

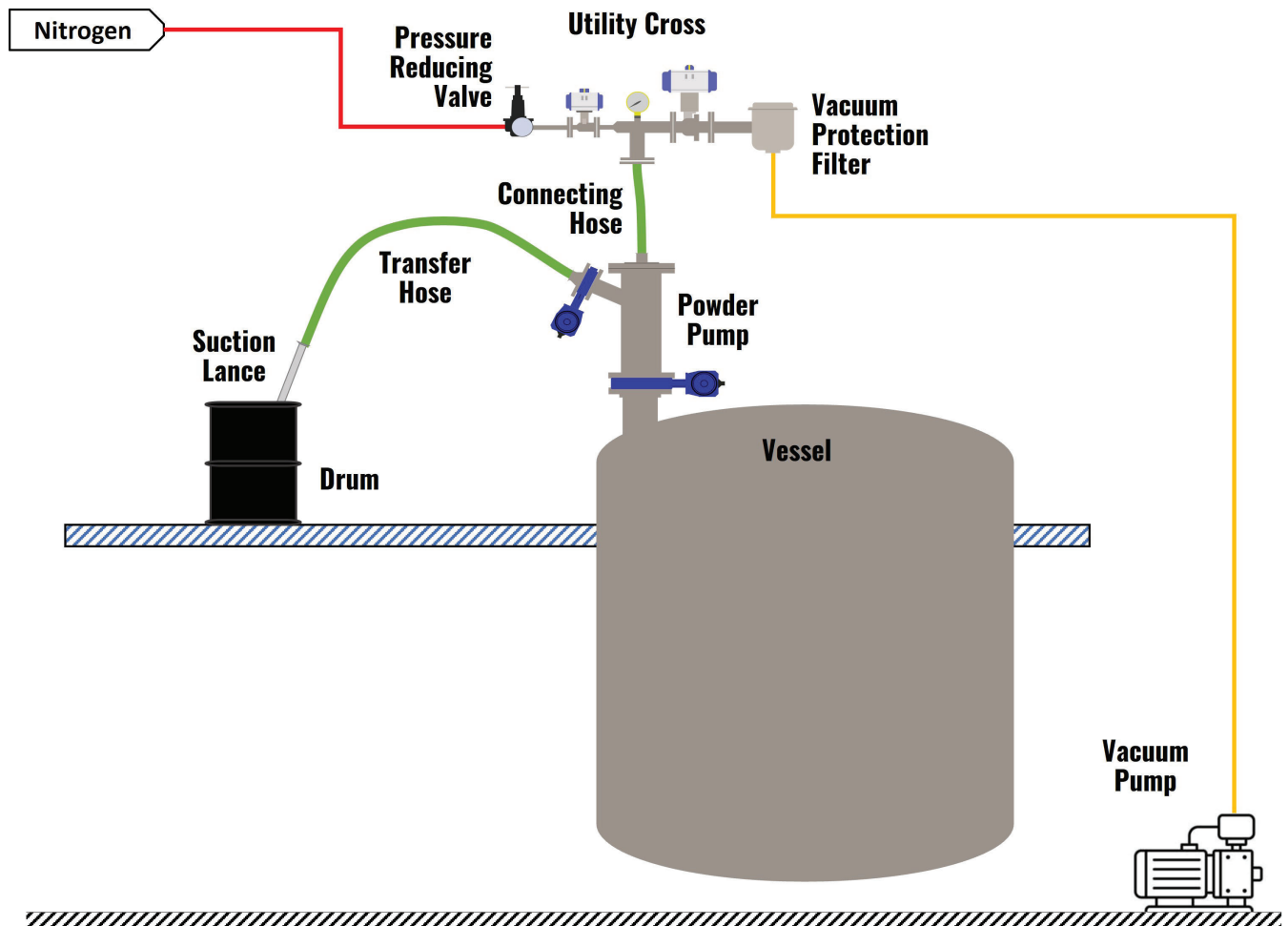


# Powder Handling Solutions Portfolio





## **SOLUTION #1: POWDER PUMP VACUUM CONVEYING SYSTEM**



### **DESCRIPTION**

The Powder Pump is specially designed to charge solids into an inerted vessel in a safe, contained manner. As depicted above, many bulk solids are supplied in drums, but can also be packaged in a variety of other style containers. The basic Powder Pump system utilizes a suction lance which allows operators to safely transfer bulk solids/powders from most types of containers while maintaining an inert condition within the vessel.



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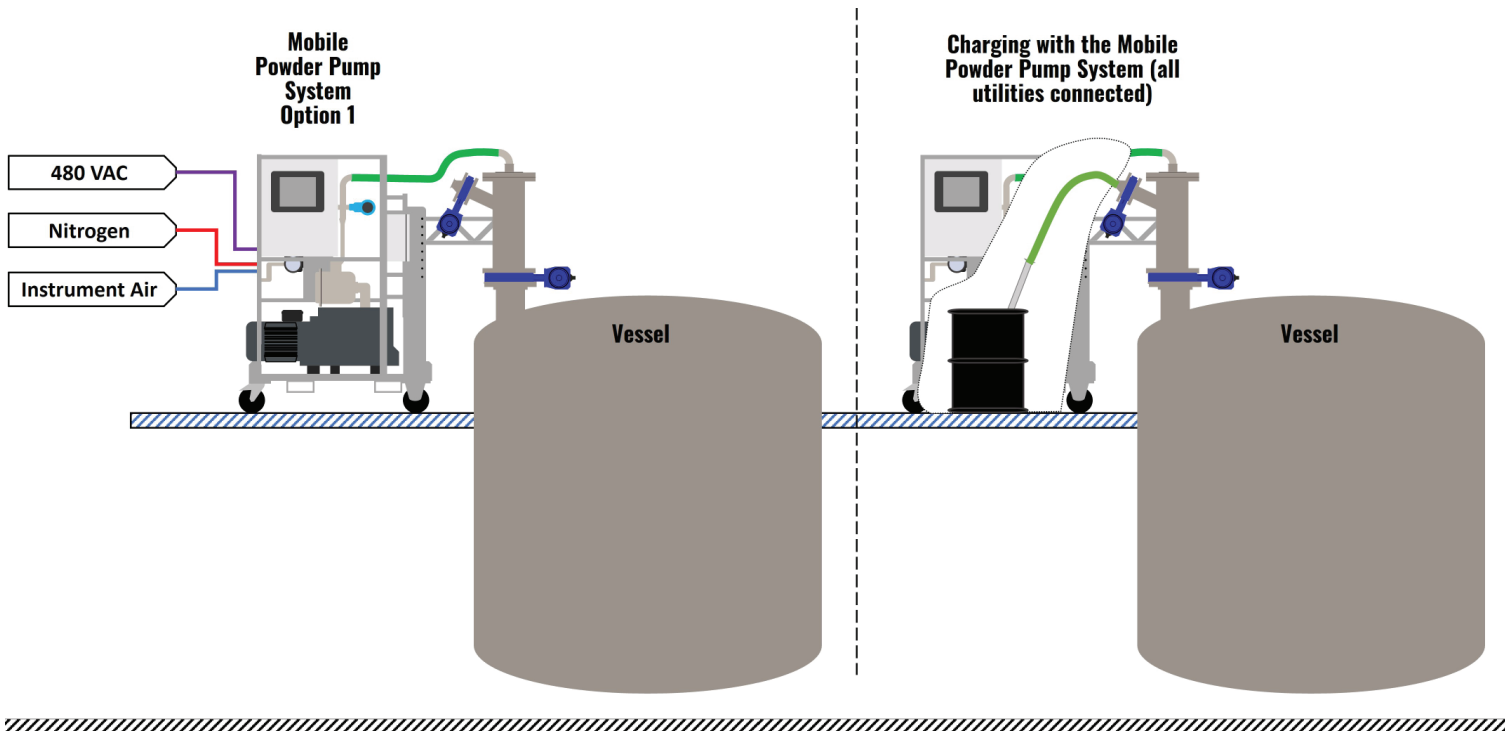


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## **SOLUTION #2:**

### **MOBILE POWDER PUMP SYSTEM (OPTION 1)**



## **DESCRIPTION**

When charging solids into multiple vessels in a local or confined area is required, one popular option is our Mobile Powder Pump System. These systems can provide safe, contained transfer with the Powder Pump body either cantilevered and supported on the cart, and connected to the vessel via a flexible sleeve, or the Powder Pump unit can be removed from the cart and bolted directly onto the vessel if required.

With either option, all utilities are connected to the cart using quick-connect type fittings which allows for easy relocation between multiple vessels.



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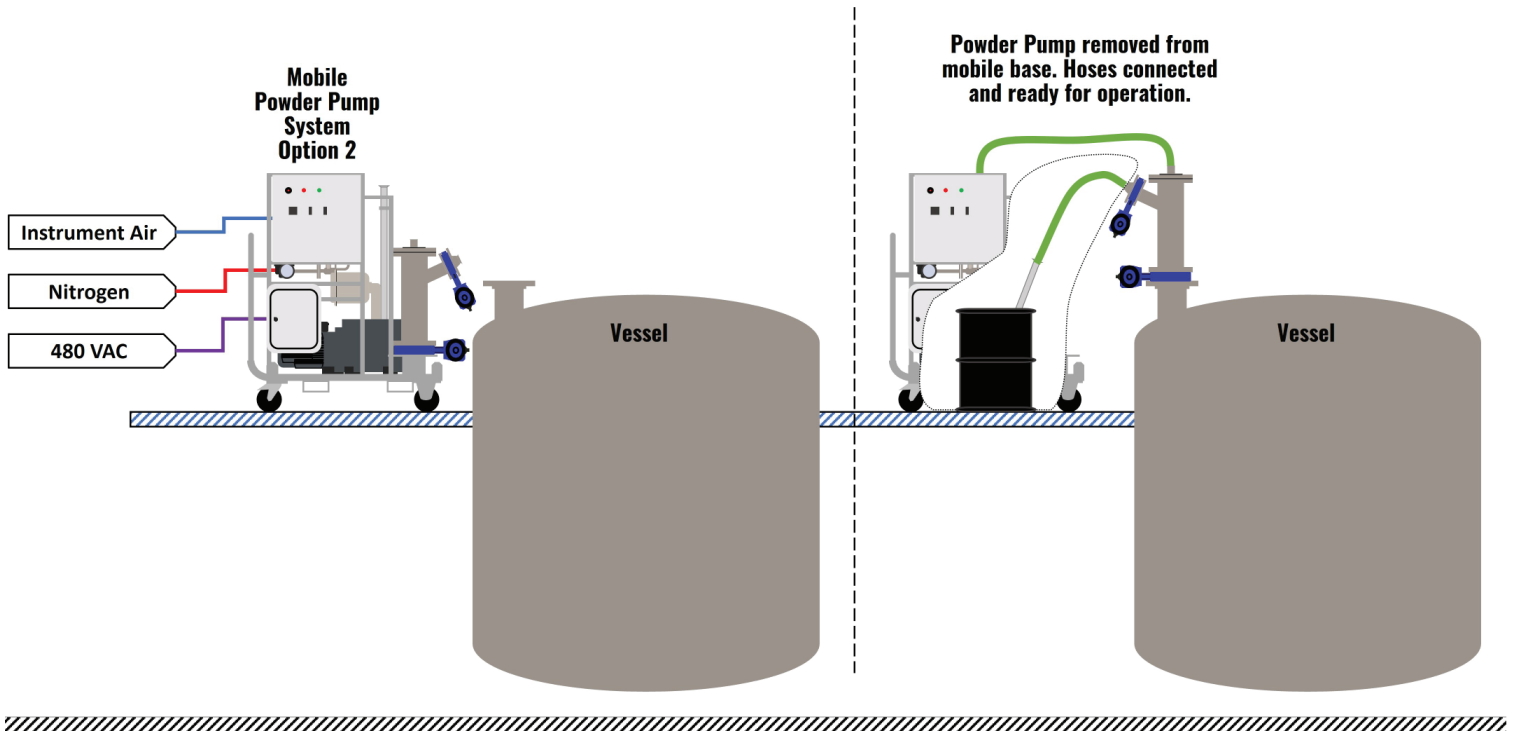


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## **SOLUTION #3: MOBILE POWDER PUMP SYSTEM (OPTION 2)**



### **DESCRIPTION**

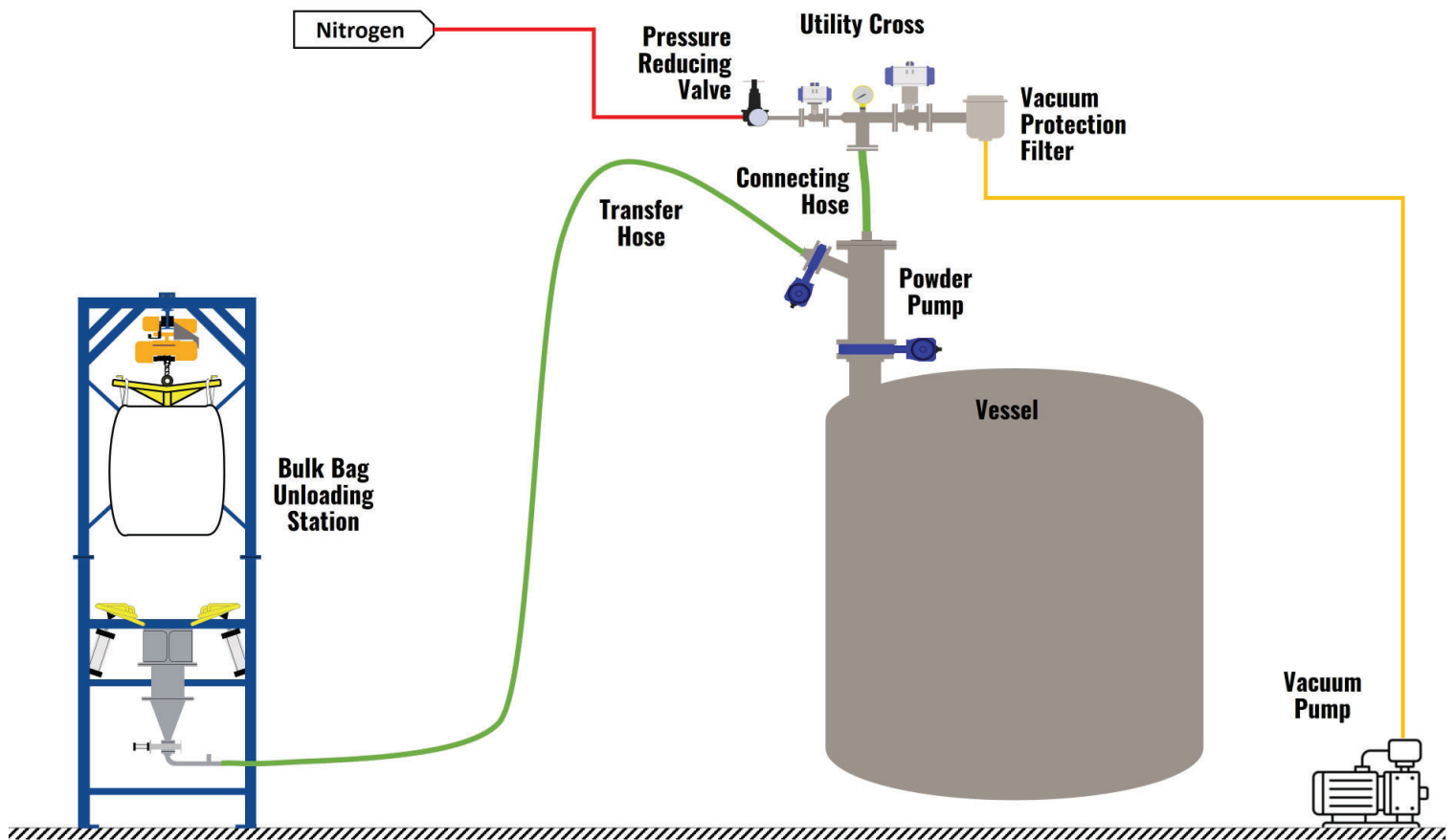
Option 2 of the Mobile Powder Pump System is very similar to Option 1. This variation allows the operator to leave the Powder Pump on the cart. The Powder Pump receiver is cantilevered over the edge of the cart and is height adjustable to accommodate various nozzle heights. While this option may be a bit more expensive than Option 1, it is more user-friendly and ergonomic.







## SOLUTION #4: BULK BAG UNLOADING AND POWDER PUMP SYSTEM



### DESCRIPTION

When handling bulk solids and powders in larger quantities, super sacks or FIBC's (Flexible Intermediate Bulk Containers) are used. Using a suction lance with a super sack may not always be the most ergonomic option, but it provides a feasible solution when budget constraints limit your choices. The optimal solution for handling super sacks is a bulk bag unloading station. This allows for a much more automated solution and better predictability when it comes to the solids flow through the transfer line. Other features like bag massage, bag cinching and sealing or load cells can be provided to further improve system operation and accuracy.



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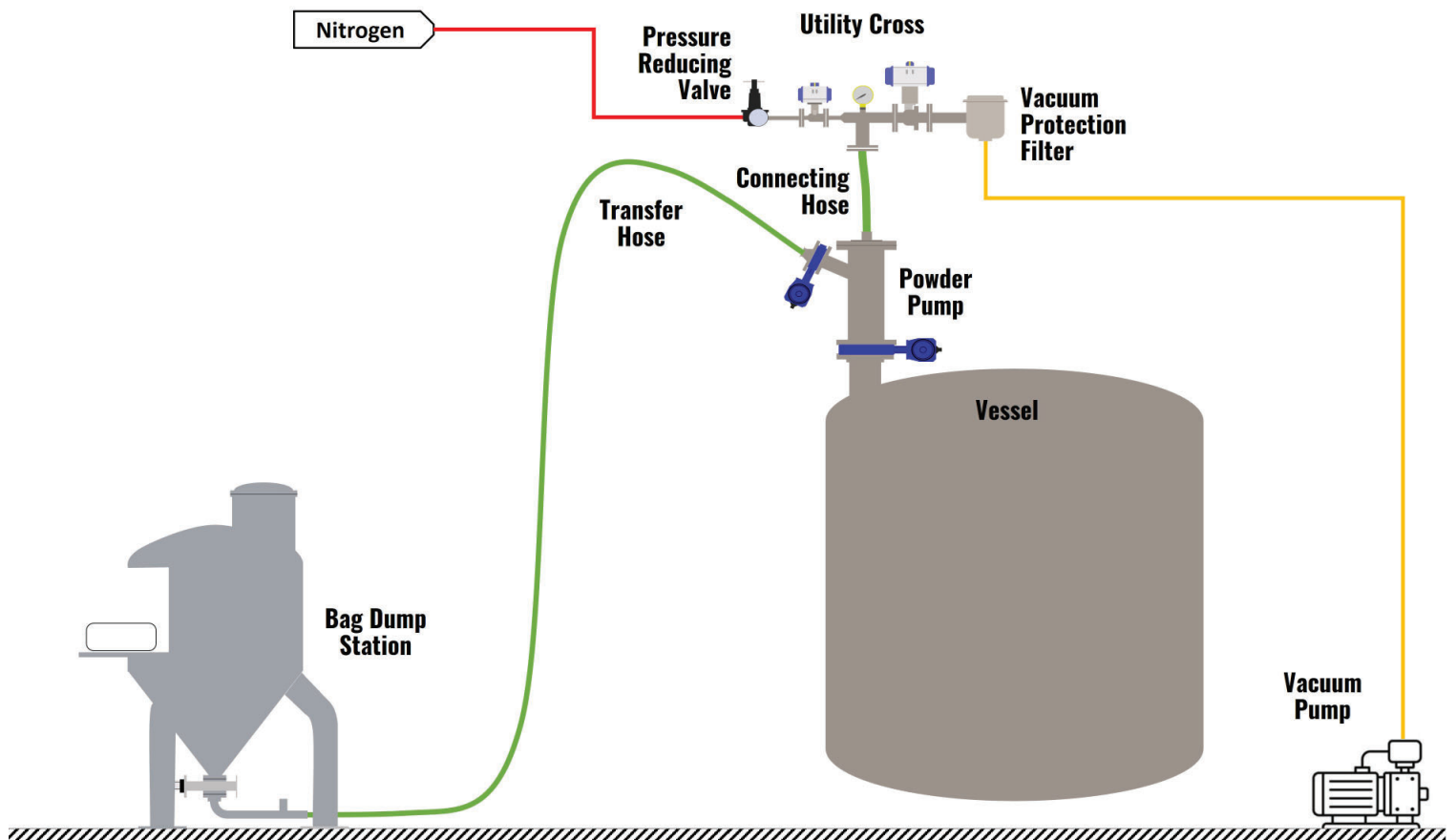
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## **SOLUTION #5: BAG DUMP STATION AND POWDER PUMP SYSTEM**



### **DESCRIPTION**

There are a lot of products that are packaged in 50 lb. bags. One of the methods in which these bags are often handled is opening a manway on a vessel, cutting the bag, and dumping its contents directly into the vessel. There are many reasons this can be unsafe. To address these safety concerns, a bag dump station, with integral dust collection if required, can be employed to provide a safer, more contained way of emptying the bags. This also brings the handling of the bags to the ground level which minimizes the number of times they need to be handled or moved.



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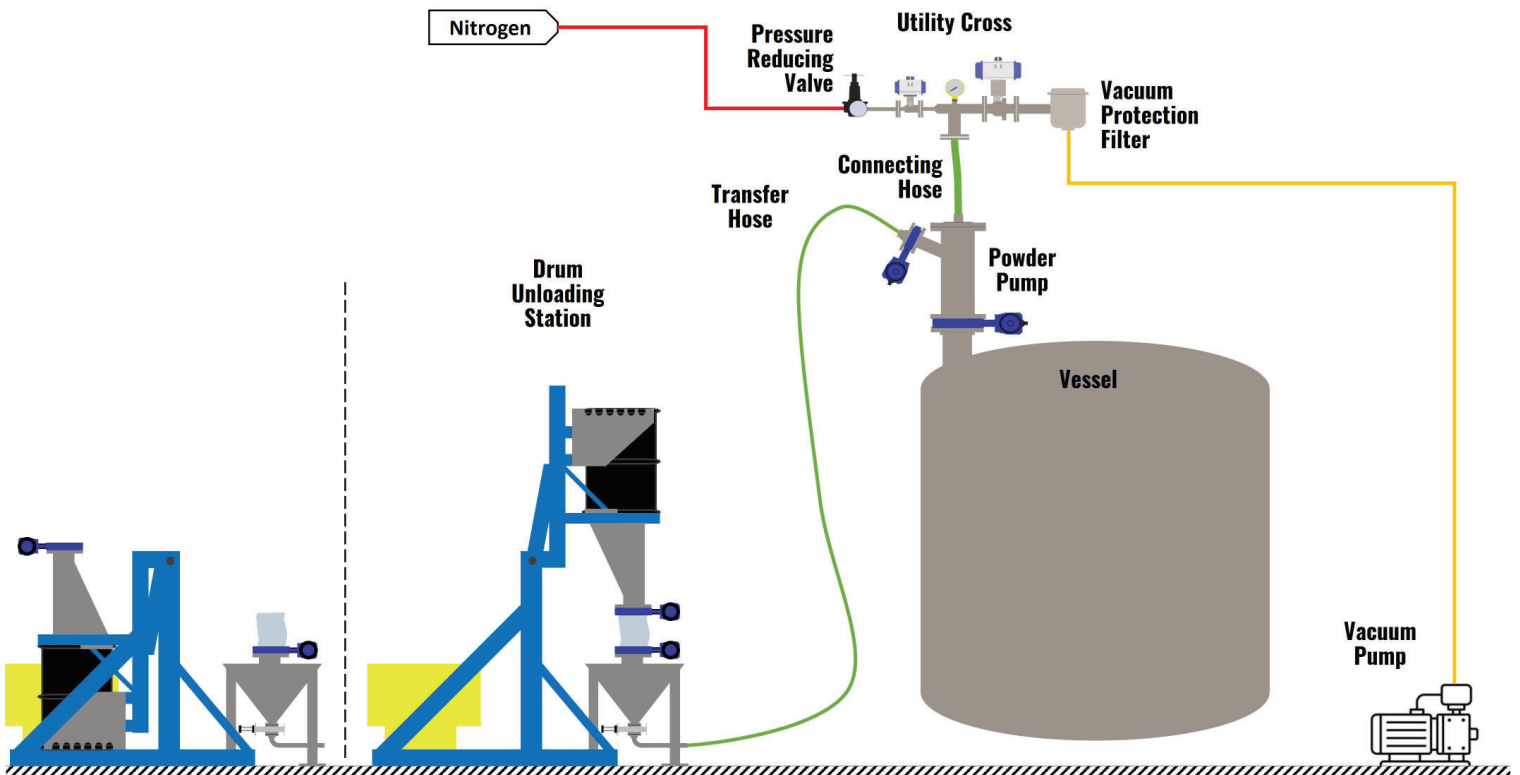
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## **SOLUTION #6: DRUM UNLOADING STATION FEEDING POWDER PUMP SYSTEM**



### **DESCRIPTION**

Drums are also a popular container type for handling various types of solids. When handling products that may be sensitive to air or moisture or require minimum exposure for operators, this solution can often be a reasonable option. Aside from removing the lid from the drum, the drum would be hydraulically sealed to the hopper and allow for dust-free operation and transfer of the material from the drum. For the most efficient way of charging, emptying drums into an intermediate charge hopper will allow additional drums to be charged while the previous drum's material is transferred from the charge hopper using the Powder Pump System.



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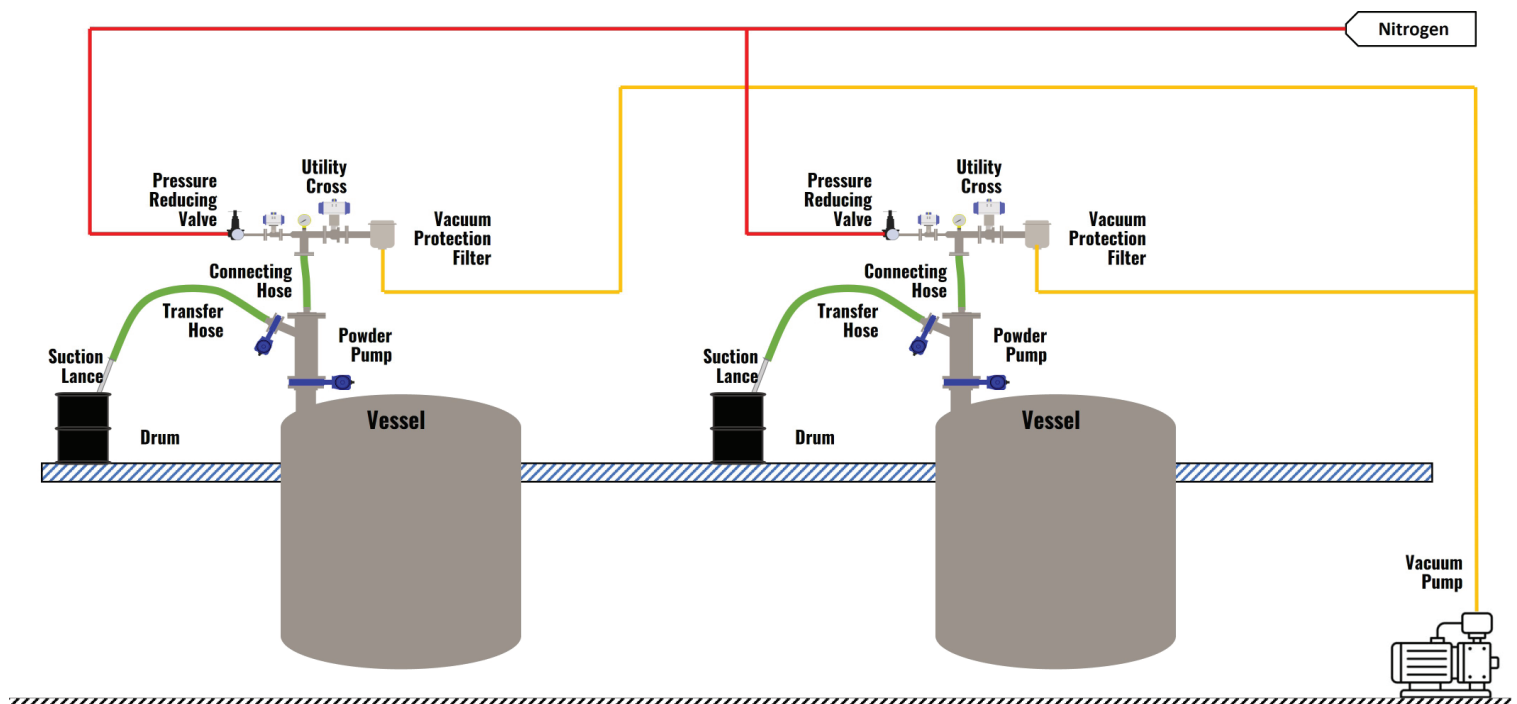
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## SOLUTION #7: MULTIPLE POWDER PUMPS WITH SINGLE VACUUM PUMP



### DESCRIPTION

In some cases, the need to handle solids may expand to more than one vessel. In this particular case, some savings can be observed by utilizing a single vacuum pump to service each system. In the case where you may need to feed more than two vessels, further optimization can be considered by consolidating the number of valves being used. This all needs to be reviewed and can vary based on distances between point of use. If you have a similar need or would like to ask questions, please feel free to contact DDPS for more information.



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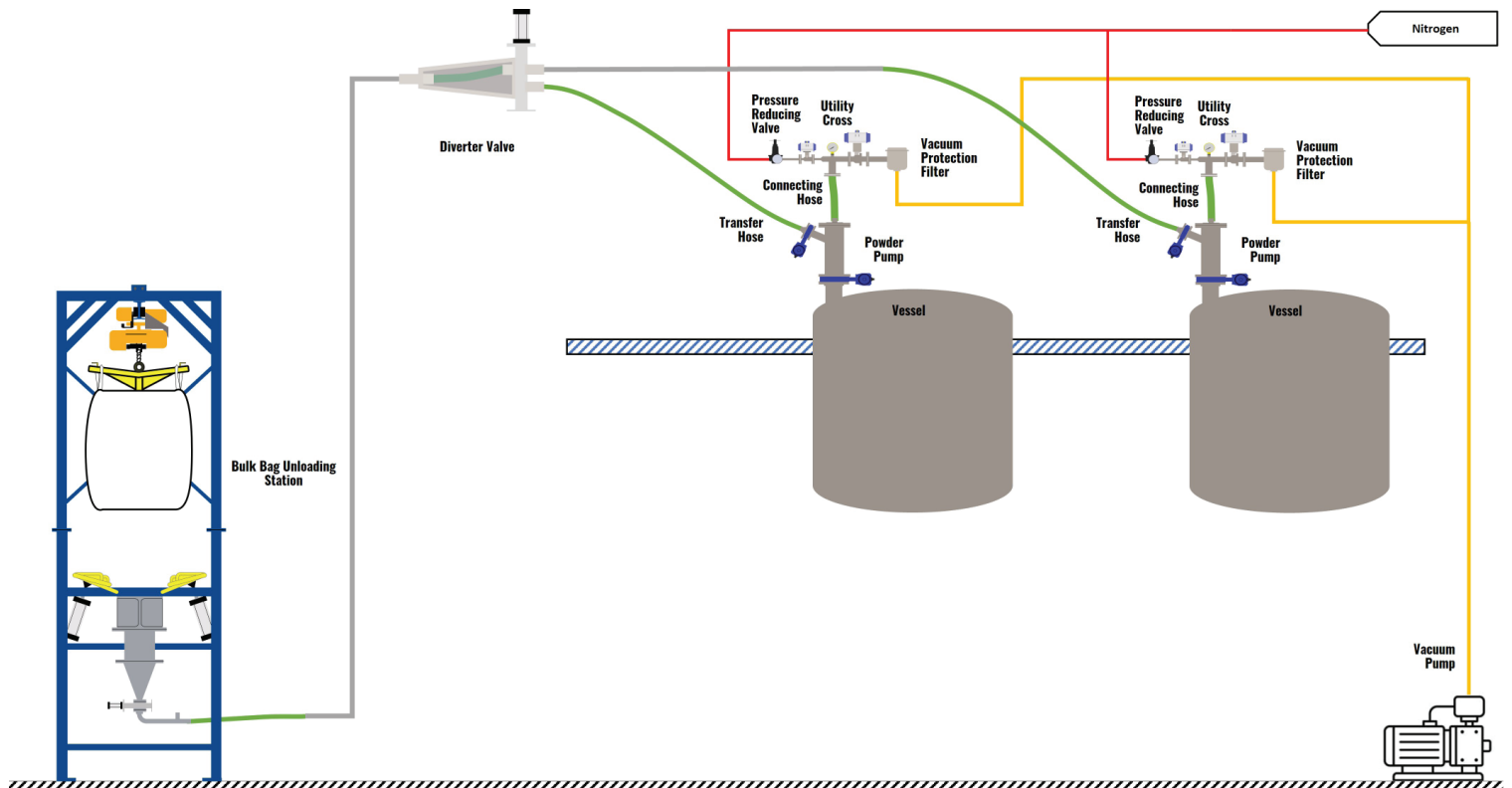


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## SOLUTION #8: FEEDING MULTIPLE VESSELS FROM A SINGLE SOURCE

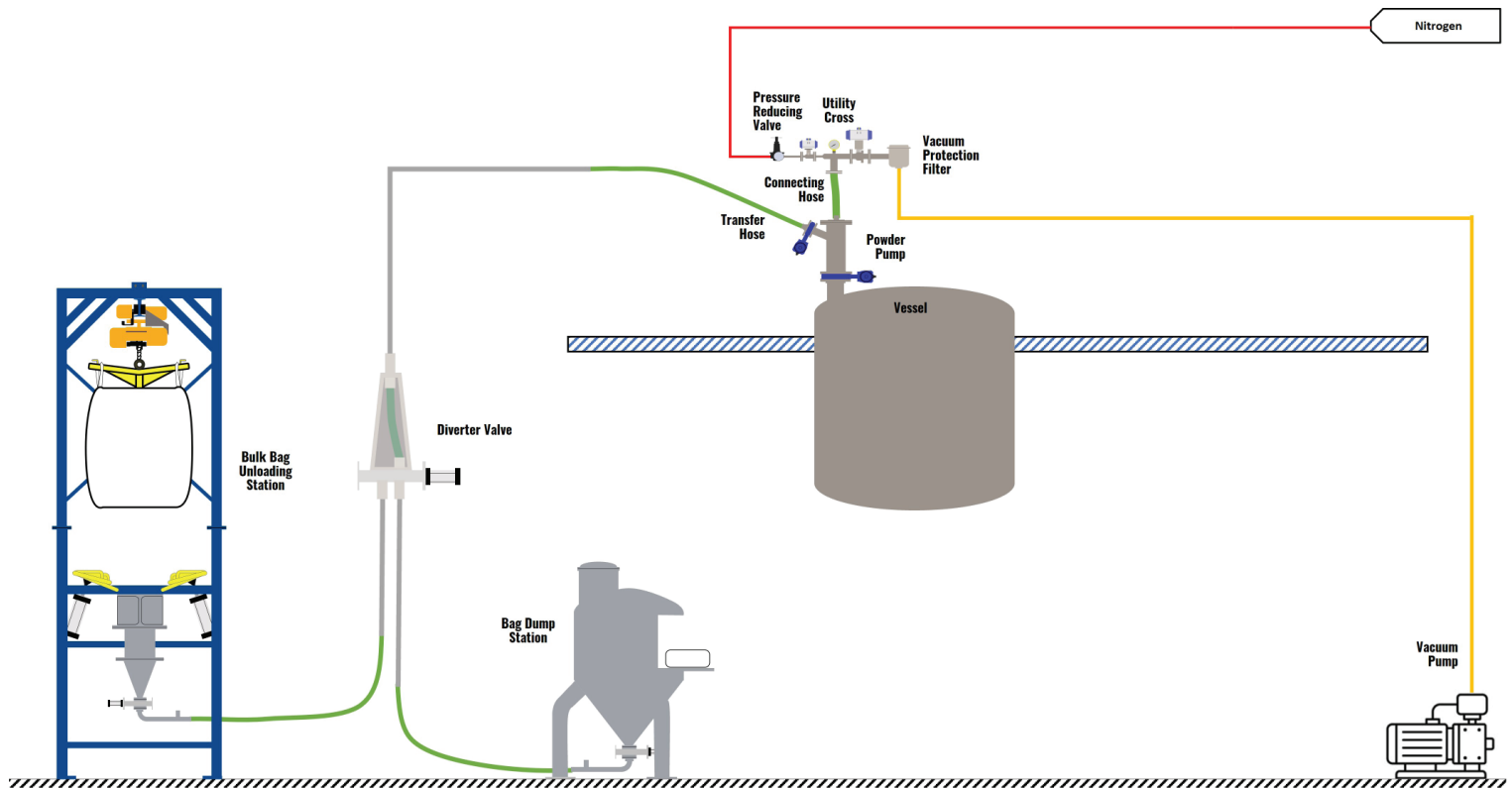


### DESCRIPTION

In this scenario there is a need to feed to multiple destinations from a single source point. While a bulk bag unloading system may be shown, this could also be done with a bag dump station, suction lance or some other type of source. To allow the charging of the solids to different locations, a diverter valve is installed in the transfer line and positioned to feed whichever vessel is selected from the control system.



## SOLUTION #9: TRANSFERRING FROM MULTIPLE FEED POINT TO A SINGLE DESTINATION



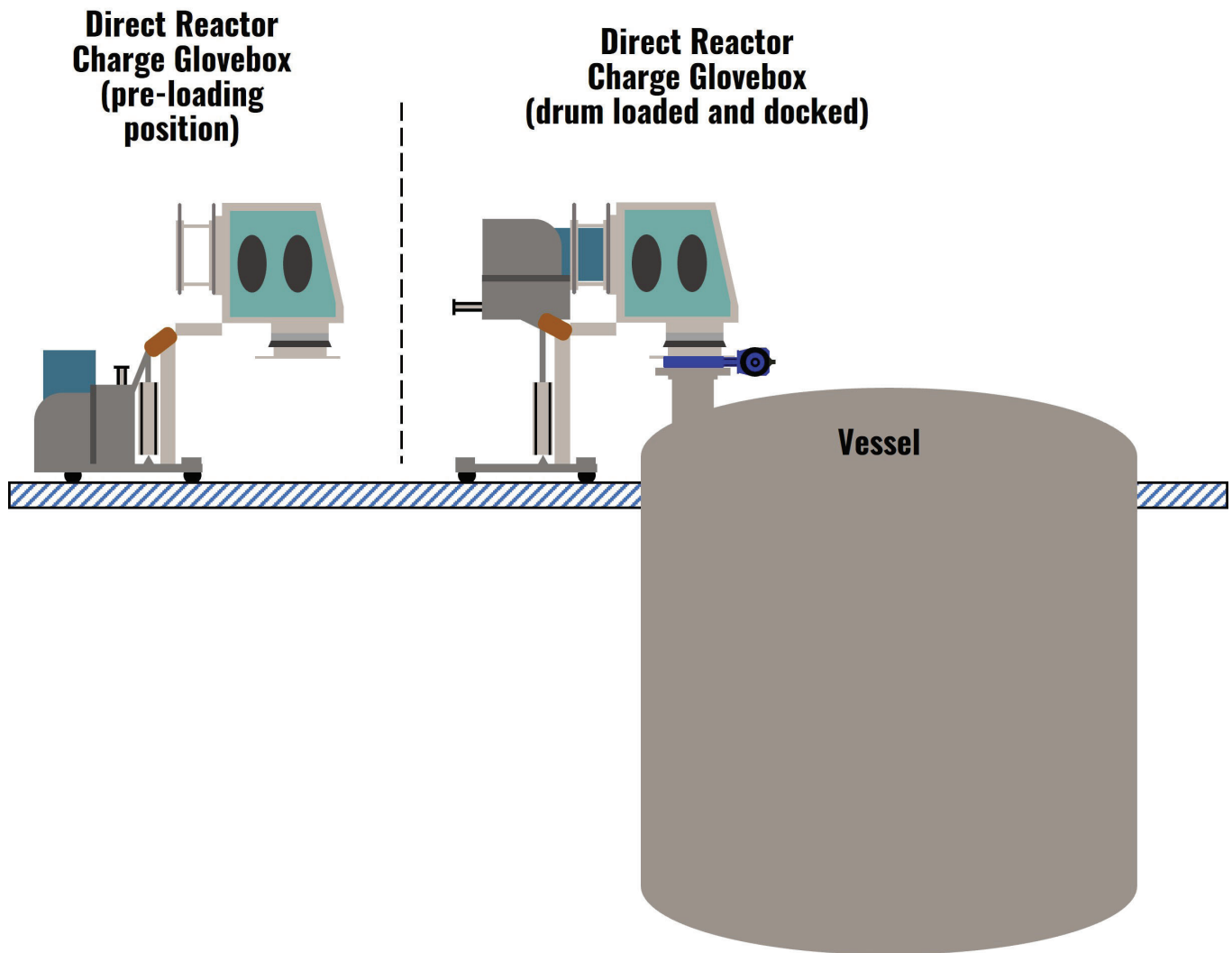
### DESCRIPTION

Opposite to Solution #5, the need may arise to feed from different sources into one single vessel. Whether because of container type, multiple ingredients, system flexibility or some other requirement, this can be easily accomplished as well. In the example above, a diverter valve is used to charge from a bulk bag unloader and bag dump station separately. While things like spatial constraints may lead to this design, an alternative could be to combine each of these functions into one single station; or a suction lance could easily be teed into either of the feed points to allow transferring from different container types. At the end of the day, a customized solution can be designed for any given application.





## **SOLUTION #10: DIRECT REACTOR CHARGE VIA GLOVE BOX**



### **DESCRIPTION**

Handling bulk solids/powders in a contained way is especially important when handling materials that may be toxic, sensitive to air/water, corrosive, or are active materials for drug manufacturing. DDPS can provide a glove box/isolator solution to allow addition of these types of materials under inert conditions. The glove box shown in the illustration above depicts a drum being tilted and indexed through the side the chamber and sealed with a specially designed iris valve.



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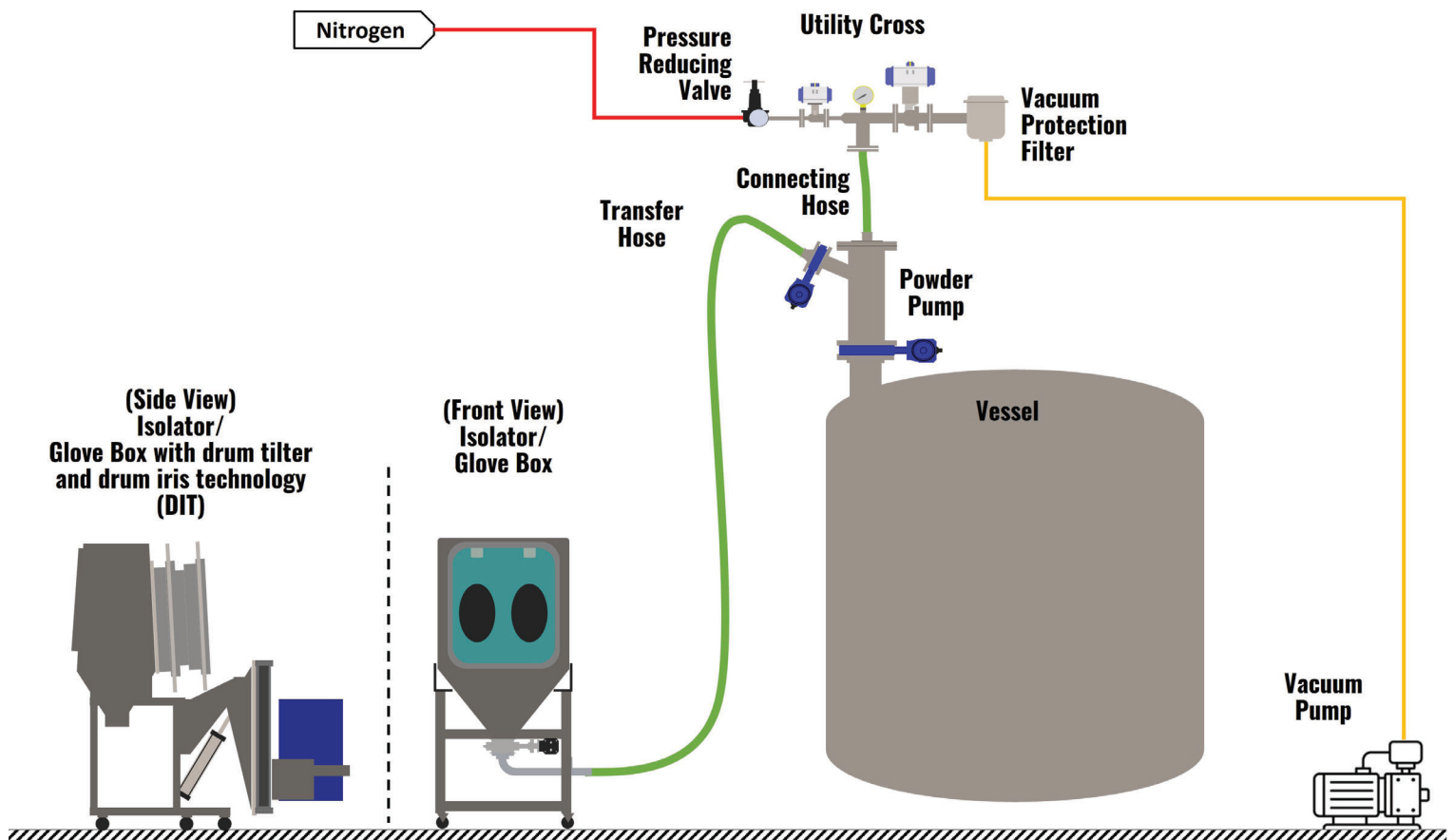
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# SOLUTION #11: VACUUM CONVEYING WITH THE POWDER PUMP SYSTEM FROM REMOTE MOUNTED GLOVE BOX



## DESCRIPTION

Headspace around the top of the vessel is usually quite crowded, not always allowing a solution like #7 illustrates. In such a case, the glove box can be located away from the vessel, potentially at ground level, and the Powder Pump System can be utilized to convey the required materials from the station. This can all be designed to maintain OEB 4 and 5 levels of containment and operate under inert conditions if necessary.



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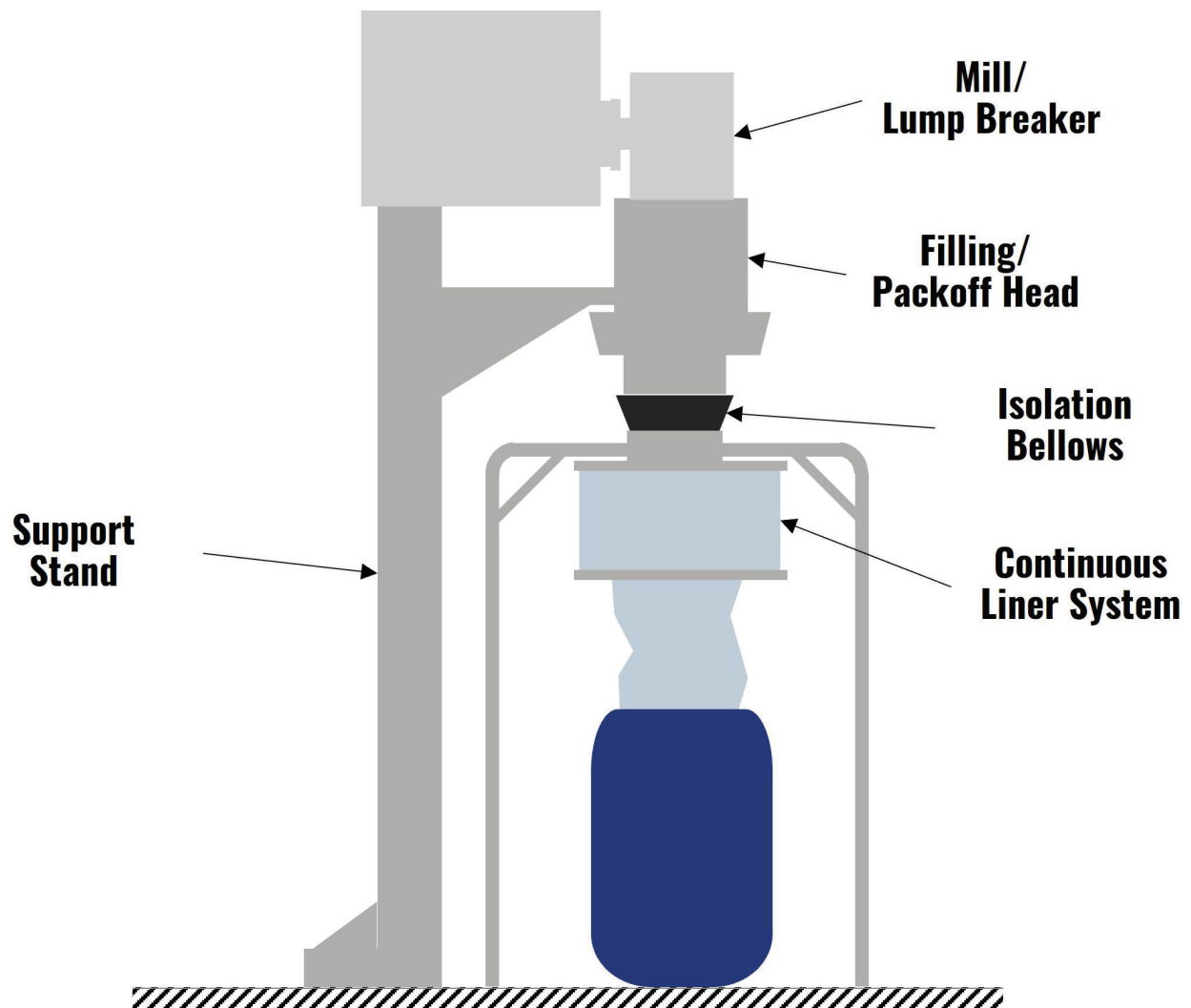
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## **SOLUTION #12: DRUM FILLING / PACKOFF STATIONS**



### **DESCRIPTION**

After working in the chemical and pharmaceutical industries for a long time and seeing how often customers are handling products in drums, DDPS decided to develop their own solution. From a basic system to simply provide an interface between a piece of equipment to feed into drums to a high containment design to handle API's or toxic materials and do so under inert conditions. While a drum is shown in the illustration above, this type of system could also be modified to accommodate bulk bags or potentially other types of containers (i.e. rigid IBC's or Gaylord boxes).



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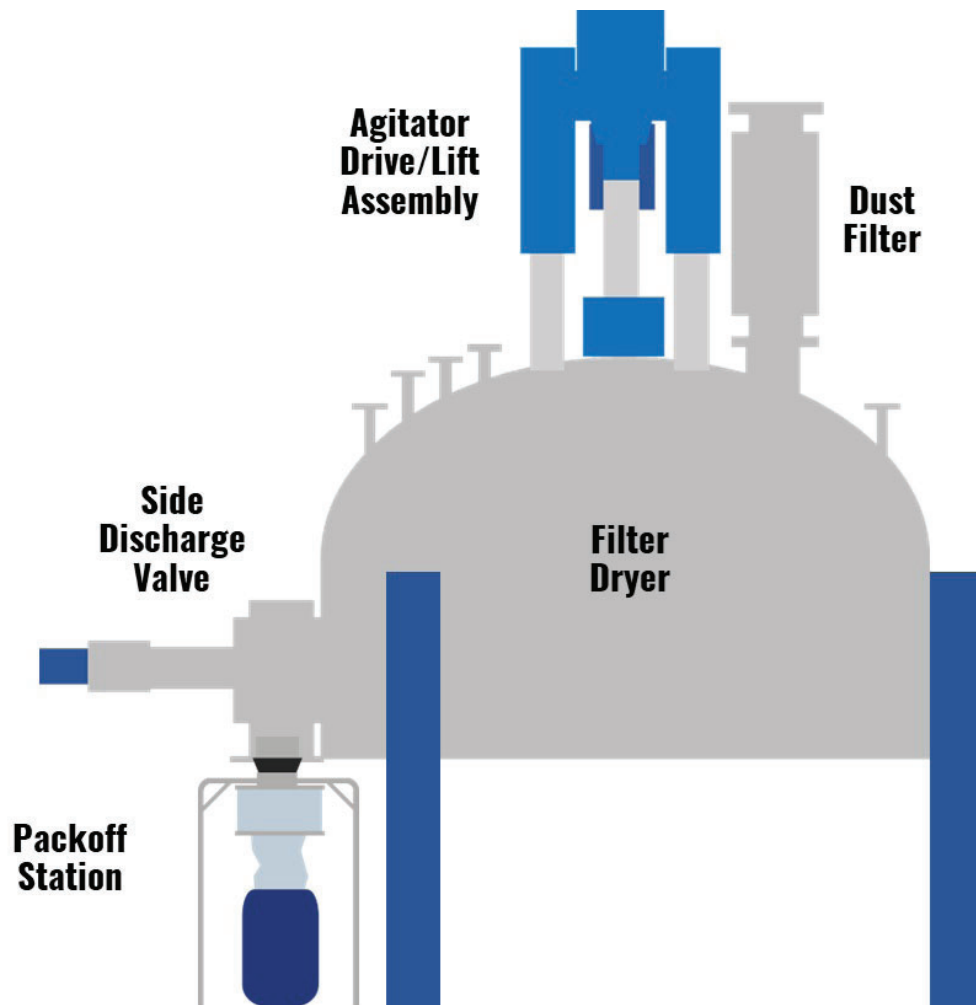


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## **SOLUTION #13: FILTER DRYER TO PACKOFF STATION**



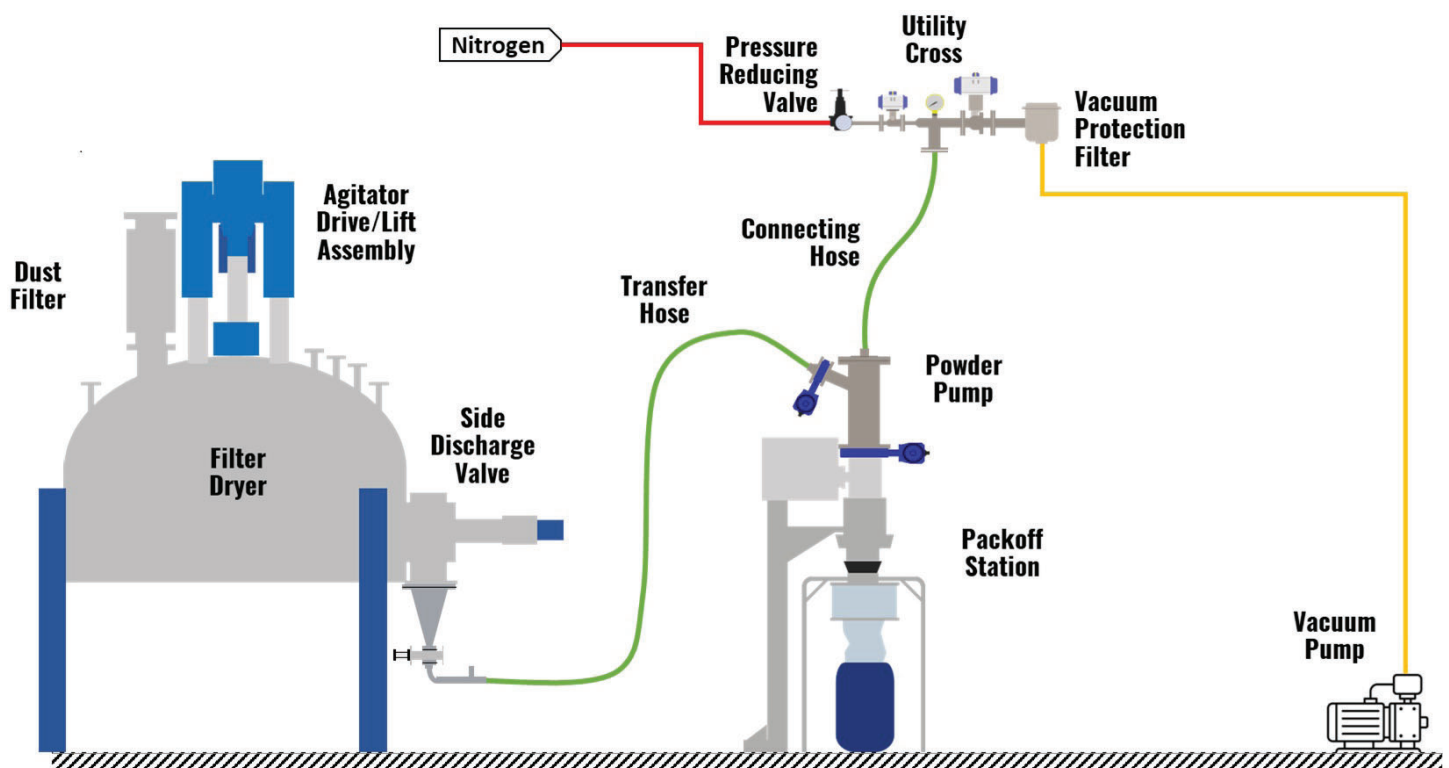
### **DESCRIPTION**

In applications handling sensitive or active materials, it's essential to keep these solids contained. The discharge from our Agitated Nutsche Filter Dryers (ANFD) is a great example of this. To ensure operator safety and product integrity, we often supply a Packoff Station to allow contained packaging into drums from the ANFD. For higher containment levels, gloveboxes or isolators can easily be used in conjunction with the Packoff Station, ensuring containment requirements are maintained and enabling operators to interact safely with the product.





## SOLUTION #14: FILTER DRYER TO PACKOFF STATION VIA THE POWDER PUMP SYSTEM



### DESCRIPTION

Similar to Solution #13, some applications may not have the necessary headroom required to add a Pack-off Station. To address this issue, DDPS can also provide a vacuum conveying system, also known as our Powder Pump System. Doing this can still allow safe, contained handling of the product and also provide the ability to add other equipment like mills or sampling devices.



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