SAFE MOTION

FSI 900



With the FSI 900, each motor shaft, winch drum, drill, roll drum, wheel or wind turbine can be equipped with an independent safety system that fulfils all necessary functional safety requirements. Your safety functions can run independently of the main control system, without the extensive cabling sometimes needed in large facilities.

The FSI 900 is a robust and reliable encoder that will monitor the rotating movement of your machinery to make sure it does not exceed the values you have defined for speed, end limits, acceleration or standstill - it is also equipped with failsafe relay outputs that can be connected either to the emergency stop loop or directly to selected braking functions. When a set limit is reached, the machinery will enter the failsafe state you have defined. This way, the Machinery Directive for functional safety is fulfilled in a reliable way by the FSI 900 alone.

- Monitor rotating movement to keep it within your defined limits.
- Create an independent, distributed, safety system by connecting the failsafe relay to the emergency stop loop – or directly to a selected braking function.
- Achieve functional safety without upgrading your existing PLC.

The following functions can be realized with the FSI 900

Safe switch-off
STO – Safe torque off
SBC – Safe brake control

Safe standstill
SS1 – Safe stop 1
SS2 – Safe stop 2
SOS – Safe operating stop

Safe motion
SLS – Safely-limited speed
SSR – Safe speed range
SDI – Safe direction
SLA – Safely-limited acceleration
SAR – Safe acceleration range

Safe monitoring
SSM – Safe speed monitor

Safe positioning
SLI – Safely-limited increment
SLP – Safely-limited position
SCA – Safe cam

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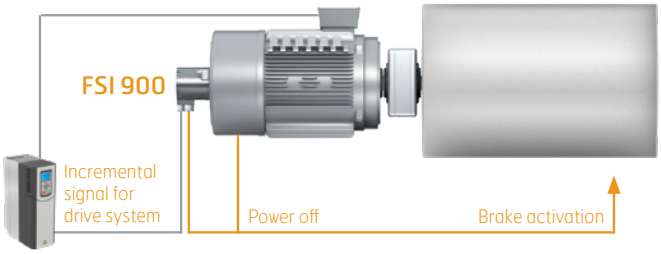
All-in-one solution for reliability and safety

FSI 900 is an encoder with an extremely robust construction in accordance with Leine Linde standards. It provides inductive scanning with variants of safe singleturn or multiturn. FSI 900 is available with both incremental outputs and fieldbus communication, for access to the encoder's speed and position data.

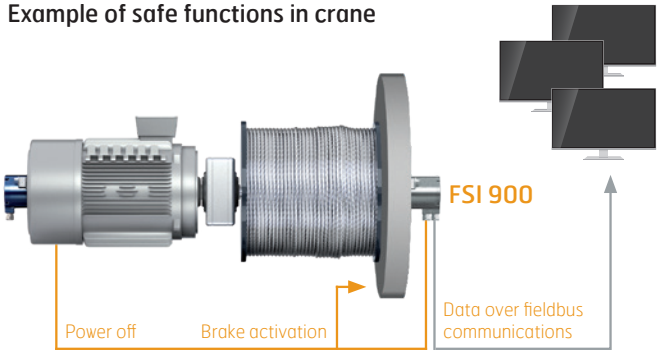
This makes FSI 900 part of the control system, but the product also takes care of functional safety separately. Together with the integrated failsafe relay outputs, the FSI 900 is more than an encoder. It is a distributed safety system – all in one package.



Example of safe functions in paper machine



Example of safe functions in crane



Signals that do not need safety certification

Safe signals

System design and integration

Reliable speed and position data in real-time

The FSI 900 scanning is constructed with internal supervision, which ensures functionality in real-time, all the time. The encoder reads the position values and will never lose its position, not even when the machine is restarted.

Distributed safety reduces the risk of safety errors and improves reaction time

With distributed and independent safety functionality, your functional safety system becomes less vulnerable to design errors, the risk of operational errors is reduced and a failsafe state can be executed directly, without going through a centralized system.

Achieve functional safety without complete system redesign

Since the safety system runs independently from the control system, your central control system will not need a safety certification. You can achieve functional safety and fulfil the requirements of the Machinery Directive without having to replace your existing control system.

Communication protocols

Supplemented by a CRG gateway the FSI 900 can be used with a variety of communication standards and protocols, including:

- CANOpen
- EtherNet/IP
- Profibus (DPV2)
- Profinet

Certifications

FSI 900 is certified to all of the applicable safety standards:

- EN ISO 13849-1: Safety of machinery — Safety-related parts of control systems
- EN IEC 62061: Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems.
- IEC 61508: Functional safety of electrical/electronic/ programmable electronic safety-related systems.
- EN IEC 61800-5-2 Adjustable speed electrical power drive systems - Part 5-2: Safety requirements – Functional - for safety in accordance with SIL2/PLd, category 3.

Safety values

MTTFd > 1141 years

PFH ≤ 1 x 10-7 failures/hour

Diagnostic coverage (DC) = 95%

Mission time (Tm) = 20 years

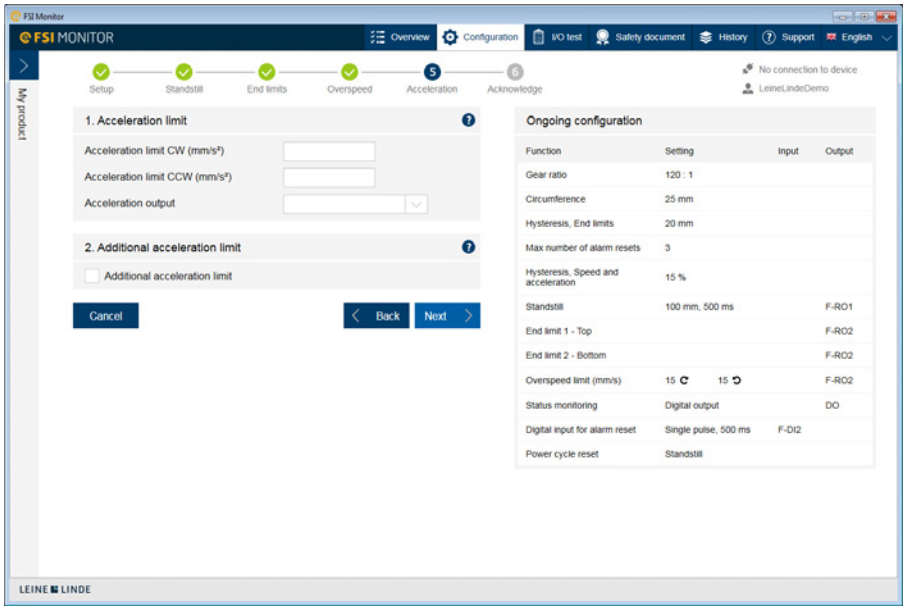
Proof test interval = One year, test by power cycling

Installation and configuration

Easy to fit

The FSI 900 is designed so that it can easily replace standard heavy-duty encoders without the need to redesign your installation. Even with the built-in safety relays the FSI 900 is compact enough to fit in most existing set-ups. No additional units need to be mounted on the axis, since everything you need to achieve functional safety is integrated in the encoder unit. There is no need for separate relays or mechanical end limit switches.

The FSI 900 is available with connectors or cable glands. Various shaft sizes and flanges make it easy to find a mechanical configuration that fits your machinery.



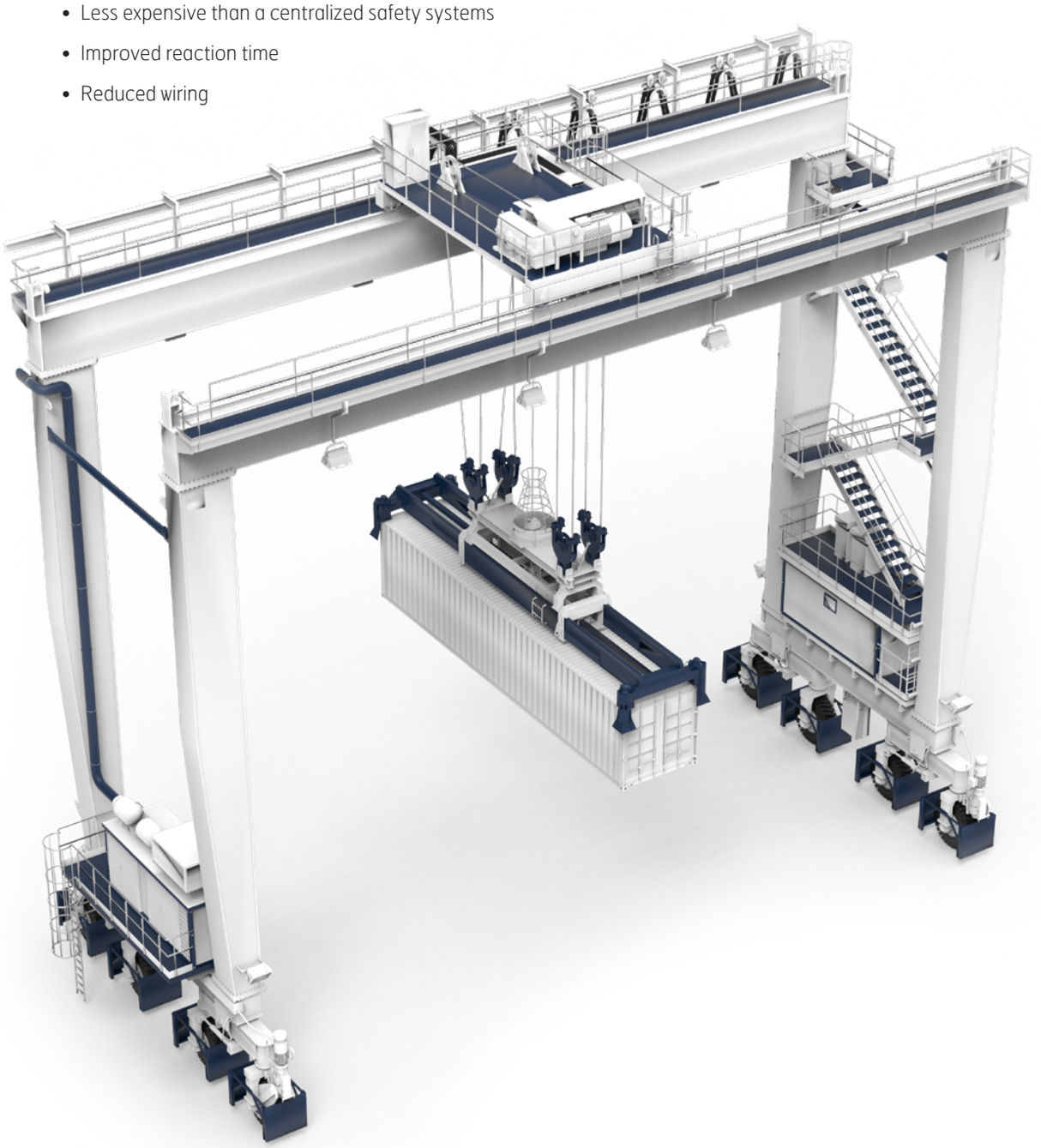
Set safety limits

Once the encoder is installed, you can configure the safety system by setting the safety limits in the FSI Monitor software. If multiple units should have the same limit values, you can save time by exporting and reusing your software set-up.

All data, such as safety values, the parameters for your configuration and event logs can be downloaded at any time, using the FSI Monitor software.

Benefits with distributed safety

- Independent operation and shutdown
- Easier to modify and upgrade without affecting other functions
- Easier to install and set-up in existing, non-safe systems
- Less expensive than a centralized safety systems
- Improved reaction time
- Reduced wiring



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