

A night-time photograph of an industrial facility, likely an oil or gas processing plant. The scene is dominated by a complex network of metal structures, pipes, and scaffolding. Several bright, circular lights illuminate the scene, creating a high-contrast, dramatic effect with lens flares. On the right side, a large, vertical, cylindrical storage tank is visible, partially obscured by the foreground structures. The overall atmosphere is industrial and technical.

LEINE  LINDE

ENCODERS FOR
OIL & GAS



Explosive atmospheres

demand extraordinary encoder solutions

Even in the toughest environments Leine & Linde encoders have to be reliable and work perfectly. With a development process primarily focusing on heavy duty encoders, Leine & Linde is proud to supply encoders with a long service life and the right certifications for hazardous area operations.



Challenging environments

Leine & Linde encoders operate with accuracy, in the least benign environments. They are subjected to vibrations, moisture, salt water, dirt, heat and cold, as well as shock from strong mechanical forces. On top of that, in the oil and gas industries the encoders need to minimise explosion risks and work safely regardless of circumstances.

ATEX and IECEx certifications

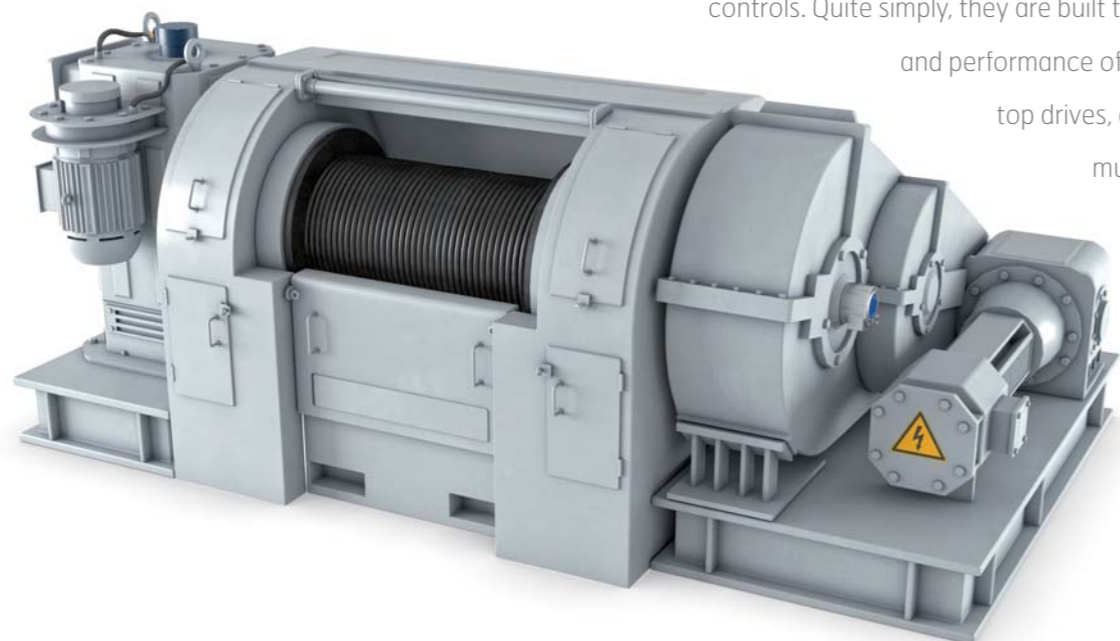
A comprehensive set of regulations is imposed on every electrical appliance used in, or near, hazardous locations with explosive atmosphere. In these 'Ex' environments, two certification systems are particularly important – the European ATEX directive and the international standard IECEx. In order to be used in any part of the EU, the equipment needs ATEX-certification. Certification in accordance with the IECEx is needed in the countries affiliated to the IECEx system, which are a majority of the countries in the world.

Avoid production downtime

Ensuring the safe use of equipment is crucial, as is ensuring machine uptime with a minimum of failure. This is why the Leine & Linde Ex-certified encoders are designed to endure the tough conditions of the oil and gas industries, where impacts from vibrations, shock and temperature variations cause risk to daily operations.

The encoders are produced with top quality in every detail, from mechanical engineering and choice of bearings, to electronic components and extensive quality controls. Quite simply, they are built to maintain uptime

and performance of machines such as top drives, draw-works, and mud pumps.



Resistance to acid and salt water

In the offshore and marine industries, rough weather conditions are the rule rather than the exception. For the absolute encoder a stainless steel material, EN 1.4404 (AISI 316L) is used, with resistance to acid and salt water. Therefore the encoders will not be affected despite heavy use in outdoor applications. Enclosures, flanges and shafts are made flameproof and corrosion resistant.

Failure prevention

It is well known that the onshore and offshore industries not only operate under extremely challenging conditions, but also that any interruption quickly results in extremely high costs. This is why there is no room for surprises, unexpected failures, or unscheduled downtime.

To maintain high uptime of the machines and to avoid unplanned stops, the Ex-certified incremental encoder has a built-in diagnostic system, ADS. This option will monitor the encoder and give an alarm if a failure has occurred. This simplifies the process of quickly finding the source of error. It also makes it easier to take precautions if there are repeated problems occurring that affect encoder or equipment performance.

Customer focus

Customers are always the number one priority at Leine & Linde. Through application knowledge, customisation ability and delivery quality, even further value is added in the chain from development to maintenance and long-term effective performance. Deliveries are made on time, and urgent orders can be manufactured and delivered in less than 24 hours (48 hours for the Ex zone 1/21 encoders).

Leine & Linde encoders according to ATEX and IECEx

The encoders for Ex zone 1/21 are certified according to ATEX and IECEx. The illustration below gives a brief overview of the various demands the encoders fulfill, and how these are specified in the classification markings. Leine & Linde also offers encoders for Ex zone 2/22, normal level of protection.

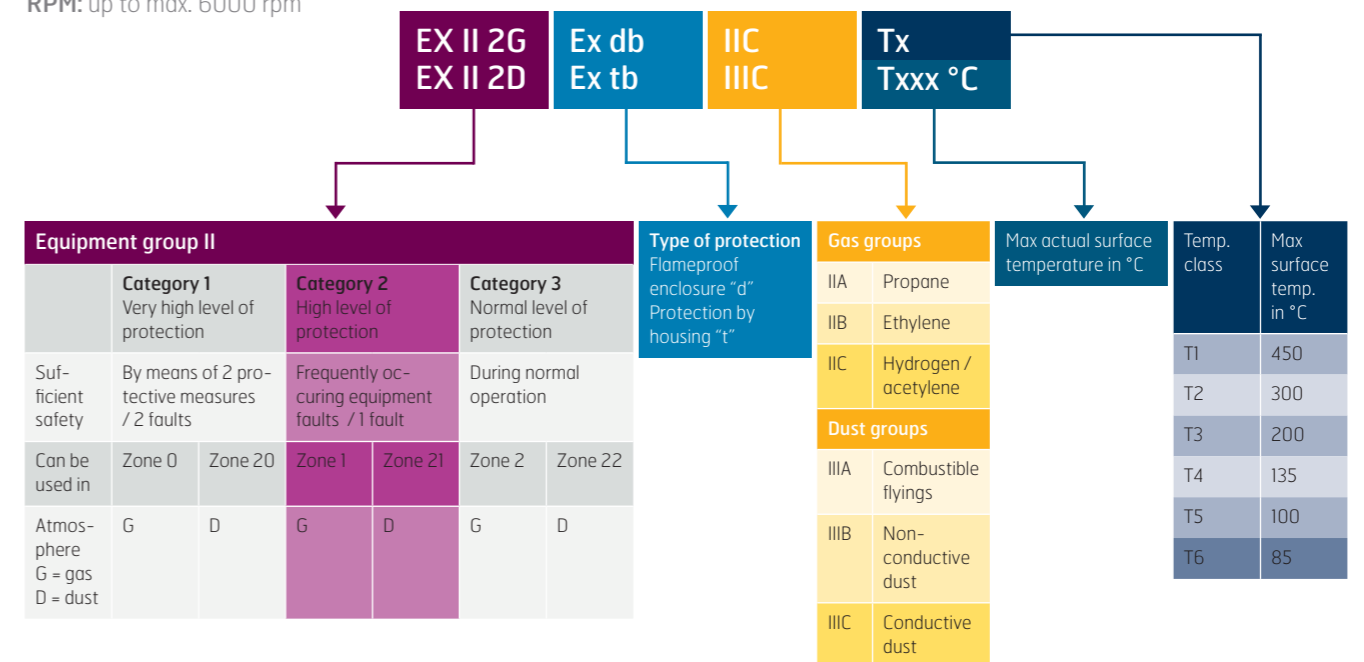
For more information on how the values correlate, please contact Leine & Linde.

The encoders are available in different options in terms of:

Temperature classes: T4, T5 or T6

Ambient temperature: -40°C...up to max. +70°C

RPM: up to max. 6000 rpm



Oil & gas applications

In offshore drilling, robust and reliable encoders keep track of movement and speed for a great number of functions. Not all of them are situated within hazardous areas. Leine & Linde provides encoder solutions adapted to different needs, with a wide range of sizes, functionalities, and robustness to suit the relevant application.



- Ex zone 1/21**
Absolute encoder IHA 648
- Crane hoist
 - Jib angle



- Ex zone 2/22**
Incremental encoder CHI 703
- Mud pump motor
 - Crane motor feedback
 - Motor applications



- Ex zone 2/22**
Additional functionality
- Bearingless encoder
 - ADS Online for condition-based maintenance
 - Encoder with programmable overspeed



- Ex zone 1/21**
Incremental encoder XHI 841
- Top drive motor
 - Draw-works motor



- Ex zone 1/21**
Absolute encoder ISA 648
- Top drive
 - Iron roughneck
 - Draw-works drum



- Ex zone 2/22**
Absolute encoder IHA 608
- Crane hoist
 - Jib angle



- Connectivity with many interfaces**
- CANopen
 - EtherNet/IP
 - DeviceNet
 - PROFIBUS
 - EnDat
 - PROFINET
 - EtherCAT
 - SSI

Ex zone 1/21 products

For the hazardous environments where the requirement of Ex zone 1/21 certification is needed, Leine & Linde offers solutions with absolute and incremental signal options.

600 series absolute encoder for hazardous environments

Shaft	Blind hollow shaft or solid shaft
Protection concepts	Ex db (gas) Ex tb (dust)
Temperature class	T4, T5 and T6
Operating temperature	-40°C... + max 70°C
Ingress protection class [IEC 60529]	IP66 and IP67
Cover material	Stainless steel A4, EN 1.4404/AISI 316L
Rotational speed max	Up to 6000 rpm
Output signal	CANopen, DeviceNet, EnDat, PROFIBUS, PROFINET or SSI



XHI 841 – Incremental encoder with additional ADS option

Shaft	Blind hollow shaft
Protection concepts	Ex db (gas) Ex tb (dust)
Temperature class	T4, T5 and T6
Operating temperature	-40°C... + max 70°C
Ingress protection class [IEC 60529]	IP65
Cover material	Aluminum, anodized
Rotational speed max	Up to 6000 rpm
Output signal	HCHTL
Option	Advanced Diagnostic Systems, ADS



Ex zone 2/22 products

For Ex zone 2/22 and for areas outside the most hazardous environments, Leine & Linde offers robust and reliable products that withstand the surrounding impacts and provide a long service life.

Incremental and absolute encoders

Shaft	Blind, through-going hollow shaft or solid shaft option
Protection class	Ex ec (gas) Ex tc (dust)
Temperature class	T4
Operating temperature	Gas -40°C*... +60°C, Dust -30°C*... +60°C
Ingress protection class [IEC 60529]	IP64
Incremental signal output	HTL, HCHTL, TTL, 1 Vpp
Absolute signal output	CANopen, DeviceNet, DRIVE-CLiQ, EnDat, EtherCAT, EtherNet/IP, PROFIBUS, PROFINET or SSI.
Cover material	Aluminum, optional stainless steel (A4)
Option	According to the table below

* Some encoders are only valid for -20°C.

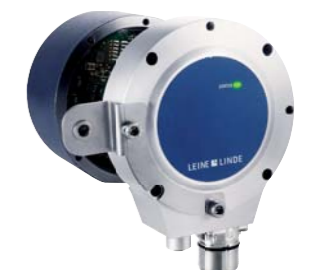
The information provided in the above table is only a brief overview. Please contact Leine & Linde or enter the Product Finder at www.leinelinde.com for more information.



Products with additional features

Encoder solutions are more than just the encoder itself. Programmable overspeed enables customised settings of speed limits with relay outputs. AUU 040 makes it possible to update installed encoders with diagnostic functionality in order to prevent unplanned events, by analysing the data provided by the diagnostic.

Bearingless encoder	Large magnetic ring with shaft sizes from 100 mm and up
Premium encoder	The absolute 900 series offer a dual output solution of incremental and absolute signals
Programmable Overspeed	Available in the 800 series, 1000 series and as a module solution
Encoder diagnostics	ADS Online, integrated diagnostics in the encoder AUU 040; ADS Online as a back cover solution for the 800 series



Electronics

Square waves

Square waves are the most common signal type for an incremental encoder. Leine & Linde's products are supplied as standard with 6 channels. Signal S00 is followed by signal S90, which is displaced 90 electrical degrees. The two inverted signals S00\ and S90\ enable differential transmission, which reduces the sensitivity of the signals to electrical interference. To check the position of the shaft, a reference pulse is produced once per revolution, Sref with its inverse Sref\.

There are several variations of electrical interface with different supply voltages and signal levels. When choosing an interface, it is necessary to take into account factors in the motor's operating environment. The exact properties of the interface is affected by frequency, cable length and temperature.



Interface	TTL	HTL	HCHTL
Supply	5 Vdc	9-30 Vdc	9-30 Vdc
Output signal	5 Vdc	9-30 Vdc	9-30 Vdc
Suitable for	Low frequencies over short cables	High frequencies over medium-length cables	Medium frequencies over long cables
Max frequency	200 kHz	200 kHz	200 kHz
Max cable length	50 m at 50 kHz	100 m at 100 kHz	350 m at 100 kHz

Absolute position encoders

Absolute position encoders are offered with serial interfaces such as SSI and EnDat or with integrated fieldbus communication of various kinds, ready for installation in an existing fieldbus system.

Available in the 600 and 900 series.



For more information about the range of encoder interfaces, please contact Leine & Linde at info@leinelinde.com or your local Leine & Linde office.

Contact us

SWEDEN / HEAD OFFICE

T +46-(0)152-265 00
F +46-(0)152-265 05
info@leinelinde.com

BRAZIL

T +55-19-3291 8425
F +55-19-3367 5658
info@leinelinde.com.br

FINLAND

T +358-(0)9-561 72 00
F +358-(0)9-561 72 020
info@leinelinde.fi

ITALY

T +39-039-596 01 08
F +39-039-971 22 08
info@leinelinde-ltn.it

CHINA

T +86-(021)-525 835 66
F +86-(021)-525 835 99
info@leinelinde.cn

GERMANY

T +49-(0)40-3176758-60
F +49-(0)40-3176758-65
info@leinelinde.de

SOUTH KOREA

T +82-(0)51-746 54 20
F +82-(0)51-746 54 21
info@leinelinde.co.kr

DENMARK

T +45-862-308 34
info@leinelinde.dk

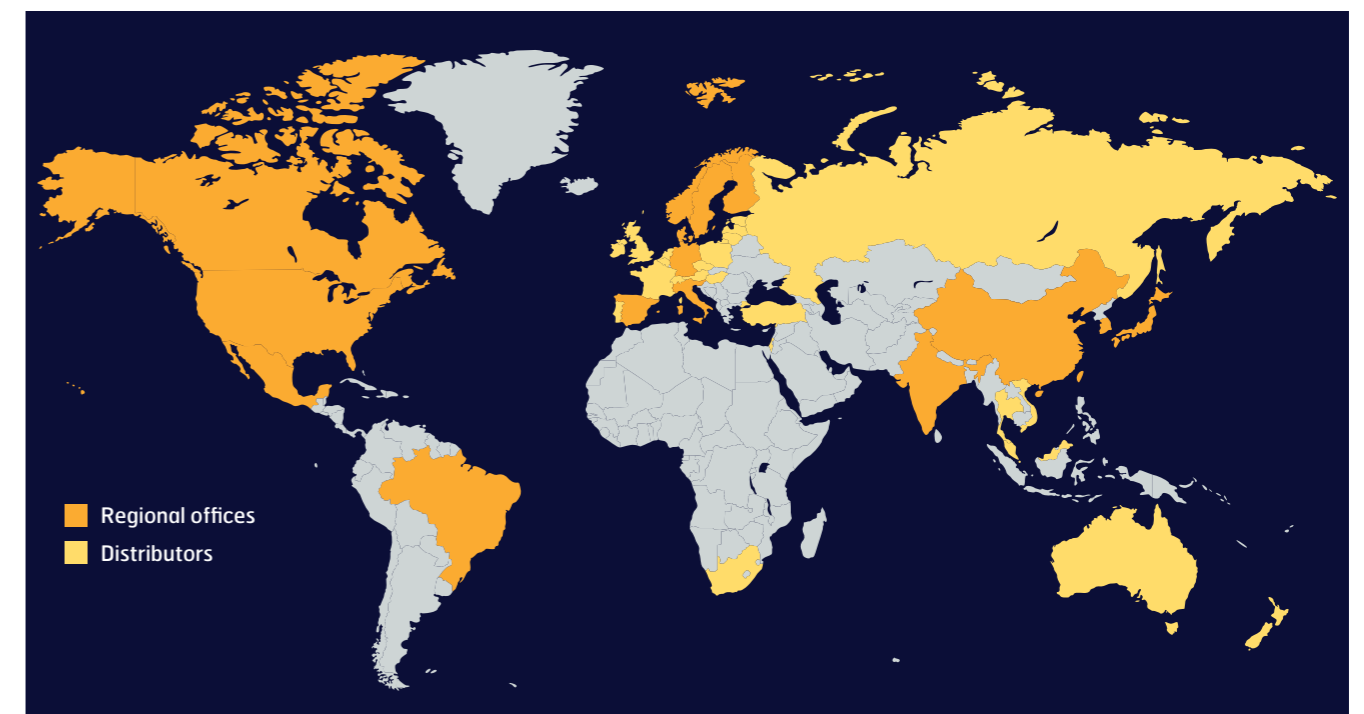
INDIA


T +91-11-261 725 04
F +91-11-261 654 49
info@leinelinde.in

SPAIN

T +34-93-574 23 02
F +34-93-560 57 60
info@leinelinde.es

Leine & Linde's worldwide presence. Read more at www.leinelinde.com





The best encoders are those you never have to think about. Those that simply do their job – year after year. Leine & Linde develops and manufactures customised encoder solutions for demanding environments, advanced measuring systems for accurate feedback of speed and position.

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+46-(0)152-265 00 www.leinelinde.com