

CASE STUDY Optimizing Pressure Control in High-Pressure Nitrogen Compression System



EXCELA™



Industry
OEM/INDUSTRIAL GAS GENERATION

APPLICATION CHALLENGE:

Nitrogen, widely used in food packaging, pharmaceuticals, bottling, laser cutting, and inerting applications, must be delivered at controlled pressures depending on end use.

An OEM manufacturer of nitrogen generators required reliable pressure control across multiple stages of a high-pressure nitrogen compression system. **However, the existing pressure control solution was over-specified, costly, and unreliable.**

The previous design utilized a combined pressure transmitter with dual-switch outputs at each control point - despite the application requiring only a single pressure switch per location. This mismatch created several operational and commercial challenges:

- **Unnecessary unit cost** due to excess functionality
- **Extended lead times** impacting production schedules
- **Quality concerns**, including approximately 20% device failure rate
- **Increased wiring and programming complexity**
- **More potential failure points** within the control architecture

The nitrogen system itself required precise switching at multiple stages:

- Atmospheric air is filtered to isolate nitrogen
- Nitrogen is compressed and delivered at a set pressure
- Independent pressure switches monitor:
 - Booster inlet pressure (prevent unnecessary activation)
 - Booster outlet pressure (prevent over-pressurization)
 - Desiccant dryer outlet pressure (protect moisture removal system)

The OEM ultimately required a simpler, more robust, and cost-effective switching solution while retaining digital indication and adjustable control.

SOLUTION:

The OEM standardized on the Excelsa 1GSWLLP17 (0-1000 psig) pressure switch across the nitrogen compression platform:

- One unit per desiccant dryer
- Two units per booster pump (inlet and outlet monitoring)

By eliminating unnecessary transmitter functionality and dual-switch configuration, the system architecture was simplified without sacrificing performance. The selected device provides:

- Digital display for setpoint visibility
- LED status indication for remote confirmation of operation
- Adjustable deadband for stable control
- Integrated self-diagnostics
- Two-wire configuration, eliminating transmitter power requirements

This reduced wiring complexity, shortened installation time, and lowered component cost by more than 50% compared to the previous device.

Build quality improvements resolved prior failure concerns, reducing field risk and warranty exposure. Programming was streamlined for faster OEM integration and repeatable configuration on the production line. A proprietary OEM specification number was developed to protect aftermarket replacement channels and support long-term lifecycle control.



Fit-for-Purpose Design



Improved Reliability



Simplified Integration