

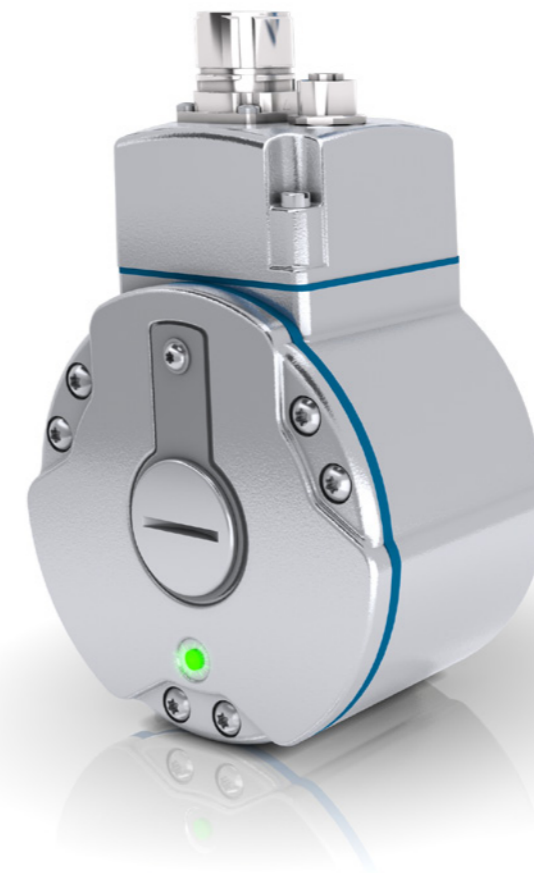
LEINE  LINDE



**ADS ONLINE**

SEE THINGS BEFORE THEY HAPPEN

Do you have time for unnecessary service visits?  
Receive information about future maintenance needs  
and conduct service during scheduled visits.



# ENCODERS

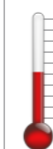
with integrated diagnostics



Encoder with  
incremental  
signals



Diagnostics  
system that con-  
stantly monitors  
the encoder's key  
functions



Monitoring of  
environmen-  
tal param-  
eters



Continual storage  
of operational  
data enables  
analysis of trends  
in operation



Associated PC  
software for  
read-out of  
detailed data





# When failure is not an option

An encoder is often used in large complex machinery such as wind turbines or paper-making machines. It constitutes a central component for speed feedback, with the entire system being dependent on its function, and it is of the utmost importance that it is reliable at all times.

The encoder is subjected to wear under use and must therefore be replaced at some point. But the exact service life is difficult to predict due to it being highly dependent on parameters in the encoder's environment. Temperature, operating speed and vibration are examples of factors that affect service life and that are unique for each installation. Depending on

the ambient environment, an encoder's service life can consequently vary from a couple of years to a couple of decades.

A wind turbine is often difficult to access, and in many cases located far out to sea. Unscheduled service is therefore extremely disadvantageous. High demands are placed on paper mills being in continual operation and any standstills cost a considerable amount of money. In both of these examples, the goal is to conduct maintenance during scheduled service, when the entire machine is inspected on a single occasion.

Condition-based maintenance entails service only being conducted as needed. ADS Online offers an advanced diagnostics system that continually analyses the encoder's condition and warns for impending faults before they occur. In this way, service can be performed only as necessary and planned in ample time to avoid unforeseen stops in production.

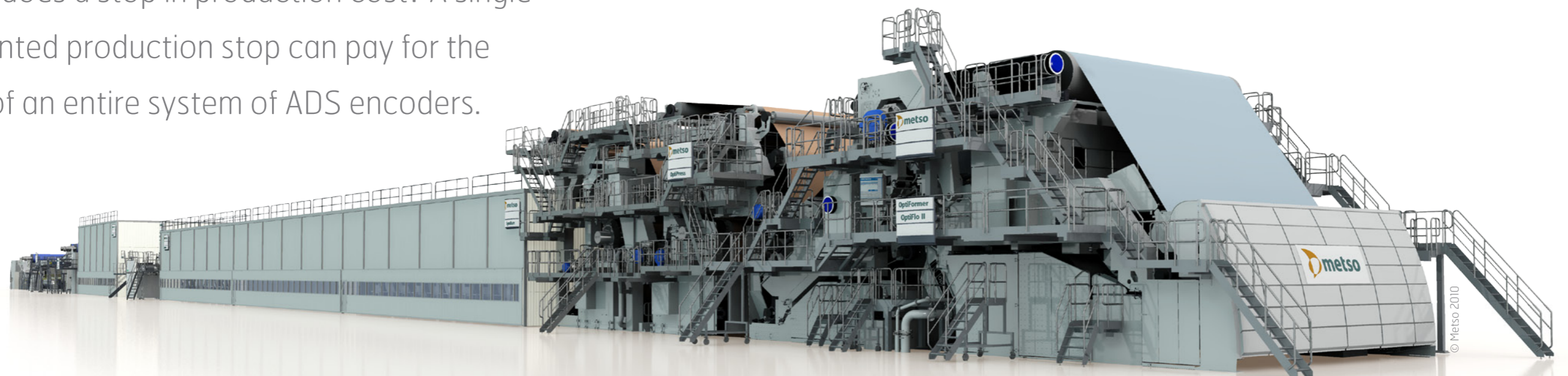
## ADS Online

- Diagnostics system that constantly monitors the encoder's key functions, fully integrated into each unit.
- Receive a warning immediately when an impending fault is detected – automatic fault interpreta-

tion determines the seriousness of the fault and categorizes it into various status levels.

- Monitoring of ambient environmental parameters to ensure that the encoder is not subjected to harmful conditions.
- Continual storage of detailed operational data – analyse trends for vibration, temperature and more.
- Associated PC software with the capability to set custom warning levels and conduct graphical analysis of the environmental parameters during operation.
- The encoder may be connected to an Ethernet network to provide access to diagnostics and analysis regardless of your location.

What does a stop in production cost? A single prevented production stop can pay for the cost of an entire system of ADS encoders.



# Constant function monitoring

Integrated into the encoder is an advanced diagnostics system that continuously monitors the encoder's function. Among the parameters that ADS Online monitors are

- that the number of detected pulses always agrees with the expected
- that the encoder's optics maintain the expected quality
- that the encoder's output signals maintain the correct voltage level
- that the signals are not subjected to electrical disturbances from the surroundings.

## Intelligent interpretation of faults

An important function in ADS Online is that the system conducts automatic interpretation and analysis of each detected fault. The analysis determines the seriousness of the fault and sorts it into one of four categories based on the encoder's condition. The system also provides notification of a recommended measure that should be taken to prevent problems.

The encoder's various status levels are indicated by an LED in one of four states.

- **Steady green** – normal state, full functionality.
- **Flashing green** – Warning, risk for fault due to harmful ambient environment. Recommendation to check the installation and correct deficiencies.
- **Flashing red** – Serious alarm, impending fault. Replacement of the encoder is recommended during the next shutdown for service.
- **Steady red** – Critical alarm, no function.

Immediate replacement of the encoder is necessary.

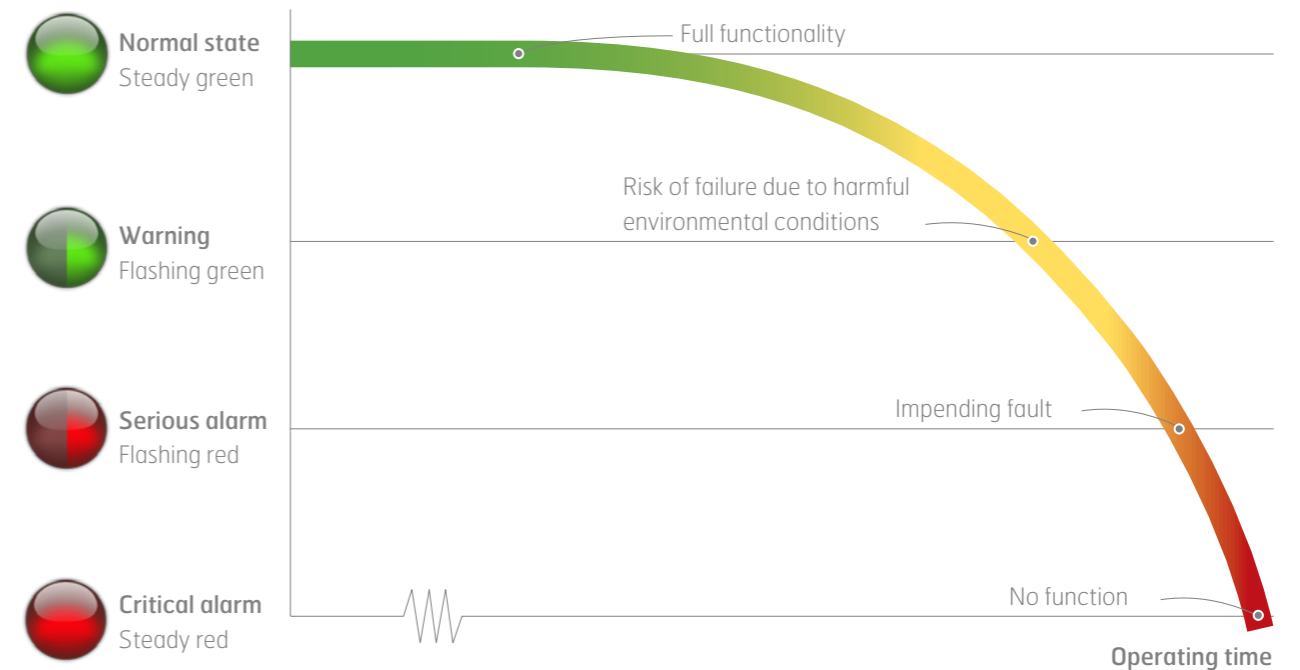
By connecting the encoder to the associated PC software, detailed information can be read about each detected fault, along with data about the condition of the surrounding environment when the fault occurred.

The screenshot shows the ADS Online 1.0 software interface. The main window displays 'Encoder, motor3' with various parameters and an active warning for 'Operating temperature'. The warning description states: 'Operating temperature reaching levels outside the programmable warning level.' The recommended action is 'Acknowledge to reset encoder status.' There is an 'Acknowledge' button. Below the warning, there is a table for 'Previous alarms and warnings'.

#	Time	Status	Type	Acknowledged
2	07 Sep 2011 15:32	Warning	Revolutions	
1	07 Sep 2011 15:31	Warning	Operating temperature	
0	07 Sep 2011 15:31	Warning	Shaft speed	se2985

At the bottom of the window, it shows 'Computer IP: 10.42.2.211', 'Current user: se2985', and 'Encoder time: 09 Sep 2011 11:44:38'.

## Encoder status



# Connection

– on-line or on-demand

ADS Online sends information about the encoder's status via several different channels in parallel. This provides extremely flexible connection opportunities

– you can always choose communications via the channel that best suits your application. Do you want information visually, electrically or online?



### Visually

Fault indication via LED

### Electrically

Fault indication via signal cable

### Online

Detailed data about each fault for analysis via PC software

Obtain information via the channel that suits you best.



### Online

By connecting the diagnostics system online to an Ethernet network, you gain access to the encoder wherever you may be, worldwide. With the associated PC software, you can read out the encoder's current status while operation is underway and conduct detailed analyses of its ambient environment.

stored in the encoder's memory. Each time a fault is detected, the encoder namely sends a warning signal, both electrically via the signal cable, and visually via an LED. A warning signal means that you should connect your laptop to the encoder to read out more detailed information about the fault. The connection is easily made, directly while the machine is in operation.



### Visually or electrically

A more basic connection alternative is to just connect your PC on-demand, in other words, only when you know that a detected fault has been

### Identifies each unit

The PC software also provides access to an electronic label with basic information about each encoder's type and specifications. Each encoder from Leine & Linde has a unique serial number. This means there is detailed information for each unit concerning its origin, such as its date of manufacture. The unit's installation date is automatically registered upon commissioning.



# Several sensors in one product

The encoder is mounted directly on a motor or generator, situated in the middle of the machine's actual operating environment. Because this operating environment affects both the encoder's and machine's service life, it is of interest to gain familiarity with the conditions in the encoder's immediate surroundings.

With ADS Online, the encoder's function is expanded to encompass several sensors in one. The multi-

sensor constantly reads off the levels for several environmental parameters in its surroundings.

The parameters that can be read off are:

- Vibration
- Temperature
- Frequency
- Shaft speed
- Supply voltage

## Receive warning of harmful ambient environment

If an environmental parameter reaches levels that are potentially damaging, a warning is sent via all channels. A warning entails that the encoder is still functional, but that it is subjected to an environment that may damage it. Should actual damage occur in the encoder, the warning goes over to a higher alarm level. But if measures are taken in time so that the environment returns to an acceptable level, the warning can be dismissed and the encoder will continue in operation.

## Set custom warning levels adapted to your machine

The encoder's ambient environment can be harmful even for other components nearby. ADS Online therefore offers the opportunity to program custom warning levels for the environmental parameters that are to be monitored. With this function, you can set levels that are adapted to the limitations on your particular machine, and avoid the risk of prematurely wearing out components.

## Application areas:

- Set custom warning level to ensure that vibration in the system never reaches damaging levels.
- Use the programmable levels for frequency and shaft speed to indicate overspeed or standstills.
- Ensure that the machine does not overheat.
- Detect voltage drops in the power supply.
- Choose to receive an automatic warning when the encoder reaches a certain operating time.



# Track trends in the operation

What is the machine's environment like where the encoder is installed? Has it changed with time? The PC software enables graphical analysis of the encoder's operating conditions over time – observe developments regarding vibration, temperature, frequency, shaft speed and supply voltage.

## History covering the encoder's entire service life

Study graphs with data collected during the encoder's entire service life. Have operating conditions changed with time? Increased vibrations can be a sign that the encoder's or motor's bearings are beginning to wear out, while increased temperature can mean that friction has increased somewhere in the machine and that service is required. The history function continually stores data for all environmental parameters, all the way back to the day when the encoder was first put in service.

## Saved fault buffer for each deviation

Each time a function deviation is detected in the encoder, all operational and environmental parameters are automatically logged that applied when the fault occurred. In this way you can later search for the cause of a fault in the ambient environment that existed when the fault occurred.

Moreover, the encoder stores a fault buffer that contains detailed parameter data with recorded development from five minutes before each fault occurs to five minutes after. The data is displayed in graphs that enable careful analysis of machine and environmental behaviour during the period when the fault occurred. By analysing the operational and environmental parameters before a fault was detected, you can draw conclusions about the

reason for the fault and ultimately prevent recurrence. Developments after a fault has occurred subsequently show the consequences it had on the system.

## Programmable recordings

The recording function for operational and environmental parameters can even be used to program custom time intervals for detailed data collection.

With the help of this function, you can make recordings during selected phases of a machine's operation and analyse the behaviour of the encoder and ambient environment during various operational phases. In this way, you gain familiarity with the machine and the environment where the encoder is situated.



# Encoders of the highest quality

It is ultimately the quality of the encoder that determines whether it is reliable or not. ADS Online is available as an option for Leine & Linde's encoder models XHI 801 and XHI 803, which are both designed for heavy duty applications.

These models are built with robust bearings and vibration-resistant electronics for use in tough environments. The shafts are insulated with hybrid bearings or peek inserts to prevent bearing currents and thus maximize service life. The encoder's optics are designed with very stringent demands on accu-

racy and manufactured with high precision in a clean room to eliminate even the smallest containments and ensure the highest quality.

A number of mechanical and electrical combinations are available to choose among and custom solutions are produced upon request. Contact Leine & Linde for more information.

Choose an encoder based on your needs



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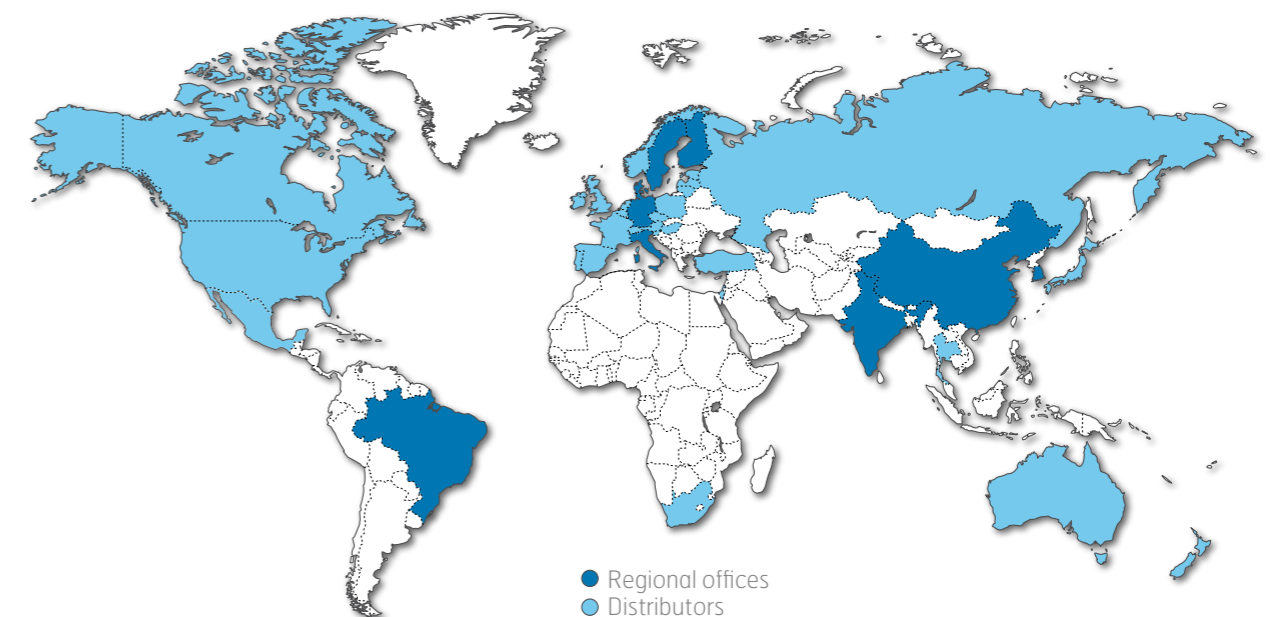
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The best encoders are those you never have to think about. Those that simply do their job – year after year. Leine & Linde develops and manufactures customised encoder solutions for demanding environments, advanced measuring systems for accurate feedback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

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