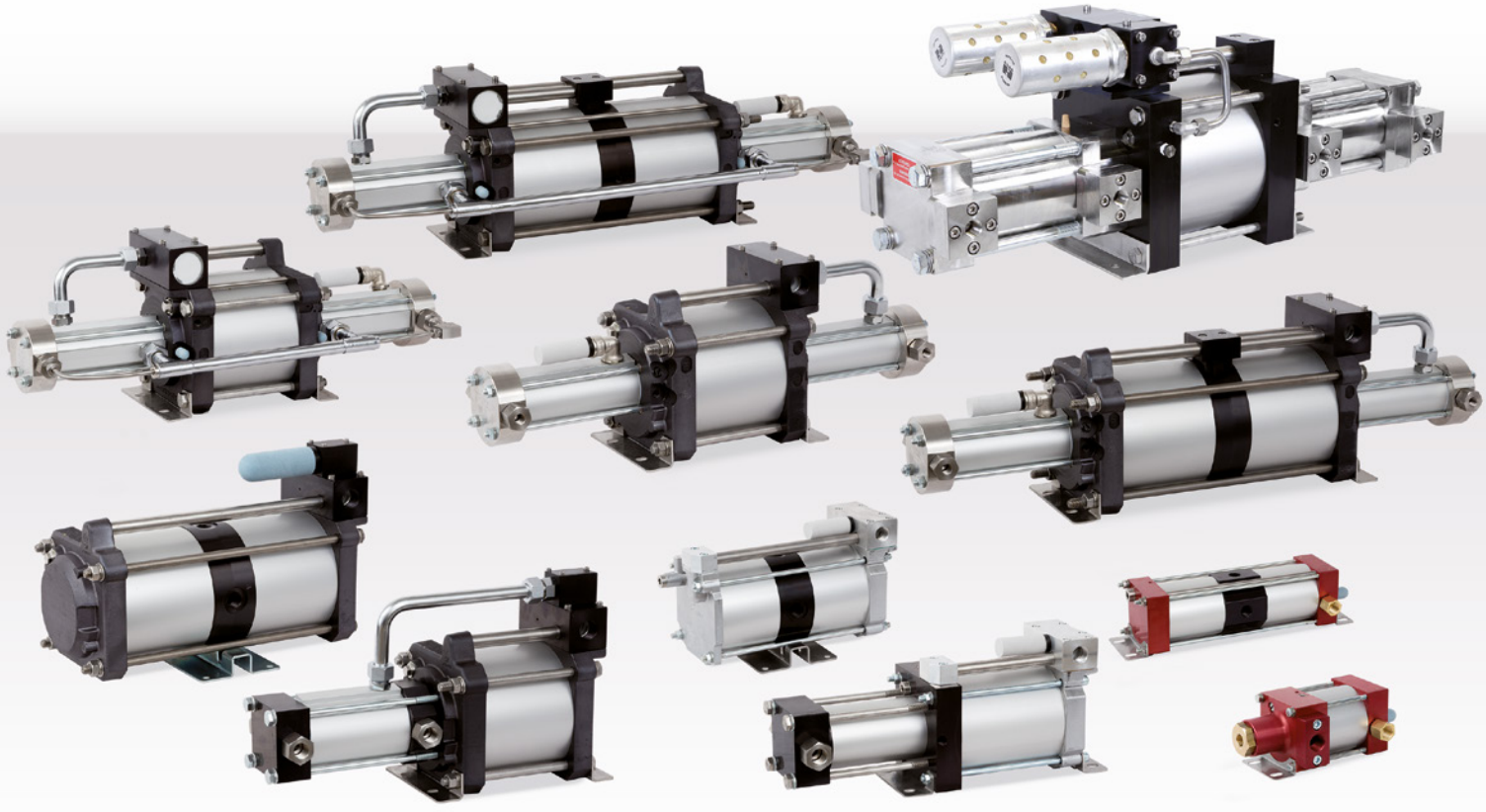
MAXIMATOR®

Maximum Pressure.

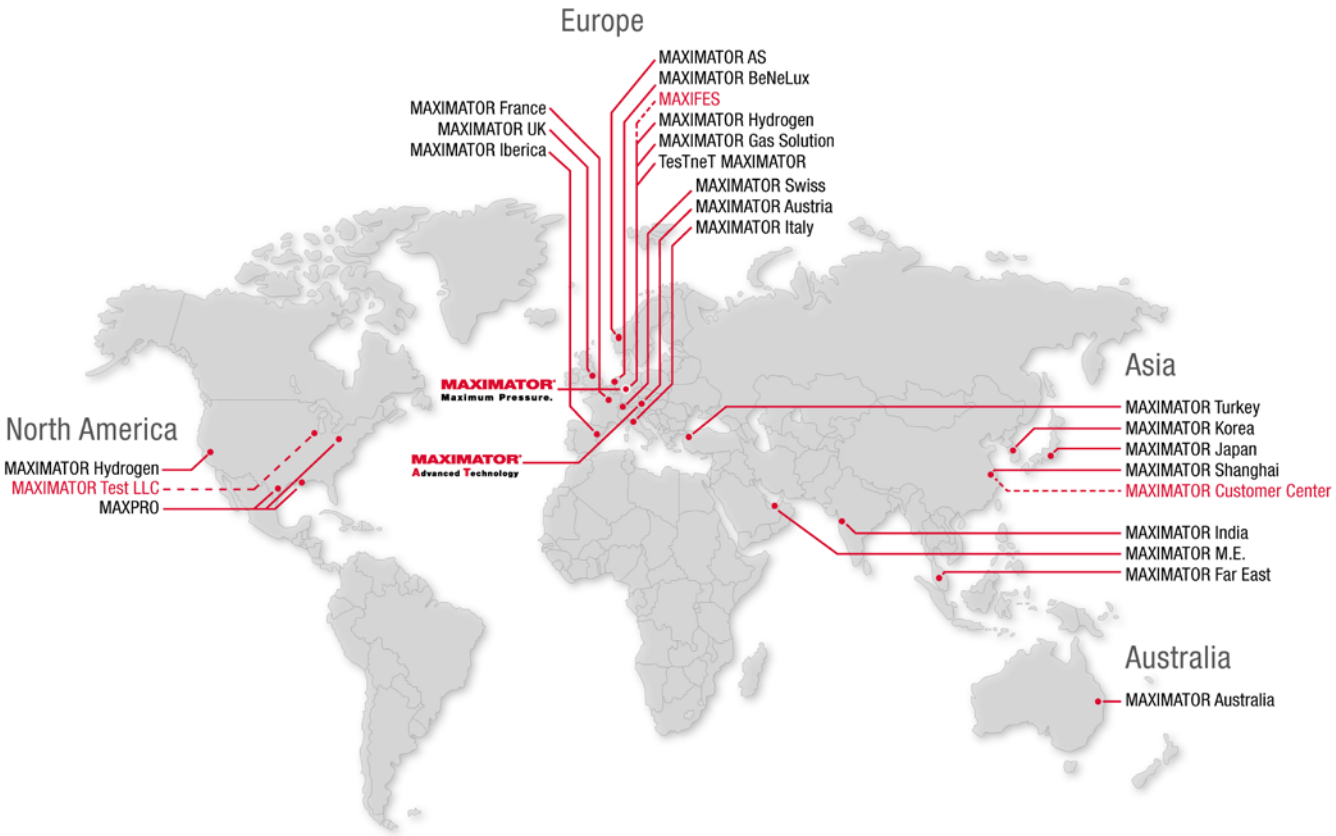
High Pressure Technology • Testing Equipment
Hydraulics • Pneumatics



» Air driven high pressure gas boosters
up to 2,400 bar (36,000 psi)

» Content

» Maximator worldwide - At your side, everywhere



As an internationally leading company specialising in high-pressure technology, Maximator develops high-performance air driven 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 gas boosters and air amplifiers, we also produce high pressure pumps and 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 comply with the machinery and ATEX directives and, on request, with the NACE specifications. Depending on the application, designs with FDA-compliant seals are also possible. Please do not hesitate to contact us about your task.

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.

Gas booster
» Type DLE

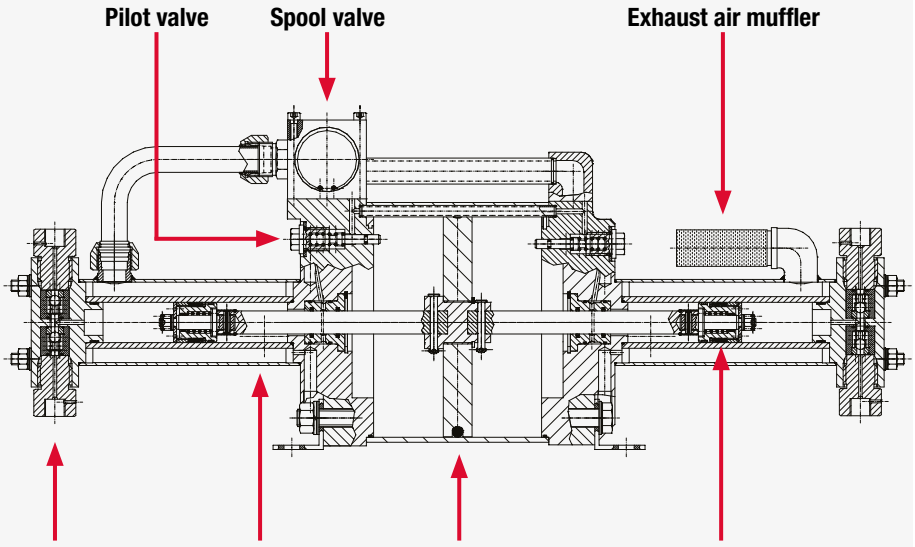
High pressure gas boosters – the Maximator concept

The Maximator high pressure gas boosters are suitable for the oil free compression of gases and air. Industrial gases like argon, helium, nitrogen and hydrogen can be compressed to operating pressures of 2400 bar (36000 psi) and oxygen up to 350 bar (5075 psi), depending on the application. Air driven gas boosters are an efficient alternative instead of electrically driven products and can be used in explosion-proof areas (according to 2014/34/EU).

The Gas boosters in detail

Features at a glance

- Pressure regulation via manual pressure regulator or pneumatically actuated valve
- Operation with compressed air allows use in explosion-proof areas
- Gas booster automatically stops operating upon reaching pre-selected final pressure
- Gas booster restarts automatically to compensate leaks
- No power consumption during long pressure holding periods
- No heat generation during pressure holding period
- Easy installation and trouble-free handling of gas boosters
- Low maintenance thanks to reliable, easy-to-install devices
- Effective cooling of the high pressure cylinders through integrated exhaust air cooling



Function and operation

The Maximator gas boosters' operating principle is similar to a pressure intensifier. A large air piston is charged with low pressure (air piston) and works on a small area with high pressure (high pressure piston).

The continuous operation is achieved by a pilot operated 4/2 way valve (spool valve). The spool valve applies the drive air alternately to the upper and bottom surface of the air piston.

The spool is piloted through two 2/2 way valves (pilot valves) which are mechanically actuated through the air piston in its end positions. The pilot valves charge and discharge the spool chamber.

The high pressure piston supported by the check valves (inlet check valve and outlet check valve) delivers the flow.

The outlet pressure is directly related to the set air drive pressure. According to the formulas indicated in the technical features table for the gas boosters, the static end pressure can be calculated.

At this pressure a force balance between drive section and gas section is achieved. The booster stalls when this end pressure is reached, and does not consume any further air.

A pressure drop at the high pressure side or a pressure increase at the drive side starts the booster automatically until the force balance is achieved again.

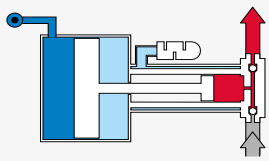
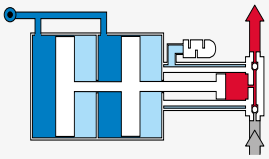
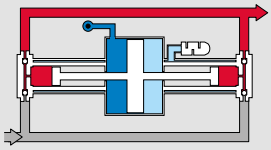
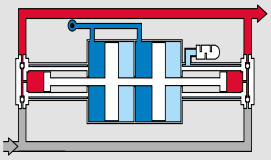
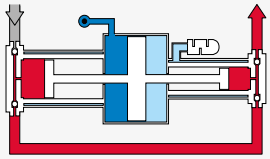
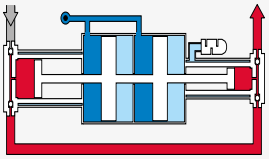
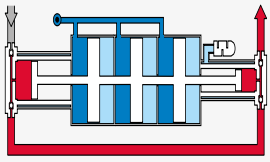
Additionally the Maximator boosters can be switched on and off automatically through Maximator air pilot switches, contact gauges or external control devices.

» Product range overview

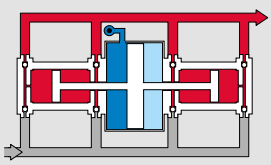
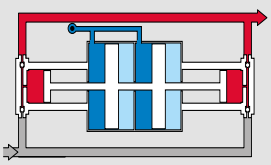
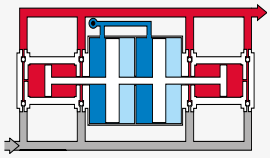
The series and its functions

Maximator gas boosters offer the right solution for every application. As a result of the wide range of models it is possible to select the optimum booster for each application. Single stage or two stage boosters, single acting, double acting, quadruple acting or a combination of these models can be used to achieve different operating pressures and flow capacities. They are suitable for different or stepped flow rates as well as for different maximum allowable operating pressures. In addition to gas boosters with a ø160 mm drive (DLE series), Maximator also offers various models with a ø200 mm drive (8DLE series) for high volume flows.

160 mm - Drive (Standard DLE-Series):

One Air Drive Section		Two Air Drive Sections	
Pattern	**Design** **Pressure ratio** **max. working pressure** **Type**	**Pattern**	**Design** **Pressure ratio** **max. working pressure** **Type**
	Single stage - single acting from 1:2 up to 1:75 max. 750 bar DLE 2-1, DLE 5-1, DLE 15-1, DLE 30-1, DLE 75-1		Single stage - single acting from 1:4 up to 1:150 max. 1500 bar DLE 2-1-2, DLE 5-1-2, DLE 15-1-2, DLE 30-1-2, DLE 75-1-2
	Single stage - double acting from 1:2 up to 1:75 max. 1500 bar DLE 2, DLE 5, DLE 15, DLE 30, DLE 75		Single stage - double acting from 1:4 up to 1:150 max. 1500 bar DLE 2-2, DLE 5-2, DLE 15-2, DLE 30-2, DLE 75-2
	Two stage from 1:2 / 1:5 up to 1:30 / 1:75 max. 1500 bar DLE 2-5, DLE 5-15, DLE 5-30, DLE 15-30, DLE 15-75, DLE 30-75		Two stage - double acting from 1:4/1:10 up to 1:60/1:150 max. 2100 bar DLE 2-5-2, DLE 5-15-2, DLE 5-30-2, DLE 15-30-2, DLE 15-75-2, DLE 30-75-2
Three Air Drive Sections			
	Two stage - double acting 1:30 / 1:75 max. 2400 bar DLE 30-75-3		

200 mm - Drive (8DLE-Series for high volume flow applications):

One Air Drive Section		Two Air Drive Sections	
	Single stage - quadruple acting 1:1,65 max. 300 bar 8DLE 1,65		Single stage - double acting 1:6 max. 40 bar 8DLE 6
			Single stage - quadruple acting 1:3 max. 40 bar 8DLE 3

» Type coding

X DLE XX - XX - X - X - XX - X

_ DLE 75 -1- 2 - GG - C

Size of air drive section:

» no information = 160 mm drive size

» 8 = 200 mm drive size

Model with pressure ratio:

» DLE = gas booster

» 75 = pressure ratio (1:75)

Acting type:

» 1 = single acting

» no information = multiple acting

Number of air drive sections:

» no information = 1 Air drive section*

» 2 = 2 Air drive sections (doubles the pressure ratio)

» 3 = 3 Air drive sections (triples the pressure ratio)

High pressure connections (Gas inlet / Gas outlet):

» G = G (BSPP) -Thread (Standard; GG = BSPP thread inlet/outlet)

» U = high pressure connection (UNF)

» N = NPT

Options, e.g. for:

» C = carbon dioxide

» S = oxygen

» H2 = hydrogen

Examples:

DLE 75-1-2-GG-C
Single stage, single acting gas booster with two air drive sections, with BSP connections, for carbon dioxide

DLE 5-NN
Single stage, double acting gas booster with one air drive section, with NPT connections

DLE 15-75-2-UU
Double stage, double acting gas booster with two air drive sections, with high pressure connections

DLE 30-1-GG
Single stage, single acting gas booster with one air drive section, with BSP connections

8 DLE 1,65-GG
200 mm drive size, single stage, quadruple acting gas booster with one air drive section, with BSP connections

* does not apply to 8DLE-Series

» General information

Gas booster installation

Maximator gas boosters can always be operated in any position, although the horizontal position is most effective in preserving the seals. For fault free operation, the devices should be equipped with fittings and tubing which are suitable for the desired pressure range. The connection sizes should never be reduced.

The connections of Maximator gas booster are available as BSPP threads and optionally as NPT threads. Both threads are suitable for pressures up to 1050 bar (15000 psi). For applications above 1050 bar only medium and high pressure connections according to Maximator specifications are permitted.

We offer medium pressure connections "M" up to 1550 bar (22500psi) and high pressure connections "H" up to 4500 bar (65000 psi) available in sizes 1/4“ (4M/4H), 3/8“ (6M/6H) and 9/16“ (9M/9H).

Please consult the Maximator Valves, Fittings and Tubing catalog, „Tools and Installation“ chapter for more detailed information about the Maximator medium and high pressure connections.

Before starting operation

The connection for the compressed air drive is located on the spool cycling valve housing. Many types (except the 8DLE Series types) have a second connection (marked by „X“) for direct pilot valve air. This is used for switching the gas booster on and off via solenoid valves with small nominal size.

The pilot valve air must be connected directly to the gas booster, unregulated and filtered. If the direct pilot valve air is not connected, the gas booster will not work.

Before starting operation, a compressed air filter with a water separator should be mounted in the air drive line prior to the gas booster. We offer the technical accessories with different nominal diameters according to the drive size of the gas booster (160 mm drive or 200 mm drive).

In general Maximator gas boosters do not require a compressed air oiler, as they are treated with special grease during assembly. An upstream connection of an oiler is recommendable if the gas booster is to be operated with very dry air (see also FEC option for operating the gas booster with dry drive air or nitrogen).

After operating the gas booster with oiled compressed air, it is advisable to retain this lubrication for subsequent applications. Should you change to un-lubricated compressed air, the gas booster should be retreated with special grease.

Drive air

In order to ensure optimal durability for the seal and guide elements, the drive air should meet the specifications of quality grades from 3 to 4 (solids/ water / oil):

Air quality in accordance with ISO 8573-1		
Specification	**Value**	
max. compressed air purity of oil (class 4):	5	mg/m³
max. solids, particle concentration:	5	mg/m³
max. pressure dew point at moisture (class 4)*:	+3	°C

* For drive media temperature of 20°C. Other values may be required depending on the temperature of the drive media.

Recommended Gases

Proper operation and efficiency of the gas booster depends mainly on the quality of the process gas as well as the compatibility of the seals. Maximator gas boosters are designed for compressing a wide range of industrial gases. Please refer to the process fluids table on page 31 of this catalog for more detailed information.

To prevent damage to both the inlet and outlet check valves and the high pressure seal, a filter with a mesh width of less than 10 µm should be fitted to the gas inlet connection.

Temperatures

The standard operating temperatures of Maximator gas booster range between -20 °C and +100 °C. For types DLE 2 and DLE 5, operating temperature limits are -20 °C to +60 °C due to the aluminum content in the high pressure section. Please note that the compression of gases produces additional heat. If you should require further assistance please contact our application team.

Cooling

The compression of gases creates heat as a by-product. Depending on the compression ratio (= gas outlet pressure / gas inlet pressure) and which gas is compressed, very high temperatures of several hundred °C can arise at the moment of maximum compression.

Due to their design, the gas boosters achieve compression ratios of up to 1:100 and are designed in continuous operation for temperatures between -20 °C to + 60 °C or + 100 °C (see temperatures). The DLE series gas boosters (with compression ratio i > 1:2) are equipped with an integrated, active exhaust air cooling system so that the compression process does not cause excessively high temperatures in the device.

» General information

Maximator gas boosters use the expanded, cold exhaust air (which is typically less than +5 °C) from the compressed air drive and direct it around the high-pressure cylinder(s) of the gas booster. This effectively dissipates the compression heat from the device. In most applications, the integrated cooling is sufficient to protect the gas booster and the downstream processes.

For applications where high compression ratios are required and this results in an unacceptably high compression temperature, it is advisable to design the compression process in several stages. Depending on the process conditions, Maximator air or water coolers can also be used to reduce the temperature input to an acceptable level.

Emission protection

High pressure gas boosters can cause emissions such as noise or air contamination from the process gas.

Parallel and series operation

Maximator gas boosters are compressed air driven piston compressors that are designed to generate high gas pressures with comparatively low flow rates. The use of gas boosters with a 200 mm drive section is therefore recommended for volume flow-intensive applications, as these devices offer larger stroke and flow volumes. Alternatively, several gas boosters of one type can be operated in parallel.

By connecting the Maximator gas boosters in series, a compression process can be designed in several stages. This is recommended if, for example, a single-stage solution would generate compression temperatures that are too high or the required volume flow cannot be achieved. When designing such complex systems and selecting the specific gas boosters, it is advisable to consult Maximator's application specialists.

Replacement and spare parts

In order to make the maintenance of the gas boosters as simple and efficient as possible, Maximator has designed spare part sets for the spool section, air drive section, high pressure section and inlet and outlet valves. The spare part sets contain all of the original parts required for the maintenance.

All Maximator gas boosters are delivered with a connection and sectional drawing including a parts list. On this drawing, all spare part kits required for the maintenance of the devices are listed with the respective order code. Only spare parts according to Maximator specifications are to be used.

Process fluids

Maximator gas boosters are designed for the oil free compression of technical gases. The devices compress gases such as argon, helium, hydrogen or nitrogen. The process fluids table on page 31 in this catalog gives an overview of the recommended sealing options for typical gases.

The compression of gases, which form an explosive atmosphere when mixed with the ambient air, as well as the compression of toxic or flammable gases creates considerations for requirements of the materials of the wetted parts and the compression process itself. Further information can be found in the operating instructions.

Media separation

With compressed air driven gas boosters, it should be noted that both the drive - and the process media are usually in a gaseous state. A mixture of both media would cause this gas mixture to be discharged through the exhaust silencer to the ambient. This contamination could possibly cause damage. It is therefore essential to prevent the drive gas from mixing with the process gas.

For this reason, all Maximator gas boosters are equipped with an integrated media separation. In this way, potential leaks on both the drive side and the process side are diverted from the device via separate leakage lines. With appropriate piping and drainage of leaks it can be ensured that process gases are not contaminated and no harmful emissions can contaminate the environment of the devices.

Purging

Due to the design of piston compressors, small leaks occur on the high-pressure side. This leakage has no effect on the functionality of the device, but may have to be taken into account in the risk assessment of a system.

With most process fluids, it is sufficient to discharge the leakage into a non-critical area in a controlled manner via the corresponding leakage connection. However, if gases are compressed that react with the ambient air or, for example, like hydrogen, which can form an explosive mixture, it is possible to efficiently prevent the process gas from being mixed with the ambient air by purging, for example with an inert gas.

All Maximator gas boosters of the DLE series are equipped with an integrated flushing connection. This connection is directly connected to the rear piston space, which means that this space can be actively flushed with an inert gas (e.g. nitrogen).

» General information

This means that even highly reactive gases can be compressed without risk. Further information on the recommended volume flow for purging the devices can be found in the installation and operating instructions.

Stroke frequencies

Compared with electric compressors, air driven gas boosters do not convert a rotational movement into a translational movement to drive the high-pressure piston. By alternately applying compressed air to each side of drive piston, Maximator gas boosters perform oscillating, translational movements - both in the air drive and high-pressure section.

This movement is called a stroke and the number of strokes per minute is defined as stroke frequency. Maximator gas boosters can achieve stroke frequencies of over 100 strokes per minute when idling (with a free gas outlet). The highest effectivity is achieved with stroke frequencies of 30 to 60 strokes per minute.

To monitor or document the number of strokes, Maximator boosters can be fitted with pneumatic stroke counters. These may also be used in explosion protection areas.

Use in potentially explosive areas

Maximator gas booster can be used in potentially explosive areas if they have an EX symbol and a declaration of conformity for 2014/34/EU is available.

Detailed information about the use of Maximator gas boosters in potentially explosive areas can be found in the installation and operating instructions.

Gas inlet pressure vs. gas outlet pressure

Maximator gas booster require a certain gas inlet pressure in order to be able to achieve the specified gas outlet pressure.

This means that the gas inlet pressure has a direct influence on the gas outlet pressure and the volume flow of the device at the required operating point.

In many applications there is no constant gas inlet pressure supply available, for example when using gas cylinders as supply source, so that the performance of the devices changes accordingly as the gas inlet pressure drops during the operation. This is particularly important for filling and testing applications.

Type coding

The type coding of Maximator gas boosters contain information on the pressure ratio and operating principle, the number of air pistons, connections and other options. Information on the tyoe code can be found in the information on our different booster series.

Scope of delivery

The following documents are included in the scope of delivery of every Maximator gas booster:

- General drawing of the device
- Assembly and operating instructions including:
  - Declaration of incorporation according to the Machinery Directive
  - Declaration of conformity according to explosion protection directive

Certificates such as Material certificates or test certificates (e.g. acceptance reports) are available on request.

» Fields of applications

Fields of applications for high pressure gas boosters

Gas compression with constant gas inlet pressure

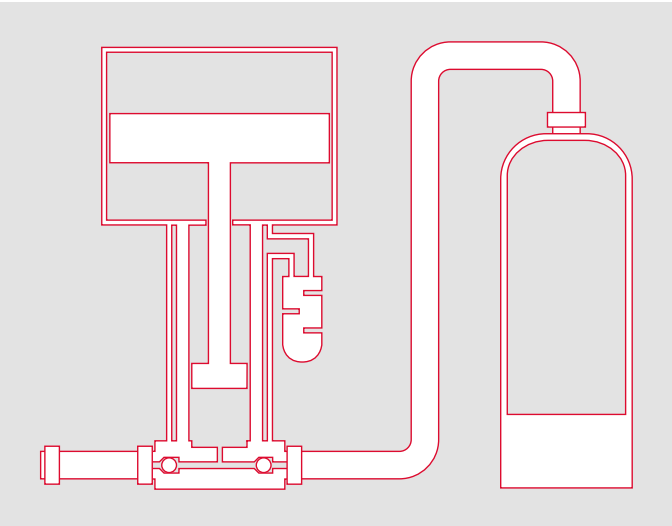
Maximator gas boosters are ideally suited for the compression of gases from low-pressure gas supply systems or gas generators. Thus, the gas supply can be increased to the required working pressure for different applications:

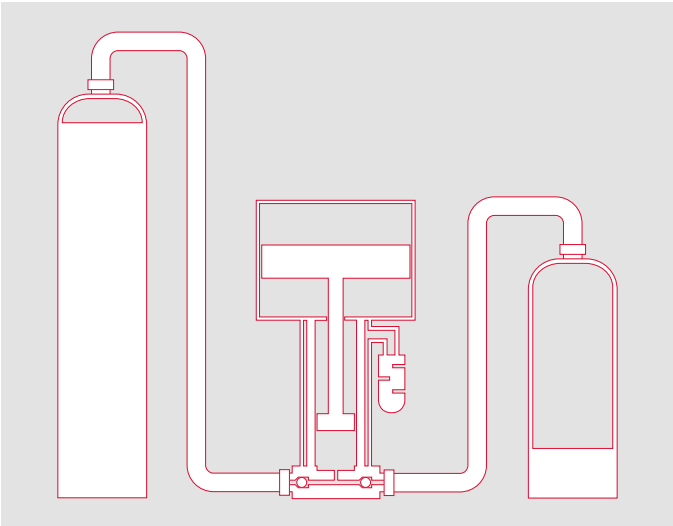
- Filling of gas bottles with technical gases (e.g. oxygen, nitrogen, helium, argon, etc.)
- Compression of gases from nitrogen or oxygen generators for gas cylinder filling or process supplies
- Compression of hydrogen e.g. from an electrolyzer
- High pressure gas supply for research and production applications in the life science sector
- Gas compression of vaporized gas from liquid gas tank supply systems

Gas compression with variable gas inlet pressure

A typical application for Maximator gas boosters is to increase the pressure of gases from gas cylinders or gas cylinder bundles. Depending on the application, more gas can be made available for the various applications at high pressure.

- Gas transfer for optimal use of the gas cylinder or the gas cylinder bundle
- Gas compression for breathing air systems or gas mixing systems for technical diving or rescue services
- Liquid gas transfer
- Stationary or mobile nitrogen charging of shock absorbers, gas pressure springs, hydraulic accumulators or suspension systems





» Fields of applications

Gas compression for laboratory and production applications

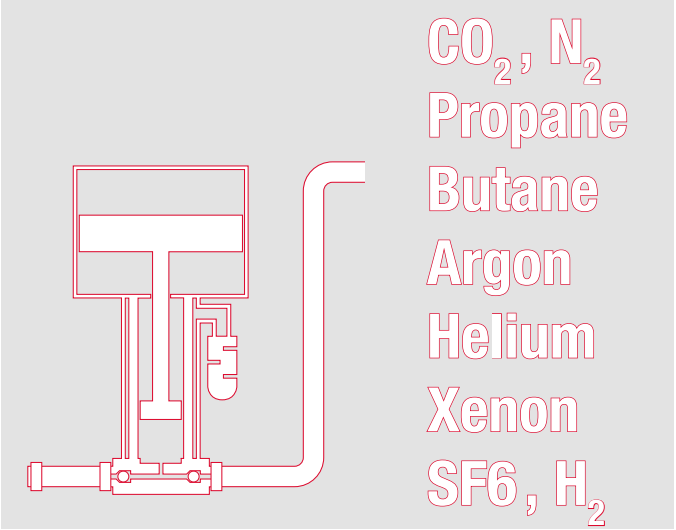
Maximator gas boosters are ideally suited for compressing gases up to pressures of 2400 bar in production and research applications.

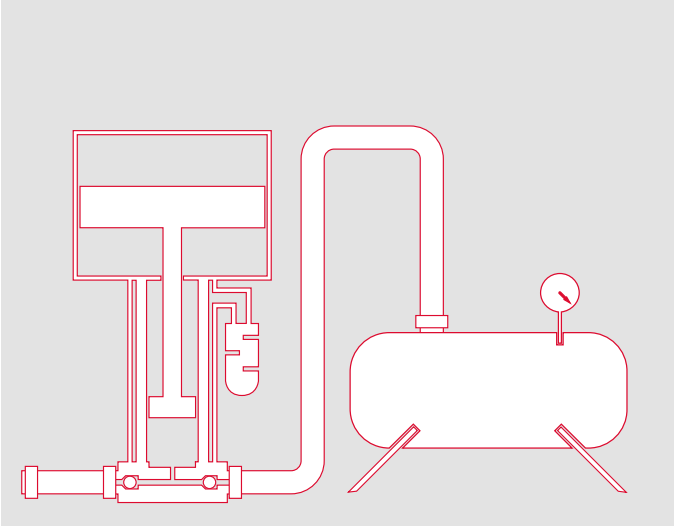
- » Filling of airbag systems with helium
- » High pressure gas supply for autoclave applications
- » Compression and pressure regulation of N_2 or CO_2 for gas assisted molding applications in the plastics industry
- » High pressure gas supply for physical foaming with N_2, CO_2, propane or butane
- » High pressure nitrogen supply for mirror chambers of laser cutting systems
- » Purge and recovery applications for expensive or hazardous gases (e.g. argon, helium, SF6, xenon, etc.)
- » High pressure supply for hydrogen applications and hydrogen research
- » Gas supply for mechanical seals in the chemical, petrochemical and life science sectors

Gas compression for high pressure testing applications

Increasing quality requirements mean that components that are under pressure must also be tested with gas - and in many cases also with the respective process gas. In these cases in particular, the high flexibility of Maximator gas boosters and the safe operation of the devices are major advantages for users.

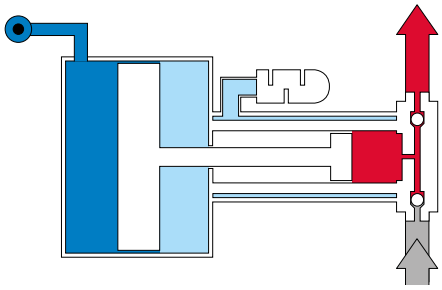
- » Gas supply for pressure and leak tests with a wide variety of technical gases and gas mixtures
- » High pressure supply for helium leak detection applications
- » Gas compression for calibration applications
- » High pressure supply for adjusting valves with gas
- » Functional tests with gases under high pressure





Gas booster Series
» DLE...-1 single stage, single acting, 1 air drive section

Maximator gas boosters in single stage, single acting design with 1 air drive piston are suitable for the use in hazardous areas of Zone 1, device group II, device category 2G, explosion group II B. The compact and effective gas boosters with one air drive and one high pressure section are available in different pressure ratios. They are ideal for mobile applications with operating pressures of up to 750 bar.



Working principle DLE 15-1

DLE...- 1

- Single acting
- Single stage
- With one air drive section
- Working pressure up to 750 bar (10875 psi)
- Formula for gas outlet pressure: $p_B = p_L * i$
- Material: compressor head, high pressure cylinders and high-pressure pistons as well as fittings made of aluminum (DLE 2-1 / DLE 5-1) or stainless steel (DLE 15-1 / DLE 30-1 / DLE 75-1); PTFE seals.
- All gas boosters are equipped with media separation (Z) and flushing connection (SFP) (Z-connections, SFP = G 1/8 “).
- Active cooling from DLE 5-1 included as standard
- Suitable for air drive pressures (p_L) from 1 to 10 bar (14.5 to 145 psi)

Options for DLE ... - 1

- Special sealing options for high and low temperature applications (-40 up to +120 °C)
- ECO-Option to reduce the air consumption
- EXIIC-Option (Device group IIC)
- FEC-Option for dry compressed air or nitrogen drive
- C-Option for CO_2 applications
- S-Option for O_2 applications
- H2-Option for H_2 applications
- Various connections for inlet / outlet (BSP, NPT, UNF)

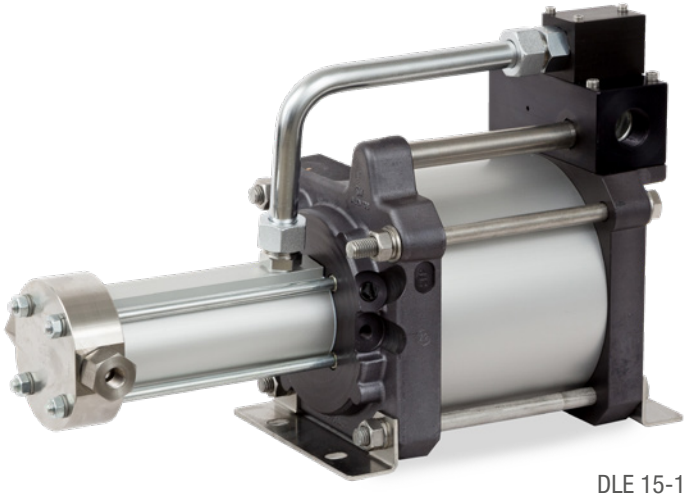
Type	Pressure ratio i *	Stroke volume**		max. working pressure p_B***		min. gas inlet pressure p_{Amin}		max. gas inlet pressure p_{Amax}	
		[cm³]	[in³]	[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
DLE 2-1	1:2	922	56,3	20	290	0	0	20	290
DLE 5-1	1:5	373	22,8	50	725	2	29	50	725
DLE 15-1	1:15	122	7,4	150	2175	7	102	150	2175
DLE 30-1	1:30	60	3,7	300	4350	15	218	300	4350
DLE 75-1	1:75	25	1,5	750	10875	35	508	750	10875

* Pressure ratio of air drive piston surface area to output piston surface area

** Calculated stroke volume

*** Maximum permissible static working pressure

p_A = Gas inlet pressure
p_B = Working pressure
p_L = Air drive pressure
i = Pressure ratio

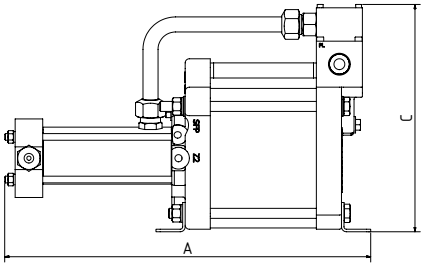


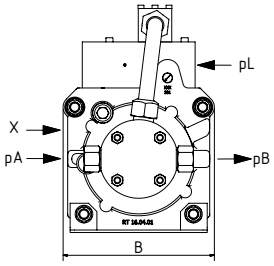
DLE 15-1

Accessories:

- Air control unit
- Pressure switches
- Cooler
- Spare part sets
- Valves, Fittings, Tubing
- Gas booster stations ready for connection according to specification

Further options and accessories on request.

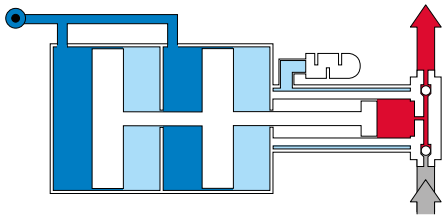




Type	Connections [in]			Dimensions [mm]			Weight [kg]
	Drive air	Inlet A	Outlet B	A	B	C	
DLE 2-1	G 3/4	G 1/2	G 1/2	435	181	272	15,3
DLE 5-1	G 3/4	G 1/2	G 1/2	433	181	272	12,8
DLE 15-1	G 3/4	G 1/4	G 1/4	438	181	272	13
DLE 30-1	G 3/4	G 1/4	G 1/4	438	181	272	12,6
DLE 75-1	G 3/4	G 1/4	G 1/4	441	181	272	12,9

Gas booster Series
» DLE...-1-2 single stage, single acting, 2 air drive sections

Maximator gas boosters in single stage, single acting design with 2 air drive pistons are suitable for the use in hazardous areas of Zone 1, device group II, device category 2G, explosion group II B. The effective gas boosters with two air drive sections and one high pressure section are available in different pressure ratios. These devices are specially designed for applications with a high operating pressure but only low available air drive pressure.



Working principle DLE 15-1-2

DLE ... -1 - 2

- » Single acting
- » Single stage
- » With two air drive sections
- » Working pressure up to 1500 bar (21750 psi)
- » Formula for gas outlet pressure: $p_B = p_L * i$
- » Material: compressor head, high pressure cylinders and high-pressure pistons as well as fittings made of aluminum (DLE 2-1-2/ DLE 5-1-2) or stainless steel (DLE 15-1-2/ DLE 30-1-2/DLE 75-1-2); PTFE seals.
- » All gas boosters are equipped with media separation (Z) and flushing connection (SFP) (Z-connections, SFP = G 1/8 “).
- » Active cooling from DLE 5-1-2 included as standard
- » Suitable for air drive pressures (p_L) from 1 to 10 bar (14.5 to 145 psi)

Options for DLE ... - 1-2

- » Special sealing options for high and low temperature applications (-40 up to +120 °C)
- » ECO-Option to reduce the air consumption
- » EXIIC-Option (Device group IIC)
- » FEC-Option for dry compressed air or nitrogen drive
- » C-Option for CO_2 applications
- » S-Option for O_2 applications
- » H2-Option for H_2 applications
- » Various connections for inlet / outlet (BSP, NPT, UNF)

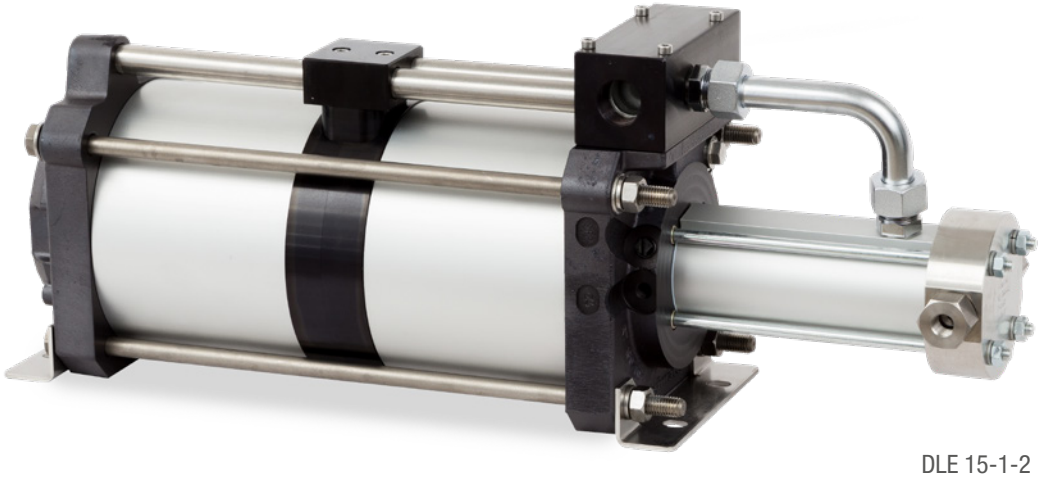
Type	Pressure ratio i *	Stroke volume**		max. working pressure p_B***		min. gas inlet pressure p_{Amin}		max. gas inlet pressure p_{Amax}	
		[cm³]	[in³]	[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
DLE 2-1-2	1:4	922	56,3	40	580	0	0	40	580
DLE 5-1-2	1:10	373	22,8	100	1450	4	58	100	1450
DLE 15-1-2	1:30	122	7,4	300	4350	10	145	300	4350
DLE 30-1-2	1:60	60	3,7	600	8700	20	290	600	8700
DLE 75-1-2	1:150	25	1,5	1500	21750	50	725	1500	21750

* Pressure ratio of air drive piston surface area to output piston surface area

** Calculated stroke volume

*** Maximum permissible static working pressure

p_A = Gas inlet pressure
p_B = Working pressure
p_L = Air drive pressure
i = Pressure ratio

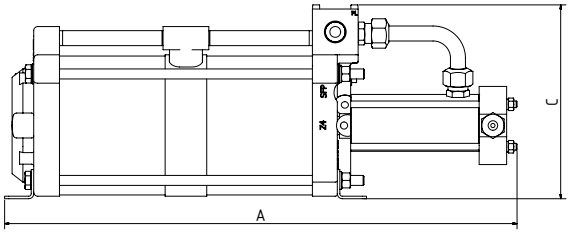


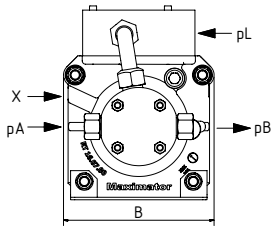
DLE 15-1-2

Accessories:

- Air control unit
- Pressure switches
- Cooler
- Spare part sets
- Valves, Fittings, Tubing
- Gas booster stations ready for connection according to specification

Further options and accessories on request.





DLE 2-1-2****

Type	Connections [in]			Dimensions [mm]			Weight [kg]
	Drive air	Inlet A	Outlet B	A	B	C	
DLE 2-1-2	G 3/4	G 1/2	G 1/2	611	181	272	25,7
DLE 5-1-2	G 3/4	G 1/2	G 1/2	611	181	233	21
DLE 15-1-2	G 3/4	G 1/4	G 1/4	616	181	233	21,5
DLE 30-1-2	G 3/4	G 1/4	G 1/4	616	181	233	21,4
DLE 75-1-2	G 3/4	G 1/4	G 1/4 ❗	619	181	233	20

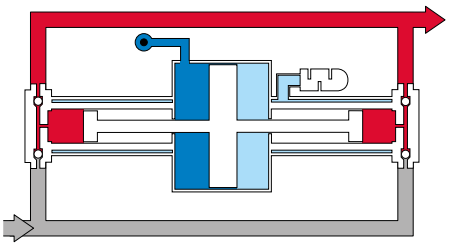
❗ High pressure gas booster with outlet connections type BSPP or NPT are suitable for outlet pressures of up to 1050 bar (15000 psi). For higher outlet pressures, the gas boosters must be ordered with high pressure connections according to the required pressure range.

**** The position and dimensions of the connections can be found in the product drawings and data sheets.

Gas booster Series

» DLE... single stage, double acting, 1 air drive section

Maximator gas boosters in single stage, double acting design with 1 air drive piston are suitable for the use in hazardous areas of Zone 1, device group II, device category 2G, explosion group II B. The compact and effective gas boosters with one air drive and two high pressure sections are available in different pressure ratios. They are ideal for mobile applications with a comparatively high volume flow.



Working principle DLE 15

DLE ...

- » Double acting
- » Single stage
- » With one air drive section
- » Working pressure up to 1500 bar (21750 psi)
- » Formula for gas outlet pressure: $p_B = p_L * i + p_A$
- » Material: compressor head, high pressure cylinders and high-pressure pistons as well as fittings made of aluminum (DLE 2/ DLE 5) or stainless steel (DLE 15/DLE 30/DLE 75); PTFE seals.
- » All gas boosters are equipped with Media separation (Z) and flushing connection (SFP) (Z-connections, SFP = G 1/8 “).
- » Active cooling from DLE 5 included as standard
- » Suitable for air drive pressures (p_L) from 1 to 10 bar (14.5 to 145 psi)

Options for DLE ...

- » Special sealing options for high and low temperature applications (-40 up to +120 °C)
- » EXIIC-Option (Device group IIC)
- » FEC-Option for dry compressed air or nitrogen drive
- » C-Option for CO_2 applications
- » S-Option for O_2 applications
- » H2-Option for H_2 applications
- » Various connections for inlet / outlet (BSP, NPT, UNF)

Type	Pressure ratio i *	Stroke volume**		max. working pressure p_B***		min. gas inlet pressure p_{Amin}		max. gas inlet pressure p_{Amax}	
		[cm³]	[in³]	[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
DLE 2	1:2	1844	112,5	40	580	0	0	40	580
DLE 5	1:5	746	45,5	100	1450	2	29	100	1450
DLE 15	1:15	244	14,9	300	4350	7	102	300	4350
DLE 30	1:30	120	7,3	600	8700	15	218	600	8700
DLE 75	1:75	50	3	1500	21750	35	508	1500	21750

* Pressure ratio of air drive piston surface area to output piston surface area

** Calculated stroke volume

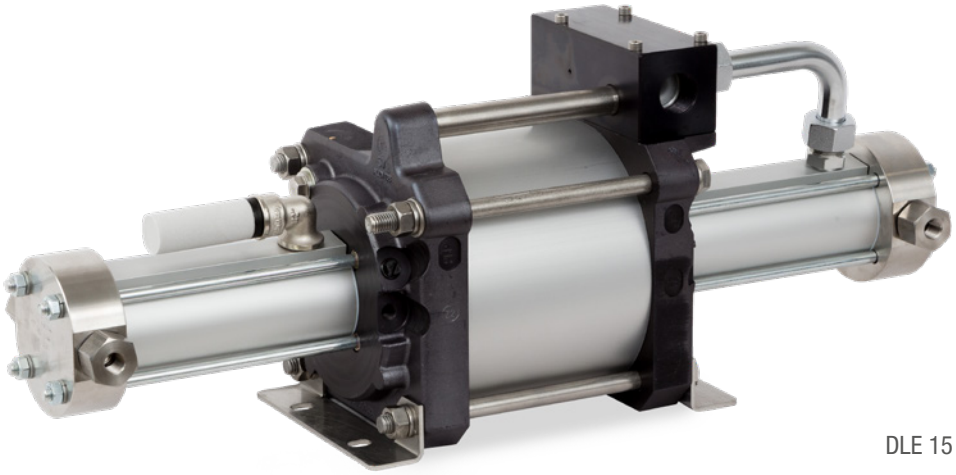
*** Maximum permissible static working pressure

p_A = Gas inlet pressure

p_B = Working pressure

p_L = Air drive pressure

i = Pressure ratio

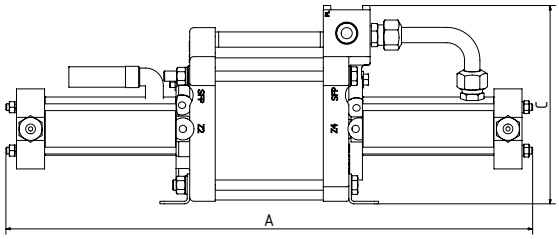


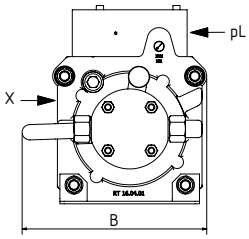
DLE 15

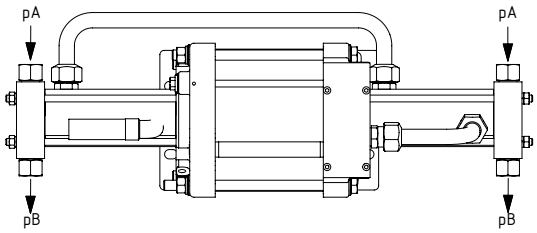
Accessories:

- Air control unit
- Pressure switches
- Cooler
- Spare part sets
- Valves, Fittings, Tubing
- Gas booster stations ready for connection according to specification

Further options and accessories on request.





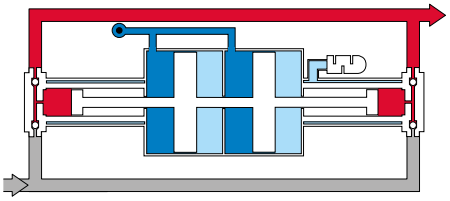


Type	Connections [in]			Dimensions [mm]			Weight [kg]
	Drive air	Inlet A	Outlet B	A	B	C	
DLE 2	G 3/4	G 1/2	G 1/2	610	181	272	20
DLE 5	G 3/4	G 1/2	G 1/2	609	219	233	18,1
DLE 15	G 3/4	G 1/4	G 1/4	619	217	233	19
DLE 30	G 3/4	G 1/4	G 1/4	619	217	233	19,4
DLE 75	G 3/4	G 1/4	G 1/4 ❗	625	217	233	18,2

❗ High pressure gas booster with outlet connections type BSPP or NPT are suitable for outlet pressures of up to 1050 bar (15000 psi). For higher outlet pressures, the gas boosters must be ordered with high pressure connections according to the required pressure range.

Gas booster Series
» DLE...-2 single stage, double acting, 2 air drive sections

Maximator gas boosters in single stage, double acting design with 2 air drive pistons are suitable for the use in hazardous areas of Zone 1, device group II, device category 2G, explosion group II B. The compact and effective gas boosters with two air drive and two high pressure sections are available in different pressure ratios. These devices are especially designed for applications in which a high operating pressure and a comparatively high volume flow are required, but only a low air drive pressure is available.



Working principle DLE 15-2

DLE ... - 2

- » Double acting
- » Single stage
- » With two air drive sections
- » Working pressure up to 1500 bar (21750 psi)
- » Formula for gas outlet pressure: $p_B = p_L * i + p_A$
- » Material: compressor head, high pressure cylinders and high-pressure pistons as well as fittings made of aluminum (DLE 2-2/ DLE 5-2) or stainless steel (DLE 15-2/ DLE 30-2/DLE 75-2); PTFE seals.
- » All gas boosters are equipped with media separation (Z) and flushing connection (SFP) (Z-connections, SFP = G 1/8 “).
- » Active cooling from DLE 5-2 included as standard
- » Suitable for air drive pressures (p_L) from 1 to 10 bar (14.5 to 145 psi)

Options for DLE ...

- » Special sealing options for high and low temperature applications (-40 up to +120 °C)
- » EXIIC-Option (Device group IIC)
- » FEC-Option for dry compressed air or nitrogen drive
- » C-Option for CO_2 applications
- » S-Option for O_2 applications
- » H2-Option for H_2 applications
- » Various connections for inlet / outlet (BSP, NPT, UNF)

Type	Pressure ratio i *	Stroke volume**		max. working pressure p_B***		min. gas inlet pressure p_{Amin}		max. gas inlet pressure p_{Amax}	
		[cm³]	[in³]	[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
DLE 2-2	1:4	1844	112,5	40	580	0	0	40	580
DLE 5-2	1:10	746	45,5	100	1450	5	73	100	1450
DLE 15-2	1:30	244	14,9	300	4350	7	102	300	4350
DLE 30-2	1:60	120	7,3	600	8700	20	290	600	8700
DLE 75-2	1:150	50	3	1500	21750	45	653	1500	21750

* Pressure ratio of air drive piston surface area to output piston surface area

** Calculated stroke volume

*** Maximum permissible static working pressure

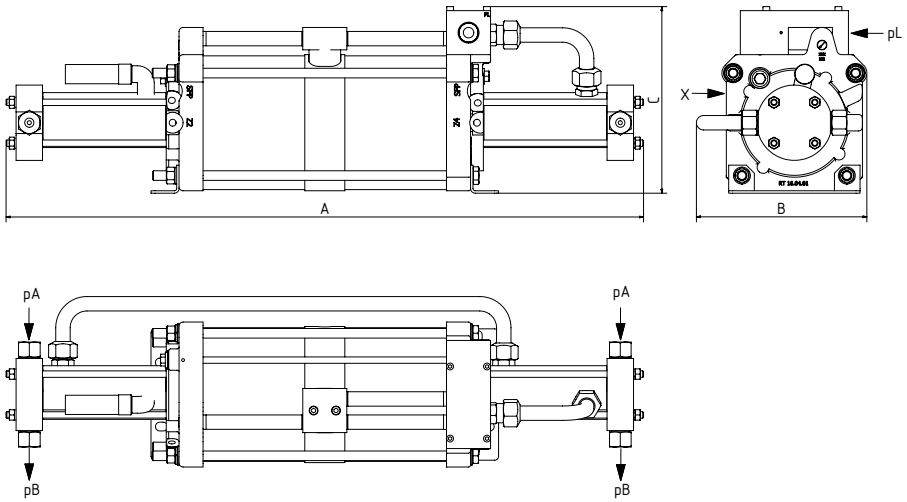
p_A = Gas inlet pressure
p_B = Working pressure
p_L = Air drive pressure
i = Pressure ratio

DLE 15-2

Accessories:

- Air control unit
- Pressure switches
- Cooler
- Spare part sets
- Valves, Fittings, Tubing
- Gas booster stations ready for connection according to specification

Further options and accessories on request.

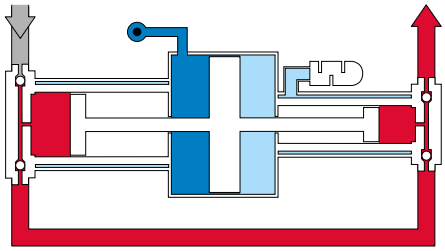


Type	Connections [in]			Dimensions [mm]			Weight [kg]
	Drive air	Inlet A	Outlet B	A	B	C	
DLE 2-2	G 3/4	G 1/2	G 1/2	787	181	272	27,5
DLE 5-2	G 3/4	G 1/2	G 1/2	786	220	233	25,9
DLE 15-2	G 3/4	G 1/4	G 1/4	796	213	233	25,3
DLE 30-2	G 3/4	G 1/4	G 1/4	796	213	233	24,1
DLE 75-2	G 3/4	G 1/4	G 1/4 ❗	802	213	233	25,3

❗ High pressure gas booster with outlet connections type BSPP or NPT are suitable for outlet pressures of up to 1050 bar (15000 psi). For higher outlet pressures, the gas boosters must be ordered with high pressure connections according to the required pressure range.

Gas booster Series
» DLE...-... two stage, 1 air drive section

Maximator gas boosters in two stage design with 1 air drive piston are suitable for the use in hazardous areas of Zone 1, device group II, device category 2G, explosion group II B. The compact and effective gas boosters with one air drive and two high pressure sections are available in different pressure ratios. By combining two different pressure stages and the effective cooling of both stages, even high compression ratios can be realised with just one gas booster.



Working principle DLE 15-30

DLE ...-...

- Two stage
- With one air drive section
- Working pressure up to 1500 bar (21750 psi)
- Formula for gas outlet pressure: see table

- Material: compressor head, high pressure cylinders and high-pressure pistons as well as fittings made of aluminum (Stages 2 and 5) or stainless steel (Stages 15, 30 and 75); PTFE seals.

- All gas boosters are equipped with media separation (Z) and flushing connection (SFP) (Z-connections, SFP = G 1/8 “).

- Active cooling from DLE 2-5, stage 5 included as standard

- Suitable for air drive pressures (p_L) from 1 to 10 bar (14.5 to 145 psi)

Options for DLE ... -...

- Special sealing options for high and low temperature applications (-40 up to +120 °C)
- EXIIC-Option (Device group IIC)
- FEC-Option for dry compressed air or nitrogen drive
- C-Option for CO_2 applications
- S-Option for O_2 applications
- H2-Option for H_2 applications
- ZK option: intercooler for gas cooling after the first compression stage
- Various connections for inlet / outlet (BSP, NPT, UNF)

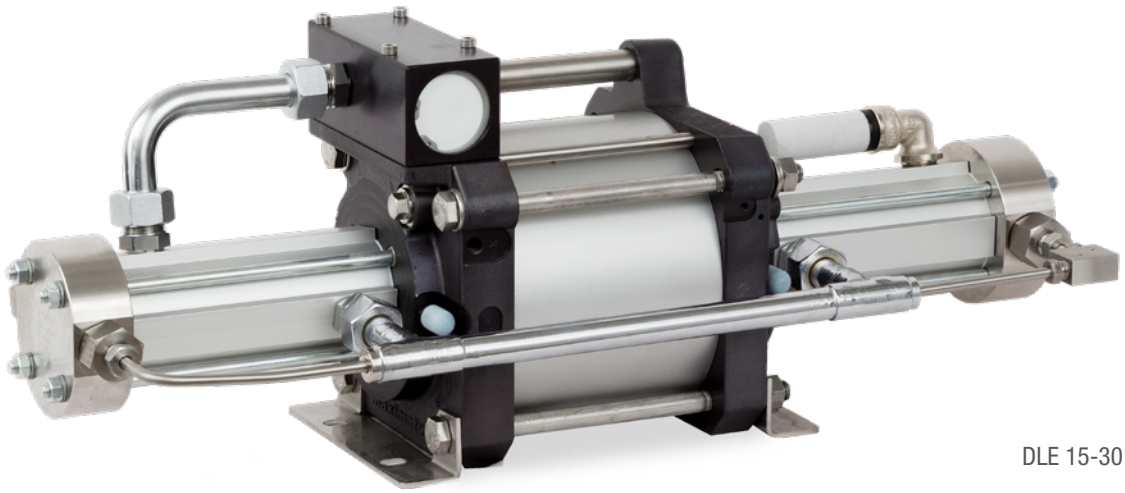
Type	Pressure ratio i_1 / i_2 *	Stroke volume **		max. working pressure p_B ***		min. gas inlet pressure p_{Amin}		max. gas inlet pressure P_{Amax}
		[cm³]	[in³]	[bar]	[psi]	[bar]	[psi]	
DLE 2-5	1:2 / 1:5	922	56,3	70	1015	0	0	0,8*p_L
DLE 5-15	1:5 / 1:15	373	22,8	198	2870	2	29	1,6*p_L
DLE 5-30	1:5 / 1:30	373	22,8	330	4785	2	29	0,5*p_L
DLE 15-30	1:15 / 1:30	122	7,4	450	6525	7	102	7,5*p_L
DLE 15-75	1:15 / 1:75	122	7,4	875	12685	7	102	2,5*p_L
DLE 30-75	1:30 / 1:75	60	3,7	1050	15500	15	218	12*p_L

* Pressure ratio of air drive piston surface area to output piston surface area

** Calculated stroke volume

*** Maximum permissible static working pressure

p_A = Gas inlet pressure
p_B = Working pressure
p_L = Air drive pressure
i = Pressure ratio

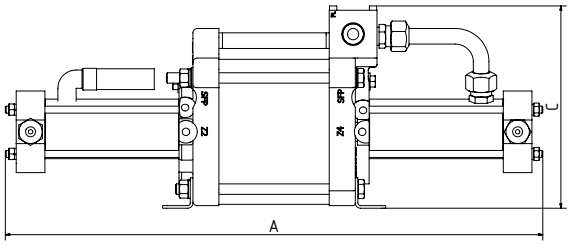


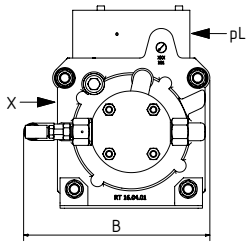
DLE 15-30

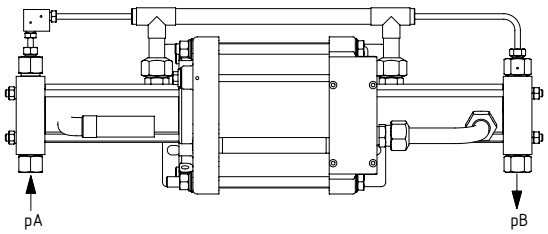
Accessories:

- Air control unit
- Pressure switches
- Cooler
- Spare part sets
- Valves, Fittings, Tubing
- Gas booster stations ready for connection according to specification

Further options and accessories on request.





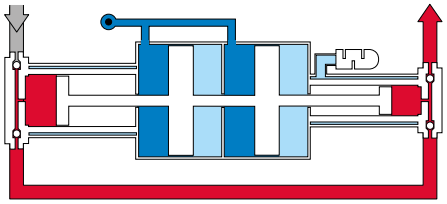


Type	Formula for gas outlet pressure p_B	Connections [in]			Dimensions [mm]			Weight [kg]
		Drive air	Inlet A	Outlet B	A	B	C	
DLE 2-5	$p_B=5*p_L+5/2*p_A$	G 3/4	G 1/2	G 1/2	611	235	233	19,8
DLE 5-15	$p_B=15*p_L+15/5*p_A$	G 3/4	G 1/2	G 1/4	614	259	233	18,5
DLE 5-30	$p_B=30*p_L+30/5*p_A$	G 3/4	G 1/2	G 1/4	614	259	233	19,5
DLE 15-30	$p_B=30*p_L+30/15*p_A$	G 3/4	G 1/4	G 1/4	619	215	233	19,8
DLE 15-75	$p_B=75*p_L+75/15*p_A$	G 3/4	G 1/4	G 1/4	622	215	233	19,3
DLE 30-75	$p_B=75*p_L+75/30*p_A$	G 3/4	G 1/4	G 1/4 ❗	622	215	233	18,2

❗ High pressure gas booster with outlet connections type BSPP or NPT are suitable for outlet pressures of up to 1050 bar (15000 psi). For higher outlet pressures, the gas boosters must be ordered with high pressure connections according to the required pressure range.

Gas booster Series
» DLE...-...-2 two stage, 2 air drive sections

Maximator gas boosters in two stage design with 2 air drive pistons are suitable for the use in hazardous areas of Zone 1, device group II, device category 2G, explosion group II B. The compact and effective gas boosters with two air drive and two high pressure sections are available in different pressure ratios. By combining two different pressure stages and the effective cooling of both stages, even high compression ratios can be realised with just one gas booster and low available air drive pressure.



Working principle DLE 15-30-2

DLE...-...- 2

- Two stage
- With two air drive sections
- Working pressure up to 2100 bar (30000 psi)
- Formula for gas outlet pressure: see table
- Material: compressor head, high pressure cylinders and high-pressure pistons as well as fittings made of aluminum (Stages 2 and 5) or stainless steel (Stages 15, 30 and 75); PTFE seals.
- All gas boosters are equipped with media separation (Z) and flushing connection (SFP) (Z-connections, SFP = G 1/8 “).
- Active cooling from DLE 2-5-2, stage 5 included as standard
- Suitable for air drive pressures (pL) from 1 to 10 bar (14.5 to 145 psi)

Options for DLE... -...-2

- Special sealing options for high and low temperature applications (-40 up to +120 °C)
- EXIIC-Option (Device group IIC)
- FEC-Option for dry compressed air or nitrogen drive
- C-Option for CO_2 applications
- S-Option for O_2 applications
- H2-Option for H_2 applications
- ZK option: intercooler for gas cooling after the first compression stage
- Various connections for inlet / outlet (BSP, NPT, UNF)

Type	Pressure ratio i_1 / i_2 *	Stroke volume**		max. working pressure p_B***		min. gas inlet pressure p_{Amin}		max. gas inlet pressure p_{Amax}
		[cm³]	[in³]	[bar]	[psi]	[bar]	[psi]	
DLE 2-5-2	1:4 / 1:10	922	56,3	100	1450	0	0	1,6*p_L
DLE 5-15-2	1:10 / 1:30	373	22,8	300	4350	2	29	3,2*p_L
DLE 5-30-2	1:10 / 1:60	373	22,8	600	8700	2	29	1*p_L
DLE 15-30-2	1:30 / 1:60	122	7,4	600	8700	7	102	15*p_L
DLE 15-75-2	1:30 / 1:150	122	7,4	1500	21750	7	102	5*p_L
DLE 30-75-2	1:60 / 1:150	60	3,7	1500	21750	15	218	24*p_L
DLE 30-75-2-25	1:60 / 1:150	60	3,7	1800	25000	15	218	24*p_L
DLE 30-75-2-30	1:60 / 1:150	60	3,7	2100	30000	15	218	24*p_L

* Pressure ratio of air drive piston surface area to output piston surface area

** Calculated stroke volume

*** Maximum permissible static working pressure

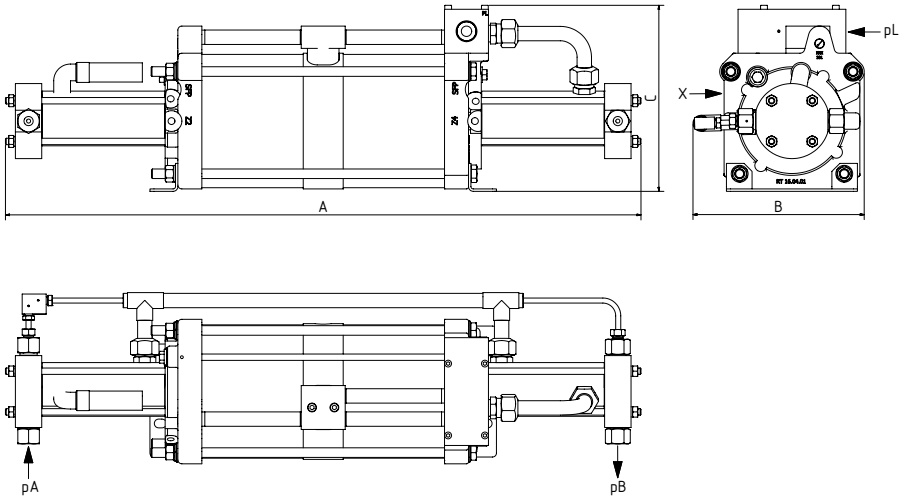
p_A = Gas inlet pressure
p_B = Working pressure
p_L = Air drive pressure
i = Pressure ratio

DLE 15-30-2

Accessories:

- Air control unit
- Pressure switches
- Cooler
- Spare part sets
- Valves, Fittings, Tubing
- Gas booster stations ready for connection according to specification

Further options and accessories on request.



Type	Formula for gas outlet pressure p_B	Connections ["]			Dimensions [mm]			Weight [kg]
		Luft	Einlass A	Auslass B	A	B	C	
DLE 2-5-2	$p_B=10*p_L+10/4*p_A$	G 3/4	G 1/2	G 1/2	788	235	233	20
DLE 5-15-2	$p_B=30*p_L+30/10*p_A$	G 3/4	G 1/2	G 1/4	791	257	233	27,3
DLE 5-30-2	$p_B=60*p_L+60/10*p_A$	G 3/4	G 1/2	G 1/4	791	257	233	27,2
DLE 15-30-2	$p_B=60*p_L+60/30*p_A$	G 3/4	G 1/4	G 1/4	796	215	233	25,4
DLE 15-75-2	$p_B=150*p_L+150/30*p_A$	G 3/4	G 1/4	G 1/4 ❗	799	215	233	16,3
DLE 30-75-2	$p_B=150*p_L+150/60*p_A$	G 3/4	G 1/4	G 1/4 ❗	799	215	233	25,4
DLE 30-75-2-25	$p_B=150*p_L+150/60*p_A$	G 3/4	G 1/4	9-16-18UNF (4H)	822	272	233	25,4
DLE 30-75-2-30	$p_B=150*p_L+150/60*p_A$	G 3/4	G 1/4	9-16-18UNF (4H)	822	272	233	25,4

❗ High pressure gas booster with outlet connections type BSPP or NPT are suitable for outlet pressures of up to 1050 bar (15000 psi). For higher outlet pressures, the gas boosters must be ordered with high pressure connections according to the required pressure range.

Gas booster Series
» DLE...-...-3 two stage, 3 air drive sections

Maximator gas boosters in two stage design with 2 air drive pistons are suitable for the use in hazardous areas of Zone 1, device group II, device category 2G, explosion group II B. The ultra-high pressure gas booster with three air drive and two high pressure sections is developed for the compression of technical gases up to 2400 bar (36000 psi).

DLE ...-...-3

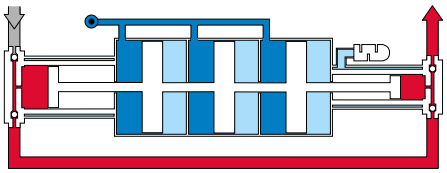
- Two stage
- With three air drive sections
- Working pressure up to 2400 bar (36000 psi)
- Formula for gas outlet pressure: see table

- Material: compressor head, high pressure cylinders and high-pressure pistons as well as fittings made of stainless steel; PTFE seals.

- All gas boosters are equipped with media separation (Z) and flushing connection (SFP) (Z-connections, SFP = G 1/8 “).

- Active cooling included as standard

- Suitable for air drive pressures (p_L) from 1 to 10 bar (14.5 to 145 psi)



Working principle DLE 30-75-3

Options for DLE... -...-3

- Special sealing options for high and low temperature applications (-40 up to +120 °C)
- EXIIC-Option (Device group IIC)
- FEC-Option for dry compressed air or nitrogen drive
- ZK option: intercooler for gas cooling after the first compression stage

Type	Pressure ratio i_1 / i_2 *	Stroke volume**		max. working pressure p_B***		min. gas inlet pressure p_{Amin}		max. gas inlet pressure p_{Amax}
		[cm³]	[in³]	[bar]	[psi]	[bar]	[psi]	
DLE 30-75-3-36	1:90 / 1:225	60	3,7	2400	36000	30	435	30*p_L

* Pressure ratio of air drive piston surface area to output piston surface area

** Calculated stroke volume

*** Maximum permissible static working pressure

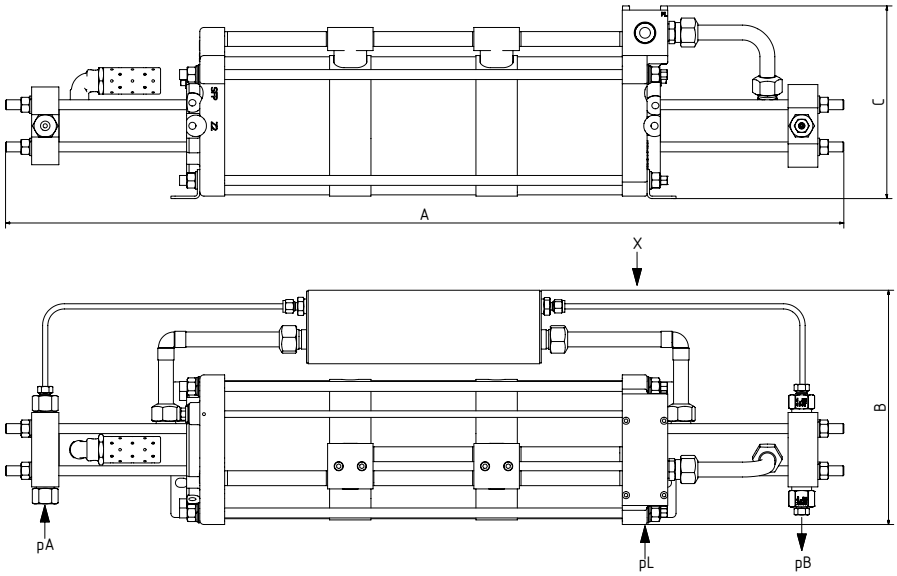
p_A = Gas inlet pressure
p_B = Working pressure
p_L = Air drive pressure
i = Pressure ratio

DLE 30-75-3 with intercooler

Accessories:

- Air control unit
- Pressure switches
- Spare part sets
- Valves, Fittings, Tubing
- Gas booster stations ready for connection according to specification

Further options and accessories on request.



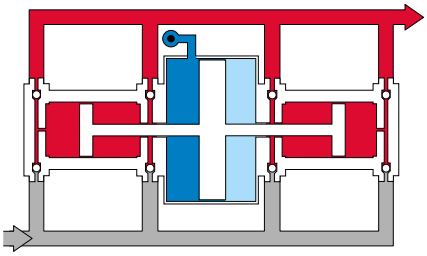
Type	Formula for gas outlet pressure p_B	Connections ["]			Dimensions [mm]			Weight [kg]
		Drive air	Inlet A	Outlet B	A	B	C	
DLE 30-75-3-36	$p_B=225*p_L+225/90*p_A$	G 3/4	G 1/4	9-16-18UNF (4H)	1014	283	233	39,4

Gas booster Series
» 8DLE... 8“- Drive

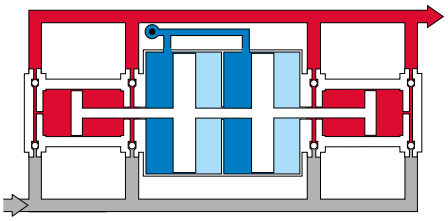
Maximator gas boosters in single stage, double or quadruple acting design with one or two air drive pistons are suitable for the use in hazardous areas of Zone 1, device group II, device category 2G, explosion group II B. The effective gas boosters with 200 mm (8") drive pistons are available in different pressure ratios and specially designed for high, continuous delivery rates.

8DLE...

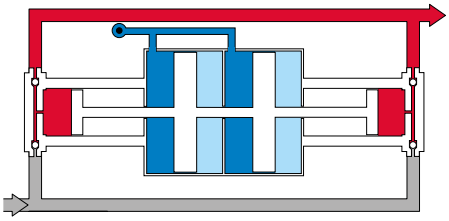
- » Double or quadruple acting
- » Single stage
- » With one or air drive section
- » Working pressure up to 300 bar (4350 psi)
- » Formula for gas outlet pressure:
  $p_B = i * p_L + p_A$
- » Material: compressor head, high pressure
- » cylinders and high-pressure pistons as well
- » as fittings made of aluminum (8DLE 3/ 8DLE 6) or stainless steel (8DLE 1,65); PTFE seals.
- » All gas boosters of the 8DLE Series are equipped with media separation (Z) (Z-connections = G 1/8 “).
- » Suitable for air drive pressures (p_L) from 1 to 10 bar (14.5 to 145 psi)



Working principle 8DLE 1,65



Working principle 8DLE 3



Working principle 8DLE 6

Options for 8DLE...

- » Special sealing options for high and low temperature applications (-40 up to +120 °C)
- » EXIIC-Option (Device group IIC)
- » ASS-Option: Air drive section made of stainless steel
- » HMR-Option: High pressure section made of stainless seel in accordance with NACE MR0175 oder MR0103
- » Various connections for inlet / outlet (BSP, NPT, 1/2" welding flange)

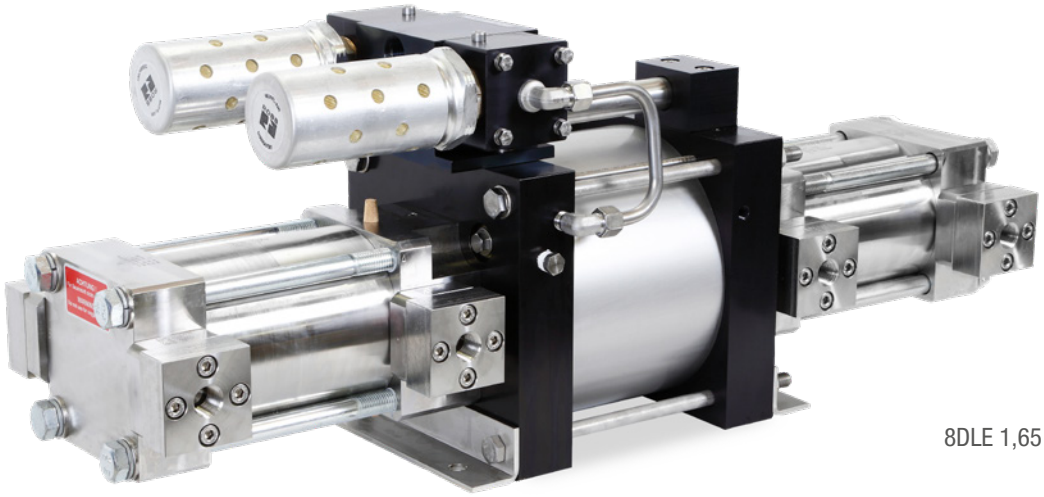
Type	Pressure ratio i *	Stroke volume**		max. working pressure p_B***		min. gas inlet pressure p_A		max. gas inlet pressure p_A	
		[cm³]	[in³]	[bar]	[psi]	[bar]	[psi]	[bar]	[psi]
8DLE 1,65	1:1,65	4100	250,2	300	4350	0	0	300	4350
8DLE 3	1:3	4100	250,2	40	580	0	0	40	580
8DLE 6	1:6	2050	125,1	40	580	0	0	40	580

* Pressure ratio of air drive piston surface area to output piston surface area

** Calculated stroke volume

*** Maximum permissible static working pressure

p_A = Gas inlet pressure
p_B = Working pressure
p_L = Air drive pressure
i = Pressure ratio

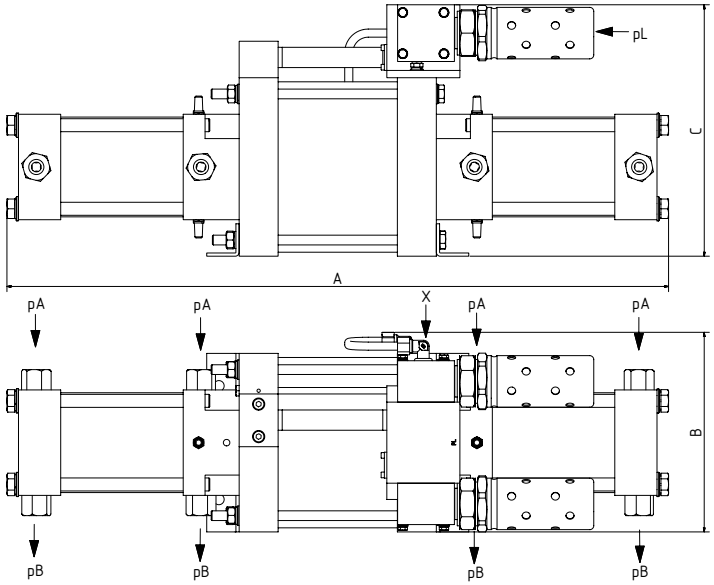


8DLE 1,65

Accessories:

- Air control unit
- Pressure switches
- Cooler
- Spare part sets
- Valves, Fittings, Tubing
- Gas booster stations ready for connection according to specification

Further options and accessories on request.



Type	Connections ["]			Dimensions [mm]			Weight [kg]
	Luft	Einlass A	Auslass B	A	B	C	
8DLE 1,65	G 3/4	G 1/2	G 1/2	815	246	310	70
8DLE 3	G 3/4	G 1/2	G 1/2	978	249	310	52
8DLE 6	G 3/4	G 1/2	G 1/2	978	249	310	52

» Flow capacity

The flow capacity of gas boosters mainly depends on the air drive pressure and, in the case of double-acting or two-stage devices, also on the gas inlet pressure. Detailed performance curves can be found in the data sheets for the various gas booster types at www.maximator.de. The flow capacity tables shown here contain rounded values and are used to compare the gas booster types. Please consult Maximator to determine the expected performance characteristics for a specific application.

Type	p_L = 6 bar		
	p_A [bar]	p_B [bar]	Q [l_n/min]
DLE 2-1	2	5	120
DLE 2-1	2	8	85
DLE 5-30	2	40	55
DLE 5-30	2	120	40
DLE 5-30	3	40	75
DLE 5-30	3	120	55
DLE 2-1	4	5	200
DLE 2	4	5	400
DLE 2-1	4	8	145
DLE 2-5	4	8	180
DLE 2-1-2	4	8	210
DLE 2	4	8	340
8DLE 3	4	8	1060
DLE 5-1	4	15	80
DLE 5-1-2	4	15	95
DLE 2-5-2	4	15	125
DLE 2-1-2	4	15	155
DLE 5	4	15	160
DLE 5-2	4	15	165
DLE 2-2	4	15	300
8DLE 6	4	15	530
8DLE 3	4	15	840
DLE 5-1	4	25	35
DLE 2-2	4	25	85
DLE 5	4	25	90
DLE 2-5	4	25	175
DLE 5-1-2	4	40	65
DLE 5-15	4	40	90
8DLE 6	4	40	100
DLE 5-2	4	40	105
DLE 2-5-2	4	40	105
DLE 5-15	4	70	65
DLE 5-30-2	4	120	55
DLE 5-30-2	4	210	45
DLE 2-5	6	8	250
DLE 2-1-2	6	8	300
DLE 2	6	8	535
DLE 2-1-2	6	15	220
DLE 2	6	15	220
DLE 2-2	6	15	460
8DLE 6	6	15	750
8DLE 3	6	15	1300
DLE 2-5-2	6	25	180
DLE 2-2	6	25	190
8DLE 3	6	25	195
DLE 2-5	6	25	245
DLE 5-15	6	40	125
DLE 2-5-2	6	40	160

Type	p_L = 6 bar		
	p_A [bar]	p_B [bar]	Q [l_n/min]
8DLE 6	6	40	230
DLE 5-15-2	6	70	75
DLE 5-15	6	70	100
DLE 5-15-2	6	120	60
DLE 5-30-2	6	120	75
DLE 5-30-2	6	210	65
DLE 5-1	10	15	180
DLE 5-1-2	10	15	210
DLE 5-2	10	15	390
DLE 5	10	15	405
DLE 5-1	10	25	80
DLE 5	10	25	300
DLE 5-1-2	10	40	140
DLE 5-2	10	40	275
DLE 5-15-2	10	70	120
DLE 5-15-2	10	120	105
DLE 15-75	10	210	70
DLE 15-75	10	350	45
DLE 15-1	15	40	110
DLE 15	15	40	200
DLE 15-1	15	70	60
DLE 15-1-2	15	70	95
DLE 15-30	15	70	105
DLE 15	15	70	130
DLE 15-2	15	70	165
DLE 15-1-2	15	120	65
DLE 15-30	15	120	90
DLE 15-2	15	120	115
DLE 15-75	15	210	100
DLE 15-75-2	15	350	55
DLE 15-75	15	350	75
DLE 15-75-2	15	600	45
8DLE 1,65	22	25	4480
8DLE 1,65	22	30	1995
DLE 30-1	22	70	80
DLE 30	22	70	145
DLE 15-30	22	70	155
DLE 30-1	22	120	55
DLE 30-1-2	22	120	80
DLE 30	22	120	105
DLE 30-2	22	120	120
DLE 15-30	22	120	140
DLE 30-1-2	22	210	60
DLE 30-75	22	210	70
DLE 30-2	22	210	90
DLE 30-75	22	350	50
DLE 15-75-2	22	350	80
DLE 15-75-2	22	600	70

Type	p_L = 6 bar		
	p_A [bar]	p_B [bar]	Q [l_n/min]
DLE 15-1	34	40	240
DLE 15	34	40	500
DLE 15-1	34	70	130
DLE 15-1-2	34	70	213
DLE 15-2	34	70	390
DLE 15	34	70	400
DLE 15-30-2	34	120	130
DLE 15-1-2	34	120	150
DLE 15-2	34	120	300
DLE 30-75	34	210	115
DLE 15-30-2	34	350	60
DLE 30-75-2	34	350	60
DLE 30-75	34	350	90
DLE 30-75-2	34	600	50
8DLE 1,65	50	53	9900
8DLE 1,65	50	56	7540
DLE 30-1	50	70	180
DLE 30	50	70	355
DLE 30-1	50	120	130
DLE 30-1-2	50	120	170
DLE 15-30-2	50	120	195
DLE 30-2	50	120	285
DLE 30	50	120	290
DLE 30-1-2	50	210	140
DLE 30-2	50	210	225
DLE 15-30-2	50	350	115
DLE 75-1	75	210	100
DLE 75	75	210	205
DLE 75-1	75	350	55
DLE 75-1-2	75	350	100
DLE 75	75	350	135
DLE 30-75-2	75	350	140
DLE 75-2	75	350	155
DLE 75-1-2	75	600	70
DLE 75-2	75	600	110
DLE 30-75-2	75	600	120
DLE 75-1	115	210	155
DLE 75	115	210	330
DLE 75-1	115	350	85
DLE 75-1-2	115	350	150
DLE 75	115	350	240
DLE 75-2	115	350	245
DLE 75-1-2	115	600	105
DLE 75-2	115	600	180
DLE 30-75-3	120	1000	120
DLE 30-75-3	120	1600	15
DLE 30-75-3	170	1000	185
DLE 30-75-3	170	1600	60

p_L = Air drive pressure
p_A = Gas inlet pressure
p_B = Working pressure
Q = Flow capacity at working point

» Gas booster selection

The selection of a suitable Maximator gas booster takes various criteria into account, which essentially depend on the type of application and the specified application parameters.

For the selection based on a process, such as the testing of components in a defined time with a gas cylinder supply (i.e. a variable gas inlet and gas outlet pressure) we recommend consulting Maximator or its global partners for the correct selection of the suitable gas booster or gas booster combination.

However, if a specific operating point is defined for an application - i.e. continuous flow capacity at a defined gas outlet pressure and a constant gas inlet pressure - the selection can be made conveniently using the performance parameters from this catalog.

Depending on the general conditions of the application, it is advisable to consider further criteria (such as the installation space or the available air drive volume flow) when making the selection.

Gas booster selection for a defined operating point

An operating point indicates which volume flow Q a gas booster should generate at a required gas outlet pressure p_B with a specific gas inlet pressure p_A and an air drive pressure p_L.

The operating point for a gas booster is defined by:

1. Air drive pressure p_L
2. Gas inlet pressure p_A
3. Gas outlet pressure p_B (working pressure)
4. Flow capacity Q

The operating point enables different gas-boosters to be compared with each another despite their different design and working principle, and to be selected according to the requirements of the application.

First, the process media and the associated requirements for the operation have to be checked. An overview of the most common gases is given in the process fluids table, on page 31.

The next criteria is the required pressure ratio. By dividing the required gas outlet pressure with the available air drive pressure, we obtain the minimum required pressure ratio i. This means that the selection can be limited to a few options.

$$i = \frac{\text{Gas outlet pressure } p_B}{\text{Air drive pressure } p_L}$$

Another criteria is the compression ratio, which describes the ratio of gas outlet pressure to gas inlet pressure.

$$\varepsilon = \frac{\text{Gas outlet pressure } p_B}{\text{Gas inlet pressure } p_A}$$

The compression ratio is required to calculate the temperature increase during gas compression. The higher the compression ratio, the higher the temperature of the outlet gas during compression. It must be ensured that the maximum compression ratio of a gas booster is not exceeded. The product data are compiled in the "Overview technical features and connections" table, on page 30.

Example of gas booster selection

In the following, a selection for a specific operating point is carried out using a practical example. The selection is based on the following application parameters:

Process gas:	Nitrogen (N_2)
Gas inlet pressure p_A:	25 bar
Gas outlet pressure p_B:	150 bar
Air drive pressure p_L:	6 bar
Flow capacity Q:	min. 60 l_n/min

1. Process gas

The process gas for the sample selection is nitrogen. According to the process fluids table, all DLE models are suitable for nitrogen and no further restrictions regarding ventilation or purging (inerting) have to be considered.

2. Min. pressure ratio i

If the process parameters are entered in the formula for calculating the pressure ratio, the result is:

150 bar / 6 bar = 25 -> **i > 1:25**.

This means that all gas boosters with a pressure ratio of i > 1:25 are basically suitable. The devices with the next higher pressure ratio should preferably be selected - in this case all devices with i = 1:30.

3. Compression ratio

If the process parameters are entered in the formula for calculating the compression ratio, the result is:

150 bar / 25 bar = 6 -> ε **= 1:6**

This means that all gas boosters with a maximum permissible compression ratio of ε > 1:6 are suitable.

On the basis of the calculated pressure and compression ratios, the following gas boosters can be considered:

DLE 15-1-2
DLE 15-2
DLE 30-1
DLE 30

Taking into account the required volume flow, the DLE 30 delivers a sufficiently high flow capacity based on the process parameters for this example.

» Overview of technical features and connections

Type	Stroke volume	max. working pressure	max. compression ratio	pressure ratio	max. operating temperature	gas inlet pressure		Connections		Recommended pipe internal diameter		
	[cm³]	pB [bar]	ε	i	T [°C]	min. p_A [bar]	max. p_A [bar]	Inlet A	Outlet B	p_L [mm]	p_A [mm]	p_B [mm]
DLE 2-1	922	20	1:10	1:2	60	0	20	G 1/2	G 1/2	19	13	13
DLE 5-1	373	50	1:15	1:5	60	2	50	G 1/2	G 1/2	19	13	13
DLE 15-1	122	150	1:20	1:15	100	7	150	G 1/4	G 1/4	19	6	4
DLE 30-1	60	300	1:20	1:30	100	15	300	G 1/4	G 1/4	19	6	4
DLE 75-1	25	750	1:20	1:75	100	35	750	G 1/4	G 1/4	19	6	4
DLE 2-1-2	922	40	1:10	1:4	60	0	40	G 1/2	G 1/2	19	13	13
DLE 5-1-2	373	100	1:15	1:10	60	4	100	G 1/2	G 1/2	19	13	13
DLE 15-1-2	122	300	1:20	1:30	100	10	300	G 1/4	G 1/4	19	6	4
DLE 30-1-2	60	600	1:20	1:60	100	20	600	G 1/4	G 1/4	19	6	4
DLE 75-1-2	25	1500	1:20	1:150	100	45	1500	G 1/4	G 1/4	19	6	4
DLE 2	1844	40	1:10	1:2	60	0	40	G 1/2	G 1/2	19	13	13
DLE 5	746	100	1:15	1:5	60	2	100	G 1/2	G 1/2	19	13	13
DLE 15	244	300	1:20	1:15	100	7	300	G 1/4	G 1/4	19	6	4
DLE 30	120	600	1:20	1:30	100	15	600	G 1/4	G 1/4	19	6	4
DLE 75	50	1500	1:20	1:75	100	35	1500	G 1/4	G 1/4	19	6	4
DLE 2-2	1844	40	1:10	1:4	60	0	40	G 1/2	G 1/2	19	13	13
DLE 5-2	746	100	1:15	1:10	60	4	100	G 1/2	G 1/2	19	13	13
DLE 15-2	244	300	1:20	1:30	100	10	300	G 1/4	G 1/4	19	6	4
DLE 30-2	120	600	1:20	1:60	100	20	600	G 1/4	G 1/4	19	6	4
DLE 75-2	50	1500	1:20	1:150	100	45	1500	G 1/4	G 1/4	19	6	4
DLE 2-5	922	70	1:25	1:2/1:5	60	0	0,8 x p_L	G 1/2	G 1/2	19	13	13
DLE 5-15	373	198	1:45	1:5/1:15	100	2	1,6 x p_L	G 1/2	G 1/4	19	13	4
DLE 5-30	373	330	1:90	1:5/1:30	100	2	0,5 x p_L	G 1/2	G 1/4	19	13	4
DLE 15-30	122	450	1:40	1:15/1:30	100	7	7,5 x p_L	G 1/4	G 1/4	19	6	4
DLE 15-75	122	875	1:100	1:15/1:75	100	7	2,5 x p_L	G 1/4	G 1/4	19	6	4
DLE 30-75	60	1050	1:50	1:30/1:75	100	15	12 x p_L	G 1/4	G 1/4	19	6	4
DLE 2-5-2	922	100	1:25	1:4/1:10	60	0	1,6 x p_L	G 1/2	G 1/2	19	13	13
DLE 5-15-2	373	300	1:45	1:10/1:30	100	2	3,2 x p_L	G 1/2	G 1/4	19	13	4
DLE 5-30-2	373	600	1:90	1:10/1:60	100	2	1 x p_L	G 1/2	G 1/4	19	13	4
DLE 15-30-2	122	600	1:40	1:30/1:60	100	7	15 x p_L	G 1/4	G 1/4	19	6	4
DLE 15-75-2	122	1500	1:100	1:30/1:150	100	7	5 x p_L	G 1/4	G 1/4	19	6	4
DLE 30-75-2	60	1500	1:50	1:60/1:150	100	15	24 x p_L	G 1/4	G 1/4	19	6	4
DLE 30-75-3	60	2400	1:50	1:90/1:225	100	30	30 x p_L	G 1/4	4H	19	6	4
8DLE 1,65	4100	100	1:10	1:1,65	100	0	100	G 1/2	G 1/2	19	13	13
8DLE 3	4100	40	1:15	1:3,3	60	0	40	G 1/2	G 1/2	19	13	13
8DLE 6	2050	40	1:15	1:6,6	60	0	40	G 1/2	G 1/2	19	13	13

p_L = Air drive pressure
p_A = Gas inlet pressure
p_B = Working pressure
i = Pressure ratio
ε = Compression ratio ($\varepsilon = p_B/p_A$)

» Process fluids

Maximator gas boosters are suitable for compressing a wide variety of gases. Special versions and options are available with which the gas boosters can be configured for special gases. The most common fluids and the gas booster designs recommended by Maximator are listed in the following table.

In general the process media must be compatible with the wetted gas booster materials. Please contact us at components@maximator.de for questions around your application or gases not mentioned below.

Process fluid (gaseous)	Formula symbol	Gas booster type	Recommendations for compressing the process fluid
Argon	Ar	all models	Well-ventilated room
N-Butane	C_4H_{10}	all models	Fit piping to and flush SFP* (special flushing port) and leak detection holes.
Carbon monoxide	CO	DLE xxx-C	Fit piping to and flush SFP* (special flushing port) and leak detection holes.
Carbon dioxide	CO_2	DLE xxx-C	Well-ventilated room
Ethane	C_2H_6	all models	Fit piping to and flush SFP* (special flushing port) and leak detection holes.
Ethylene	C_2H_4	all models	Fit piping to and flush SFP* (special flushing port) and leak detection holes.
Freon (F-12)	CCL_2F_2	DLE xxx-CR	Fit piping to and flush SFP* (special flushing port) and leak detection holes.
Helium	He	all models	Well-ventilated room
Hydrogen	H_2	DLE xxx-H2	Fit piping to and flush SFP* (special flushing port) and leak detection holes. max. compression ratio 1:4
Methane	CH_4	all models	Fit piping to and flush SFP* (special flushing port) and leak detection holes.
Sour gas (natural gas with proportion of hydrogen sulphide)		DLE xxx-HMR	Fit piping to and flush SFP* (special flushing port) and leak detection holes.
Propane	C_3H_8	all models	Fit piping to and flush SFP* (special flushing port) and leak detection holes.
Nitrogen	N_2	all models	Well-ventilated room
Nitrous oxide	N_2O	DLE xxx-S	Fit piping to and flush SFP* (special flushing port) and leak detection holes.
Oxygen	O_2	DLE xxx-S	Fit piping to leak detection holes, oil-free and grease-free drive air, max. compression ratio 1:4** max. operating pressure 350 bar
Sulphur hexafluoride	SF_6	DLE xxx-CR	Fit piping to and flush SFP* (special flushing port) and leak detection holes.
Syngas (synthesis gas)		DLE xxx-H2	Fit piping to and flush SFP* (special flushing port) and leak detection holes. Please contact us for the product selection.
Xenon	XE	all models	Well-ventilated room

* Flushing port for any high-pressure leaks occurring

** taking into account the ignition temperature of greases minus a safety reserve of 80°C

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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:

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