



**samos®** PRO MOTION

# SAFE **MOTION**

Safe Speed, Direction and Position Monitoring  
for Machines and Plants.







# SAMOS® PRO MOTION ALL IN ONE

Integrated motion monitoring for machines and plants.

SAFE STANDSTILL  
MONITORING



SAFE  
DIRECTION



SAFE SPEED  
RANGE



SAFELY LIMITED  
SPEED



SAFE MINIMUM  
SPEED



SAFELY LIMITED  
POSITION



- + Integrated motion functionality
- + Compact dimensions
- + Special toolbox against vibration



## HTL INCREMENTAL ENCODER

- Highest safety level up to SIL 3/PL e
- Simple and reliable operation
- Comfortable mounting without toothed wheel



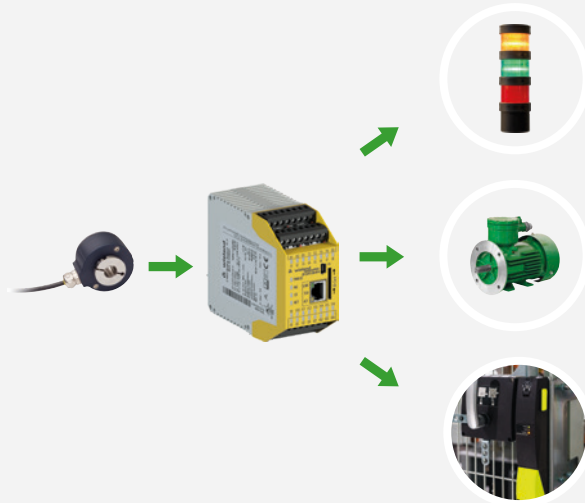
## INITIATORS

- Monitoring of 2 Axes up to PLd
- Scalable for single and multiple axes
- Cost effective installation for retrofit

# FEATURES AND BENEFITS

## WHAT IS SAFE MOTION MONITORING?

- Motion sensors provides pulses during movement
- samos® PRO MOTION converts pulses to speed, angle, position and direction
- Motion functions compare current values with limits
- If an allowed limit or range is exceeded
  - Motor can be stopped safely
  - Doors can be locked or unlocked
  - An alarm can be activated



## ALL IN ONE: SAVING OF MODULES

- Integrated motion functionality in the base module
- Fast motion inputs up to 70 kHz
- Monitoring up to 100 limits
- Benefit: Up to 60% less modules due to the integration of motion, gateway and I/O modules in samos® PRO MOTION

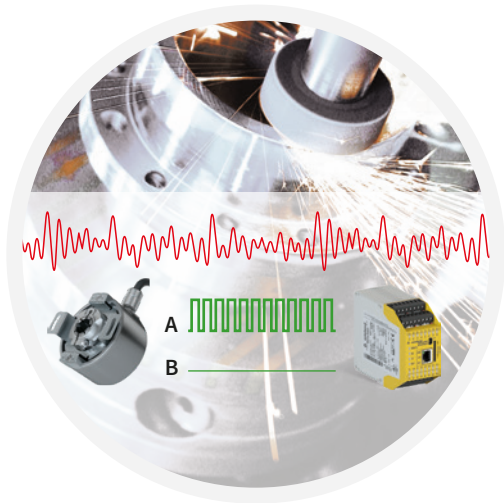
## 6 TÜV CERTIFIED FUNCTIONS BLOCKS

- Intuitive programming with motion function:
  - SLS (Safe Limited Speed)
  - SMS (Safe Minimum Speed)
  - SSR (Safe Speed Range)
  - Standstill (Safe Standstill Monitoring)
  - SDI (Safe Direction)
  - SLP (Safely Limited Position)
- Benefit: Intuitive and clear programming according to standards with well structured software samos® PLAN 6 for your motion projects



### 100 % RELIABLE STANDSTILL MONITORING

- Configurable speed windows for simple sensors
- Configurable position windows for advanced or redundant sensors
- **Benefit:** Robust standstill even for vertical and slowly gliding axes

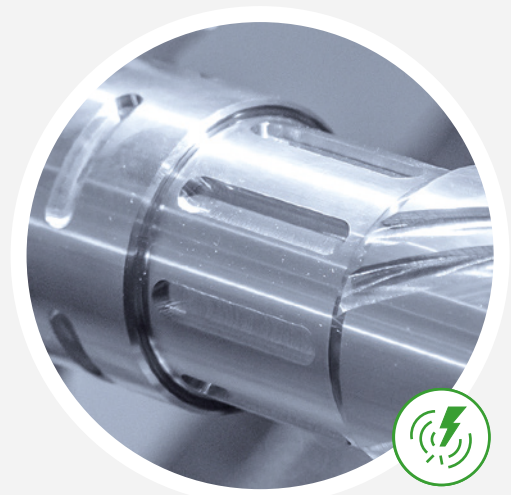


### HIGH AVAILABILITY AND SAFETY DESPITE VIBRATIONS

- Anti-vibration toolbox in safety software samos® PLAN 6 against micro vibrations with configurable options
- Flexibly configurable for different Application needs
- **Benefit:** Highest availability with reliable security

### HIGHER SAFETY LEVEL THROUGH REDUNDANCY

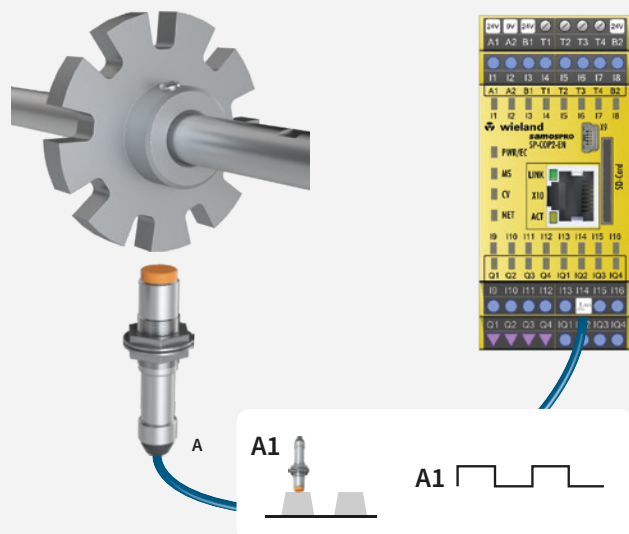
- Easy configuration of two motion sensors
- Dynamic speed comparison in function block
- Easy usage even in presses and portal axes
- Online display on samos® PLAN 6 for status bits, counter values, speed, position and direction as well as analog values
- Online oscilloscope for all digital and analog values
- **Benefit:** Higher safety level even with standard sensors
- **Benefit:** Saving of additional signal splitter or extra sensor



# SENSORS AND SAFETY LEVELS

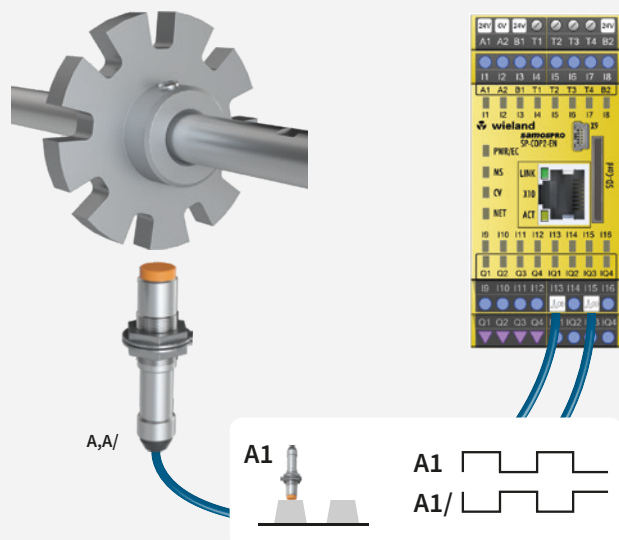
## PROXIMITY SENSOR - TRACK A

- Standard sensor, single channel
- Sensor output must be PNP
- Toothed gear with any pulse ratio (ideal 1:1)
- Typically 3-wire sensors
- Up to 2 axes with 1 samos® PRO MOTION
- Maximal reachable safety level for monitoring:
  - Speed: Cat 1, PL c, SIL 1
  - Position and Direction: not applicable



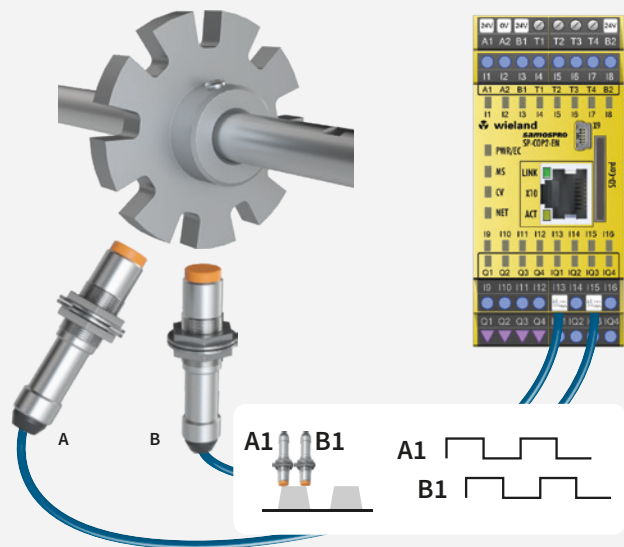
## PROXIMITY SENSOR, ANTIVALENT – TRACKS A, A/

- Standard sensor, antivalent (NO/NC)
- Sensor output must be PNP
- Toothed gear with any pulse ratio (ideal 1:1)
- Typically 4-wire sensors
- Up to 2 axes with 1 samos® PRO MOTION
- Maximal reachable safety level for monitoring:
  - Speed: Cat 1, PL c, SIL 1
  - Position and Direction: not applicable



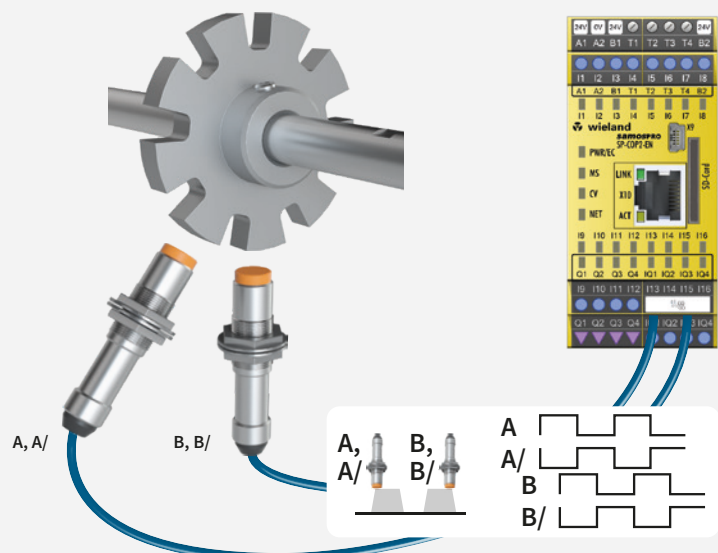
## 2 PROXIMITY SENSORS – TRACKS A, B

- 2 standard sensors, single channel
- Sensor output must be PNP
- Toothed gear with any pulse ratio (ideal 1:1)
- Flexible phase shift (ideal 90°)
- Typically 3-wire sensors
- Up to 2 axes with 1 samos® PRO MOTION
- Distanced inputs against cross short circuit
- Maximal reachable safety level for monitoring:
  - Speed: Cat 3, PL d, SIL 2
  - Position and Direction: Cat 2, PL d, SIL 2



## 2 PROXIMITY SENSORS, ANTIVALENT – TRACKS A, A/, B, B/

- 2 standard sensors, antivalent
- Sensor output must be PNP
- Toothed gear with any pulse ratio (ideal 1:1)
- Flexible phase shift (ideal 90°)
- Typically 4-wire sensors
- 1 axis with 1 samos® PRO MOTION
- Maximal reachable safety level for monitoring:
  - Speed: Cat 3, PL d, SIL 2
  - Position and Direction: Cat 3, PL d, SIL 2

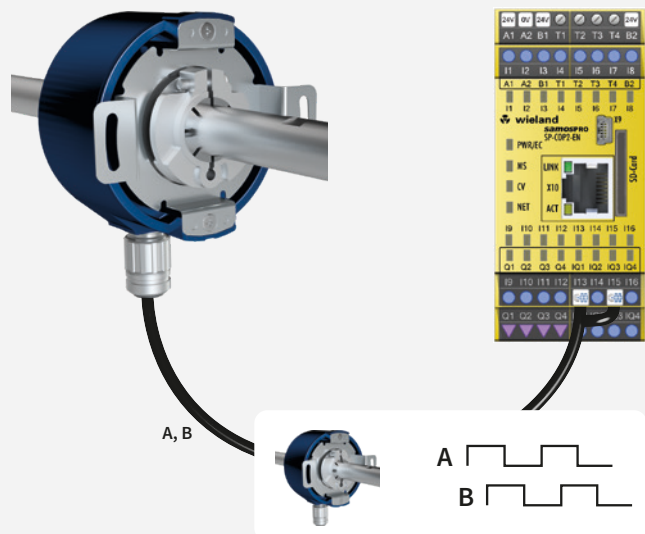






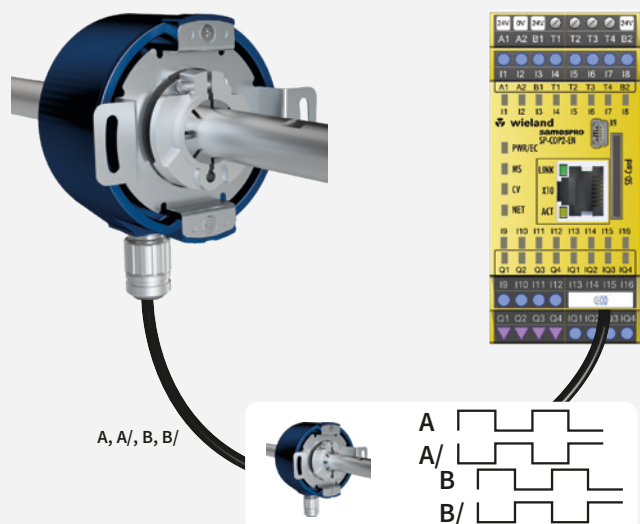
## SENC SAFE HTL ENCODER, 2 TRACKS

- 2 axes with 1 samos® PRO MOTION
- Speed, position and direction monitoring
- All functions with or without direction
- Maximal reachable safety level:
  - Without Vibration Filter: Cat 3, PL e, SIL 3
  - With Vibration Filter: Cat 3, PL d, SIL 2



## SENC SAFE HTL ENCODER, 4 TRACKS

- Only 1 axis with 1 samos® PRO MOTION
- Speed, position and direction monitoring
- All functions with or without direction
- Maximal reachable safety level:
  - Without Vibration Filter: Cat 4, PL e, SIL 3
  - With Vibration Filter: Cat 4, PL e, SIL 3



# APPLICATIONS

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## MACHINE TOOLS AND METAL WORKING

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- Laser cutting mostly for metal sheets
- Plasma cutting for thicker metal sheets
- Water Jet Cutting mostly for stone, ceramics, glass

### SAFETY FUNCTIONS

- Standstill monitoring
- Safe Limited Speed
- Safe Direction



### YOUR BENEFITS

- + Easy calibration mode with SLS
- + Highest safety during tool change
- + Robustness against vibrations
- + One system for all safety functions

## WOOD WORKING MACHINES

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- CNC wood working machines
- Sawing Machines
- Edge laminating machines
- Grinding, sandblasting and polishing machines

### SAFETY FUNCTIONS

- Safe Standstill for tool change during process
- Safe Standstill for service and maintenance
- Safe Limited Speed for calibration and setup



### YOUR BENEFITS

- + Cost effective and compact solution
- + PL d with proximity switches or encoders
- + Support of other functions like safety mats

# APPLICATIONS

## PACKAGING MACHINES

- Packaging Material (Carton folding, window patching)
- Secondary Packaging (Sealing, labelling)
- End of Line Packaging (Wrapper, Palletizers, etc)



### SAFETY FUNCTIONS

- Standstill for service and maintenance
- Safe Limited Speed (SLS) for machine setup
- Safe Direction (SDI) if combined with conveyor

### YOUR BENEFITS

- + Flexible programming for machine options
- + Continuous operation with open doors thanks SLS
- + Easy retrofitting with SENC encoder

## AUTOMATED GUIDED VEHICLES (AGVS)

- Unit load carriers, tow vehicles
- Forklift and pallet trucks



### SAFETY FUNCTIONS

- Safe Direction (SDI) to activate rear/back scanners
- Safe Speed Range (SSR) for switching scanner zone
- Safe Speed Range (SSR) for slowing in warning zone
- Safe Speed Range (SSR) for stopping in near zone
- Safe Limited Position (SLP) for direction of steering axis

### YOUR BENEFITS

- + Most compact solution saving place in cabinet
- + TÜV certified PL d with 2 SENC encoders
- + Industrial ethernet integrated in base module
- + Tool-free commissioning with SD-cards
- + Special solutions for steering and differential axes



# APPLICATIONS

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## HIGH BAY STORAGE

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- High Bay Storage Systems
- Channel Storage Systems
- Storage Retrieval Machines (SRM)



### SAFETY FUNCTIONS

- Standstill monitoring for service and maintenance
- SLS for human interaction and investment protection
- SLP for safe working range

### YOUR BENEFITS

- + Cost effective and integrated solution
- + TÜV certified PL d with 2 SENC encoders
- + Professional standstill for vertical axes

## CRANES AND HOISTING

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- Portal cranes
- Lifting platforms
- Special and service lifts



### SAFETY FUNCTIONS

- Standstill for service or parking position
- SLS for safely limited speed
- SLP for safe working range
- Safe Analog for load measurement or absolute distance sensors via 0-20 mA

### YOUR BENEFITS

- + All in one solution with motion and analog functions
- + Safe Monitoring of working zones with SLP
- + Speed comparison of parallel portal axes

# APPLICATIONS

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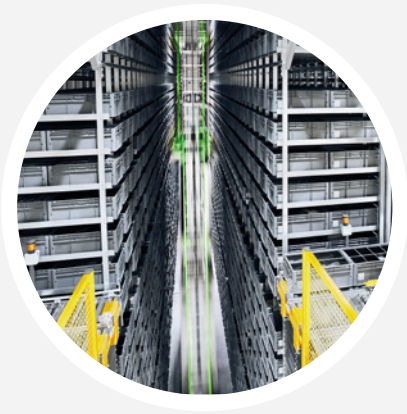
## 1000 OTHER POSSIBILITIES...

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- Wind turbines
- Cement mixers
- Centrifuges
- Rotary tables

### SAFETY FUNCTIONS

- Overspeed detection in wind turbines
- SLP for safe working range or angle
- Standstill for service or maintenance
- Safe limited speed to unlock hoods



# SAMOS® PRO MOTION · ORDERING OVERVIEW

## BASIC MODULES



SP-COP2-x

Name/type	Description	Part No.	P.U.
SP-COP2-EN-M-A	Controller module, MOTION version, USB and Ethernet connection, 16 inputs / 4 outputs and 4 configurable inputs or outputs with press, analog and motion functions, screw terminals, pluggable	R1.190.1250.0	1
SP-COP2-EN-M-C	Controller module, MOTION version, USB and Ethernet connection, 16 inputs / 4 outputs and 4 configurable inputs or outputs with press, analog and motion functions, push-in terminals, pluggable	R1.190.1260.0	1
SP-COP2-ENI-M-A	Controller module, MOTION version, USB and Industrial Ethernet connection, 16 inputs / 4 outputs and 4 configurable inputs or outputs with press, analog and motion functions, screw terminals, pluggable	R1.190.1350.0	1
SP-COP2-ENI-M-C	Controller module, MOTION version, USB and Industrial Ethernet connection, 16 inputs / 4 outputs and 4 configurable inputs or outputs with press, analog and motion functions, push-in terminals, pluggable	R1.190.1360.0	1

## I/O MODULES



SP-SDIO84-x | SP-SDI8-x | SP-DIO84-x

Name/type	Description	Part No.	P.U.
<b>I/O modules</b>			
SP-SDIO84-P1-K-A	Input/output extension with output test pulses, 8 inputs / 4 outputs, screw terminals, plug-in	R1.190.0030.0	1
SP-SDIO84-P1-K-C	Input/output extension with output test pulses, 8 inputs / 4 outputs, push-in terminals, plug-in	R1.190.0040.0	1
SP-SDI8-P1-K-A	Input extension, 8 inputs, screw terminals, plug-in	R1.190.0050.0	1
SP-SDI8-P1-K-C	Input extension, 8 inputs, push-in terminals, plug-in	R1.190.0060.0	1
SP-DIO84-K-A	Standard I/O module, 4 inputs / 4 outputs, screw terminals, plug-in	R1.190.1050.0	1
SP-DIO84-K-C	Standard I/O module, 4 inputs / 4 outputs, push-in terminals, plug-in	R1.190.1060.0	1

## ANALOG MODULES



SP-SAR4-x | SP-SAC4-x | SP-SACR22-x

<b>Analog modules</b>			
SP-SAR4-A	Screw terminals, pluggable, 4 safe inputs RTD	R1.190.1610.0	1
SP-SAR4-C	Push-in terminals, pluggable, 4 safe inputs RTD	R1.190.1620.0	1
SP-SAC4-A	Screw terminals, pluggable, 4 safe inputs 0-20 mA	R1.190.1630.0	1
SP-SAC4-C	Push-in terminals, pluggable, 4 safe inputs 0-20 mA	R1.190.1640.0	1
SP-SACR22-A	Screw terminals, pluggable, 2 safe inputs RTD, 2 safe inputs 0-20 mA	R1.190.1650.0	1
SP-SACR22-C	Push-in terminals, pluggable, 2 safe inputs RTD, 2 safe inputs 0-20 mA	R1.190.1660.0	1

## GATEWAYS



SP-CANopen | SP-PROFIBUS-DP | SP-EN-ETC

<b>Gateways</b>			
SP-CANopen	CANopen gateway with diagnosis function	R1.190.0210.1	1
SP-PROFIBUS-DP	PROFIBUS-DP gateway with diagnosis function	R1.190.0190.1	1
SP-EN-ETC	EtherCAT gateway	R1.190.0160.0	1

## ACCESSORIES



SP-COP-CARD1 | SP-CABLE-USB1  
SP-CABLE-ETH1

Name/type	Description	Part No.	P.U.
SP-COP-CARD1	Memory card 512 MB for SP-COP modules	R1.190.1000.0	1
SP-CABLE-USB1	USB connection cable for SP-COP, 1.8 m	R1.190.1010.0	1
SP-CABLE-ETH1	Ethernet connection cable for SP-COP, 2 m	R1.190.1020.0	1
SP-COP-STARTER-SET	Contents: SP-COP2-EN-A, SP-COP-CARD1, SP-PLAN6, SP-CABLE-USB1, SP-CABLE-ETH1	R1.190.1100.0	1



# SERIES SENC

## SAFE HTL INCREMENTAL ENCODER



**SENC-58H WITH HOLLOW SHAFT**



**SENC-58S WITH SOLID SHAFT**

### APPLICATIONS FOR SAMOS® PRO MOTION

- Safe Rotational speed, rotational direction or position monitoring to EN/IEC 61800-5-2
- Shutdown monitoring for commissioning or maintenance
- Safe direction detection (SDI) for rolls, gates or machines
- Safely reduced speed (SLS) for setup mode
- Safely limited position (SLP) for rotative or linear axes

### FEATURES

- Rotational speed or position monitoring to SIL 3 and PL e, for 1 axis, and up to SIL 2 and PL d for 2 axes
- Special form fit with the positive lock for hollow shafts
- Compact 58 flange size with minimum space requirement inside the machine
- Flexible mounting with hollow shaft, solid shaft or axial connector
- Compatible HTL output for fast safe inputs on samos® PRO MOTION
- Resolutions from 360 ppr and 1024 ppr depending on accuracy requirement
- PUR encoder cable resistant to oil, UV, ozone and solvents
- Over 100,000 hours of service life from mounting at hollow shaft encoder
- Maximum peak speed of 9000 rpm and continuous speed of 4000 rpm

### TYPE CODE

	SENC-	xxx	xx	xxx	xxxx	x
Shaft type and sizes	Solid shaft, size 58 mm	58S				
	Hollow shaft, size 58 mm	58H				
Shaft diameter	10 mm shaft diameter (58S only)		10			
	14 mm shaft diameter (58H only)		14			
Electronic system	Supply voltage 11-30 V, digital HTL output (AA/, BB/, ZZ/)			HTL		
Resolution	360 ppr (ppr: pulse/revolution)				0360	
	1024 ppr (ppr: pulse/revolution)				1024	
Connection orientation	Axial					A
	Radial					R

### SAFETY-RELEVANT DATA

	PFD avg	PFH	MTTFd	DCavg	Mission Time	SIL	PL
Rotational speed monitoring (partially redundant) at 40 °C	6.60E-05	7.53E-10	1515	99.00 %	20 years	SIL 3	PL e / Cat 4
Rotational speed monitoring (partially redundant) at 80 °C	2.97E-04	3.39E-09	336	99.00 %	20 years	SIL 3	PL e / Cat 4
Position monitoring (single channel) at 40 °C	6.60E-05	7.53E-10	1515	99.00 %	20 years	SIL 3	PL e / Cat 4
Position monitoring (single channel) at 80 °C	2.97E-04	3.39E-09	336	99.00 %	20 years	SIL 3	PL e / Cat 4

# SERIES SENC

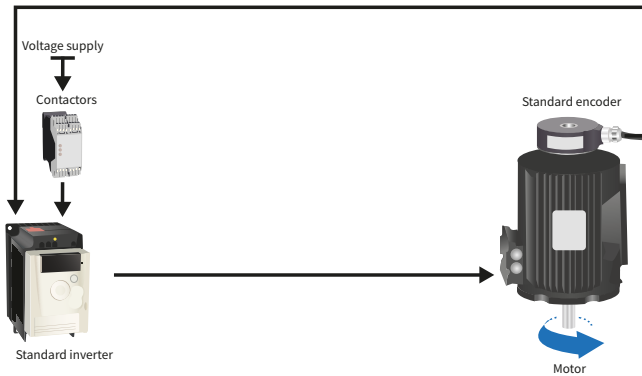
## SAFE HTL INCREMENTAL ENCODER

### TYPICAL ARCHITECTURE

The integration of encoders for speed monitoring in a safety loop is possible in various configurations. Various solutions, depending on the existing safety level and/or existing equipment, are presented below.

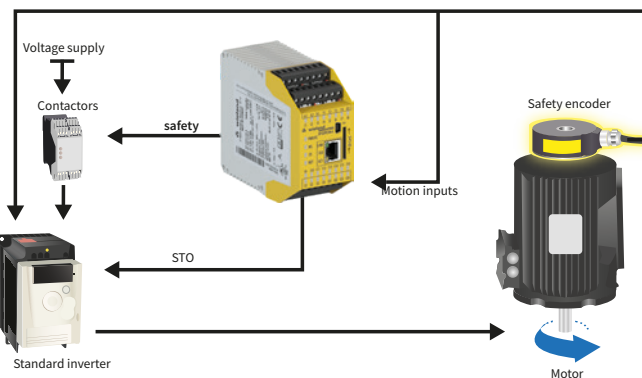
### NOTE

The use of encoders in a safety loop requires external monitoring of the encoder signals. The safety modules offered by Wieland meet these requirements in a manner that is transparent for the user.



### STANDARD INSTALLATION WITHOUT SIL CERTIFICATION

Safety level: 0



### SOLUTION FOR MODULAR SAFETY

Safety level: to SIL 3/PL e

#### Establishing conformity of an existing system

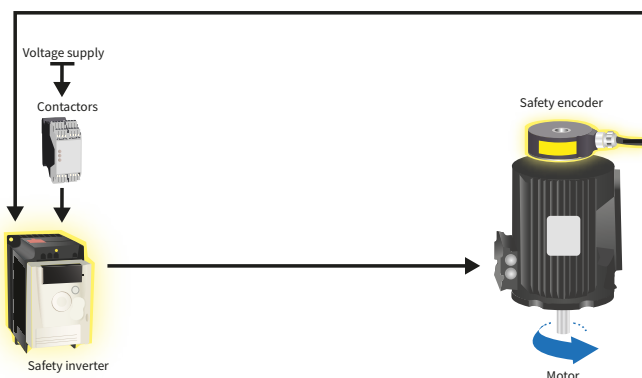
Problem-free integration: +++

Cost-effective solution: +++

#### New design

Problem-free integration: +++

Cost-effective solution: ++



### SOLUTION FOR INTEGRATED SAFETY

Safety level: to SIL 3/PL e

#### Establishing conformity of an existing system

Problem-free integration: +

Cost-effective solution: +

#### New design

Problem-free integration: +++

Cost-effective solution: +++

# SERIES SENC

## SAFE HTL INCREMENTAL ENCODER

TECHNICAL DATA		
Function	SENC-58Sxx	SENC-58Hxx
Incremental rotary encoder	Logging of position or angle changes via rectangular pulses with photoelectric sensing	
Nominal voltage U <sub>N</sub>		24 V DC
Operating voltage range U <sub>B</sub>		11 – 30 V DC
Galvanic isolation supply circuit - output circuit		No
Supply current		100 mA without load
Electrical data		
Output signals	Digital HTL signals (11-30 V DC)	
PIN coding	A, A/, B, B/ for safe incremental pulses 0, 0/ for index pulse (no internal plausibility check)	
Color coding of encoder cable (CABLE-M23CCW...)	A: gray, A/: pink, B: brown, B/: green, 0: red, 0/: black, +V: blue and green/brown, 0V: white and white/green	
Resolution	360 ppm and 1024 ppm	
Current per channel pair	40 mA	
Short circuit strength	Yes	
Protection against polarity reversal	Yes	
Mechanical data		
DIN-size	58 mm	
Shaft type	Solid shaft	Hollow shaft
Shaft diameter	1000 mm	14 mm
Housing material	Powder-coated, die-cast zinc	
Flange material	Aluminum	
Shaft material	AISI 303 stainless steel	
Bearing	6800 series – sealed	6803 series – sealed
Maximum loads	Axial: 40 N, radial: 80 N	Axial: 20 N, radial: 40 N
Shaft moment of inertia	< 2800 g/mm <sup>2</sup>	< 9500 g/mm <sup>2</sup>
Static/dynamic torque	5 / 35 mN/m	10 / 85 mN/m
Max. peak rotational speed	9000 rpm	9000 rpm
Max. continuous rotational speed	6000 rpm	4000 rpm
Theor. mechanical service life*	> 29.7/10 <sup>9</sup> revolutions / 82,365 hours	> 24/10 <sup>9</sup> revolutions / 100,000 hours
Weight (approx.)	0.300 kg	0.280 kg
General data		
Protection class as per DIN 60529	IP65	
Ambient temperature / storage temperature	-25°C – +85°C / -20°C – +85°C	
Standards	EN/ IEC 61508, IEC 13849-1, IEC 61800-5-2, IEC 62061	
Approvals	CE, TÜV, cULus listed	
* continuous max. rotational speed – ½ max. load – to ISO 281:1990, L10		

## OVERVIEW OF DEVICES

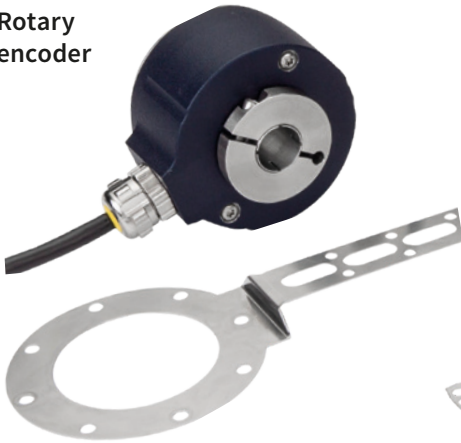
Type	Description	Part. no.	P.U.
SENC-58S10HTL0360A	Safe HTL encoder, SIL 3, PL e, solid shaft, size 58mm, 360ppr, axial	R1.450.1010.0	1
SENC-58S10HTL0360R	Safe HTL encoder, SIL 3, PL e, solid shaft, size 58mm, 360ppr, radial	R1.450.1020.0	1
SENC-58S10HTL1024A	Safe HTL encoder, SIL 3, PL e, solid shaft, size 58mm, 1024ppr, axial	R1.450.1050.0	1
SENC-58S10HTL1024R	Safe HTL encoder, SIL 3, PL e, solid shaft, size 58mm, 1024ppr, radial	R1.450.1060.0	1
SENC-58H14HTL0360R	Safe HTL encoder, SIL 3, PL e, hollow shaft, size 58mm, 360ppr, radial	R1.450.1110.0	1
SENC-58H14HTL1024R	Safe HTL encoder, SIL 3, PL e, hollow shaft, size 58mm, 1024ppr, radial	R1.450.1130.0	1



# SERIES SENC

## ACCESSORIES FOR ROTARY ENCODER LINE

Rotary encoder



Torque support with retaining bracket



Torque support with stator coupling

Torque supports offer a high degree of rotatory stability, preventing the encoder rotating along with the shaft. Flange adapters are used to mount the encoder on a motor. The reducing bushes allow you to reduce the diameter of a hollow shaft encoder. The encoder cables from PUR with M23 connector (encoder side) and open core (controller side) offer high flexibility, ruggedness and durability.

## Rated for maximum ruggedness and optimized safety



Safe drive with keyed joint.



A unique device for continuous hollow shafts, which effectively prevents slippage through locking pins.



Rugged mechanical design with additional bearing in the cover.

### OVERVIEW OF DEVICES

Type	Description	Part. no.	P.U.
<b>ACCESSORIES: COUPLING</b>			
COUP-STATOR-58-S	Stator coupling, size 58mm, stainless-steel	R1.450.9110.0	1
COUP-TETHER-58-S	Tether arm coupling, size 58mm, stainless-steel	R1.450.9120.0	1
<b>ACCESSORIES: FLANGE ADAPTERS</b>			
FLANGE-58-A	Flange adapter, size 58mm, aluminium	R1.450.9210.0	1
<b>ACCESSORIES: SHAFT</b>			
COUP-SHAFT-58S-S-10-10	Shaft coupling, solid shaft, size 58mm , shaft diameter 10mm to 10mm	R1.450.9250.0	1
KEY-SHAFT-58S-S-04-10	Shaft key, solid shaft, size 58mm, width 4mm, length 10mm	R1.450.9260.0	10
<b>ACCESSORIES: ENCODER CABLE</b>			
CABLE-M23CKW-PUR-015	Encoder cable, 1,5 m, PUR, shielded	R1.450.9310.0	1
CABLE-M23CKW-PUR-030	Encoder cable, 3 m, PUR, shielded	R1.450.9314.0	1
CABLE-M23CKW-PUR-050	Encoder cable, 5 m, PUR, shielded	R1.450.9320.0	1
CABLE-M23CKW-PUR-070	Encoder cable, 7 m, PUR, shielded	R1.450.9324.0	1
CABLE-M23CKW-PUR-100	Encoder cable, 10 m, PUR, shielded	R1.450.9330.0	1
CABLE-M23CKW-PUR-150	Encoder cable, 15 m, PUR, shielded	R1.450.9335.0	1
CABLE-M23CKW-PUR-200	Encoder cable, 20 m, PUR, shielded	R1.450.9340.0	1
<b>ACCESSORIES: TERMINAL BLOCKS</b>			
WKFN 2,5 E/35 R2 3K	Duo Feed-through terminal with tension spring connection, nominal cross section: 2.5 mm <sup>2</sup> , width: 5 mm, color: red, resistance: 3 kOhm	56.703.8455.5	20
WKFN 2,5 E/35/...ROT	Duo Feed-through terminal with tension spring connection, nominal cross section: 2.5 mm <sup>2</sup> , width: 5 mm, color: red	56.703.7555.5	100
WKFN 2,5 E/SL/35	Ground terminal with tension spring connection, nominal cross section: 2.5 mm <sup>2</sup> , width: 5 mm, color: Green-yellow	56.703.8955.0	100
IVBWK 2,5- 2	Cross connector, insulated for DIN rail terminal blocks type WKF..., 2-pole	Z7.280.6227.0	50
WST 13,5 / TS 35	Shield connection terminal block for wire diameter 4 to 13.5 mm	Z2.803.6110.0	10
APFN 2,5 E/35	End plate for DIN rail terminal blocks type WKFN 2,5 E..., color: grey	07.312.7355.0	10

The fault elimination of the mechanic is not part of the device and has to be provided by the operator. For additional information (e.g. drawings and dimensions), visit the eShop at <http://eshop.wieland-electric.com>



## INFO TO GO

All brochures from Wieland Electric are available for download on our website.



<https://www.wieland-electric.com/en/support/downloads>

Interesting for you

### SAMOS® PRO COMPACT

Safety controllers for machines + plants  
Part No. 0881.1



### SAFETY CATALOG

Safe System Solutions for Automation Technology  
Part No. 0860.1

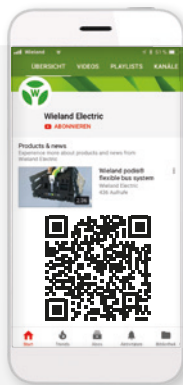


### SAFETY SERVICE

Training + Services for the safety of your machines (only german)  
Part No. 0870.1



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**Technical consultation**  
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