White Paper

CHAMPION

Reciprocating vs. Rotary

How to decide which technology is best for your application

www.ChampionPneumatic.com

Introduction

One of the toughest decisions a customer can make when selecting a low horsepower lubricated air compressor is which technology to use. Champion Compressors have three different technologies to choose from in the low horsepower range. We offer reciprocating, commonly referred to as a piston compressor, rotary vane, which uses a unique sliding vane airend technology, and rotary screw, which is newer to the low horsepower market. There are three main variables to consider when deciding which technology is best for you: duty cycle, environment and customer profile.

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Duty Cycle

The first, perhaps most important variable to consider is duty cycle. Duty cycle can be defined as, “How much will the compressor be on/off in a given time period?” For example, if a compressor would be turned on/off multiple times in an hour, the application would be considered an intermittent duty cycle application. Whereas, if a compressor were to be running the entire hour, it would be considered a continuous duty cycle (or 100% duty cycle) application.

Depending on your application, there could be a mix of continuous and intermittent duty cycles. Take a carwash for example. Throughout the work week, the duty cycle may be quite intermittent because of slower, sporadic traffic. But on the weekend, when the weather is nice and the carwash is very busy, the duty cycle could change to continuous.

Fully evaluating the duty cycle is key to selecting the product technology and machine configuration that best meets your needs. In intermittent duty cycle applications, you would want to select a reciprocating compressor, as those typically have a 70-80% duty cycle. For continuous duty applications, a rotary vane or rotary screw would be a better option since those are 100% duty cycle. Understanding your demand profile (which includes duty cycle and fluctuations in plant demand) and flow requirements will enable you to select the compressor product that is the best fit to meet your compressed air needs.

In today’s competitive market, it is crucial that we look at the duty cycles and environment when deciding between a rotary and reciprocating compressor.

Environment and Customer Profile

Another very important variable to consider when choosing between rotary and reciprocating is the environment. An application that is a very dirty or rugged environment, would lean itself towards a reciprocating compressor or a rotary vane compressor. If a lower dBA or sound requirement is desired, then a quiet enclosed reciprocating, a rotary vane, or a rotary screw would be the desired choice. These are outlined in more detail below where we outline a customers' profile.

A customer's profile is also a major deciding factor in selecting the technology that would fit the customer's requirements and preferences. These are pointed out below.

- Cost Efficiency – When a customer is wanting to focus on price, then a reciprocating compressor would be their focus. These prices vary with our good, better, best philosophy typically used with the different products offered in our reciprocating compressor line.
- Noise Level – If a customer requires a quiet application, then they would select either a rotary screw, rotary vane, or a quiet enclosed reciprocating compressor.
- Performance - In applications where rugged, robust performance is required, one of our "best" reciprocating compressors would be a good selection. These would include the R-Series or the PL-Series depending on the customer's application.
- Energy Efficiency - If a customer is concerned most about energy efficiency, then a variable speed rotary screw compressor would be the best way to go.
- Maintenance Costs – Generally speaking a reciprocating compressor will have lower maintenance costs due to less moving parts and fewer service items.

Application Examples

Intermittent Duty Applications

Facilities where a compressor would be turned on/off multiple times in a given hour. These types of applications would best be suited for a reciprocating compressor.

- Small Body Shops
- Tire Shops
- Carwash Facilities
- Anywhere where noise is not a factor

Continuous Duty Applications

Facilities that require 100% duty cycle. These types of applications would focus on a rotary vane or rotary screw compressor.

- Industrial Manufacturing, light to heavy
- Large Body Shops
- Anywhere that has a constant volume application

Performance Examples

5HP Reciprocating R-Series (best) at 175 PSI

- 17.0 CFM
- 75 dBA (noise)
- Belt Drive
- 80% Duty Cycle

5HP Reciprocating Quiet Enclosed at 175 PSI

- 16.8 CFM
- 67 dBA (noise)
- Belt Drive
- 80% Duty Cycle

5HP Rotary Vane Open at 150 PSI (typically these are 100 and 150 PSI machines)

- 16 CFM
- 72 dBA (noise)
- Direct Drive
- 100% Duty Cycle

5HP D-Series Rotary Screw at 145 PSI

- 16 CFM
- 65 dBA (noise)
- Belt Drive
- 100% Duty Cycle

5HP L Series Rotary Screw at 130 PSI

- 18 CFM
- 68 dBA (noise)
- Belt Drive
- 100% Duty Cycle

Summary

Whether a reciprocating, rotary vane or rotary screw compressor is the right choice for your application, you can feel confident that Champion Compressors has a product to meet your needs. With industry-leading extended warranty programs, quick delivery on all products, and an extensive distributor base throughout the country, you can be assured that we have you covered.

Champion is committed to delivering superior products built with the exceptional standards you expect.

Disclaimer:

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