

PSA Nitrogen Generator — Top 10 Service Issues

Field Technician Quick Reference | First-line diagnostics before escalating to South-Tek Support

01 | Low N2 Purity / High O2 Reading

<p>▶ SYMPTOMS</p> <ul style="list-style-type: none">• O2 analyzer reads above setpoint• Purity alarm active on HMI• Unit cycling normally but product spec not met	<p>▶ POSSIBLE CAUSES</p> <ul style="list-style-type: none">• Inlet air moisture or oil above spec• CMS bed saturation or contamination• Cycle time too short for actual demand• Downstream leak diluting product	<p>▶ RECOMMENDED FIXES</p> <ul style="list-style-type: none">• Verify inlet dew point — must be dry ($\leq 35^{\circ}\text{F}$ PDP). Inspect pre-dryer and coalescers.• Confirm feed air pressure is at design spec (typically 100–120 PSI).• Adjust adsorption cycle timing via HMI if demand exceeds rated flow.• Perform full leak test on product piping, valves, and connections.• If oil-contaminated CMS is suspected — notify South-Tek. Bed replacement required.
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02 | Insufficient N2 Flow / Low Delivery Pressure

<p>▶ SYMPTOMS</p> <ul style="list-style-type: none">• Product pressure below setpoint• Process starvation downstream• Unit runs continuously	<p>▶ POSSIBLE CAUSES</p> <ul style="list-style-type: none">• Demand exceeds generator rated capacity• Compressor outlet pressure too low• Clogged inlet	<p>▶ RECOMMENDED FIXES</p> <ul style="list-style-type: none">• Compare actual N2 consumption vs. generator rated capacity at required purity.• Verify compressor outlet pressure — low feed = low product pressure.• Inspect and replace inlet particulate filter and coalescing filter elements.• Confirm all manual isolation valves are fully open.• If demand has grown beyond capacity, contact South-Tek for upgrade options.
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y without satisfying demand

- filter or pre-treatment
- Partially closed isolation valve

03 | Switching Valve Failure / Valve Not Actuating

► SYMPTOMS

- Valve fault alarm active
- One tower not cycling (stuck in one phase)
- Hissing or exhaust noise during pressurization
- Purity drops or fluctuates

► POSSIBLE CAUSES

- Solenoid coil failure
- Valve body wear or debris ingestion
- Loss of pilot air supply to actuator
- PLC output failure

► RECOMMENDED FIXES

- Check solenoid LED indicator — no light = electrical fault. Verify 24VDC at coil.

- Manually actuate valve (if safe) to confirm mechanical function.
- Confirm instrument/pilot air supply is adequate (typically 60–80 PSI).
- Inspect valve exhaust ports for debris or moisture buildup causing sticking.
- Swap coil with a known-good unit to isolate electrical vs. mechanical fault.

04 | High O2 Alarm — False or Drifted Reading

► SYMPTOMS

- O2 high alarm with apparently stable readings
- False alarm at startup /

► POSSIBLE CAUSES

- O2 analyzer calibration drift
- Sensor cell at end of life
- Sample line leak

► RECOMMENDED FIXES

- Calibrate O2 analyzer with certified calibration gas per manufacturer procedure.

- Check sample line fittings and tubing for cracks or loose connections.
- Verify HMI alarm setpoint matches customer's required purity spec.
- Replace O2 sensor cell if calibration won't hold (typical life: 1–2 years).
- Allow 15–20 min warm-up before trusting analyzer readings after cold start.

cold start • Alarm clears after 15–20 min warm-up	drawing in ambient air • Alarm setpoint incorrectly configured	
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05 | Excessive Pressure Drop Across Towers

<p>► SYMPTOMS</p> <ul style="list-style-type: none"> • Feed pressure significantly higher than product pressure • Unit takes longer to reach setpoint pressure • Increased or erratic cycle times 	<p>► POSSIBLE CAUSES</p> <ul style="list-style-type: none"> • Plugged CMS bed (dust migration or oil contamination) • Clogged tower inlet screens or diffusers • Excessive feed air velocity causing bed fluidization 	<p>► RECOMMENDED FIXES</p> <ul style="list-style-type: none"> • Check inlet filter differential pressure — replace elements if ΔP exceeds limit. • Inspect tower inlet/outlet screens for carbon dust or debris accumulation. • Review feed air flow rate against unit nameplate — oversupply fluidizes the CMS bed. • If CMS dust found in downstream piping, bed containment may have failed — contact South-Tek.
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06 | Moisture in N2 Product Stream

<p>► SYMPTOMS</p> <ul style="list-style-type: none"> • Wet or condensation in product line • Moisture damage to 	<p>► POSSIBLE CAUSES</p> <ul style="list-style-type: none"> • Pre-treatment dryer not functioning • Desiccant saturated or expired 	<p>► RECOMMENDED FIXES</p> <ul style="list-style-type: none"> • Verify pre-treatment dryer is operating — check outlet dew point (target: $\leq 35\text{--}40^\circ\text{F PDP}$). • For heatless desiccant dryers: confirm purge valve function and desiccant condition. • For refrigerated dryers: check refrigerant pressure, drain function, condenser cleanliness. • Confirm drain traps on all filters are cycling and not flooded. • CMS is highly moisture-sensitive — sustained wet air will permanently degrade beds.
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downstream process equipment • Water visible at drain points past the generator	• Refrigerated dryer refrigerant or drain fault • Bypassed or missing pre-treatment stage	
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07 | Generator Not Starting / HMI Blank / No Power

▶ SYMPTOMS • No display on HMI panel • Unit completely unresponsive • E-stop light illuminated • Main breaker tripped	▶ POSSIBLE CAUSES • E-stop engaged (local or remote) • Main breaker or fuse tripped • Control power supply failure • Incoming power phase loss	▶ RECOMMENDED FIXES • Confirm all E-stop buttons are pulled out and reset — check local and remote E-stops. • Inspect main disconnect, breakers, and fuses. Reset only after identifying root cause. • Check incoming voltage at main panel — all phases must be within $\pm 10\%$ of nameplate. • Inspect 24VDC control power supply LED output status indicator. • Check PLC power LED — if off with control power present, PLC power module may have failed.
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08 | CMS (Carbon Molecular Sieve) Degradation

▶ SYMPTOMS • Gradual purity decline over weeks or months • Cannot	▶ POSSIBLE CAUSES • Oil contamination from compressor • Moisture ingress over	▶ RECOMMENDED FIXES • Inspect upstream coalescing filter elements — oil saturation is the #1 cause of CMS failure. • Confirm no liquid carryover events have occurred (water slugs destroy CMS rapidly). • Check compressor oil carryover spec — should be < 0.01 ppm at generator inlet. • CMS life is typically 10+ years under clean conditions — early failure = investigate root cause first. • Contact South-Tek for CMS replacement quote and bed reloading procedure.
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reach rated purity at any cycle setting	time	
• Carbon dust found in downstream filter housing	<ul style="list-style-type: none"> • Physical bed damage from water slugs • End of CMS service life 	

09 | Abnormal Cycle Times / Unit Not Cycling Correctly

<p>► SYMPTOMS</p> <ul style="list-style-type: none"> • Towers cycling too fast or too slow • HMI cycle timer fault alarm • One tower stuck in adsorption or regeneration phase 	<p>► POSSIBLE CAUSES</p> <ul style="list-style-type: none"> • Cycle timer settings incorrect for actual demand • Valve fault preventing tower switchover (see #03) • PLC program fault or I/O error • Pressure sensor failure providing false input to PLC 	<p>► RECOMMENDED FIXES</p> <ul style="list-style-type: none"> • Review HMI cycle time parameters — confirm they match commissioning baseline settings. • Check tower pressure sensors — compare readings to calibrated gauge. Replace if drifted. • Monitor PLC I/O screen during cycling: confirm all valve outputs are toggling correctly. • If one tower is stuck, trace back to valve fault (see Issue #03). • Cycle time re-optimization may be needed if customer demand has changed — contact South-Tek.
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10 | High Pressure Fault / Safety Relief Valve Lifting

<p>► SYMPTOMS</p> <ul style="list-style-type: none"> • High 	<p>► POSSIBLE CAUSES</p> <ul style="list-style-type: none"> • Product 	<p>► RECOMMENDED FIXES</p> <ul style="list-style-type: none"> • Immediately verify all downstream isolation valves are open — dead-heading causes rapid overpressure. • Check pressure regulator setting and compare to process setpoint. Adjust if drifted.
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<p>pressure alarm on HMI</p> <ul style="list-style-type: none"> • PRV venting/lifting to atmosphere • Product pressure above setpoint 	<p>pressure regulator failed or miscalibrated</p> <ul style="list-style-type: none"> • Downstream isolation valve closed with unit running • PRV setpoint too low • Product pressure transducer reading incorrect 	<ul style="list-style-type: none"> • Inspect PRV after it has lifted — verify it fully re-seats and does not weep. • Calibrate or replace product pressure transducer if HMI reading differs from local gauge. • Do not bypass or raise PRV setpoint beyond design pressure — contact South-Tek if sizing is wrong.
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When escalating, please have ready: unit serial number, inlet conditions (pressure, dew point), current purity reading, and HMI fault/alarm log.