SMARTER SAVINGS THROUGH MODULATION CONTROL

WHY MODULATION OUTPERFORMS LOAD/NO-LOAD IN ROTARY SCREW COMPRESSORS

SULLIVAN PALATEK

At Sullivan-Palatek, we know that compressed air isn't just a utility — it's the lifeblood of your operation. That's why the type of control system inside a rotary screw compressor matters as much as the compressor itself. Controls determine how efficiently your machine reacts to changing air demand, directly influencing energy costs, air storage requirements, reliability, and total cost of ownership.

Two of the most common control strategies are load/no-load and modulation. While both have their place, modulation delivers superior efficiency, stability, and long-term savings

LOAD/NO-LOAD CONTROL

In a load/no-load system, the compressor cycles between two states:

· Load: The compressor runs at full capacity when demand exists.

· No-Load: The compressor unloads but continues running at motor speed, consuming energy until pressure drops enough to reload.

AIR STORAGE REQUIREMENTS

Because the compressor fully cycles on and off, it requires large receiver tanks to prevent rapid cycling and wide pressure swings:

· Sizing Rule: 3–5 gallons of storage per CFM.

· Example: A 100 CFM compressor typically needs a 300–500 gallon tank.

COST IMPACT

· Energy: Even while unloaded, the motor consumes 15–35% of full-load power, inflating operating costs.

· Maintenance: Frequent cycling accelerates wear on starters, valves, and motors.

· Upfront Cost: Larger tanks and heavier piping increase system investment.

Load/no-load systems may be simple and inexpensive at the outset, but they often cost more in energy and maintenance over their lifetime.

MODULATION CONTROL

Instead of switching between fully loaded and unloaded states, modulation regulates the compressor's inlet valve to throttle airflow. This allows the compressor to adjust capacity smoothly and match demand more closely.

AIR STORAGE REQUIREMENTS

Because modulation delivers steadier airflow, it requires much smaller air receivers:

· Sizing Rule: 1–2 gallons of storage per CFM.

· Example: A 100 CFM compressor typically needs just a 100–200 gallon tank

COST IMPACT

· Energy: Reduces waste by avoiding high idle power draw.

· Maintenance: Minimizes cycling, extending the life of motors and valves.

· Upfront Cost: Smaller tanks reduce initial system investment.

With modulation, you get lower energy bills, smoother pressure control, and reduced long-term maintenance.

WHY SULLIVAN-PALATEK RECOMMENDS MODULATION

At Sullivan-Palatek, our compressors are engineered with efficiency and reliability in mind. By incorporating modulation controls, our systems:

- Cut Operating Costs by reducing idle energy consumption.
- Extend Equipment Life with smoother transitions and less mechanical stress.
- Ensure Stable Air Pressure to protect downstream tools and processes.
- Lower Total Cost of Ownership through smaller air storage needs and reduced energy waste.

For many operations, modulation strikes the perfect balance between performance and cost-effectiveness. While Variable Speed Drive (VSD) technology offers the highest efficiency, modulation often delivers the best return on investment compared to load/no-load systems.

CONCLUSION

Choosing the right compressor control system has a direct impact on air storage requirements, energy efficiency, and lifecycle costs.

- Load/No-Load: Larger storage tanks, higher idle power consumption, and more frequent maintenance.
- Modulation: Smaller storage tanks, lower energy bills, smoother operation, and reduced long-term costs.

That's why Sullivan-Palatek recommends modulation control as the smarter, more cost-effective choice for most rotary screw compressor applications.

Sullivan-Palatek: Built in the USA. Backed by Reliability. Engineered for Efficiency.

OIL-FLOODED ROTARY SCREW COMPRESSOR CONTROL COMPARISON

