Rigid Outer Containers

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Introduction

Rigid Outer Containers (ROCs) are a common part of the infrastructure that supports the usage of larger volume single-use assemblies. This document serves as a primer to the general features, functionality and usage of the two primary Meissner product families that serve this functionality, the FlexStation® and QuaDrum® product lines.

It should be noted that Meissner can provide custom biocontainer assembly designs compatible with a vast array of third party ROCs, however, this must communicated with our Applications Engineering team at the outset of a given endeavor.

General Considerations

The following considerations are applicable to the selection of any ROC and serve to differentiate the characteristics of Meissner's ROC products and potentially guide an end-user in the appropriate selection thereof.

Deployment

The term deployment as used herein considers the manner in which an end-user would install and utilize, or deploy, a given single-use system (SUS). This is a critical consideration in the design and implementation of a SUS as this process must be both repeatable and robust to ensure the successful usage thereof.

The following assumes two distinct methods of biocontainer deployment — self-deployment, in which the gussets are located in a horizontal orientation on the sides of biocontainer, and traditional deployment, in which the gussets are located on the top and bottom of the biocontainer. We will assume the working definition of aspect ratio as $AR = W/H_B$, the associated variables are defined below.

Variable Definition

Please reference Figure 1, which defines the variables used to determine sizing of a biocontainer.

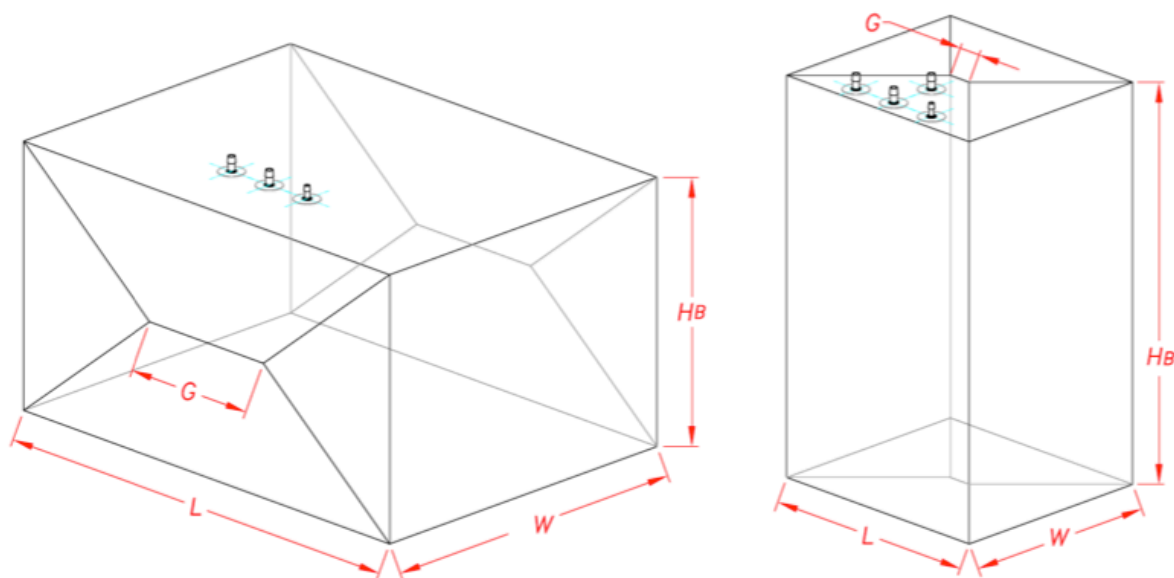| Definition	Variable
Biocontainer length	L (L > W)
Biocontainer width	W (W < L)
Biocontainer gusset width	G
Biocontainer Height	H_B

Figure 1: The biocontainer design on the left is self-deploying with an AR>1
while the design on the right will exhibit a traditional deployment with an AR<1.

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Self-Deployment

A biocontainer is considered self-deployable when the rigid outer container allows for a design in which the gusset is located in a horizontal orientation on the side of the biocontainer. The gusset is most frequently located on the longest side of the biocontainer, defined as the length (L) as per the above. The gusset width is then defined as $G = L - H_B$. The FlexStation® product line is compatible with self-deploying biocontainers.

Traditional Deployment

A biocontainer is not considered readily self-deployable when the rigid outer container prompts a biocontainer design in which the height dimension approaches the length dimension or $L - H_B$ approaches zero. The gusset is then typically rotated to the top of the biocontainer, where the gusset width is defined as $G = L - W$; this results in what is described as a traditional deployment. The QuaDrum® product line is compatible with traditional deployment biocontainers.

Discussion

Self-deploying biocontainers allow for SUS assemblies to be positioned in the bottom of a rigid outer container then filled without additional operator manipulation. Biocontainers in which the gusset is located on the top typically require some limited operator interaction during filling. A biocontainer deployed in the latter manner needs to be centered in the rigid outer container until enough fluid has been introduced to effectively secure the biocontainer in its location. The degree to which this manipulation is necessary will depend on the ROC and associated biocontainer design. Note that in the case of QuaDrum® ROCs this is typically mitigated as opposed to more traditional cylindrical vessels.

Assembly Design

Bottom Drain

A bottom drain can be useful in gravity feed applications or when uninterrupted fluid flow is critical. It should be noted, however, that when using a positive displacement pump, e.g. a peristaltic pump, that evacuating fluid from a top port will result in functional fluid removal as well. All FlexStation® products can accommodate a bottom drain. This is an optional feature for QuaDrum® ROCs.

Assembly Considerations

Meissner has an array of standard SUS designs available that interface with both our FlexStation® and QuaDrum® products. Our Applications Engineering Department can assist in the customization of a SUS assembly for your specific process.

Meissner recommends the use of 3D biocontainer assemblies with all of its ROCs. Historically, some rigid outer containers (e.g. cylindrical drums) have been used in conjunction with two-dimensional (2D) face-ported biocontainers. We do not recommended this for either the FlexStation® or QuaDrum® ROCs.

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Footprint

Manufacturing space is typically at a premium and thus footprints of the ROC being considered is typically a relevant consideration. All Meissner ROCs make efficient utilization of floor space with the FlexStation® products providing the added advantage of folding up when not in use.

Usage

Definition of the intended usage paradigm for an ROC is a critical consideration when specifying an ROC. The following three points are common when considering this, and are expounded upon further in the sections of this document specific to the FlexStation® and QuaDrum® products.

Interfacility

An ROC that is going to be used in an interfacility operating mode typically indicates that it, and the associated SUS, will be introduced to some form of transportation between facilities. This is the more rigorous of the two usage models and requires the use of dunnage materials. FlexStation® ROCs are compatible with interfacility deployment.

Intrafacility

Intrafacility usage indicates that an ROC and associated SUS will be deployed and utilized within a given facility. This is the less demanding of the two usage models, although consideration of how the ROC may move, even intrafacility, is crucial to a successful implementation.

Mobility

A fluid filled ROC and SUS can be quite heavy, thus consideration of how these items will be moved intrafacility, and potentially interfacility is necessary. Meissner offers a number of accessory items that facilitate these operations.

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FlexStation® ROCS

Overview

FlexStation® ROCs are designed to support critical intrafacility applications and most are also compatible with interfacility usage when properly employed. They are available in nominal capacities that support applications between 100 and 1000 L.

Specifications

Sizes

FlexStation® ROCs are available in the nominal sizes represented in the table below. Additionally, indicated therein is information pertaining to the general configuration of these items and the maximum applicable volumes for which they can be utilized.

FlexStation© Part No.	Description	Configuration	Maximum Volume[1] Intrafacility Usage	Maximum Volume[1] Interfacility Usage
FSB0100FB	FlexStation© 100 ROC	Services top and bottom drain applications, includes false bottom for bottom fluid path access and storage.	110 L	105 L
FSB0200FB	FlexStation© 200 ROC	Services top and bottom drain applications, includes false bottom for bottom fluid path access and storage.	220 L	205 L
FSB0200TD	FlexStation© 200 ROC	Services top drain applications only, no bottom fluid path access or storage provided.	260 L	250 L
FSB0500BD	FlexStation© 500 ROC	Services top and bottom drain applications, includes false wall for bottom fluid path access and storage	515 L	510 L
FSB0500TD	FlexStation© 500 ROC	Services top drain applications only, no bottom fluid path access or storage provided.	525 L	510 L
FSB1000TD	FlexStation© 1000 ROC	Primarily services top drain applications, lower fluid path access possible, however, no storage area provided.	1,030 L	N/A

[1] Volumes represented predicated on usage of appropriate single-use systems.

Table 1

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Figure 2. FlexStation® 100 (Part Number FSB0100FB).

Inside View

Figure 3. FlexStation® 200 (Part Number FSB0200FB).

Inside View

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Figure 4. FlexStation® 200 (Part Number FSB0200TD).
Note: There is no lower access door provided on this model given that there
are no accommodations for bottom fluid path storage on this model.

Inside View

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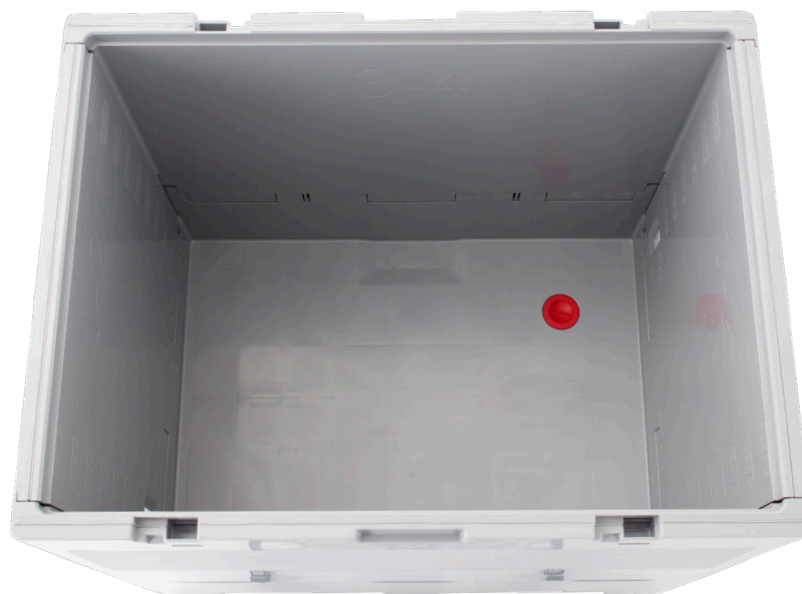
Figure 5. FlexStation® 500 (Part Number FSB0500BD).
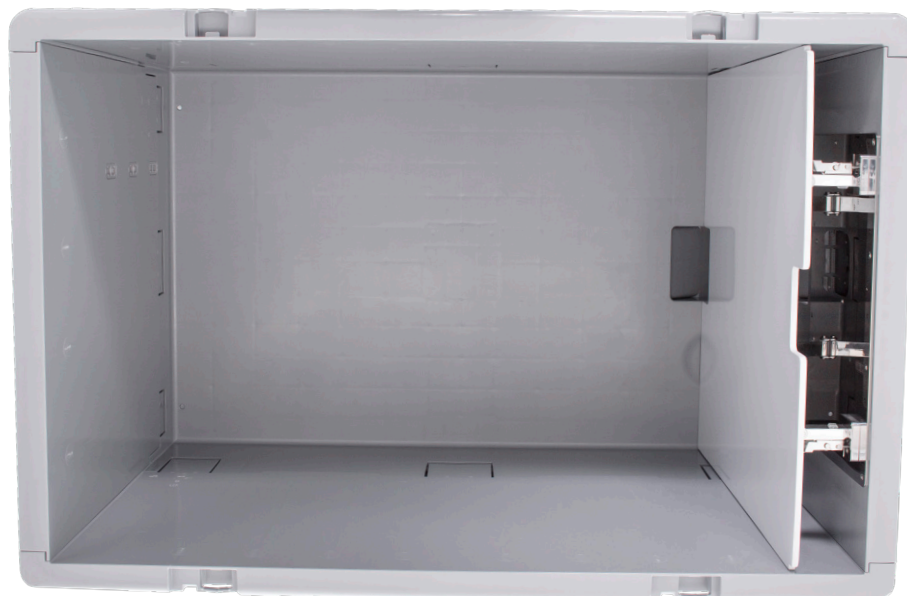
Inside View

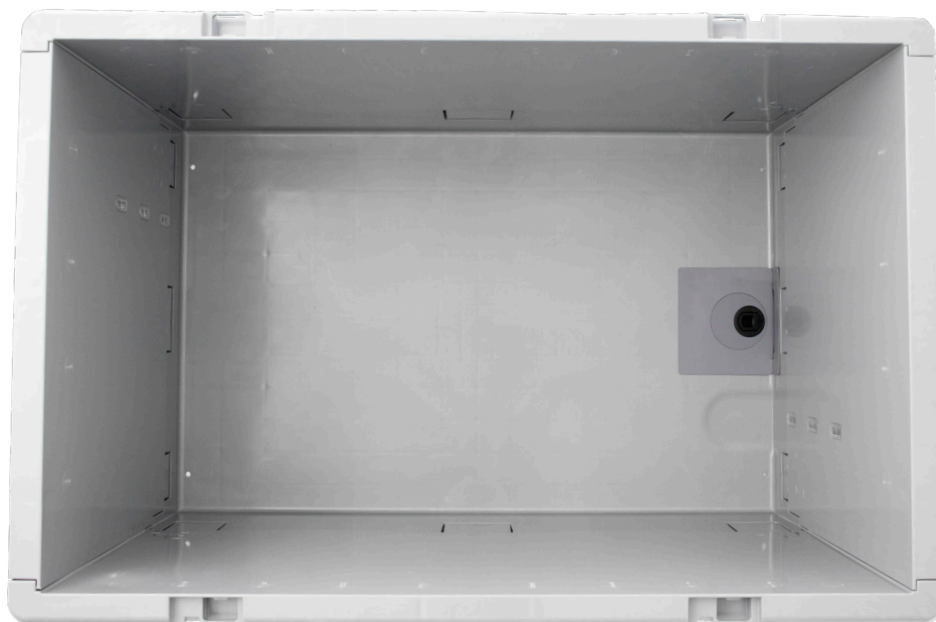**Figure 6.** FlexStation® 500 (Part Number FSB0500TD).

Inside View

Figure 7. FlexStation® 1000 (Part Number FSB1000TD).

Inside View

General Dimensional and Weights

The outer dimensions of the various FlexStation® ROCs and their empty weights are presented in the table below.

FlexStation© Part No.	Length	Width	Height (Deployed)	Height (Collapsed)	ROC Weight (Empty)
FSB0100FB	31.9" (809 mm)	24.0" (609 mm)	32.8" (833 mm)	15.9" (403 mm)	66 lb (30 kg)
FSB0200FB	31.9" (809 mm)	24.0" (609 mm)	32.8" (833 mm)	15.9" (403 mm)	53 lbs (24 kg)
FSB0200TD	31.9" (809 mm)	24.0" (609 mm)	32.8 (833 mm)	15.9" (403 mm)	44 lbs (20 kg)
FSB0500BD	47.2" (1,200 mm)	31.5" (800 mm)	36.3" (922 mm)	18.5" (475 mm)	225 lbs (102 kg)
FSB0500TD	47.2" (1,200 mm)	31.5" (800 mm)	36.3" (922 mm)	18.5" (475 mm)	155 lbs (70 kg)
FSB1000TD	47.2" (1,200 mm)	39.4" (1,000 mm)	49.5" (1,260 mm)	18.5 (475 mm)	275 lbs (125 kg)

Table 2

Materials of Construction

The primary materials of construction in the FlexStation® 100 and 200 are presented in the table below.

FlexStation© Part No.	Bin	Support Rack	Support Tray	Access Door	Badging
FSB0100FB	Polypropylene	304 Stainless Steel	Polypropylene	ABS	304 Stainless Steel
FSB0200FB	Polypropylene	304 Stainless Steel	Polypropylene	ABS	304 Stainless Steel
FSB0200TD	Polypropylene	N/A	N/A	N/A	304 Stainless Steel

Table 3

The primary materials of construction in the FlexStation® 500 and 1000 models are presented in the table below.

FlexStation© Part No.	Bin	Support Rack	Support Tray	Access Door	Badging
FSB0500BD	ABS	304 Stainless Steel/ABS	304 Stainless Steel/Aluminum	304 Stainless Steel/ABS	304 Stainless Steel/ABS
FSB0500TD	ABS	N/A	N/A	304 Stainless Steel/ABS	304 Stainless Steel/ABS
FSB01000TD	ABS	N/A	N/A	304 Stainless Steel/ABS	304 Stainless Steel/ABS

Table 4

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Optional Features and Accessories

Carts

Meissner has carts available for all FlexStation® models as detailed in the table below. All locking casters indicated in the table lock both the wheel and the pivot, providing a stable and rigid platform to assist in loading, unloading, and storage.

Cart Part No.	Applicable FlexStation© Part No.	Construction	Caster Wheels	Features
FSCS02A	FSB0100FB FSB0200FB FSB0200TD	304 Stainless Steel	(4) Locking Swivel; Stainless steel hardware, non-marring 4" urethane wheels	Removable handle, forklift accessible from (2) sides
FSCS02B	FSB0100FB FSB0200FB FSB0200TD	304 Stainless Steel	(4) Locking Swivel; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (4) sides, optional tow bar (See Powered Movers section)
FSCS02C	FSB0100FB FSB0200FB FSB0200TD	304 Stainless Steel	(2) Locking Swivel, (2) Non-locking; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (4) sides, optional tow bar (See Powered Movers section)
FSCL04A	FSB0500TB FSB0500BD	304 Stainless Steel	(4) Locking Swivel; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (4) sides, optional tow bar (See Powered Movers section)
FSCL04B	FSB0500TD FSB0500BD	304 Stainless Steel	(2) Locking Swivel, (2) Non-locking Fixed; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (4) sides, optional tow bar (See Powered Movers section) caster configuration recommended for usage with power assisted Movers
FSCL11A	FSB1000TD	304 Stainless Steel	(4) Locking Swivel; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (4) sides, optional tow bar (See Powered Movers section)
FSCL11B	FSB1000TD	304 Stainless Steel	(2) Locking Swivel, (2) Non-locking Fixed; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (4) sides, optional tow bar (See Powered Movers section) caster configuration recommended for usage with power assisted Movers

Table 5

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Additional dimensional information as well as weights for the FlexStation® carts provided in table below.

Cart Part No.	Applicable FlexStation© Part No.	Cart Length	Cart Width	Cart Height (from ground to base of FlexStation©)	Weight (Cart only)
FSCS02A	FSB0100FB FSB0200FB FSB0200TD	32" (813 mm)	25.75" (654 mm)	6.75" (172 mm)	30 lbs (14 kg)
FSCS02B	FSB0100FB FSB0200FB FSB0200TD	32.5" (826 mm)	24.2" (615 mm)	7.3" (185 mm)	53 lbs (24 kg)
FSCS02C	FSB0100FB FSB0200FB FSB0200TD	32.5" (826 mm)	24.2" (615 mm)	7.3" (185 mm)	53 lbs (24 kg)
FSCL04A	FSB0500TD FSB0500BD	48.4" (1,229 mm)	32.6" (828 mm)	7.3" (185 mm)	70 lbs (32 kg)
FSCL04B	FSB0500TD FSB0500BD	48.4" (1,229 mm)	32.6" (828 mm)	7.3" (185 mm)	70 lbs (32 kg)
FSCL11A	FSB1000TD	48.4" (1,229 mm)	40.6" (1,031 mm)	7.3" (185 mm)	70 lbs (32 kg)
FSCL11B	FSB1000TD	48.4" (1,229 mm)	40.6" (1,031 mm)	7.3" (185 mm)	70 lbs (32 kg)

Table 6

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Carts with Integrated Load Cells

Meissner also offers a selection of FlexStation® carts with integrated load cells for weight measurement. All carts provide the same display and electronics package for operational consistency as summarized in the following table.

Transmitter	Units	Capacity	Accuracy	Enclosure Rating	Electrical Requirements
Mettler Toledo	lbs or kgs	4,000 lbs (1,815 kgs)	0.1 lb (0.05 kg)	Nema 4x (IP66)	115 V/230 V 50.60 HZ

Table 7

Load Cell Cart Part No.	Applicable FlexStation© Part No.	Construction	Caster Wheels	Features
FSCS02B-LC	FSB0100FB FSB0200FB FSB0200TD	304 Stainless Steel	(4) Locking Swivel; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (3) sides, optional tow bar (See Powered Movers section)
FSCS02C LC	FSB0100FB FSB0200FB FSB0200TD	304 Stainless Steel	(2) Locking Swivel, (2) Non-locking; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (3) sides, optional tow bar (See Powered Movers section)
FSCL04A-LC	FSB0500TD FSB0500BD	304 Stainless Steel	(4) Locking Swivel; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (3) sides, optional tow bar (See Powered Movers section)
FSCL04B-LC	FSB0500TD FSB0500BD	304 Stainless Steel	(2) Locking Swivel, (2) Non-locking; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (3) sides, optional tow bar (See Powered Movers section) caster configuration recommended for usage with power assisted Movers
FSCL11A-LC	FSB1000TD	304 Stainless Steel	(4) Locking Swivel; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (3) sides, optional tow bar (See Powered Movers section) caster configuration recommended for usage with power assisted Movers
FSCL11B-LC	FSB1000TD	304 Stainless Steel	(2) Locking Swivel, (2) Non-locking; Stainless steel hardware, non-marring 5" urethane wheels	Forklift accessible from (3) sides, optional tow bar (See Powered Movers section) caster configuration recommended for usage with power assisted Movers

Table 8

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Additional dimensional information as well as weights for the FlexStation® carts featuring load cells is provided in the table below.

Cart Part No.	Applicable FlexStation© Part No.	Cart Length	Cart Width	Cart Height (From ground to base of FlexStation©)	Cart Height (From ground to top of Load Cell Cart)	Weight (Cart only)
FSCS02B-LC	FSB0100FB FSB0200FB FSB0200TD	32.5" (826 mm)	28.6" (725 mm)	9.81" (249 mm)	33.3" (846 mm)	133 lbs (60 kg)
FSCS02C-LC	FSB0100FB FSB0200FB FSB0200TD	32.5" (826 mm)	28.6" (725 mm)	9.81" (249 mm)	33.3" (846 mm)	133 lbs (60 kg)
FCSL04A-LC	FSB0500TD FSB0500FB	48.8" (1,239 mm)	37.0" (939 mm)	9.81" (249 mm)	33.3" (846 mm)	156 lbs (71 kg)
FSCL04B-LC	FSB0500TD FSB0500FB	48.8" (1,239 mm)	37.0" (939 mm)	9.81" (249 mm)	33.3" (846 mm)	156 lbs (71 kg)
FSCL11A-LC	FSB1000TD	48.8" (1,239 mm)	45.0" (1,142 mm)	9.81" (249 mm)	33.3" (846 mm)	163 lbs (74 kg)
FSCL11B-LC	FSB1000TD	48.8" (1,239 mm)	45.0" (1,142 mm)	9.81" (249 mm)	33.3" (846 mm)	163 lbs (74 kg)

Table 9

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Figure 8. Cart for 100 L and 200 L FlexStation® ROC (Part Number FSCS02A).

Figure 9. Cart for 100 L and 200 L FlexStation® ROC (Part Number FSCS02B).

Figure 10. Cart with Load Cells for 100 L and 200 L FlexStation® ROC (Part Number FSCS02B-LC).

Figure 11. Cart for 500 L FlexStation® ROC (Part Number FSCL04A/B). Note: The FSCL04A is shown and contains (4) swivel casters. The FSCL04B is the same cart, but with (2) swivel and (2) fixed casters as per Table 6.

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Figure 12. Cart for 1000 L FlexStation® ROC (Part Number FSCL11A/B). Note: The FSCL11A is shown and contains (4) swivel casters. The FSCL11B is the same cart, but with (2) swivel and (2) fixed casters as per Table 6.

Powered Movers

Power assisted movers can be useful in conjunction with the FlexStation® carts described in the previous section, especially at the larger scale. Meissner recommends the SmartMover motorized tug for accomplishing this. The smaller cart which is compatible with the FlexStation® 100 and 200, is also compatible with this hardware, while the larger carts that interface with the FlexStation® 500 and FlexStation® 1000 require the adaptor indicated below. Please visit www.meissner.com for photos and additional information pertaining to this option.

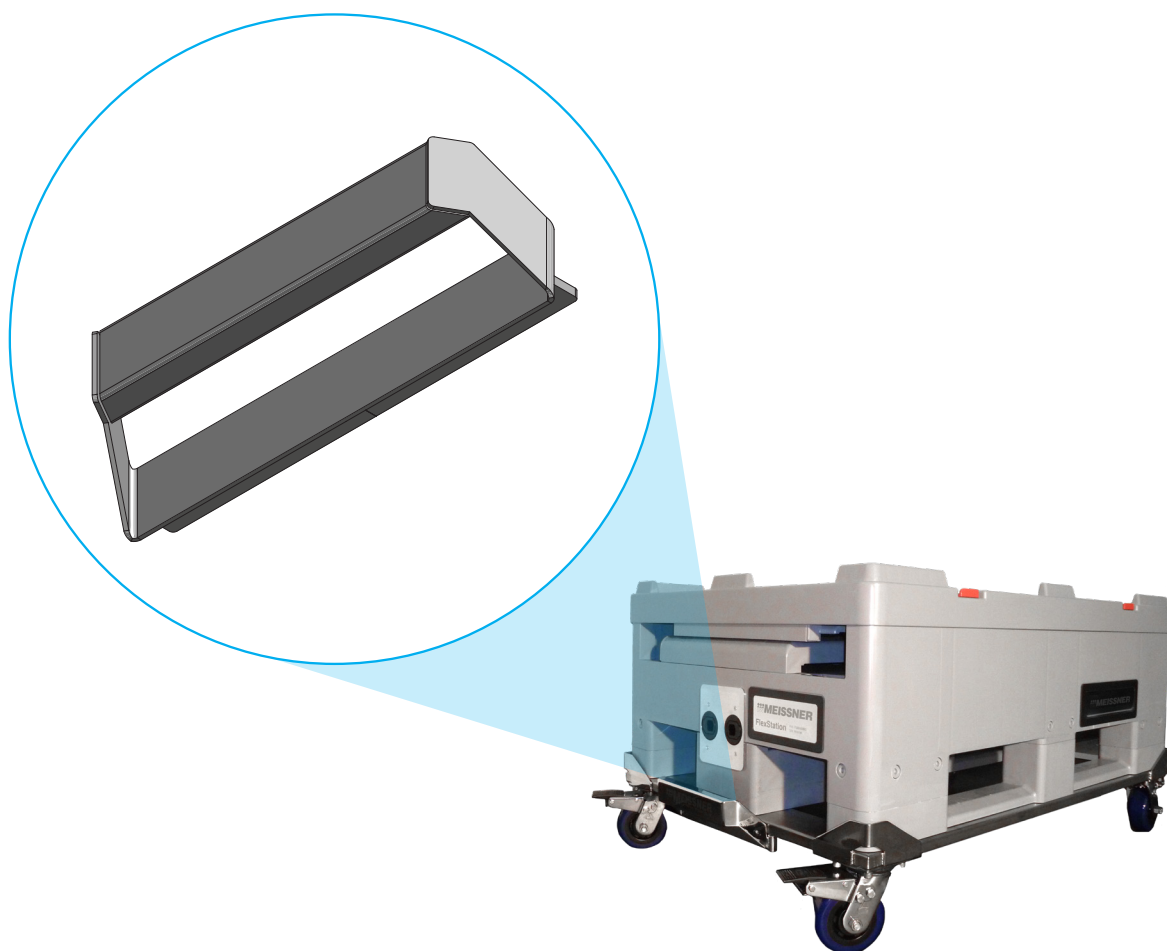| Part No.	Description
FSCA-6M01	Adapter for FSCL xxx Carts

Figure 13. Powered mover adapter for the 500 L and 1000 L FlexStation® ROCs (Part Number FSCA-6M01).

Figure 14. SmartMover attached to FlexStation® ROC and cart with adapter.

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All FlexStation® ROCs are compatible with pallet jacks. Meissner recommends the use of a short fork model for use with the smaller 100 L and 200 L models.

Part No.	Description
FSPJ01A	Stainless Steel Pallet Jack for 100 L and 200 L FlexStation® ROC models.

Figure 15. Short fork pallet jack recommended for the 100 L and 200 L FlexStation® ROC models.

Deployment

ROC Deployment

Deployment instructions for specific FlexStation® ROCs can be requested through Meissner's website, your local sales representative, or through our Applications Engineering department.

Biocontainer Deployment

All standard FlexStation® compatible SUSs are self-deploying. Unless otherwise requested, all custom single-use assemblies designed by our Applications Engineering team will also feature a self-deploying biocontainer. There are videos of various deployments available on the Meissner website at www.meissner.com.

Assembly Deployment

Bottom Drain Functionality

FlexStation® 100, 200, and 500 "FB" (False Bottom) and "BD" (Bottom Drain) models [part numbers FSB0100FB, FSB0200FB, and FSB0500BD] all feature integrated lower fluid path storage areas. In the 100 and 200 L models, this is provided via an integrated lower storage area accessible via a lower door. In the 500 L model, this same capacity is provided via a storage area on the side of the bin, which communicates with the lower fluid path access area. The FlexStation® 200 "TD" (Top Drain) [part number FSB0200TD] does not have accommodations for bottom porting. The FlexStation® 500 TD and 1000 [part numbers FSB0500TD and FSB1000TD] have lower port access areas to support bottom drain applications, however do not include fluid path storage areas.

Assembly Considerations

All FlexStation® compatible single-use assemblies can be designed with a wide variety of associated fluid paths, integrated sampling systems, etc.

Intrafacility Applications

General Recommendations

Compatibility

The compatibility of the various FlexStation® ROCs with possible usage paradigms is presented in the table below. Reference the definitions of Intrafacility and Interfacility provided on Page 6 of this document. Additional delineation of Interfacility is provided within Table 7 via the terms "Limited" and "Intermediate." Limited use encompasses infrequent, shorter duration transport while Intermediate use encompasses longer transport durations and/or through less controlled shipping methods. Please reference the Risk Factors on the following page (Figure 14) for further definition of the variables that affect the delineation between these two terms. Finally, note that Fleet usage is not covered within this document. For inquiries pertaining to this usage paradigm, please contact Meissner.

FlexStation© Part No.	Intrafacility Use	Limited Interfacility Use	Intermediate Interfacility Use
FSB0100FB	Compatible	Compatible	Compatible
FSB0200FB	Compatible	Compatible	Compatible
FSB0200TD	Compatible	Compatible	Compatible
FSB0500BD	Compatible	Compatible	Limited Compatibility, Reference Risk Factors
FSB0500TD	Compatible	Compatible	Application Specific, Reference Risk Factors
FSB01000TD	Compatible	Not Compatible	Not Compatible

Table 10

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Risk Factors

When considering interfacility usage of a FlexStation® ROC, the risk factors presented in Figure 14 should be considered. Each unique risk factor is represented as a continuum from lower to higher risk with functional examples provided to illustrate each case. Note: These factors are presented as an aid to help evaluate and mitigate risk associated with interfacility usage of FlexStation® products, and do not represent a quantifiable tool for determining process compatibility. Please contact Meissner with inquiries pertaining to your specific process.

Risk Factors	Risk Continuum		
	Lower Risk	**Moderate Risk**	**Higher Risk**
Shipment Method	Dedicated transport	LTL[1]	LTL[1] with multiple cross-dockings
Fluid Being Shipped	$SG^2 = 1$	$SG^2 > 1$	$SG^2 \gg 1$
Ancillary Protection	Stretch wrapped 5-7 times with top covered	Minimal stretch wrap	Sans ancillary protection
Stacking	Not stacking during transport	Stacked in storage	Stacked during transport
Handling	By trained personnel at cGMP facilities per SOP	By personnel at cGMP facilities	By untrained personnel

[1] LTL: Less Than Truckload shipping, wherein the ROC would be loaded with other dissimilar materials.
[2] SG: Specific Gravity.

Figure 16

Qualification

Meissner has performed both International Safe Transit Association (ISTA) and real-world distribution testing to qualify the applicable FlexStation® ROCs for interfacility usage.

ISTA 3H Testing

Overview: The ISTA 3H testing series is a general simulation test for mechanically handled bulk loads and is thus applicable to the FlexStation® ROCs. It includes horizontal impact testing, rotational flat and edge drops, and vibrational testing all performed in a prescribed sequence. Meissner has tested the part numbers indicated below in conjunction with this test. All testing was performed with applicable dunnage using standard TepoFlex® biocontainer assemblies.

FlexStation Part No.	Replicates tested
FSB0100FB	4
FSB0200FB	4
FSB0500BD	4
FSB0500TD	3

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Summary: Meissner performed a total of four (4) replicates of the ISTA 3H test on the FlexStation® 100, 200 and 500 units. In all cases, this testing was performed with the biocontainer filled to nominal rated capacity using a standard TepoFlex® biocontainer assembly. The biocontainers were filled with filtered water at standard temperature and pressure to simulate room-temperature aqueous solutions with low headspace and limited altitude change. Once filled, the containers were packed out for distribution, which includes tubing coil and connector protection, closed cell polyethylene foam dunnage, lid application with factory latches and cable tie type tamper evidence, and finally covered and wrapped for loading. Immediately following the tests there was a hold period of a minimum of four (4) hours during which the biocontainers were physically inspected for leaks or moisture, which would be indicative of an integrity breach. Following this inspection, the biocontainers were evacuated, removed from their respective rigid outer containers, and inflated with air for inspection of irregular wear patterns, etc. In all cases, the biocontainer assemblies were observed to be integral after the ISTA 3H test in that no leaks were identified during the hold period and no irregular wear patterns were observed. No pressure hold tests or helium leak tests were performed post-use on these assemblies.

Real-World Distribution Testing

In addition to the simulated testing performed via ISTA 3H Meissner has subjected the FlexStation® products to various real-world distribution testing.

Assembly Considerations

When considering the use of a FlexStation® ROC in an interfacility mode thought should also be given to the associated single-use assembly. This should be mitigated in scope to the extent possible as lengthy fluid paths, extensive componentry, and the like can all serve to exacerbate stress on the assembly during distribution.

Dunnage

Dunnage is required when utilizing the FlexStation® ROCs in an interfacility mode. The biocontainer must be secured by placing dunnage between the biocontainer and the lid of the ROC. Once the biocontainer has been filled and dunnage has been placed, the tubing and ancillary items can be placed into their corresponding compartment. The lid's latches can be locked securely in place by compressing the dunnage. The container can now be handled as one discrete unitized load by forklift or fork truck.

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QuaDrum® ROCs

Overview

QuaDrum® ROCs are designed to support intrafacility applications and are available in nominal capacities which support applications between 50 and 200 L. These rectangular ROCs provide a host of benefits over more traditional cylindrical drums which include improved deployment characteristics as well as substantial floor space utilization and improved dynamic stability when deployed on the appropriate dolly.

Specifications

Sizes

QuaDrum® ROCs are available in the nominal sizes represented in the table below. Additionally, indicated therein is information pertaining to the general configuration of these items as well as the maximum applicable volumes that they can be utilized for.

QuaDrum© Part No.	Description	Configurations[1]	Maximum Volumes[2]
FASD-025D	25 L QuaDrum(R) ROC	Standard 25 L configuration, supports top drain applications	27.5 L
FASD-025B	25 L QuaDrum(R) ROC	Bottom Drain 25 L configuration, supports bottom drain applications	27.5 L
FASD-050D	50 L QuaDrum© ROC	Standard 50 L configuration, supports top drain applications	55 L
FASD-050B	50 L QuaDrum© ROC	Bottom drain 50 L configuration, supports bottom drain applications	55 L
FASD-100D	100 L QuaDrum© ROC	Standard 100 L configuration, supports top drain applications	110 L
FASD-100B	100 L QuaDrum© ROC	Bottom drain 100 L configuration, supports bottom drain applications	110 L
FASD-200D	200 L QuaDrum© ROC	Standard 200 L configuration, supports top drain applications	215 L
FASD-200B	200 L QuaDrum© ROC	Bottom drain 200 L configuration, supports bottom drain applications	215 L

[1] Note that bottom drain QuaDrum® must be deployed on associated dolly to utilize bottom drain functionality.
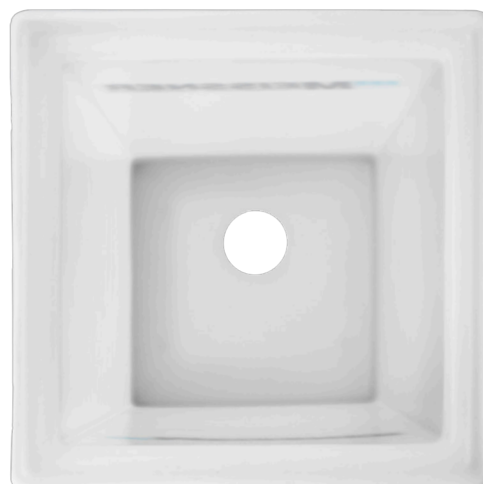[2] Volumes represented predicated on usage of appropriate SUS.

Table 11

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Figure 17. Standard 50 L QuaDrum® ROC, Part Number FASD-050D.

Inside View

Figure 18. Bottom Drain 50 L QuaDrum® ROC (Part Number FASD-050B) is shown deployed on associated dolly, which is required to facilitate bottom drain functionality.

Inside View

Figure 19. Standard 100 L QuaDrum® ROC, Part Number FASD-100D.

Inside View

Figure 20. Bottom Drain 100 L QuaDrum® ROC (Part Number FASD-100B) is shown deployed on associated dolly, which is required to facilitate bottom drain functionality.

Inside View

Figure 21. Standard 200 L QuaDrum® ROC, Part Number FASD-200D.

Inside View

Figure 22. Bottom Drain 200 L QuaDrum® ROC (Part Number FASD-200B) is shown deployed on associated dolly, which is required to facilitate bottom drain functionality.
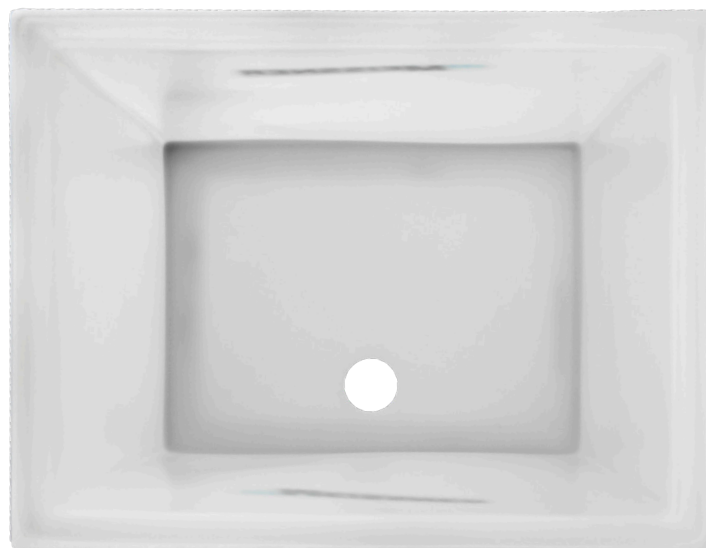

Inside View

General Dimensions and Weights

The outer dimensions of the various QuaDrum® ROCs and their empty weights are presented in the table below.

QuaDrum© Part No.	Length (outer dimension)	Width (outer dimension)	Height (outer dimension)	ROC Weight (empty)
FASD-025D	12" (310 mm)	12" (310 mm)	14" (356 mm)	5.5 lbs (2.5 kg)
FASD-025B				
FASD-050D	12" (310 mm)	12" (310 mm)	25" (640 mm)	10.8 lbs (4.9 kg)
FASD-050B				
FASD-100D	12" (310 mm)	18" (615 mm)	31" (790 mm)	16.2 lbs (7.4 kg)
FASD-100B				
FASD-200D	18" (460 mm)	24" (610 mm)	31.5" (800 mm)	32 lbs (14.5 kg)
FASD-200B				

Table 12

Materials of Construction

All QuaDrum® ROCs are molded from the same high quality polyethylene resin.

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Optional Features and Accessories

Dollies

Meissner has dollies available for all QuaDrum® models as detailed in the table below. All feature dynamic stability, which exceeds that of traditional drum dollies, and ground clearance required for drum configurations featuring bottom drains.

QuaDrum© Dolly Part No.	Applicable QuaDrum© Part No.	Construction	Caster Wheels	Drum Height When Deployed on Dolly	Weight (Dolly only)
FASC-025T	FASD-025D, FASD-025B	304 Stainless Steel	(4) Fixed legs 304 Stainless Steel	18.5" (470 mm)	5.5 lbs (2.5 kg)
FASC-050C, FASC-050L	FASD-025D, FASD-025B, FASD-050D, FASD-050B	304 Stainless Steel	(4) Non-locking Swivel; nickel plated hardware, non-marring 3" urethane wheels	30.5" (770 mm)	10.8" (4.9 kg)
FASC-100C, FASC-100L	FASD-100D, FASD-100B	304 Stainless Steel	(4) Non-locking Swivel; nickel plated hardware, non-marring 3" urethane wheels	36.5" (930 mm)	16.2 lbs (7.4kg)
FASC-200C, FASC-200L	FASD-200D, FASD-200B	304 Stainless Steel	(4) Non-locking Swivel; nickel plated hardware, non-marring 3" urethane wheels	37" (940 mm)	32 lbs (14.5 kg)

Table 13

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Figure 23. Cart for 50 L QuaDrum® ROC (Part Number FASC-050C).

Figure 24. Cart for 100 L QuaDrum® ROC (Part Number FASC-100L).

Figure 25. Cart for 200 L QuaDrum® ROC (Part Number FASC-200C).

Lids

There are three types of lids available for QuaDrum® ROCs as described below.

Lid Type	General Functionality
Standard Lid	Provides complete coverage of the top of the QuaDrum® for maximum security during storage
Access Lid	Provides access for up to three (3) fluid paths when secured in place such that fluid can be transferred to/from single-use assembly when it is in place.
Retaining Lid	Includes functionality of the Access lid with a retainer for a 3" TC port which positively locates this large bore port during e.g. powder transfer applications.

The table below features the part number for each of the QuaDrum® lids.

| QuaDrum© Part No.	Description	Applicable QuaDrum© Part No.	Construction
FASD-050L	50 L QuaDrum© Standard Lid	FASD-050D, FASD-050B	Polypropylene lid with nylon handle
FASD-050A	50 L QuaDrum© Access Lid	FASD-050D, FASD-050B	Polypropylene lid with nylon handle
FASD-050R	50 L QuaDrum© Retaining Lid	FASD-050D, FASD-050B	Polypropylene lid with nylon handle
FASD-100L	100 L QuaDrum© Standard Lid	FASD-100D, FASD-100B	Polypropylene lid with nylon handle
FASD-100A	100 L QuaDrum© Access Lid	FASD-100D, FASD-100B	Polypropylene lid with nylon handle
FASD-100R	100 L QuaDrum© Retaining Lid	FASD-100D, FASD-100B	Polypropylene lid with nylon handle
FASD-200L	200 L QuaDrum© Standard Lid	FASD-200D, FASD-200B	Polypropylene lid with nylon handle
FASD-200A	200 L QuaDrum© Access Lid	FASD-200D, FASD-200B	Polypropylene lid with nylon handle
FASD-200R	200 L QuaDrum© Retaining Lid	FASD-200D, FASD-200B	Polypropylene lid with nylon handle

Table 14

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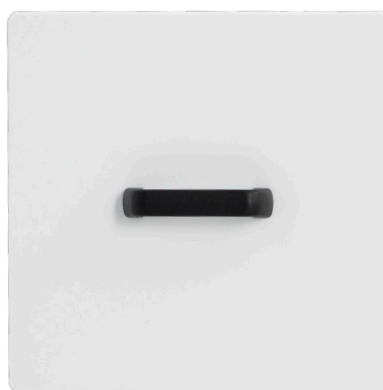
Figure 26. Standard Lid for the 50 L QuaDrum® ROC (Part Number FASD-050L).

Figure 27. Standard Lid for the 50 L QuaDrum® ROC (Part Number FASD-050L) shown in use.
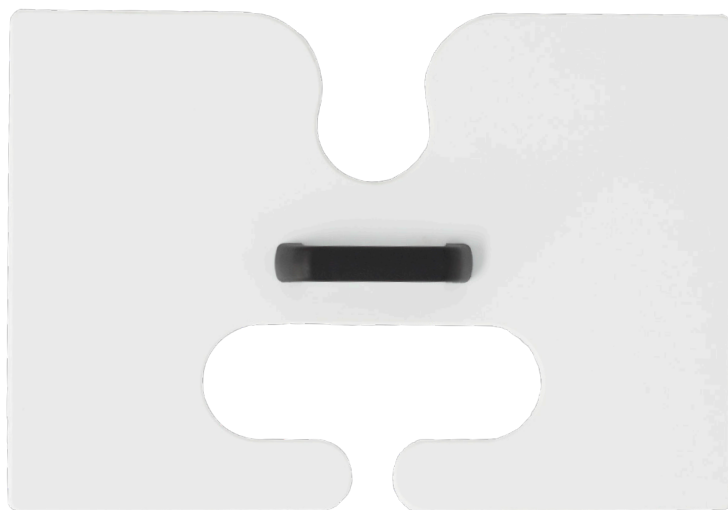
Figure 28. Retaining Lid for the 100 L QuaDrum® ROC (Part Number FASD-100R).

Figure 29. Retaining Lid for the 100 L QuaDrum® ROC (Part Number FASD-100R) shown in use.
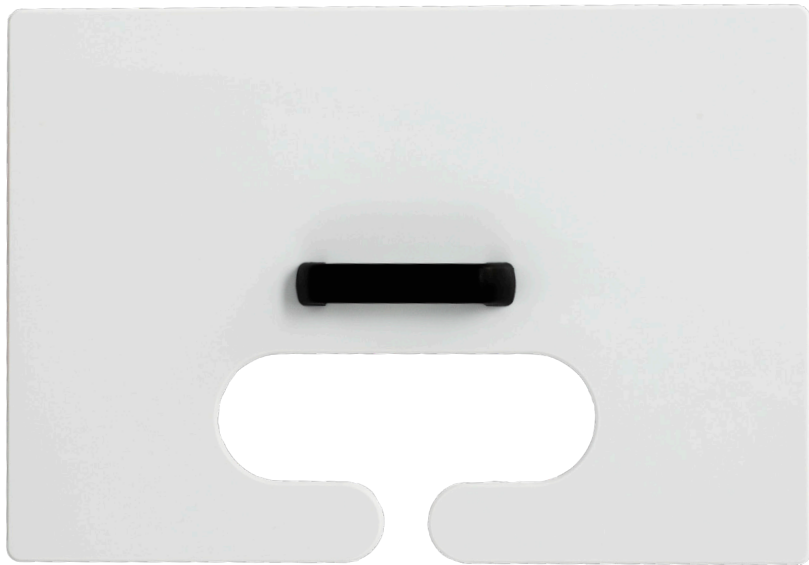
Figure 30. Access Lid for the 200 L QuaDrum® ROC (Part Number FASD-200A).

Figure 31. Access Lid for the 200 L QuaDrum® ROC (Part Number FASD-200A) shown in use.

Deployment

ROC Deployment

Deployment instructions for specific QuaDrum® ROCs can be requested through Meissner's website, your local sales representative, or through our Applications Engineering department.

Biocontainer Deployment

All QuaDrum® compatible SUSs deploy in the traditional manner as described herein, however, given the rectangular footprint of these drums, deployment is both simpler and more repeatable relative to typical cylindrical drums. There are videos of various deployments available on the Meissner website at www.meissner.com.

Assembly Deployment

Bottom Drain Functionality

Those QuaDrum® ROCs that feature a bottom drain must be deployed on the associated dolly in order to take advantage of this functionality. When deployed on the dolly, clearance is available at the bottom of the ROC, which allows the bottom fluid path to be deployed. Note, however, there is no fluid path storage provided; thus, care must be used when moving the drum/dolly combination with a bottom fluid path deployed.

Lid Use

When an Access lid is being used in conjunction with a QuaDrum® and applicable SUS, it is recommended that the biocontainer be filled at least half way before initially installing the lid to allow for fill monitoring and prevent fluid path entrapment. When a Retaining id is being used, the 3" TC port typically can be installed after only a few liters of fluid have been added to the biocontainer as this positively locates the top of the biocontainer relative to the ROC.

Assembly Considerations

All QuaDrum® compatible single-use assemblies can be designed with a wide variety of associated fluid paths, integrated sampling systems, etc.

Operational Footprint Considerations

Compared with traditional cylindrical drums, QuaDrum® ROCs feature a number of benefits described herein. The table below expounds upon the reduction in floor space that can be achieved via utilization of these items.

Nominal Volume	QuaDrum©			Traditional Cylindrical Drums		Typical Reduction in Floor Space Provided by QuaDrum©
	Length	Width	Projected Footprint [1]	Diameter	Projected Footprint [1]	
50 L	12" (310 mm)	12" (310 mm)	144" (929 cm²)	13" (330 mm)	169" (1,090 cm²)	17%
100 L	18" (460 mm)	12" (310 mm)	216" (139.4 cm²)	18" (460 mm)	324" (2,090 cm²)	50%
200L	24" (610 mm)	18" (460 mm)	432" (278.7 cm²)	22" (560 mm)	484" (3,122 cm²)	12%

[1] Projected area us calculated at Diameter x Diameter, as this accurately represents floor space consumed by cylindrical drum in typical applications.

Table 15

⁞⁞⁞MEISSNER