

COOPER TURBOCOMPRESSOR CENTRIFUGAL COMPRESSORS

Cooper Turbocompressor's Model 3MSGEP-14 maintains reliable performance for an industrial gas application in a remote area of the Pacific Rim.



Custom engineered for your application – Proven performance worldwide

Cooper Turbocompressor has been a leading manufacturer in the compressor industry for more than 40 years. Founded by Joy Manufacturing Company, the company created a true revolution in compressor technology when it introduced the first integrally geared centrifugal compressors for plant air application in 1961.

Today, with over 5,000 installations worldwide, on nearly every continent, Cooper Turbocompressor products are proven in a wide variety of industries including plastics, pharmaceuticals, chemicals, industrial gases, automotive, textiles, paper and utilities to name a few. These compressors have earned a reputation for rugged, reliable performance in even the most extreme environments, from the harsh cold of Alaska to the scorching heat of desert climates.

Headquartered close to Niagara Falls in Buffalo, NY (USA), with sales offices around the world, Cooper Turbocompressor continues to advance the state-of-the-art in centrifugal compressor design. The company's fully integrated manufacturing facilities are dedicated entirely to the engineering and manufacturing of centrifugal compressors for plant and process air applications. Advanced research and development, the most modern testing facilities and ISO 9001 Certification assure Cooper Turbocompressor's continued leadership in the compressor industry.

Cooper Turbocompressor has the centrifugal compressor to meet your exact needs

Cooper Turbocompressor offers a full line of compressors, each designed for long-lasting performance, easy operation and convenient service. This brochure details the custom engineered MSG® and TA Oil-Free Centrifugal Compressors designed to assure 100% oil-free air or nitrogen gas delivery.

- TA (Turbo Air) compressors are completely packaged on a common base for easy installation. They are available in a number of configurations for capacities in the 600 CFM to 35,000 CFM range to a maximum of 12,000 horsepower and 750 PSIG.

- MSG® (Multi-Stage Geared) compressors are application engineered with a number of available configurations for flow requirements from 600 CFM to 70,000 CFM to a maximum of 20,000 horsepower and 750 PSIG.

For over 40 years, from Joy Manufacturing to Cooper Turbocompressor, this Buffalo, NY, USA (near Niagara Falls) facility has been the headquarters of leading compressor technology.



The compressors above feature Cooper Turbocompressor's complete capacity range, from 600 CFM on the left to the 70,000 CFM capacity machine on the right.

No matter what your application requires, Cooper Turbocompressor centrifugal compressors offer outstanding flexibility backed by the engineering expertise to meet your specific needs.

A single-gearbox, high-pressure air compressor provides reliable oil-free air for chemical processing in the midwestern United States.



Experience and innovation to meet your exact needs

From air separation plants and refineries to chemical processing and manufacturing facilities, Cooper Turbocompressor engineers have a broad range of experience in designing systems around the world. There is pride in this heritage of innovation in the industry and a striving to exceed the high standards set for the TA and MSG[®] centrifugal compressors.

Cooper Turbocompressor takes a team approach to meeting customer requirements. The team works with you and your staff, engineer to engineer, in designing the optimum compressor for your plant or process. Together the team can determine the factors that affect the performance of your compressor, including environmental conditions, space requirements and more. The result is a compressor to fit your specific application.

The latest technology to design your compressor

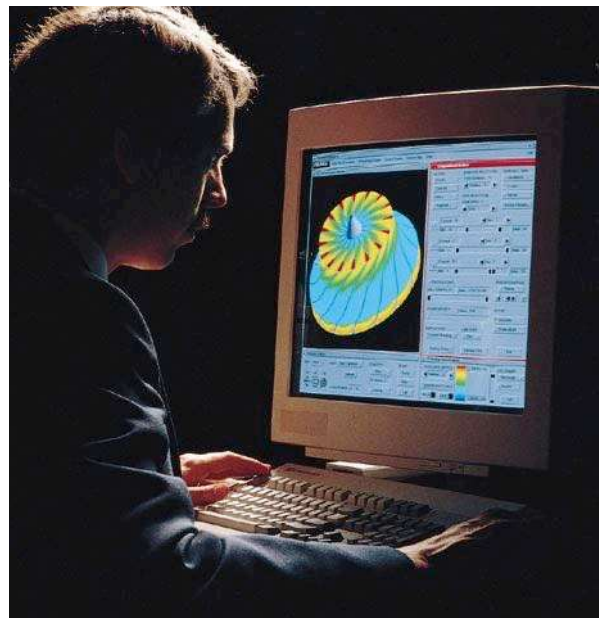
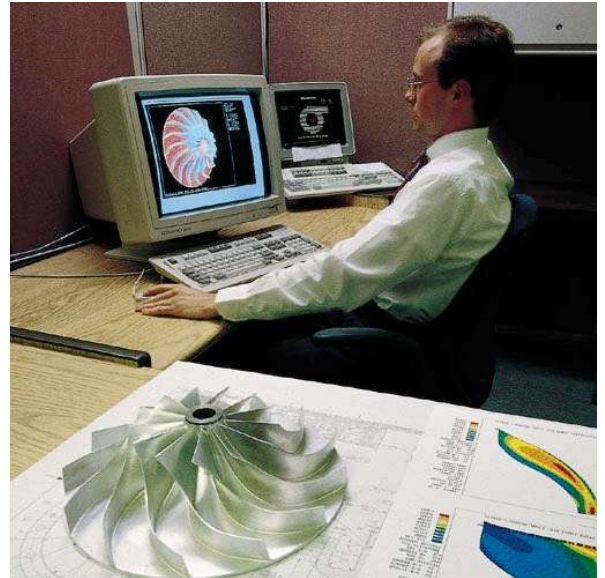
Cooper Turbocompressor has invested in the latest technology to support the expertise of its engineers and shorten response time. CAD/CAM systems are utilized across the entire design and production process.

Tasks are performed simultaneously by engineering teams instead of one at a time by individuals, significantly reducing the time of delivering a high quality compressor for your application.

Advancing the state-of-the-art in compressor design

Cooper Turbocompressor engineers have access to the resources of dedicated lab facilities and extensive research and development programs to ensure your compressor is designed with the very latest technology. These efforts continually advance compressor design with breakthroughs such as the patented intercooler seals, and the first centrifugal compressors with microprocessor control.

Finite Element Analysis - Used to analyze static and dynamic impeller stresses for special impeller designs.



Three-Dimensional Fluid Dynamic System – analyzes the compressible viscous flow through each stage resulting in a high-efficiency impeller and diffuser.

MANUFACTURING

This Model TA-70 plant air compressor is installed in a midwestern U.S. automotive plant.



The way it is put together sets Cooper Turbocompressor apart

The Buffalo, New York plant is a fully integrated facility featuring the most current manufacturing technologies. Advanced computer aided manufacturing techniques and precision equipment are utilized to produce each compressor under the ISO 9001 certified quality program.

The latest manufacturing techniques

Cell manufacturing and work-team approaches provide greater control and flexibility in manufacturing. Employees are trained to perform a number of tasks in one cell and are empowered to increase productivity and quality.

Cooper Turbocompressor's teamwork system ensures the highest quality possible for this single-gearbox, combined recycle/feed compressor for shipment to Europe.



A double-gearbox, high-pressure, soot-blowing air compressor being assembled for installation in a Middle Eastern electric utility.

MANUFACTURING (CONTINUED)

The latest manufacturing technology

Cooper Turbocompressor has invested in tools and facilities to reduce manufacturing costs, improve quality, and shorten delivery schedules. Examples of these advanced capabilities include:

Gearbox Machining Cell — The Gearbox Cell is used to machine gearboxes offered in TA and MSG® centrifugal compressors. The Cell consists of a CNC-controlled horizontal machining center, with tool changer and 4 pallet system, radial drill and positioner. In short, the Gearbox Cell enables Cooper Turbocompressor to produce compressor gearboxes with outstanding accuracy, consistency, and repeatability.

Impeller Manufacturing System (IMS) — The IMS produces centrifugal compressor impellers faster and with greater precision than conventional machines. The CNC-controlled, five-axis milling machine is a system with all tooling, fixturing, and programming required to mill impellers from stainless steel or other material forgings.

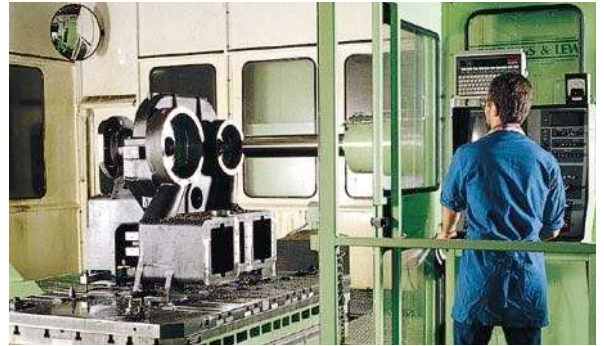
The IMS has the capacity to machine impellers from 5" to 30" diameter. The system features custom software including programs to perform coordinate measurements during the machining process to further enhance accuracy.

A tradition of craftsmanship and quality

Cooper Turbocompressor's advanced manufacturing technologies are complemented by a tradition of excellence in craftsmanship. Highly trained experienced craftsmen build every centrifugal compressor with high quality components and materials to ensure reliability and long operating life.

Compressors are built tough with high strength cast nodular iron scrolls or steel scrolls where required, cast iron gear boxes, stainless steel impellers and pivoted shoe bearings. Integral gears are hardened and precision ground for longer life and designed in accordance with AGMA standards.

Cooper Turbocompressor's totally computerized machining cell produces gearboxes with outstanding accuracy, consistency and repeatability.



This precision manufacturing system uses custom software to continually check and recheck impeller measurements for a high degree of accuracy.



Five-axis milling of a high-efficiency, stainless steel impeller.

ISO 9001 QUALITY

This high-efficiency 4 MSGE-12 contributes to energy conservation in an air separation plant.



Our commitment to your complete satisfaction

ISO 9001 certification is testimony to Cooper Turbocompressor's commitment to be the best in the compressor industry. It means quality is an all-encompassing, company-wide attitude, from top management to research and development to engineering, manufacturing, and field service. It proves that Cooper Turbocompressor is truly a world-class manufacturer of centrifugal compressors.

Quality Policy

As part of the ISO 9001 certification, Cooper Turbocompressor has established a Quality Policy in which the focus is long-term customer satisfaction. The policy states that the company will provide the products and services worldwide that fully meet the customer's expectations and requirements; design and manufacture products to equal or exceed industry and government regulatory standards; and provide the customer with the best value delivered.

Total Quality Management

An extensive quality control system, including strict adherence to a Total Quality Management (TQM) program, extends through all areas of products and services. The TQM program provides a systematic approach to continuous improvement, focusing on consistently meeting and exceeding customer expectations.

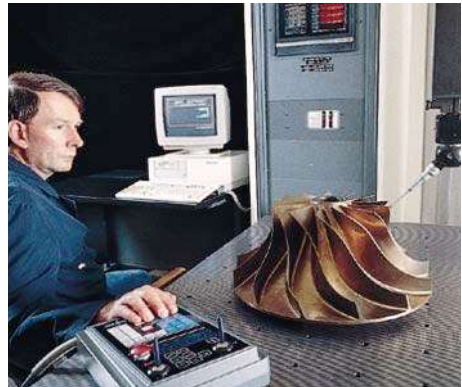
Supplier partners

Cooper Turbocompressor quality includes its suppliers. A close working relationship is maintained with suppliers to clearly define the quality requirements. A formal review system is in place with key suppliers to continually exchange feedback and improve the quality of the products purchased. New suppliers undergo an extensive audit before they are included on the suppliers list.

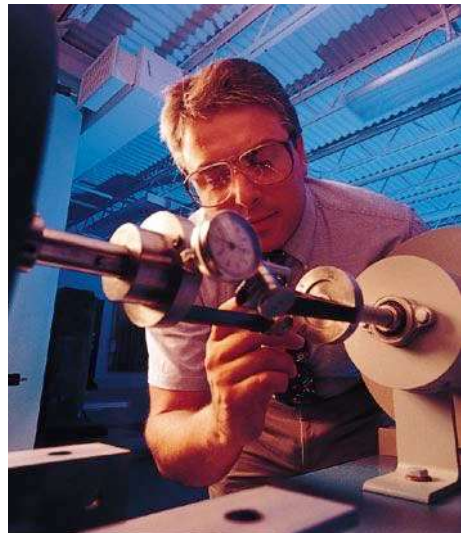
Quality never stops

Ultimately, the measure of quality is the customer's complete satisfaction. Cooper Turbocompressor works closely with its customers to be certain that the company's products consistently meet the customers' application requirements.

Cooper Turbocompressor is committed to providing the customer with the best value delivered.



The contour of this impeller blade is given final verification utilizing the Cordax measuring system.



Quality is an all-encompassing, company-wide attitude which is measured by our customer's complete satisfaction.

ADVANCED TESTING FACILITIES

A Model TA-35 air compressor provides reliable service to a southeastern United States pulp and paper mill.



Complete testing — further assurance of Cooper Turbocompressor's quality

Cooper Turbocompressor's outstanding quality is further assured by its testing facility where every centrifugal compressor is given a complete aerodynamic and mechanical test by highly skilled technicians.

The company has invested millions of dollars to create one of the industry's most sophisticated testing facilities, with five test stands and a wide range of advanced testing instrumentation. All aerodynamic testing is performed per the ASME PTC-10 test code guidelines. To ensure mechanical integrity, the compressor is run 10% over its rated speed.

Test stands with variable speed drives

Three test stands have variable speed output to 11,000 horsepower. Two test cells are available for use with customer drives with maximum power of 1,250 horsepower to meet specific testing requirements.

Two bays allow two machines to be tested simultaneously, or one machine to be tested while another is being set up, providing reduced test schedules.

Two cooling towers are used to provide intercooler water, regulated to meet customer conditions according to ASME specifications.

A complete range of testing instrumentation

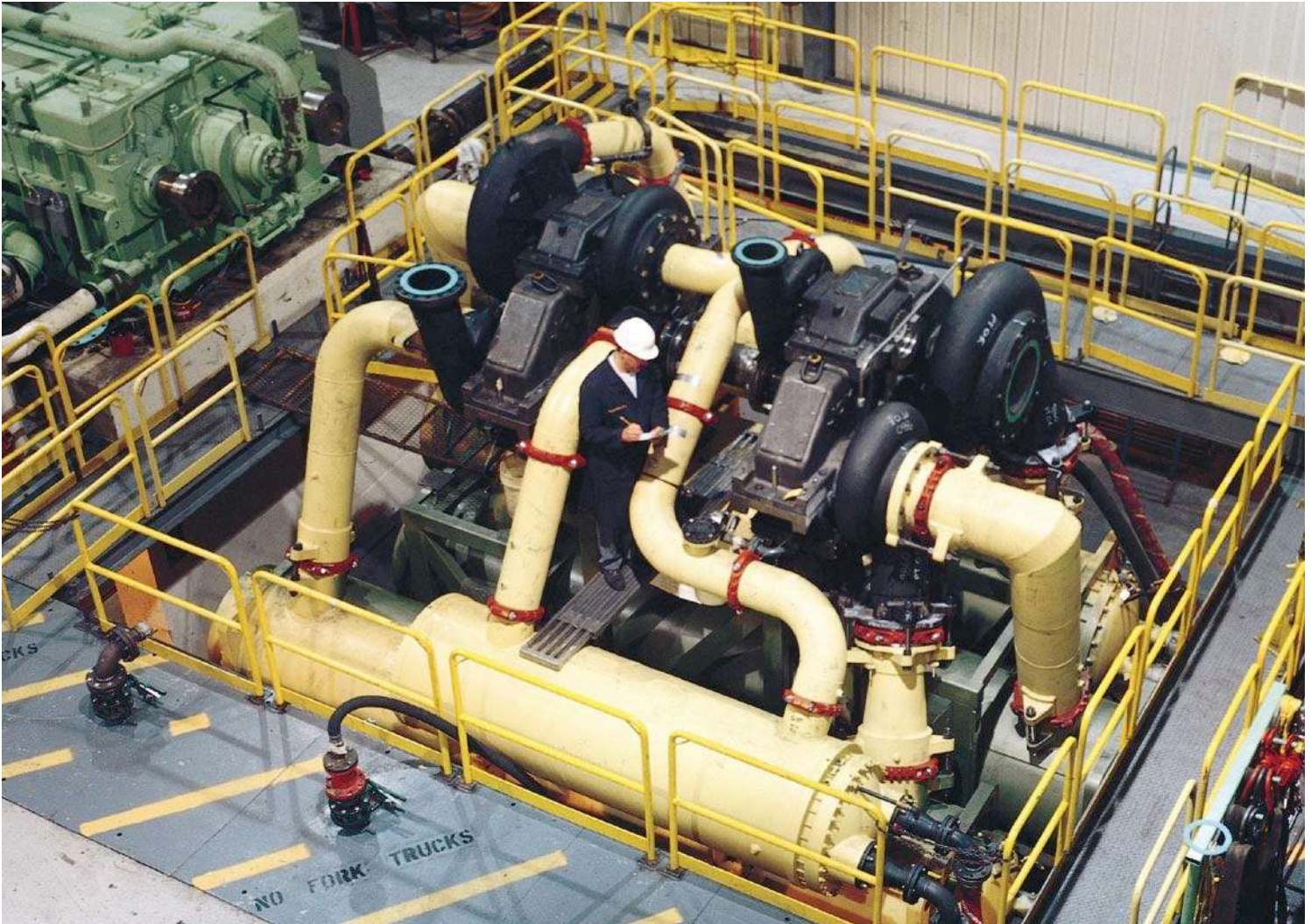
Accurate and precise compressor testing is performed by experienced technicians utilizing the latest testing equipment, including pressure instrumentation similar to what NASA uses for its complex specifications.

Automated laser alignment tables on each test stand speed test set-up time and self-calibrating instrumentation systems assure accuracy and consistency.

These 4,500 and 11,000-horsepower variable speed test stands enable reduced test schedules in Cooper Turbocompressor's state-of-the-art testing facility.



Cooper Turbocompressor's fully computerized monitoring and data acquisition system performs accurate and precise testing.



Testing observation and documentation

Upon request, customers are welcome to observe testing of their compressor. Complete test documentation is available.

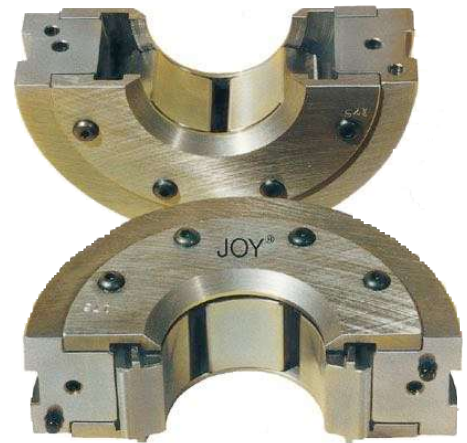
Documentation can be provided for full operating tests to identify compressor air capacity, pressure, temperature, and horsepower. Vibration data for both steady state and coast down operation is recorded to verify rotor critical speed and response.

This double-gearbox compressor package is ready for testing in the 11,000-horsepower test bay.

COOPER TURBOCOMPRESSOR CENTRIFUGAL TECHNOLOGY

The most efficient, reliable and highly accessible centrifugal compressor in a compact package

Cooper Turbocompressor centrifugal compressors feature superior design and engineering to deliver a reliable, economical supply of oil-free air for your plant or process needs. The compact package design makes every compressor easier to install, simple to operate and maintain, and more dependable.



Horizontally Split Gearbox

The horizontally split gearbox allows inspection or replacement of gears, bearings and seals by simply lifting a cover. No disassembly of piping, heat exchangers or impellers is necessary as with vertically split designs.

Periodic inspections and maintenance are made easy through functional simplicity. Easy access is provided through removal of a few parts, unlike other compressor designs in which practically the entire machine must be disassembled just to inspect an impeller. Maintenance and downtime savings can be considerable.

Tilting pad bearings provide high stability and reliability

Horizontally split, tilting pad (five-pad) journal bearings are universally acknowledged to have the highest stability and lowest vibration level for high speed shafts which are subjected to variable loading over a wide range.

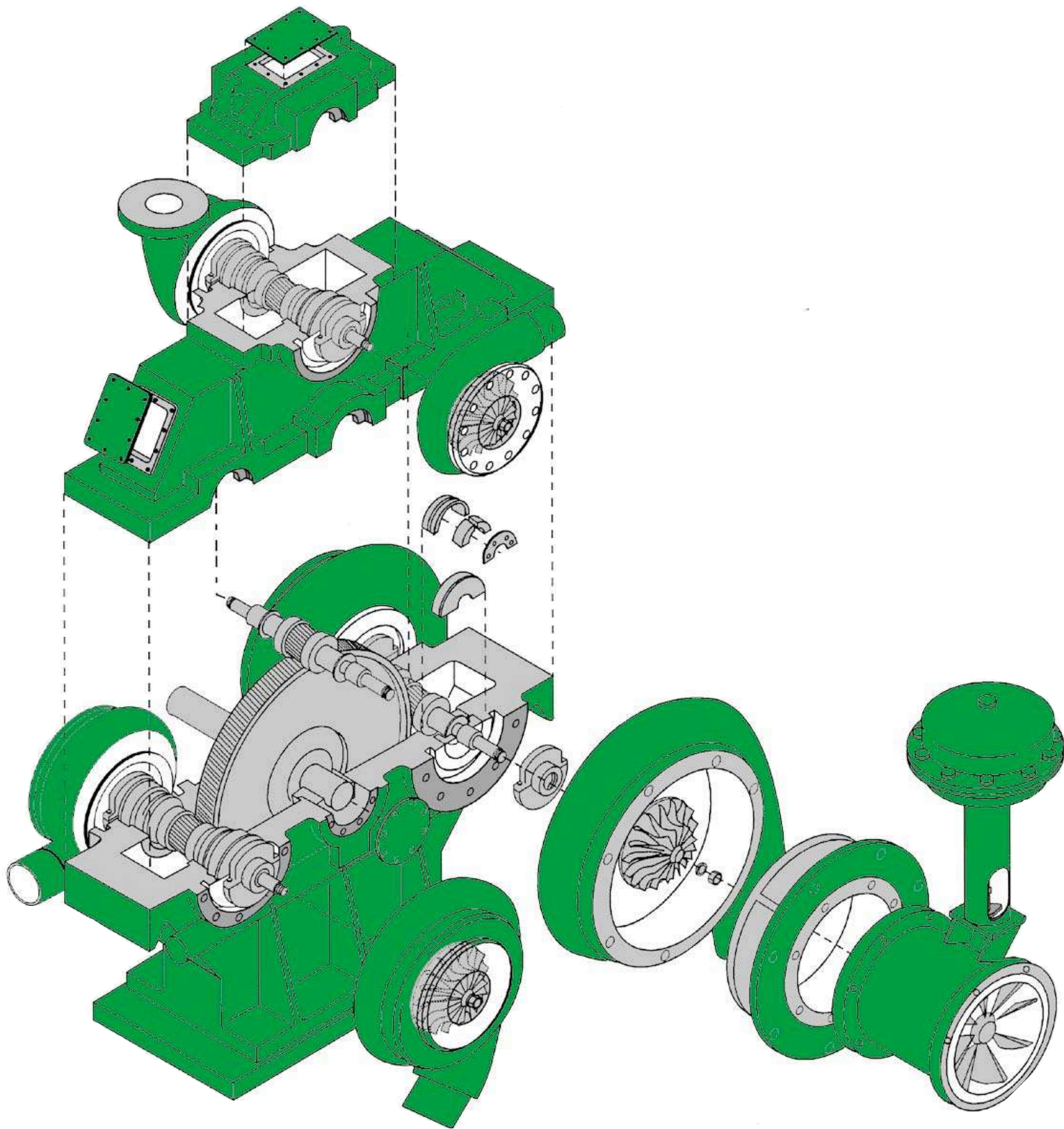
In the TA and MSG® centrifugal compressors, this means high reliability over the entire operating range of the unit, from full load to no load, from surge to stonewall. Bearing shoes are pressure lubricated and steel-backed babbitt for maximum reliability.

Bull gear delivers optimum speed and efficiency

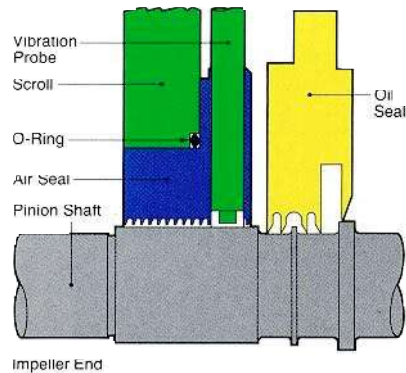
The bull gear allows each pinion to operate at optimum speed as determined by the flow and efficiency characteristic of the impellers. The bull gear is connected directly to the compressor driver by a low speed coupling.

There is no need for high speed couplings or external speed reduction gears. Gears are high speed, precision helical-type designed to meet or exceed AGMA standards quality.



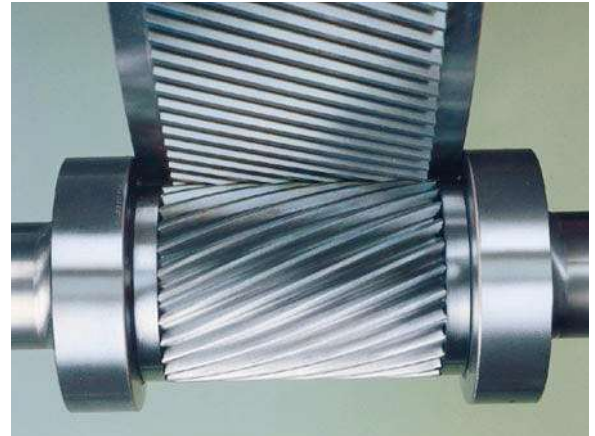


Standard Air Seal



Sealing arrangement provides oil-free operation

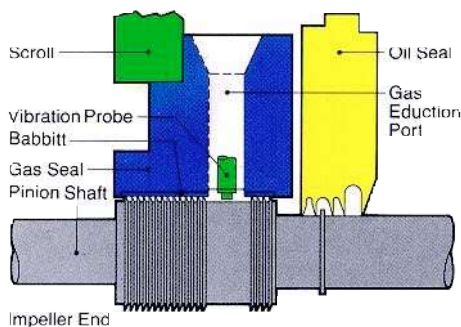
Separate labyrinth-type air and oil seals effectively confine air in the stage casings and prevent contamination of the gas stream from lubricating oil. Atmospheric air space between the air and oil seals keeps free oil vapor away from the air stream, thereby ensuring 100% oil-free operation under all conditions. Cooper Turbocompressor's horizontally split, non-contacting labyrinth seals do not require periodic replacement because they are not subject to critical shaft wear nor do they require a buffer gas supply.



Tapered "rider ring" thrust collars maximize efficiency

The symmetry of the Cooper Turbocompressor centrifugal design cancels out the bulk of power-robbing thrust loads. Tapered "rider ring" thrust collars on the pinion shafts create an oil wedge which carries the small remaining net thrust to the bull gear where it is absorbed by a simple low speed thrust bearing. This reduces gearbox power losses to a minimum while maximizing mechanical integrity.

Optional Babbitt Seal



Babbitt seals provide near zero leakage with highest reliability

When used with educting, these seals have the best recovery rate of any of the available seals. The rotating seal teeth create their own grooves in a babbitt sleeve for the ultimate in close clearance.



Rotor assembly provides smooth operation

Each rotor assembly consists of a pinion shaft to which one or two impellers are attached. Pinion gears are hardened and precision ground (AGMA 13 quality) for longer life. Smooth, vibration-free operation is ensured through precision balancing of component parts, both individually and as completed assemblies.

AERODYNAMIC PERFORMANCE

Using standard components, most models can be customized for special industry needs - such as this TA-30 unit, manufactured for an Asia-Pacific refinery.



Application engineered to match your exact requirements

Optimum performance from a centrifugal compressor depends on two very important components: aerodynamic concepts and the machine's mechanical arrangement. Cooper Turbocompressor excels in both areas.

Unique impeller designs

With more than 40 years of research and experience in compressor applications, Cooper Turbocompressor has designed several unique impeller configurations in both cast and five-axis milled stainless steel.

Sigma Radial impeller

Combines the best features of straight radial bladed and backward leaning impeller designs. Precision investment casting with high mechanical

integrity provides lower operating stress levels. It provides better part load efficiency due to the compressed air being delivered at a near constant power per CFM over the operating range. An added feature of the Sigma Radial impeller is its capability to deliver flows in excess of 100% at slightly reduced pressures.

Custom Engineered – milled

Custom engineered impellers are based on the latest impeller design codes which consider inducer blade lean and exit blade rake to produce an impeller design which is optimum for its application. Higher efficiency equates to dollars saved over the lifetime of the compressor. Savings overall can be as great as 5% increase in efficiency. For a 3,000 horsepower compressor, with a power evaluation of \$2,000/horsepower, that can equate to a savings of over \$250,000. These unique impellers are manufactured from forgings that are machined by a five-axis milling process.

Radial Sigma Radial

For added flexibility, Cooper Turbocompressor will use RSR impellers. These impellers provide more compression ratio and are used most often in upgrades when the customer's needs have changed over time.

Meeting the customer's needs

The Cooper Turbocompressor aerodynamic system consists of a combination of impellers, scrolls and diffusers. Impellers are carefully stage matched by computer. The original Cooper Turbocompressor double-row vaned diffuser, single-row diffuser, or most recently, the low solidity cascade diffuser augments the impeller performance. Finally, the best scroll is chosen from three standard sizes for each stage location. The final objective, combine the components in order to meet customer needs.

Cooper Turbocompressor's impellers, diffusers and scrolls are uniquely designed to meet each customer's needs. Below are examples of various specialty-milled, standard-precision cast impellers and diffusers.



Custom Engineered
Milled



Custom Engineered
Milled



Low Solidity Diffuser



Sigma Radial



Radial Sigma Radial



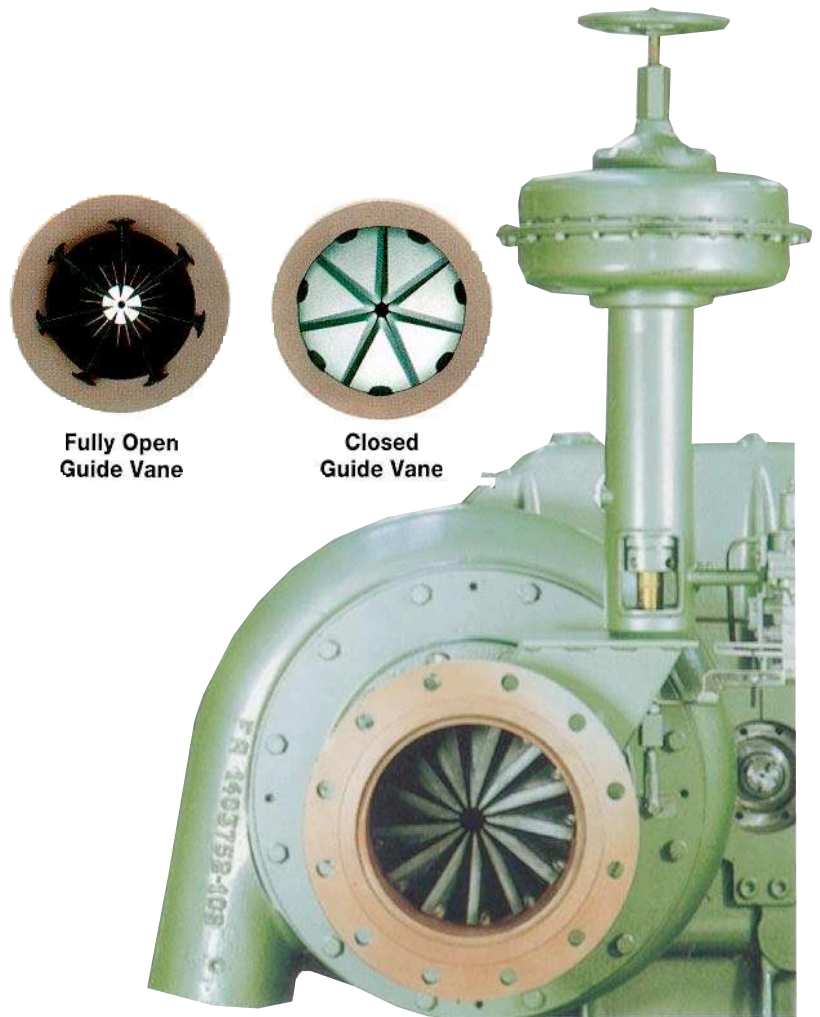
Double Row Vaned Diffuser

Variable inlet guide vanes offer power savings up to 9%

The compressors can be fitted with optional variable inlet guide vanes. Whenever the ambient temperature is below the design air temperature, the compressor flow capability increases. If this additional flow is not required, or system demand is less than 100% capacity, the guide vanes reduce the air flow into the compressor reducing the power consumption.

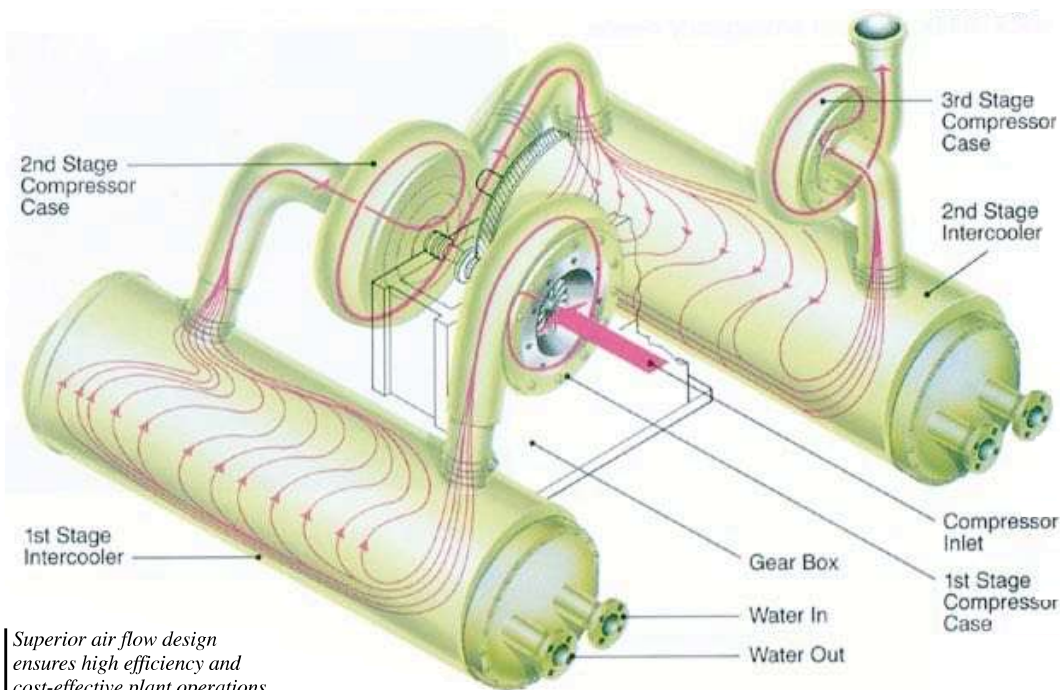
The inlet vanes impart a whirling motion to the inlet air flow in the same direction as the impeller operation, reducing the work input.

The net power savings when operating at reduced flow or on days colder than the design temperature can be as much as 9%. The inlet vanes are positioned close to the impeller to achieve maximum benefit.



Highly efficient air flow arrangement

Cooper Turbocompressor features a superior arrangement of air flow components. Air movement through each stage of the compressor is directed so turbulence-induced friction is reduced. The air is cooled after every stage to assure a high isothermal efficiency.



Superior air flow design ensures high efficiency and cost-effective plant operations.

SUPERIOR PACKAGING

This model TA-50 air compressor provides high operating efficiency to a southeastern United States textile facility.



Great flexibility to tailor a compressor to your needs

Every TA and MSG® model includes compressor, lubrication system, intercoolers, shaft coupling, coupling guard, interconnecting piping, and normally the driver and control panel...all on a common base.

As a result, each compressor can be installed on a simple slab foundation in the shortest possible time. This ease of installation results from Cooper Turbocompressor's sensible packaging concept in which the primary goal is to maintain component accessibility.

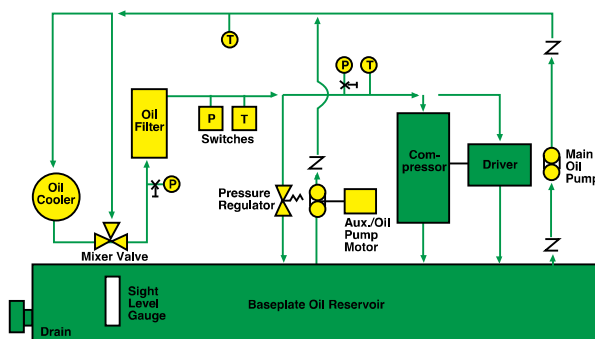
The concept is simple: don't mount anything on the compressor that isn't functional, use top grade components, and make everything accessible with the least amount of work. Besides saving you time, energy and expense on maintenance, this concept affords great flexibility for tailoring machines to your needs.

Cooper Turbocompressor can build standard compressor packages or specialized API-672 packages like the one shown below, all on a common baseplate, very sensibly packaged.

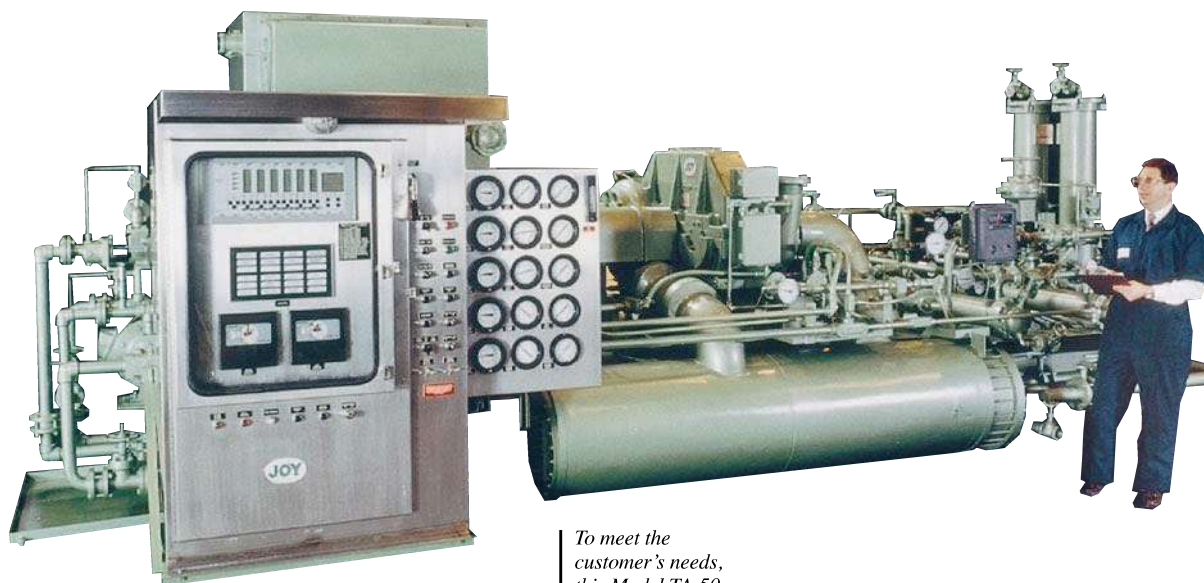
Highly reliable lubrication system

The TA and MSG® centrifugal compressors are furnished with a pressure lubrication system which can serve the driver as well as the compressor. The system consists of an oil reservoir, main oil pump, full-flow auxiliary oil pump, oil cooler, full-flow oil filter (10 micron cartridge), oil piping, and necessary safety instruments and gauges. The system is assembled and packaged with the compressor. Separate consoles are available for the largest MSG® units.

The main oil pump may be shaft-driven, electric motor-driven, or steam turbine-driven. The auxiliary oil pump may be electric motor-driven or air motor-driven. Dual oil coolers and filters are available, as are other custom design features to meet application needs.



The standard TA lubrication system can serve the driver as well as the compressor.



To meet the customer's needs, this Model TA-50 was built to the stringent standards of API-672.

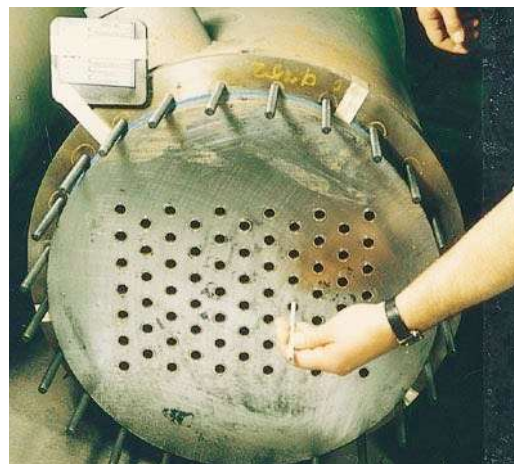
Cooper Turbocompressor intercoolers guarantee maximum heat transfer

ASME-coded intercoolers provide efficient cooling between stages. The air-in-shell, water-in-tube design puts the water where cleaning is easy, an important consideration in areas with poor water conditions. The extended surface, plate-fin design provides maximum heat transfer with minimum space requirements. Entrained moisture is separated by the extended fins and changing air flow direction at low velocity.

The exclusive Cooper Turbocompressor design makes intercoolers more accessible for inspection and cleaning. Smooth bore tubes are easily rodded with bundles in place.

No disassembly of any other part of the compressor is required to perform maintenance on the intercoolers. Standard materials are copper or admiralty brass tubes with aluminum fins.

Special materials are available for tubes and tube sheets where bad water or special conditions dictate. Where contaminated air is a problem, special materials and coatings are available for fins and shells. Water consumption requirements can be tailored to customer needs, using either cooling tower or municipal water.



Cooper Turbocompressor's intercoolers are designed to be more accessible for inspection and cleaning.

Low operating sound levels

The TA and MSG® centrifugal compressors are available with sound attenuating treatment for applications where low operating sound levels are a requirement. Compressors are rated in accordance with CAGI-PNEUROP test code for the measurement of sound from pneumatic equipment (ANSI 5.1, 1971). Attenuation is achieved without compromise in machine accessibility.

The extended surface plate-fin intercooler design maximizes heat transfer for greater cost savings.

Legend

- | | |
|---|--|
| 1. Independent floating tubesheet/ header...no thermal loads | 6. Smooth bore water-in-tube ... easily cleaned |
| 2. Rectangular bundle...efficient, predictable performance | 7. Bundle support channel rollers... bundle easily removed |
| 3. Diagonal baffle...smooth velocity changes | 8. Water box |
| 4. Unique flexible seal...seals over a wide range of tolerances | 9. Shell assembly |
| 5. Flexible gas nozzle couplings... no transferred loads | 10. Air in |
| | 11. Air out |
| | 12. Water in |
| | 13. Water out |



SUPERIOR PACKAGING (CONTINUED)

For even more installation savings, this Model TA-85 has been packaged with its optional water manifold and packaged Quad control system.



The right compressor for your needs

Sensible packaging means TA and MSG® centrifugal compressors offer outstanding flexibility to meet a wide variety of plant and process air applications. Here are some packaging considerations to assist you in selecting the model that best fits your needs.

TA (Turbo Air)

The TA represents a ready-to-install, immediately available package in which the compressor base is packaged with the compressor, ASME coded intercoolers, lubrication system, control system, control guide vane, main driver and shaft coupling. Installation is simple, with air and oil piping complete and on the base. The entire package can be put in place with one lift.



MSG® (Multi-Stage Geared)

MSG® compressors represent a number of different arrangements:

MSG - Compressor base with compressor and intercoolers. Lube oil reservoir and driver base separate.

MSGP - Compressor base with compressor, intercoolers, and lube oil reservoir. Driver base separate.

MSGPB - Compressor base with compressor and intercoolers adjoined to the motor base. Lube oil reservoir may be packaged under compressor base or driver base.

A single-gearbox, five-stage, three-pinion, high-pressure nitrogen compressor stands ready for shipment to a European location.

Pictured below is a Model TA-70M5R3 four-stage air compressor with a cover-mounted, customer-supplied, cryogenic expander.

TA or MSG® three pinion - single gearbox arrangements

To accommodate 6 stages per gearbox, a three-pinion casing is provided which has an additional horizontal split through the top half of the gearbox. This allows an additional pinion to be mounted on top of the bull gear.

The 6 stage compressors feature the same design as the 4 stage compressors - where gearboxes are split horizontally for the best possible access to components. The benefits of 6 stage compressors include:

- Higher pressures
- Multiple air compression service
- Reduced overall footprint
- Fewer internal components
- Easier installation
- Lower installed cost than two separate machines

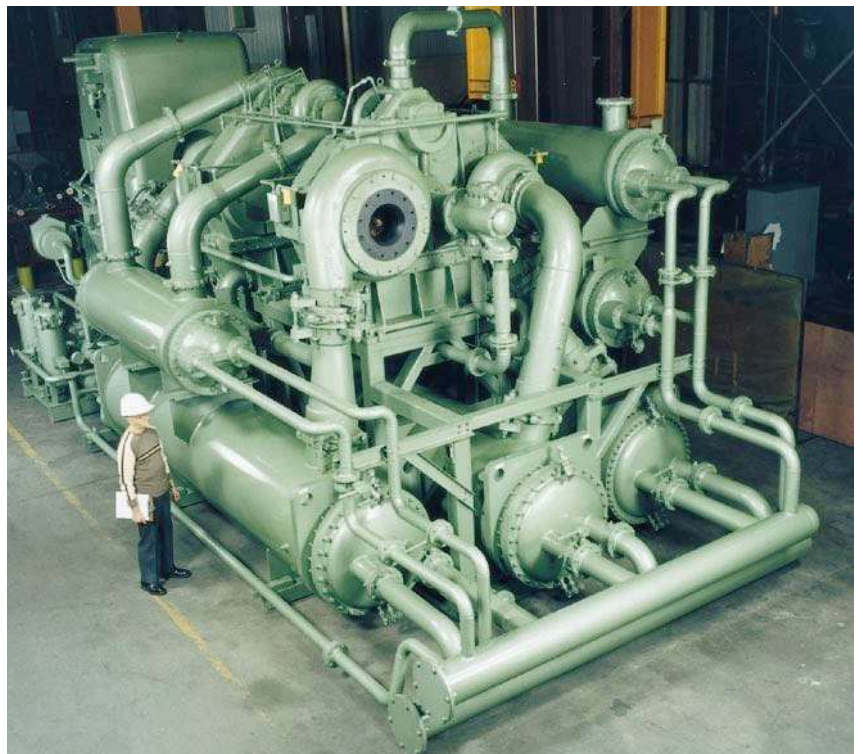
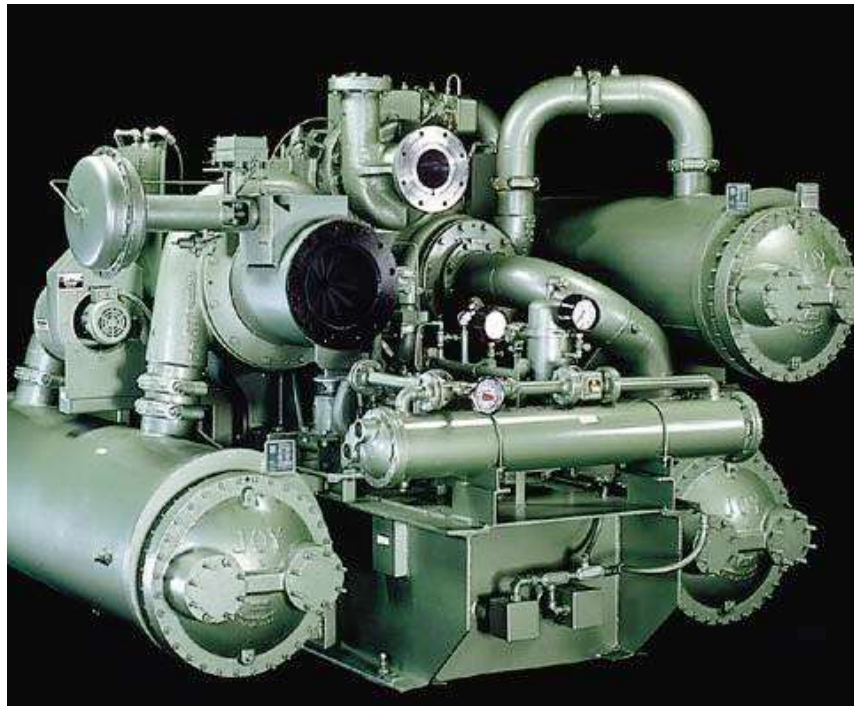
MSG® three pinion - double gearbox arrangements

The three pinion arrangement has been expanded to provide other packaging options. These include applications where more than one process requiring more than 6 stages can be coupled together with two gearboxes on one base. As many as 3 services and 12 stages can be packaged on a single compressor unit with 2 gearboxes.

For example, a combination of a high pressure recycle compressor (normally 4 stages) and a nitrogen feed compressor (normally 3 stages). In this type of combination, the feed compressor is built into the third pinion location on top of the gearbox. Each duty can be controlled separately. Benefits of such an arrangement include:

- An entire plant can be simplified by having only one machine to install, operated by only one driver and starting system
- Overall operation is improved
- Installation costs are reduced
- Overall costs are reduced
- One lubricating and control system

All Cooper Turbocompressor Recycle Compressors frame MSG -7 and larger are equipped with a patented pressure balance piping system on each stage discharge. This pressure balanced system relieves almost all of the pressure and thermal forces on the scrolls. With reduced forces, Cooper Turbocompressor can provide machines with higher efficiency, hence reducing operating power consumption.



Sensible packaging sets us apart. This Model 3R3x4R3MSGEPB-7RCD combined feed/recycle compressor has an optional feed-mounted after-cooler.

COOPER TURBOCOMPRESSOR CONTROL SYSTEM

This 3x2MSG-8 nitrogen pipeline compressor contributes to the smooth operation of a nitrogen plant in the United Kingdom.



Enhanced compressor efficiency and performance are in your control

Cooper Turbocompressor introduced the first microprocessor control for centrifugal compressors over 15 years ago. Today the Quad 2000 is the most advanced microprocessor-based system ever, with numerous advantages over digital relay logic and programmable controller-based systems.

Quad 2000 gives you more control, faster speed, more input/output capability, and more efficient operation ...and it's easy to use. It is a very flexible control system to meet your exact performance standards. Quad 2000 control can save you money the minute you install your TA or MSG® compressor.

Vibration levels and critical temperatures and pressures with alarm and trip functions are constantly monitored. All data is displayed on a digital readout screen.

Automatically adapts to changes in system demand

Quad 2000 has the unique ability to anticipate changes in system demand and adapt to them automatically...unlike conventional control systems which simply react to changes after they occur. Quad 2000 constantly monitors the rate of change in operating conditions, controlling the inlet valve or guide vanes and modulating the by-pass or blow-off valve to provide smooth, efficient control.

The highly flexible Quad 2000 control system acts to changes in system demand – unlike others, which only react.

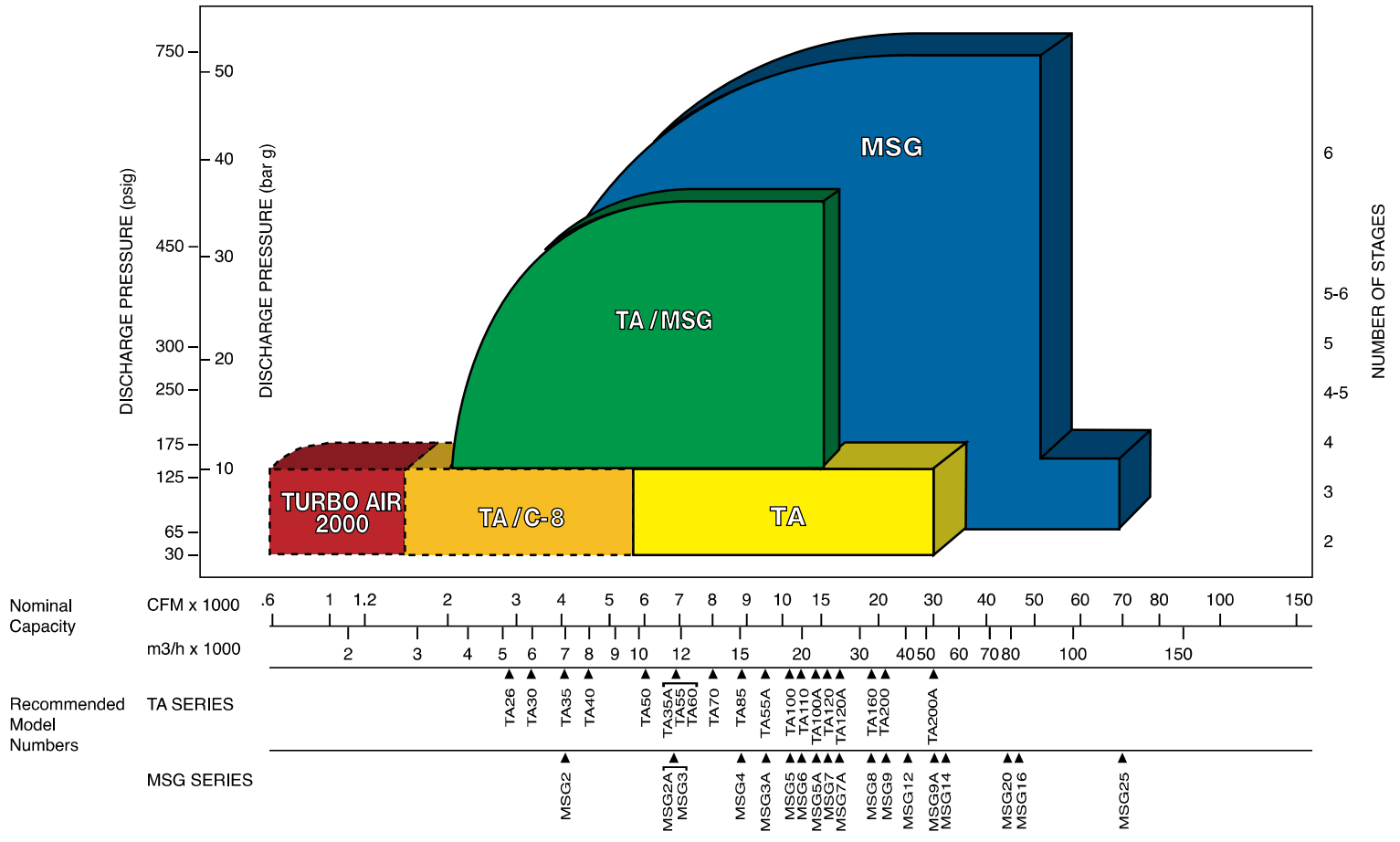


Flexible to meet your application requirements

Quad 2000 is offered with Auto/Dual control, Constant Pressure control or Constant Mass Flow control. Surge Protection automatically ensures stable compressor operation under all operating conditions, while providing maximum range.



MODULAR COMPRESSOR SELECTION



Cooper Turbocompressor models have a modular design to fit customer needs for capacity and discharge pressure. Aerodynamic units consisting of matched impellers, scrolls, diffusers, and pinion speeds can be arranged on standard compressor frames to provide a variety of performances.

The complete product line includes standard plant air compressors. These TA-2000 and C-8 series compressors are briefly described on page 24 and in a separate description bulletin.

A Number of Custom Performances, Designed from Standard Components

Two-stage TA compressors for glass manufacturing, and pharmaceuticals.

Three-stage TA for large manufacturing, textile fiber, and process applications.

Four-stage TA and MSG® for chemical processing needs.

Packaged five- and six-stage MSG® models are available for soot blowing electric utilities and high pressure boosting.

Four-stage double gearbox MSG® compressors for high pressure liquifying and soot blowing service.

Three pinion single gearbox or double gearbox TA and MSG® arrangements for combined service compressors and high pressure applications.

PRODUCT SECTION

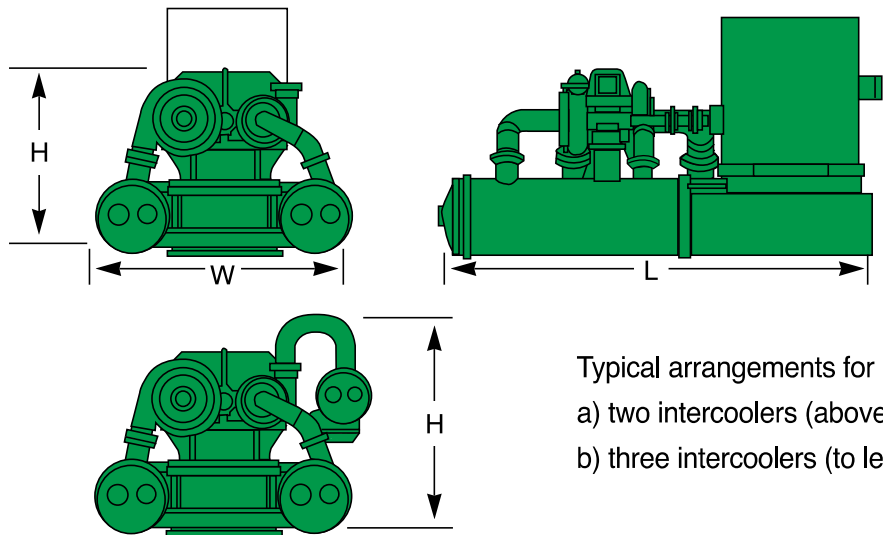
TURBO-AIR “TA” COMPRESSORS

TWO OR THREE STAGES ON ONE OR TWO ROTORS WITH:

	ONE OR TWO STANDARD INTERCOOLERS									ONE OR TWO HIGH EFFICIENCY INTERCOOLERS								
	L		H		W		Wgt			L		H		W		Wgt		
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb*)	(lb**)	(kg**)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb*)	(lb**)	(kg**)
TA26/30/35/35A	160	4070	60	1530	85	2160	11200	16500	7500	200	5080	60	1530	95	2420	17000	22700	10300
TA40/50/55/55A	190	4830	70	1780	95	2420	16700	24000	10900	210	5340	75	1910	105	2670	21000	27700	12600
TA60/70	200	5080	75	1910	105	2670	20300	28800	13100	210	5340	75	1910	105	2670	24000	28800	13100
TA85/100/100A	210	5340	75	1910	105	2670	24000	33000	15000	245	6230	95	2420	120	3050	32000	47000	21400
TA110/120/120A	235	5970	110	2800	120	3050	36000	53100	24100	245	6230	110	2800	130	3310	40000	57000	25900
TA160/200/200A	245	6230	110	2800	130	3310	40000	60000	27300	265	6740	140	3560	145	3690	50000	67000	30400

FOUR, FIVE OR SIX STAGES ON TWO OR THREE ROTORS WITH:

	THREE STANDARD INTERCOOLERS									THREE HIGH EFFICIENCY INTERCOOLERS								
	L		H		W		Wgt			L		H		W		Wgt		
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb*)	(lb**)	(kg**)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb*)	(lb**)	(kg**)
TA26/30/35/35A	160	4070	70	1780	95	2420	15000	20000	9100	210	5340	80	2040	105	2670	20000	25800	11800
TA40/50/55/55A	210	5340	80	2040	105	2670	20000	27700	12600	225	5720	100	2540	120	3050	24000	34000	15500
TA60/70	225	5720	90	2290	120	3050	23000	35100	16000	225	5720	100	2540	120	3050	24000	35100	16000
TA85/100/100A	225	5720	100	2540	120	3050	25000	36300	16000	265	6740	120	3050	135	3430	35000	44000	20000
TA110/120/120A	} MODELS ARE MANUFACTURED AS MSG PACKAGES																	
TA160/200/200A																		



Typical arrangements for
a) two intercoolers (above)
b) three intercoolers (to left)

NOTE:

For 50 Hz applications, add five (5) inches (130 mm) to the width (W)

For five and six stages, add on average 7,000 lbs. (3,200 kg) to the weight listed in the above matrix

For five and six stages with four intercoolers, and four stages with three intercoolers and a mounted aftercooler, add on average 40 inches (1,000 mm) to the width (W)

All dimensions and weights are subject to change without notice

* Weights of compressor base, compressor, intercoolers & lubrication system

** Total weight of (*-above) with motor

MULTI STAGE GEARED “MSG” COMPRESSORS

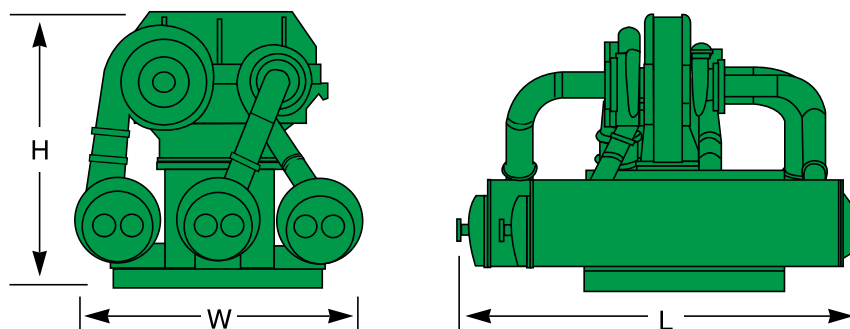
TWO OR THREE STAGES ON ONE OR TWO ROTORS WITH:

	ONE OR TWO STANDARD INTERCOOLERS								ONE OR TWO HIGH EFFICIENCY INTERCOOLERS							
	L		H		W		Wgt*		L		H		W		Wgt*	
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb)	(kg)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb)	(kg)
MSG6/7/7A	195	4960	110	2800	120	3050	36100	16400	185	4700	110	2800	130	3310	40000	18200
MSG8/9/9A	205	5210	110	2800	130	3310	53000	24100	215	5470	140	3560	145	3690	60000	27300
MSG12	230	5850	155	3940	150	3810	76000	24100	225	5720	155	3940	145	4320	85000	38600
MSG14/16	225	5720	155	3940	170	4320	85000	34500	235	5970	155	3940	170	4580	86000	39100
MSG20	255	6480	175	4450	185	4700	11500	38600	255	6480	175	4450	180	4700	111500	50600
MSG25	255	6480	175	4450	185	4700	11500	52200	255	6480	185	4450	185	4700	111500	52200

FOUR, FIVE OR SIX STAGES ON TWO OR THREE ROTORS WITH:

	THREE STANDARD INTERCOOLERS								THREE HIGH EFFICIENCY INTERCOOLERS							
	L		H		W		Wgt**		L		H		W		Wgt**	
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb)	(kg)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb)	(kg)
MSG6/7/7A	200	5080	125	3180	140	3560	50000	22700	205	5210	125	3180	140	3560	52600	23900
MSG8/9/9A	185	4700	125	3180	135	3430	54000	24500	210	5340	135	3430	145	3690	55000	25000
MSG12	225	5720	155	3940	170	4320	77000	35000	225	5720	160	4070	175	4450	94000	42700
MSG14/16	225	5720	160	4070	175	4450	94000	42700	235	5970	170	4320	190	4830	110000	49900
MSG20	255	6480	175	4450	225	5720	140000	63500	255	6480	175	4450	225	5720	140000	63500
MSG25	255	6480	185	4700	230	5850	158000	71700	255	6480	185	4700	230	5850	158000	71700

Typical arrangement for a compressor with three intercoolers. With a one or two intercooler application the lube oil console can be packaged in the compressor base.



NOTE:

For 50 Hz applications, add five (5) inches (130 mm) to the width (W)

For five and six stages, add on average 7,000 lbs. (3,200 kg) to the weight listed in the above matrix

For five and six stages with four intercoolers, and four stages with three intercoolers and a mounted aftercooler, add on average 40 inches (1,000 mm) to the width (W)

All dimensions and weights are subject to change without notice

* Weights of compressor base, compressor, intercoolers and lubrication system

** Weights of compressor base, compressor and intercoolers

COMBINATION THREE PINION ARRANGEMENT RECYCLE AND RECYCLE/FEED COMPRESSORS

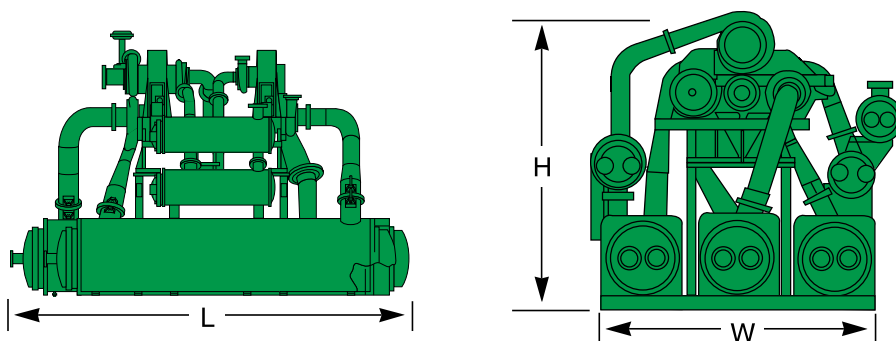
COMBINATION RECYCLE AND FEED COMPRESSORS

▲	4 STAGES OF RECYCLE & 3 STAGES OF FEED DOUBLE GEARBOX 4R3 X 3R3 MSGE- ▲ RCD								4 STAGES OF RECYCLE & 2 STAGES OF FEED SINGLE GEARBOX 6R3 MSGE- ▲ RCD							
	L		H		W		Wgt*		L		H		W		Wgt*	
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb)	(kg)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb)	(kg)
3/3A	180	4580	140	3560	155	3940	44000	20000	235	5970	120	3050	145	3690	44000	20000
4/5/5A	195	4960	130	3310	145	3690	57000	25900	250	6350	110	2800	140	3560	52000	23600
6/7/7A	235	5970	165	4200	165	4200	94000	42700	200	5080	165	4200	165	4200	63000	28600
10/11/11A	265	6740	175	4450	180	4580	99000	44900	265	6740	175	4450	180	4580	99000	44900
12	290	7370	185	4700	225	5720	169000	76700	265	6740	175	4450	180	4580	99000	44900
14/16	330	8390	200	5080	230	5820	175000	79400	265	6740	195	4960	215	5470	115000	52200

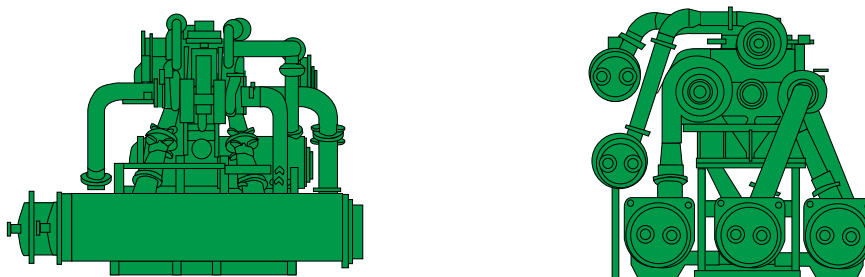
RECYCLE COMPRESSORS - DOUBLE GEARBOX 2 X 2 MSGE- ▲ RC

▲	THREE STANDARD INTERCOOLERS							
	L		H		W		Wgt*	
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb)	(kg)
3/3A	165	4200	105	2670	115	2930	41000	18600
4/5/5A	195	4960	120	3050	125	3180	47000	21400
6/7/7A	235	5970	150	3810	155	3940	72000	32700
10/11/11A	255	6480	155	3940	150	3810	105000	47700
12	280	7120	170	4320	205	5210	124000	56300
14/16	295	7500	185	4700	210	5340	130000	59000

Typical arrangement of combination double gearbox.



Typical arrangement of combination single gearbox.

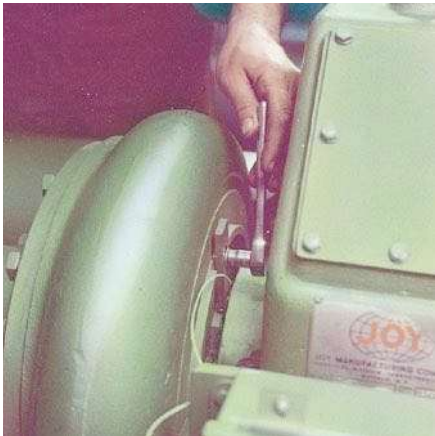


NOTE:

All dimensions and weights are subject to change without written notice.

*Weights of compressor base, compressor and intercoolers

EASY MAINTENANCE SERVICE



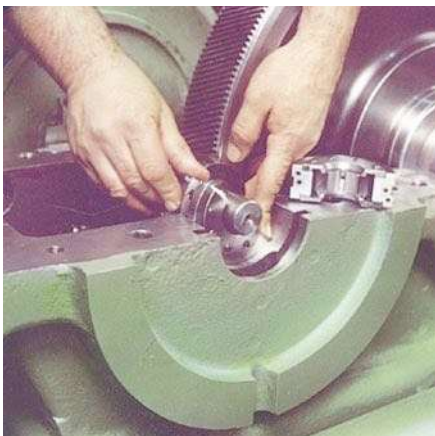
Vibration probe removed easily with simple tools, without unit disassembly.



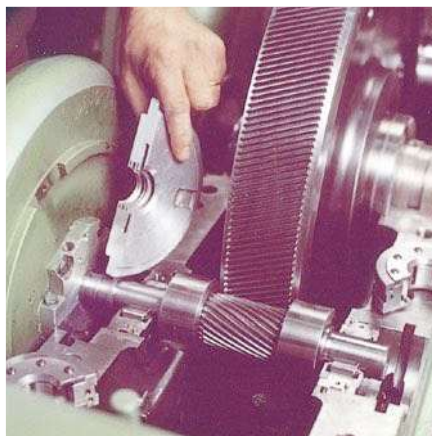
Horizontally split gearbox offers easy access to internal components.



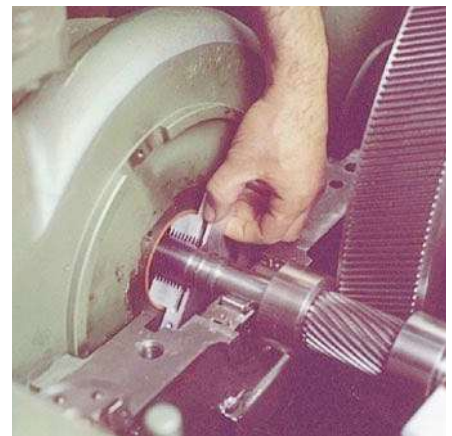
Bearings, gears and seals immediately accessible with gearbox cover removal.



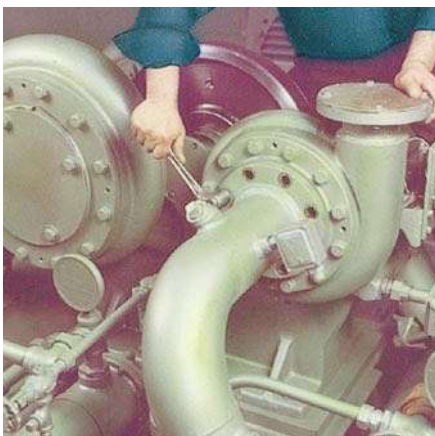
Bearing removal is simple.



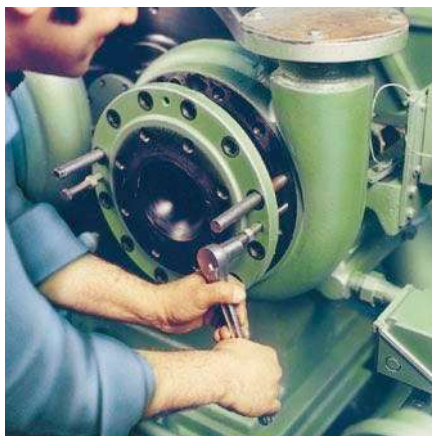
Split labyrinth oil seal removal.



Split labyrinth air seal removal.



Removal of interstage piping is the first step to inspecting impeller.



Inlet nozzle can be removed easily to completely expose impeller.



Impeller is revealed for inspection or simple removal.

A combined 11,000-horsepower, 7-stage recycle/feed compressor, installed at a Western New York air separation plant, where liquid nitrogen, oxygen and argon are produced and trucked to area users.



A Model 4MSG-9, main air compressor installed at the same air separation facility as the 11,000 horse power, 7 stage recycle/feed compressor to the left.



A United Kingdom air separation plant utilizes this custom-engineered, 10,000-horsepower, single-gearbox recycle/feed compressor.



An air separation facility in the southern United States utilizes this high efficiency Model 4MSG-25 main air compressor.