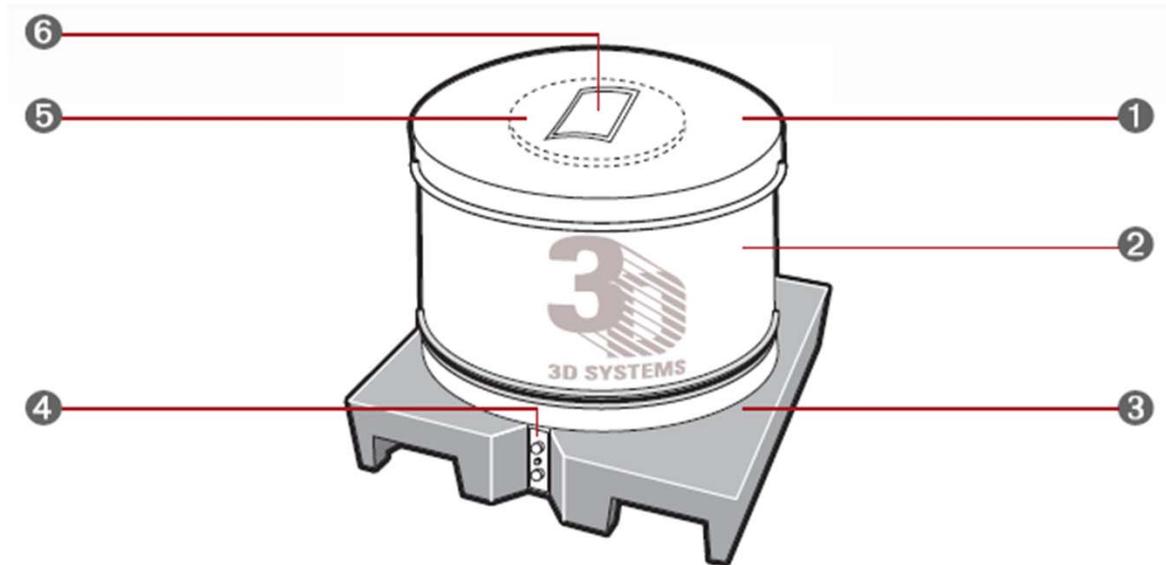




## IPC Inspection and Connecting

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## General Nomenclature and Specifications

**1 Fabric cover**

Protects container during shipment.

**2 Collapsible powder container**

Holds 100 kg (220 lbs.) of DuraForm® powder material. Flattens when empty for easy shipping. Shipping weight of full container plus pallet is 125 kg (276 lbs.).

**3 Pallet**

Permanently fastened to the powder container; includes pallet jack channels. Empty IPCs are stackable; full IPC's are not.

**4 Umbilical connectors**

Three nozzles and one socket for the umbilical molded connector;

**Top nozzle** – pulse air line; air pulses in order to “fluidize” the powder in the container.

**Middle nozzle** – transport air line; transport air conveys powder through the fill hose.

**Bottom nozzle** – powder outlet hose (bottom); carries powder to IRS virgin bin.

**RFID tag** – (in molded connector) verifies IPC powder matches powder in IRS.

**5 Fill cap (under shipping cover)**

Do not open. Factory use only.

**6 Pressure sensor tap (on fill cap)**

Connector for IPC over-pressure safety air line. This “sense” line is connected to a dual pressure safety circuit within the IRS that provides redundant safety measures in case of over pressurization.



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**IPC Specifications**

**Input power-** None (passive RFID tag on pallet)

**Weight-**

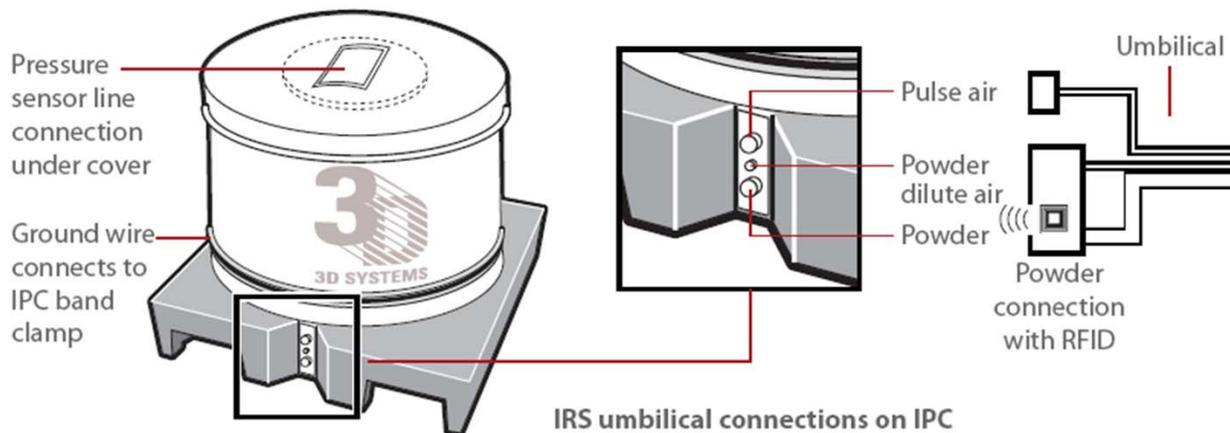
- Full shipping weight 125 kg (276 lbs.)
- Empty shipping weight 25 kg (54 lbs.)
- Net weight of DuraForm PA plastic powder 100 kg (220 lbs.)

**Dimensions (HxWxD) -** (92x80x83) cm; (36x32x33) in.

**IPC Description**

The Intelligent Powder Cartridge (IPC) is a DuraForm powder material delivery and storage container. It has two connections on its pallet base that are protected during shipment by a spring-loaded cover. It also has one connection on the upper lid under the fabric cover.

When you are ready to use the IPC, move it next to the IRS, connect the safety pressure sensor line to the top of the IPC, then connect the IRS umbilical at the bottom as shown:.





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**IRS UMBILICAL CONNECTIONS**

Pressure sensor connection located on the top lid, under the IPC cover; press in to connect/pull to remove. Ensure the safety pressure line is **fully seated and secured** when connecting. Before connecting this line, inspect the following items;

- Lid is securely in place and the “Tamper” cable is installed
- Over Pressure tap in the lid shows no signs of damage
- No FOD (foreign object debris) is present in or around the tap
- Pressure line is serviceable and clean of FOD and/or powder

Pulse Air top connection under the spring loaded cover; inflates the IPC during powder unload and delivers short, high-volume air pulses to fluidize the powder.

Powder Connection bottom two connections under the spring-loaded cover. The large molded connector terminates two umbilical lines; the small air line used to dilute the powder flow and the larger powder flow line. The connector also contains a radio frequency identification tag (RFID) reader used to identify the powder contained in the IPC.

IPC ground connection Connect the ground wire on the IRS powder umbilical to the IPC band clamp before unloading virgin powder.

**IPC Theory of Operation**

- 1. Powder line purge.** The IRS supplies both continuous and pulsed air to the IPC to purge the powder line and fluidize any powder near the outlet that may have settled during shipping.
- 2. IPC inflation.** The IRS inflates the IPC to minimum pressure using continuous and pulsed air. If minimum pressure is not reached within a set time period, the IRS assumes the IPC is empty and shuts it down.
- 3. Powder flow.** To ensure smooth powder flow, the IRS keeps the IPC inflated above minimum pressure with both continuous and pulsed air streams. The IRS monitors the time that the IPC pressure falls below the minimum pressure and above the maximum pressure set-points. If either time limit is exceeded, or if the IRS Virgin bin is full, the IRS shuts down the IPC; i.e., shuts off air flow to the IPC and powder flow to the IRS.
- 4. Shutdown.** The IRS lets the pressure in the IPC drop below minimum. As soon as it does, the IRS introduces pulsed air in the IPC to clear the powder line. This prevents the powder line from clogging when the next unload batch starts.



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**IPC overpressure safety shutdown**

The pressure sensor line at the top of the IPC connects to a redundant overpressure sensor inside the IRS. This sensor is completely independent of the IPC batch unload air flow controls. If the sensor detects air pressure in the IPC greater than 1.8 psi above the maximum IPC pressure set-point, the IRS shuts down the IPC and air cannot enter the IPC from any source.

Minimum and maximum IPC pressure set-points are set at the factory and must only be changed by a certified 3D Systems Customer Support Technician or Authorized Service Provider

**IPC RFID operation**

When the IPC is first connected, the IRS communicates with the RFID reader to determine the type and amount of powder contained in the IPC. The type must be the same as what the IRS already contains. If the tag indicates that the powder type is valid, the IRS will begin to unload.

After each “batch” of powder is unloaded from the IPC, the IRS will write out the amount of powder loaded from the IPC to keep the tag current. In addition, the IRS tracks the amount of powder unloaded from each IPC. Once the IPC RFID tag indicates that all powder has been unloaded, the IRS will not unload any further powder and will shut down until the empty IPC is disconnected from the system.

**IPC batch unload sequence**

Powder is unloaded from the IPC in batches of roughly 5 kg.

If you stop unloading manually before an entire batch (5 kg) unloads, the IPC continues until it unloads 5 kg. If the IPC empties before a batch completes, the IRS will shut it down after 8 minutes.

**IRS & IPC Safety**

When you use any SLS® equipment, follow all general safety guidelines in Safety on page 9 of the User’s Guide. When you use the IRS or IPC, follow these IRS and IPC-specific guidelines as well.



**WARNING:** Hazardous voltage exists inside the IRS enclosure. Injury or death from electrical shock can result if you remove external panels or attempt to defeat safety interlocks. Panels should only be removed, and interlocks should only be defeated, by trained and certified 3D Systems Customer Support personnel.

Before moving the IPC or attempting to load the IRS with powder from the IPC, see IPC Handling Safety on page 37 of the “Safety” Section in the “Sinterstation® Pro SLS System User’s Guide”.



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**Note:** Do not attempt to move the IRS without the assistance of a trained 3D Systems service technician. It is recommended to use a pallet jack to move an IPC.

Some exterior IRS and IPC surfaces are warm to the touch during operation, but not warm enough to pose a burn hazard.

**IPC moving and storage safety**

The IPC is designed to be lifted and moved with a pallet jack. Do not try to lift or move it manually, especially when it is full. The IPC weighs 25 kg (54 lbs.) empty and 125 kg (276 lbs.) full.



**WARNING:** Always follow standard lifting practices (one person per 23 kg (50 lbs.) when moving any SLS® equipment or material. If you are not accustomed to lifting this much weight, or if you have back problems, do any or all of the following to protect yourself: use additional people to lift the items, remove mass to reduce weight, or use mechanical assistance such as a pneumatic lift cart.

**IPC unpacking safety**

Never use a sharp instrument or blade to remove the shrink-wrap from an IPC. You could damage the vinyl container fabric and cause it to leak when the IPC is pressurized during unloading.

Visually inspect the IPC container for any shipping damage prior to pressuring.

Before you unload powder from the IPC, verify that the safety overpressure air line is connected to the push-on fitting on the top of the IPC container. (The safety overpressure air line connects to two pressure switches in the IRS. These switches detect potential overpressure in the IPC during unloading.) Ensure the fabric cover is reconnected to the container using the plastic clips mounted on the container after securing the over pressure line to the lid tap.

The pressure in the IPC normally cycles between 0.7 psig and 0.8 psig while the IRS is unloading powder from it. When an unload cycle completes, the IRS clears the umbilical which raises the pressure in the IPC to about 1.25 psi. The overpressure switches close all the air valves for air flow from the IRS to the IPC if the pressure in the IPC exceeds 1.8 psi.



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**IRS umbilical safety**

Disconnect IRS umbilical in Standby mode only



**WARNING:** Always place the IRS in Standby mode before you disconnect the umbilical. If you disconnect the umbilical with the IRS in Ready mode, there's a chance the IRS might be unloading powder from the IPC. If so, powder can spray out and the airborne particles could irritate your eyes. There is also a remote chance that the airborne dust cloud will explode in the presence of an ignition source.

Verify the Fabric Cover is re-secured to the IPC collapsible container using existing plastic snap clamps on the IPC.

Connect the ground wire clamp on the end of the umbilical to the IPC band clamp screw before unloading virgin powder. This will prevent potentially damaging electrostatic discharge, from the IPC to the IRS.