



# *Agitator motors*

*Atlas Copco*

# Why choose pneumatic motors?



Pneumatic motors are the most robust and versatile drives available to designers and users today. They offer many advantages and the power-to-weight ratio is one of the main reasons to choose a pneumatic drive. Pneumatic motors have a power density that is significantly above that of almost any other motor: They are about 75% lighter and 85% smaller than asynchronous electric motors of the same power.

Our pneumatic motors can be loaded to a standstill without any problems, even at full torque, and can be started and stopped any number of times without damaging or overheating the motor. They are infinitely adjustable over a wide speed range and apply the greatest torque when it is needed most: at start-up.

In addition, the torque automatically adjusts to the applied load, and Atlas Copco motors can be infinitely adjusted over a wide speed range with an ease that is typical of compressed air solutions. The particularly soft start-up places minimal load on all drive components and attachments.

Pneumatic motors are not sensitive to electrical interference and cannot cause such interference themselves. The ATEX certification is particularly important if motors are used in potentially explosive environments. In such cases, you can play it safe by choosing pneumatic motors from

Atlas Copco Tools. The advantages specific to each motor are presented in concise form on the following pages.



Our full motor catalogue (available free of charge under order number **9833 8998 01** and as a download from **[www.atlascopco.com](http://www.atlascopco.com)**) provides further technical details. In addition, our sales engineers are happy to offer advice and support.



# LZL motors — powerful and robust

The LZL series of vane motors offer outstanding start-up behaviour and top performance even at low speeds. As the six vanes of an LZL motor are coupled in pairs and forcibly actuated, they hug the cylinder walls tightly at all times. This means the motor runs smoothly without any jerking, and ensures that air consumption is kept low. The motors are manufactured with very few moving parts and are extremely robust and durable.

The models in the LZL 03 and 05 series are available as slow-running versions—specially designed for use in agitator motors and mixing plants—and as high-performance motors for other applications. Their simple interface and the three standard flanges available throughout the series (Atlas Copco flange as the first standard solution for the most common applications, and European IEC and North American NEMA flange for simple use in place of electric motors) make them extremely easy to use.



The LZL series of pneumatic vane motors are your ideal drive for agitators and mixing plants. Their large speed and torque range make them perfect for applications in the chemical, pharmaceutical and food industry, as well as for paints, coatings, dispersions and much more.



- All LZL motors are supplied with vanes for oil-free operation
- Double-sealed drive shaft for maximum reliability
- The reinforced shaft bearing means there is no need to use or maintain additional support bearings
- The patented ventilation in the area of the shaft seals increases their service life
- Corrosion protection of all parts that come in contact with the media being mixed
- Low air consumption for economical permanent operation
- Long service life, low maintenance and high level of durability



# LZL high — performance motor

Data at an operating pressure of 6.3 bar

## Oil-free motors

The oil-free LZL motors are designed for maximum reliability at very low and medium speeds. As they do not need lubrication of the compressed air, the environment remains clean and there is no contamination from aerosols. These motors are ideal for such applications as agitators. To ensure cleanliness and hygiene, they use a double shaft seal. In addition, all components that come in contact with the media being mixed are made of corrosion-resistant material. The innovative design of the cylinder and highly resistant bearings mean LZL motors do not need additional fittings for the drive shaft and are ready to install without additional accessories. Various adapter flanges are available for attachment and installation (AC, IEC and NEMA).



The agitator motors come with explosion certification in compliance with ATEX directive EX II 2GD cT6IICT85°C X.

Model	Rated power		Rated speed	Rated torque		Minimum starting torque		Stall torque		Idle speed	Max. permissible speed	Air consumption at max. power		Weight		ATEX code**	Ordering No.
	kW	hp	RPM	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	RPM	RPM	l/s	cfm	kg	lb		
LZL03-LP-AC	1.05	1.4	5300	1.9	1.4	2.8	2.1	3.8	2.8	11,000		29	61	2.9	6.4	Ex II 2GD cT6 IICT85°C X	8411 1009 70
LZL03-LP-IEC	1.05	1.4	5300	1.9	1.4	2.8	2.1	3.8	2.8	11,000		29	61	3.9	8.6	Ex II 2GD cT6 IICT85°C X	8411 1009 88
LZL03-LP-NEMA	1.05	1.4	5300	1.9	1.4	2.8	2.1	3.8	2.8	11,000		29	61	3.8	8.4	Ex II 2GD cT6 IICT85°C X	8411 1009 96
Throttle-free*	1.7	2.5	7500	2.2	1.6	2.8	2.1	3.8	2.8		11,000	45	95				
LZL05-LP-AC	1.3	1.7	4300	2.9	2.1	4.8	3.5	5.8	4.3	9000		37	78	3.9	8.6	Ex II 2GD cT6 IICT85°C X	8411 1010 30
LZL05-LP-IEC	1.3	1.7	4300	2.9	2.1	4.8	3.5	5.8	4.3	9000		37	78	4.8	10.6	Ex II 2GD cT6 IICT85°C X	8411 1010 48
LZL05-LP-NEMA	1.3	1.7	4300	2.9	2.1	4.8	3.5	5.8	4.3	9000		37	78	4.9	10.8	Ex II 2GD cT6 IICT85°C X	8411 1010 55
Throttle-free*	2.1	2.8	6300	3.1	2.3	4.8	3.5	5.8	4.3		9200	50	106				
LZL15-LP-AC	2.3	3.1	3380	6.5	4.8	10.9	8.0	13	9.6	7000		61	129	7.1	15.7	Ex II 2GD cT6 IICT85°C X	8411 1011 19
LZL15-LP-IEC	2.3	3.1	3380	6.5	4.8	10.9	8.0	13	9.6	7000		61	129	8.3	18.3	Ex II 2GD cT6 IICT85°C X	8411 1011 68
Throttle-free*	3.2	4.3	4500	6.8	5.0	10.9	8.0	13	9.6		7200	87	184				
LZL25-LP-AC	3.4	4.6	2800	11.6	8.5	18	13.2	23	17	5800		86	182	11.3	24.9	Ex II 2GD cT6 IICT85°C X	8411 1011 27
LZL25-LP-IEC	3.4	4.6	2800	11.6	8.5	18	13.2	23	17	5800		86	182	15.2	33.5	Ex II 2GD cT6 IICT85°C X	8411 1011 76
Throttle-free*	5.0	6.7	4000	12.0	8.8	18	13.2	23	17		6000	135	286				
LZL35-LP-AC	5.2	7.0	2500	20	14.7	32	23.6	40	30	5000		130	275	20	44.1	Ex II 2GD cT6 IICT85°C X	8411 1011 35
LZL35-LP-IEC	5.2	7.0	2500	20	14.7	32	23.6	40	30	5000		130	275	20	44.1	Ex II 2GD cT6 IICT85°C X	8411 1011 84
Throttle-free*	6.5	8.7	3100	20	14.7	32	23.6	40	30		5000	160	339				

\* Motors without a throttle in the air intake and outlet must not be operated above the maximum permissible speed.

\*\* Maximum permissible speed for compliance with the ATEX specification: 5000 RPM.

## Stainless steel motors (R)

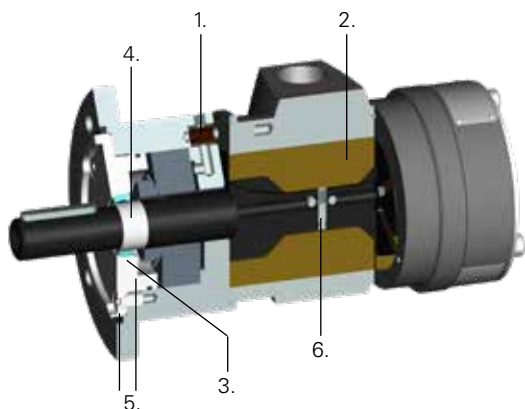
The type LZL 05 motors are available in stainless steel versions. They have the same properties as the other lubricant-free motors. All external components including the drive shaft are made of stainless steel. This makes the motors corrosion-resistant and ideal for applications in the food industry, for agitators with corrosive media and the chemical industry.

The motors come with explosion certification in compliance with ATEX directive EX II 2GD cT4 IICT110°C. The external components consist of stainless steel of quality ISO 683/XIII type 17, SS 14 2346, DIN 17440 X 12CrNiS188. The drive shaft is made of stainless steel of quality ISO 683/XIII type 9b, SS 14 2321, DIN 17440 X 22CrNi17.

Model	Power at 3000 RPM		Rated torque 3000 RPM		Stall torque		Max. permissible speed**	Air consumption at 3000 revolutions		Weight		ATEX code	Ordering No.
	kW	hp	Nm	lb-ft	Nm	lb-ft		RPM	l/s	cfm	kg		
LZL05-RLP-IEC	0.63	0.84	2.0	1.5	4.8	3.5	3000	25	52	6.1	13.4	Ex II 2GD cT4 IIC T110°C	8411 1010 97
LZL05-RLP-NEMA	0.63	0.84	2.0	1.5	4.8	3.5	3000	25	52	6.1	13.4	Ex II 2GD cT4 IIC T110°C	8411 1011 01
Throttle-free*	1.7	2.2	5.3	3.9	6.7	4.9	3000	35	74				

\* Motors without a throttle in the air intake and outlet must not be operated above the max. permissible speed.

\*\* The max. permissible speed for compliance with the ATEX specification is 5000 revolutions



1. Hose valves for ventilating bearings and seals
2. Lubricant-free vanes
3. Double seals
4. Stainless steel bearings
5. Aluminium front plate with stainless steel screws
6. Spring-loaded pins

## Agitator motors (M)

**Less pressure – lots of power** – even at very low pressures, the gearless LZL agitator motors provide reliable performance at low speeds of around 50 RPM and up to 3000 RPM. As they come with ATEX certification, these motors are suitable for operation in potentially explosive environments and the series 03/05 M is certified for temperature class T6 (= max. surface temperature 85°C).

Model	Power at 3000 RPM		Rated torque 3000 RPM		Stall torque		Max. permissible speed	Air consumption at 3000 revolutions		Weight		ATEX code	Ordering No.
	kW	hp	Nm	lb-ft	Nm	lb-ft		RPM	l/s	cfm	kg		
LZL03-LM-AC	0.41	0.55	1.3	0.95	3.3	2.4	3000	16	34	2.9	6.4	Ex II 2GD cT6 IIC T85°C X	8411 1010 06
LZL03-LM-IEC	0.41	0.55	1.3	0.95	3.3	2.4	3000	16	34	3.8	8.4	Ex II 2GD cT6 IIC T85°C X	8411 1010 14
LZL03-LM-NEMA	0.41	0.55	1.3	0.95	3.3	2.4	3000	16	34	3.9	8.6	Ex II 2GD cT6 IIC T85°C X	8411 1010 22
Throttle-free*	1.0	1.3	3.3	2.4	3.7	3.7	3000	24	51				
LZL05-LM-AC	0.63	0.84	2.0	1.5	5.8	4.3	3000	25	52	3.9	8.6	Ex II 2GD cT6 IIC T85°C X	8411 1010 63
LZL05-LM-IEC	0.63	0.84	2.0	1.5	5.8	4.3	3000	25	52	4.8	10.6	Ex II 2GD cT6 IIC T85°C X	8411 1010 71
LZL05-LM-NEMA	0.63	0.84	2.0	1.5	5.8	4.3	3000	25	52	4.9	10.8	Ex II 2GD cT6 IIC T85°C X	8411 1010 89
Throttle-free*	1.7	2.2	5.3	3.9	6.7	4.9	3000	35	74				

\* Motors without a throttle in the air intake and outlet must not be operated above the maximum permissible speed.

\*\* Maximum permissible speed for compliance with the ATEX specification: 3000/5000 RPM.

# LZB motors

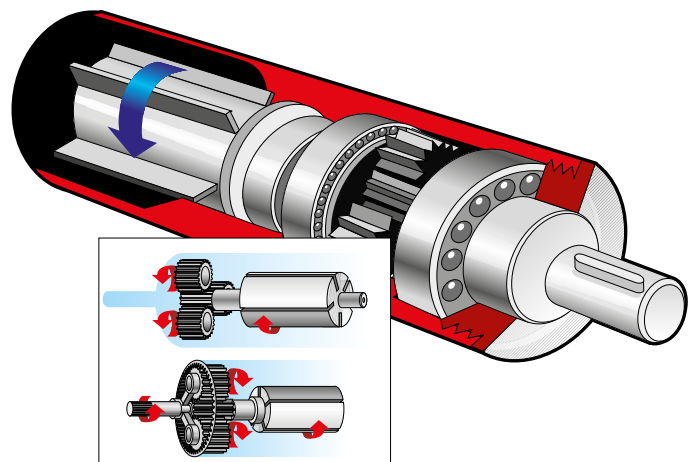
## — compact and efficient

The type LZB universal vane motors are compact, light and available at a wide range of transmission ratios. For this reason, they are particularly suitable for operation in agitators and mixing plants, but also for many other applications.

The main difference between these motors and the gearless LZL motors is the fact that the motor is combined with the Atlas Copco planetary gears in one housing. This makes the LZB models particularly space-saving and they can utilize their full power density and exceptionally high efficiency in the smallest possible external dimensions.

As with the LZL models, double seals at the shaft ends prevent dirt or water entering the stable gears and contaminating the lubricant.

The special grease used for lubrication and prevention of friction losses in the rust-free motors corresponds to the requirements of NSF H1 and FDA 21CFR Sec. 178.3570, which means they can be used with confidence in the food industry.



### Explosion protection with explosion certification

As our LZB pneumatic motors come with explosion certification in accordance with EU-ATEX directives (Ex II 2GD cT6 IIC T85 °C), the LZB-33 models represent safe drive solutions in this protection class for working environments in which explosive air/gas mixtures or dusts can occur.



## Economical and powerful

The LZB 33 offers a power output of 380 watts and the four transmission levels permit torques of up to 40 Newton metres and idle speeds of up to 1180 RPM.

Despite this high performance level, the air requirements for these conveniently small power packages with a mass of just 1.02 to 1.5 kg are only 8.1 litres per second.

Motors in the LZB 33 series are extremely simple to integrate in components such as mixing containers or agitators:

The standard Atlas Copco flange is the first standard solution that is suitable for the most common applications.

There are also designs with a compact IEC flange. This interface defines the size, shaft diameter and fit, enabling the LZB models to be fitted precisely on the mounts for electric motors, which they can easily replace.



### Data at an operating pressure of 6.3 bar

Model*	Rated power		Rated speed RPM	Rated torque		Minimum starting torque		Stall torque			Idle speed RPM	Air requirements at max. performance		Weight		Shaft load code	ATEX code	Ordering No.
	kW	hp		Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	l/s		cfm	kg	lb				
<b>Oil-free</b>																		
<b>Clockwise rotation (shaft with key)</b>																		
LZB33-LA013-20	0.38	0.51	580	6.4	4.7	12	8.9	12.8	9.4	1180	8.1	17.2	1.02	2.25	d	Ex II 2GD cT6 IICT85 °C	8411 0352 75	
LZB33-LA007-20	0.38	0.51	320	11.5	8.5	21	15.5	23	17	650	8.1	17.2	1.02	2.25	d	Ex II 2GD cT6 IICT85 °C	8411 0352 83	
LZB33-LA005-20	0.38	0.51	260	14.2	10.5	26	19.2	28	21	520	8.1	17.2	1.02	2.25	d	Ex II 2GD cT6 IICT85 °C	8411 0352 91	
LZB33-LA0030-11	0.37	0.5	160	22.3	16.4	40	30	45	33	340	8.1	17.2	1.5	3.31	d	Ex II 2GD cT6 IICT85 °C	8411 0306 72	
<b>Anticlockwise rotation (shaft with key)</b>																		
LZB33-LAV0030-11	0.37	0.5	160	22	16.2	38	28	44	32	340	9.5	20.2	1.5	3.31	d	Ex II 2GD cT6 IICT85 °C	8411 0345 59	
<b>Reversible (shaft with key)</b>																		
LZB33-LAR0026-11	0.24	0.32	120	19	14	20	14.8	38	28	230	7.9	16.8	1.5	3.31	d	Ex II 2GD cT6 IICT85 °C	8411 0308 70	
<b>Accessories — IEC flange</b>																		
IEC flange FF85																	4430 2134 80	
IEC flange FF130																	4430 2287 80	

\* Motor only, without flange

NOTE: If motors run with 100% dry air and without lubrication, the power may be 5 to 15% below the stated maximum power of the motor.

If the application allows, an oil-free motor can be operated with lubricated air in order to increase the service life.





# Vane motors mix in the drum repository



*When it comes to dispensing, conveying and mixing paints and coatings, precision is key. The ingredients must be precise to the gram and must be suspended at defined speeds in order to counteract even minor tendencies to separate. Füll Systembau GmbH achieves this by using the new explosion-protected LZB agitator drives from Atlas Copco Tools.*

*"I know that there is no all-purpose solution, but we are always looking for the safest and most efficient and durable solution for our customers".*

Sebastian Noll is quite uncompromising when he explains the philosophy that Füll Systembau GmbH in Idstein follows when it makes components and turnkey systems:

*"We and around 30 colleagues develop solutions of all kinds here on-site for anything liquid that needs to be dispensed and/or mixed",* says the chemical engineer responsible for sales, who specializes in dispensing and mixing technology. These solutions range from comparatively simple barrel, IBC and tripod agitators to customized dispensing plants, as well as the construction of highly complex storage tanks overseas in accordance with

European safety standards — and that is in addition to all project planning and engineering services.

A gravimetric dispensing plant is currently being built in the production hall and will later be used by a customer for coating large metal parts. A paint that meets the customer's exact order requirements in terms of colour tone is created by adding the ingredients in a documented process with milligram precision, from the base coat storage area to where the paint is applied to the sheet metal.

*"In these cases, users talk of 'neck tie colours', the quality of which is guaranteed thanks in no small part to the pneumatic drives from Atlas Copco Tools",* explains Sebastian Noll.

## Mixing systems with integrated explosion protection

Füll prefers to use pneumatic drives from the LZB series for mixing the coatings in its plants. Unlike conventional electric motors, they are ATEX-certified. *"Around 80 percent of our storage tanks and agitators are used in potentially explosive working environments, where there may be highly flammable solvent vapour, for example. With these pneumatic motors, we are on the safe side".* The higher investment costs for electric motors when they are operated in potentially explosive environments—plus electrical installation—mean there are good reasons to choose pneumatic motors. *"The small LZB motors are practically cooled from the inside by the exhaust air, so we do not need an additional bulky housing".*

The drives labelled by Atlas Copco Tools according to explosion protection class Ex II 2GD cT6 IICT85 °C are provided with planetary gears and have been equipped for use in agitators and mixing plants with a reinforced shaft bearing. They are also equipped with oil-free vanes to enable operation with unlubricated compressed air.

## PWIS freedom as an additional advantage

*"Oil-free operation is an important aspect for us, as any particles of lubricant in the exhaust air can reduce the quality of any type of mixture. Particularly in the automotive industry and when dealing with industrial coatings, paint-wetting impairment substances (PWIS) must be avoided, as they cause faults in the coating or crater formation in the surfaces and reduce the durability and robustness of the coating".*

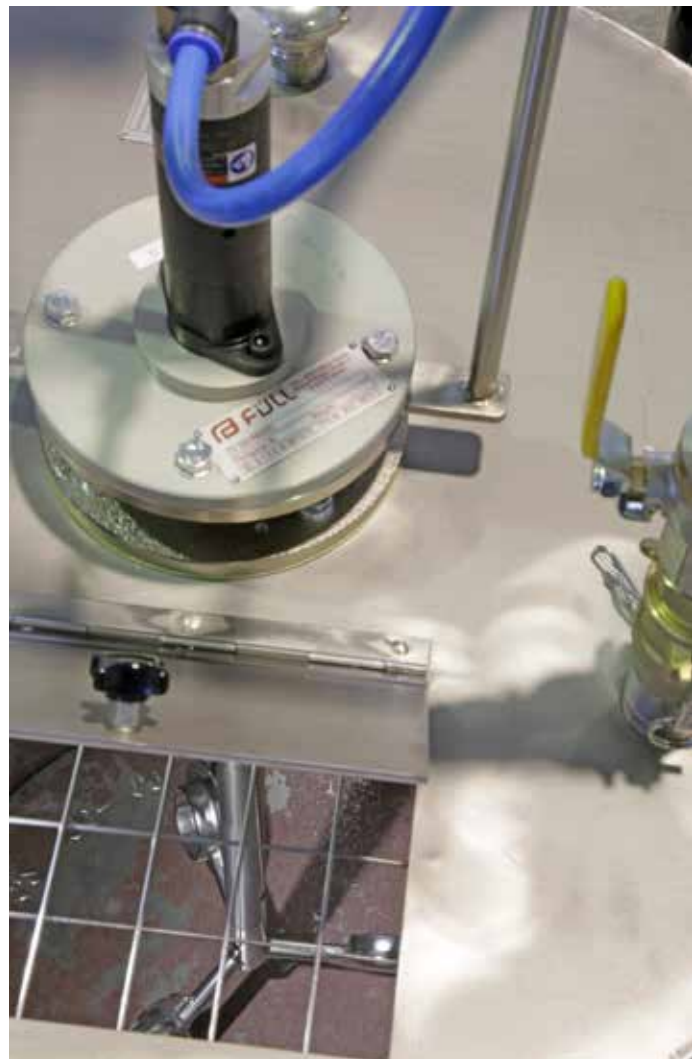
In Noll's experience, the LZB motors are particularly suitable for the user-friendly systems at Füll due to their high torque, comparatively low air requirements and simple regulation via the volume flow and working pressure.

As the technology is reliable and easy to use, he says that the operating personnel can benefit from everything the motors can offer after a short training period. And as a motor with low rated speed and a higher torque at consistently

*"We can agitate acids, alkalis and explosive liquids safely and reliably with the ATEX-certified LZB motors and keep the starting materials homogeneously mixed until the dispensing stage".*



slow agitation needs to apply much less force and still provides excellent mixing results, Noll adds that Füll often manages with the 380-W pneumatic motors from the LZB-33 series, which are much more compact and energy-saving than the previous larger drives.



## Simple handling and minimized energy requirements

*"By using these drives and through the customer-specific design of our agitators, we reduce their energy consumption by up to 60 percent,"*

says the very satisfied chemical engineer. In simple terms, this means a maximum consumption of only 8.1 l of compressed air per second in an uncompressed state compared to about 25 l/s for a 1000-W power unit that would otherwise conventionally be used. For a paint dispensing plant, which in some instances may have 24 or even more agitators, this means a significant reduction in operating costs for Füll customers. Despite the extremely small dimensions, Atlas Copco Tools specifies torque values of 6.0 to 20.9 Nm and rated speeds of 611 to 171 RPM for the LZB-33 models, which are available in four gear designs as standard. The Idstein-based company was initially sceptical, admits Noll in retrospect; the motors seemed much more delicate than their previous models.



*"But these concerns were unfounded.*

*In terms of durability, the new LZB-33 models are just as stable. We have now installed several dozen and successfully used them in mixing and agitating. The low weight offers additional potential for new applications and savings", emphasizes Sebastian Noll.*

TO REDUCE RISK  
UNDERSTAND  
SUPPLIED WITH  
II 2GD  
Tech. File Ref. 200



**FÜLL**

FÜLL SYSTEMBAU GmbH  
Richard-Krüger-Strasse 21  
D-85510 Idstein

FS 250 RW25Ex	Baujahr	2013
Fertigungs-Nr.		
II 1/2 G cb IIBT4/T3	TPS 04	ATEX 10572 Z

# ATEX codes explained



## ATEX certificate

For information on the ATEX certificate, see technical documentation 9836 4610 from ATEX.

If the product is part of a module whose components have different ATEX codes, the component with the lowest safety value determines the ATEX code for the whole module.

Description	Value	Definition
Equipment group	I	Application in mining
	II	Surface-treatment industry
Equipment category group I	M1	Can continue to be used if a potentially explosive atmosphere is present
	M2	Cannot be used if a potentially explosive atmosphere is present
Equipment category group II	1	Very high protection level <ul style="list-style-type: none"> <li>• Zone 0 (Gas)</li> <li>• Zone 1 (Gas)</li> <li>• Zone 2 (Gas)</li> <li>• Zone 20 (Dust)</li> <li>• Zone 21 (Dust)</li> <li>• Zone 22 (Dust)</li> </ul>
	2	High protection level <ul style="list-style-type: none"> <li>• Zone 1 (Gas)</li> <li>• Zone 2 (Gas)</li> <li>• Zone 21 (Dust)</li> <li>• Zone 22 (Dust)</li> </ul>
	3	Normal protection level <ul style="list-style-type: none"> <li>• Zone 2 (Gas)</li> <li>• Zone 22 (Dust)</li> </ul>
Atmosphere	G	Atmosphere contains gas, vapour and mist
	D	Atmosphere with dust
Safety design	c	Constructional safety
Ignition protection type	Ex nL	Explosion protection. Type: "Energy-limited equipment and circuits"
Gas group	II A	Propane/acetone/ammoniac
	II B	Ethylene
	IIC	Hydrogen/acetylene
Max. surface temperature with gas		T1 = 450°C (848°F) T2 = 300°C (572°F) T3 = 200°C (392°F) T4 = 135°C (275°F) T5 = 100°C (212°F) T6 = 85°C (185°F)
Max. surface temperature at		Example temperatures: T85°C (185°F) T110°C (230°F) T120°C (248°F) T125°C (257°F) T240°C (464°F)
Ambient temperature range	Ta	Example: 20 °C Ta +40 °C

# *Committed to sustainable productivity*

We stand by our responsibilities towards our customers,  
towards the environment and the people around us.  
We make performance stand the test of time.  
This is what we call — Sustainable Productivity.

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