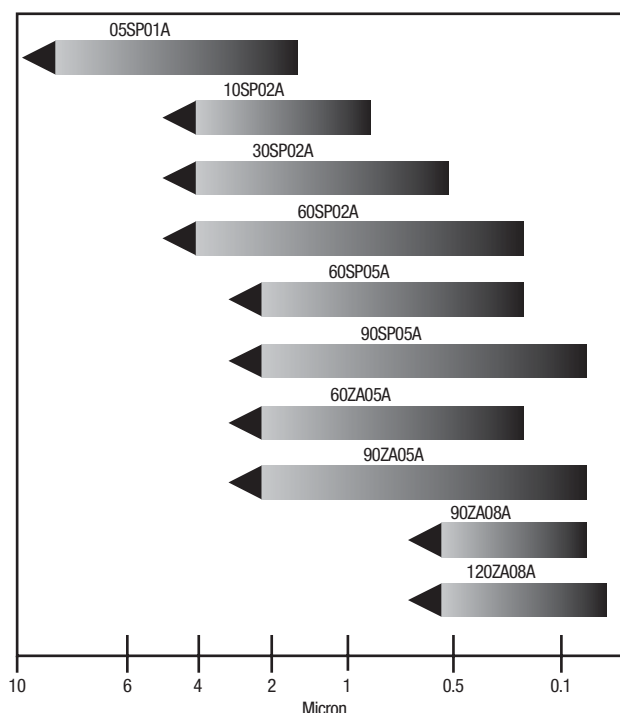
The small holder is available for scale-up studies and lab-scale protein production. This holder can accommodate from one to four 0.23 m<sup>2</sup> capsules or one 1.6 m<sup>2</sup> (double-layer EXT) or 2.5 m<sup>2</sup> (single-layer) capsule. Either single-stage or two-stage depth filtration can be performed within the same holder. The standard small holder has a built-in torque limiter that will signal that the holder assembly is properly sealed. A modified version is available that is ideal for applications where autoclaving is required.

#### Large holder (model 16EZB)

The large holder can accommodate up to 17.5 m<sup>2</sup> of single-layer Zeta Plus filter media (or 11.2 m<sup>2</sup> of double-layer Zeta Plus filter media) and is ideal for small to large production scale purification processes.

**Figure 2: Nominal retention ratings for Zeta Plus™ EXT grades**

(For reference only. Retention ratings may vary depending on use applications.)

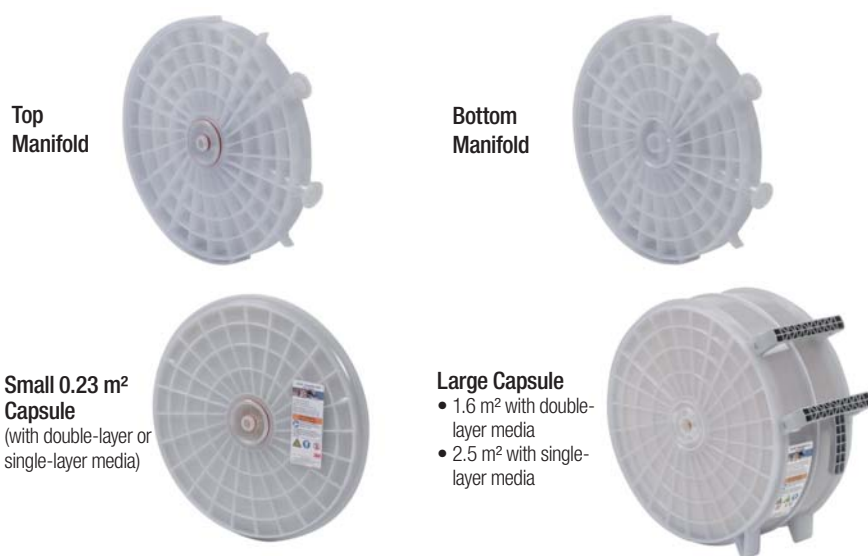


## Innovative capsule/manifold design

Two capsule sizes are available, a small or a large capsule which can be used with the Zeta Plus Encapsulated System. The small capsule is designed for use with the small holder in lab-scale production and scale-up studies. It has 0.23 m<sup>2</sup> filtration area and it accommodates both single-layer and double-layer Zeta Plus filter media. The larger capsule is designed for use with both the small and large holders. It accommodates 1.6 m<sup>2</sup> double-layer media or 2.5 m<sup>2</sup> single-layer media.

The larger capsule has a self guiding locking mechanism for a fast, easy and robust capsule-to-capsule connection and a solid core design that eliminates the need for stainless steel bands and centre post. In addition, this capsule also has two handles for convenient loading and unloading and a low capsule fill volume and post-blown down hold-up volume.

The capsule plastic shells are available in two different materials for a broad range of applications. The standard capsules use polycarbonate, thus have the translucent plastic shells that enables easy liquid level detection. The alkaline resistant capsules use polyphenylene/polystyrene which can be used in applications where NaOH is required for sanitisation. Correspondingly, the single use top and bottom manifolds are also available in these two materials. The manifold set ensures the entire filtration process is fast, easy and clean. An extra pair of manifolds is required to perform two-stage filtration within one holder assembly. Full operating instructions are provided with each system.



Zeta Plus™ cartridge and capsule family



Figure 3:  
16EZB holder with mechanical polish finish



Figure 4:  
Zeta Plus™ Scale-Up capsules



## Features and benefits

### Zeta Plus™ Scale-Up capsules:

#### Translucency

- Easy detection of the liquid level inside

#### Capsule design

- Stand-alone unit
- Easy-to-use
- Ease to vent to remove air

#### Stackable

- In parallel and in sequence
- Reduced bench space

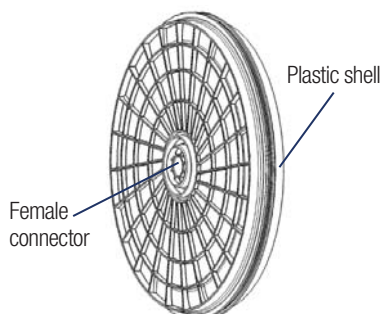
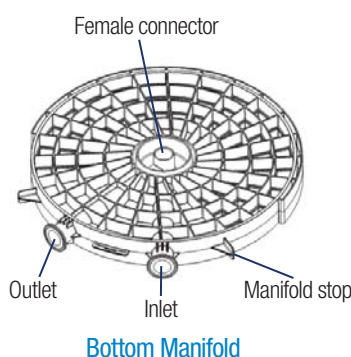
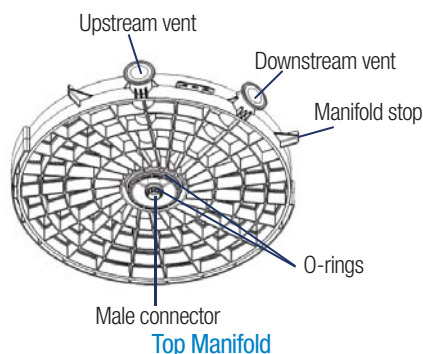
#### Minimal hold-up volume

- Improved product yield

#### Zeta Plus™

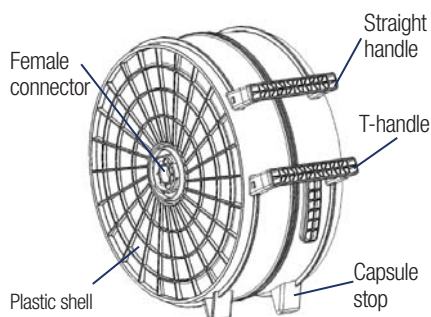
- Full range of double-layer EXT and single-layer media for your applications

**Figure 5: Single-use manifold and capsule filter schematics**



**E16 Single-Cell Capsule**

0.23 m<sup>2</sup> capsule with double-layer or single-layer media



**1.6 m<sup>2</sup> Capsule**

1.6 m<sup>2</sup> capsule with double-layer media  
2.5 m<sup>2</sup> capsule with single-layer media

## Scalability

The Zeta Plus Encapsulated System retains the lenticular filter design and vertical flow path that are characteristics of traditional depth filtration systems, helping ensure consistent performance from bench-scale to production scale and from traditional non-disposable to disposable systems.

Four different surface areas disposable scale-up devices are available for media grade selection and filter sizing. The BC25 capsule with 25 cm<sup>2</sup> filter is ideal for media grade screening. The scale-up capsule filters with 170 cm<sup>2</sup>, 340 cm<sup>2</sup> and 1020 cm<sup>2</sup> are designed for intermediate scale-up studies and lab-scale protein production. Combined with these small-scale devices, the Zeta Plus Encapsulated System offers a completely single-use solution to process from 0.5 litre to over 2500 litre of liquid.

**Table 2a: Zeta Plus™ Encapsulated System capsule filter and manifold specifications**

| Configuration                              |                                       |                                       |                                                                      |                                 |                             |
|--------------------------------------------|---------------------------------------|---------------------------------------|----------------------------------------------------------------------|---------------------------------|-----------------------------|
| Filter capsules                            | Small capsule                         |                                       | Large capsule                                                        |                                 |                             |
|                                            | Standard                              | Alkaline resistant <sup>1</sup>       | Standard                                                             | Alkaline resistant <sup>1</sup> |                             |
| Dimensions (height x diameter)             | 5.7 cm x 45.2 cm                      |                                       | 20.3 cm x 45.2 cm                                                    |                                 |                             |
| Weight                                     |                                       |                                       |                                                                      |                                 |                             |
| Dry                                        | 3.3 kg                                | 3.4 kg                                | 10.0 kg                                                              | 10.7 kg                         |                             |
| Wet post blow-down                         | 4.4 kg                                | 4.8 kg                                | 19.3 kg                                                              | 19.7 kg                         |                             |
| Materials of construction                  |                                       |                                       |                                                                      |                                 |                             |
| Filter media                               | Filter aids, cellulose, binding resin |                                       | Filter aids, cellulose, binding resin                                |                                 |                             |
| Outer shell                                | Polycarbonate                         | Polyphenylene / Polystyrene           | Polycarbonate                                                        | Polyphenylene / Polystyrene     |                             |
| O-rings                                    | Silicone                              |                                       | Silicone                                                             |                                 |                             |
| Separators, spacers and connectors         | Polypropylene                         |                                       | Polypropylene                                                        |                                 |                             |
| Edge seals                                 | Thermoplastic elastomer               |                                       | Thermoplastic elastomer                                              |                                 |                             |
| Handles                                    | N/A                                   |                                       | Nylon                                                                |                                 |                             |
| Hold-up volume                             |                                       |                                       |                                                                      |                                 |                             |
| Capsule fill volume <sup>2</sup>           | Double layer                          | ~ 1.1 litre                           | ~ 5.2 litre                                                          |                                 |                             |
|                                            | Single layer                          | ~ 2.6 litre                           | ~ 4.2 litre                                                          |                                 |                             |
| Post blow-down hold-up volume <sup>3</sup> |                                       | < 100 ml                              | < 100 ml                                                             |                                 |                             |
| Maximum operating line pressure            |                                       | 3.4 bar                               | 3.4 bar                                                              |                                 |                             |
| Maximum differential pressure forward      |                                       | 2.4 bar                               | 2.4 bar                                                              |                                 |                             |
| Sterilisation                              |                                       | 1 cycle autoclave (30 min.) at 126 °C | 1 cycle autoclave (30 min.) at 126 °C                                |                                 |                             |
| Effective filtration area                  |                                       | 0.23 m <sup>2</sup>                   | Double layer: 1.6 m <sup>2</sup><br>Single layer: 2.5 m <sup>2</sup> |                                 |                             |
| Top/Bottom manifold                        |                                       |                                       |                                                                      |                                 |                             |
| Dimensions (height x diameter)             |                                       | 5.2 cm x 45.2 cm                      | 5.2 cm x 45.2 cm                                                     |                                 |                             |
| Connector                                  |                                       | 1.5" sanitary style                   | 1.5" sanitary style                                                  |                                 |                             |
| Material                                   |                                       | Polycarbonate                         | Polyphenylene / Polystyrene                                          | Polycarbonate                   | Polyphenylene / Polystyrene |
| Weight                                     |                                       | 4.5 kg                                | 4.5 kg                                                               | 4.5 kg                          | 4.5 kg                      |
| Hold-up volume                             |                                       | < 250 ml                              |                                                                      | < 250 ml                        |                             |

<sup>1</sup> Based on testing with 1M NaOH and 5% NaClO (Bleach). See Chemical Compatibility Guide for more information.

<sup>2</sup> Capsule fill volume is defined as the volume of liquid that is required to fill the portion of the capsule outside the filter media.

<sup>3</sup> Post blown-down hold-up volume is defined as the volume of the residual liquid after nitrogen gas blown-down.

<sup>1</sup> Based on testing with 1M NaOH and 5% NaClO (Bleach). See Chemical Compatibility Guide for more information.

<sup>2</sup> Capsule fill volume is defined as the volume of liquid that is required to fill the portion of the capsule outside the filter media.

<sup>3</sup> Post blown-down hold-up volume is defined as the volume of the residual liquid after nitrogen gas blown-down.

Table 2b: Zeta Plus™ Scale-Up Capsule specifications

| Filter Capsules                            |              | Configuration                         |                     |                      |
|--------------------------------------------|--------------|---------------------------------------|---------------------|----------------------|
|                                            |              | 170 cm <sup>2</sup>                   | 340 cm <sup>2</sup> | 1020 cm <sup>2</sup> |
| Dimensions                                 |              |                                       |                     |                      |
| Height x diameter                          |              | 10.3 cm x 21.6 cm                     |                     | 15.2 cm x 21.6 cm    |
| Weight                                     |              |                                       |                     |                      |
| Dry                                        | Single layer | 1.0 kg                                | 1.0 kg              | 1.4 kg               |
|                                            | Double layer | 1.0 kg                                | 1.0 kg              | 1.6 kg               |
| Wet post blow - down                       | Single layer | 1.1 kg                                | 1.1 kg              | 1.8 kg               |
|                                            | Double layer | 1.2 kg                                | 1.3 kg              | 2.4 kg               |
| Materials of construction                  |              |                                       |                     |                      |
| Capsule shells                             |              | Polysulfone                           |                     |                      |
| Separator, spacer and vent cap             |              | Polypropylene                         |                     |                      |
| O-ring                                     |              | Fluorocarbon                          |                     |                      |
| End cap and edge seals                     |              | Thermoplastic elastomer               |                     |                      |
| Volume                                     |              |                                       |                     |                      |
| Capsule fill volume <sup>1</sup>           | Single layer | 0.48 litre                            | 0.40 litre          | 0.91 litre           |
|                                            | Double layer | 0.43 litre                            | 0.34 litre          | 0.62 litre           |
| Post blow-down hold-up volume <sup>2</sup> | Single layer | < 40 ml                               | < 40 ml             | < 40 ml              |
|                                            | Double layer | < 40 ml                               | < 40 ml             | < 40 ml              |
| Other                                      |              |                                       |                     |                      |
| Sterilisation                              |              | 1 cycle autoclave (30 min.) at 126 °C |                     |                      |
| Effective filtration area                  |              | 170 cm <sup>2</sup>                   | 340 cm <sup>2</sup> | 1020 cm <sup>2</sup> |
| Connector                                  |              | 1/2" sanitary style                   |                     |                      |

<sup>1</sup> Capsule fill volume is defined as the volume of liquid that is required to fill the portion of the capsule outside the filter media.

<sup>2</sup> Post blown-down hold-up volume is defined as the volume of the residual liquid after nitrogen gas blown-down.

IMPORTANT NOTICE: Always operate the filter system within the maximum differential pressure of 2.4 bar.

Figure 7: Scale-Up Capsule filter schematics

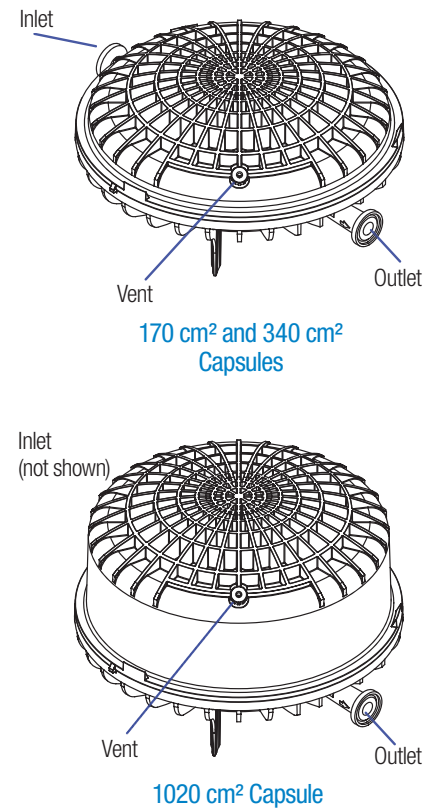
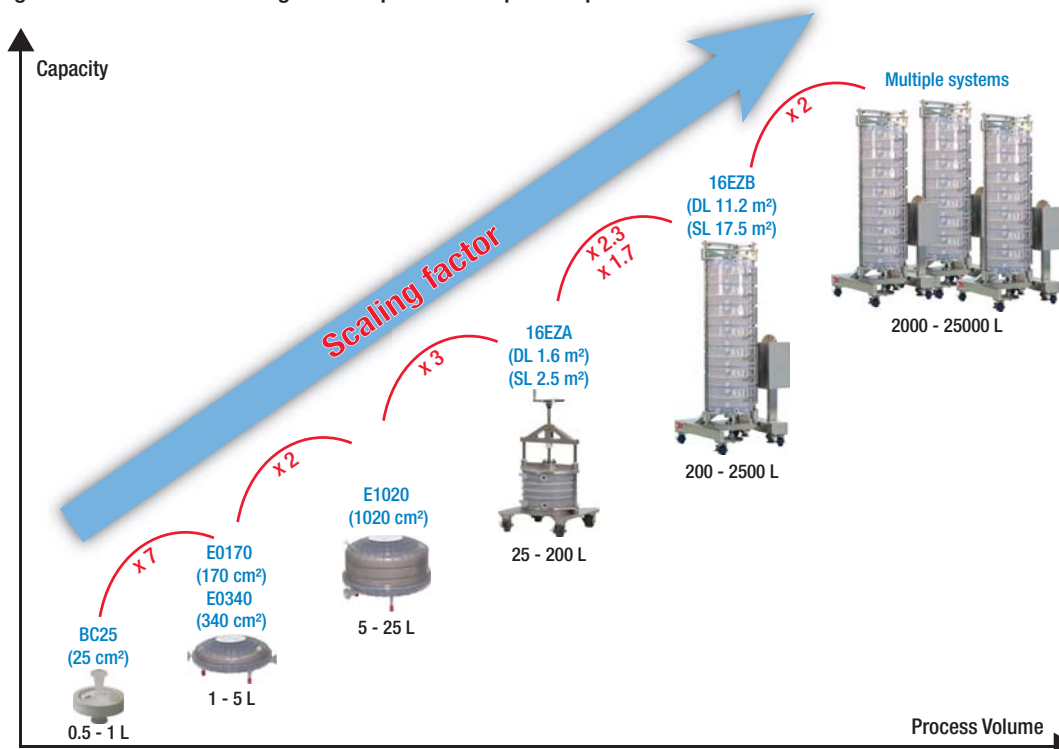


Figure 6: The Zeta Plus™ single-use depth filtration product portfolio



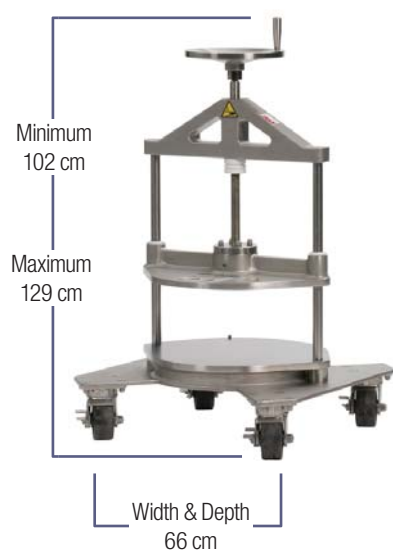
**Table 3: Zeta Plus™ Encapsulated System holder specifications**

|                            | Holder model                                     |                                       |
|----------------------------|--------------------------------------------------|---------------------------------------|
|                            | Small holder<br>(Model 16EZA)                    | Large holder<br>(Model 16EZB)         |
| Maximum operating pressure | 3.4 bar                                          | 3.4 bar                               |
| Materials of construction  |                                                  |                                       |
| Frame                      | 304 stainless steel                              | 304 stainless steel                   |
| End plate                  | 304 stainless steel                              | 304 stainless steel                   |
| Support rods               | 440 stainless steel                              | 316 stainless steel                   |
| Stand                      | 304 stainless steel                              | 304 stainless steel                   |
| Hand wheels                | 300 Series stainless steel                       | 300 Series stainless steel            |
| Gear box                   | N/A                                              | Epoxy-coated cast iron cover          |
| Locking bar                | N/A                                              | 304 stainless steel                   |
| Casters                    | Stainless steel                                  | Stainless steel                       |
| Wheels                     | Phenolic                                         | Polyurethane                          |
| Surface                    |                                                  |                                       |
| Standard                   | Satin glass bead finish<br>(4814901 and 4815501) | Mechanical polish finish<br>(6123502) |
| Special                    | Electropolish finish<br>(4814902)                | N/A                                   |

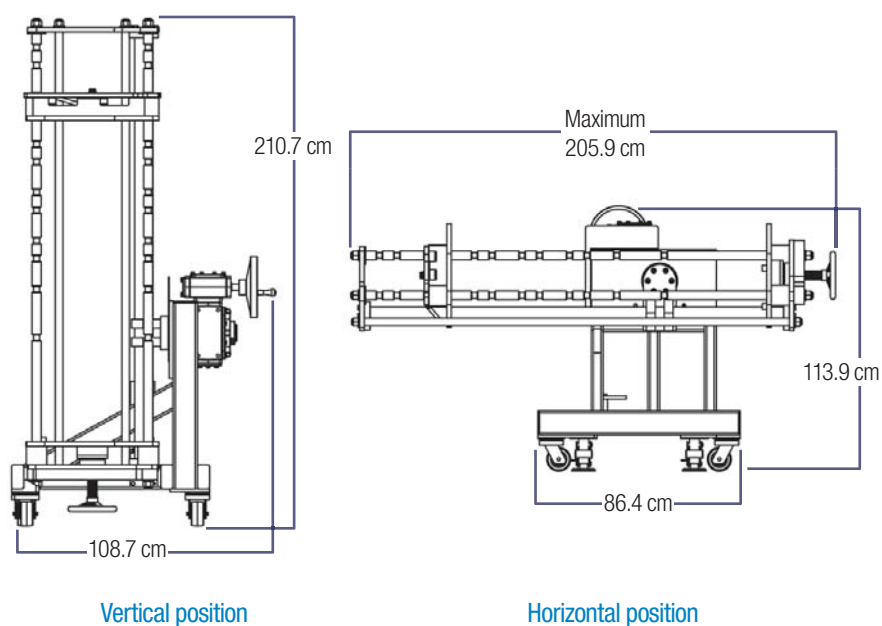
**Table 4: Zeta Plus Encapsulated System holder capacity**

| Model  | Single stage            |                        | Two-stage               |                        |
|--------|-------------------------|------------------------|-------------------------|------------------------|
|        | E16 Single-cell capsule | E16 Multi-cell capsule | E16 Single-cell capsule | E16 Multi-cell capsule |
| 16 EZA | 4                       | 1                      | 2                       | N/A                    |
| 16 EZB | N/A                     | 7                      | N/A                     | 6                      |

**Figure 8: Small holder (model 16EZA) dimensions**



**Figure 9: Large holder (model 16EZB) dimensions**



## Zeta Plus™ Encapsulated System - Ordering guide

### A-1. Double-layer capsule filter description information

| Catalogue number | Configuration                           | Number of cells            | Gasket material | Grade   |         |          |
|------------------|-----------------------------------------|----------------------------|-----------------|---------|---------|----------|
| E16              | E - Standard<br>R - Alkaline resistant* | 01 - 1 Cell<br>07 - 7 Cell | A - Silicone    | 05SP01A | 60ZA05A | 90ZA08A  |
|                  |                                         |                            |                 | 10SP01A | 60SP02A | 120ZA08A |
|                  |                                         |                            |                 | 10SP02A | 90SP05A | DEL108A  |
|                  |                                         |                            |                 | 30SP02A | 90ZA05A |          |

### A-2. Single-layer capsule filter description information

| Catalogue number | Configuration                           | Number of cells             | Gasket material | Grade |      |      |
|------------------|-----------------------------------------|-----------------------------|-----------------|-------|------|------|
| E16              | E - Standard<br>R - Alkaline resistant* | 01 - 1 Cell<br>11 - 11 Cell | A - Silicone    | 30LA  | 30LP | DEL1 |
|                  |                                         |                             |                 | 50LA  | 50LP |      |
|                  |                                         |                             |                 |       | 60LP |      |
|                  |                                         |                             |                 |       | 90LP |      |

#### NOTES:

1. All Zeta Plus™ EXT grades are available for order.
2. For further information regarding Zeta Plus™ EXT Series filter media, please contact your local 3M Purification representative.
3. DEL108A is a Zeta Plus™ EXT grade with two single layers of Delipid (DEL1) media.
4. Single layer 05SP media is offered in 0.23 m<sup>2</sup> and 1.6 m<sup>2</sup> Capsule format. One part number example is E16E07A05SP.

### A-3. Double-layer scale-up capsule filter description information

| Catalogue number | Filter area          | Material code | Grade   |         |          |         |
|------------------|----------------------|---------------|---------|---------|----------|---------|
| E                | 0170<br>0340<br>1020 | FSA           | 05SP01A | 30SP02A | 90SP05A  | DEL108A |
|                  |                      |               | 10SP01A | 60SP02A | 90ZA05A  | DELP08A |
|                  |                      |               | 10SP02A | 60ZA05A | 120ZA08A |         |
|                  |                      |               |         |         |          |         |

### A-4. Single-layer scale-up capsule filter description information

| Catalogue number | Filter area          | Material code | Grade |      |      |
|------------------|----------------------|---------------|-------|------|------|
| E                | 0170<br>0340<br>1020 | FSA           | 30LA  | 30LP | DEL1 |
|                  |                      |               | 50LA  | 60LP |      |
|                  |                      |               |       | 90LP |      |
|                  |                      |               |       |      |      |

### B. Disposable manifold ordering information

| Manifold part                      | 3M ID number |
|------------------------------------|--------------|
| Manifold set (Standard)            | 70020256221  |
| Manifold set (Alkaline resistant*) | 70020262369  |

\* Based on testing with 1M NaOH and 5% NaClO (Bleach).  
Ask for Chemical Compatibility Guide for more information.

### C. Hardware (filter holder) ordering information

| Model name | Description                                    | 3M ID number |
|------------|------------------------------------------------|--------------|
| 16EZA      | Standard small holder                          | 70020233048  |
| 16EZA      | Small holder with electropolishing finish      | 70020253889  |
| 16EZA      | Modified small holder suitable for autoclaving | 70020236512  |
| 16EZB      | Large holder with mechanical polish finish     | 70020252899  |

#### A-1a. Double-layer standard capsule filter ordering information

| Single-cell capsules |              | Multi-cell capsules |              |
|----------------------|--------------|---------------------|--------------|
| Product description  | 3M ID number | Product description | 3M ID number |
| E16E01A05SP01A       | 70020239011  | E16E07A05SP01A      | 70020236918  |
| E16E01A10SP02A       | 70020239029  | E16E07A10SP02A      | 70020236561  |
| E16E01A120ZA08A      | 70020238526  | E16E07A120ZA08A     | 70020236926  |
| E16E01A30SP02A       | 70020238534  | E16E07A30SP02A      | 70020236942  |
| E16E01A60SP02A       | 70020239078  | E16E07A60SP02A      | 70020236603  |
| E16E01A60ZA05A       | 70020238542  | E16E07A60ZA05A      | 70020236967  |
| E16E01A90ZA08A       | 70020238559  | E16E07A90ZA08A      | 70020236983  |
| E16E01A90SP05A       | 70020239102  | E16E07A90SP05A      | 70020236629  |
| E16E01A90ZA05A       | 70020238559  | E16E07A90ZA05A      | 70020236975  |

#### A-1b. Alkaline resistant\* double-layer capsule filter ordering information

| Single-cell capsules |              | Multi-cell capsules |              |
|----------------------|--------------|---------------------|--------------|
| Product description  | 3M ID number | Product description | 3M ID number |
| E16R01A05SP01A       | 70020262609  | E16R07A05SP01A      | 70020262740  |
| E16R01A10SP02A       | 70020262625  | E16R07A10SP02A      | 70020262757  |
| E16R01A120ZA08A      | 70020262641  | E16R07A120ZA08A     | 70020262773  |
| E16R01A30SP02A       | 70020262948  | E16R07A30SP02A      | 70020262799  |
| E16R01A60SP02A       | 70020262682  | E16R07A60SP02A      | 70020262823  |
| E16R01A60ZA05A       | 70020262708  | E16R07A60ZA05A      | 70020262856  |
| E16R01A90ZA08A       | 70020262732  | E16R07A90ZA08A      | 70020262898  |
| E16R01A90SP05A       | 70020262716  | E16R07A90SP05A      | 70020262864  |
| E16R01A90ZA05A       | 70020262963  | E16R07A90ZA05A      | 70020262880  |



#### A-2a. Single-layer standard capsule filter ordering information

| Single-cell capsules |              | Multi-cell capsules |              |
|----------------------|--------------|---------------------|--------------|
| Product description  | 3M ID number | Product description | 3M ID number |
| E16E01A30LA          | 70020288430  | E16E11A30LA         | 70020288604  |
| E16E01A30LP          | 70020288448  | E16E11A30LP         | 70020288612  |
| E16E01A50LA          | 70020288471  | E16E11A50LA         | 70020288646  |
| E16E01A50LP          | 70020288489  | E16E11A50LP         | 70020288653  |
| E16E01A60LP          | 70020288505  | E16E11A60LP         | 70020288687  |
| E16E01A90LP          | 70020288539  | E16E11A90LP         | 70020288729  |
| E16E01ADELI          | 70020256130  | E16E11ADELI         | 70020288588  |

#### A-2b. Alkaline resistant\* single-layer capsule filter ordering information

| Single-cell capsules |              | Multi-cell capsules |              |
|----------------------|--------------|---------------------|--------------|
| Product description  | 3M ID number | Product description | 3M ID number |
| E16R01A30LA          | 70020288802  | E16R11A30LA         | 70020289032  |
| E16R01A30LP          | 70020288810  | E16R11A30LP         | 70020289040  |
| E16R01A50LA          | 70020288836  | E16R11A50LA         | 70020289073  |
| E16R01A50LP          | 70020288844  | E16R11A50LP         | 70020289081  |
| E16R01A60LP          | 70020288877  | E16R11A60LP         | 70020289115  |
| E16R01A90LP          | 70020288901  | E16R11A90LP         | 70020289156  |
| E16R01ADELI          | 70020288786  | E16R11ADELI         | 70020289016  |

\* Based on testing with 1M NaOH and 5% NaClO (Bleach). Ask for Chemical Compatibility Guide for more information.

## A- 170 cm² Scale-up capsule filter ordering information

| 3a. Double-layer capsules |             | 4a. Single-layer capsules |             |
|---------------------------|-------------|---------------------------|-------------|
| Description               | ID number   | Description               | ID number   |
| E0170FSA05SP01A           | 70020290170 | E0170FSA30LA              | 70020290246 |
| E0170FSA10SP01A           | 70020290196 | E0170FSA50LA              | 70020290303 |
| E0170FSA10SP02A           | 70020290204 | E0170FSA30LP              | 70020290253 |
| E0170FSA30SP02A           | 70020290279 | E0170FSA60LP              | 70020290345 |
| E0170FSA60SP02A           | 70020290378 | E0170FSA90LP              | 70020290436 |
| E0170FSA90SP05A           | 70020290451 | E0170FSADELI              | 70020290139 |
| E0170FSA60ZA05A           | 70020290410 |                           |             |
| E0170FSA90ZA05A           | 70020290485 |                           |             |
| E0170FSA120ZA08A          | 70020290220 |                           |             |
| E0170FSADELI08A           | 70020290147 |                           |             |
| E0170FSADELP08A           | 70020290154 |                           |             |

## A- 340 cm² Scale-up capsule filter ordering information

| 3b. Double-layer capsules |             | 4b. Single-layer Capsules |             |
|---------------------------|-------------|---------------------------|-------------|
| Description               | ID number   | Description               | ID number   |
| E0340FSA05SP01A           | 70020290543 | E0340FSA30LA              | 70020290618 |
| E0340FSA10SP01A           | 70020290568 | E0340FSA50LA              | 70020290675 |
| E0340FSA10SP02A           | 70020290576 | E0340FSA30LP              | 70020290626 |
| E0340FSA30SP02A           | 70020290642 | E0340FSA60LP              | 70020290717 |
| E0340FSA60SP02A           | 70020290741 | E0340FSA90LP              | 70020290808 |
| E0340FSA90SP05A           | 70020290824 | E0340FSADELI              | 70020290501 |
| E0340FSA60ZA05A           | 70020290782 |                           |             |
| E0340FSA90ZA05A           | 70020290857 |                           |             |
| E0340FSA120ZA08A          | 70020290592 |                           |             |
| E0340FSADELI08A           | 70020290519 |                           |             |
| E0340FSADELP08A           | 70020290527 |                           |             |

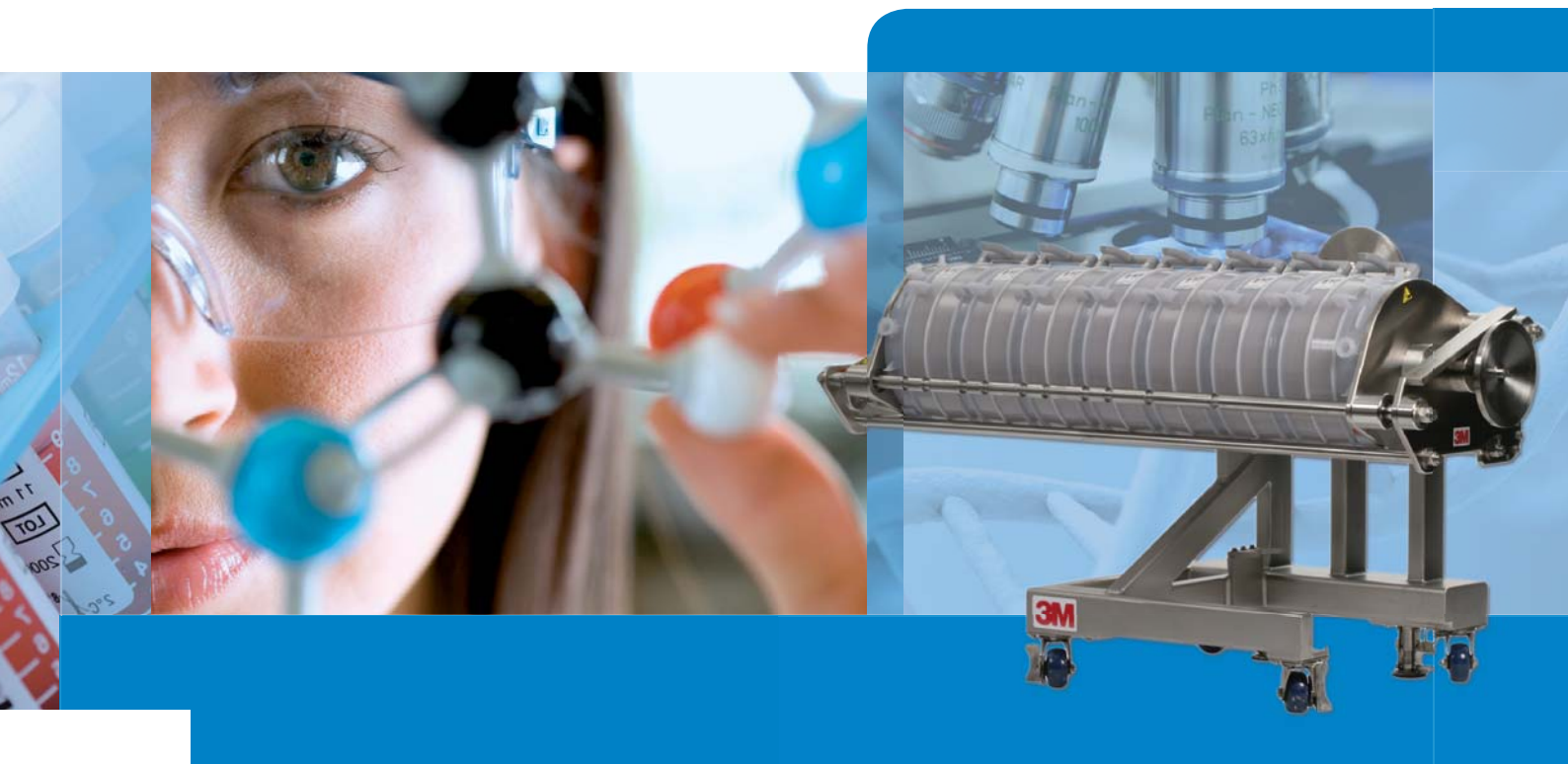
## A- 1020 cm² Scale-up capsule filter ordering information

| 3c. Double-layer capsules |             | 4c. Single-layer capsules |             |
|---------------------------|-------------|---------------------------|-------------|
| Description               | ID number   | Description               | ID number   |
| E01020FSA05SP01A          | 70020290915 | E01020FSA30LA             | 70020290980 |
| E01020FSA10SP01A          | 70020290931 | E01020FSA50LA             | 70020291046 |
| E01020FSA10SP02A          | 70020290949 | E01020FSA30LP             | 70020290998 |
| E01020FSA30SP02A          | 70020291012 | E01020FSA60LP             | 70020291087 |
| E01020FSA60SP02A          | 70020291111 | E01020FSA90LP             | 70020291178 |
| E01020FSA90SP05A          | 70020291194 | E01020FSADELI             | 70020290873 |
| E01020FSA60ZA05A          | 70020291152 |                           |             |
| E01020FSA90ZA05A          | 70020291228 |                           |             |
| E01020FSA120ZA08A         | 70020290964 |                           |             |
| E01020FSADELI08A          | 70020290881 |                           |             |
| E01020FSADELP08A          | 70020290899 |                           |             |



## Zeta Plus™ Encapsulated Depth Filter Platform - Scalability

| Lab and R&D   | Scale-Up        | Pilot production | Large-scale production |
|---------------|-----------------|------------------|------------------------|
|               |                 |                  |                        |
| Up to 1 litre | Up to 50 litres | Up to 400 litres | Up to 5000 litres      |



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