vibro-meter®

Welcome to WEBINAR II

MEGGITT

Technical Introduction

SpeedSys300

Overspeed Detection System

Host:

- Matias Canedo, Customer Support Engineer

Date: 21.10.20

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SPEEDSYS300 OVERVIEW

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DESIGN CONCEPT

SpeedSys300 is designed as **in independent layer of protection**; to be **fundamentally simple and robust**. It delivers fast and reliable protection for speed and acceleration and **complies to all industry standards including SIL and ATEX**.

Key features

SpeedSys300 ODS301

GENERAL FEATURES

- Different input Sensors technologies: Eddy-Current, Hall Effect, VR
- Advanced Self Diagnostics
- Galvanically separated inputs
- Modular
- USB Interface
- Event Log
- DIN rail mounted

SIL BY DESIGN

- High Proof Test interval (10 years)
- Extensive Proof Test function
- Proof Test command (PLC)
- Fast reaction time (≤ 8ms)
- 2 SAFETY relays (Overspeed, Underspeed or Acceleration limits)
- Diagnostic status
- 2oo3 voting, hardwire or external (PLC)

COMPLIANCE & CERTIFICATIONS

- **Industrial standards**

SIL 2, SIL 3 (IEC61508)

API670, API612 compliant

ATEX (IECEx) Zone 0,1,2

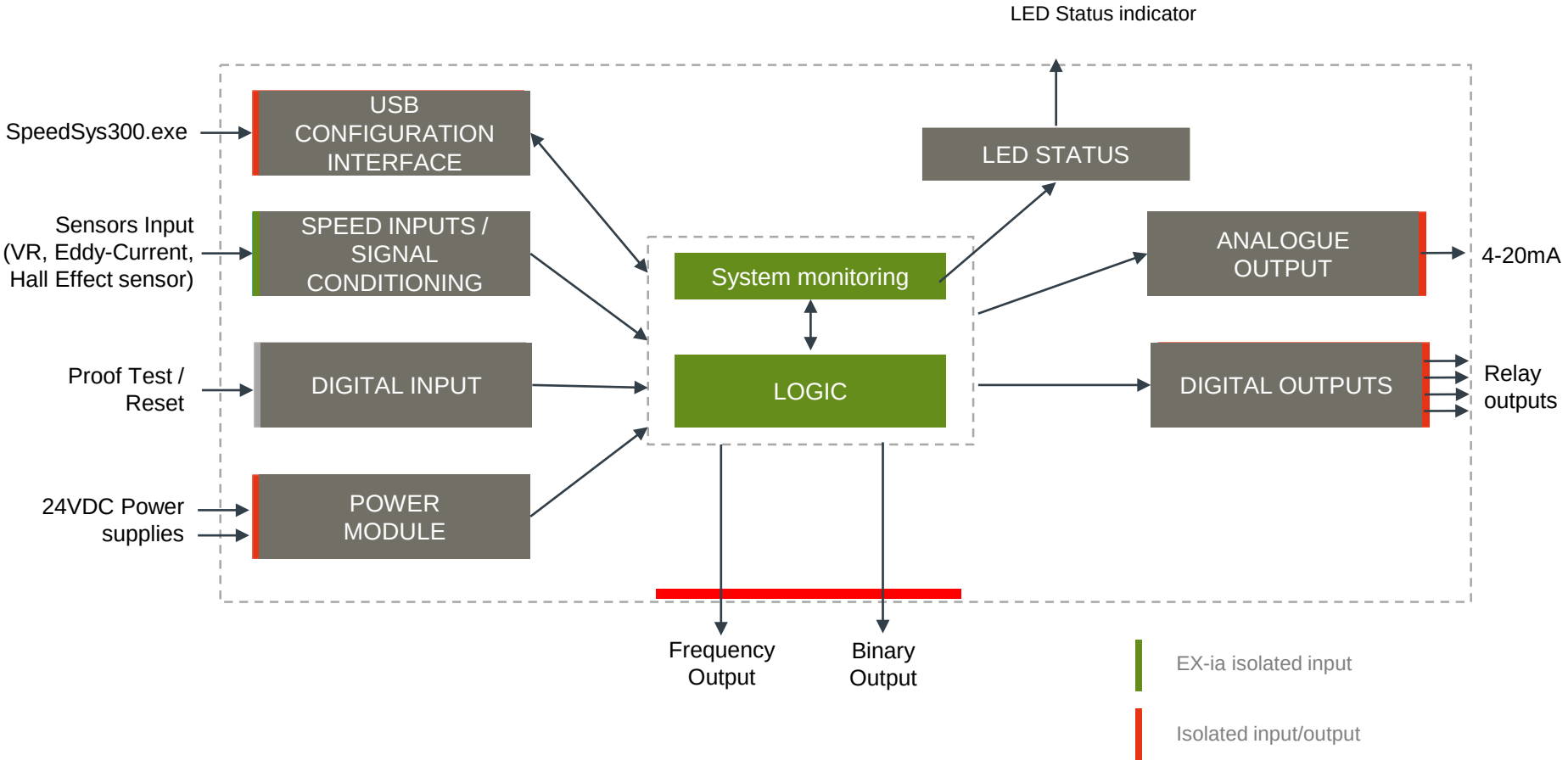
- **International standards**

Europe: CE

USA/Canada: cMETus (with FCC)

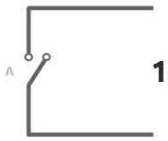
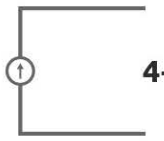
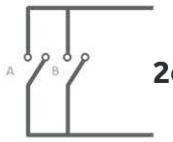
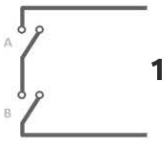
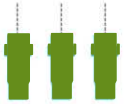
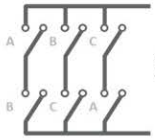
Block Diagram

SpeedSys300 ODS301



Architecture

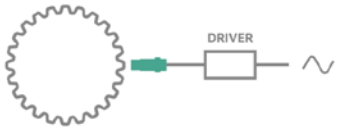
SpeedSys300 ODS301

	Sensors	Modules	Configuration
SIL2			 1oo1  4-20mA
SIL2			 2oo2  1oo2
SIL3			 2oo3

Sensor input compatibility

SpeedSys300 ODS301

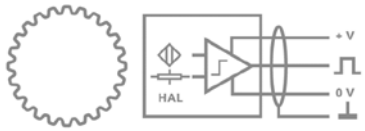
Eddy-Current



2-wire (current signal)
e.g. Meggitt TQ9xx / IQS9xx type

- **Signal:** current modulated signal
- **Monitoring**: Current driver with self-monitoring technology: Probe OK limit 15,5 mA … 20,5 mA (programmable)
- **ATEX**: Ex ia Gas & Dust, Ex ec, for installations in zones 0,1 or 2
- **SIL**: SIL2 (IEC 61508), PL c Cat 1 (ISO 13849)
- **Temperature**: -40 to 180°C (sensor)
- **Frequency**: up to 20kHz

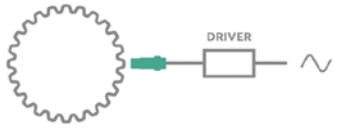
Electronic Hall Effect



3-wire, e.g. Jaquet DSF series
(DSF 1210.00 SHV Ex ATEX, 5m sensor)

- **Signal:** square vawe (voltage)
- **Monitoring**: N.A.
- **ATEX**: Ex ia Gas & Dust, for installations in zone 1 or 2
- **SIL**: N.A.
- **Temperature**: -40 to 125°C
- **Frequency**: up to 20kHz

Magnetic Pickups (VR)



2-wire, e.g. Jaquet DSE series
(DSE 1210.35 SHZ SIL sensor)

- **Signal:** sinus wave (voltage). Signal output is variable, dependent of the speed, can generate high signal amplitudes (> 80V RMS)
- **Monitoring**: N.A.
- **ATEX**: N.A.
- **SIL**: SIL2/SIL3 (IEC 61508), Pl e CAT 3 (ISO 13849)
- **Temperature**: -40 to 150°C
- **Frequency**: not suitable for low speed

SPEEDSYS300 SPECIFICATIONS

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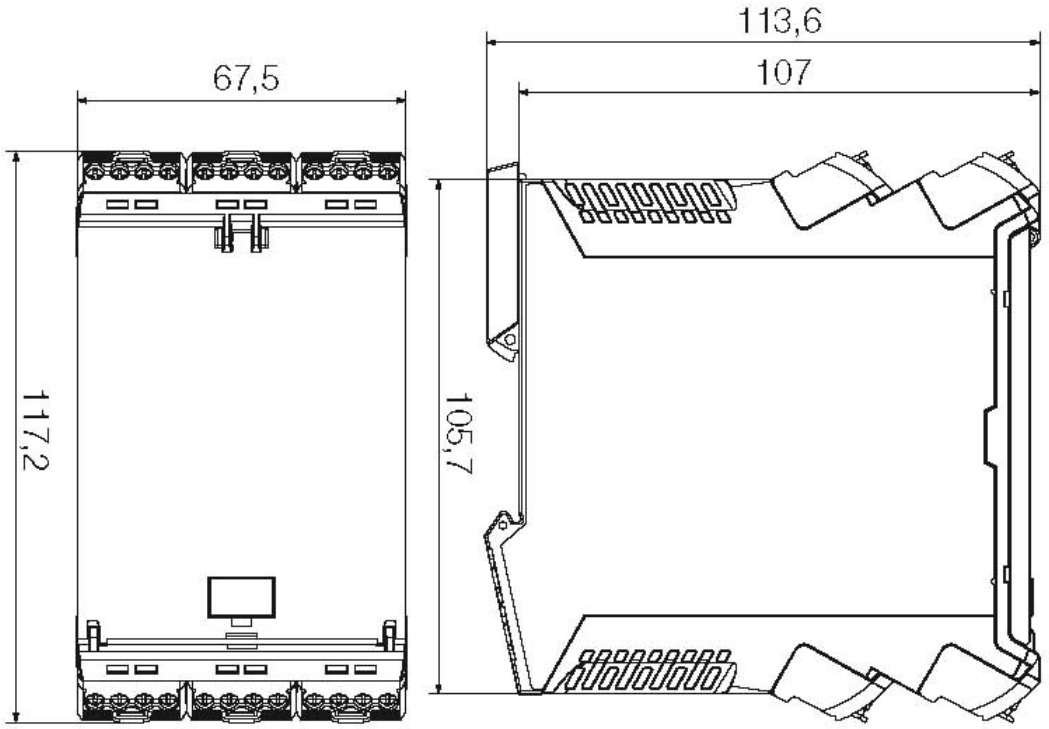
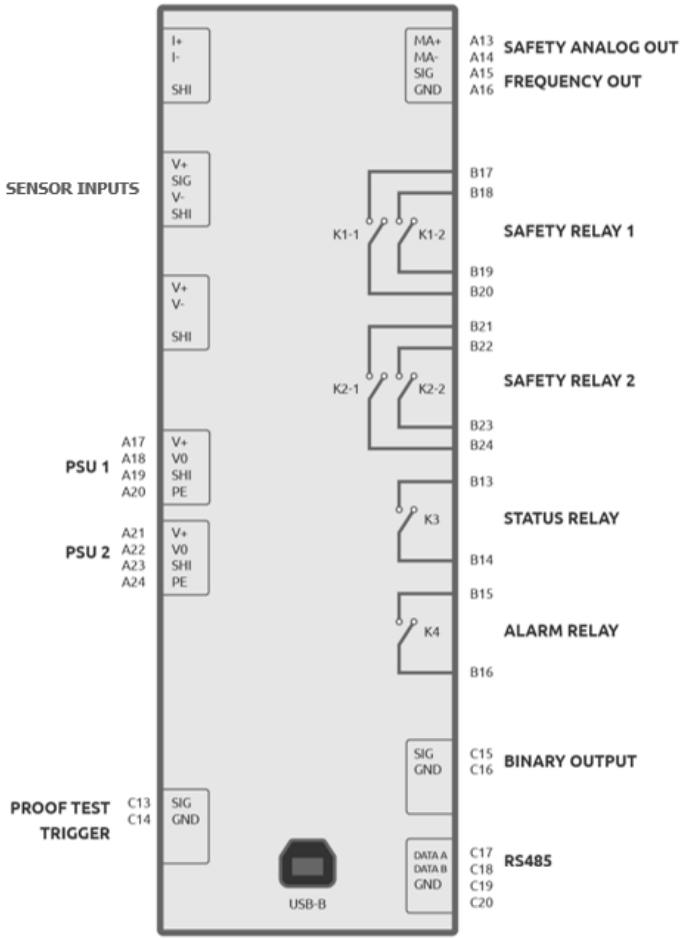
Module dimensions

SpeedSys300 ODS301



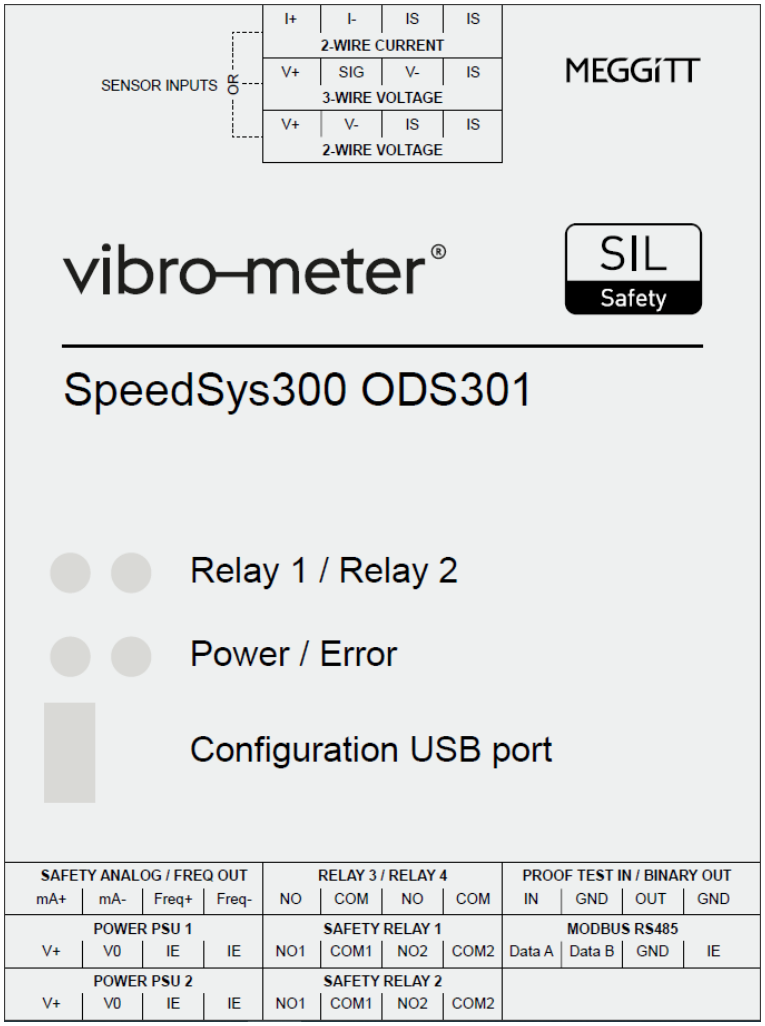
Module connections

SpeedSys300 ODS301



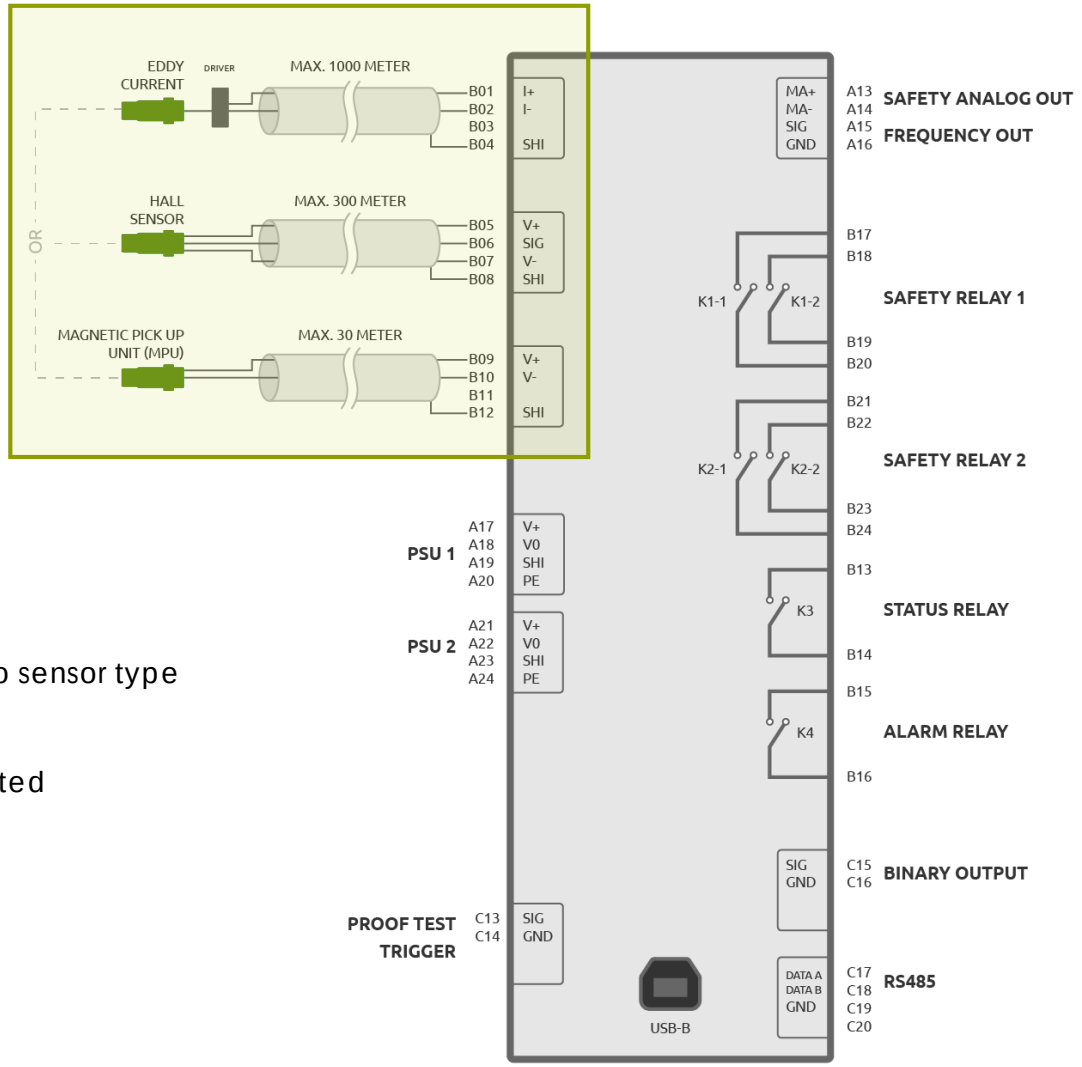
Module connections

SpeedSys300 ODS301



Sensor Inputs

SpeedSys300 ODS301

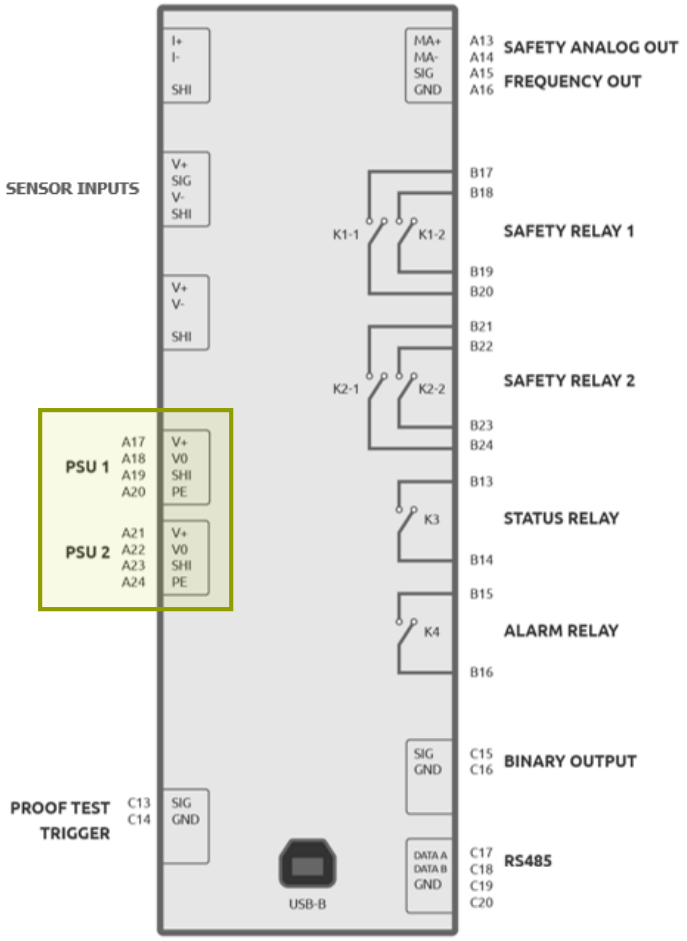


- **Sensor Inputs (3)**
  - Only **ONE** sensor input per module
  - Appropriate power supply according to sensor type (current / voltage / none)
  - Inputs (sensors) are galvanically protected

Power Supply

SpeedSys300 ODS301

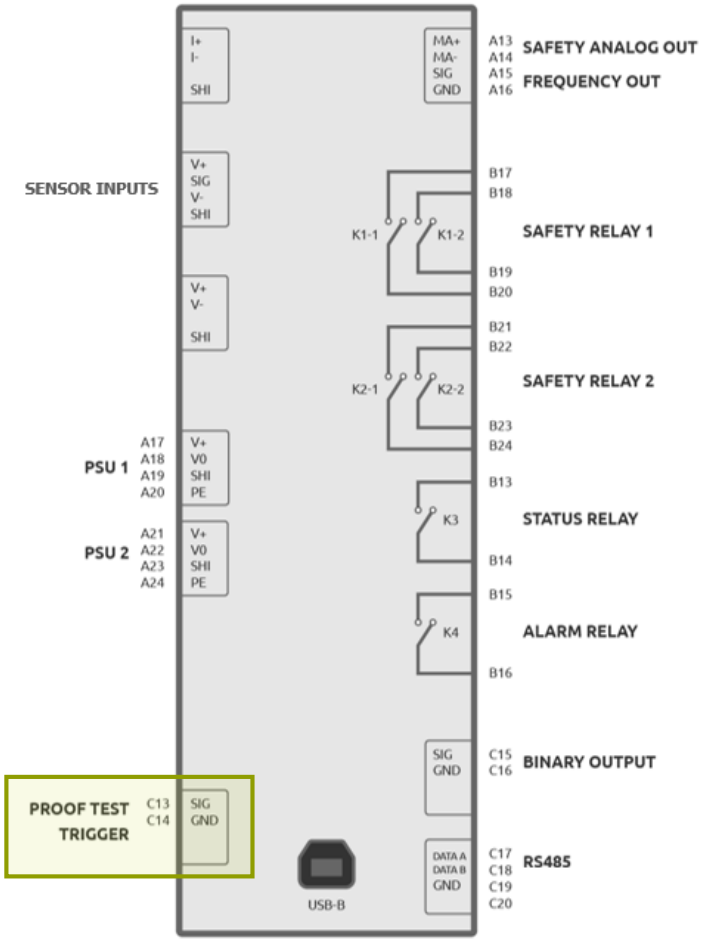
- **POWER SUPPLY (2)**
  - 24 VDC nominal (18 to 36VDC)
  - Two separate inputs to support external power supply redundancy
  - Power consumption: max. 5.3W (220mA at 24VDC)



Digital Input

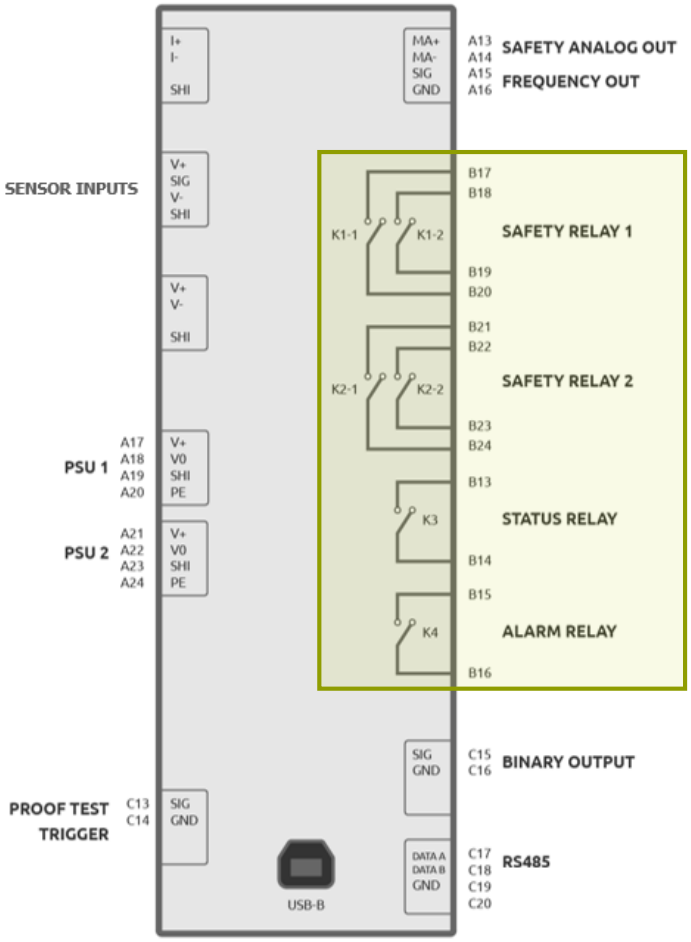
SpeedSys300 ODS301

- **DIGITAL INPUT (1)**
  - Digital input for RESET or PROOF TEST (programmable)
  - Low (< 5VDC) enables the control input
  - High (> 15VDC) disables the control input



Relay Outputs

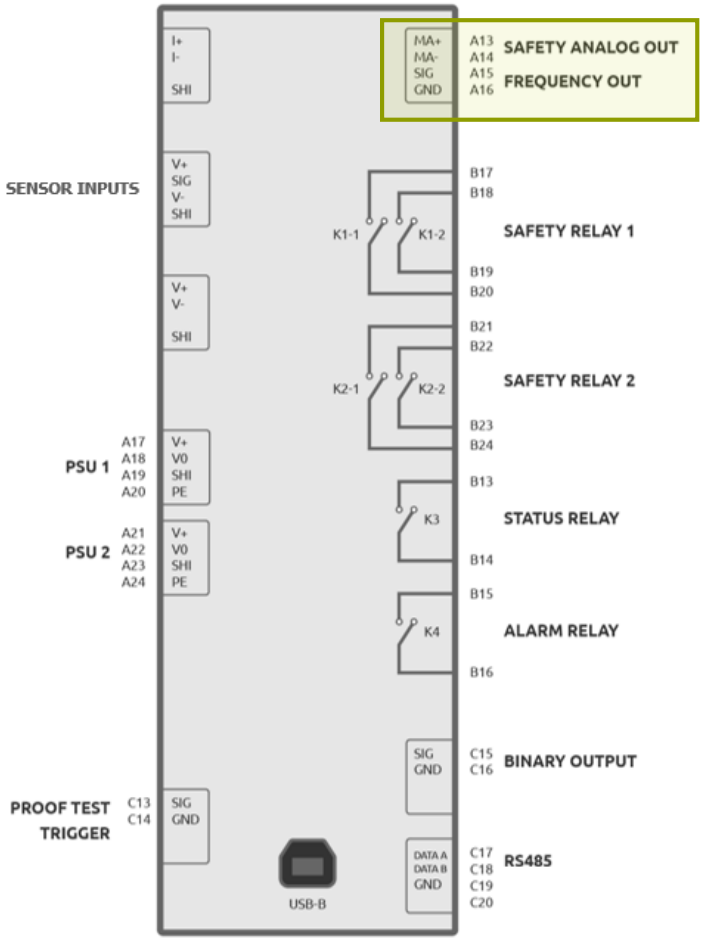
SpeedSys300 ODS301



- **SAFETY RELAYS (2)**
  - RL#1 and RL#2 used for protection functions
  - Normally De-Energized relays (NDE type) with Normally Open contacts (NO); without power supply, contacts will open -> Fail Safe
  - Double-pole single-throw (DPST) safety relays – certified for SIL safety loops
  - Overspeed, Underspeed, Acceleration function thresholds are freely configurable
  - Diagnostic or “Safe State” condition is included
  - Hysteresis and time delay are freely configurable
  - Contacts change-over: 30 VDC, max. 2 A
  - LED status indicators (ORANGE / OFF)
- **ADDITIONAL RELAYS (2)**
  - RL#3 and RL#4 used for auxiliary functions
  - Configurable NDE or NE type (*Inverted*)
  - SPST relays for non SAFETY outputs

Analog / Frequency Output

SpeedSys300 ODS301

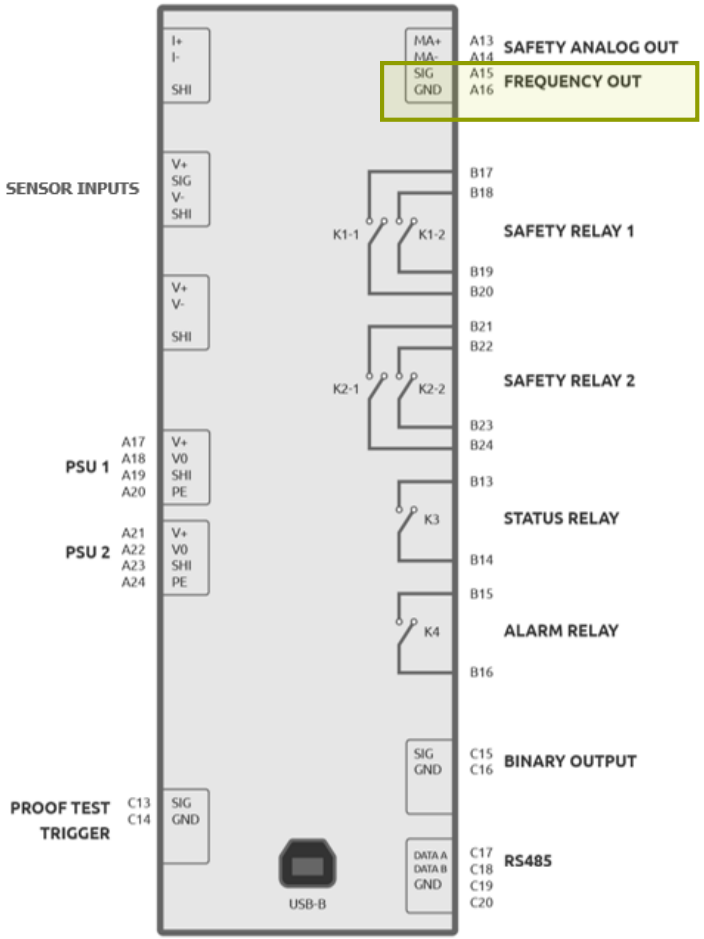


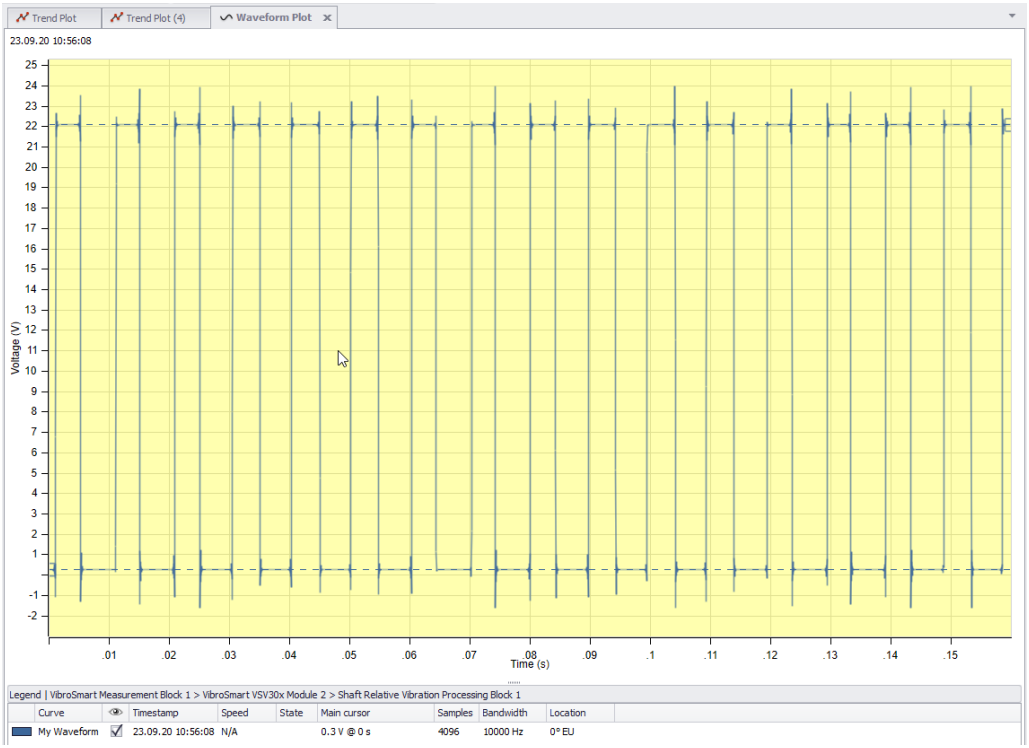
- **SAFETY ANALOG OUTPUT (1)**
  - 4 ... 20 mA certified for SIL safety loops
  - 16 bit resolution
  - Scaling freely configurable
  - Response time: ≤ 100 ms
  - Accuracy: Current output 0.1% referenced to 20mA of the end value or better, programmable

- **FREQUENCY OUTPUT (1)**
  - Open collector output signal (up to 24VDC, 100mA)
  - Provides a binary / digital output (HIGH / LOW signal)
  - This signal is equivalent to the measured and processed input signal (a fixed processing time delay is present, same among multiple ODS301 modules)
  - It can be used as interface with other systems (e.g. detect the sense of rotation)

Frequency Output

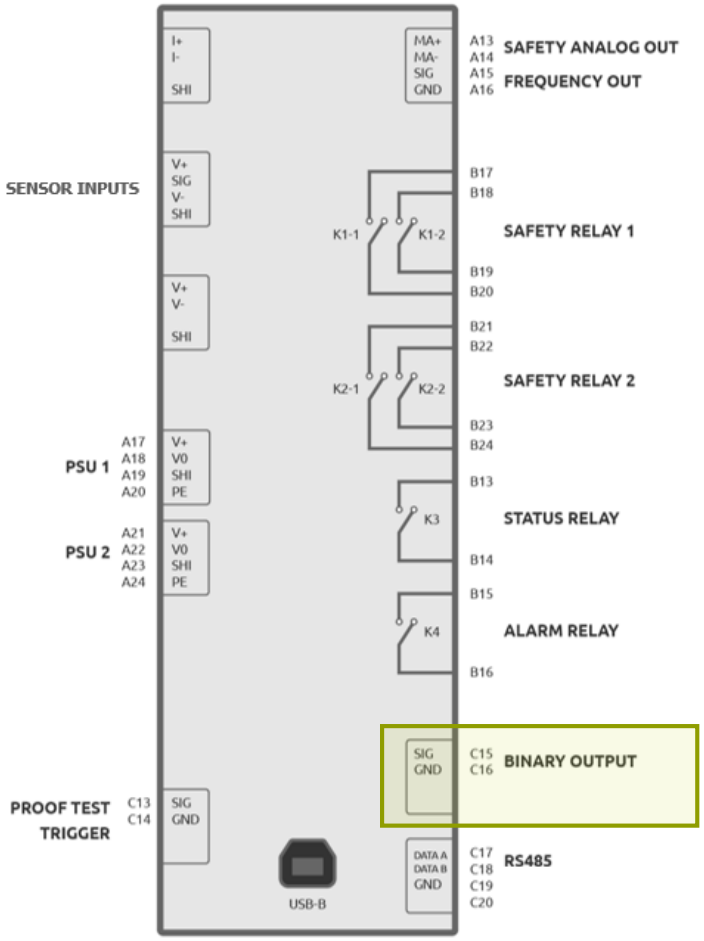
SpeedSys300 ODS301





Binary output

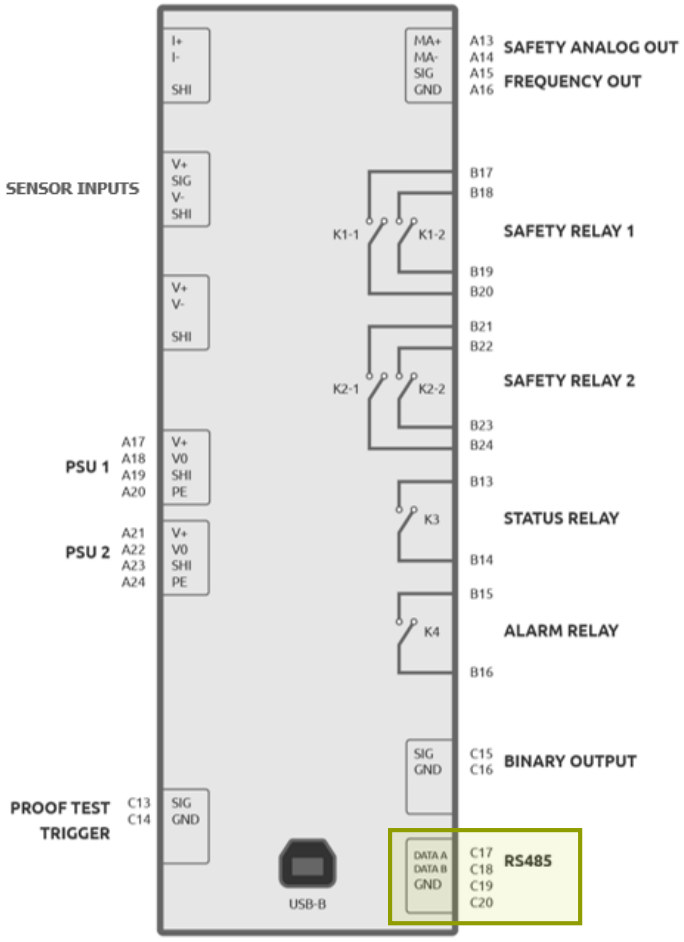
SpeedSys300 ODS301



- **BINARY OUTPUT (1)**
  - Open collector output signal (up to 24VDC, 90mA)
  - Provides a binary / digital output (HIGH / LOW signal)
  - It can be configured to indicate any of the functions of the module (Overspeed, Diagnostic, etc.)
  - Called *Digital Out* in SpeedSys SW

Modbus interface

SpeedSys300 ODS301



- **RS485 (1)**
  - Modbus RTU serial (RS485 - 2wires) interface
  - Communicate ODS301 information with third-party systems such as DCS or PLC (read only)
  - Communication settings fully configurable (COM port, baud rate, etc.)
  - Default Modbus list

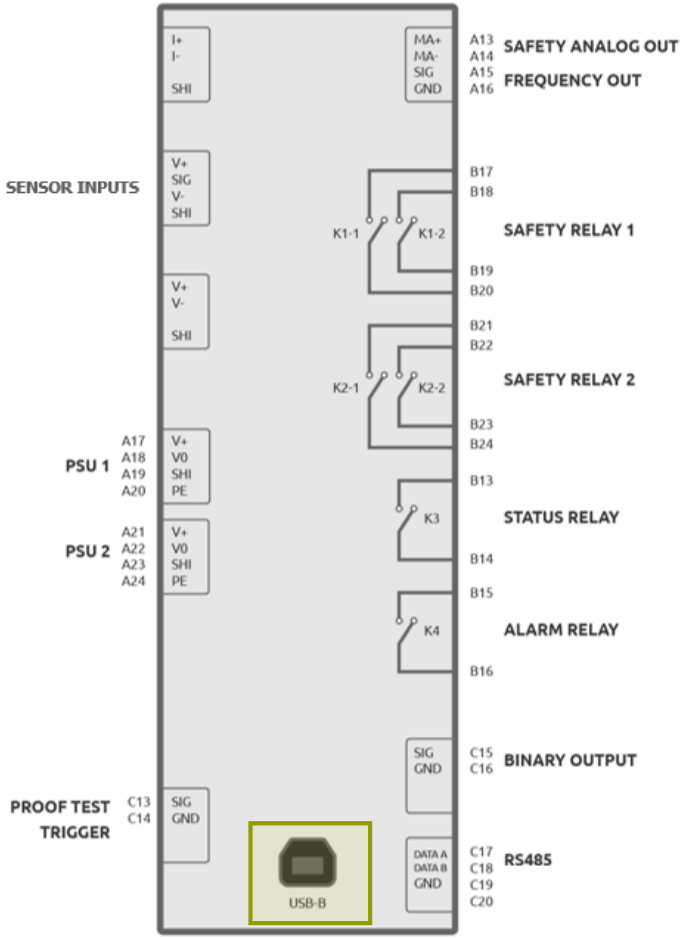
5.1.3 Current values

All data in this block are read-only.

Adr.	Name	Type	Range	Access	Description
0500	curr_rpm	single		R/O	Current velocity [RPM]
0502	curr_acc	single		R/O	Current acceleration [RPM/s]
0504	curr_freq	single		R/O	Current input frequency used as base for velocity calculation [Hz].
0506	curr_acc_freq	single		R/O	Current input frequency used for acceleration calculation [Hz]
0508	curr_acc_base	single		R/O	Current acceleration [Hz/s]. Used as base for RPM/s caclulation
0510	curr_aout	single		R/O	Current analog output value [mA]
0512	curr_aout_fb	single		R/O	Current analog output feed back value [mA]

USB interface

SpeedSys300 ODS301



- USB Mini-B (1)
- Computer interface for ***SpeedSys300*** software
- USB/Serial interface (auto discovery)

SPEEDSYS300 CONFIGURATION

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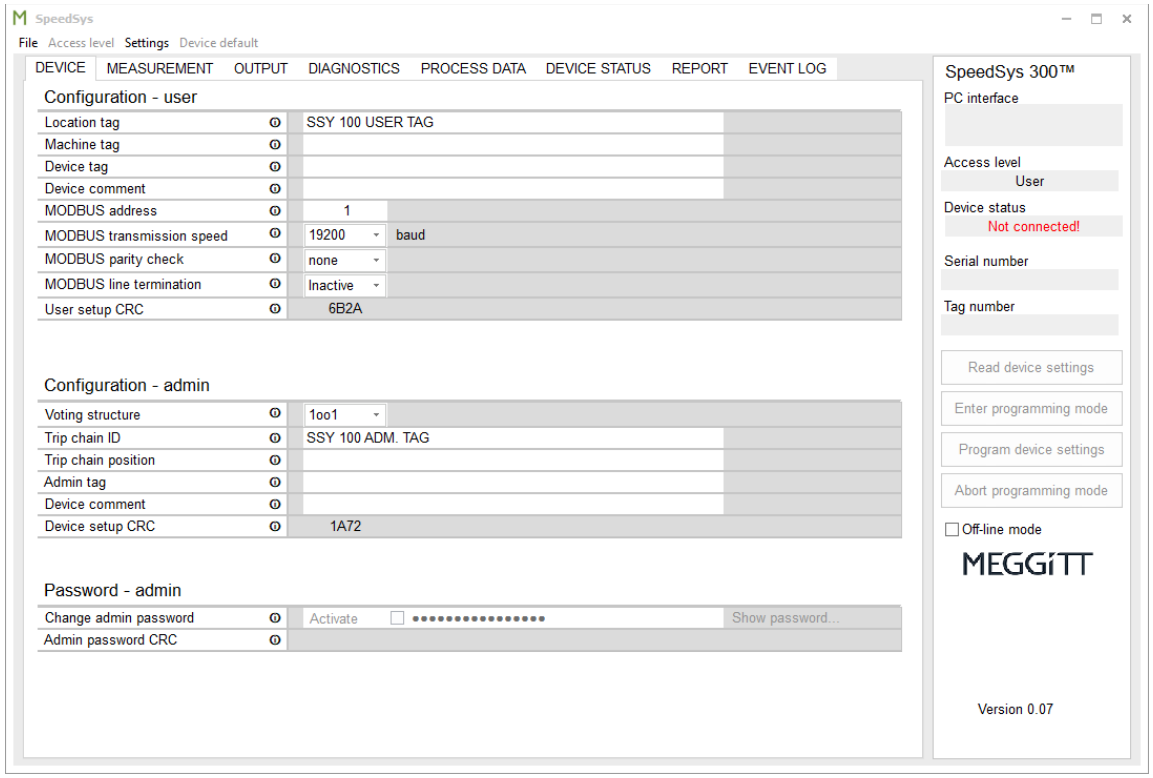
SpeedSys Configuration

Foreword

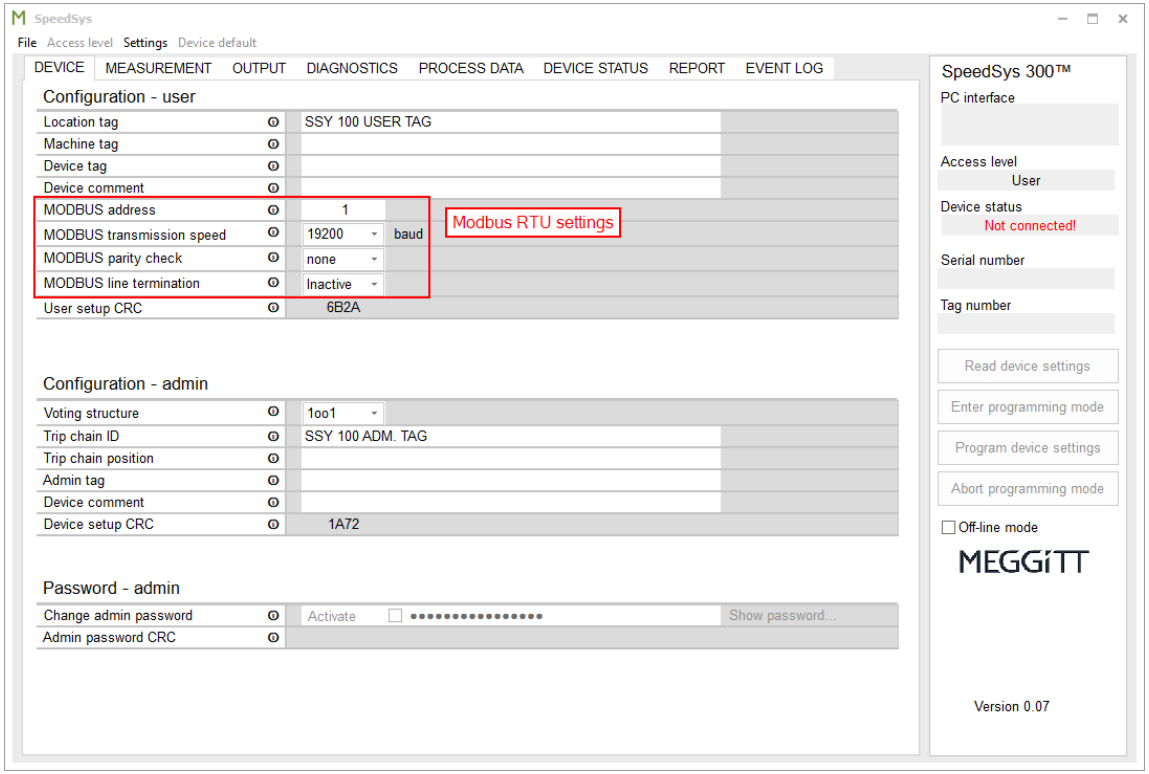
- Always start from a configuration template, e.g. “Meggitt TQ/IQS 2 wire.ssy”
- It is possible to modify a configuration if not connected to a SpeedSys300 module



SpeedSys Configuration

Device tab (general settings)

- Configure module tags
- Manage Modbus interface settings
- Manage admin password (only if device is *Connected*)



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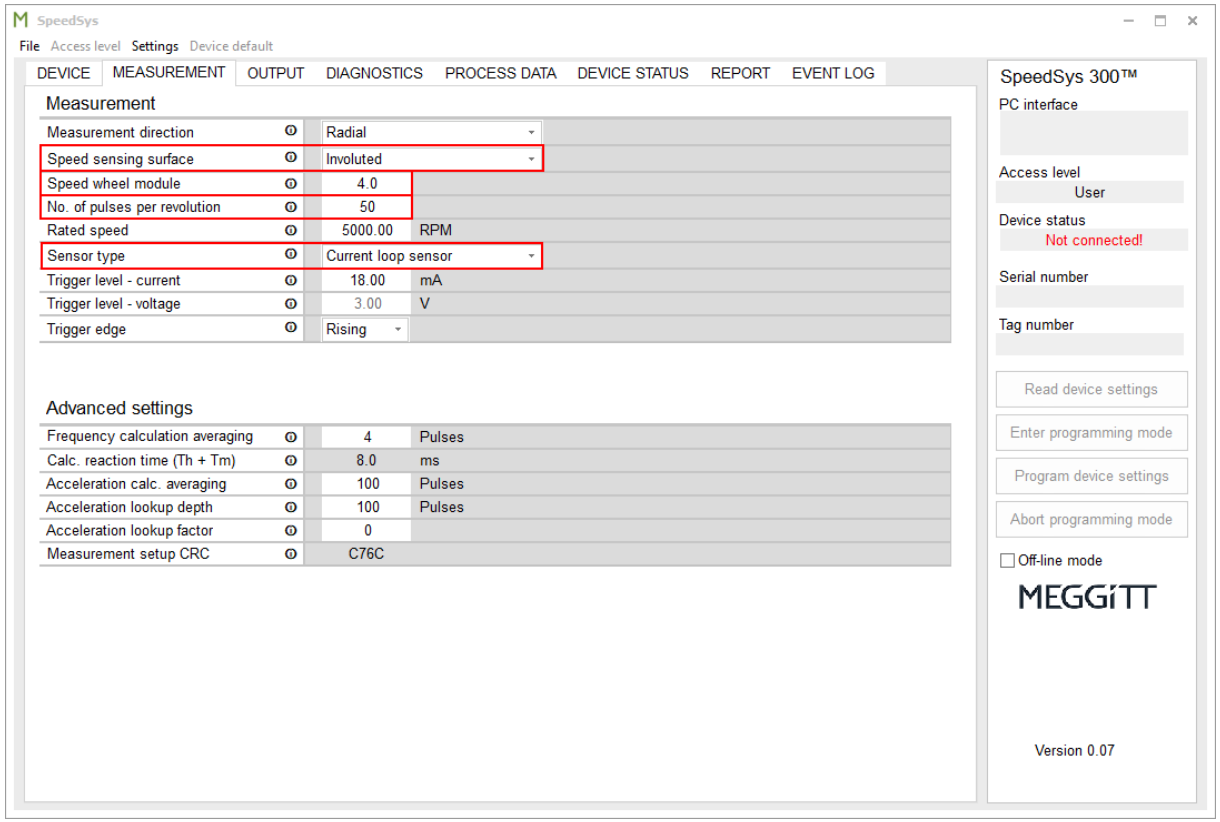
SpeedSys Configuration

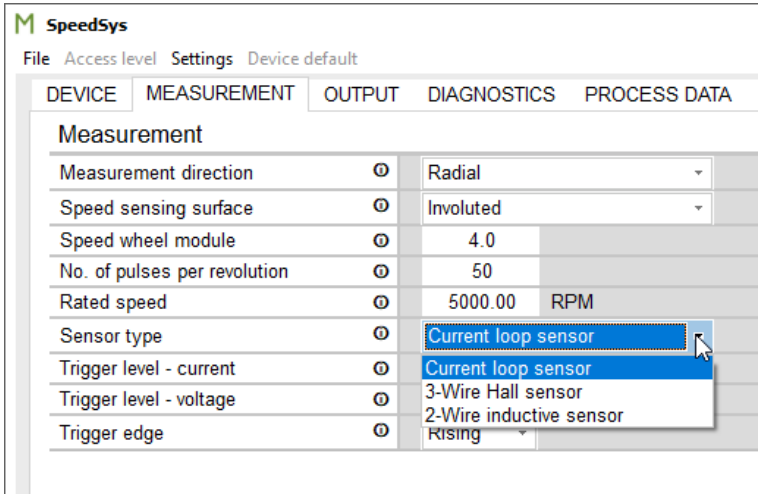
Measurement tab (sensor & signal settings)

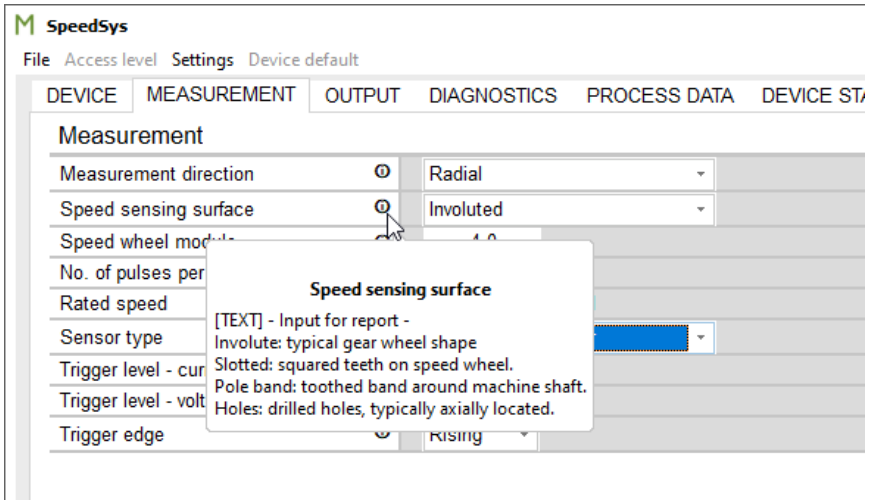
- Configure wheel properties
- Configure wheel teeth number
- Configure sensor type



SpeedSys Configuration

Measurement tab (sensor & signal settings)

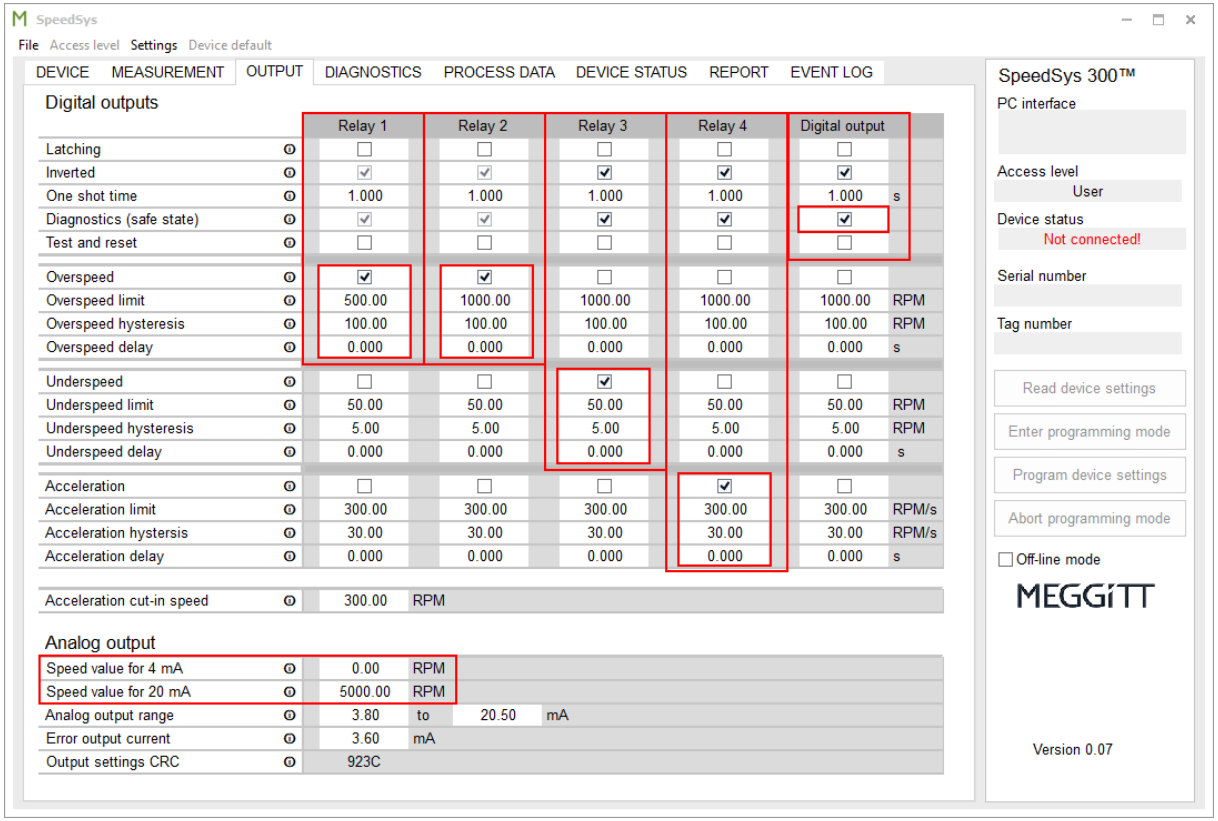




SpeedSys Configuration

Output tab (relay settings)

- RL#1 Overspeed : 500 rpm
- RL#2 Overspeed : 1000 rpm
- RL#3 Underspeed: 50 rpm
- RL#4 Acceleration: 300 rpm/s
- DOP: Diagnostics
- ANO: 4-20 mA / 0-5000 rpm



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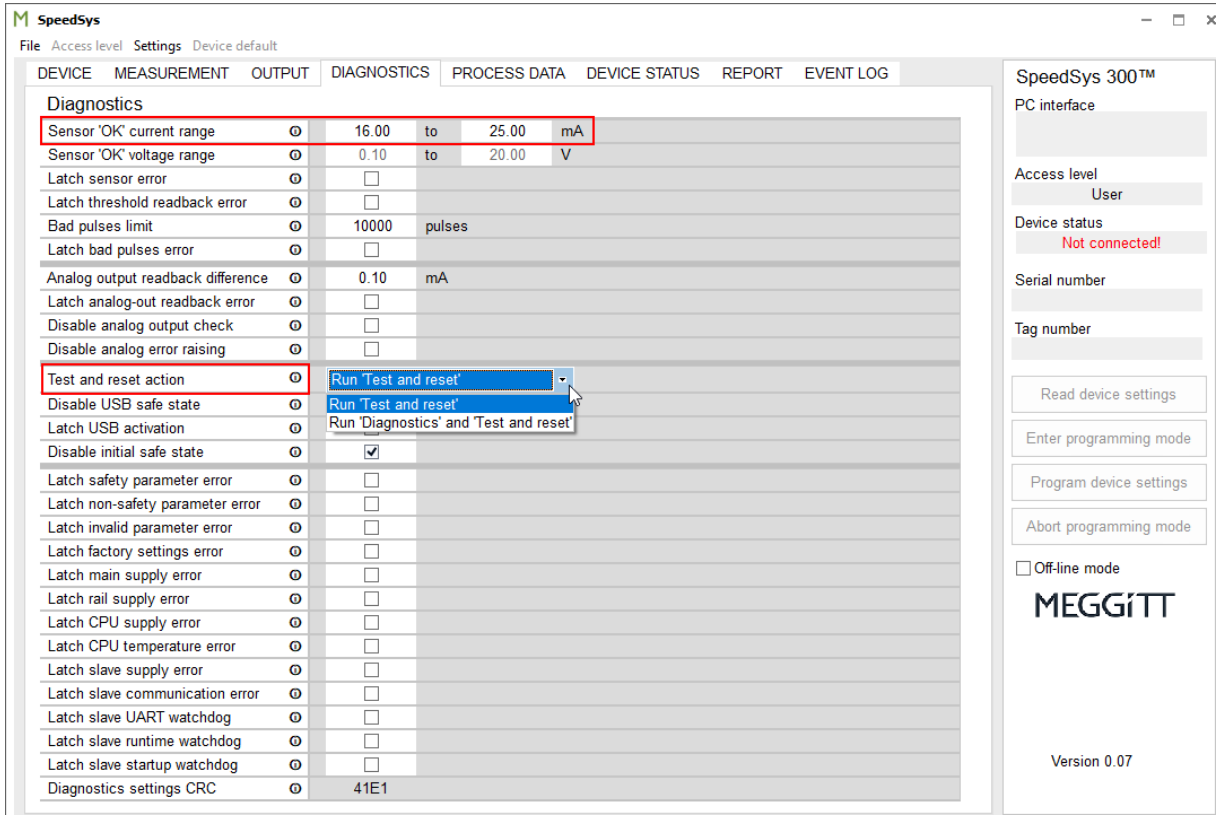
SpeedSys Configuration

Diagnostic tab

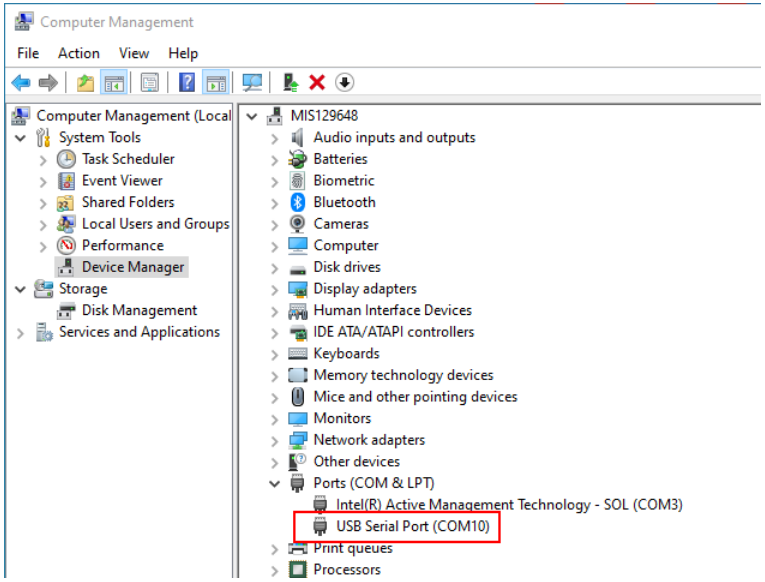
- Configure Sensor OK range
- Configure Digital Input (RESET)
- Latch/Unlatch the various statuses

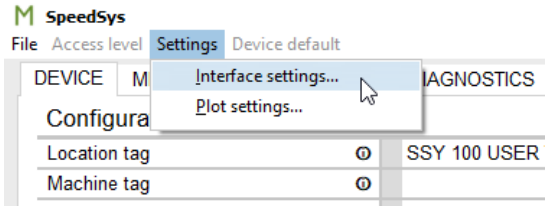


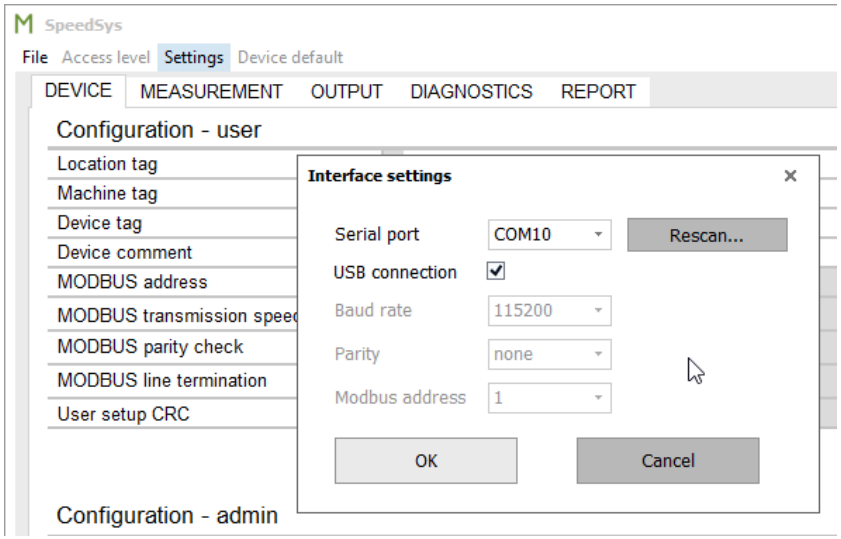
SpeedSys Configuration

Communication settings

- Connect laptop to USB interface
- On Settings -> Interface Settings... Select the right COM port (automatic COM port discovery mechanism)

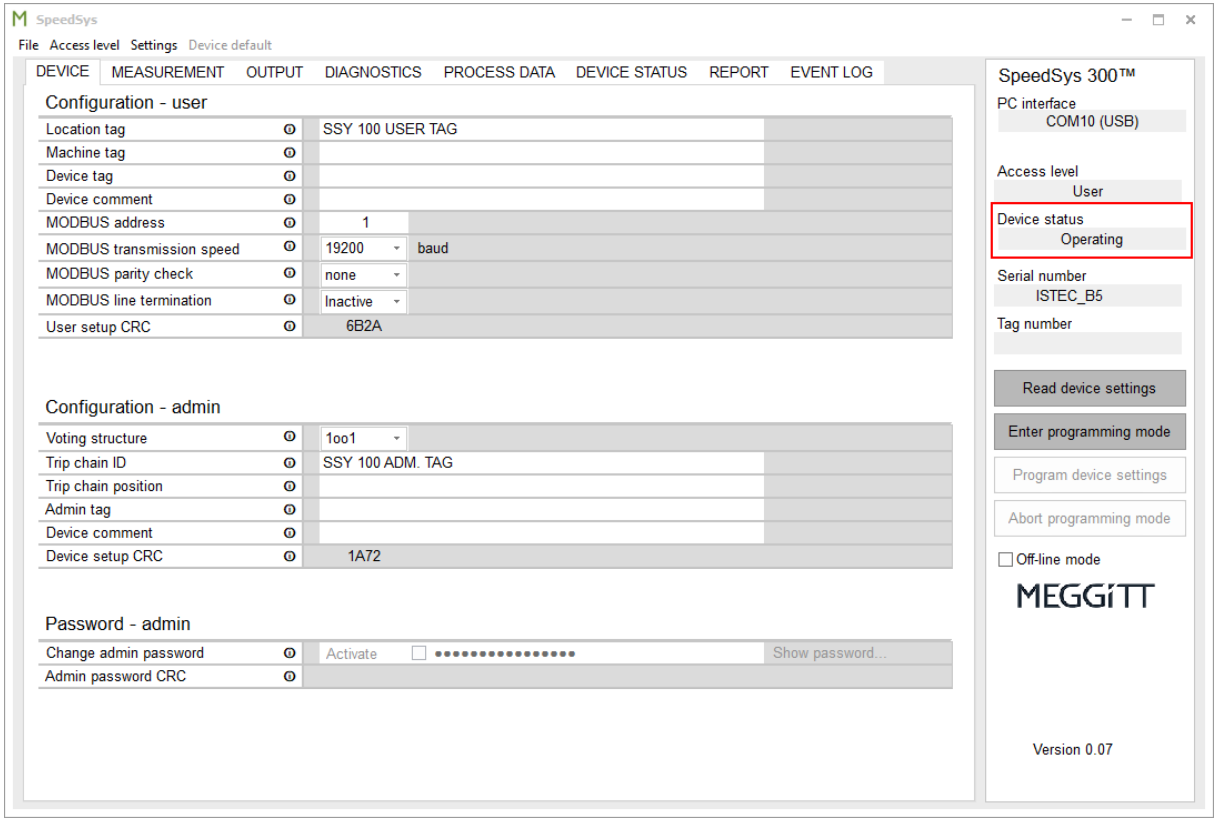






SpeedSys Configuration

Device status: *Operating*



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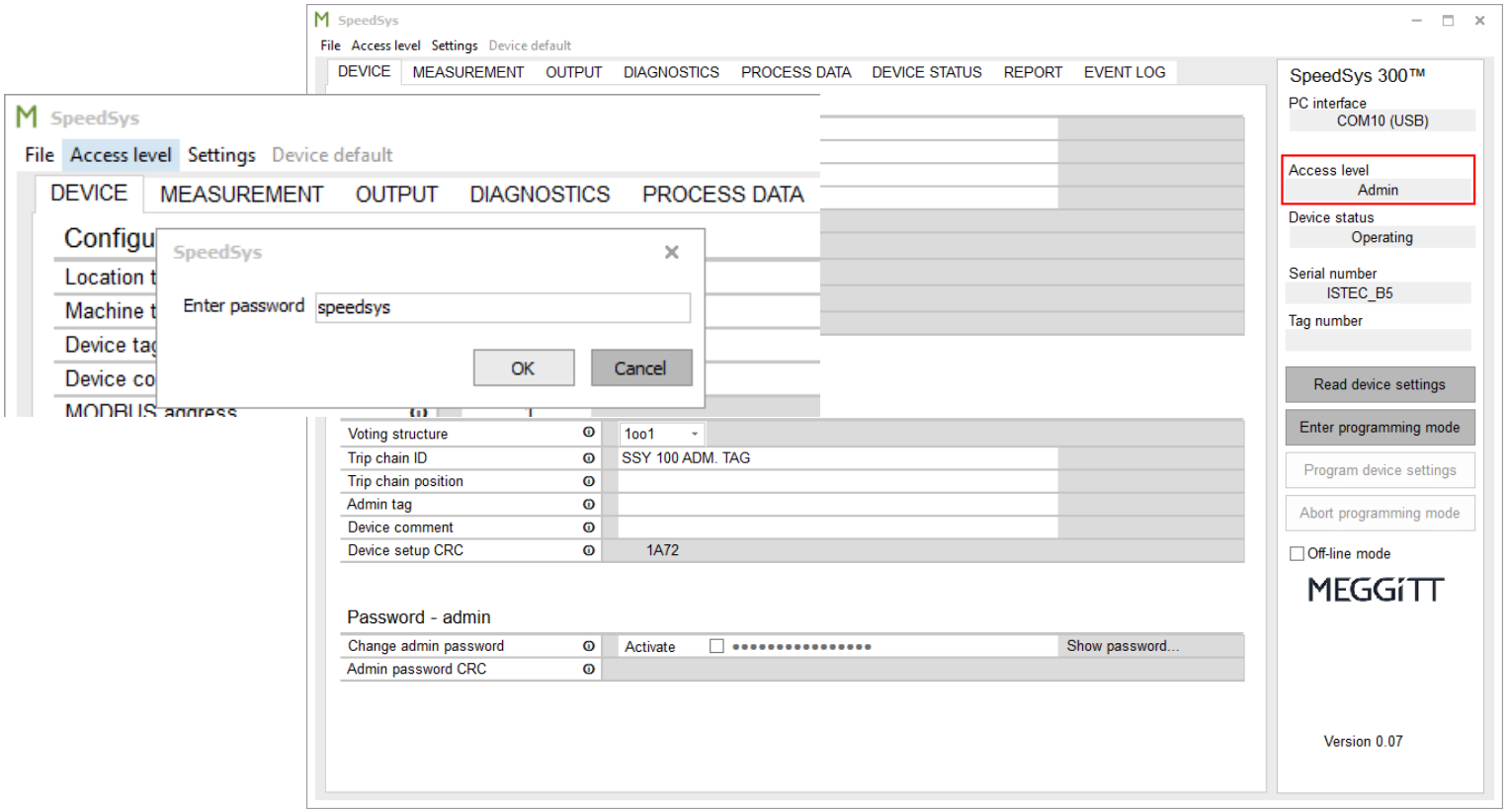
SpeedSys Configuration

Access level

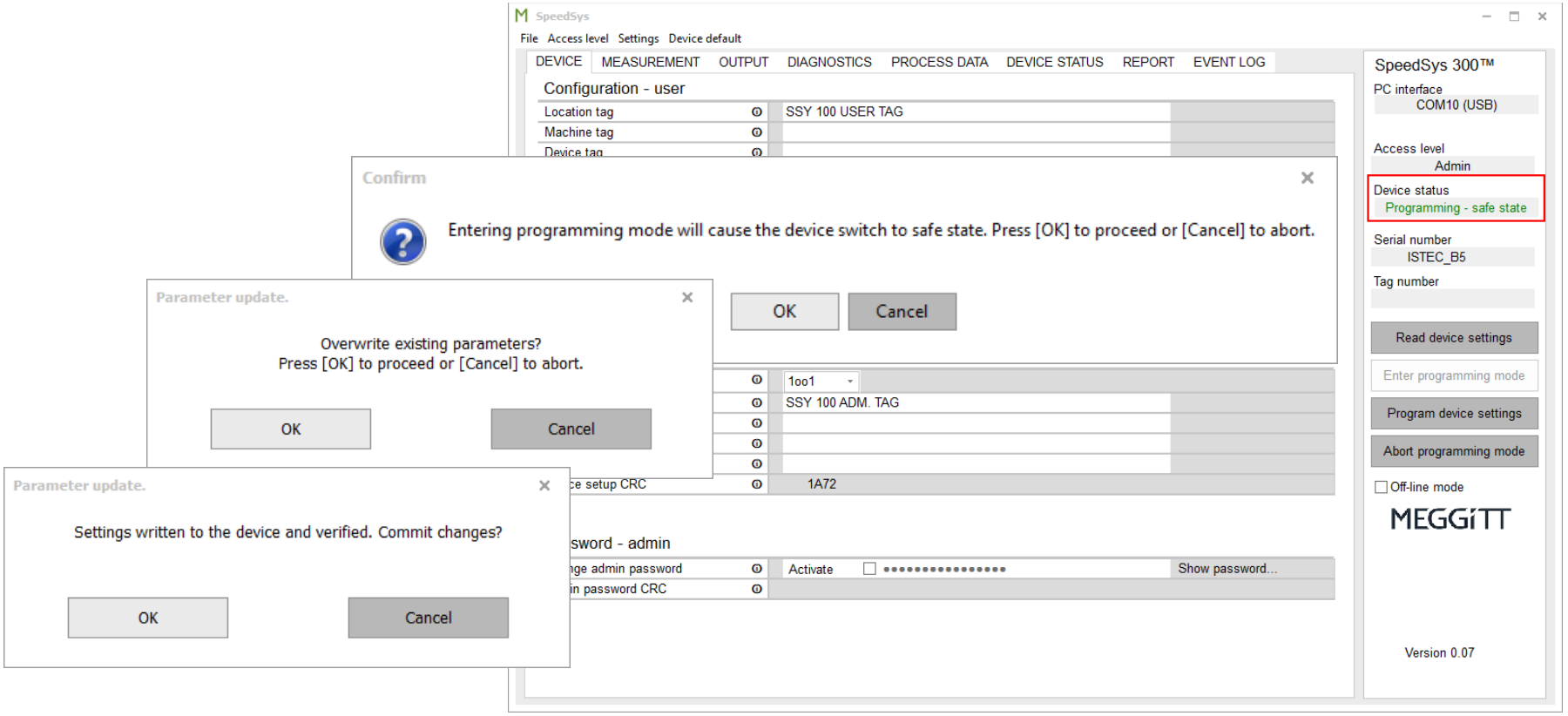
- To activate changes, one has to increase access level to Administrator, *Access level* -> ***Admin***
- Default password is "***speedsys***"



SpeedSys Configuration

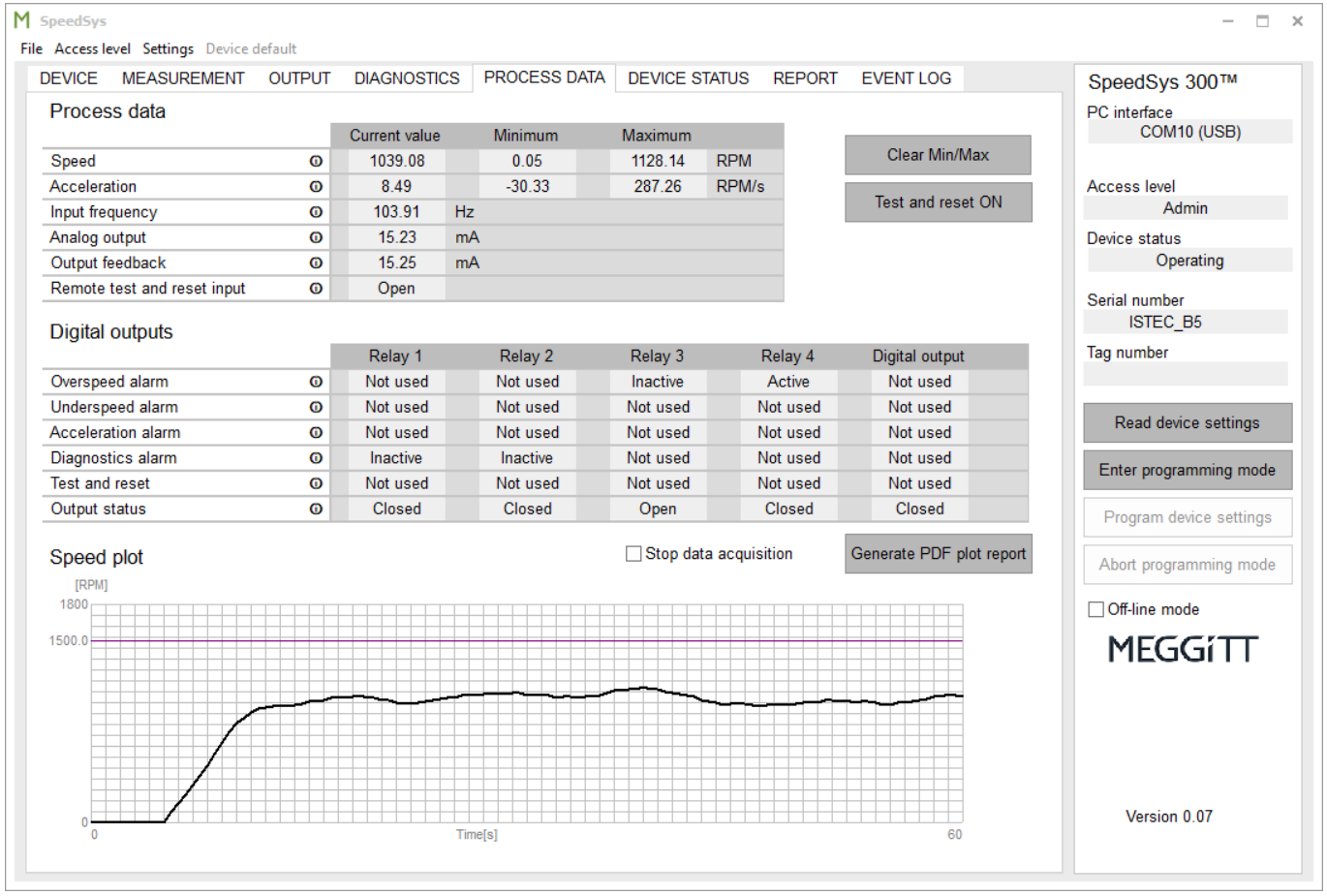
Device status: *Programming*

- Once connected to the module, one can *Read Device settings.*
- If logged with Admin privileges, one can *Enter programming mode* and activate *Program device settings.*



SpeedSys Configuration

Process Data tab (live readings)



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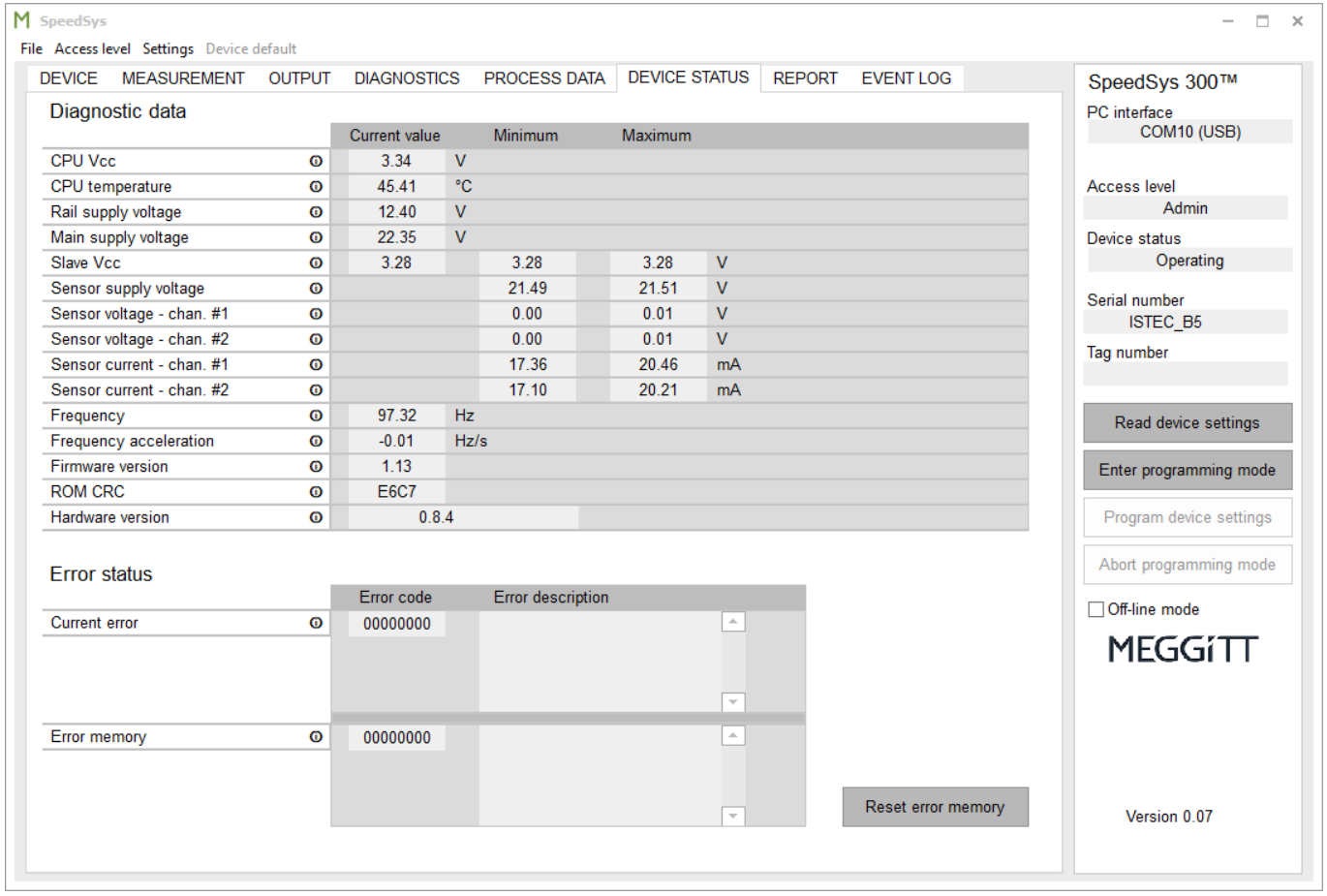
SpeedSys Configuration

Device Status tab (live readings)



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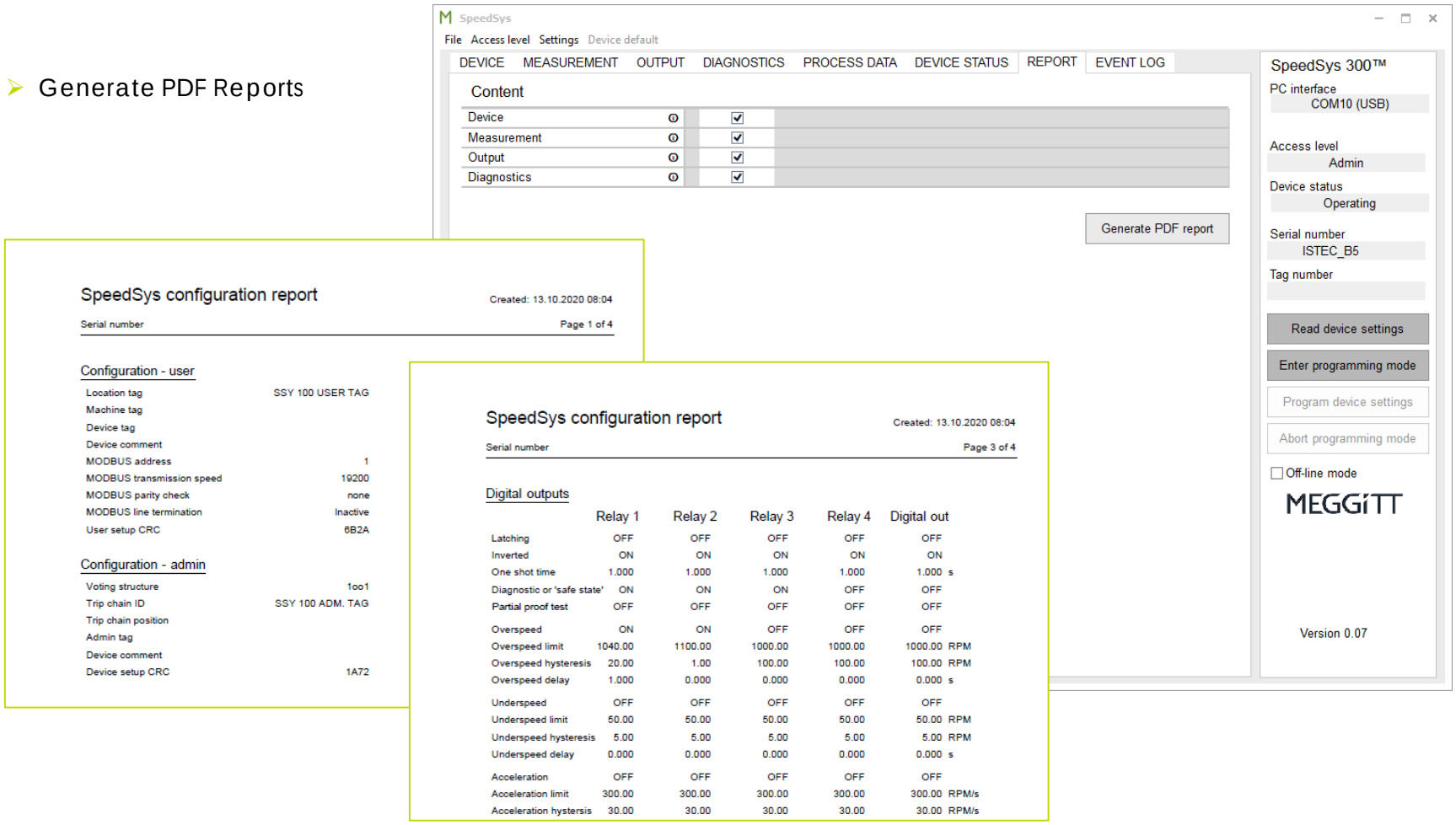
SpeedSys Configuration

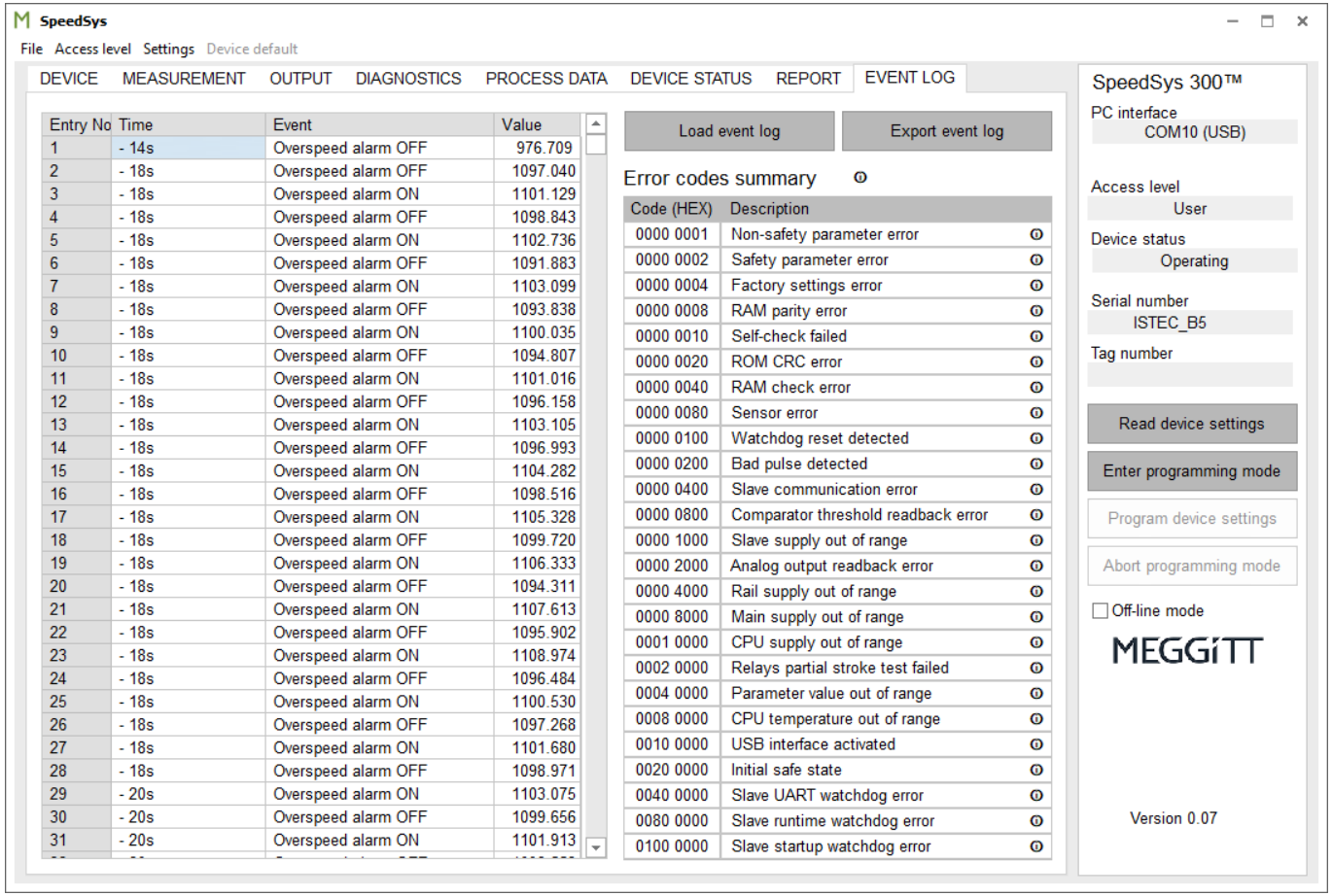
Report tab

- Generate PDF Reports



SpeedSys Configuration

Event Log tab



Entry No	Time	Event	Value
1	- 14s	Overspeed alarm OFF	976.709
2	- 18s	Overspeed alarm OFF	1097.040
3	- 18s	Overspeed alarm ON	1101.129
4	- 18s	Overspeed alarm OFF	1098.843
5	- 18s	Overspeed alarm ON	1102.736
6	- 18s	Overspeed alarm OFF	1091.883
7	- 18s	Overspeed alarm ON	1103.099
8	- 18s	Overspeed alarm OFF	1093.838
9	- 18s	Overspeed alarm ON	1100.035
10	- 18s	Overspeed alarm OFF	1094.807
11	- 18s	Overspeed alarm ON	1101.016
12	- 18s	Overspeed alarm OFF	1096.158
13	- 18s	Overspeed alarm ON	1103.105
14	- 18s	Overspeed alarm OFF	1096.993
15	- 18s	Overspeed alarm ON	1104.282
16	- 18s	Overspeed alarm OFF	1098.516
17	- 18s	Overspeed alarm ON	1105.328
18	- 18s	Overspeed alarm OFF	1099.720
19	- 18s	Overspeed alarm ON	1106.333
20	- 18s	Overspeed alarm OFF	1094.311
21	- 18s	Overspeed alarm ON	1107.613
22	- 18s	Overspeed alarm OFF	1095.902
23	- 18s	Overspeed alarm ON	1108.974
24	- 18s	Overspeed alarm OFF	1096.484
25	- 18s	Overspeed alarm ON	1100.530
26	- 18s	Overspeed alarm OFF	1097.268
27	- 18s	Overspeed alarm ON	1101.680
28	- 18s	Overspeed alarm OFF	1098.971
29	- 20s	Overspeed alarm ON	1103.075
30	- 20s	Overspeed alarm OFF	1099.656
31	- 20s	Overspeed alarm ON	1101.913

Code (HEX)	Description
0000 0001	Non-safety parameter error
0000 0002	Safety parameter error
0000 0004	Factory settings error
0000 0008	RAM parity error
0000 0010	Self-check failed
0000 0020	ROM CRC error
0000 0040	RAM check error
0000 0080	Sensor error
0000 0100	Watchdog reset detected
0000 0200	Bad pulse detected
0000 0400	Slave communication error
0000 0800	Comparator threshold readback error
0000 1000	Slave supply out of range
0000 2000	Analog output readback error
0000 4000	Rail supply out of range
0000 8000	Main supply out of range
0001 0000	CPU supply out of range
0002 0000	Relays partial stroke test failed
0004 0000	Parameter value out of range
0008 0000	CPU temperature out of range
0010 0000	USB interface activated
0020 0000	Initial safe state
0040 0000	Slave UART watchdog error
0080 0000	Slave runtime watchdog error
0100 0000	Slave startup watchdog error

SPEEDSYS300 DEMONSTRATION

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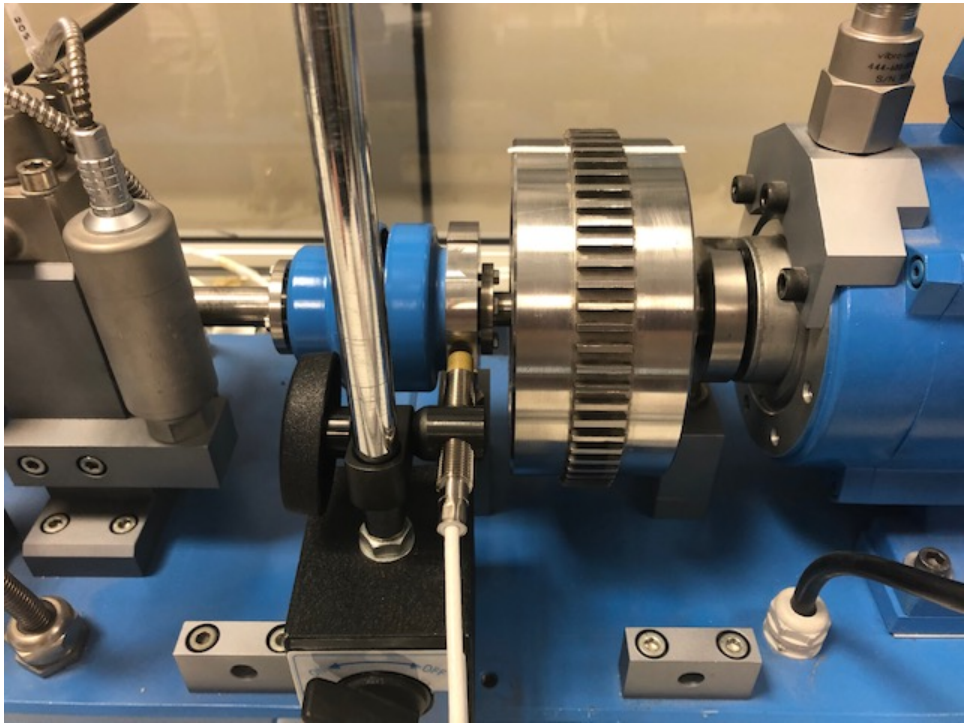
Demonstration

Speed Sensor



- Pole wheel with six (6) teeth per revolution
- TQ/IQS 9xx (4mm range)

Demonstration

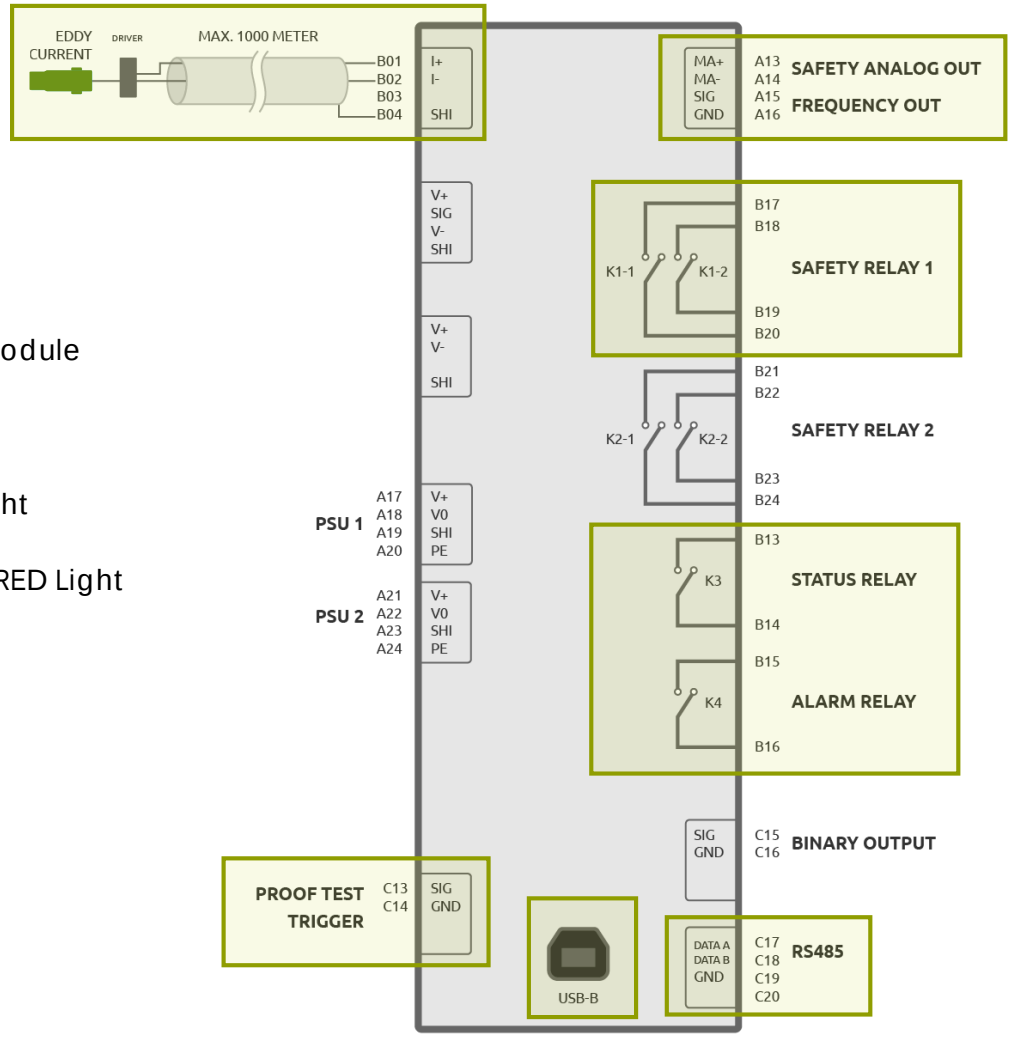
Overspeed Detection System

- SpeedSys ODS301 as Overspeed Protection System, providing protection outputs to Control System
- VibroSmart VSV300 as Control System (“DCS”)
- VibroSight Modbus Client as Modbus interface
- Pilot lights as visual feedback
- Contact switch as RESET command

Demonstration

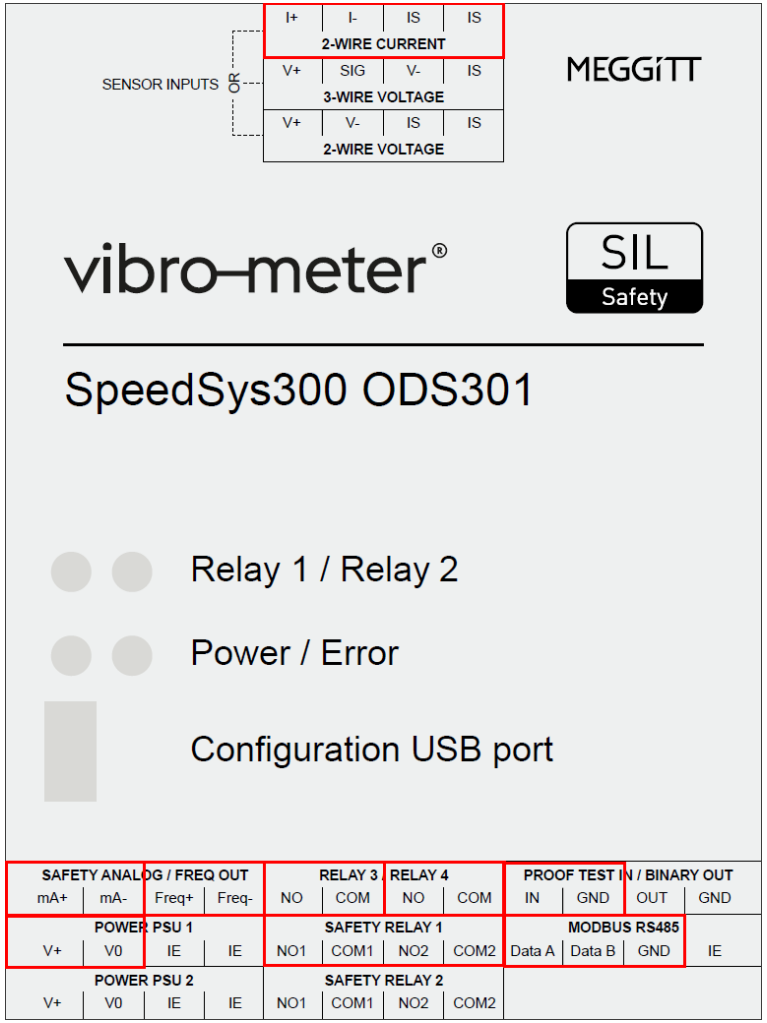
Wiring layout

- TQ/IQS 9xx (1.25uA/um) Sensor Input
- USB-B connection between laptop and ODS301 module
- SAFETY Relay 1 (DIAGNOSTIC) to GREEN light
- Relay 3 (OVS WR) to VibroSmart CH.2 / YELLOW Light
- Relay 4 (OVS TRIP - Latched) to VibroSmart CH.1 / RED Light
- Analog 4-20mA output to VibroSmart AUX CH.
- Serial RS485 Modbus communication to VibroSight
  - Exsys EX-1333V serial adaptor
- Control Input (RESET) from contact switch
- Frequency Output to VibroSmart CH.1



Demonstration

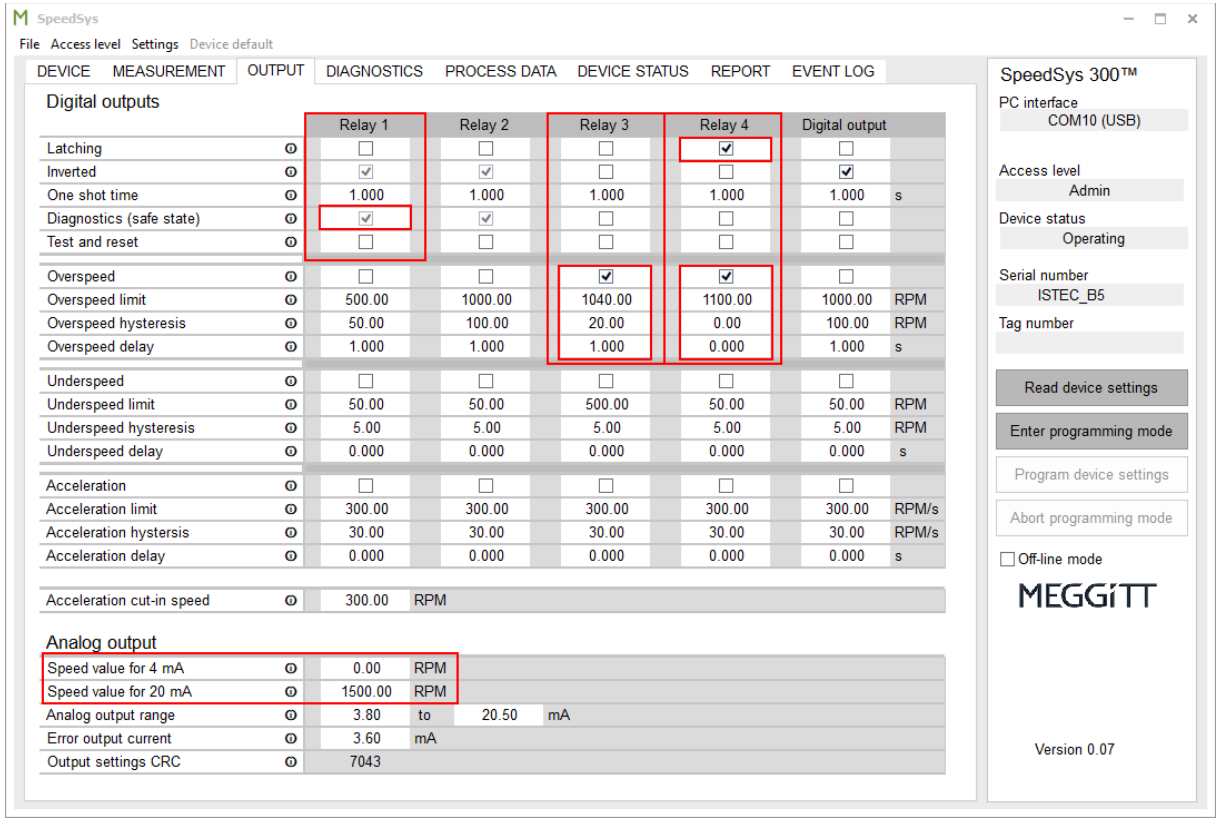
Wiring layout



Demonstration

Relay settings

- Configure DIAGNOSTIC (RL#1)
- Configure OVR WR (RL#3)
- Configure OVR TRIP (RL#4)
- Configure analog output scaling



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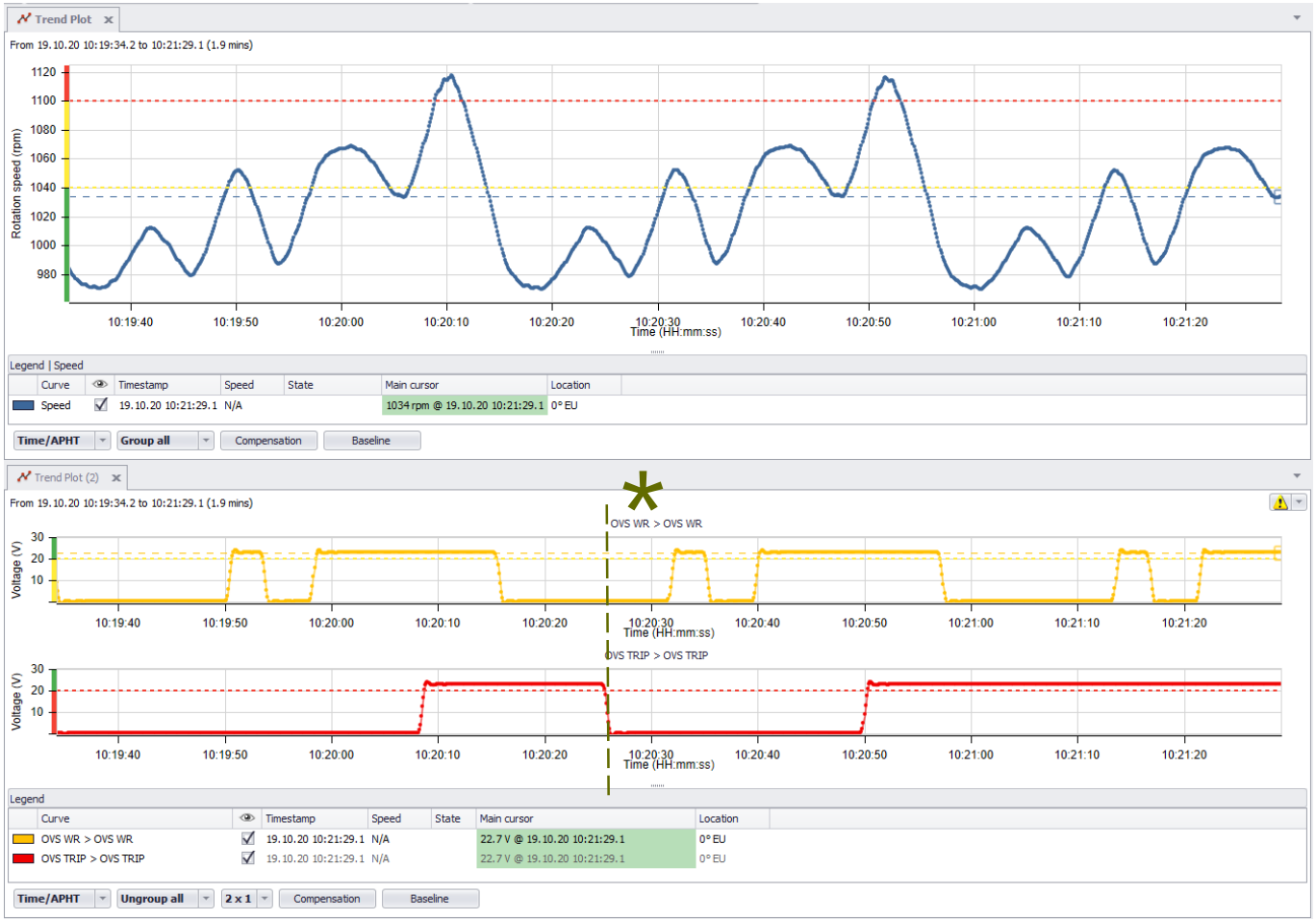
Demonstration

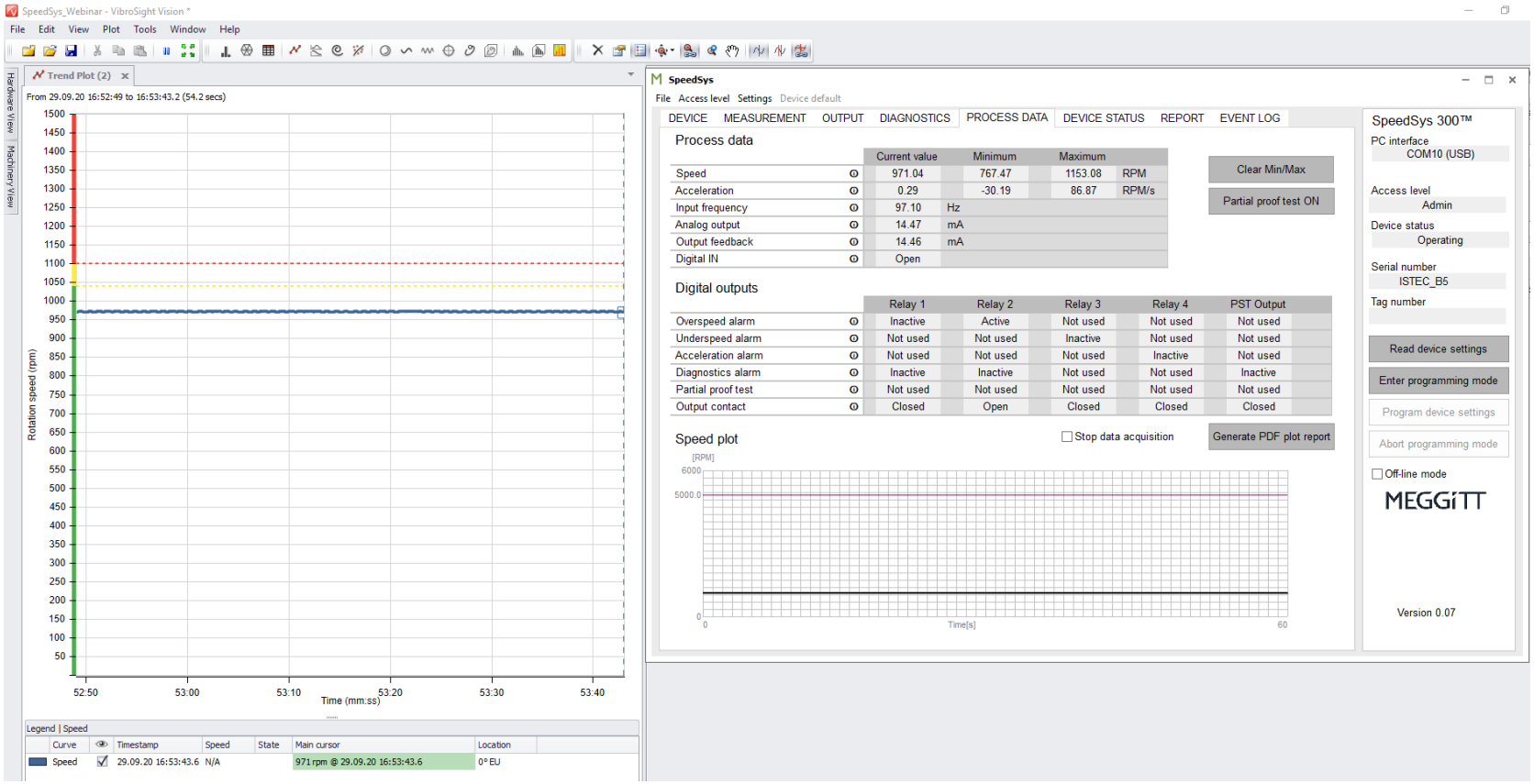
Speed vs. relay outputs



RL#4 (OVS TRIP) remains open, until RESET condition (*), because latched condition

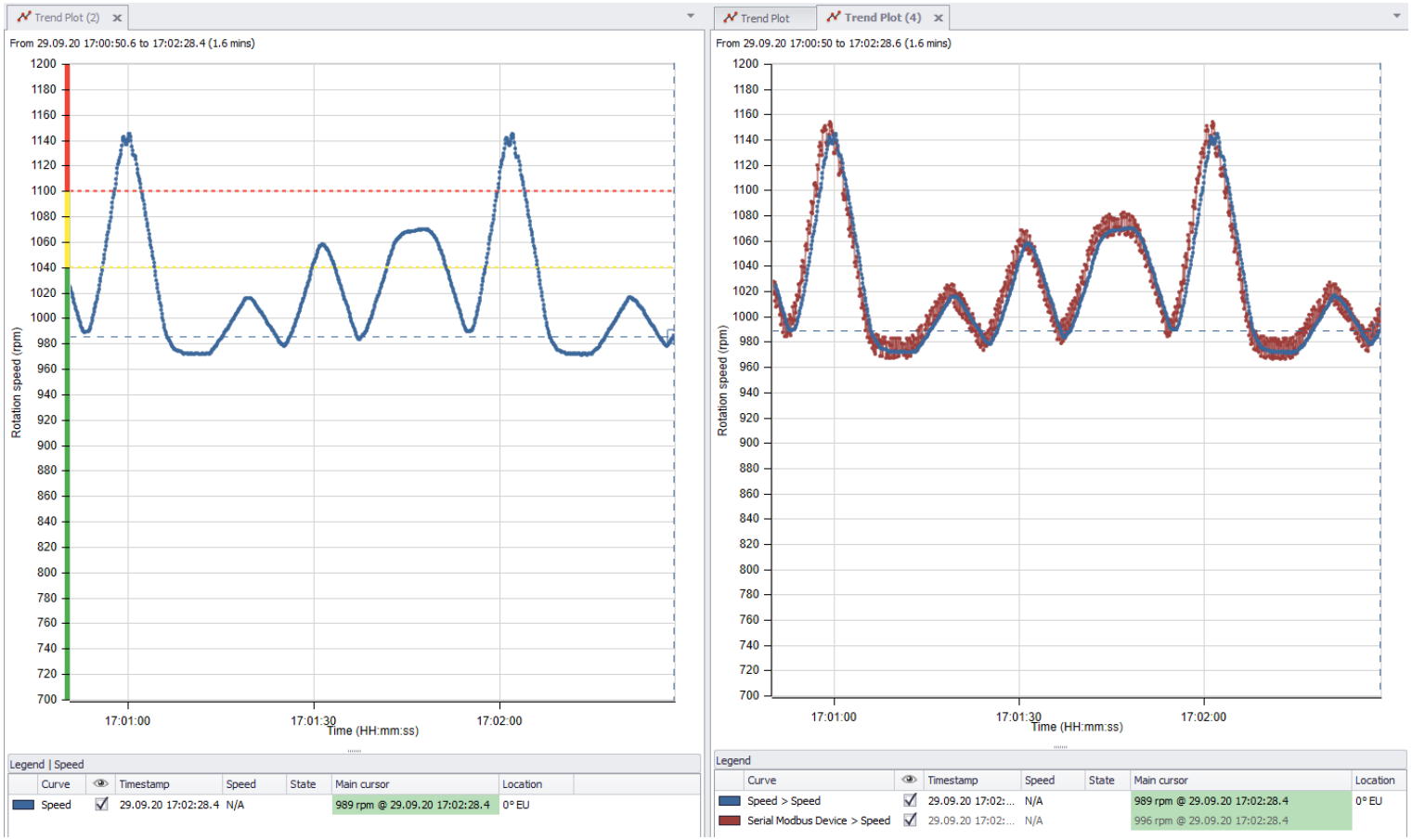
Demonstration

Readings at constant speed



Demonstration

Analog vs. Modbus readings



NEXT STEPS

Demo units

Available for ordering

Demo modules for testing are now available for quote

- ✓ **CHF 1'602.-** a 46% price reduction (regular module list price CHF 3'944)

  no additional discount will be applied

- ✓ Not for sales - ***demo* label**
- ✓ One time effort – quoting will be open until end of 2020
- ✓ Availability expected for February 2021

SpeedSys300 DEMO Module

PNR: 600-047-000-001

Tool Kit

Want to learn more?

Tool Kit e-mail :

- ✓ Today's presentation
- ✓ Today's webinar recording /demo film
- ✓ Articles – www.meggittsensing.com/energy/blog

Launch status

- **October 2020 -** Availability to quote
- **Q1 2021 -** Product entry into service (ready to ship)

Save the date

webinar agenda

VM600^{MK2} product introduction

- ✓ Wednesday, **November 18th**
- ✓ Sessions: 10h30 am CET & 04h30 pm CET

Vibro-meter competitive analysis

- ✓ Wednesday, **December 9th**
- ✓ Hosted by the new TCoE
- ✓ Sessions: 10h30 am CET & 04h30 pm CET

Q&A

How would you rate today's session?

Go to www.menti.com and use the code 28 18 7

Thank you!

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