

Ful-Vane™ compressors for air and gas applications

Low energy consumption.

Low maintenance. Long life.



A high-performance, low OPEX compressor

When your compressor offers a poor maintenance track record and high energy costs, it's time to upgrade. Compressors are a critical part of your system and should not drag down performance and pile on costs. The Ful-Vane™ rotary vane compressor for air and gas applications provides smooth and reliable compression with reduced maintenance requirements, minimal wear, and lower energy consumption.

Key benefits

- Minimal wear
- Long service life
- Reduced energy consumption
- Low maintenance

Ful-Vane™ Rotary Vane Air Compressor

Proven Performance

We understand the frustrations with most types of air compressors. They are complex, with numerous high tolerance parts. They wear quickly and can't be rebuilt in the field. And after a short time, they don't operate as efficiently as they did when new, delivering less air and consuming more power. Our Ful-Vane Rotary Vane Air Compressor is designed to combat all these problems using a simple rotary design. The compressor maintains maximum efficiency with minimum wear.

A large inlet area enables the efficient capture of high volumes of air. And with only three moving parts and low operating speeds, we've minimised mechanical losses. Further, constant blade-to-cylinder contact results in constant compression efficiency, which is maintained throughout the compressor's lifespan.

Drive options: Direct coupling, belt, or gearbox

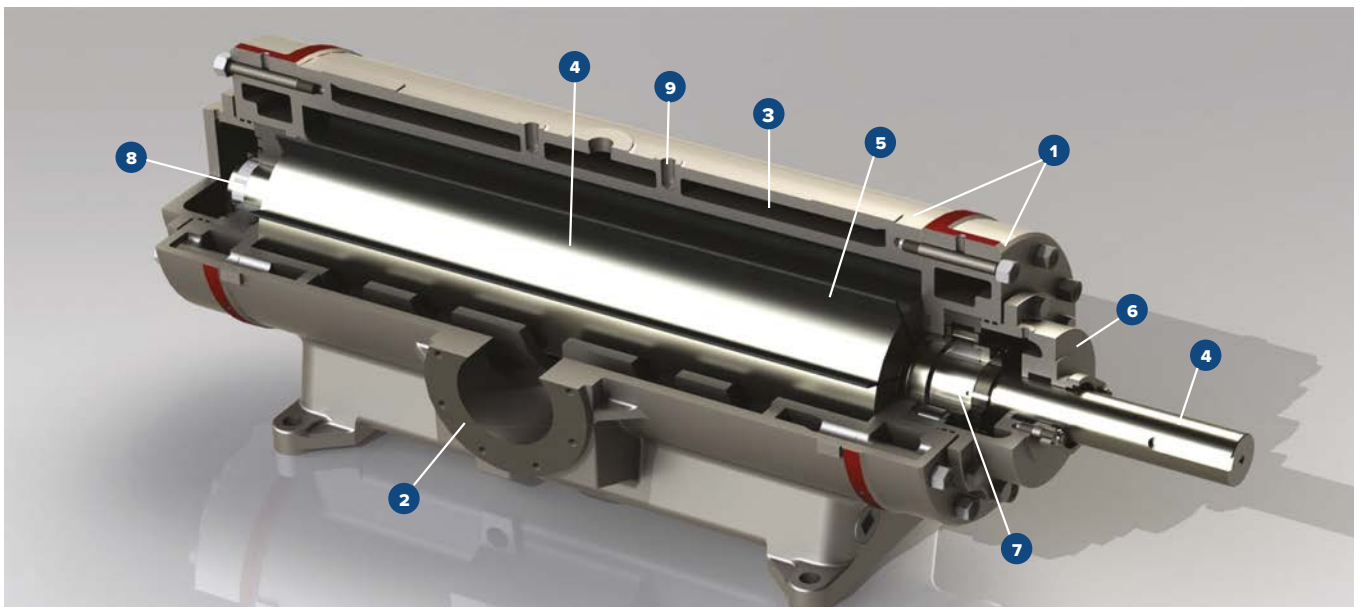
Shaft and bearings suited for maximum HP in all arrangements

Integral overhead mounted motor available on CU/CC/FV-250 and larger compressors

We have also designed the Ful-Vane™ Rotary Vane Air Compressor so that the cylinder can be reconditioned, and the rotor can be reslotted several times, providing you with a better return on your investment.

1. Cylinder and head casting: ASTM 278 gray iron or ASTM 536 ductile iron
2. Inlet/outlet flange: ANSI 125# flat face drilling pattern (250# raised face drilling available on high pressure models)
3. Cooling jacket: Integral to cylinder and heads
4. Rotor and shaft: Solid single piece ASTM 536 ductile iron
5. Blades: B3000™ Carbon fiber laminate
6. Packing gland or mechanical seal, depending on application
7. Expansion end bearing: Floating cylindrical roller
8. Lubrication: Integral lube fittings with check valves
9. Shaft seals: Teflon-graphite packing (air compressors); single or double mechanical (gas compressors)

- Large inlet area provides efficient capture of large air flows
- Only three moving parts simplifies field maintenance
- Constant blade-to-cylinder contact results in constant compression efficiency
- Low speed design minimises drive losses and wear
- Negligible inlet/outlet pressure drops minimise internal compression losses
- Extremely tolerant of dirty, dusty environments



Ful-Pak™ automated air supply packages

Reliable air supply with drop-in convenience



We offer standard designed Ful-Pak™ air compressor packages for sizes CU/CC/FV-135 and larger. Ready for installation with only cooling water, power and discharge air piping connections needed.

Compact and totally self-contained in a low-noise enclosure, our Ful-Pak™ is a complete air source for reliable, efficient operations in dusty, demanding environments.

Options

- Closed-loop cooling
- Remote monitoring
- After cooler

Standard Ful-Pak packages include:

- Compressor
- Cylinder assembly
- Discharge check valve

Drive

- Belt Driver
- Electric motor

Pressurized lubrication system

- Reservoir
- Pumping unit
- Tubing
- Heavy-duty structural base

Weather/sound enclosure

- 85 dba at 1 meter
- Fan cooled enclosure
- Hinged doors

PLC control panel

- Instrumentation for and monitoring of:
 - Cooling water flow
 - Lubrication no flow
 - High air discharge temperature
 - High inlet filter delta P
- Panel view HMI

Ancillaries

- Inlet filter
- Inlet silencer
- Discharge silencer
- Discharge pressure relief valve
- Cooling water solenoid shut-off valve
- Cooling system piping

Ful-Vane™ vacuum pumps

High efficiency, long lasting and low maintenance

Two-Stage Vacuum Skid

With a robust design and a pulse-free operation, our Ful-Vane™ vacuum pumps deliver high performance and durability in a wide range of vacuum applications. Developed from Fuller® design and technology, they automatically compensate for wear, resulting in a consistent, highly efficient operation in a small footprint.

Our standard vacuum pump rotor is constructed of cast ductile iron with an integral shaft. This quality engineered design assures durability and reduced maintenance, eliminating the need for auxiliary shafts. The bearings, vanes and seals are the only routine wearing parts, and are all easily accessible by removing the cylinder head.

Our vacuum pumps are suitable for a wide range of vacuum services, including vacuum filtering for mining; flash cooling for refrigeration; general vacuum holding and can manufacturing, and vacuum de-gassing for foundries.

Ful-Vane™ vacuum pumps are available as single and two-stage units: single-stage applications up to 26" Hg (880 mbar) vacuum; two-stage applications up to 29.95" Hg (1014 mbar) vacuum, and can include valves necessary for high-volume parallel operation at start-up, then crossing over to series for deeper vacuum.

- **High-efficiency design requires less horsepower**
- **Field repairable for reduced downtime**
- **Water-cooled for maximum efficiency**
- **Two-stage arrangement allows high volume parallel operation at startup**

Ful-Vane vacuum pump packages include:

Compressor

- Cylinder assembly
- Discharge non-return valve

Drive options

- Belt
- Direct coupling
- Gear box

Driver

- Electric motor

Ful-Lube™ Pressurized lubrication system

- Reservoir
- Pumping unit

Ancillaries

- Inlet vacuum gauge
- Wet service intake filter assembly
- Vacuum relief valve
- Vacuum relief valve filter
- Cooling water flow switch
- Cooling water solenoid valve
- Cooling water temperature switch

Options

- Structural base
- Mist eliminator
- Kevlar vanes for applications with chlorine



Single-stage compressor performance

PRESSURE SERVICE

FRAME SIZE*	SPEED RANGE (RPM)	15 PSIG		30 PSIG		40 PSIG	
		SCFM	BHP	SCFM	BHP	SCFM	BHP
30/40/50	725-1848	95-350	8-38	90-335	12-52	87-325	14-60
60/70	500-1240	150-450	12-42	146-435	18-60	143-424	21-70
80/100	500-1240	215-635	16-59	207-615	25-85	202-599	30-99
110/120	400-924	295-770	21-66	285-750	32-97	280-735	39-113
135/150	400-924	377-980	27-81	367-955	41-119	360-938	49-140
175/200	325-740	475-1265	33-106	459-1232	51-155	450-1210	61-182
225	325-740	655-1485	45-123	635-1446	71-181	624-1420	85-213
250/300	325-740	740-1940	51-160	720-1890	80-236	708-1856	96-277
350	325-650	995-1985	67-154	966-1932	107-232	949-1897	128-274
375/400/450	300-514	1155-2370	80-180	1121-2305	126-274	1100-2263	151-325
508/608	300-514	1500-3000	104-230	1462-2920	164-349	1435-2867	197-414

* Available in undercut (C) or circular (CC) bore design
 Elevation: 107 m (350 ft) ASL (14.50 PSIA)
 Inlet temperature: 20°C (68°F)

VACUUM SERVICE

FRAME SIZE**	SPEED RANGE (RPM)	15" Hg Vacuum		20" Hg Vacuum		26" Hg Vacuum	
		ICFM	BHP	ICFM	BHP	ICFM	BHP
30/40/50	725-1500	96-290	5-18	92-279	5-20	72-219	5-18
60/70	500-1000	156-373	7-20	150-360	7-21	123-294	7-19
80/100	500-1000	221-527	9-28	213-508	10-30	174-416	9-27
110/120	400-800	302-685	12-35	293-667	13-37	252-574	11-33
135/150	400-800	388-874	15-41	378-851	16-44	325-732	14-39
175/200	325-650	485-1144	19-56	472-1113	20-60	406-958	17-53
225	325-650	672-1343	26-65	653-1307	28-69	562-1125	24-62
250/300	325-650	762-1755	29-85	741-1707	32-90	638-1470	27-80
350	325-650	1022-2043	38-96	994-1987	41-102	856-1711	35-90

** Available in undercut (C) bore design only
 Elevation: 107 m (350 ft) ASL (14.50 PSIA)
 Inlet temperature: 20°C (68°F)

Two-stage packages are also available for both pressure- up to 250 PSIG, and vacuum - up to 29.95" Hg (1014 mbar) service.

Ful-Vane™ compressors for gas applications

Energy efficient compression suitable for sour, corrosive gases

Delivering more compression with less energy, our Ful-Vane™ Gas Compressors are a highly efficient solution for gas compression and vapour recovery applications. These compressors deliver flow ranges from 50 to 3000 SCFM, compression ratios up to 5:1, and are available in booster sizes with maximum allowable working pressures up to 250 PSIG, making them suitable for a wide range of applications. Additionally, up to 50% capacity reduction is attainable with the use of Variable Frequency Drives.

Ful-Vane™ Gas Compressors are available in a full range of single-stage, two-stage, and booster sizes, all designed for consistent efficiency, long life, and minimal downtime. We can offer varying scope, from a bare-shaft compressor to a complete compression package – custom built to your project specifications or FLSmidth standards.

- High efficiency is maintained throughout operation life
- Low Speed operation, typically 325 to 1800 RPM
- Once-through lubrication protects internals against corrosive gasses using standard oils
- Gas maintained above dew point preventing internal condensation
- No minimum compression ratio required for operation, thus saving power
- Simple design reduces spare parts inventory requirements
- Available Boosters specially designed for higher differential pressures

We've also made sure these compressors are built to last. Routine annual maintenance can easily be carried out in the field, saving you time and money.



Ful-Vane™ compressors for gas applications

Energy efficient compression suitable for sour, corrosive gases

Hydrocarbon service

Our Ful-Vane™ compressors are proven for a wide range of low and high molecular weight hydrocarbon gases, in vacuum or pressure services. They are also well suited for saturated, corrosive, and sour gas services. Ful-Vane™ boosters are suitable for applications with discharge pressures up to 250 PSIG.

- LPG loading/unloading
- Vapor recovery
- Casing head gas
- Natural gas
- Flare gas recovery
- Stock tank vapor recovery
- Sweet/sour gases
- Gas gathering
- Fuel gas boosting



SINGLE STAGE PERFORMANCE ¹						TWO STAGE PERFORMANCE ²				
MSCFD	MODEL	BHP	NAMEPLATE HP	VE ³	AE ⁴	MODEL	BHP	NAMEPLATE HP	VE ³	AE ⁴
200	CC30	31	40	75.1%	77.2%	CC30-30H	51	60	74.7%	76.3%
350	CC60	49	60	77.1%	81.6%	CC60-60H	80	100	76.5%	81.1%
500	CC80	70	75	77.1%	82.7%	CC80-80H	112	125	76.6%	81.2%
750	CC120	94	100	81.8%	85.6%	CC120-120H	152	200	80.6%	85.0%
1000	CC150	124	150	81.8%	86.8%	CC150-150H	201	250	80.7%	85.8%
1250	CC200	154	200	81.8%	86.3%	CC200-200H	242	250	83.1%	86.2%
1500	CC225	185	200	81.8%	86.4%	CC225-225H	291	300	83.1%	86.3%
2000	CC300	247	250	81.8%	86.2%	CC300-300H	386	400	83.2%	86.5%
2500	C400	306	350	81.8%	88.4%	C350-350H	481	500	83.2%	86.6%
3500	C608	427	450	81.8%	88.5%	-	-	-	-	-

Performance based on Natural gas with the following properties: MW = 19.460, SG = 0.670, Cp/Cv = 1.270, T₁ = 90°F, Elev. = 500 FASL

¹ P₁ = 0 psig, P₂ = 50 psig

³ VE = Volumetric Efficiency

² P₁ = 0 psig, P₂ = 140 psig

⁴ AE = Adiabatic Efficiency

Ful-Vane™ compressors for gas applications

Energy efficient compression suitable for sour, corrosive gases

Landfill gas service

Built to withstand severe environments, our Ful-Vane™ compressors are well suited for wet, high CO2 applications such as landfill gas. These compressors are specifically designed to reduce operating costs by offering high volumetric efficiency, reliability and durability. Ful-Vane™ compressors are also field repairable and feature rebuildable cylinders and rotors, which minimizes downtime while reducing your maintenance and ownership costs.

"...We started using Ful-Vane compressors to process landfill gas in 2014. To date, the Ful-Vane compressors have operated predictably and reliably in a corrosive and reactive environment. The operational stability gained with the Ful-Vane compressor has allowed us to focus on our customers." – Director of Engineering Support at an Energy Services Company



VACUUM / PRESSURE SERVICE ¹						PRESSURE SERVICE ²				
SCFM	MODEL	BHP	NAMEPLATE HP	VE ³	AE ⁴	MODEL	BHP	NAMEPLATE HP	VE ³	AE ⁴
100	CC30	19	25	83.4%	71.9%	CC30	18	25	81.7%	83.4%
250	CC70	41	50	84.6%	76.8%	CC70	42	50	83.0%	86.6%
350	CC100	58	60	87.8%	77.5%	CC100	59	75	83.0%	87.1%
500	CC120	80	100	87.8%	76.6%	CC120	80	100	86.5%	86.5%
650	CC150	101	125	87.8%	78.7%	CC150	102	125	86.5%	87.9%
800	CC200	124	150	87.8%	78.2%	CC200	125	150	86.5%	87.6%
950	CC225	147	150	87.8%	78.6%	CC225	148	150	86.5%	87.8%
1200	CC300	184	200	87.8%	79.2%	CC250	190	200	86.5%	86.5%
1500	C450	219	250	87.8%	84.0%	CC300	239	250	86.5%	85.6%
2000	C608	296	300	87.8%	83.2%	C450	312	350	86.5%	88.6%
2500	-	-	-	-	-	C608	391	400	86.5%	88.6%

Performance based on Landfill gas with the following properties: MW = 30.015, SG = 1.040, Cp/Cv = 1.310, T₁ = 100°F, Elev. = 500 FASL

¹ P₁ = -90"WC, P₂ = 25 psig

³ VE = Volumetric Efficiency

² P₁ = 15"WC, P₂ = 45 psig

⁴ AE = Adiabatic Efficiency

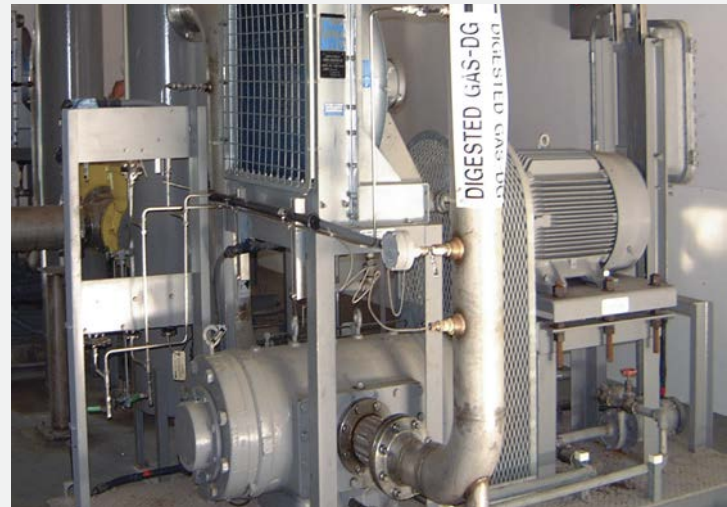
Ful-Vane™ compressors for gas applications

Energy efficient compression suitable for sour, corrosive gases

Digester gas service

Digester gas compression is a harsh process, with highly corrosive vapours that can quickly cause damage to your equipment. Our Ful-Vane™ compressors are specifically designed for reliable, efficient operation over many years in the most corrosive applications. Oil lubrication protects internal surfaces. The field repairable design minimises maintenance requirements. Widely used in digester gas applications, our Ful-Vane™ compressors are proven to be a reliable foundation of your biogas system.

Our compressors all include B3000™ carbon fibre blades, rugged cast construction and simple design for easy inspection and maintenance. Available in a wide range of sizes.



LOW PRESSURE SERVICE ¹						MEDIUM PRESSURE SERVICE ²				
SCFM	MODEL	BHP	NAMEPLATE HP	VE ³	AE ⁴	MODEL	BHP	NAMEPLATE HP	VE ³	AE ⁴
150	CC50	13	20	86.3%	74.5%	CC50	22	25	81.0%	82.0%
300	CC70	27	30	86.9%	71.8%	CC70	42	50	82.2%	80.0%
450	CC100	41	50	86.9%	71.2%	CC100	65	75	82.2%	79.6%
600	CC120	52	60	89.9%	71.5%	CC120	81	100	86.0%	80.0%
800	CC150	68	75	89.9%	73.4%	CC150	106	125	86.0%	81.5%
1000	CC200	85	100	89.9%	72.6%	CC200	132	150	86.0%	80.8%
1250	CC225	107	125	89.9%	72.0%	CC225	167	200	86.0%	80.3%
1500	CC300	125	150	89.9%	73.7%	CC300	196	200	86.0%	81.6%
1750	C350	143	150	89.9%	75.4%	C350	226	250	86.0%	83.0%
2000	C450	159	200	89.9%	80.9%	C450	254	300	86.0%	85.2%
2500	C608	199	250	89.9%	78.5%	C608	318	350	86.0%	85.3%

Performance based on digester gas with the following properties: MW = 17.429, SG = 0.599, $C_p / C_v = 1.319$, Elev. = 500 FASL, $T_1 = 90^\circ\text{F}$

¹ $P_1 = 0$ psig, $P_2 = 15$ psig

² $P_1 = 0$ psig, $P_2 = 30$ psig

³ VE = Volumetric Efficiency

⁴ AE = Adiabatic Efficiency

Ful-Vane™ compressors for gas applications

Energy efficient compression suitable for sour, corrosive gases

Ammonia service

Originally designed by Fuller®, our Ful-Vane™ ammonia booster compressors are a highly energy efficient foundation of a two-stage refrigeration compression system. These rotary compressors have been used since 1949 as low-stage refrigeration booster compressors in commercial low temperature freezing applications due to their small footprint, high capacity, and low power per tonne refrigeration.

With low-speed operation and a robust design, these compressors are built to last. Designed for simplicity, they have only two bearings, no internal valves, and vibration-free rotary motion. Not only does the simple design reduce your energy and maintenance costs, it is also easily field repairable. Ful-Vane™ ammonia booster compressors feature rebuildable cylinders and rotors. So, rather than being replaced, the inner cylinder can be re-bored numerous times, and the rotor can be reslotted up to three times. This means the compressor can be rebuilt to factory specifications several times

over its lifespan at a significant cost savings compared to replacing with a new unit.

We manufacture the original low-stage boosters including all 'A' and 'CA' sizes from 30 to 300.

- OEM parts, including:
 - Bearings
 - B3000™ carbon fiber blades
 - Replacement mechanical shaft seals

Also available:

- Replacement check valves
- Updated lubrication systems
- Modern belt drives for higher efficiency operation
- Factory-authorized service and rebuilds with new factory warranty
- On-site maintenance advisory and training services



Ful-Vane™ gas compressor packages

Customised single-stage and two-stage compressor solutions

Compressor package

We will work with you to find the best solution for your gas compression application. If you are looking for a comprehensive solution, we can provide a complete, customised gas compression package designed around our Ful-Vane rotary vane compressor. Packages include condensate capture and removal, jacket cooling, lubrication, after-cooling, recycle control valve, plus instruments and controls. Additional auxiliary components are available upon request.

Our standard packages include:

Drive Options

- Synchronous belt
- Direct
- Gear box

Driver

- Electric motor
- Engine

Pressurized lubrication system

- Reservoir
- Pumping unit
- Tubing

Capacity control

- Variable frequency drive
- Automatic gas bypass

Structure

- Steel base
- ANSI gas piping
- ASME scrubbers

Ancillaries

- PLC control panel
- Closed loop cooling system
- Condensate removal
- Intercooler/aftercooler
- Instrumentation



Accessories and Parts

Energy efficient compression suitable for sour, corrosive gases

Our Ful-Vane™ gas and air compressors are amongst the most energy-efficient compressors on the market. But if your compressor system is more than several years old, you might not be taking advantage of the most modern supplemental equipment to help keep costs low. The following accessories effectively upgrade your compressor performance.

B3000™ carbon graphite compressor blades **Smooth, lightweight and low maintenance**

Blade breakage could cause catastrophic cylinder failure in your compressor, resulting in unplanned downtime and repair costs. That's why we make our B3000™ compressor blades from carbon graphite, making them stronger than any other blade out there. These compressor blades provide up to four times the wear life of phenolic or Kevlar blades. Increased strength means less blade breakage and reduced maintenance costs.

- Reduces cylinder wear
- Reduces lubrication needed
- Reduces maintenance costs
- Extends the life of the compressor



Ful-Lube™ compressor lubrication system

Reduce maintenance and maximise the life and productivity of your Ful-Vane™ compressor

If your Ful-Vane™ compressor goes down, your productivity suffers. You're left to deal with the cost and productivity impact of repairs. But with proper lubrication, you can extend the life of your compressor and maximise its performance, ensuring that your conveying operation keeps moving.

We have three Ful-Lube™ lubrications systems, specifically designed to meet the requirements of your Ful-Vane™ compressor:

- The Ful-Lube™ 2: A simple and reliable lubrication system that keeps your Ful-Vane™ rotary vane compressor properly lubricated for up to 30 days without refilling.
- The Ful-Lube™ 3: A PLC-based lubrication system that precisely delivers oil to each lubrication point and monitors your compressor's operating parameters.
- The Ful-Lube™ PLUS: Building on the functions of the Ful-Lube™ 3, this lubrication system can control the compressor and its auxiliary equipment.

Key benefits

- Simple and reliable
- Reduced compressor maintenance
- Increased productivity
- Go longer between refills
- Minimised waste



Accessories and Parts

Ful-Power™ motor

The high-efficiency power upgrade for your Ful-Vane™ compressor

The Ful-Vane™ compressor is a highly efficient source of compressed air. However, your direct-drive electric motor may be wasting energy, preventing you from taking full advantage of the compressor's efficiency.

Our Ful-Power™ high-efficiency motor upgrade is designed to reduce your energy costs and save you money. It allows you to replace your old, inefficient low-RPM direct drive motor with a premium efficiency 1800 RPM (or 1500 RPM with 50 HZ) motor.

- Designed to fit in the same footprint as your original direct drive motor
- No need to move compressor or piping
- Eliminates the high-cost and long-delivery for replacement of a low-RPM motor

Customised single-stage and two-stage compressor solutions

The Ful-Power upgrade kit includes everything you need to save on energy and the high cost for replacement of non-standard, low-speed motors:

- Adjustable motor stand
- Cog-belt type synchronous drive
- Safety guard

Additional options:

- Standard RPM, high-efficiency motor
- Ful-Lube™-2 lubrication system with 25 gallon oil reservoir

The Ful-Power™ upgrade may assist your facility in obtaining Energy Star designation through the EPA, or in taking advantage of utility rebates or government tax incentives related to upgrading outdated motors and reducing demand on the energy grid.

A West Coast customer saw the potential to cut electricity consumption while increasing reliability, by replacing older, low-speed motors with modern, energy efficient models. The result was a \$110,000 rebate from their electric utility for decreased demand on the local energy grid. The energy savings alone paid for the investment cost in less than one year; the rebate was a bonus.



Accessories and Parts

Energy efficient compression suitable for sour, corrosive gases

World-class service and support

An OEM and project partner you can trust

It's not always easy to know what you need, but you can always rely on us for advice, expertise and support. With more than a century of experience in this sector and thousands of references around the world, we know compressors inside and out. We can help you achieve optimum productivity and save you money with energy efficient, low maintenance solutions.

We manufacture all our compressors at our own manufacturing facilities, ensuring that every component is built and tested to the most rigorous standards. We also have an after-hours/aftermarket breakdown service, and on-site training for rebuilding compressors, so you can access the help you need, when you need it.

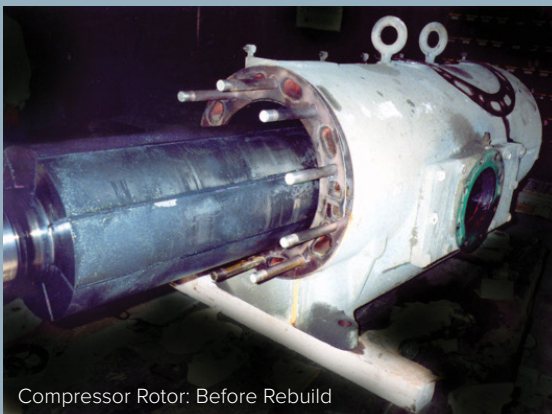
We have factory-certified independent service centres and parts warehouses in North America.

Compressor Exchange Programme

Our Compressor Exchange Programme enables you to replace your worn existing FLSmidth rotary air compressor in exchange for a factory rebuilt duplicate. Through this programme, you received factory



reconditioned unit restored to original specifications and performance standards, with minimised downtime and cost. Exchange your worn Ful-Vane™ air compressor and receive a reconditioned unit built to FLSmidth specifications with new OEM parts. Each exchange compressor carries the same 48-month warranty as a new compressor.



Compressor Rotor: Before Rebuild



Compressor Rotor: After Rebuild

Contact us



flsmidth.eco/contact

