

SYSTEMS

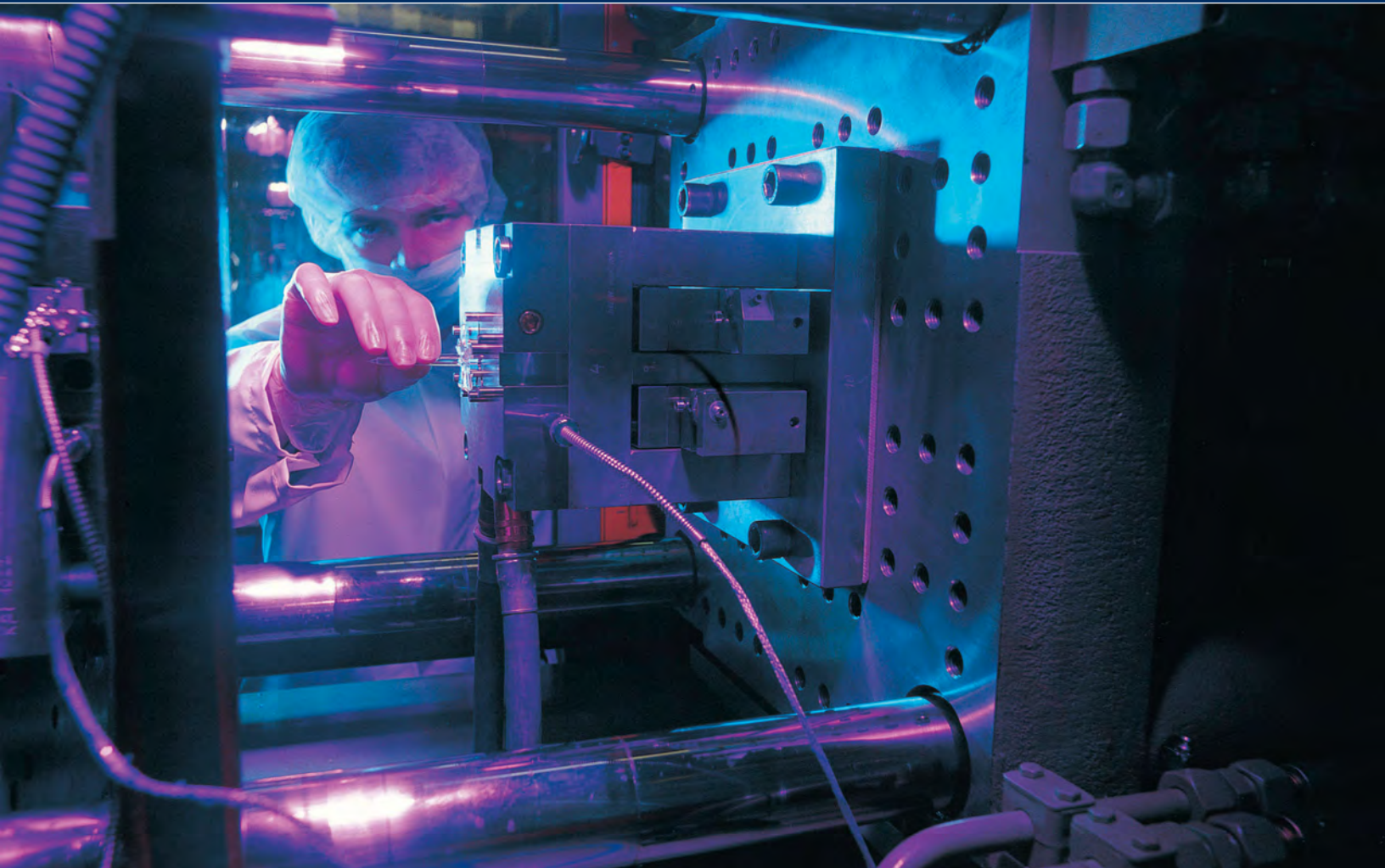
SERVICE

TRAINING

WORLDWIDE

GAS ASSIST SOLUTIONS

From the Injection Molding Experts





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› Turnkey Systems

MISSION STATEMENT

To be the global leader by supplying the best quality product while continuously improving through innovation.

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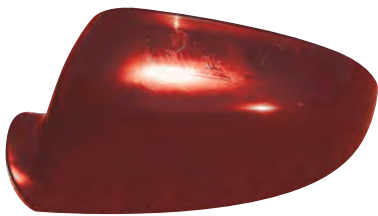
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FAQs

APPLICATIONS



› AUTOMOTIVE



› CONSUMER



› MEDICAL

What is gas assist injection molding?

The most effective method of applying pressure to an injection molded part during cooling.

Gas assist injection molding is a low pressure process which reduces the clamp tonnage required for molding. Gaseous nitrogen is applied internally, either directly into thicker sections of the part or via a network of gas channels. Through proper design, this lower gas pressure is applied evenly throughout the part and sustained during the entire cooling phase, thereby eliminating potential defects.

Packing force must be applied and maintained to an injection molded part as it cools. Conventional molding often results in relatively high pressure within the mold cavity, which can cause flash, premature tool wear, sink marks and shrink.

What can gas assist do for me?

Gas assist injection molding will lower your production costs.

There are many benefits associated with the gas assist process.

Clamp Tonnage Reduction

Significant cost savings can be realized via reduced clamp tonnage; in some cases, gas assist can lower these

requirements by 30% to 70%. Even with a full resin shot gas is able to penetrate, if only to take up volumetric shrinkage within the cavity. As a result, tools that would normally run in 1500 ton presses can be placed in smaller presses. The reduction in machinery cost, potential energy savings, and increased flexibility to quote jobs beyond current tonnage capacity can make any project interesting.

Cycle Time Reduction

Nitrogen extends the flow of resin as it travels through the part, completing fill while displacing resin from thick areas of the part. With less material in thick areas, cooling time and cycle time are reduced; cycle times for some thick walled parts have been reduced more than 50%. With thin wall parts, cycle times can be reduced by replacing the pack and hold phase of the process with gas pressure, allowing for screw recovery immediately after injection.

Resin Savings

With today's resin pricing, part weight reduction is important to molders. Handles and similarly thick-sectioned parts are ideal candidates for gas assist and offer potential for significant weight reductions, but resin savings are also possible in thin walled parts. In many parts nominal wall thickness

can be reduced when using gas assist, increasing part strength. With proper tool design, gas assist will also allow you to reduce scrap rates.

Improved Part Quality

Gas assist technology can improve the quality of products having certain dimensional and appearance requirements. Recent trends have reduced nominal wall thickness and increased boss and mounting configurations, which can result in added stresses, shrinkage, surface defects and imperfections. Thin walled parts with heavy bosses are also susceptible to sink. When properly applied, gas assist can eliminate these quality concerns.

Design Freedom

Gas assist offers certain freedoms to designers that are unachievable with conventional methods. Heavy wall sections can intersect thinner ones, ribs and bosses can be designed thicker than the nominal wall without fear of sinks, mechanical tool movements used for coring can be eliminated, and parts can be designed with thick sections that will become hollow. When the runner system is designed within the part, gas assist can potentially eliminate the added expense and complications (weld lines) associated with hot manifold systems.



▶ ELECTRONICS



Overview

1 Process Consultation

- Part design and mold filling analysis
- Mold trials and process demonstrations
- Project evaluation and tool layout assistance

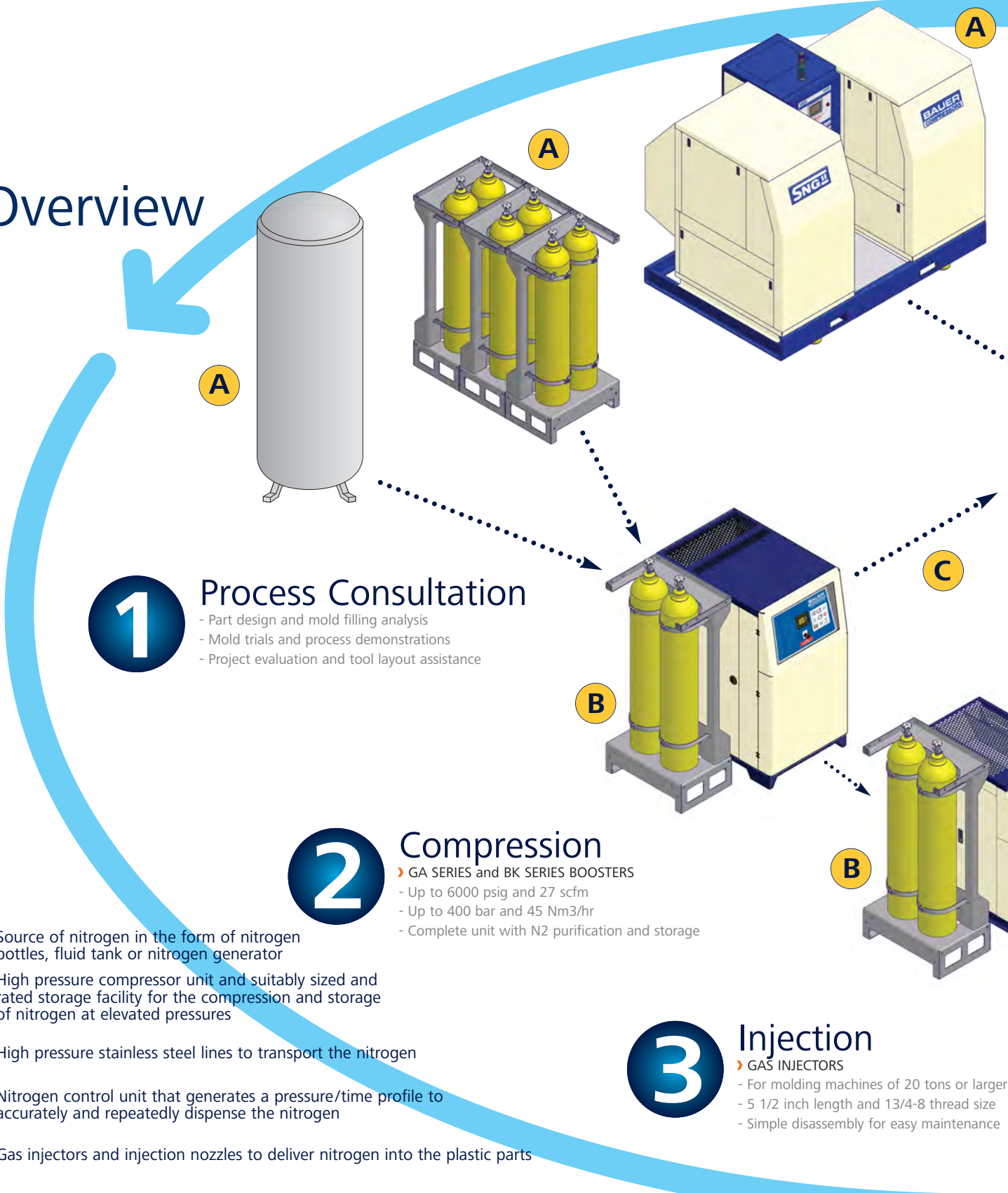
2 Compression

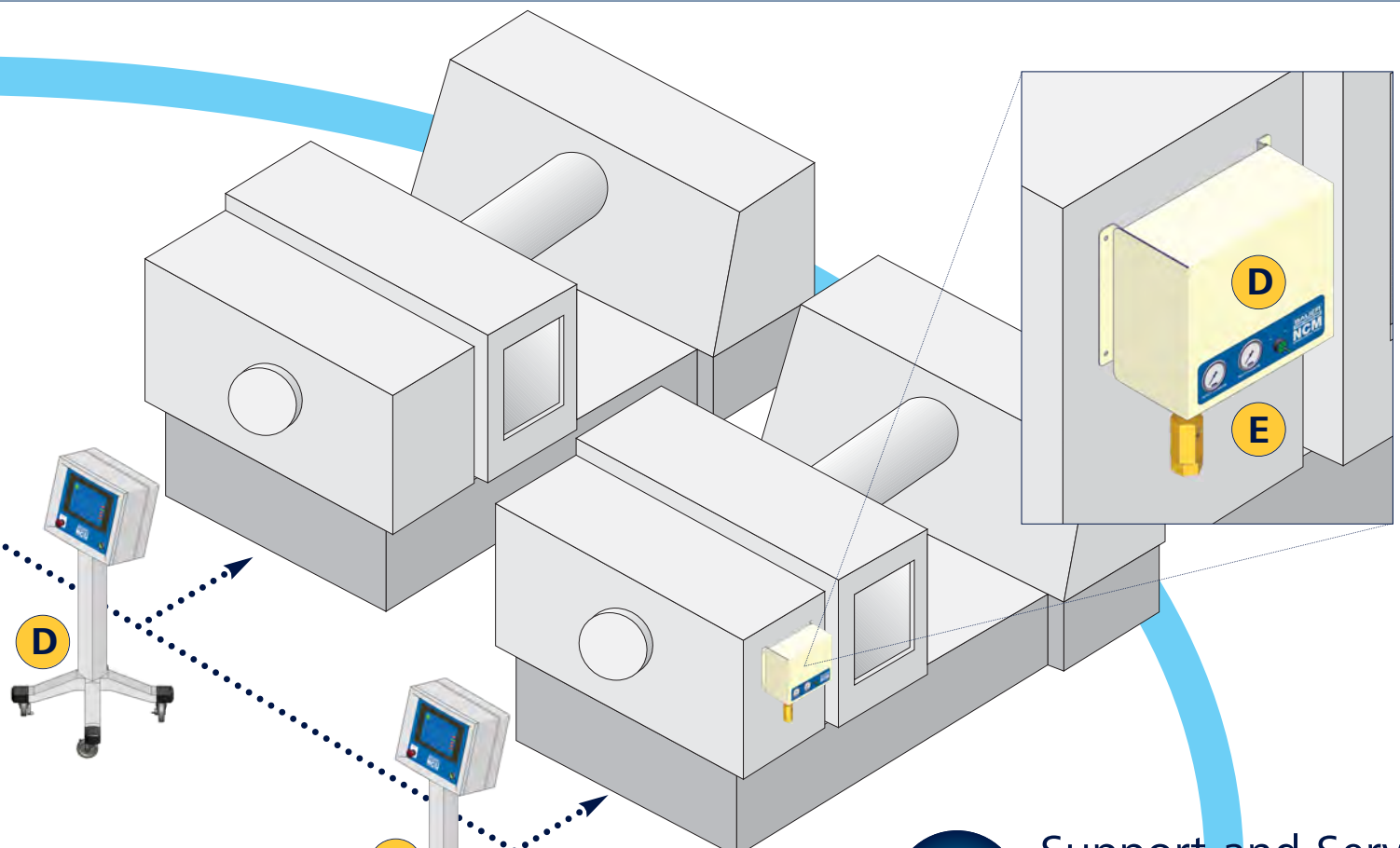
- GA SERIES and BK SERIES BOOSTERS
- Up to 6000 psig and 27 scfm
- Up to 400 bar and 45 Nm³/hr
- Complete unit with N₂ purification and storage

3 Injection

- GAS INJECTORS
- For molding machines of 20 tons or larger
- 5 1/2 inch length and 13/4-8 thread size
- Simple disassembly for easy maintenance

- A** Source of nitrogen in the form of nitrogen bottles, fluid tank or nitrogen generator
- B** High pressure compressor unit and suitably sized and rated storage facility for the compression and storage of nitrogen at elevated pressures
- C** High pressure stainless steel lines to transport the nitrogen
- D** Nitrogen control unit that generates a pressure/time profile to accurately and repeatedly dispense the nitrogen
- E** Gas injectors and injection nozzles to deliver nitrogen into the plastic parts





6 Support and Service

- Installation / start-up services
- Maintenance / repair services
- Operational / process training

5 Optimization

› VENT CONTROL VALVE®

- Latest advance in high pressure regulator protection
- For use with any gas assist control unit
- 4 1/2 inch length



4 Control

› NCM-1 and NCU-V2

- Control units for gas injection technology
- Up to 5000 psig (345 bar)
- Up to 4 independently controlled channels (NCU-V2 only)

> Nitrogen controllers

PRODUCTS



> NCU



> NCM



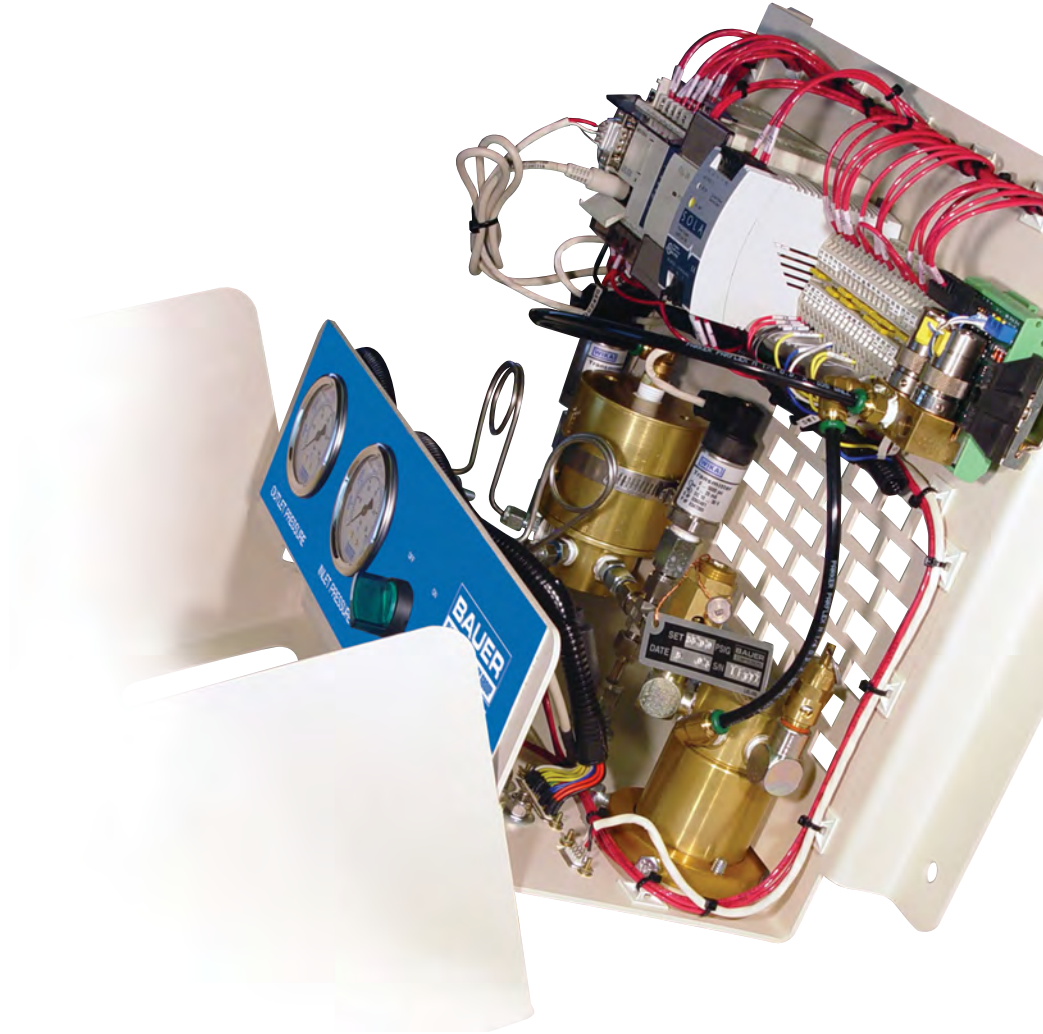
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EXCELLENCE

Injection molding is a study in precision, a symphony of numerous processes working simultaneously to create a single part. If even one of the processes is even the slightest bit off, the part can be compromised. This is particularly true with gas assist injection molding, where the timing of gas injection can make the difference between a Class A part and scrap. Given the ever-rising costs of energy and raw materials, you need the assurance that your gas assist controls can perform consistently and accurately, time and time again.

BAUER understands that reliability and optimal performance are extremely critical for these applications. That's why we've worked for many years to develop the very best high pressure gas assist injection molding solutions in the world. Our systems are designed for designing gas assist profiles that are easy to configure, repeatable, and reliable.

When you need control of your gas assist process, BAUER Plastics Technology Group is there.



MFC



> Nitrogen generation



PRODUCTS



> SNGII (to 6000 psi)



> SNGII-LP (to 150 psi)



> NGM

WHY BUY NITROGEN WHEN YOU CAN MAKE YOUR OWN?

Nitrogen is a versatile and crucial component of any gas assist operation. When it isn't available at the pressures, capacities, and purities you need, it can create high scrap counts and even bring your processing operations to a standstill. Even when it is available, poor quality gas can result in unplanned maintenance issues and unnecessary downtime. Given the ever-rising costs and increased safety requirements for manufacturing operations, you need the assurance that your nitrogen systems can perform consistently and accurately, time and time again.

BAUER understands that reliability and optimal performance are extremely critical for these applications. That's why we've worked for many years to develop the very best high pressure gas assist injection molding solutions in the world. Our systems are designed to safely deliver consistent purity at higher capacities than ever before. It begs the question: Why buy nitrogen, when you can make your own?

When you need nitrogen, BAUER Plastics Technology Group is there.

Technical Data

Model	Product flow at 99.5% purity		Product flow at 99.0% purity		Product flow at 98.0% purity	
	scfm ¹⁾	l/min	scfm ¹⁾	l/min	scfm ¹⁾	l/min
5000 psig (345 bar)						
SNGII-15305	4	113	5.5	156	7.5	212
SNGII-20410	7	198	11	311	14	396
SNGII-30615	13	368	18	510	26	736
SNGII-40815	25	708	26	736	27	765
6000 psig (414 bar)						
SNGII-15376	10	254	10	254	10	254
SNGII-40820	25	708	25	708	25	708

1) Capacity (FGD) is referenced to standard conditions. Tolerance +/- 5%. Dimensions and weight are approximate and are dependent upon model and drive.



▶ CUSTOM DESIGN



› Compressors and boosters



PRODUCTS



› MINI VERTICUS



› MAXI VERTICUS



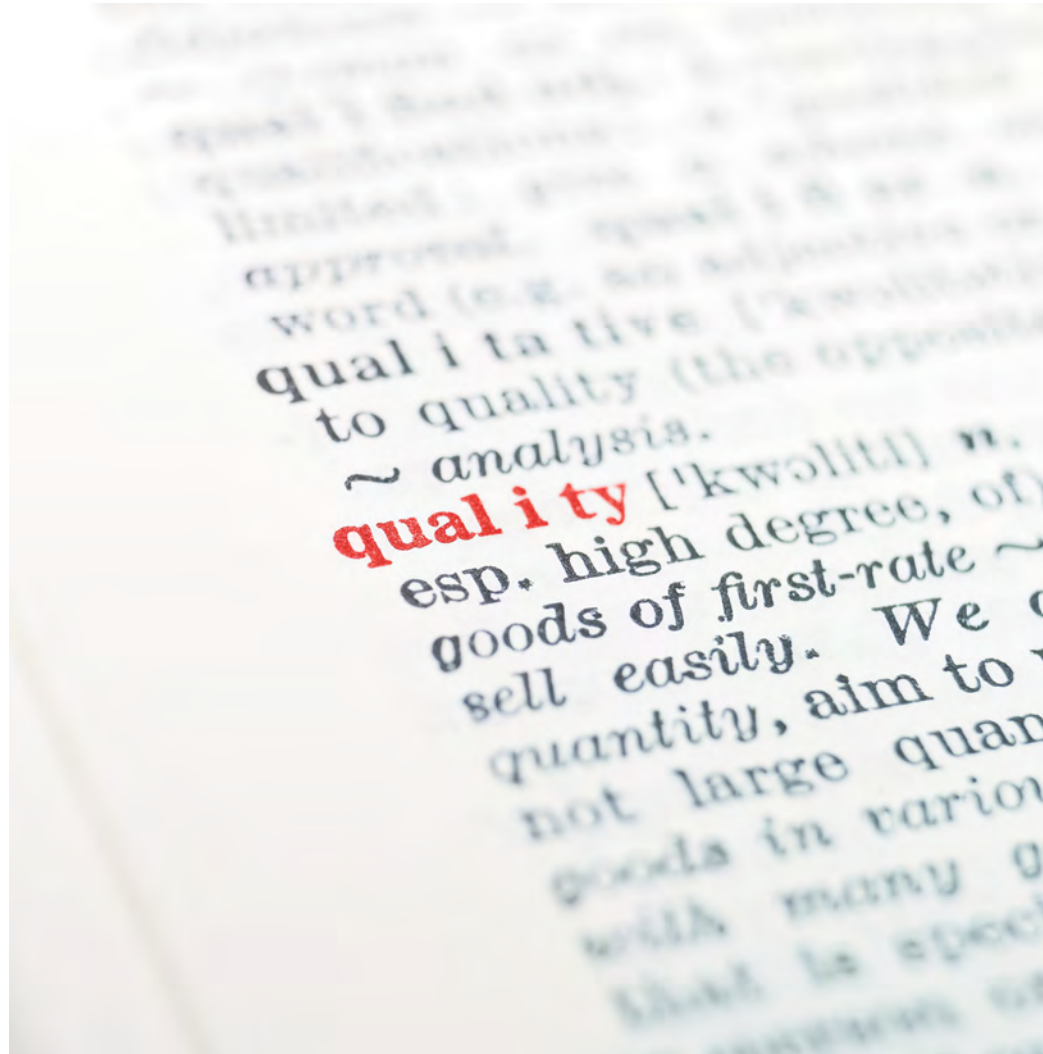
› VERTECON

COST EFFECTIVE

For many molders, purchasing nitrogen is a part of the day-to-day operations. For those who use this nitrogen in support of the gas assist process, returning bottles with substantially unused gas is wasteful and a drain on the bottom line. Given the ever-rising costs of merchant-supplied gas, you need the assurance that you can at least use what you purchase. With our high pressure compressors and boosters you can, time and time again.

BAUER understands that reliability and optimal performance are extremely critical for these applications. That's why we've worked for many years to develop the very best high pressure gas assist injection molding solutions in the world. Our systems are designed to completely empty your merchant gas bottles and recompress the gas to a higher pressure, giving you full value for your purchased gas.

When you need efficiency and optimum performance, BAUER Plastics Technology Group is there.



▶ CUSTOM PACKAGES



➤ High pressure



PRODUCTS



➤ UN/ISO



➤ ASME



➤ LOW PRESSURE STORAGE

ENERGY IN RESERVE

When an application requires storage, either in the form of a single cylinder or multiple cylinders, arranged either for bulk or in banks for cascading, a properly sized storage system offers many benefits to the compressed air/gas system. The main purpose of storage is to serve as a reservoir to handle constant, sudden or unusually high demands for air/gas that can exceed the capacity of the compressor. Storage protects the compressor from the direct demand of the system as well as serving to dampen or eliminate pressure pulsations to the system.

Each high pressure application must be carefully reviewed to determine the best type and size of storage to use. The cost of equipment as well as operational and maintenance costs can be reduced by properly matching the compressor to the storage system. BAUER recommends that the compressor does not start more than 4 times per hour to avoid short-cycling of the compressor. Short-cycling can be detrimental to the compressor, motor, compressor control system and to the high pressure system. Our Storage Brochure will serve as a guide to selecting the best storage system solution for your application.

The volume of storage required for a specific application depends upon:

- A. Consumption rate of the system
- B. Capacity of the compressor/booster
- C. Deadband of the final pressure sensor

STORAGE SIZING

Bulk storage for limiting the number of compressor starts to 4 times per hour can be calculated by the following formula:

$$VR = 58 \times (QC / \Delta P)$$

Where:

- **VR** = Volume of storage, cubic feet water volume
- **QC** = Capacity of compressor, standard cubic feet per minute (scfm)
- **Δ P** = Approximate deadband of final pressure sensor, pounds per square inch differential (psid).

Multiple cylinders and banks can be used for applications that require a large volume of storage. Contact BAUER for sizing storage with multiple banks for cascading.

TECHNICAL DATA

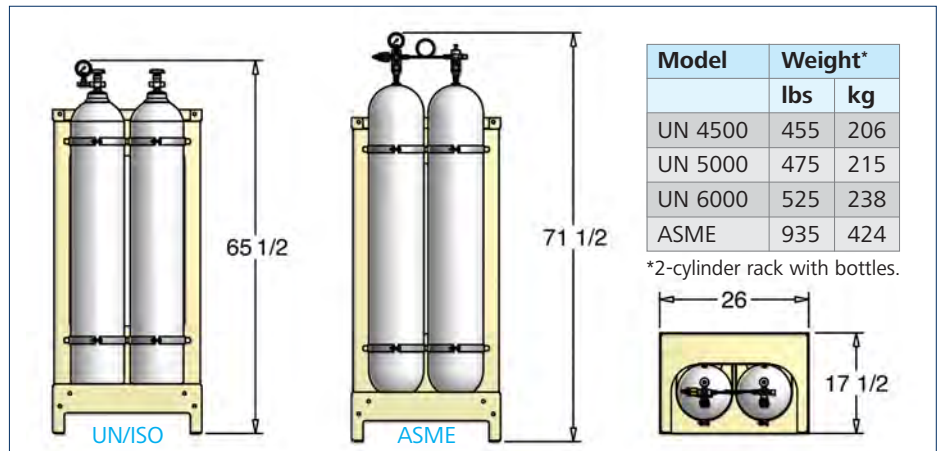
BAUER is knowledgeable in the application of storage to medium and high pressure applications. We offer cylinders for storage to meet the code requirements of either the American Society of Mechanical Engineers (ASME) or the United Nations (UN) Model Regulations (ISO 9809-PART 2). Refer to the Storage brochure for technical data when storing inert gases. The table provides a summarization of technical data for cylinders offered by BAUER when storing air.

SYSTEM

All UN cylinders are shipped with a protective cap for the cylinder valve. Valve caps are shipped installed on loose cylinders and shipped loose with racked assemblies. The mandatory retest period for these UN cylinders is every ten (10) years. Under no circumstances are these cylinders to be filled to a pressure exceeding the marked service pressure at 70 °F.



CUSTOM PACKAGES



› From the source



QUALITY



› INJECTION NOZZLE



› INJECTION PINS

U.S. Patent # 6,904,925



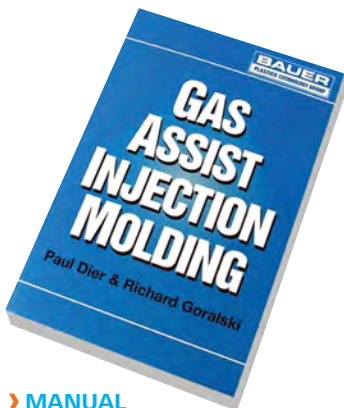
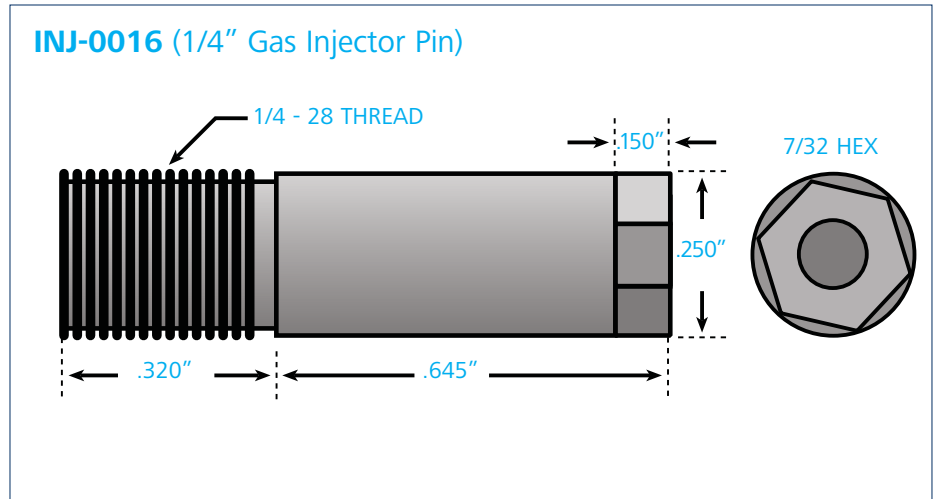
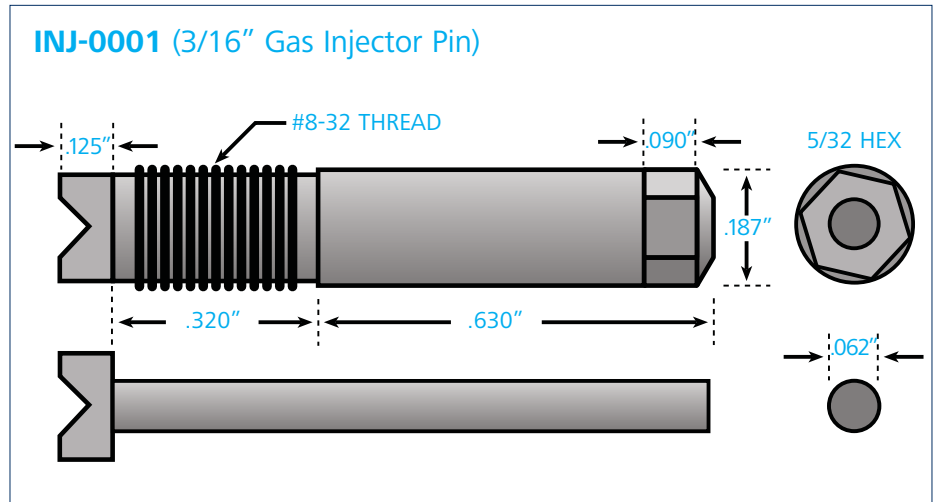
› VENT CONTROL VALVE

QUALITY

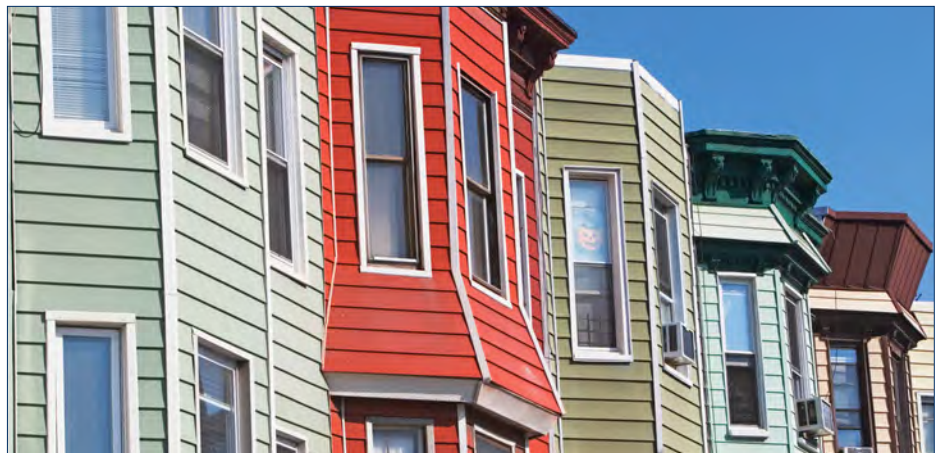
It's the little things that matter most with injection molding. Small pieces, such as slides or ejectors, play big roles in the molding process and are crucial to the finished product. The same principle applies to gas assist, where the little things such as injectors help to precisely target the injection point of nitrogen to deliver the very best results. Given the ever-increasing needs for efficiency and reliability, you need the assurance that the little things will work as consistently as the big things.

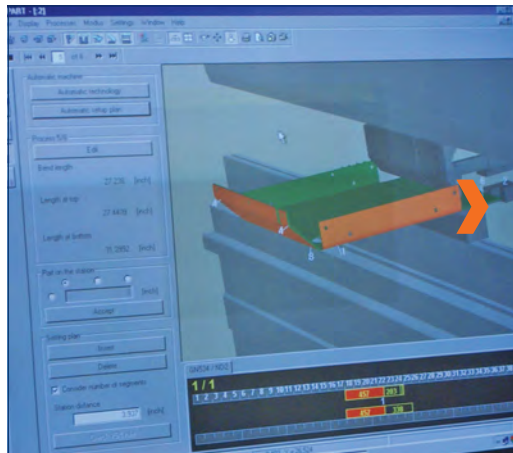
BAUER understands that reliability and optimal performance are extremely critical for these applications. That's why we've worked for many years to develop the very best high pressure gas assist injection molding solutions in the world. Our accessories are application-tested and designed for simple installation and maintenance. We're so confident about our capabilities that we've even written a book on the process – feel free to contact us and take advantage of our industry-leading expertise!

When you need knowledge and support, BAUER Plastics Technology Group is there.

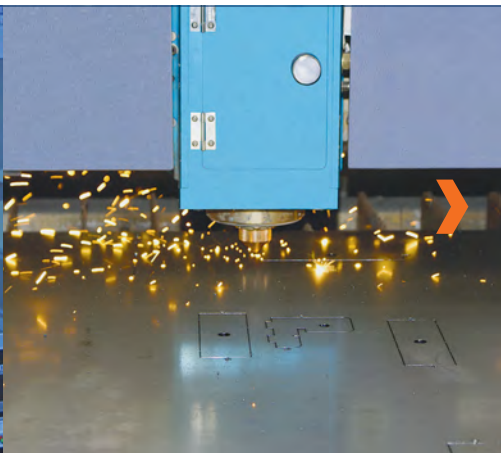


MANUAL

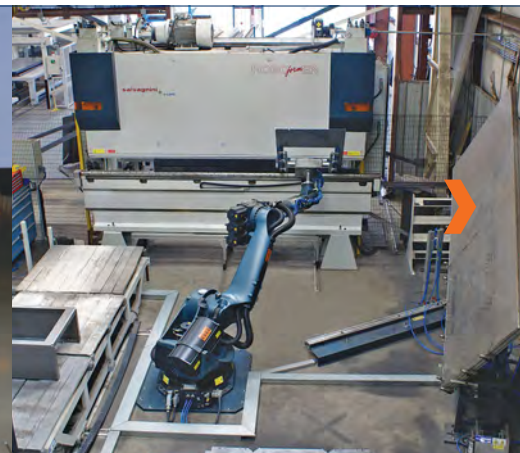




CAD DESIGN



LASER CUTTING



ROBOTIC BRAKE

EXPERIENCE FOR YOUR BENEFIT

BAUER compressor systems are field-proven in a multitude of diverse plastics processing applications worldwide. More than 60 years of combined experience, research and development are in place to find the very best solutions to your plastics processing requirements. We are world renowned for reliability and durability, and BAUER as a company is recognized as a leading innovator in the design and manufacture of high pressure compressor solutions.

BAUER is especially capable of working with clients on a worldwide basis because of our vast network of sales and service centers around the globe. BAUER'S U.S. operations include a 115,000 sq ft manufacturing facility in Norfolk, VA and branch offices in Michigan, California and Florida.

DEDICATION TO YOU

BAUER is committed to the philosophy that customer satisfaction is achieved through a strategy of continuous improvement using in-house research and development, engineering, manufacturing and support services. Our ISO 9001 registered quality management system is testament to our commitment to quality and customer satisfaction.

CUSTOMER SATISFACTION

BAUER begins with expert system evaluation and continues with the design, installation, training and support services to ensure the highest quality and optimum performance of the product.



BAUER Block Manufacturing Geretsried, Germany



BAUER COMPRESSORS INC. Norfolk, Virginia USA



ROBOTIC WELDING



QUALITY



BAUER UNIVERSITY TRAINING

› Compressor technology



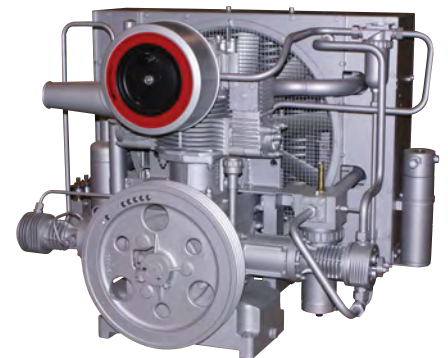
COMPRESSORS AND BOOSTERS



› **Booster 15.x**



› **22.x**



› **23.x**

BAUER ADVANTAGES...

Wide range of capacity and pressure in both compressor and booster configuration allows tailoring a solution to meet specific requirements.

Proven air-cooled design is economical, reliable and environmentally friendly. An external power source is not required and no coolant.

Large surface area and fine ribbing on cylinders provides efficient heat dissipation for lower operating temperatures.

Aftercooler provides low discharge temperature. Supplemental cooling at the outlet is not required.

Pressurized lubrication ensures reliable lubrication of all internal components for extended compressor life. Oil filter protects the lubrication system.

Roller or needle bearing used at each bearing surface for reduced friction and optimum mechanical efficiency. Compressor runs cooler, oil life is extended and maintenance is reduced.

Heavy-duty roller bearings to support the crankshaft. 30,000 hours design life.

Aluminum alloy crankcase used through 30 hp enables compact dimensions because of rapid heat dissipation. Cast iron crankcase used on 40 hp and greater to support greater

forces. High capacity cooling fan(s) provide efficient cooling.

Encapsulated crankcase to protect the environment from oil laden mist.

High efficiency intake filter to protect the compressor from damaging particles.

Safety valve after each stage of compression to protect the compressor from overpressure and to safeguard the operator. Gas compressors and boosters also include a safety valve at the inlet.

Balanced flywheel and counterbalanced crankshaft results in nearly vibration-free operation. BAUER compressors and boosters do not require special foundations which reduces installation cost.

Readily accessible valves do not require disassembly of compressor piping for easy accessibility and reduced maintenance cost and downtime.

Corrosion resistant materials used for coolers, separators and valves for longer life and reduced maintenance.

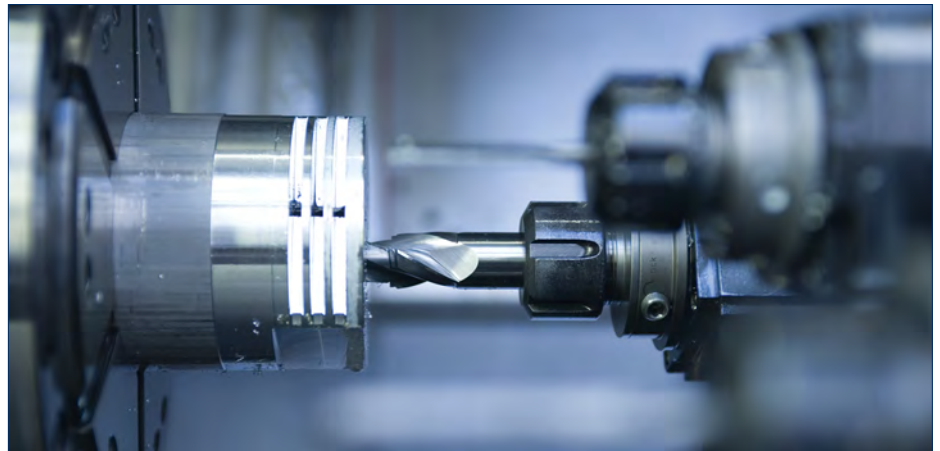
Genuine spare parts at affordable prices.

Operation and maintenance manual with illustrated parts lists.

...FOR YOUR BENEFIT



› 25.x and 28.x



Worldwide

- BAUER OFFICES
- PTG DISTRIBUTORS



