

# IT'S INTEGRATED!

## Absolute FSI 900 for safe motion



**Simplify the encoder installation while making sure that speed, acceleration, and end positions keep within safe limits in a functionally safe manner, certified in accordance with SIL2/PLd category 3. Meet the new product from Leine&Linde: FSI 900 – with functional safety integrated!**

Leine & Linde presents a brand new product series with integrated safe functions, the FSI series, where FSI means Functional Safety Integrated. FSI 900 monitors rotating movement, and acts immediately to make sure none of the user-configured limits will be exceeded. Together with the integrated failsafe relay outputs, the FSI 900 is more than an encoder. It is a safety system – all in one package.

The FSI 900 is mounted on a motor shaft, winch drum, drill, roll drum, wheel or wind turbine. To achieve the safety func-

tions required in its application, the FSI is based on an absolute encoder. The safe absolute scanning reads out unique values for every position, not even losing its position when the machine is restarted. Movement cannot go unnoticed where FSI 900 is mounted.

Define and monitor safe speed, end limits, acceleration, or standstill. By connecting FSI 900 to the emergency stop loop or directly to selected braking functions, it will use its failsafe relay outputs to break the control unit and enter the state defined as failsafe, when a set limit is reached. Thereby the Machinery Directive for functional safety is fulfilled in a reliable way by the FSI 900 alone.

The product is certified and fulfils the EN ISO 13849-1, EN IEC 62061, IEC 61508, and EN IEC 61800-5-2 for safety in accordance with SIL2/PLd, category 3.

### 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

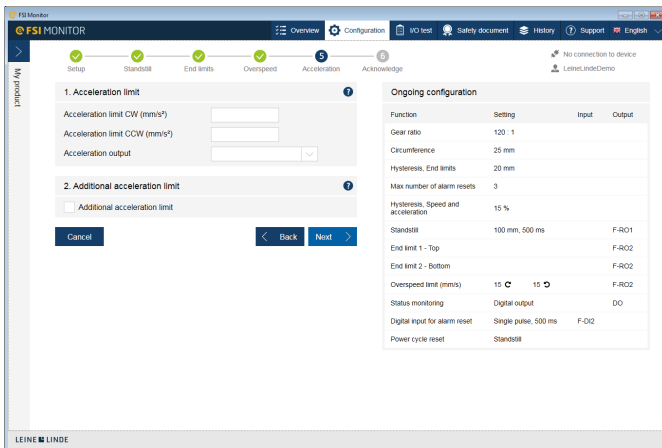
## All-in-one for reliable safety!

An advantage with FSI 900 is that everything that is needed to fulfil the desired safe functions, including the necessary certification, is integrated in one and the same product. There is no need for separate relays or mechanical end limit switches, as all this is integrated.

Safe is truly safe when nothing can go wrong. Focus is usability and simplicity!

## FSI Monitor for configuration of safe limits

FSI 900 is so versatile it can be adapted to the needs for safety in any encoder application – and many more! Configuration of the safe limits is made on site, in the product's software FSI Monitor, by the safety coordinator, so that risk for errors is minimised. The software set-up can be exported to other units, in case there are more than one machine that uses the same limit values.

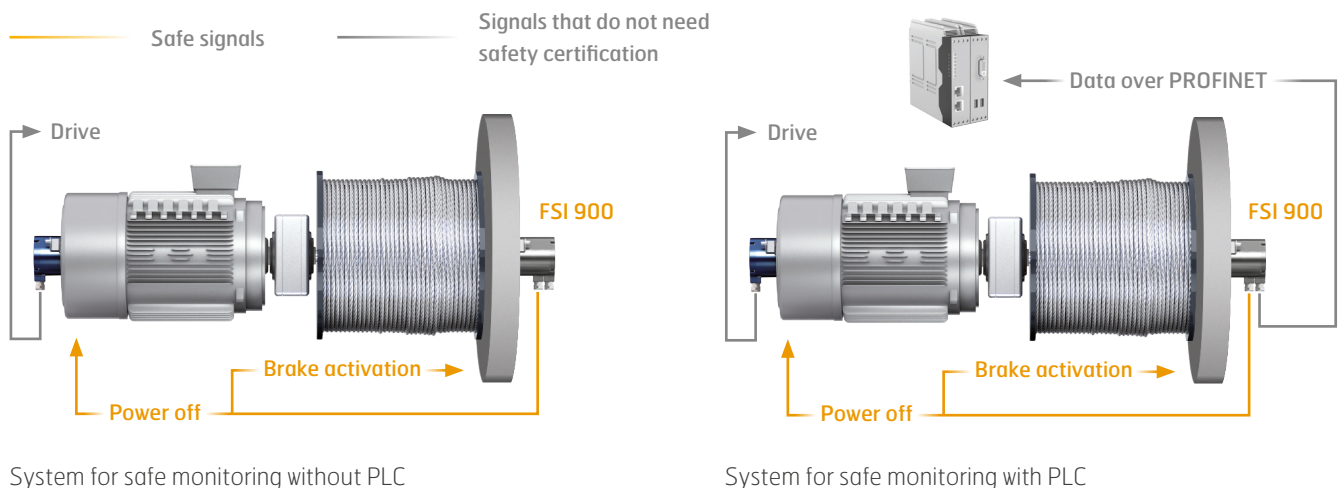


## All the necessary documents – at once

Certificates, lists of configured parameters, or history logs – all of this is available in the FSI product and can be downloaded onto a computer or printed for the safety documentation.

## Part of the control system – but manages safe functions separately

FSI 900 can be ordered with PROFINET fieldbus communication, for access of the encoder's speed and position data. This makes FSI 900 part of the control system, but the product still takes care of the safe functions separately. The PLC used in the system **does not need** safety certification. The PLC output is not part of the safety certification, and the communication to the PLC takes part in the normal, standardized way.



## Standard robust design

Extremely robust construction in accordance with Leine & Linde standards.

Absolute inductive scanning with safe singleturn and multiturn – ensuring safety even at power off.

Available with 11 mm and 14 mm shaft, or hollow-shaft. Key or keyway for mechanically slipfree installation.

### Safety values

MTTF<sub>d</sub> > 100 years

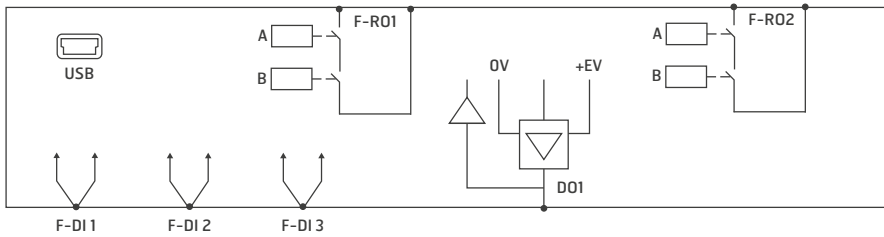
PFH = 11,2 x 10<sup>-9</sup> h<sup>-1</sup>

DC = 95%

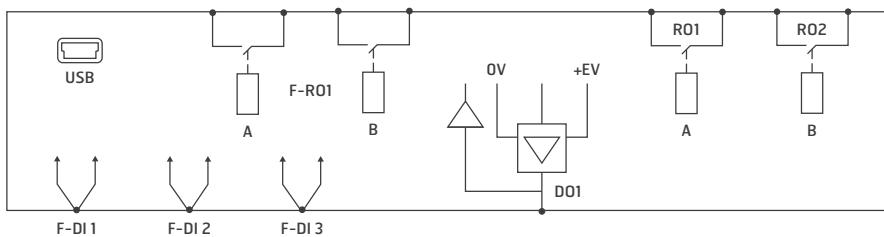
Mission time (T<sub>m</sub>) = 20 years



## FSI 900 – Configuration variants



Interface	Function
USB	Interface to PC program
F-R01 to F-R02	Failsafe relay outputs 1 and 2
F-DI1 to F-DI3	Failsafe digital inputs 1 to 3
DO1	Non-secure digital output



Interface	Function
USB	Interface to PC program
F-R01	Failsafe relay outputs
RO1 to RO2	Non-secure relay outputs
F-DI1 to F-DI3	Failsafe digital inputs 1 to 3
DO1	Non-secure digital output

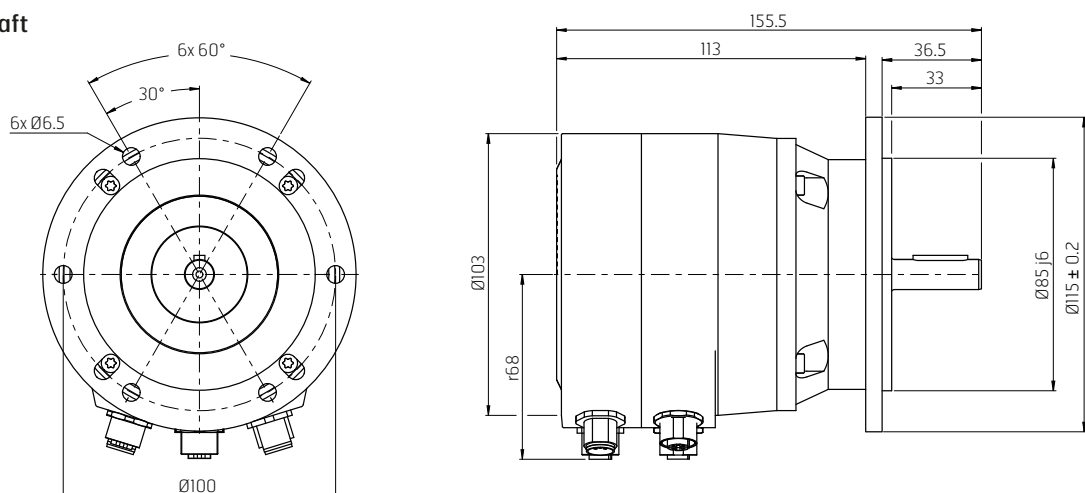
## Technical data

### FSI 900

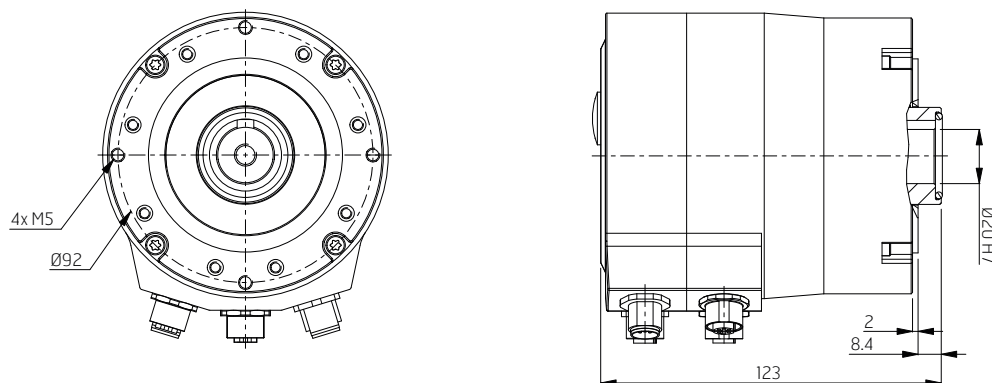
Shaft size	Hollow shaft Ø20 mm with key way Solid shaft Ø11 mm and Ø14 mm with key nut Solid taper shaft Ø16 mm with key nut
Operating temperature	-30°C...+70°C
Ingress protection class [IEC 60529]	IP67 (IP66 at shaft inlet)
Vibration [IEC 60068-2-64]	10 g RMS, 10-500 Hz
Shock [IEC 60068-2-27]	100 g/11 ms, 200 g/6 ms
Shaft load axial / radial	100 N / up to 200 N
Rotational speed max	5000 rpm
Output interface	PROFINET RT
Power supply	18-30 Vdc
Connection type	Connector

## Dimensions

### FSI 900 – Solid shaft



### FSI 900 – Hollow shaft



# FSI 900 Series

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## Model

- 984 = Position Sensor + Safety function (2 safe relay outputs)
- 985 = Position Sensor + Safety function and Process feedback interface (2 safe relay outputs)
- 986 = Position Sensor + Safety function with signal relays (1 safe relay output)
- 987 = Position Sensor + Safety function with signal relays and Process feedback interface (1 safe relay output)

## Shaft

- 0 = Hollow shaft 20 mm with keyway
- 1 = Solid shaft 11 mm with key nut
- 4 = Solid shaft 14 mm with key nut
- 5 = Solid taper shaft 16 mm with key nut

## Flange

- 0 = No torque bracket (hollow shaft)
- 2 = Torque bracket 120° (hollow shaft)
- 3 = Torque bracket 330° (hollow shaft)
- 8 = Euro-flange B10 (solid shaft)
- 9 = Customer specific flange

## Safety function

- 80= All safety functions
- 81= Standstill
- 82= End limits
- 83= Overspeed
- 84= Acceleration
- 85= End limits and standstill (Not available for FSI 986/987)
- 86= End limits, standstill and overspeed (Not available for FSI 986/987)
- 87= Overspeed and acceleration
- 88= Overspeed, acceleration and standstill (Not available for FSI 986/987)
- 89= Customer specific safety function

## Connection

- |                                     |                        |
|-------------------------------------|------------------------|
| <b>I/O electronics</b>              | <b>Connection type</b> |
| 3= Relay outputs and digital inputs | M12 Connectors         |

## Process feedback interface

- |    | Type                | Resolution  | Connection type |
|----|---------------------|-------------|-----------------|
| 61 | PROFINET singleturn | 19 bit      | 3xM12 connector |
| 62 | PROFINET multiturn  | 19 + 12 bit | 3xM12 connector |