Flow

PASER® CF900
ABRASIVE DELIVERY SYSTEM

PASER CF900 Abrasive Delivery System

Intended use

The PASER CF900 Abrasive Delivery System (ADS) is designed for the continuous transport of abrasive materials. A programmable logic controller (PLC) constantly monitors the level of abrasive, and a control cabinet provides visual and audio feedback.

Safety

Operating errors or misuse may endanger the health of the operator, the ADS, other valuable property, and can prevent the efficient functioning of the equipment.

Ensure that the machine workspace is clean and clear.

Modification of products

For safety reasons, do not do independent refits, conversions, or changes to the machine.

Strictly adhere to operating, maintenance, and installation conditions in this manual.

Personal Protective Equipment (PPE)

All maintenance and operating personnel shall practice and promote safety at all times to avoid potential injury and unnecessary downtime.

Any personnel in proximity of the equipment must wear safety glasses with side shields to prevent eye injuries caused by pressurized abrasive leaking from the silo or hose.

Maintenance personnel must wear safety gloves when cleaning the machine to prevent abrasive particles from penetrating any existing wounds or skin abrasions.

Personnel must wear dust masks or respirators when loading abrasive materials into the silo to prevent particle or dust inhalation.

Hearing protection is recommended.

Safety labels

Electrical warning symbol. This symbol is located on the control cabinet. This warning shows that the control cabinet contains hazardous voltage.

Flying debris warning symbol. This symbol is located on the silo. This warning shows that flying debris may be present; wear safety glasses.

Hearing protection warning symbol. Hearing protection is recommended.

Safety messages

Safety messages are highlighted with the safety alert symbol and a signal word or a signal word panel. Pay particular attention to these safety messages and all safety precautions posted on the equipment.

Safety alert symbol

This is the safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

Signal word panels

WARNING! WARNING indicates a hazardous situation, which if not avoided, could result in death or serious injury.

CAUTION! CAUTION indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.

Signal panel words

DANGER DANGER indicates a hazardous situation, which if not avoided, will result in death or serious injury.

NOTICE *NOTICE* indicates a non-hazardous situation, which if not avoided, could result in property damage.

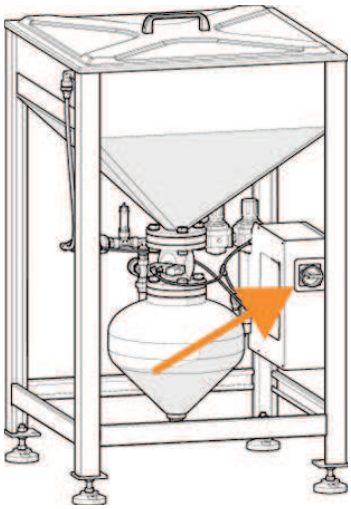
Lockout/Tagout

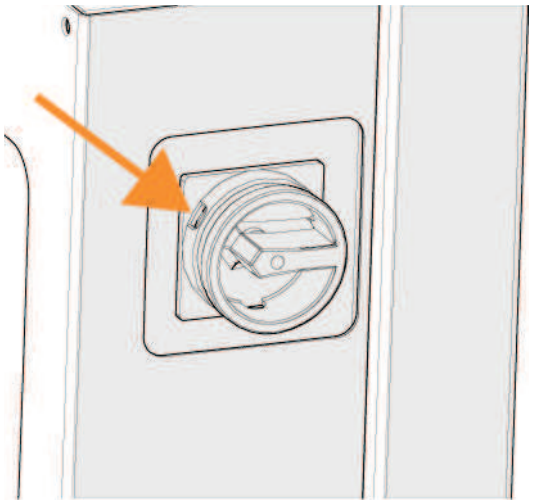
The lockout/tagout procedure protects personnel from injuries caused by the unexpected energizing or startup of the ADS or the release of stored energy during service or maintenance.

Do the lockout/tagout procedure before doing service or maintenance procedures.

WARNING! Failure to do the lockout/tagout procedure can result in equipment damage or injury to personnel.

1. Stop the ADS by turning off the power switch, and then lock and tag the power switch.





2. Turn off the air supply to the ADS, and then lock and tag the air source.

Specifications

Dimensions (Length × Width × Height)	858 × 858 × 1392 mm (33.8 × 33.8 × 54.8 in.)
Weight	112 kg (247 lb) empty
	537 kg (1184 lb) full
Abrasive capacity	425 kg (937 lb)
Customer air supply	has lockout/tagout capability
Customer air supply line	>20 mm (3/4 in.)
Operating pressure/volume	5.5 bar (80 psi) @ 566 lpm (20 scfm)[1]
Surge pressure/volume	5.5–6.5 bar (80–94 psi) @ 2250 lpm (80 scfm)
Maximum compressed air volume	dependent on abrasive material and flow rate
Quality of compressed air	dry and filtered to 10 µm
Supply voltage	100–240 VAC, 50/60 Hz, or 24VDC[2]
AC Frequency	50/60 Hz
Full-Load current	0.20 A@ 240 VAC
	0.48 A @ 100 VAC
	2.0 A @ 24 VDC
Largest-load current	2.0 A
Rating (SCCR)	2.5 kA
Site	Level and solid
Operating environment temperature	0°C–55°C (32°F–131°F)
Operating environment relative humidity	5%–95%
Operating environment elevation	0–2500 m (0–8200 ft) above sea level
Service clearance	1 m (3 ft) on front and sides

[1] Requires a minimum of 2 bar (30 psi) difference between the supply pressure and the operating pressure.

Sound level, conveying abrasive..... 69.6 dBa[3]

Sound level, depressurization ..... 98 dBa[3]

Sound level, repressurization ..... 79.4 dBa[3]

Transport the ADS

Contact Flow Technical Service if you are connecting the ADS to a different voltage power supply in the new location.

CAUTION! Comply with your local regulations for moving equipment. Flow recommends the presence of flaggers and spotters.

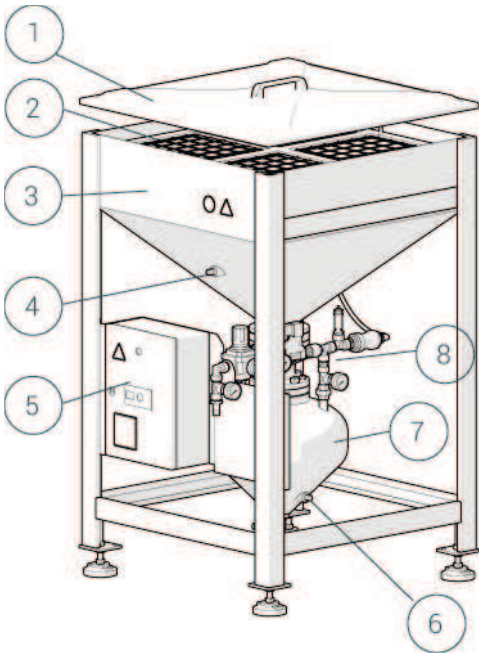
1. Empty the silo.

   WARNING! The silo must be empty to transport the ADS. If you leave abrasive in the silo, it can cause an unsafe high center of gravity during transport.

2. Disconnect the electrical and pneumatic connections.
3. Use a forklift or pallet jack to lift the ADS. Place the forks under a pair of lower beams on the frame (accessible from all four sides). Transport it to the final operating location.
4. Place the ADS on a level and solid foundation.
5. Level the ADS with the leveling pads.
6. If required, use anchor bolts to attach the ADS to the floor.

Components



Number	Description
1	Lid
2	Sieve
3	Silo
4	Silo low abrasive switch
5	Control cabinet
6	Vessel low abrasive switch
7	Vessel
8	Pinch valve pneumatic controls

The abrasive material is loaded through the sieve and temporarily stored in the silo. You can fill the silo without stopping the ADS. Abrasive moves from the silo through a pinch valve, and then to the vessel. The abrasive flows through a hose to the cutting system.

Visual and audio signals provide operating condition and warning notices. The control cabinet display shows status messages.

There are two low abrasive switches:

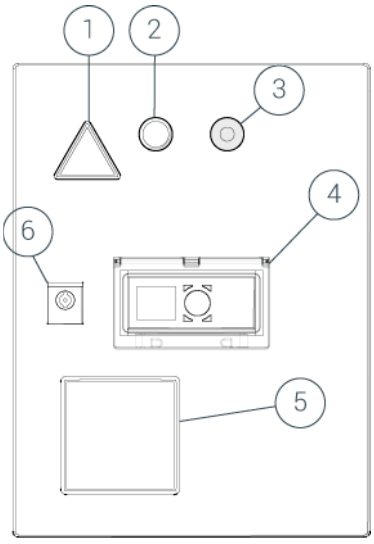
- Silo low abrasive switch. When this switch does not sense abrasive, it signals the PLC to start the flashing warning indicator and rhythmic audio signal. The display panel shows the “Silo Empty” message.
- Vessel low abrasive switch. When this switch does not sense abrasive, it signals the PLC to start the continuous warning indicator and continuous audio signal. The display panel shows the “Vessel Empty” message. If you are using FlowCUT™, the program stops.

Control cabinet

The control cabinet uses alternating current (AC) from 100 to 240V at 50/60Hz, or 24V direct current (DC). The internal control voltage is 24V DC.

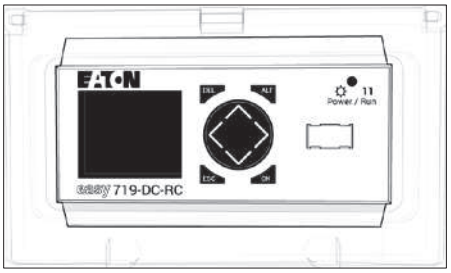
The control cabinet contains the PLC, terminal strip, and warning indicators.

The PLC constantly monitors the operating conditions and sends control signals to the solenoid valves, the warning indicator, and the audio signal.



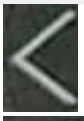
Number	Description
1	Electrical hazard warning label
2	Yellow warning indicator
3	Audio signal
4	Display panel
5	CE label
6	Panel lock

Display panel



The display panel shows the following notices:

Notice	Description
Filling	Fill cycle
Bleed	Release of the vessel pressure
Running	Normal operation mode
Silo Empty	Silo is empty
Vessel Empty	Vessel is empty
Replace Insert of Pinch Valve Reset P3 =>	Pinch valve hose insert replacement is necessary. This service message shows after 6000 cycles.

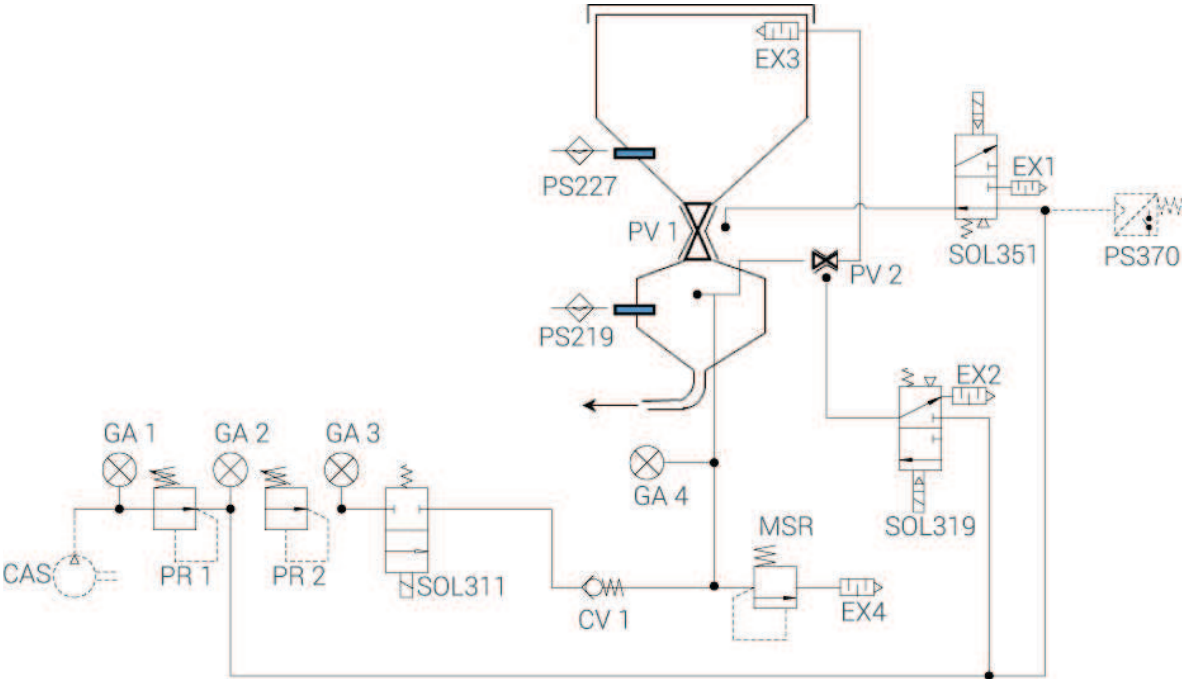
Button	Button ID	Button function
	P1	Push and hold the button for five seconds to show (from top to bottom) the following: software version, operating hours (h), switching cycles (c)
	P2	Push this button to open the vent, venting valve, and normally closed pressure solenoid valve to release pressure from the vessel.
	P3	Push and hold this button for five seconds to set the cycle counter to zero.
	P4	Push and hold this button for 10 seconds to switch the potential free contacts for a warning message from normally open to normally closed. You can accept the selected signal in the ADS and use it there for an additional alarm or as a way to stop the cutting process.

Warning indicators

The yellow warning indicator and the audio signal tells operators of specific conditions. See the Troubleshooting section for more information.

Warning	Cause	Remedy
Yellow warning indicator flashes and the audio signal operates in a rhythmic pattern. The device stays in operation. If the ADS integrates with FlowCUT, a flashing warning indicator displays on the machine PC.	Silo abrasive level is low. The silo low abrasive switch signaled that the abrasive level is at the minimum level.	Fill the silo with abrasive.
Yellow warning indicator illuminates continuously and the audio signal sounds continuously.	The vessel low abrasive switch has not signaled the presence of abrasive for 20 seconds. The ADS is stopped. It starts after the vessel fills with abrasive.	Fill the silo with abrasive. If applicable, start FlowCUT again after the warning indicators have turned off.

Pneumatic controls



Symbol	Definition
CAS	Customer Air Supply
PR1	Pressure Regulator 1—Set to 5.5 bar (80 psi)
PR2	Pressure Regulator 2—Set to 2.7 bar (40 psi)
PS227	Abrasive ADS Low—Normally Open (Warning)
PS219	Vessel Empty—Normally Open (Warning)
MSR	Main System Relief—Factory set to 7 bar (100 psi)
GA1	Gauge 1
GA2	Gauge 2
GA3	Gauge 3
GA4	Gauge 4

Symbol	Definition
PS370	Pressure switch (when used)
PV1	Pinch Valve 1—Normally Open
PV2	Pinch Valve 2—Normally Open
SOL351	Primary Pinch Valve Control—Normally Open
SOL319	Air Exhaust Pinch Valve Control—Normally Closed
SOL311	Air Supply Valve Control—Normally Closed
EX1	Exhaust 1
EX2	Exhaust 2
EX3	Exhaust 3
EX4	Exhaust 4

The controls are:

- Two pinch valves
- Two pressure regulating valves
- Two solenoid valves, normally closed (N/C)
- One solenoid valve, normally open (N/O), for venting
- One check valve

The supply pressure controls the pinch valve. The operating pressure controls the vessel.

A safety valve opens at 7 bar (102 psi) and limits the maximum pressure in the vessel.

Pinch valve PV1 is operated by compressed air. It is controlled by SOL351.

There must be a minimum of 2 bar (30 psi) difference between the supply pressure PR1 and the operating pressure PR2 to ensure closure of the pinch valve. For best performance, set PR1 to 5.5 bar (80 psi) and PR2 to 2.8 bar (40 psi). If the minimum difference is maintained, you can adjust PR1 and PR2 to control the abrasive flow.

Proximity switch PS219 sends a signal to the PLC to indicate presence of abrasive. If there is no abrasive, the PLC sends a signal to release the pressure from the vessel, and then sends a signal to open the pinch valve. When the proximity switch senses abrasive during refilling, a delay timer starts. When the delay timer ends, the pinch valve closes, and the vessel pressurizes.

When SOL319 opens pinch valve PV2, pressure is released from the vessel to the silo.

Operation

CAUTION! Never operate the ADS unless the abrasive outlet hose connects to a cutting system.

Always keep the lid on, except when adding abrasive. The lid prevents abrasive from spraying from the silo when the vessel releases pressure before entering the fill cycle.

If the ADS connects to a cutting system using FlowCUT, the cutting program stops when the vessel switch signals the PLC. Start FlowCUT again after the indicators have reset.

Normal operation

This table describes the conditions of the switches, valves, and other components.

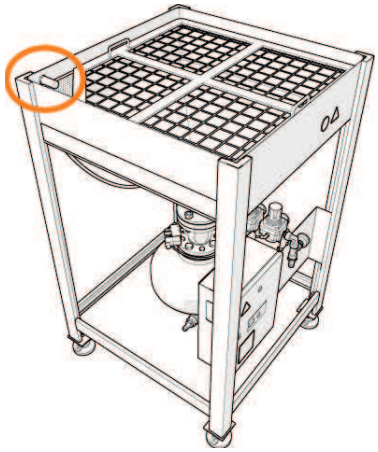
Switches	Engaged State	Disengaged State
Power switch	The controller checks the state of all switches and solenoids. The controller waits for abrasive to be added to the silo or starts the steady state operating cycle.	No pressure is supplied to the vessel; the main pinch valve opens. All controls/electronics are without power.
Silo low abrasive switch	The switch is engaged when it senses abrasive.	The switch is disengaged when it does not sense abrasive. The yellow warning indicator flashes and the rhythmic audio signal operates.
Vessel low abrasive switch	The switch is engaged when it senses abrasive. During a refill cycle, the switch signals the pinch valve to close and for the vessel to pressurize.	When the switch is disengaged, the refill cycle starts. If disengaged for approximately 20 seconds, the yellow warning indicator turns on continuously and the audio signal operates continuously.
Pressure Switch (Mach 4c only)	When engaged, the pressure switch signals FlowCUT that the vessel has air pressure.	When disengaged, FlowCUT prevents any programs from starting and stops any running programs.

Fill the ADS

1. Remove the lid, and then fill the silo with abrasive.

CAUTION!

- Wear safety goggles to prevent eye injuries caused by pressurized abrasive leaking from the silo.
- Wear a dust mask or respirator when loading abrasive into the silo to prevent particle or dust inhalation.
- Observe proper lifting techniques when lifting abrasive bags.
- Avoid adding abrasive near the pressure valve muffler (below).



2. Put the lid on the silo.

Startup

1. Ensure the abrasive outlet hose connects to the vessel and the cutting system.
2. Ensure that the abrasive level is above the silo low abrasive switch.
3. Turn on the air supply to the ADS.
4. Ensure that the PR1 gauge is at 5.5 bar (80 psi) and PR2 is at 2.8 bar (40 psi).
5. Turn on the power switch.

Shutdown

- Turn off the power switch.

Maintenance

Description	Daily	Other
Examine the pressure regulating valves, solenoid valves, and check valve for damage.	✓	
Examine the solenoid valve on the pinch valve for damage.	✓	
Examine the pressure gauges for functionality. There must be a minimum difference of 2 bar (30 psi) pressure between PR1 and PR2.	✓	
Replace the PV1 pinch valve seal. The display shows a message when the pinch valve seal is due for replacement.		Every 6000 cycles

Replace the silo low abrasive switch

PARTS

- 86200023, Proximity switch

TOOLS

- 6 in. adjustable wrench
- Small flat-tip screwdriver

TASK

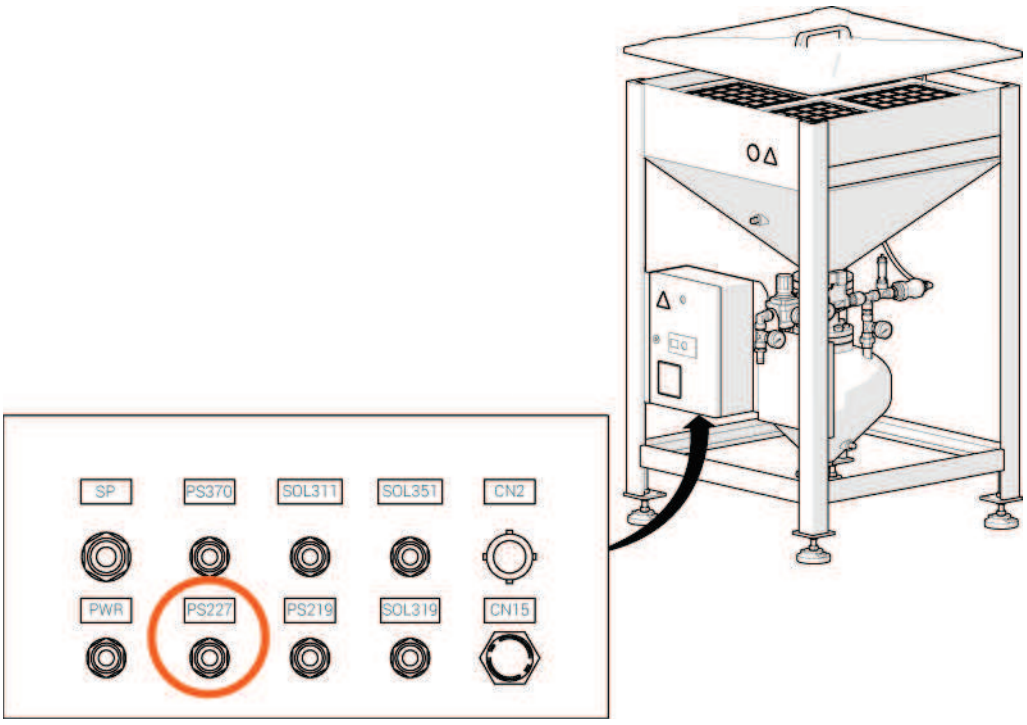
1. Do the Lockout/Tagout procedure.

   WARNING! Failure to do the lockout tagout procedure can result in equipment damage or injury to personnel.

2. Remove abrasive until it is below the silo low abrasive switch.
3. Open the control panel, and then disconnect the cables from TB1-9, TB1-10, and TB1-11.

4. Pull the cables out of the PS227 port.

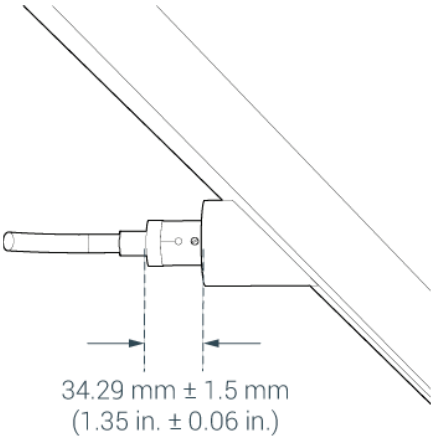


5. Loosen the locknut, and then remove the proximity switch.

6. Remove abrasive from the silo threads.

NOTICE Failure to remove all abrasive will damage the threads of the silo and the proximity switch.

7. Install the new proximity switch. Turn the switch so that access to the adjustment screw is easy. Tighten the locknut to hold the switch in position.



8. Insert the cables through the PS227 port, and then connect the cables:
    - Brown, 1142P to TB1-9
    - Blue, 1160N to TB1-10
    - Black 2270 to TB1-11
9. Fill the silo with abrasive, and then turn on the ADS.
10. Use the small flat-tip screwdriver to adjust the switch:
    a. Turn the adjustment screw counterclockwise until it stops.
    b. Turn the adjustment screw clockwise until the light on the switch comes on.
    c. Turn the adjustment screw counterclockwise until the light goes off.
    d. Slowly turn the adjustment screw clockwise until the light comes on.
11. Connect the air supply to the ADS.

Replace the vessel low abrasive switch

PARTS

- 86200023, Proximity switch

TOOLS

- 6 in. adjustable wrench
- Small flat-tip screwdriver

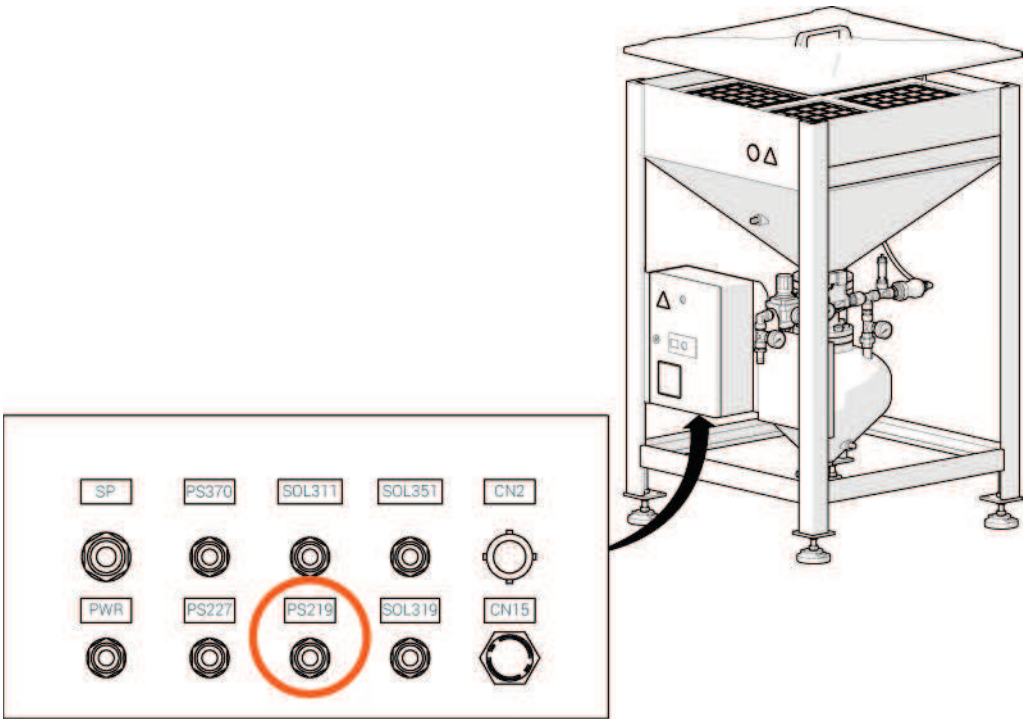
TASK

1. Remove all abrasive from the vessel.
2. Do the Lockout/Tagout procedure.

WARNING! Failure to do the lockout tagout procedure can result in equipment damage or injury to personnel.

3. Open the control panel, and then disconnect the cables from TB1-6, TB1-7, and TB1-8.

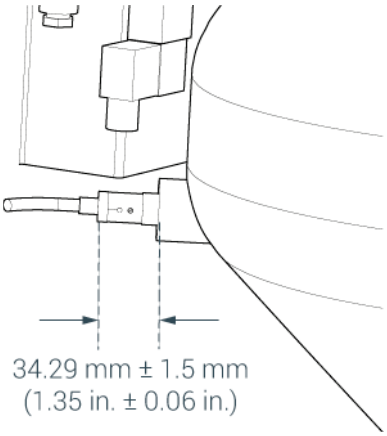
4. Pull the cables out of the PS219 port.



5. Loosen the locknut, and then remove the low abrasive switch.
6. Remove the abrasive from the vessel threads.

NOTICE Failure to remove all abrasive from the threads damages the threads of the vessel and the switch.

7. Install the new switch. Turn the switch for easy access to the adjustment screw. Tighten the locknut to hold the switch in position.



8. Insert the cables through the PS219 port, and then connect the cables:
    - Brown, 1142P to TB1-6
    - Blue, 1160N to TB1-7
    - Black 2190 to TB1-8
9. Fill the silo with abrasive.
10. Turn on power to the ADS.
11. Use the small flat-tip screwdriver to adjust the switch:
    a. Turn the adjustment screw counterclockwise until it stops.
    b. Turn the adjustment screw clockwise until the light on the switch comes on.
    c. Turn the adjustment screw counterclockwise until the light goes off.
    d. Slowly turn the adjustment screw clockwise until the light comes on.
12. Connect the air supply to the ADS.

Replace the PV1 pinch valve seal

Replace the PV1 pinch valve seal after approximately 6000 switching cycles.

An assistant is required during some steps of this procedure.

PARTS

- Pinch valve seal (hose insert)

TOOLS

- 6 in. adjustable wrench
- 12 in. adjustable wrench

SUPPLIES

- Lint-free rags
- Wooden blocking

TASK

1. Empty the abrasive from the silo and, if possible, from the vessel.

CAUTION! Support the vessel if it is not empty. It can weigh over 90.7 Kg (200 lb) when full.

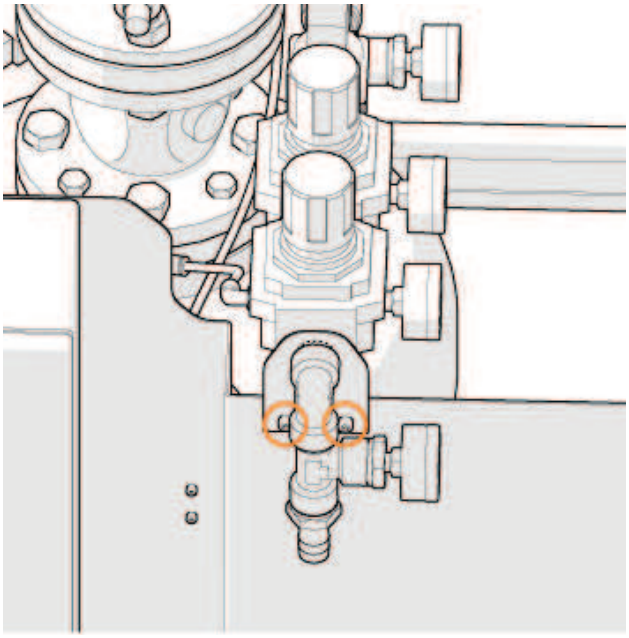
2. Record the pressure settings for PR1 and PR2 if they are set to pressures different from the regulator labels.
3. Set PR1 to 0 bar (0 psi).
4. Do the Lockout/Tagout procedure.

WARNING! Failure to do the lockout tagout procedure can result in equipment damage or injury to personnel.

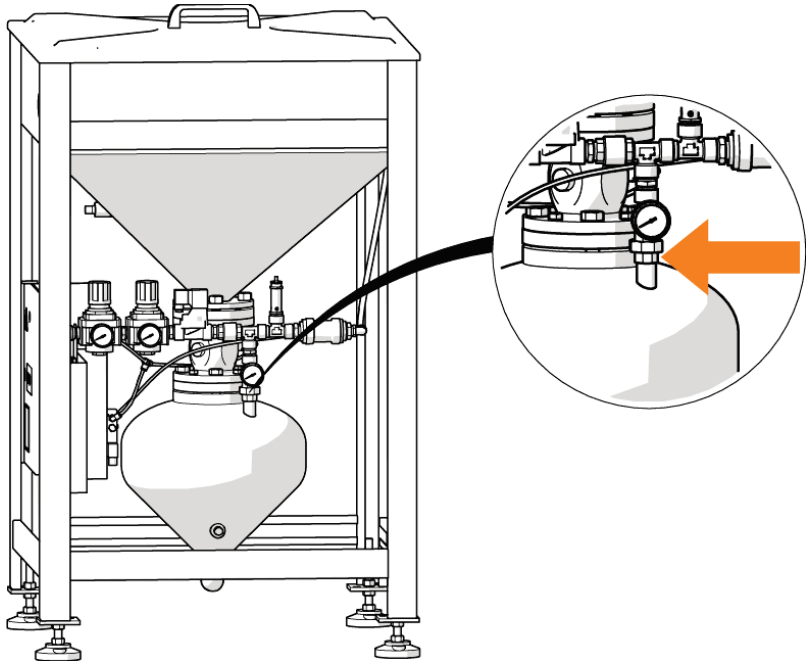
5. Disconnect all abrasive and air hoses from the vessel, pinch valve, and pneumatic controls.
6. Disconnect the cables from the manifold pressure sensors.

Label the cables. This helps to connect the cables later.

7. Remove the two bolts that attach the tubing support to the sheet metal.



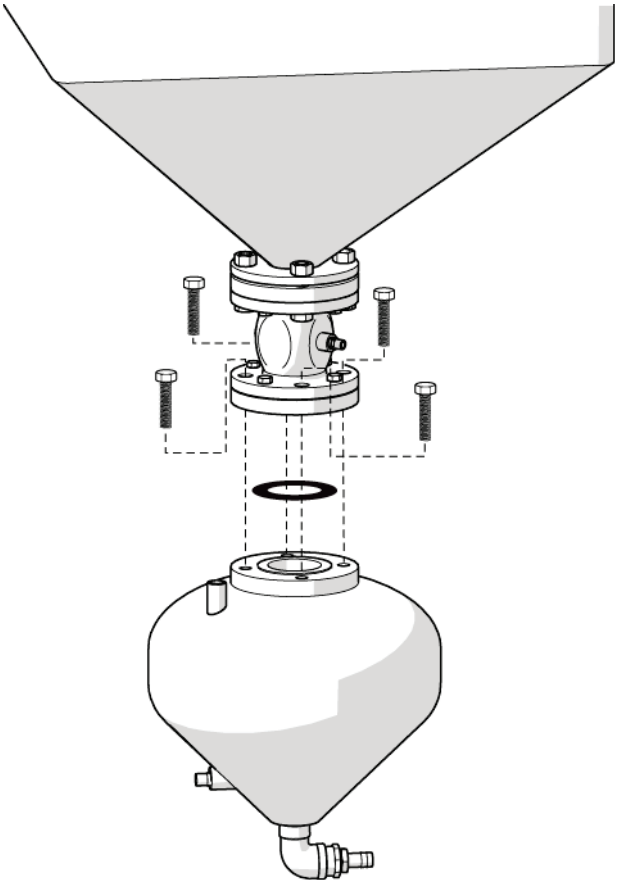
8. Loosen the coupling that attaches the pneumatic manifold to the vessel, and then set the manifold aside.



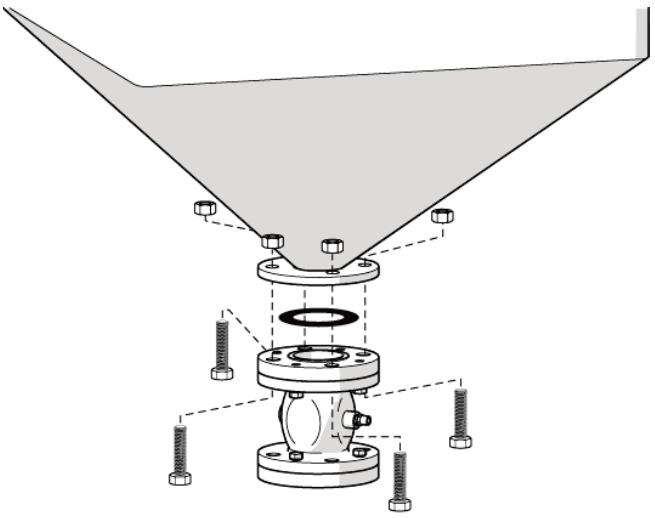
9. Disconnect the cable from the solenoid mounted on the pinch valve.
10. Position wooden blocking between the floor and the abrasive outlet port to support the vessel during removal.

CAUTION! The vessel weighs over 90.7 Kg (200 lb) when full.

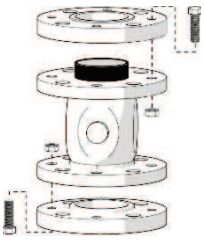
11. **An assistant is required for this step.** Remove the four M16 hex screws, and then lower the vessel onto the wooden blocking.



12. Move the vessel and the wooden blocking away from the pinch valve.
13. Remove the gasket from between the vessel and the pinch valve housing. Clean the gasket with a lint-free rag, and then set gasket aside.
14. Remove the M16 hex screws and nuts, and then remove the pinch valve.

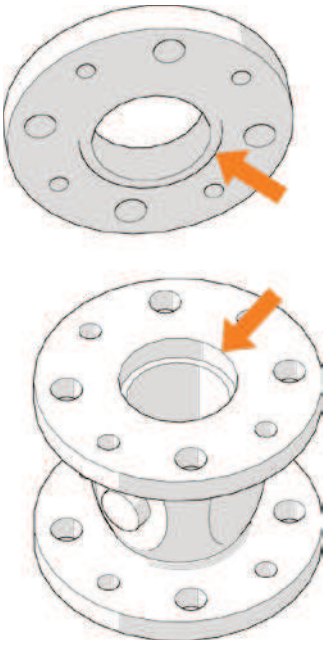


15. Remove the gasket. Clean the gasket with a lint-free rag, and then set the gasket aside.
16. Remove the eight M12 screws and nuts, and then remove the two flanges from the pinch valve housing.



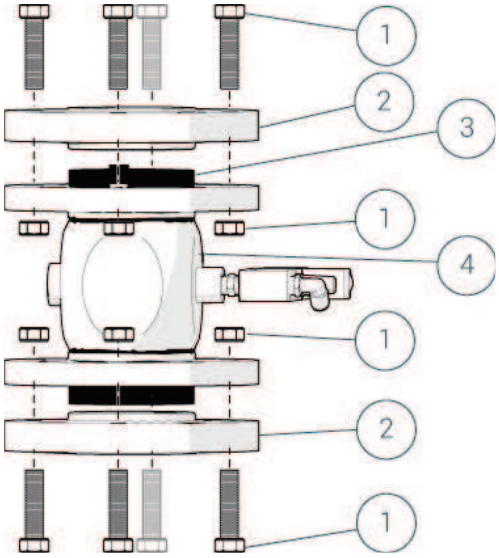
17. Pull the pinch valve seal out of the pinch valve housing.
18. Examine the tapered surfaces on the pinch valve flanges and housing. Replace the pinch valve, if necessary.

    The tapered surfaces should be smooth (paint discoloration is okay) with no grooves or pitting. Replace the pinch valve if the tapered surfaces have damage.



19. Clean the tapered surfaces with a lint-free rag. The surfaces must be clean before installing the new pinch valve seal.

20. Push the pinch valve seal into the pinch valve housing. Adjust the pinch valve seal so that both ends extend equally from the pinch valve housing.



Item	Description
1	M12 screw & nut
2	Flange
3	Pinch valve seal
4	Pinch valve housing

21. For each flange, apply a small amount of tension to the flanges with two opposing M12 screws and nuts. Guide the tapered surfaces of the flanges to the interior of the pinch valve seal. Do not allow the pinch valve seal to twist during tensioning.

    If the screws cannot engage the flange threads, use longer grade 8.8 M12 screws to seat the flanges.

22. Loosely install the remaining M12 screws and nuts. Evenly tighten them in a circular pattern until they are tight. The gap between the tapered flanges and the pinch valve housing flanges must be even.

23. Loosely attach the pinch valve to the silo with three of the four M16 screws and nuts. Position the pinch valve so that the solenoid points away from the manifold and towards the corner of the silo where the pressure valve muffler is.

24. Install the gasket between the silo and the top of the pinch valve through the gap caused by the missing screw.

25. Loosely install the last M16 screw and nut.

26. Position the gasket around the center of the inner raised surface of the pinch valve, and then evenly tighten the four M16 screws and nuts. The gap between the silo flange and the upper pinch valve flange must be even after all of the screws are tight.

27. Position the gasket around the center of the vessel opening.
28. **An assistant is required for this step.** Position the vessel under the pinch valve, and then attach it to the pinch valve with four M16 screws.
29. Evenly tighten the four M16 screws. The gap between the vessel flange and the lower pinch valve flange must be even after all of the screws are tight.
30. Install the new coupling in the vessel.
31. Attach the pneumatic manifold to the vessel coupling.
32. Install the two screws that attach the tubing support to the sheet metal.
33. Install the abrasive hoses and the air hoses to the vessel, pinch valve, and pneumatic controls.
34. Connect the cables to the sensors and solenoids.

CAUTION! Wear safety glasses at the beginning of the test cycle and remain clear of the pinch valve.

35. Connect the air source to the ADS.
36. Gradually increase air pressure of PR1 to 5.5 bar (80 psi) and then do a check for leaks.
37. Set PR2 to 2.8 bar (40 psi), and then do a check for leaks.
38. If PR1 and PR2 were set to pressures different from what is specified on the regulator labels, set PR1 and PR2 to their previous settings.
39. Fill the silo with abrasive.
40. Remove the lockout from the power switch.

Engineering drawings

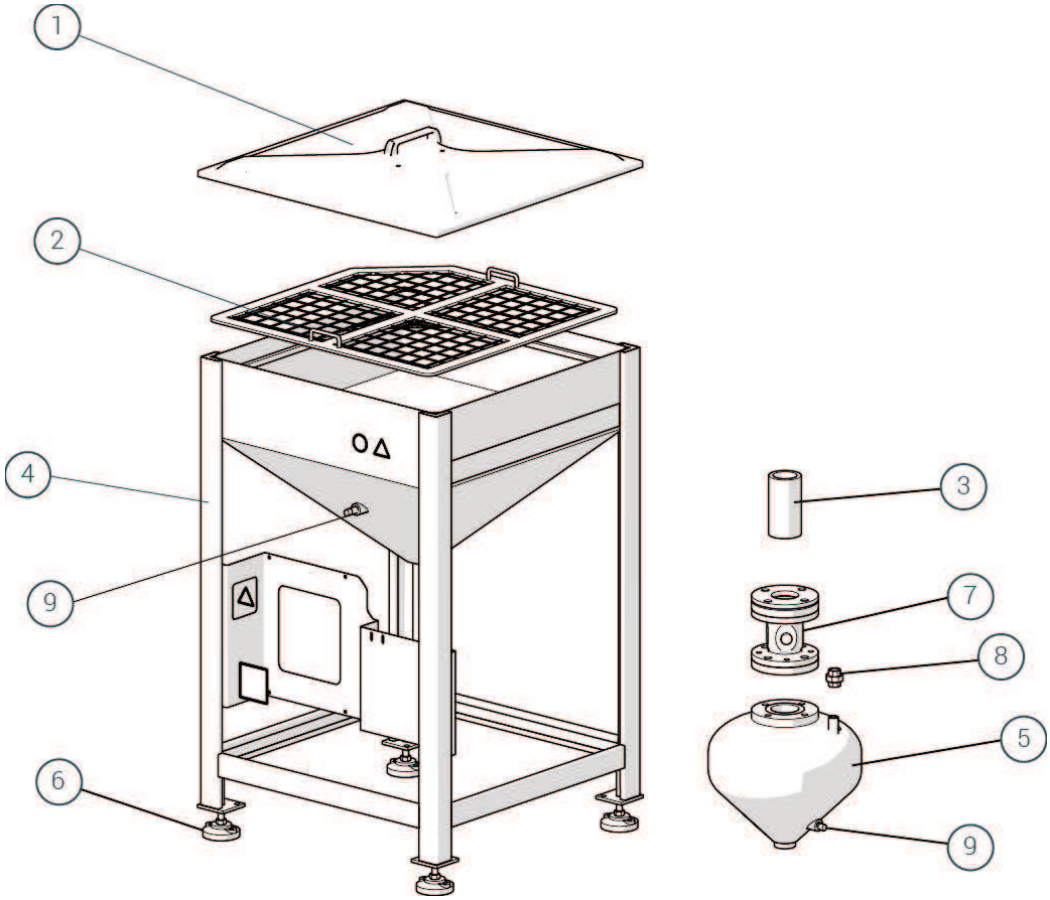
Schematics	Part number	Revision
Electrical	86200038	03

Troubleshooting

Symptom	Potential causes	Solution
No abrasive delivery, but there is sufficient abrasive in the ADS for proper operation.	The supply connection is interuppted.	Inspect all supply connections (air and electrical).
	The silo or vessel low abrasive switch is malfuntioning.	Test the function of the silo or the vessel low abrasive switch. Replace if necessary.
	Operating pressure set too low.	Increase the operating pressure while not going below a 2 bar (30 psi) difference between the supply pressure and the operating pressure.
No abrasive delivery, and either the yellow warning indicator is not on or the audio signal is not on.	Either the yellow warning indicator or the audio signal is defective.	Test the function of the yellow warning indicator and replace the bulb if necessary. Test the function of the audio signal and replace if necessary. If the container is empty and both indicators are not working, contact Flow Technical Service.
The ADS continuously vents.	The venting valve is malfunctioning.	Clean the valve or replace if necessary.
Air leaks from the silo.	The operating pressure is set too high	Limit the operating pressure on the pressure regulating valve to a minimum of 2 bar (30 psi) below the supply pressure.
	The pinch valve seal in PV1 is defective	Replace the pinch valve seal.

Symptom	Potential causes	Solution
The ADS conveys too much abrasive-dosing/metering valve is pressurizing.	The operating pressure is set too high.	Limit the operating pressure on the pressure regulating valve to a minimum of 2 bar (30 psi) below the supply pressure.
The ADS conveys too little abrasive.	Abrasive material demand is too high.	Abrasive demand is higher than maximum conveying volume.
	Outlet opening on the vessel is contaminated or blocked.	Examine the outlet opening in the vessel for contamination and foreign objects. Examine for restrictions in the hose between the vessel and the cutting system. Examine for restrictions in the abrasive metering system of the cutting system.

Spare parts



Number	Part number	Description
1	86700023	Lid
2	86700024	Screen/sieve
3	86700026	Pinch valve seal (hose insert)
4	86700025	Dual stage hopper, 200 Liter
5	86700022	Dual stage hopper, 26 Liter (vessel)
6	86700016	Leveling pad
7	86700018	Pinch valve
8	86700041	Coupling, Hex, brass, 3/4pt
9	86200023	Switch, proximity (used in storage container and vessel)