



OPERATION MANUAL PISYS



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1 Introduction

1.1 About the PiSys

The PiSys is a custom made blast and vacuum loop unit. It is 100% pneumatically operated. All components are grounded. Therefore the system is usable in most environments.

There are two different types of PiSys-machines:

- **PiSys 100:** basically developed for handheld tools fed through a single hose with one nozzle, therefore the dimensions and capacity are adapted to this purpose.
- **PiSys 1000:** developed for use with PiBlasters.

2 Safety Instructions

The products described in this manual are intended for knowledgeable, experienced users of abrasive vacuum blasting equipment. It is the responsibility of the user to ensure that proper training has been completed and to have the relevant certificates from the Pinovo training program, PiCademy.

It is the responsibility of the users to familiarize themselves with the appropriate laws, regulations and safe practices that apply to these products and materials that may be used with these products, and that a safe work environment is provided.

In addition to information on installation and operation, this instruction manual may contain **WARNINGS** and **CAUTIONS** pertaining to user safety. A **WARNING** indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury. A **CAUTION** indicates a potentially hazardous situation which, if not avoided may result in minor or major injury.

Do not attempt to operate this tool until you have read and understood all safety precautions and instructions listed in this manual. **INCORRECT OPERATION OF THIS UNIT CAN CAUSE SERIOUS INJURY.**

2.1 Warnings

⚠ WARNING	Vacuum blasting equipment may cause serious injury – protect hands, feet, eyes and hearing.
⚠ WARNING	Show utmost care when connecting and operating the system. ALWAYS THINK SAFETY FIRST!
⚠ WARNING	Wear PPE at all times when operating the PiSys. Type of respiratory protection should be considered depending on material being removed.
⚠ WARNING	Before starting the PiSys, ensure that all fixing screws, bolts and fittings are mounted correctly and securely tensioned. Also ensure that whipchecks and safety pins are used for all hose-connections and hook-ups.
⚠ WARNING	Check all hoses for damage before starting the system
⚠ WARNING	Only use fork lift accessibility on bottom of system for lifting the PiSys
⚠ WARNING	Maintenance/repair on the system should only be carried out when the system is depressurized
⚠ WARNING	Never aim the blast head at anybody, not even when blasting is not done. Never look into the blast head when connected to the system.

2.2 Cautions

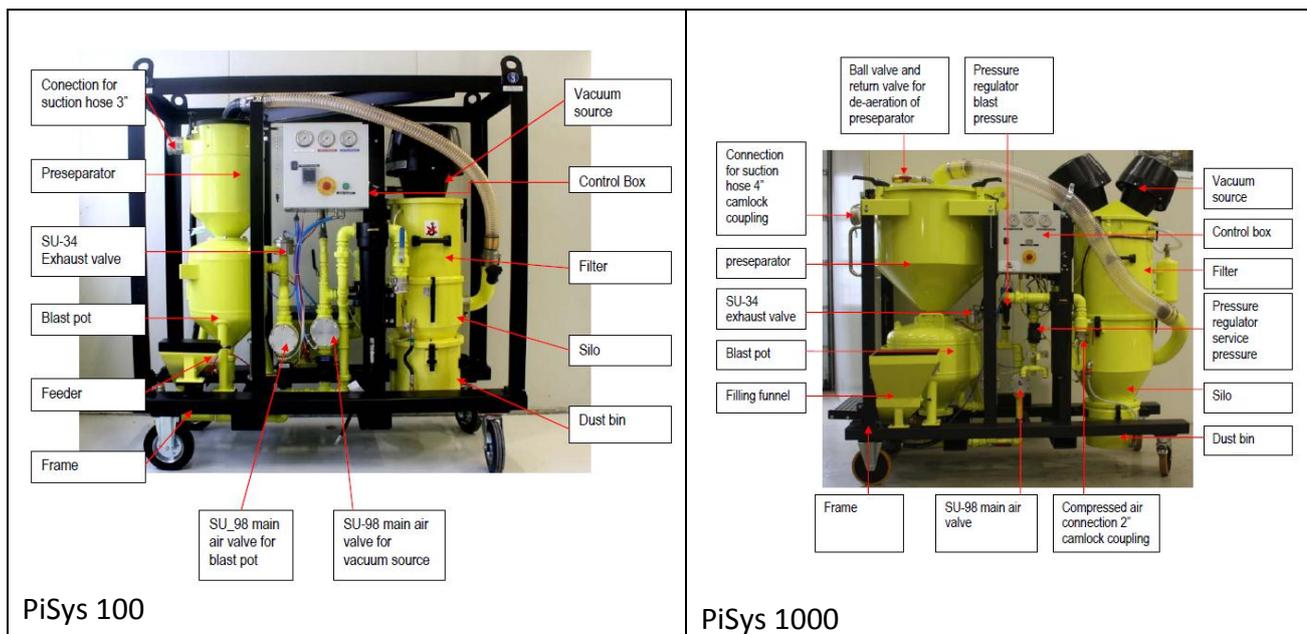
⚠ CAUTION	Never install, remove or perform any maintenance on the PiSys machine when the system is pressurized.
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⚠ CAUTION	Always use the deadman's handle when operating the system. The deadman's handle must never be set in a locked position.
⚠ CAUTION	Only use Brown Fused Aluminum Oxide in the appropriate size
⚠ CAUTION	Valves must be opened slowly to allow seal to function correctly and to give a safe operation.
⚠ CAUTION	Never operate the PiSys while wearing loose hanging chains, hanging ID/Security badges or garments.
⚠ CAUTION	Never start the PiSys before it's hoses are properly secured and safely located.
⚠ CAUTION	Always place the PiSys in a safe, flat location without risk of tipping, rolling or being hit by falling or moving objects.
⚠ CAUTION	The PiSys should be properly maintained and stored when not in use to avoid damage to parts.

3 System description

3.1 Main components of a PiSys

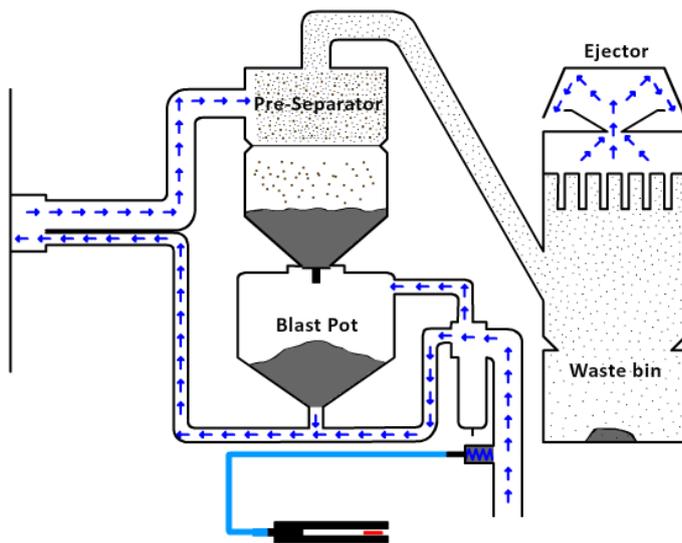
The PiSys consists of a blast unit with a pre separator on top, a vacuum unit and a control box connected to a number of different valves for controlling the system. The system is remotely controlled through a "deadmans" handle.



When the blast pot is empty, you have to stop for a couple of minutes to let the recycled media from the pre-separator back into the blast pot.

Also, monitor and empty the waste bin regularly.

Remember that the abrasive grains are getting smaller with each loop through the system, and that you therefore constantly have to add a small amount of new abrasive through the filling funnel to obtain a constant surface profile.



3.2 The different valves on the PiSys system

There are a few valves on the system, and here we will tell you where they are and what they do.

The moisture bleed valve is located under the moisture separator. It should always be slightly open to drain away moisture from the compressed air.

The same goes for the bleed valve under the air manifold.

It is also important to remember to have the bleed valve on the PiSys open when depressurizing the system, this for emptying the system for all pressure.

The choke valve is located on the pipe that feeds air to the blast hose. It is used for “choking” the system and gives the system a boost when grit is packing up in the blast pot.

The position of this valve should be open when the system is running. If the valve is closed for more than a couple of seconds, you will fill the blast hose with grit and there is a good chance for the hose to end up blocked.

There is a valve right before the hose for the vacuum ejector. This valve is just for closing off the air supply to the ejector and is always to be left open when running the system.

3.3 The extraction timer on PiSys

The system has a pneumatic timer to adjust the period the system continues the extraction after the deadmans handle has been released.

This is for the system to empty all hoses and get all grit and dust back into the system.

Open the control box with the “black key” mounted in a chain next to it.

Inside the control box you see a timer knob marked with zero and the letters A-F.

This is where you adjust the extraction time. Turn the knob clockwise for increasing and counter clockwise for decreasing the extraction time.

Remember to close the control box properly to keep moisture away from the components inside.

3.4 The Minute Counter

The minute counter shows the running time for the system.

4 Operating instructions

4.1 PiSys Hookup procedure

<p>You always start with connecting the earth cable to a location with good metallic connection to your worksite.</p> <p>Remember that the connection spot has to be bare metal for good connection.</p>	
<p>Make sure that the main air inlet valve on the PiSys system is closed.</p>	
<p>Connect the 2 inch main air supply hose.</p> <p>Always use 2 safety pins and a proper whip-check.</p>	
<p>Connect the blast hose to its location.</p> <p>Make sure the integrated pins hit their holes on the opposite coupling. Also, attach a proper whip-check.</p>	
<p>Connect the 3 inch extraction hose to its location on top of the pre-separator. Remember to use 2 safety pins and a proper whip-check.</p> <p>If you need more 3 inch extraction hoses, connect it now. Just remember to use safety pins and whip-checks on all joints.</p>	
<p>Connect the reduction joint from 3 to 2 inch extraction hose. Remember to attach safety pins on each side of the joint.</p> <p>Also, attach a proper whip-check from one hose, over the joint to the other hose.</p>	
<p>The connect the blast hose to the precursor with the tool adaptor.</p> <p>Make sure the integrated pins hit their holes on the opposite coupling and attach a proper whip-check between the hoses.</p>	
<p>Now you might attach the tool you are using to the adapter.</p>	
<p>Connect the hose for the deadman's handle to its connection point underneath the control box.</p> <p>Make sure that the couplings are properly attached.</p>	

<p>Now is the time to do a visual overview of the system and the components connected to it.</p> <p>Make sure that everything looks normal and that all safety pins and whip-checks are in place.</p>	
<p>We are now ready to connect the 2 inch main air hose to the air manifold.</p> <p>The air manifold is to be mounted between the PiSys 100 and the air source.</p> <p>Its main task is to be a buffer for obtaining the correct pressure at all times. Remember to use both safety pins and whip-checks on all connections.</p>	
<p>It also has a bleed valve underneath which should be slightly open to drain moisture that might be in the compressed air.</p>	
<p>There is a manometer on top of the manifold which tells you what pressure it has inside.</p>	
<p>The air should be dry and maintain a constant pressure of 7 bars for the system to function optimally.</p> <p>Remember to use safety pins and whip-checks when connecting to the source, also on all joints the hose might contain.</p>	
<p>Now you can pressurize the main air hose and air manifold.</p> <p>A good rule to follow when pressurizing any air hose is to open the lever 1/3, wait 3 seconds and if everything looks normal then slowly push the lever to fully open position.</p>	
<p>Then pressurize the 2 inch hose between air manifold and the PiSys.</p> <p>Check that the lever for changing vacuum mode located on the right side of the control box is set to auto.</p> <p>Now gently open main air inlet and pressurize the system.</p>	
<p>Now make sure the bleed valve under the moisture separator is slightly open so that condensation from the main air hose is drained away from the system.</p>	
<p>Check the setting for service pressure on the control box, should never exceed 7 bar, and adjust if necessary.</p>	
<p>Adjust the metering-valve to the desired setting.</p>	

Normal setting is between 3 and 4 full turns.	
Make sure the emergency button is not in activated position, which means that it has been pressed and released.	
Note that the emergency button is for emergency only and is never to be used as a shortcut to the procedures when going for a break.	
Adjust the blast and suction pressure to the desired levels.	
The system is now ready for use.	

4.2 Applying Blast Media

The blast media used for the PiSys systems is Aluminum Oxide.

There are 3 different gradings used, NK12, NK16 and NK20, depending on the desired surface profile.

When applying blast-media to the system you have 2 options:

<ol style="list-style-type: none"> Open lid on top of pre-separator, and gently pour blast-media inside. There is a sieve located inside and by pouring too much at the time the weight of the blast-media might make this to slip out of position. This method is to be performed on a de-pressurized system. 	
<ol style="list-style-type: none"> Pour blast-media into a clean and dry container, a plastic bucket will do. Remove any tool that might be connected to the adapter, pressurize the system and set the lever for vacuum-mode to manual. Now use the hose with adapter to gently suck the blast-media into the system. When finished set the lever for vacuum-mode back to auto. 	

4.3. How to empty the waste bin on the PiSys

Always wear minimum a dust particle mask when performing this operation. If you are working on potential hazardous materials you should consider wearing a gas mask with particle filter or a fresh air mask.	
First of all make sure that the system is depressurized.	
Disconnect the upper coupling on the pressure equalization hose.	
Now open the hinged latches on both sides of the waste bin.	
Lift the waste bin and release the hinges, remember that the waste bin might be heavy if it hasn't been monitored and emptied regularly.	
Fold the waste bag together and seal it with a plastic strips. Remove the bag from the bin and replace it with a new plastic bag. Fold the bag neatly over the bins edge and then reposition the waste bin.	
Remember to reattach the pressure equalization hose.	

4.4 Breaks and Daily Shutdown

Close the main air-inlet valve, set lever for vacuum-mode to manual to release pressure from the system, set lever back to auto then disconnect the deadmans-handle.	
Now go and close connection to main air source.	
Go back to Pisis 100, open main air-inlet valve, again set lever for vacuum-mode to manual to release pressure from the system, set lever back to auto and then make sure the bleed-valve on the moisture-separator is open to release any leftover pressure that still remains in the system.	
When all pressure is released from the system, close the main air-inlet valve.	
For any breaks exceeding lunch or coffee times and you are working with tools that aren't attached to the worksite, the tool should also be removed and the holes in the adapter blinded with ducktape to prevent moisture to access the system. No tools are ever to be left uncovered when there is a possibility for rain and moisture to reach it.	
The system and all connected hoses are now depressurized and you may disconnect the components in the reverse order from which you attached them. The earth-cable is the last thing to be removed. Remember to take care of all safety pins and whip-checks for later use.	
Be aware that only trained service personnel are allowed to perform maintenance and repairs on the Pisis systems.	

4.5 How to Empty the Blast Pot

<p>You need the proper hose to empty the PiSys 100.</p> <p>Connect the yellow coupling to the blast hose coupling, and the other side of the hose to the black adapter on the vacuum unit.</p>	
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Now open the top on the pre separator and lift the lid up on the separators edge. Pressurize the system and set lever for vacuum mode to manual. Block the pipe in the separator lid with the rubber plate to build up vacuum in the system.



Open the metering valve to fully open position, then press and hold the green button on the control box. The green button opens the metering valve without pressurizing the system, and the grit now flows from the blast pot to the waste bin only with help of vacuum.



You must monitor the operation, and change plastic bag in the waste bin regularly, since the blast pot holds more grit than the waste bin can take in one go.

Continue this operation until the blast pot is empty.

Close main air inlet valve to depressurize the system. Then set vacuum mode back to auto.

Now close the metering valve, remove the hose for emptying the system.

Remove the plate you used to build up vacuum in the system.

Now you can add new blast media to the system and attach all components that you need to continue blasting.

5 Maintenance

Be aware that only trained service personnel are allowed to perform maintenance and repairs on the PiSys systems.

6 Troubleshooting

6.1 What to do when the system isn't starting

Is the system pressurized?	
<p>Are all valves for main air open?</p> <ul style="list-style-type: none"> - Main air source - Air manifold - Main inlet valve on the PiSys 100 	 
Is the main air source running?	
Check the manometers on the control box, to verify that they display that the system is pressurized.	
Also check the manometer on air manifold to verify that it displays pressure from compressed air inside.	
Did you check that the emergency button is not in activated position?	
If the emergency button has been pressed you have to turn it clockwise to release it to un-activated position.	
Check that the deadmans handle looks intact, also check that the hoses for the deadmans handle is intact and don't have any kind of damages or leaks.	
Make sure that the couplings on the twin hose for the deadmans handle are properly attached to their couplings under the control box.	
If the system still isn't starting, contact Pinovo for further support: +47 90 75 55 00	

7.2 What to do when the system gives no grit

7.2.1 The choke valve function

<p>The choke valve is located on the pipe which feeds the blast hose with compressed air.</p> <p>When you close this valve, all the air has to go through the blast pot and therefore builds up pressure inside, hopefully to push the grit out of the pot.</p> <p>It might help to fully open the metering valve when performing this operation, just remember to adjust it after the grit flow stabilizes.</p> <p>Close the choke valve for 3-4 seconds and then quickly open the valve to make a "boost".</p> <p>Repeat this a few times and if it's just the grit packing up in the pot it should start to flow like normal.</p>	
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7.2.2 Moisture in blast media

The PiSys systems are more vulnerable to moisture than a conventional blast kit, since the same media runs through the system a large number of times.

If you have problem with moist grit, you should empty the blast pot and apply new grit to the system.

7.2.3 What to do if hoses or nozzles are blocked

The nozzle used with the PiCo tools is usually 6,4mm and there is possibility for blockage if large particles accessing the system.

Also if the metering valve has been adjusted too high the grit might build up inside the hose and then finally makes a block inside. In these cases you have to disconnect the hose and empty it by shaking the grit out of it.

A good rule to follow is to always start the system with the metering valve closed in case there is a lot of grit in the hose. When the hose is empty adjust the metering valve to the desired setting.

7.2.3.1 How to remove the nozzle from the blast adapter

If you have a vice available we would recommend that you use it for this operation.

Use a pipe wrench to un-tighten the nozzle holder from the blast adaptor.

Then use a wrench to loosen the nozzle, and then un-tighten it by hand.

Use any suitable remedy to remove any obstacle that might sit inside the nozzle.

Assemble everything in the reverse order that you dissembled it.

Remember that the nozzle holder is made from brass and the blast adaptor from stainless steel.

It's very important that you fit the nozzle holder correctly or the threads on the brass nozzle holder will break.

If fitted correctly you should be able to tighten it mostly by hand.



7.2.3 Blocked Channel for Metering Valve

First of all open the metering valve to fully open.

Then you might want to try to choke the system a few times to see if the obstacle is moving by itself.

If still no grit appears you have to remove the metering valve and then remove any obstacle that prevents the grit flow to the metering valve.



7.2.3.1 Dismantling the metering valve

⚠ WARNING First of all make sure the system you are working on is depressurized.

Remove the 6 mm plastic hose that controls the metering valve.

There is a plastic ring where the hose enters the coupling, press this ring against the coupling and pull out the plastic hose.

Now use a wrench to remove the two bolts that connect the metering valve to its pipe.



<p>You might want to have a few plastic bags ready to collect the grit, because when the channel now gets open nothing stops the grit from flowing out of the system and you have to wait until the blast pot is empty before you can reattach the metering valve.</p>	
<p>You will need some kind of metal string to lead into the pipe against the blast pot, to remove anything that blocks the channel.</p> <p>Make a small hook in the end of the string to grab obstacles inside the channel.</p> <p>In most cases this will remove the object that blocks the grit and the grit will now continue to drain from the blast pot until the pot is empty.</p>	
<p>Make sure the metering valve is in fully open position and then reattach it.</p> <p>Put the bolts in position and tighten them with a wrench.</p> <p>Now reconnect the plastic hose to the metering valve. Just push the hose as far as it goes into its coupling, and the plastic ring will lock it in position.</p> <p>Remember to close the metering valve before applying new grit to the system</p>	

7.3 What to do when you have low suction power in the system

<p>If the suction power drops, extraction is no longer performed correctly and grit and dust builds up in the extraction hose and the tool.</p> <p>Check that the valve which connects the air hose to the ejector is in fully open position.</p> <p>Check that the valve connecting the hose from the filling funnel to the pre separator is closed to prevent loosing vacuum effect.</p>	
<p>Check the two manometers above the lever for changing vacuum mode on the control box.</p> <p>They should optimally show the same result, but the lower manometer drops if the filters start to get dirty and the extraction pressure also drops.</p>	

7.3.1 How to get access to the filters in the vacuum unit

<p>⚠ WARNING First of all make sure the system you are working on is depressurized.</p>	
<p>Now disconnect the coupling for the thin black hose below the valve for the ejector.</p>	
<p>Disconnect the coupling on top of the vacuum unit.</p>	
	
	
	
	

Now disconnect the two thin plastic hoses which are on the side of the filter section.

Now you can open the 3 plastic locks from the ejector and remove the top from the vacuum unit.



Then open the 3 lower locks and now remove the filter section from the vacuum unit.
In the bottom of this section you could now visually see the statement of the filters.

8 Storage and transport

Always empty blast pot before transport. If it is not possible to do this before leaving site, it should be done on return to Pinovo storage location.

8.1 What to do when equipment arriving on site

When the equipment is arriving on site, you should always perform inventory counting.

8.2 What to do when equipment is sent from site

When the equipment is to be sent back to Pinovo, you also need to perform an inventory count.

Check out for everything packed and ready for shipment back to Pinovo, also here sign and preferably send by email, but the form might also be left in the container with the equipment.

8.3 How things should be packed in the container

To avoid transportation damages everything has to be properly strapped and secured.

8.4 What to do when having damage on the equipment?

When any kind of damage is made to Pinovo's equipment, a report is to be made.