



DATASHEET

# SpeedSys® 200 & 300

Overspeed detection system (ODS)

## GAME CHANGING INNOVATION FOR SIL RATED OVERSPEED PROTECTION

SpeedSys ODS is a high-integrity overspeed detection system for rotating machinery. It delivers the core layer of protection with a compact architecture. Its small technical footprint and low-impact installation enables advanced protection to a wide range of applications. The simple and robust design meets the latest safety standards, and features easy maintenance and long proof test intervals.



## ADVANCED DETECTION FOR A WIDE RANGE OF APPLICATIONS

- Overspeed, underspeed and acceleration detection for critical and semi-critical rotating machinery
- Designed for versatility and scalable to any application
- Suitable for API 670 and API 612 applications

*Typical applications include:*

- Compressors and pumps
- Microturbines
- Wind turbines
- Gas- and steam turbines
- Marine applications

## SAFETY SYSTEM BY DESIGN

- Certified SIL 2/3 capability
- Fast 8 ms hardware response time (relays)
- 2 safety relays + 1 safety analog output per module
- Discrete in- and output (*SpeedSys 300 only*)
- Modbus RS485 (*SpeedSys 300 only*)
- Suitable for all common sensor types
- External voting for redundant configurations
- Advanced self-monitoring and diagnostics
- 10 years proof test interval (typical)

## VERSATILE ARCHITECTURE

Each channel is designed to work as an independent module. SIL 2 rated protection can be achieved with a single module. SIL 3 rated protection can only be achieved with the SpeedSys 300 and with a HFT  $\geq 1$ . To maximize safety or availability, the double pole safety relays can easily be wired into various configurations.

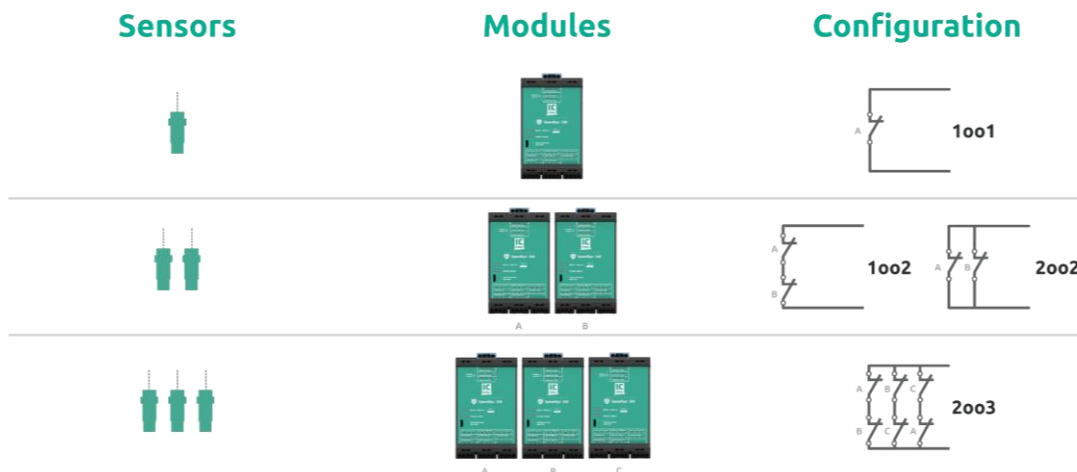


Figure 1: configuration examples with SpeedSys 300. Configuration is identical for SpeedSys 200. Relays are depicted energized-closed.

## INPUT

### Input channels

Sensor input	3 separate sensor inputs for different sensor types Note: Only one sensor input can be used at any time
Frequency range	0.025 Hz to 35 kHz
Measurement accuracy	0.05 %

### (1) Hall effect sensor

Input type	3-wire voltage input
Sensor power supply	21.0 V (@ 0 mA) to 15.5 V (@ 15 mA)
Input range	0 V to 24 V
Trigger level (programmable)	0 V to 24 V
Impedance	500 k $\Omega$
Sensor monitoring	Open circuit detection, sensor power supply short circuit detection
Note	Hall effect sensors are typically suitable for cable lengths up to 300 m.

### (2) Electromagnetic sensor (MPU)

Input type	2-wire voltage input
Sensor power supply	n/a
Input range	20 mV <sub>RMS</sub> to 80 V <sub>RMS</sub>
Trigger level (programmable)	0 V to 5 V
Impedance	100 k $\Omega$
Sensor monitoring	Open circuit detection



Note Electromagnetic sensors, depending on electromagnetic environment, sensor and application design, can have a maximum cable length ranging from 30 to 500 m.

**(3) Proximity sensor**

Input type 2-wire current input  
 Note: 2-wire dynamic current eddy current probe ONLY

Sensor power supply 21.0 V (@ 0 mA) to 20.5 V (@ 21 mA) (@ 20 °C)  
 21.0 V (@ 0 mA) to 20.0 V (@ 21 mA) (@ 60 °C)

Input range 0.0 mA to 21.0 mA

Trigger level (programmable) 0.0 mA to 20.5 mA

Sensor monitoring Open circuit detection, short circuit detection

Note Proximity sensors are typically suitable for cable lengths up to 1000 m.

**Binary input / Proof test trigger  
 (SpeedSys 300 only)**

Number 1 binary input

Input type Open collector input

Input voltage "Low / inactive" < 5 V<sub>DC</sub>  
 "High / active" > 15 V<sub>DC</sub>

Functionality High signal triggers reset OR Reset & Proof test. This functionality is software-configurable

Operation Activation/deactivation switches the software-selected relays and clears the device of alarms, latching, errors and stored values.  
 Note: activation of the binary input triggers the software-selected relays and is thus only suitable for testing the tailing equipment of SpeedSys 300.

**OUTPUT**

**Safety relays**

Number 2 safety relays (relay 1 & 2)

Type Double pole single throw (DPST)  
 2 x COM and 2 x NO contacts available per relay

Function User-configurable for overspeed, acceleration and/or underspeed limits and/or system status

Maximum switching capacity 30 V<sub>DC</sub> / 2 A (resistive load)  
 30 V<sub>DC</sub> / 100 mA (inductive load)

Hysteresis User-configurable

Safe state Normally open (de-energized to trip)

SIL safety Yes. The safety relays are part of the SIL approvals and can be used for critical machine protection applications as specified.

**Non-safety relays**

Number 2 relays (relay 3 & 4)

Type Single pole single throw (SPST)  
 1 x COM and 1 x NO contacts available per relay

Function User-configurable identical to the safety relays.

Maximum switching capacity 30 V<sub>DC</sub> / 2 A (resistive load)



Hysteresis	30 V <sub>DC</sub> / 100 mA (inductive load)
Safe state	User-configurable
SIL safety	User-configurable normally open or normally closed
	No. The additional relays are NOT part of the SIL approvals and cannot be used for critical machine protection applications.

**Binary output (*SpeedSys 300 only*)**

Number	1 binary output
Type	Open collector output (requires external pull-up resistor of ± 2.4 kΩ)
Function	Fast signalling output to announce system status ahead of relays. User-configurable identical to the relays.
Maximum capacity	Up to 24 V <sub>DC</sub> / 90 mA
Hysteresis	User-configurable
SIL safety	No. The discrete output is NOT part of the SIL approvals and cannot be used for critical machine protection applications.

**Analog output**

Number	1 analog output
Type	4 to 20 mA current loop
Function	User-configurable range to transmit current output value equivalent to the measured speed.
Resolution	16 bit (0 – 24 mA)
Accuracy	0.1 %
Safe state	Output driven to configurable out of range value
SIL safety	Yes. The analog output is part of the SIL approvals and can be used for critical machine protection applications as specified.

**Digital frequency output**

Number	1 frequency output
Type	Digital open collector output
Signal	Max 24 V <sub>DC</sub> / 100 mA

**Modbus RS485 (*SpeedSys 300 only*)**

Number	1 Modbus output (read-only)
Type	RS485, half-duplex (2-wire)
Transmission speed (baud rate)	4 800 / 9 600 / 19 200 / 38 400 / 57 600 / 115 200 [bps]

**Status LED indicators**

Relay indicators	2 LED indicators for safety relay status
Power / error indicators	2 LED indicators for power and module status

## SYSTEM

### Reaction time

Measurement time ( $T_m$ )	Dependent on signal frequency and averaging, typically $\pm 2$ ms
Hardware reaction time ( $T_h$ )	Relays: $\leq 8$ ms Analog out: $\leq 100$ ms
Total reaction time ( $T_h + T_m$ )	Relays, typical: $\leq 10$ ms Analog out, typical: $\leq 100$ ms

### PC interface

USB-B mini for programming and status reading  
(Windows® 7 and higher proprietary software application)

### Power supply input

Number	2 redundant power supply inputs
Input voltage range	24 V <sub>DC</sub> (18 to 36 V <sub>DC</sub> )
Current consumption	SpeedSys 200: 210 mA @ 24 V <sub>DC</sub> SpeedSys 300: 220 mA @ 24 V <sub>DC</sub>
Reverse polarity protection	Yes

### Heat dissipation

SpeedSys 200: maximum 5.0 W (@ 24 V<sub>DC</sub>)  
SpeedSys 300: maximum 5.3 W (@ 24 V<sub>DC</sub>)

### Housing

Material	Polyamide (PA 66 GF 30)
Dimensions	SpeedSys 200: 45.0 x 117.7 x 114.0 mm (1.77 x 4.63 x 4.49") SpeedSys 300: 67.5 x 117.7 x 114.0 mm (2.66 x 4.63 x 4.49")
Mounting assembly	DIN rail
Connectors	SpeedSys 200: 9 plug-in connectors with 4 contacts, screw type terminals SpeedSys 300: 11 plug-in connectors with 4 contacts, screw type terminals
Connector clamping range	0.13 to 3.31 mm <sup>2</sup> (26 to 14 AWG)
Connector tightening torque	0.4 to 0.6 Nm (0.30 to 0.44 lb-ft)
Weight	SpeedSys 200: $\pm 350$ g (0.77 lb) SpeedSys 300: $\pm 425$ g (0.94 lb)

### Environmental conditions

Operating temperature	-20 to 60 °C (-4 to 140 °F)
Storage temperature	-40 to 85 °C (-40 to 185 °F)
Operating humidity	5 to 80 % RH (non-condensing)
Storage humidity	5 to 85 % RH (non-condensing)

### Ingress protection

IP20 according to IEC 60529  
Indoor use or use in a protective enclosure




### Other

Over voltage category II  
Pollution degree 2

## APPROVALS

Conformities	EU: CE
	UK: UKCA
	US and Canada: cMETus
Electromagnetic compatibility / EMC	FCC 47 CFR, part 15 (according to ANSI C 63.4) EN 61326:2017 EN 55011:2016/A1:2017
Electrical equipment (safety) / LVD	EN IEC 61010-1:2010/A1:2016
Environmental / RoHS	EN IEC 63000:2018
Hazardous areas / ATEX	EN IEC 60079-0:2018 (See section: Hazardous Areas)
Functional safety	SIL 2/3 capable according to IEC 61508:2010
API conformity	Suitable for compliance to API 670 and API 612

## HAZARDOUS AREAS

Type of protection	Ex ia; intrinsic safety on sensor inputs
Approval marking	 
Identifiers	IECEx IBE 20.0045  IBEExU20ATEX1157
Important information	Certification refers to sensor input only. Refer to the certificates for specific parameters of the mode of operation and special conditions of use.

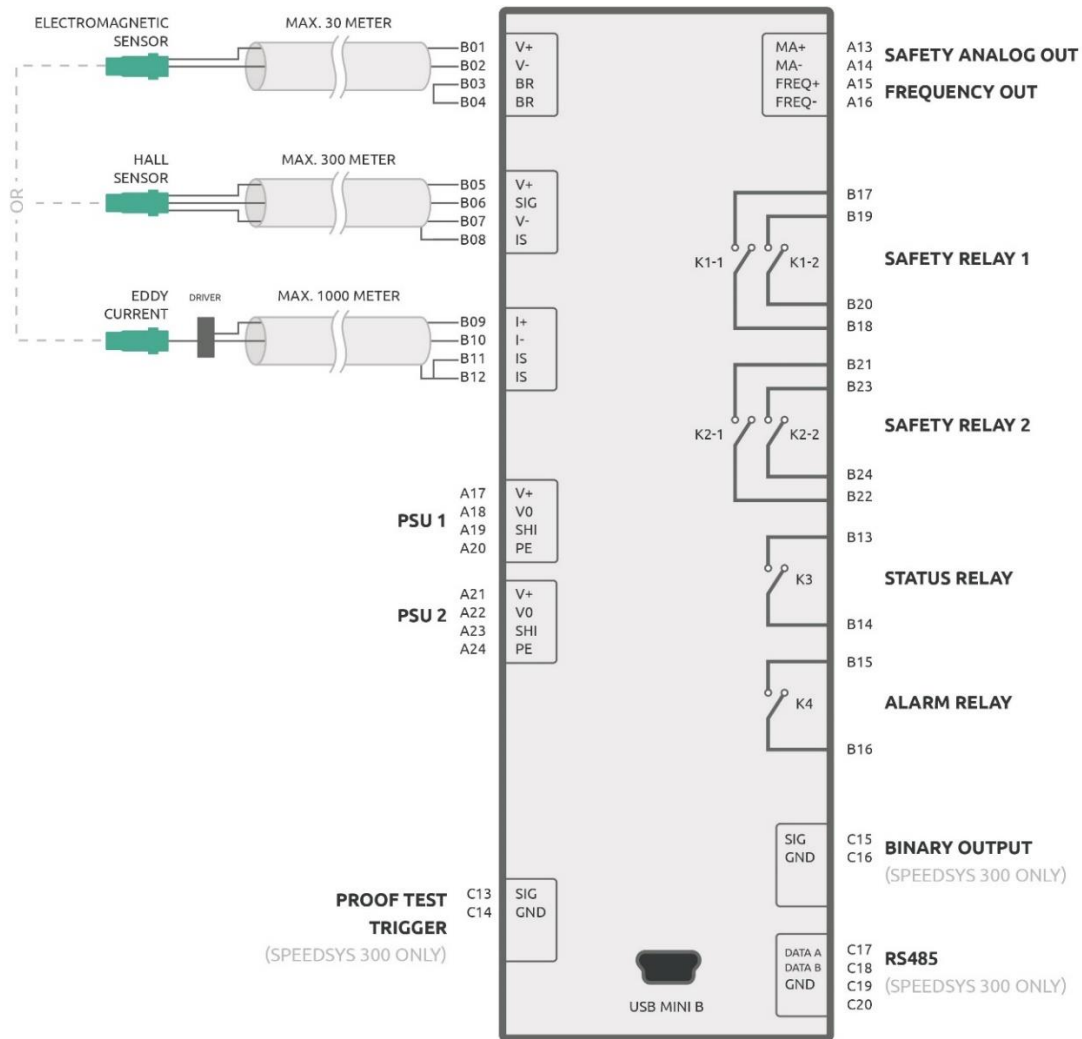


Figure 2: connection diagram SpeedSys ODS. Relays are depicted de-energized-open.

## ABOUT ISTECS

We ensure maximal value generation of your critical machinery with advanced protection and monitoring solutions. Every Istec product is designed to meet the increasing demands of industrial applications and taps into our 50 years of experience in the industry.

Our expertise is to support and maintain these critical sensors and systems in the field throughout their operational life; to increase safety, maximize machine availability and to provide new monitoring data and machine insights.

### Questions and support?

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This product has been tested according to the listed standards. If the product is used in a manner not specified by manufacturer the degree of protection may be impaired. Therefore, the product documentation must be read completely, carefully and all safety instructions must be followed.

The information in this document, like descriptions, drawings, recommendations and other statements, was drawn in good faith to be correct, but the completeness and accuracy of this data cannot be guaranteed. Not all possibilities or situations are described in the product documentation. Before using this product, the user must evaluate it and determine its suitability to the intended application.

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