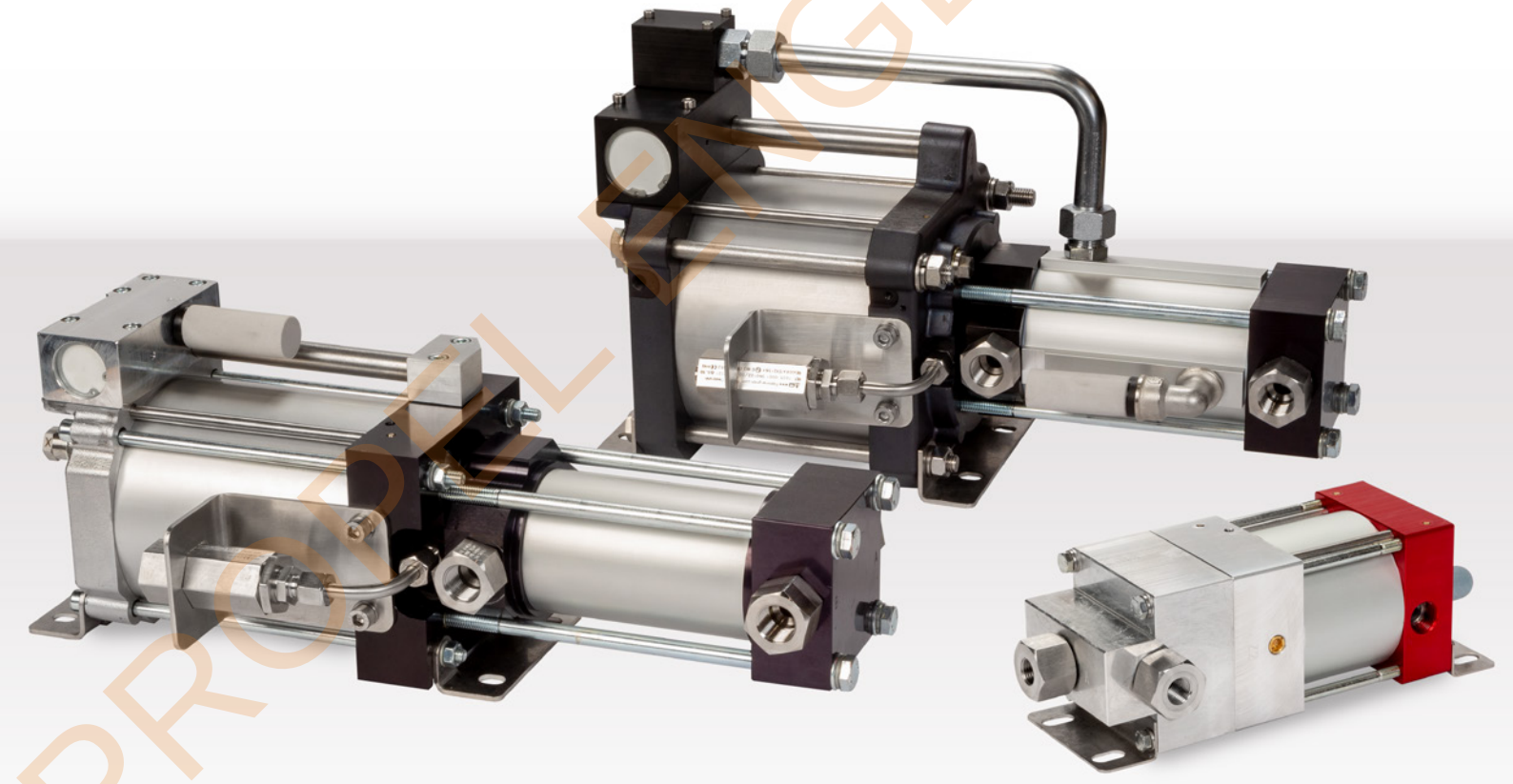
MAXIMATOR®

Maximum Pressure.

PROPEL ENGENHARIA

High Pressure Technology • Testing Equipment
Hydraulics • Pneumatics



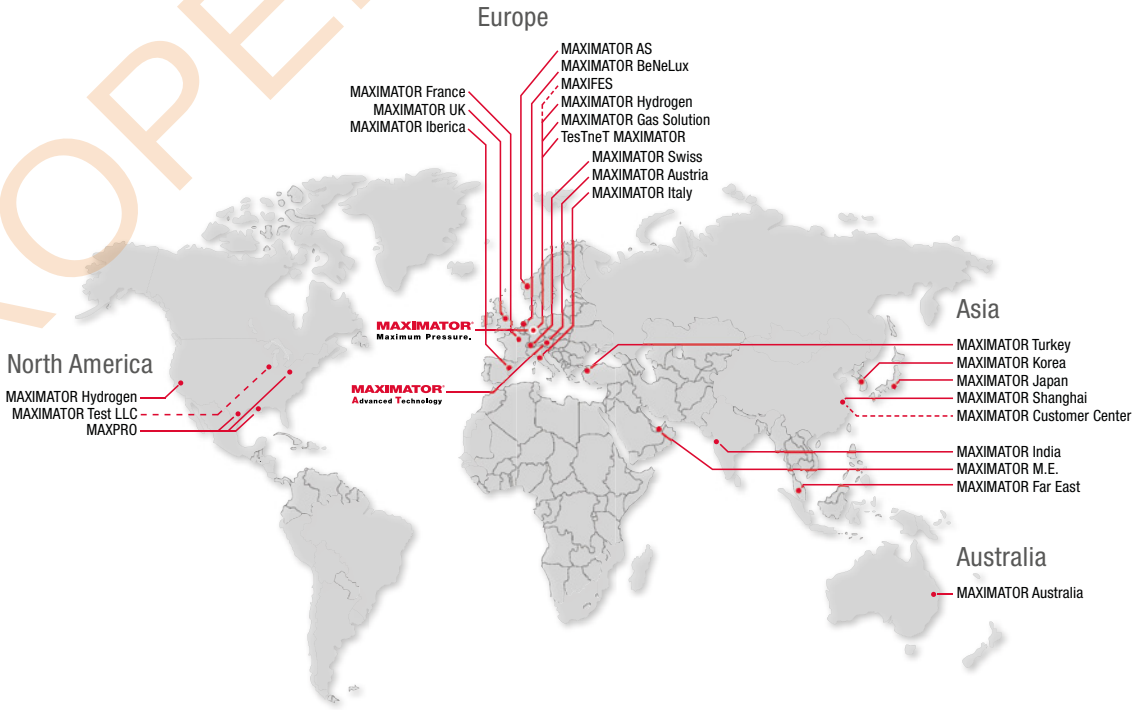
Liquified Gas Pumps
LGP Series

Content / About Maximator

At your side, everywhere

As an internationally leading company specialising in high-pressure technology, MAXIMATOR develops high-performance air driven liquid pumps and gas boosters for a variety of uses and applications. For decades we have supported well-known companies in the automotive and supply industry, as well as the chemical, plastics, oil and gas industries.
In addition to air driven liquid pumps and gas boosters, we also produce high-pressure technology such as valves, fittings, pressure switches and other components. We also offer extensive services in the field of high-pressure testing and production technology.

Our devices satisfy the requirements of the pressure equipment, machinery and ATEX directives and, on request, NACE specifications. We follow strict quality guidelines certified according to ISO 9001. In order to ensure the continuous further development of our products, we maintain a close cooperation with our customers as well as with material and component suppliers.
With four technical offices in Germany and qualified partner companies worldwide, we can offer optimal customer service. A total of over 400 qualified, highly motivated employees work at our production centre in Nordhausen.



Application and Function

Liquified Gas Pumps – the Maximator-Concept

The Maximator LGP (Liquified Gas Pump) series was developed for use with refrigerants. The design of these pumps is based on the mode of operation of gas compressors in combination with proven high-pressure pump technology. The technology has been optimized for the compression of liquid and gaseous fluids, so that the pumps of the LGP series can compress and convey both aggregate states.

Another special feature of this series is its suitability for the compression of flammable media. A flameproof enclosure according to DIN EN 60079-1 including a TÜV test has been implemented. Thus, the pumps of the LGP series can be used for a variety of fluids.

The SLGP and GLGP pumps are also optionally available with reduced stroke. On the one hand, this reduces the size of the pump and, on the other hand, this reduces the likelyhood of icing on the muffler. Should a phase transition nevertheless occur, the pumps of the Maximator LGP series can also pump the fluid in the gas phase without impairing functionality.

Phase transitions
Easy handling of occurring phase transitions

Increase availability
Fluid-resistant material selection

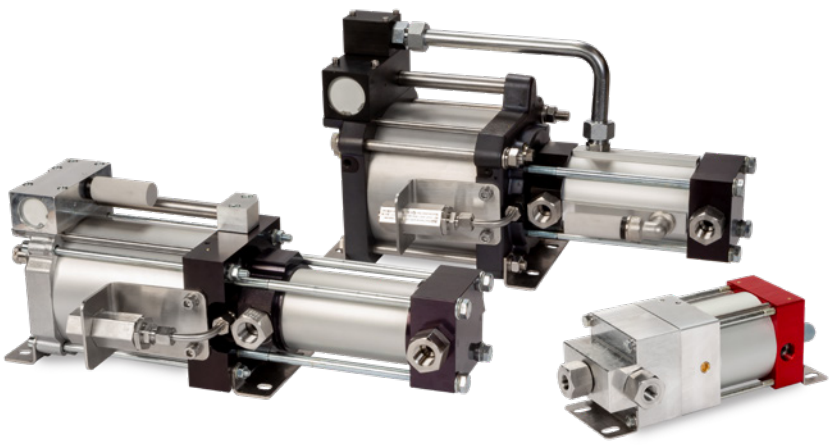
Application orientation
Application-optimized technology to avoid icing or phase transitions

EX-Zone
Design of the technology for safe operation in EX zones

Safety
Flame arrester and flameproof enclosure for the use of flammable fluids

Advantages of Maximator Maximator LGP-Serie:

- Pressure regulation via manual pressure regulator or pneumatically actuated valve
- Operation with compressed air and design adaptations allows use in explosion-proof areas
- Flame arrester for the use of flammable fluids
- Easy installation and trouble-free handling of pumps
- Low maintenance thanks to reliable, easy-to-install devices
- Easy handling of occurring phase transitions
- Increased availability through fluid resistant material selection
- Application-optimized technology to avoid icing or phase transitions



Selection and use

Selecting the right pump

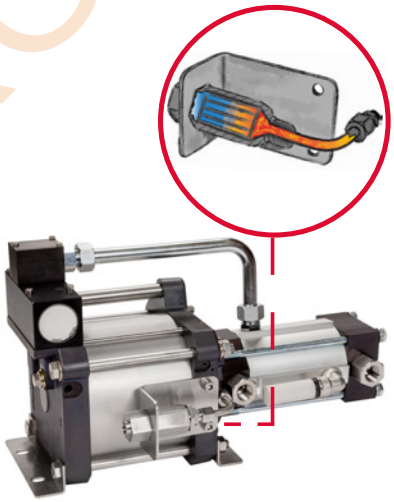
The following parameters are required for designing and selecting pumps:

- Required operating pressure
- Desired pump capacity at operating pressure
- Available air drive pressure
- Fluid, Temperature of the fluid
- Ambient Temperature
- Information on requirements regarding size, weight, etc.
- Desired options and sealing materials

Note: On request, the Maximator team will undertake the design and advise on the selection. There are special requirements for many applications; advice from experienced Maximator staff is therefore recommended.

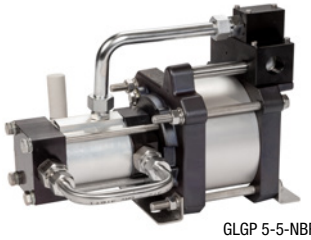
Use

Flame arrester	Versions & Options*
Common climate-friendly refrigerants are mostly flammable. Should a flammable mixture of the refrigerant and oxygen form inside the pump, ignition can occur. In the event of a leak on the high pressure side, a flammable gas mixture could form in the combined leakage hole that has a connection to the air drive. This can trigger an explosion in the event of ignition. The resulting flame is stopped immediately in the flame arrester, which prevents the thermal energy from spreading. In addition, the space of the combined leakage line is designed and tested according to DIN EN 60079-1, so that no flame can escape. There is a flameproof enclosure in accordance with gas group IIB. The pumps may be operated in potentially explosive atmospheres with appropriate precautions.	**FS** – Flame safety device, see flame arrester. **RS** – **R**educed **S**troke.The stroke volume of the pump is split in half. **two stage** (3-3, 5-5) – The medium is compressed via two pressure stages. **FEC** – **F**or **E**xtreme **C**ycling. For drive with dry compressed air or nitrogen **LT** – **L**ow **T**emperature. The media temperature can be as low as -40°C. Special sealing materials are used for this purpose. **LTA** – **L**ow **T**emperature **A**mbient. The media and ambient temperatures can be as low as -40°C. Special sealing materials are used for this purpose. **SS** – **S**tainless **S**teel. Wetted parts made of stainless steel. *These options/ variants cannot be retrofitted and must therefore be specified when ordering.



GLGP 5-5-NBR-FS

GLGP 5-5-NBR



GLGP 5-5-NBR-RS

Product overview

Model	Version	Flame arrester*	Options	available sealing materials**
MLGP 7-NBR	standard	without FS	LT LTA SS FEC	NBR CR EPDM FFKM PTFE FKM HNBR
SLGP 3-NBR	RS -3 -3-RS standard	with FS without FS		
GLGP 5-NBR	RS -5 -5-RS standard			

* the flame arrester cannot be retrofitted.
**The sealing material used in the standard can be found in the product name.
Note: further technical information is available on the product data sheets.

Sealing materials

NBR – Nitrile rubber,good cold and deformation behavior at -30°C to 100°C, media compatibility: low, elastic.

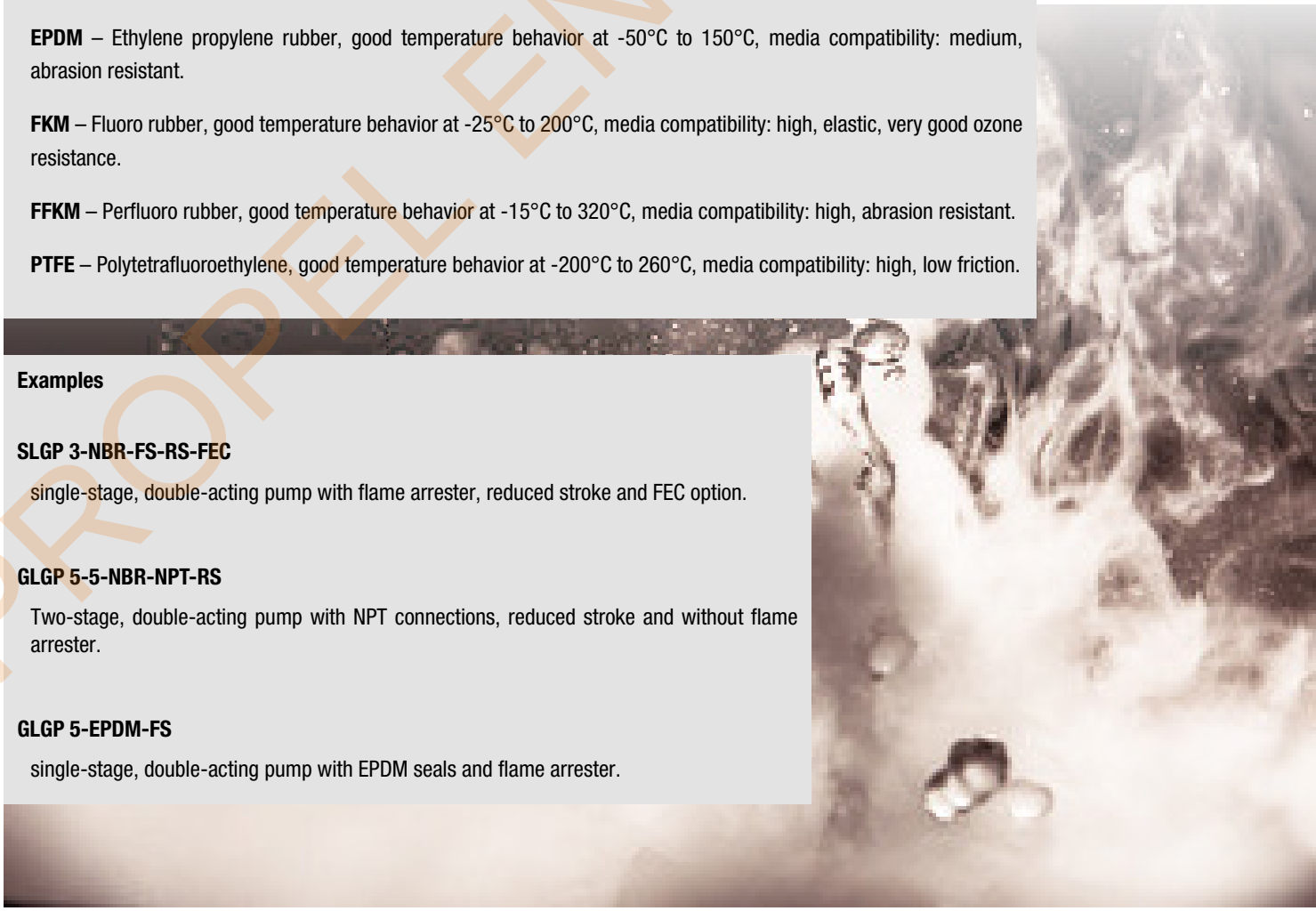
HNBR – hydrogenated nitrile rubber, good temperature behavior at -40°C to 140°C, media compatibility: low, abrasion resistant.

EPDM – Ethylene propylene rubber, good temperature behavior at -50°C to 150°C, media compatibility: medium, abrasion resistant.

FKM – Fluoro rubber, good temperature behavior at -25°C to 200°C, media compatibility: high, elastic, very good ozone resistance.

FFKM – Perfluoro rubber, good temperature behavior at -15°C to 320°C, media compatibility: high, abrasion resistant.

PTFE – Polytetrafluoroethylene, good temperature behavior at -200°C to 260°C, media compatibility: high, low friction.



Examples

SLGP 3-NBR-FS-RS-FEC

single-stage, double-acting pump with flame arrester, reduced stroke and FEC option.

GLGP 5-5-NBR-NPT-RS

Two-stage, double-acting pump with NPT connections, reduced stroke and without flame arrester.

GLGP 5-EPDM-FS

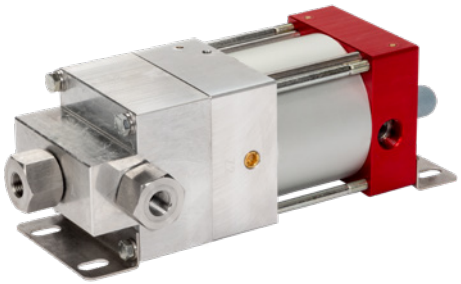
single-stage, double-acting pump with EPDM seals and flame arrester.

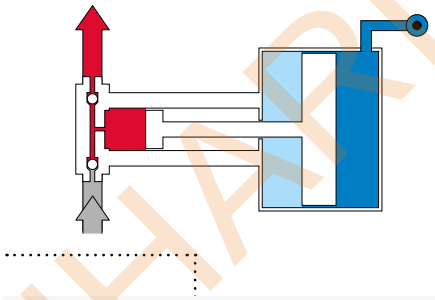
MLGP-Series

MLGP 7-NBR

» Single-acting
» With one air drive piston
» Operating pressures of up to 70 bar (1.015 psi)
» Formula for gas outlet pressure:

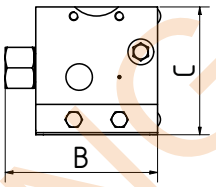
$$p_B = i * p_L$$

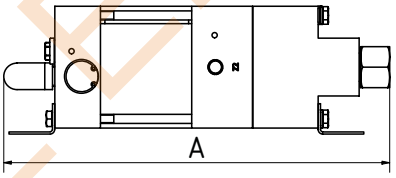




The compact and robust pumps of the MLGP series are available in a wide range of options to compress a broad spectrum of refrigerants.

- Material: Pump heads made of aluminium, Pistons and valves made of stainless steel and NBR Sealing in standard
- Standard models with bottom inlet
- Suitable for air drive pressures from 1 to 10 bar (14.5 to 145 psi)





Options for MLGP 7

- Seal version, e.g. FKM, HNBR, EPDM, CR for special fluids
  Order code: see media compatibility guide
- Special connections, e.g. with NPT thread
  Order code: MLGP7 - NPT
- **FEC-Option** for dry compressed air or nitrogen drive
  Order code: MLGP7 - FEC

Type	Pressure ratio i*	Displ. Volume **		Outlet pressure p_B***		min. inlet pressure p_A		Connections			Dimensions in mm			Weight
		cm^3	cu.inch	bar	psi	bar	psi	Air drive p_L	Inlet A	Outlet B	A	B	C	kg
MGLP 7	1:7	15	0,92	70	1015	-0,8	-11,6	3/8 BSP	1/4 BSP	1/4 BSP	254	100	84	3,3

* Ratio – driving surface air drive piston / driven surface high pressure piston (calculated)
** Displacement volume per double stroke (calculated).
*** Static outlet pressure (calculated and maximum allowed).

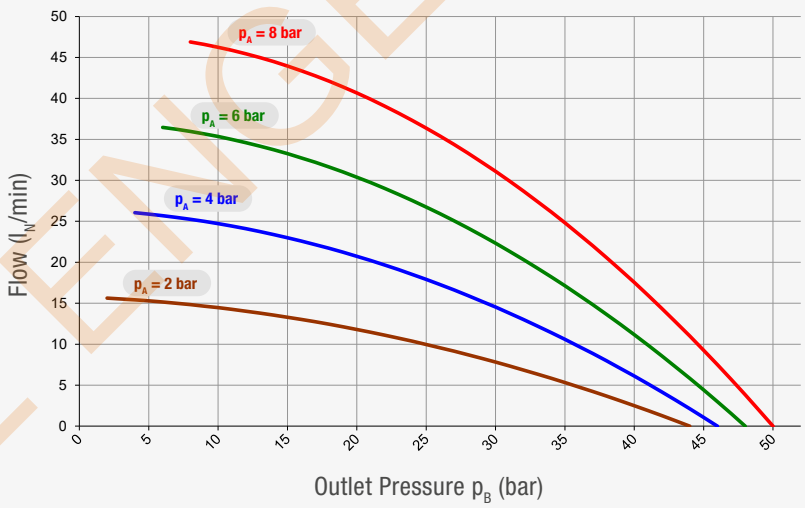
- **LT-Option**:Low-temperature modification for the high pressure section (-40°C up to 60°C)
  Order code: MLGP7 - LT

- **LTA-Option**:Low-temperature modification for the high pressure and air drive section (-40°C bis 60°C)
  Order code: MLGP7 - LTA

Other options available on request.

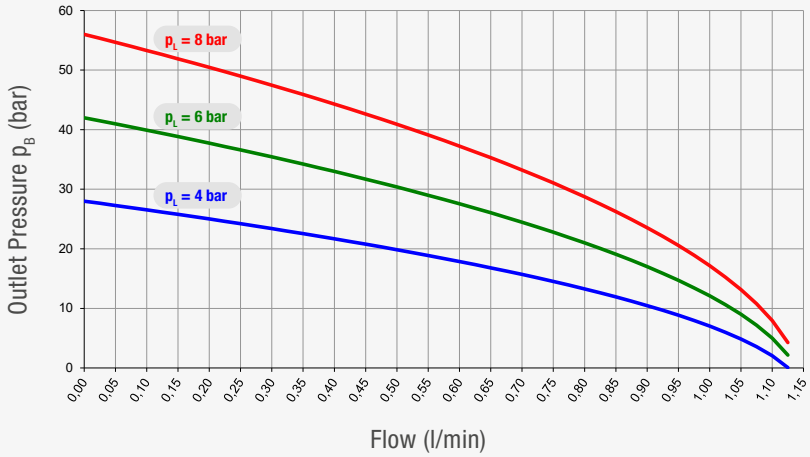
Performance Graph for gaseous state

Drive pressure p_L = 6 bar, Test fluid: Nitrogen, p_A = gas inlet pressure



Performance Graph for liquid state

Drive pressure = $p_{L,}$ Test fluid: Water-Oil-Emulsion approx. 1 - 10 cst

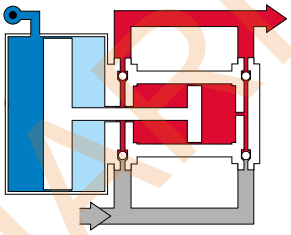


SLGP-Series

SLGP 3-NBR

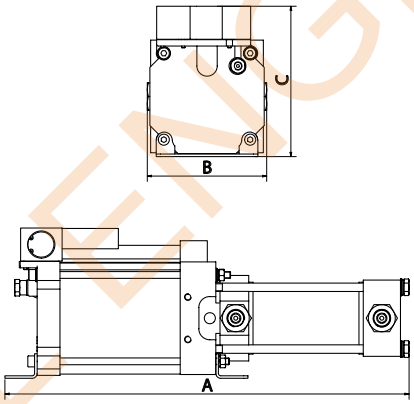
» **Double-acting**
» **Single stage**
» **With one air drive piston**
» **Operating pressures of up to 52 bar (755 psi)**
» **Formula for gas outlet pressure:**

$$p_B = i * p_L + p_A$$



The compact and robust pumps of the SLGP series are available in a wide range of options to compress a broad spectrum of refrigerants.

- Material: Pump heads made of aluminium, Pistons and valves made of stainless steel and NBR Sealing in standard
- Standard models with bottom inlet
- Suitable for air drive pressures from 1 to 10 bar (14.5 to 145 psi)

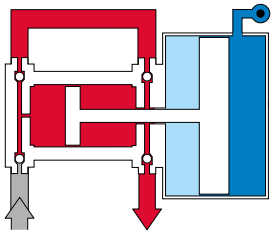


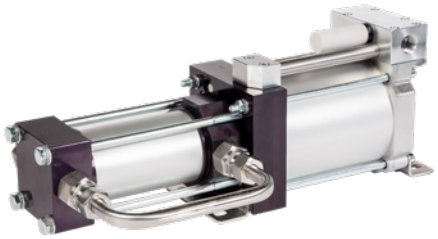
Options for SLGP 3(-3)

- Seal version, e.g. FKM, HNBR, EPDM, CR for special fluids - **Order code: see media compatibility guide**
- Special connections, e.g. with NPT thread **Order code: SLGP3 - NPT**
- **FS-Option**: Flame arrester and flame proof enclosure for the use of flammable fluids
- **RS-Option**: Reduced Stroke

Type	Pressure ratio i*	Displ. Volume **		Outlet pressure p_B***		min. inlet pressure p_A		Connections			Dimensions in mm			Weight
		cm³	cu.inch	bar	psi	bar	psi	Air drive p_L	Inlet A	Outlet B	A	B	C	kg
SLGP 3	1:3,2	746	45,52	52	755	-0,8	-11,6	1/2 BSP	1/2 BSP	1/2 BSP	478	141	178	10,7
SLGP 3-RS	1:3,2	373	22,76	52	755	-0,8	-11,6	1/2 BSP	1/2 BSP	1/2 BSP	382	141	178	10
SLGP 3-3	1:3,2/1:3,4	373	22,76	52	755	-0,7	-10,2	1/2 BSP	1/2 BSP	1/2 BSP	478	233	178	11,1
SLGP 3-3-RS	1:3,2/1:3,4	186	11,35	52	755	-0,7	-10,2	1/2 BSP	1/2 BSP	1/2 BSP	382	233	178	10,4

* Ratio – driving surface air drive piston / driven surface high pressure piston (calculated)
** Displacement volume per double stroke (calculated).
*** Static outlet pressure (calculated and maximum allowed).





SLGP 3-3-NBR

- **» Double-acting**
- **» Two stage**
- **» With one air drive piston**
- **» Operating pressures of up to 52 bar (755 psi)**
- **» Formula for gas outlet pressure:**

$$p_B = 3,4 * p_L + 3,4/3,2 * p_A$$

- **FEC-Option:** for dry compressed air or nitrogen drive
  Order code: SLGP3 - FEC

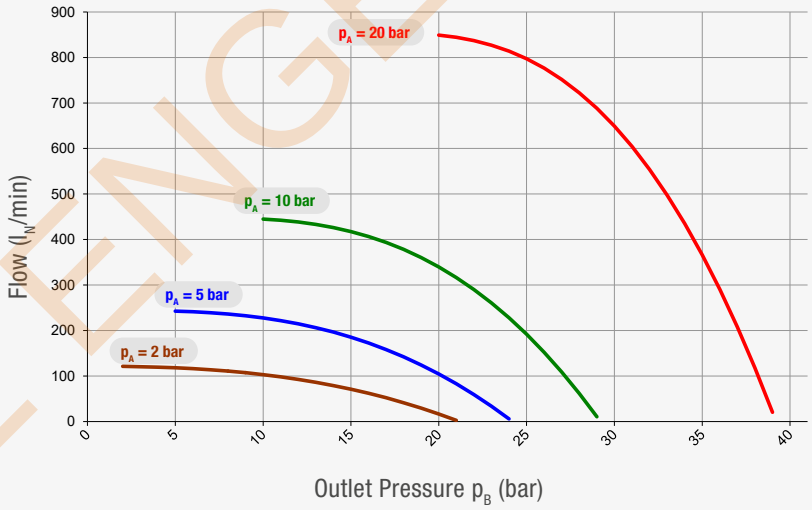
- **LT-Option**:Low-temperature modification for the high pressure section (-40°C up to 60°C)
  Order code: SLGP3 - LT

- **LTA-Option**:Low-temperature modification for the high pressure and air drive section (-40°C bis 60°C)
  Order code: SLGP3 - LTA

Other options available on request.

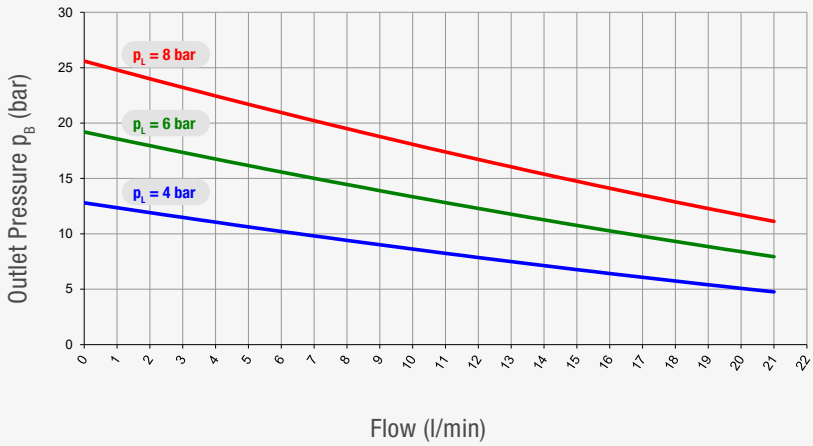
Performance Graph SLGP 3* for gaseous state

Drive pressure p_L = 6 bar, Test fluid: Nitrogen, p_A = gas inlet pressure



Performance Graph SLGP 3* for liquid state

Drive pressure = p_L, Test fluid: Water-Oil-Emulsion approx. 1 - 10 cst



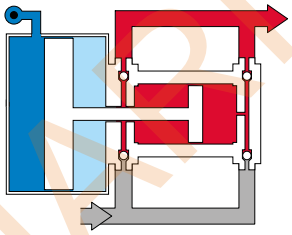
* Detailed performance diagrams of the SLGP series can be found in the product data sheets..

GLGP-Series

GLGP 5-NBR

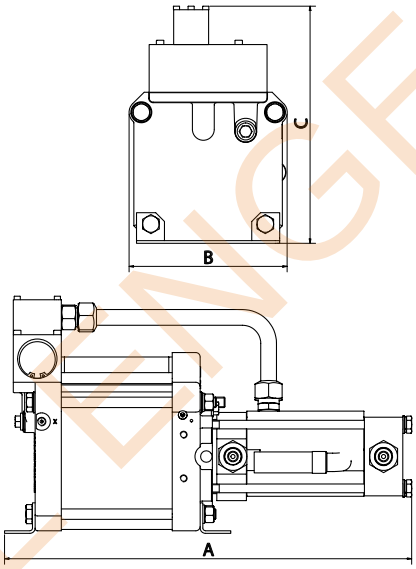
» **Double-acting**
» **Single stage**
» **With one air drive piston**
» **Operating pressures of up to 90 bar (1.305 psi)**
» **Formula for gas outlet pressure:**

$$p_B = i * p_L + p_A$$



The compact and robust pumps of the GLGP series are available in a wide range of options to compress a broad spectrum of refrigerants.

- Material: Pump heads made of aluminium, Pistons and valves made of stainless steel and NBR Sealing in standard
- Standard models with bottom inlet
- Suitable for air drive pressures from 1 to 10 bar (14.5 to 145 psi)

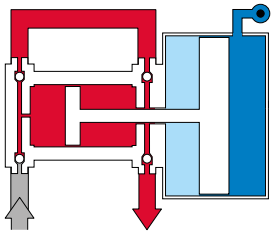


Options for GLGP 5(-5)

- Seal version, e.g. FKM, HNBR, EPDM, CR for special fluids - **Order code: see media compatibility guide**
- Special connections, e.g. with NPT thread **Order code: GLGP 5 - NPT**
- **FS-Option**: Flame arrester and flame proof enclosure for the use of flammable fluids
- **RS-Option**: Reduced Stroke

Type	Pressure ratio i*	Displ. Volume **		Outlet pressure p_B***		min. inlet pressure p_A		Connections			Dimensions in mm			Weight
		cm^3	cu.inch	bar	psi	bar	psi	Air drive p_L	Inlet A	Outlet B	A	B	C	kg
GLGP 5	1:5,2	746	45,52	90	1035	-0,8	-11,6	3/4 BSP	1/2 BSP	1/2 BSP	466	181	272	15,1
GLGP 5-RS	1:5,2	373	22,76	90	1035	-0,8	-11,6	3/4 BSP	1/2 BSP	1/2 BSP	370	193	272	14,2
GLGP 5-5	1:5,2/1:5,6	373	22,76	90	1035	-0,9	-13,1	3/4 BSP	1/2 BSP	1/2 BSP	466	253	272	15,4
GLGP 5-5-RS	1:5,2/1:5,6	186	11,35	90	1035	-0,9	-13,1	3/4 BSP	1/2 BSP	1/2 BSP	370	265	272	14,6

* Ratio – driving surface air drive piston / driven surface high pressure piston (calculated)
** Displacement volume per double stroke (calculated).
*** Static outlet pressure (calculated and maximum allowed).



GLGP 5-5-NBR

- **» Double-acting**
- **» Two stage**
- **» With one air drive piston**
- **» Operating pressures of up to 90 bar (1.305 psi)**
- **» Formula for gas outlet pressure:**

$$p_B = 5{,}6 * p_L + 5{,}6/5{,}2 * p_A$$

- **FEC-Option:** for dry compressed air or nitrogen drive
  Order code: GLGP 5 - FEC

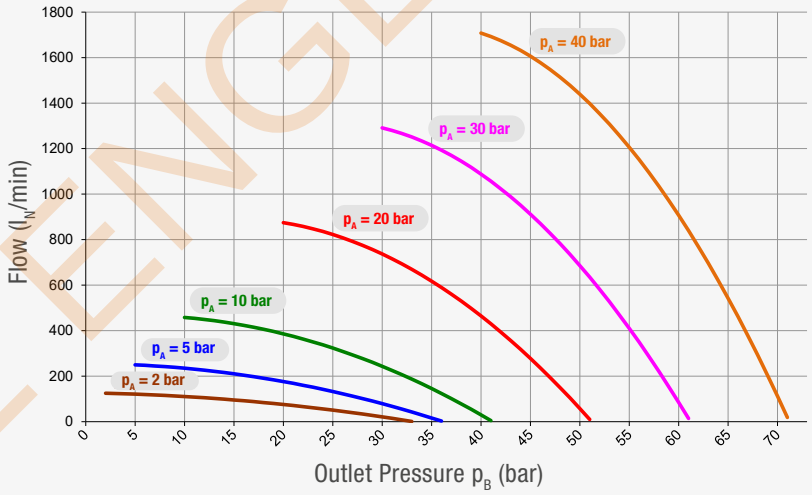
- **LT-Option**:Low-temperature modification for the high pressure section (-40°C up to 60°C)
  Order code: GLGP 5 - LT

- **LTA-Option**:Low-temperature modification for the high pressure and air drive section (-40°C bis 60°C)
  Order code: GLGP 5 - LTA

Other options available on request.

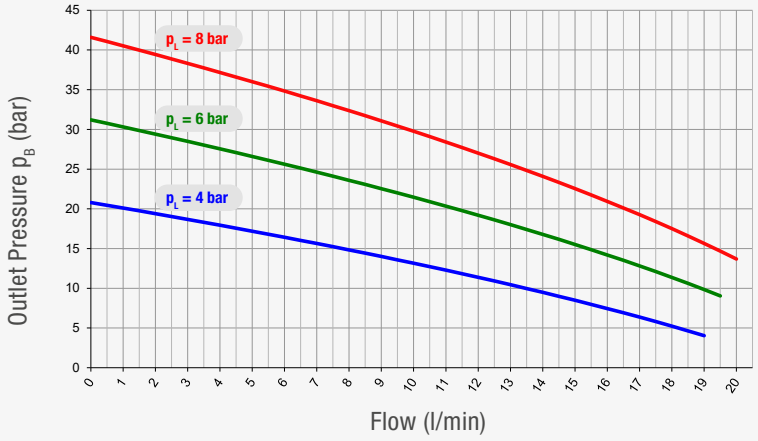
Performance Graph GLGP 5* for gaseous state

Drive pressure p_L = 6 bar, Test fluid: Nitrogen, p_A = gas inlet pressure



Performance Graph GLGP 5* for liquid state

Drive pressure = p_L, Test fluid: Water-Oil-Emulsion approx. 1 - 10 cst



* Detailed performance diagrams of the SLGP series can be found in the product data sheets.

Common refrigerants

Refrigerant	Fluid	GWP	Safety class	Recommended sealing material and notes	
R32	Difluoromethane	675	A2L		EPDM + PTFE + NBR + FFKM
R50	Methane	25	A2		see operating instructions
R170	Ethane	6	A3		see operating instructions
R290	Propane	3	A3		see operating instructions
R454a/b	Mixture R32 + R1234yf	239	A2L		CRL+ HNBR
R513a	Tetrafluoropropene/ ethane mixture	631	A1	Reacts with aluminum; however, almost all compressors for R134a are approved for R513a.	EPDM + PTFE + HNBR
R600/A	Butane/Isobutane	3	A3		EPDM + PTFE
R718	Water	0	A1	Covered by standard Maximator pumpst	EPDM + PTFE
R744	Carbon dioxide	1	A1	High operating pressures necessary	NBR + PTFE
R1150	Ethene	0	A3	partial transfer to high pressure vessel necessary/ emergency cooling;covered by DLE	see operating instructions
R1234yf	Tetrafluoropropene	4	A2L		EPDM + PTFE (HNBR) + FFKM
R1234ze	Tetra-fluoropropene	7	A2L		EPDM + PTFE (HNBR) + FFKM
R1270	Propene/propylene	3	A3	Higher pressure levels + discharge gas temperatures	FKM/ FFKM + PTFE
R1336mzz	Hexafluorobutene	2	A1		NBR + FFKM

F-Gases Regulation of the EU

Refrigerant	GWP	Safety Class	Recommended sealing material and notes
FCKW HFCKW	>4750 >1182		please contact the factory
R11	400	A1	NBR + PTFE
R22	1810	A1	please contact the factory
R23	14800	A1	EPDM + PTFE
R116	9200	A2	please contact the factory
R134a	1430	A1	EPDM + PTFE (HNBR)
R404a	3922	A1	please contact the factory
R407C	1744	A1	please contact the factory
R407F	1825	A1	please contact the factory
R410a	2088	A1	EPDM + PTFE
R438A	2265	A1	please contact the factory
R442D	2729	A1	please contact the factory
R448A	1386	A1	EPDM + PTFE
R449A	1396	A1	EPDM + PTFE
R452A	2140	A1	EPDM + PTFE
R507	3990	A1	EPDM + PTFE

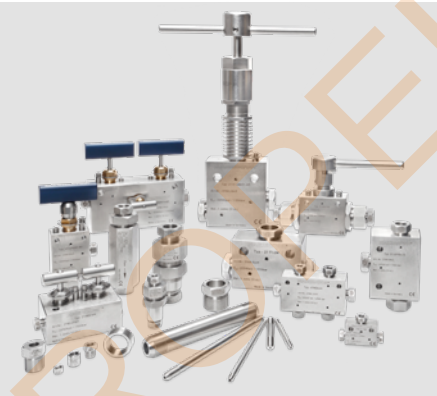
Additional products
» Hydraulics and pneumatics

High Pressure Pumps

- Pressure generation up to 7,000 bar
- Air-driven high pressure pumps which operating according to the principle of a pressure intensifier
- Air-driven operation makes them particu larly suitable for use in explosion-protected areas
- No power consumption during long pressure holding periods

Gas boosters

- Oil-free compression of industrial gases and compressed air up to 2,400 bar
- Air-driven piston boosters which operating according to the principle of a pressure intensifi
- Air-driven operation makes them particu-larly suitable for use in explosion-protected areas
- No power consumption during long pressure holding periods



Valves, fittings and tubings

- Engineering and manufacturing exclusively in Germany
- Extensive product range (high-pressure valves, fittings, tubings, check valves, filters, adaptors and more)
- Short delivery times thanks to highly flexible manufacturing

- Certificates available for all products (manufacturer‘s declaration, ATEX and more)
- MAXIMATOR VFT-ToolBoXX is available in 3 versions:

  1. Complete: tube dimension 1/4“, 3/8“ and 9/16“ of the Medium, High and Ultra High Pressure Series

  2. Medium Pressure: tube dimension 1/4“, 3/8“ and 9/16“ of the Medium Pressure Series

  3. High Pressure: tube dimension 1/4“, 3/8“ and 9/16“ of the High and Ultra High Pressure series

Rental Units for liquids

Maximator Power Packs Liquid can be used for many technical applications in engineering and industry. They generate hydraulic pressures of up to 4,000 bar safely and inexpensively.

- no electrical connection required for operation
- all Power Packs can be used in explosion areas
- an extensive array of accessories for adaptation and pressure measuring
- Control panels with logical design ensure safe operation

Rental Units for gases

Maximator Power Packs Gas are complete, ready-for-connection boster stations for generating operating pressure of up to 2,100 bar.

- oil-free gas compression without soiling the gas
- simple regulation of the operating pressure by setting the drive pressure
- partially suitable for use in explosion areas

Testing and production systems, Gas Filling Systems

- Autofrettage machines (25,000 bar)
- Leakage and burst pressure testing technology
- Gas Filling Systems for Hydrogen Applications
- Expansion units
- Pressure pulse test machines (6,000 bar)
- High-pressure forming machines
- Testing technology for plastic components
- Testing technology for high-pressure-carrying components in hydrogen mobility

At your side, everywhere

With our international partner companies, experienced experts in high-pressure technology are always ready to assist you. We have compiled detailed contact information for our international partners which you can find on our website at:
www.maximator.de/worldwide+distribution.

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3999.5605 | 10/2022