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 ≥ 1. To maximize safety or availability, the double pole safety relays can easily be wired into various configurations.
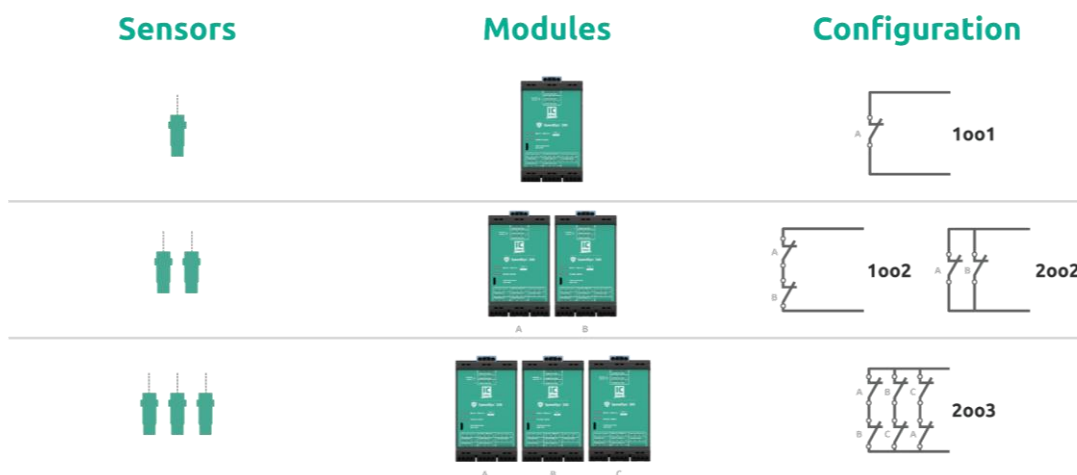

Figure 1: configuration examples with SpeedSys 300. Configuration is identical for SpeedSys 200. Relays are depicted energized-closed.

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 kΩ
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$_{RMS}$ to 80 V$_{RMS}$
Trigger level (programmable)	0 V to 5 V
Impedance	100 kΩ
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_{DC} "High / active" > 15 V_{DC}
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 <u>tailing equipment</u> 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_{DC} / 2 A (resistive load) 30 V_{DC} / 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_{DC} / 2 A (resistive load)

	30 V_{DC} / 100 mA (inductive load)
Hysteresis	User-configurable
Safe state	User-configurable normally open or normally closed
SIL safety	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_{DC} / 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_{DC} / 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 ± 2 ms	
Hardware reaction time (T_h)	Relays:	≤ 8 ms
	Analog out:	≤ 100 ms
Total reaction time ($T_h + T_m$)	Relays, typical:	≤ 10 ms
	Analog out, typical:	≤ 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_{DC} (18 to 36 V_{DC})
Current consumption	SpeedSys 200: 210 mA @ 24 V_{DC}
	SpeedSys 300: 220 mA @ 24 V_{DC}
Reverse polarity protection	Yes

Heat dissipation

SpeedSys 200: maximum 5.0 W (@ 24 V_{DC})

SpeedSys 300: maximum 5.3 W (@ 24 V_{DC})

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^2 (26 to 14 AWG)
Connector tightening torque	0.4 to 0.6 Nm (0.30 to 0.44 lb-ft)
Weight	SpeedSys 200: ± 350 g (0.77 lb)
	SpeedSys 300: ± 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

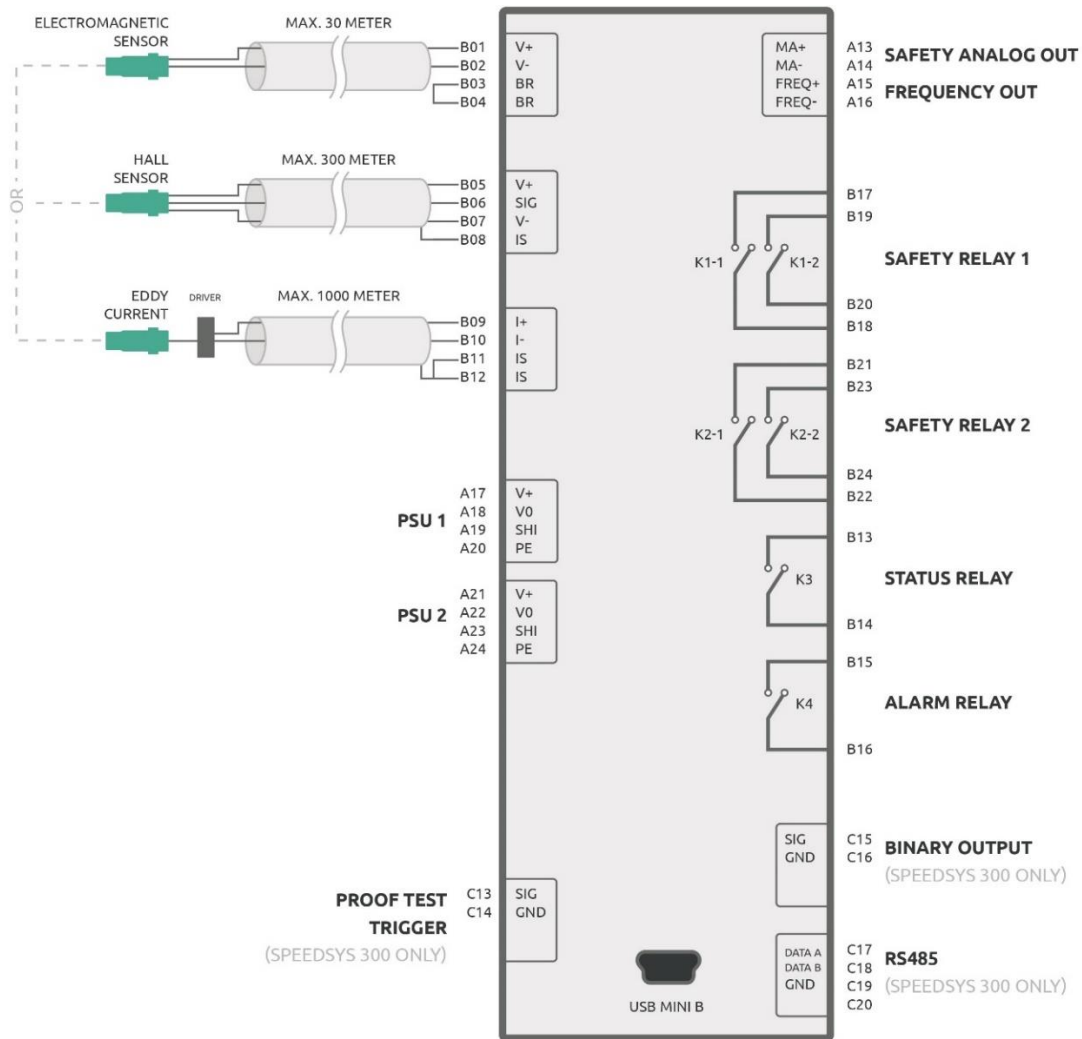|	
Type of protection	Ex ia; intrinsic safety on sensor inputs
Approval marking	⟨Ex⟩ II (1)G [Ex ia Ga] IIC (Gas)
	⟨Ex⟩ II (1)D [Ex ia Da] IIIC (Dust)
Identifiers	IECEx IBE 20.0045
	IBExU20ATEX1157
Important information	Certification refers to sensor input only. Refer to the certificates for specific parameters of the mode of operation and special conditions of use.

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

ABOUT ISTEC

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?	Contact Istec	
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