

Common Pneumatic-System Faults and Corrective Actions

Pneumatic Systems · Routine Troubleshooting · Maintenance Reference

Applicable to Pneumatic Industrial Manipulators / Pneumatic Balancers / Vacuum Lifters / Pneumatic Tooling / Custom Material-Handling Equipment

Item	Details
Document No.	AUREK-MNT-PNE-001
Version	V1.0
Scope	Air supply, filter-regulator, tubing fittings, pushbutton valves, directional valves, flow-control valves, cylinders, vacuum generators, suction cups, and pneumatic tooling
Applicable Stage	Pre-use inspection / Routine maintenance / Preliminary after-sales troubleshooting / On-site fault reporting
Intended Users	On-site operators, equipment maintenance personnel, sales and after-sales service personnel

Usage note: This document provides general troubleshooting guidance for pneumatic systems. Corrective actions may vary with load, tooling, control logic, and site air-supply conditions. For issues involving control-valve internals, cylinder seals, loss-of-air protection, or safety circuits, contact the manufacturer or qualified personnel.

1. Safety Instructions Before Troubleshooting

- If the equipment behaves abnormally, stop operation first and place the workpiece in a stable position or unload it. Do not continue testing while loaded.
- Before servicing or replacing pneumatic components or disconnecting air tubing, the main air supply MUST be shut off and residual pressure in the lines released.
- Before restoring the air supply, confirm that the tooling is in a safe position. Personnel must not stand within the travel envelope of the workpiece, tooling, or manipulator.
- Pneumatic valves, regulators, balance-pressure settings, and safety circuits are normally commissioned before shipment. Unqualified personnel must not change them without authorization.
- If the equipment raises or lowers on its own, the tooling will not release, a brake fails, or loss-of-air protection behaves abnormally, remove the equipment from service and contact the manufacturer.

2. Pneumatic troubleshooting sequence

Inspect from the outside inward, from simple causes to complex causes, and from the air supply to the actuators. Do not begin by dismantling valves or cylinders.

Troubleshooting steps	Check the key points	Diagnostic Method / Recommended Action
1. Check the Air Supply	Check that the main air supply is open, pressure meets equipment requirements, and the air compressor is not cycling excessively.	Check the pressure gauge; confirm that the main air supply pressure is stable; if it is lower than the equipment requirements, deal with the air supply first.
2. Check the Filter-Regulator	Condensate in the filter bowl; blocked filter element; unstable regulator output; pressure misadjusted.	Drain water; observe the output pressure; clean or replace the filter element if necessary.
3. Check Air Tubing and Fittings	The air tubing is bent, worn, cut, bulged, and the quick-connect connector is loose or leaking.	Listen for air leakage; detect leaks with soapy water; straighten the air tubing; replace damaged air tubing and joints.

Troubleshooting steps	Check the key points	Diagnostic Method / Recommended Action
4. Check the control valve	Check operation of the pushbutton, directional, and flow-control valves; check for blocked valve ports or abnormal leakage at exhaust ports.	Press the button to see if there is air output; check the muffler and valve port; if abnormal, contact maintenance personnel.
5. Check the cylinder/actuator	Check the cylinder for stick-slip, low force, internal leakage, or binding, and confirm that each tooling cylinder completes its full stroke.	Test unloaded operation; check the air supply to both cylinder ports; determine whether there is internal leakage or mechanical interference.
6. Check the Tooling and Load	Check whether the workpiece is overweight, the tooling is eccentrically loaded, the suction cups or gripper jaws are worn, or the workpiece surface is abnormal.	Check the workpiece weight and dimensions; check the tooling contact surface; re-evaluate the tooling plan if necessary.

3. Common Air-Supply and Filter-Regulator Issues

Symptom	Possible Causes	Inspection and Corrective Action
Equipment Motion Is Weak Overall	The total air supply pressure is low; the main pipeline air supply is insufficient; multiple devices use air at the same time, causing the pressure to drop.	Check the main air-supply gauge and the gauge at the equipment. Confirm that pressure is stable. If necessary, increase the supply-line diameter, add an air receiver, or adjust the air-use cycle.
Movement Speed Fluctuates	Air-supply pressure fluctuates; compressed air contains water; regulator output is unstable.	Observe the pressure gauge for fluctuation; drain condensate from the filter; check whether the regulator has been misadjusted or is blocked.
There is too much water in the filter	Insufficient compressor after-treatment; poor refrigerated-dryer performance; condensate not drained promptly.	Drain daily; add pre-filtration, cold dryer or automatic drainage device if necessary.
Regulator Output Is Unstable	The pressure regulating knob is loose; the internal diaphragm or seal is abnormal; the inlet pressure fluctuates too much.	Lock the knob; observe the inlet pressure; replace it or contact the manufacturer if it is still unstable after adjustment.
Device cannot rise	Air supply not open; pressure below the equipment's operating requirement; loaded-state switching not completed.	Open the air supply; confirm pressure at the equipment; check whether loaded/unloaded control switches correctly; confirm that the workpiece does not exceed the rated load.

4. Air Leaks in Tubing, Fittings, and Pneumatic Lines

Symptom	Possible Causes	Inspection and Corrective Action
Air leakage at joints	Air tubing is not fully inserted; the tubing end is not cut square; the seal in a push-in fitting is worn; the threaded fitting is loose.	Remove the air tubing, cut the end square, and reinsert it fully. Tighten threaded fittings. If leakage persists, replace the fitting.
Damaged or Leaking Air Tubing	Air tubing is abraded by the workpiece, sharp edges, or moving parts; long-term aging; tubing has bulged.	Replace the air tubing with the same specification. Improve routing and add a protective sleeve or retaining clips, keeping the tubing clear of moving joints and sharp edges.
Movement slows down	Air tubing is kinked; the line is excessively long; the line diameter is too small; the silencer is blocked.	Straighten the lines; remove unnecessary tubing length; verify the line diameter; clean or replace the silencer.
Pipes fall off repeatedly	The line diameter does not match the fitting; the air tubing is under tension; the fitting's retaining collet is damaged.	Confirm the air-tubing specification; add retaining points and movement allowance; replace the push-in fitting.
Slow Leaks Are Difficult to Locate	A small leak is present at a valve-body connection, tee, push-in fitting, vacuum line, or suction-cup connection.	Apply soapy water at each suspected leak point; isolate pneumatic-circuit sections; observe pressure retention.

5. Control-Valve, Pushbutton-Valve, and Flow-Control-Valve Faults

Symptom	Possible Causes	Inspection and Corrective Action
No response when pressing button	Control air does not reach the pushbutton valve; a small control tube is disconnected; the pushbutton valve is damaged or sticking.	Check the control-air supply; verify air at the pushbutton-valve outlet; inspect the small control tube and pilot port.

Symptom	Possible Causes	Inspection and Corrective Action
Valve Response Is Sluggish or Inconsistent	There is moisture, oil or dust in the valve; the valve core is stuck; the spring returns abnormally.	Improve air-supply filtration. With the air supply shut off, clean external connections. If the valve body has an internal fault, replace it or contact the manufacturer.
Continuous Leakage from the Exhaust Port	The reversing valve seal is damaged; internal leakage in the cylinder causes air leakage; the sealing ring is contaminated or the assembly is abnormal.	First determine whether leakage originates in the valve or cylinder. Check for internal leakage between cylinder chambers. Replace the valve or cylinder seals as necessary.
Movement Speed Is Too High	Throttle valve opening is too large; load changes; buffer adjustment is improper.	Gradually close the flow-control valve; confirm the load range; avoid making a large adjustment in one step.
Movement speed is too slow	The throttle valve opening is too small; the muffler is blocked; the air supply is insufficient; the valve port is blocked.	Increase the throttle valve appropriately; clean the muffler; check the air supply pressure and pipeline smoothness.
Abnormal Loaded/Unloaded Switching	Control valve does not shift; insufficient pilot signal; incorrect pressure adjustment.	Check the Load button, unloaded-balance pressure, and loaded-balance pressure. Do not activate the loaded state when no workpiece is gripped.

6. Cylinder and Actuator Faults

Symptom	Possible Causes	Inspection and Corrective Action
Cylinder Does Not Move	No air supply; the directional valve does not shift; air tubing is connected incorrectly or blocked; the mechanical structure is binding.	Confirm the air supply to both cylinder ports; check directional-valve output; check the tooling or linkage for mechanical interference.
Cylinder Force Is Low	Insufficient air supply pressure; excessive load; internal leakage in the cylinder; mismatched cylinder specifications.	Verify pressure and load; check for internal leakage. If low force persists, contact the manufacturer for assessment.
Cylinder Exhibits Stick-Slip or Rough Motion	The air supply contains water/contamination; the seal is worn; the guide resistance is large; the load is eccentric; the speed is improperly adjusted.	Improve filtration; check guides and connections; adjust load center; replace seals if necessary.
Air leakage at both ends of the cylinder	Piston or end-cap seals are worn; the cylinder bore or rod is scored; prolonged exposure to dust has caused wear.	Locate the leak; replace seals or the cylinder; improve dust protection and air preparation.
Tooling Cylinder Does Not Complete Its Stroke	Restricted stroke; changed workpiece dimensions; shifted gripper-jaw position; insufficient air pressure.	Check workpiece dimensions and gripper-jaw positions; verify the travel switch or end stop; unload the workpiece before adjusting the tooling.

7. Common Vacuum-Gripping Issues

Symptom	Possible Causes	Inspection and Corrective Action
Vacuum Tooling Does Not Grip	Insufficient vacuum pressure; suction cup is aging; workpiece has a rough surface, oil, and holes; the vacuum tube is leaking.	Check the vacuum meter; clean the workpiece surface; replace the suction cup; check the vacuum tube, joints and suction cup interface.
Workpiece Drops After Pickup	Too few suction cups; insufficient effective holding area; workpiece deformation; handling motion is too fast; inadequate vacuum retention.	Reduce handling speed; check suction cup layout; increase suction cup quantity or replace suction cup form; evaluate anti-drop protection.
Vacuum builds up slowly	The vacuum pipeline is too long; the pipe diameter is too small; the filter is clogged; the air supply to the vacuum generator is insufficient.	Shorten the pipeline; check the air supply pressure; clean the vacuum filter; check the vacuum generator.
Vacuum Releases Slowly	Vacuum-break valve fault; restricted exhaust path; suction cups adhere too tightly to the workpiece.	Check the vacuum breaking valve; clean the exhaust port; adjust the suction cup layout and contact pressure.
Rapid Suction-Cup Wear	Sharp workpiece edge; rough surface; unsuitable suction-cup material; dragging during operation.	Replace with more suitable material suction cup; avoid dragging; increase guide positioning to reduce eccentric wear.

8. Tooling, Brakes, and Safety Pneumatics

Symptom	Possible Causes	Inspection and Corrective Action
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Symptom	Possible Causes	Inspection and Corrective Action
Gripper Does Not Clamp Securely	Insufficient gripping pressure; worn gripper pads; changed workpiece dimensions; incorrect tooling position.	Check gripping pressure; replace gripper pads; verify workpiece dimensions; correct the position, then test-grip again.
Tooling Will Not Release	Release valve does not operate; cylinder binds; workpiece is mechanically wedged; mechanical interference.	First stabilize the workpiece. Check the Release button and control valve; verify cylinder operation; inspect the tooling for deformation.
Joint brake does not work	The brake pneumatic circuit is out of air; the button valve is faulty; the air tubing is bent; the brake mechanism is stuck.	Check the brake control air pressure; check the button valve output; straighten the air tubing; contact the manufacturer if necessary.
Equipment Raises or Lowers on Its Own	Incorrect unloaded/loaded balance-pressure adjustment; air-supply pressure fluctuations; internal cylinder leakage; abnormal balance circuit.	Remove the equipment from service immediately; stabilize the workpiece; do not continue loaded testing; have qualified personnel recommission the system.
Abnormal Motion After Loss of Air	Loss-of-air protection has failed; the air-reserve circuit is abnormal; the check valve or safety valve has failed.	Remove the equipment from service and contact the manufacturer to inspect the safety circuit. Unqualified site personnel should not make adjustments themselves.

9. Quick leak detection and judgment methods

method	Applicable location	Operational points
Audible Leak Check	Damaged fittings, valves, silencers, and air tubing with obvious leakage	After the equipment supplies air, approach the suspected location and listen for a "hissing" sound; be sure to keep a safe distance.
Soapy water leak detection	Push-in connectors, threaded connectors, valve body interfaces, vacuum pipelines, suction cup interfaces.	After applying the solution, observe whether bubbles continue to form. Wipe the area dry after inspection to avoid contaminating components.
Pressure-Hold Test	The complete pneumatic circuit, tooling holding circuit, and vacuum holding circuit	After isolating downstream functions, observe the rate of pressure drop to determine whether a slow leak is present.
Isolation-by-Section Test	Multi-branch pneumatic circuits, tooling pneumatic circuits, and vacuum systems	Close or disconnect sections step by step to reduce the scope of air leakage and avoid blind replacement of components.
Substitution Test	Suspicious components such as button valves, reversing valves, pressure regulating valves, and throttle valves.	Replacement testing is performed on the premise that the specifications are consistent and safe; critical safety components must be operated by professionals.

10. Daily maintenance suggestions

maintenance items	Recommendation cycle	Maintain content
Air-Supply Pressure Check	daily	Check the main air supply and equipment end pressure gauges to confirm that the pressure is stable and meets equipment requirements.
filter drain	Daily or according to on-site conditions	Drain the accumulated water from the filter cup to prevent moisture from entering the valve, cylinder and vacuum generator.
Air-Tubing Inspection	weekly	Check for wear, bending, bulging, aging, and friction with moving parts.
Joint inspection	weekly	Check for looseness, leakage, or disconnection; reseal or replace the component as necessary.
Control valve inspection	monthly	Check for responsive operation, abnormal exhaust-port leakage, and proper pushbutton return.
Cylinder inspection	monthly	Check for smooth motion, stick-slip, leakage, binding, or abnormal noise.
Vacuum system inspection	weekly	Check suction cup, vacuum tube, filter, vacuum gauge and vacuum breaker valve.
tooling connection check	weekly	Check that bolts, pins, gripper pads, anti-drop features, and locating components are secure and reliable.

11. Customer Checks and Conditions Requiring Manufacturer Support

Checks the Customer May Perform

- Check whether the air supply is open and pressure is noticeably low.
- Check the filter-regulator for accumulated condensate and confirm that pressure has not been misadjusted.
- Check whether air tubing is kinked, fittings are disconnected, or suction cups show obvious aging.

- Check whether workpiece weight, dimensions, and surface condition match the original design conditions.
- Check whether new obstructions, tooling, utilities, or structures interfere with manipulator motion.

Contact the Manufacturer or a Qualified Technician When

- The equipment rises or falls on its own and cannot stabilize its balance.
- The control valve continues to leak, the cylinder is suspected of internal leakage, or the safety circuit is abnormal.
- The tooling will not release, a brake fails, or loss-of-air protection behaves abnormally.
- The equipment has sustained a collision, the structure is deformed, or a weld or load-bearing connection is abnormal.
- Balance pressure, loaded-balance pressure, load-switching logic, or tooling safety interlocks require readjustment.

12. On-site fault feedback record

record items	Fill in the content	Remarks
Equipment number/project name		
Date/Time of Fault		
Fault location	☐ Air Supply ☐ Pneumatic Lines ☐ Control Valve ☐ Cylinder ☐ Vacuum System ☐ Tooling ☐ Other	
Symptom Description		
Was the unit carrying a load?	☐ Yes ☐ No; workpiece weight: _____ kg	
Equipment end air pressure	_____ MPa	
Is there any air leakage sound?	☐ Yes ☐ No; Location:	
Actions Already Attempted		
On-site photos/videos	☐ Provided ☐ Not provided	It is recommended to provide equipment panorama, fault location, pressure gauge, pipeline and tooling action video
Corrective Action / Preliminary Assessment		
Is on-site service required?	☐ Yes ☐ No ☐ To be confirmed	
Spare parts requirements	☐ None ☐ Air tubing ☐ Connector ☐ Valve ☐ Cylinder ☐ suction cup ☐ Others:	
Manufacturer Response / Recommended Corrective Action		
Maintenance Person/Date		
Customer confirmation		
Contact/Phone		

Resource Center card copy: This guide covers routine maintenance and troubleshooting of pneumatic systems for Pneumatic Industrial Manipulators, Pneumatic Balancers, Vacuum Lifters, and custom pneumatic tooling. It addresses common issues including insufficient air-supply pressure, air-tubing leaks, loose fittings, control-valve leakage, abnormal cylinder motion, inadequate vacuum grip, and tooling that will not release.