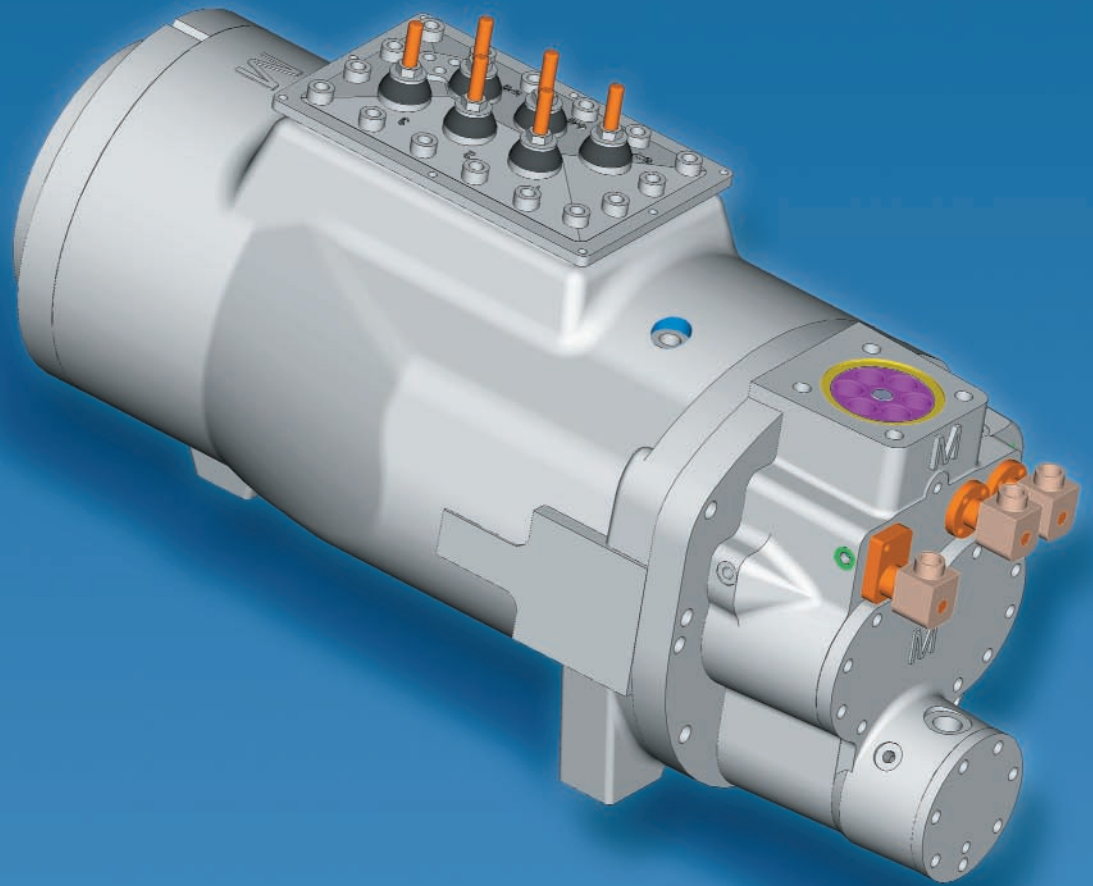




# Screw Compressors

---





# Available Screw Compressors

Invented in 1878, the screw compressor developed slowly because of its manufacturing complexity. Realizing that reliability and performance improvements on reciprocating designs would be limited, Trane first considered the screw compressor in 1946 as the design of the future.

An independent laboratory was commissioned to do the developmental work. Since manufacturing a high-efficiency screw compressor for air conditioning requires extremely tight machining tolerances, the laboratory concluded that it was not feasible to economically manufacture a screw compressor in large quantities at that time.

In the 1980s, the computer, CAD/CAM, and coordinate measuring machine (CMM) technology became useful design tools. With powerful computer simulation, Trane engineers optimized rotor and screw compressor designs specifically for air conditioning applications resulting in the Trane screw compressor. Through the use of computers, our engineers know that the design can be machined accurately and economically. This makes design changes for future development easy to incorporate into the manufacturing process and provides Trane the ability to improve its products on a continuing basis.

Trane spent over ten years of rigorous research and development testing and invested millions of dollars in capital equipment before introducing the screw compressor to the market.

Specific testing was developed to fail a compressor so that any necessary changes or improvements could be easily incorporated into early prototype designs. These tests verified reliability at conditions outside the operating envelope.

Size Range (nominal tons)	
035	070
040	085
050	100
060	120 (R-134a only)

Standard Voltages	
200-60-3*	460-60-3/400-50-3
230-60-3*	220-50-3
380-60-3	200/230-60-3**
575-60-3	

\* = 35-60 ton only  
\*\* = 70-100 ton only

## Common Features (all models)

- Semihermetic design
- Two rotor design
- Direct-drive
- 3600 rpm (60 Hz) - 3000 rpm (50 Hz)
- Motor winding thermostats
- Internal discharge check valve
- Unidirectional operation
- Oil injection
- Remote oil separator and oil sump
- Capacity control
- 150W crankcase heater
- Motor start methods
  - Across the line
  - Wye-Delta start

**Suction Inlet Screen**

**Hi-Efficiency Direct-Drive 3600 RPM Refrigerant-Cooled Motor**

**Roller Element Bearings**

**Trane Designed Rotor Profile for Superior Performance**

**Female Unloader Valve**

**Internal Oil Shutoff Valve**

*Pictured: New design, 35 to 120 ton, (R-134a) compressor.*

# Available Screw Compressors

## Unique Features

**Current production 035-060 (R-22)**

**New design 035-120 (R-134a)**

- Internal pressure relief 450 psid
- High and low volume ratio
- Suction and discharge service valves  
(Trane provided - customer mounted)
- Internal oil filter
- Single point oil connection
- Internal oil shutoff valve
- Male and female rotor capacity control
  - Step capacity control
  - Combination of step and variable capacity control

**Current production 070-100 (R-22)**

- External pressure relief required  
(customer supplied)
- Suction service valve  
(Trane provided - customer mounted)
- External oil filter, base and five micron element  
(Trane provided - customer mounted and piped)
- Multiple point oil connection  
(Customer provided)
- Continuous modulating slide valve capacity control

## Fewer Moving Parts

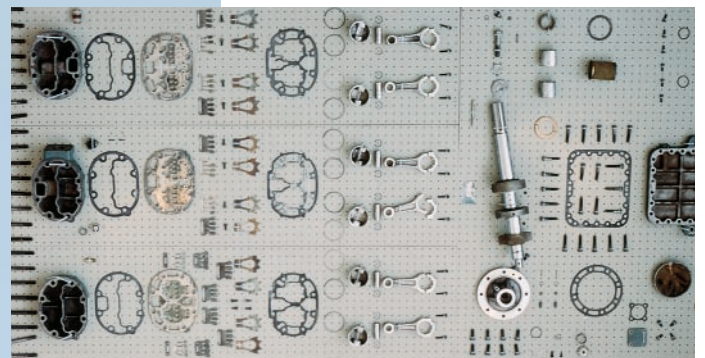
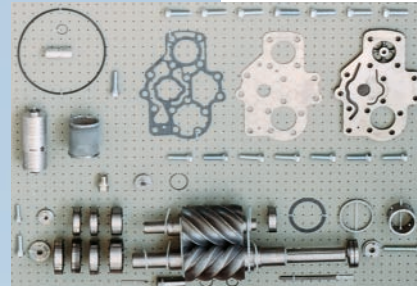
The Trane screw compressor has two rotors and an unloading mechanism. A typical reciprocating compressor has fifteen times more critical parts including pistons, rods and valves. Fewer moving parts mean reduced chances for failure. Historically, reciprocating compressors have a failure rate of two to four percent within the first year of operation while Trane's helical rotary compressor has a reliability rate of 99.5 percent.

## Low Torque

Small diameter rotors in a screw compressor require small start-up torque. Continuous circular motion constitutes little torque variation.

Reciprocating compressors mandate

high starting torque and torque variations as a result of the directional piston changes during the compression process. These torque variations generate excessive heat within the motor windings and create additional stress to the components.



## Tolerates Liquid Slugging

Reciprocating designs are intolerant of liquid slugging. Cracked rods and/or pistons are the result of introducing liquid to the compression cycle. The screw has increased reliability over a reciprocating compressor because of its capability to tolerate liquid slugging.

## Motor Designed for Across-the-Line Start or Reduced Current Inrush Start

**Male Unloader Piston**

**Internal Check Valve**

**Male Load and Unload Solenoid Valves**

**Female Unloader Solenoid Valve**

**Roller Element Bearings**

**Internal Oil Filter**





### One-half Degree Control

The screw compressor has variable capacity control capabilities that allow system water temperatures to be controlled to within 1/2°F. Typical reciprocating compressors and some competitive screws with fixed step unloading have loop temperature control tolerances of 2°F. This 2°F offset causes significant under and/or overcooling resulting in increased overall energy expenditure.

### Capacity Control

The Trane screw compressor has variable unloading capability, which can provide better temperature control than typically available with discrete step unloading reciprocating and some competitive screw compressors.

The variable unloading capability provides the opportunity for the temperature control system to better match the equipment load. Better matching of the equipment load minimizes under and/or overcooling resulting in reduced overall energy expenditure and reduced number of compressor starts.

### Applications

Trane screw compressors are designed for the industrial and commercial markets. The highly reliable semi-hermetic design combined with energy efficiency, low sound levels and flexibility of design allows the Trane screw compressor to be used in a wide variety of applications including:

- Comfort Cooling
- Industrial Process Cooling
- Ice/Thermal Storage
- Heat Recovery
- Low Temperature Process Cooling

This flexibility in the application of the Trane screw compressor makes it ideal for office buildings, hospitals, schools, retail buildings and industrial applications.

After more than a decade of manufacturing and shipping over 60,000 screw compressors, Trane's helical rotary compressor has maintained a reliability rate of 99.5 percent within the first year of operation. As we go forward, Trane will continue to build reliable and durable compressors while improving efficiency to meet worldwide demand.



The Trane Company  
An American Standard Company  
[www.trane.com](http://www.trane.com)

For more information contact Trane  
OEM products at 800-755-5678.

---

Literature Order Number    COM-S-13-EN

---

Date    September 2000

---

Supersedes    New

---

Stocking Location    La Crosse

---

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change design and specifications without notice.