SpeedSys® T10
SpeedSys® T20
SpeedSys® T30

Speed monitoring systems

Manual

MAN_SSYTx0_202306V1.0

Dutch innovation, European manufacturing

Congratulations on taking this step in solidifying the monitoring and protection of your assets with SpeedSys®; Modern speed measurement solutions characterized by Dutch innovation and European manufacturing quality.

Revision history approval

Version	Status	Changes
1.0	Release	Final release for customers
0.9	Pre-release	For test purpose only

Copyright

For more information about this product and other Istec products, please visit www.istec.com.

This document is subject to change without notice. The latest version of this document can be downloaded from the Istec website.

Before you continue...

We made every effort to design this product with great usability in mind. But, as with any product, the understanding of its user is key. Therefore, we have created an online learning environment: The Istec Academy.

Istec Academy

Our free online learning environment is intended to provide valuable (video) content to become familiar with our products and related parameters.

By registering your product, we can provide application-specific courses and support from our (over)speed specialists.

Register at https://members.istec.com

Important notice

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

Istec has made every effort to include all operation and safety related instructions and warnings in this manual, but the completeness and accuracy of this data cannot be guaranteed. Not all possibilities or situations are described in this manual. Before using this product, the user must evaluate it and determine its suitability for the intended application.

This manual is written for operators and integrators of the SpeedSys Tx0 product series.

All operating personnel is expected to follow the product-specific procedures and all applicable other general and safety procedures. Operating personnel is assumed to have the necessary technical training and proven competence to enable them to install the product correctly and safely.

In case of unsafe, inexpert, or irregular use, Istec will decline any liability or warranty claims.

About SpeedSys Tx0

SpeedSys Tx0 is a line of products for speed monitoring and switching on rotating machinery. The series includes single, dual, and triple channel devices.

The small technical footprint and low impact installation enables advanced speed measurement functions to a wide range of applications.

Index

1 General

1.1 Symbols used in this manual.

This symbol indicates directives, procedures, or precautionary measures concerning safety and the correct use of the device. Failure to obey this information could lead to injury or damage.

This symbol indicates information, concerning understanding and the correct use of the device.

Electrostatic discharge (ESD): The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against ESD according to EN 61340-5-1 and EN 61340-5-2.

1.2 General Instructions

Read this manual carefully and understand the safety instructions before use.

Not all functions are available for all models and releases.

This manual is applicable to the following models:

- SpeedSys® T10
- SpeedSys® T20
- SpeedSys® T30

1.3 General handling precautions

- Do not drop the product or subject it to physical shocks.
- Protect the product using suitable protective materials when handling, storing, or transporting the product. Remove all protective materials before installation and use of the product.
- When storing the product, respect the environmental conditions as specified for the product.

1.4 Maintenance and cleaning

This product is an electronic device. There are no serviceable parts inside the product. The product should not be opened, modified, transformed, or changed in any way. Return the product to the supplier for service and calibration. This product contains electrostatic sensitive components that can be damaged by electrostatic discharges.

All maintenance and repair should be carried out by the manufacturer of the product. If required, clean gently with a soft, dry cloth. Do not soak. Do not use steamer, ultrasonic, soap or brush. Avoid exposure to acids or chemicals. Damaged devices, mechanical or otherwise, must be labelled as 'unusable' and must be scrapped or returned for service.

1.5 Parts and accessories

SpeedSys T10

- SpeedSys T10 module
- 5 removable connectors

SpeedSys T20

- SpeedSys T20 module
- 10 removable connectors

SpeedSys T30

- SpeedSys T30 module
- 15 removable connectors

Defective components may only be replaced by identical parts.

2 System overview.

2.1 System description.

The SpeedSys T10, SpeedSys T20 and SpeedSys T30 are respectively 1-, 2- and 3-channel speed monitors and switches that deliver accurate speed measurement functions to rotating equipment. The devices convert the signals from speed sensors to processed outputs. Their small technical footprint and versatile usability allows for a low-impact installation and to enable speed monitoring to a wide range of applications.

2.2 Concept.

The SpeedSys Tx0 series offers modern speed measurement solutions. There are three versions.

- SpeedSys T10 is a 1-channel device that offers sensor signal conditioning, speed monitoring functions, highly accurate analog signal for further processing and fast responding relays.
- SpeedSys T20 is a 2-channel device that adds additional inputs and outputs, advanced 2-channel logic functions and software voting.
- SpeedSys T30 is a 3-channel device that adds additional inputs and outputs, advanced 3-channel logic functions and software voting.

The devices and their functionality are derivatives of our top tier SIL-rated overspeed protection system, SpeedSys 200 and 300, and feature some of the same innovations and ideas to ensure precisions, safety, and reliability.

Note: The multichannel functions are foreseen for T20 and T30 versions and not part of this version of the manual

2.3 Application

SpeedSys Tx0 provide sensor signal conditioning and rotational speed measurement functions to general rotating equipment applications. Typical applications include turbines, compressors, engines, wind turbines and industrial automation.

SpeedSys Tx0 can be used as a standalone speed monitor or combined with the SpeedSys SIL rated protection systems to add a layer of monitoring and communication. Please check the commercial documentation for more information about the combined application.

2.4 Intended use.

This device is intended for industrial environments. It was designed for indoor use or use in a protective enclosure. It can only be operated at altitudes up to 2000 meters. This device is designed for applications within a pollution degree of up to 2, and an overvoltage category II environment.

This product **was not** designed to meet the requirements of a IECE 61508 functional safety system.

2.5 Environmental conditions.

	Operating	Storage
Temperature	-20 to +60 °C	-40 to +85 °C
Humidity	75% averaged over the year; up to 90% for max 30 days. Condensation to be avoided.	
Ingress protection	IP20 according to IEC 60529	

3 Mounting and installation

3.1 Module details

The front panel sticker contains basic information about the connectors, wiring connections and module status.

The top side of the module has connections for frequency output (FO) and digital input (DI) on the middle row, and sensor input on the front row.

The bottom side has connections for power and grounding on the back row, relay 2 and analog out (AO) on the middle row, and relay 1 (double pole) on the front row.

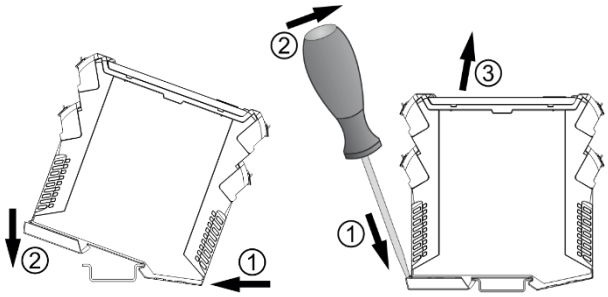
Denotations a, b or c on multi-channel devices indicate the channel.

The LEDs show relay and system status. Details about the different status is explained in 6.10 Status LEDs.

The communication port in the front panel is used for configuration and Modbus TCP connectivity.

3.2 Module dimensions and installation

The product is designed to work with standard DIN rail. For installation, the device is clipped onto the upper part of the DIN rail and pressed down until the lock snaps in. For deinstallation, the spring lock is opened with a slotted screwdriver and the device is removed upwards (see following figures).

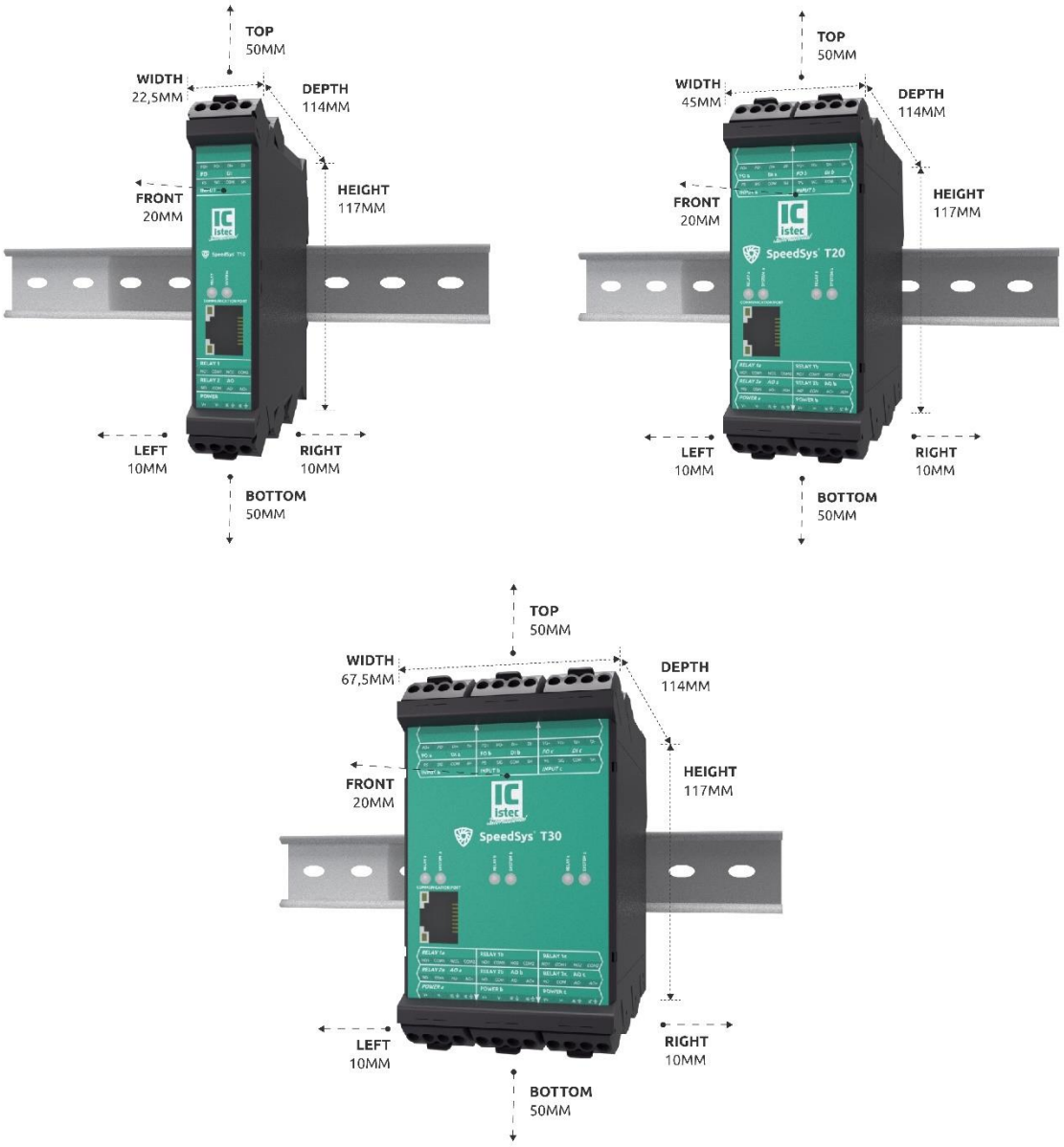


Mounting (left) and demounting (right) of the unit.

Install the device in a suitable housing with a suitable degree of protection in accordance with IEC 60529 to protect it from mechanical and electrical damage.

Electrostatic discharge: The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and EN 61340-5-2.

Observe the minimum clearances as shown in the figures below to allow for sufficient cooling.

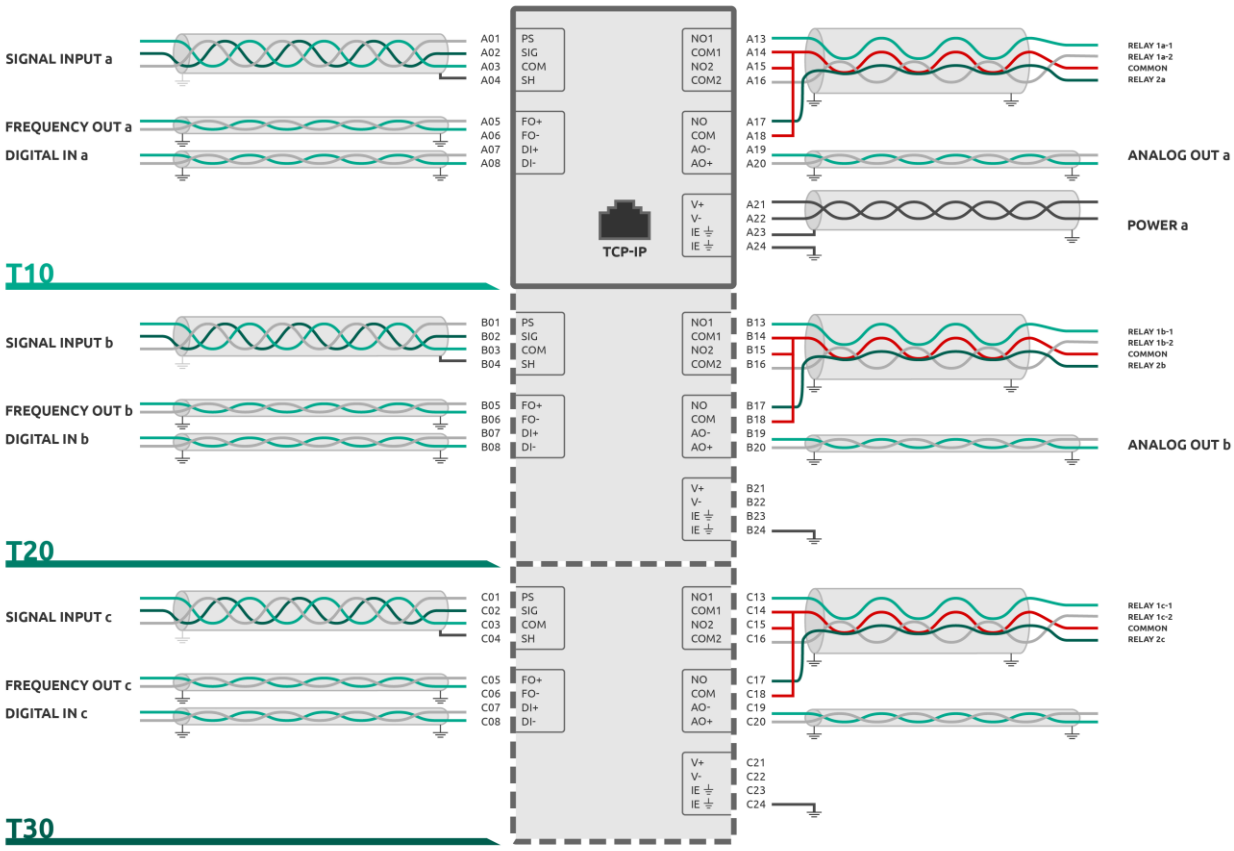


The electrical connections are established via push terminals. Use a matching screwdriver to release a wire from the connector. The entire pluggable terminal block, containing 4 contacts, can be removed by flipping the lever.

3.3 Connection diagram

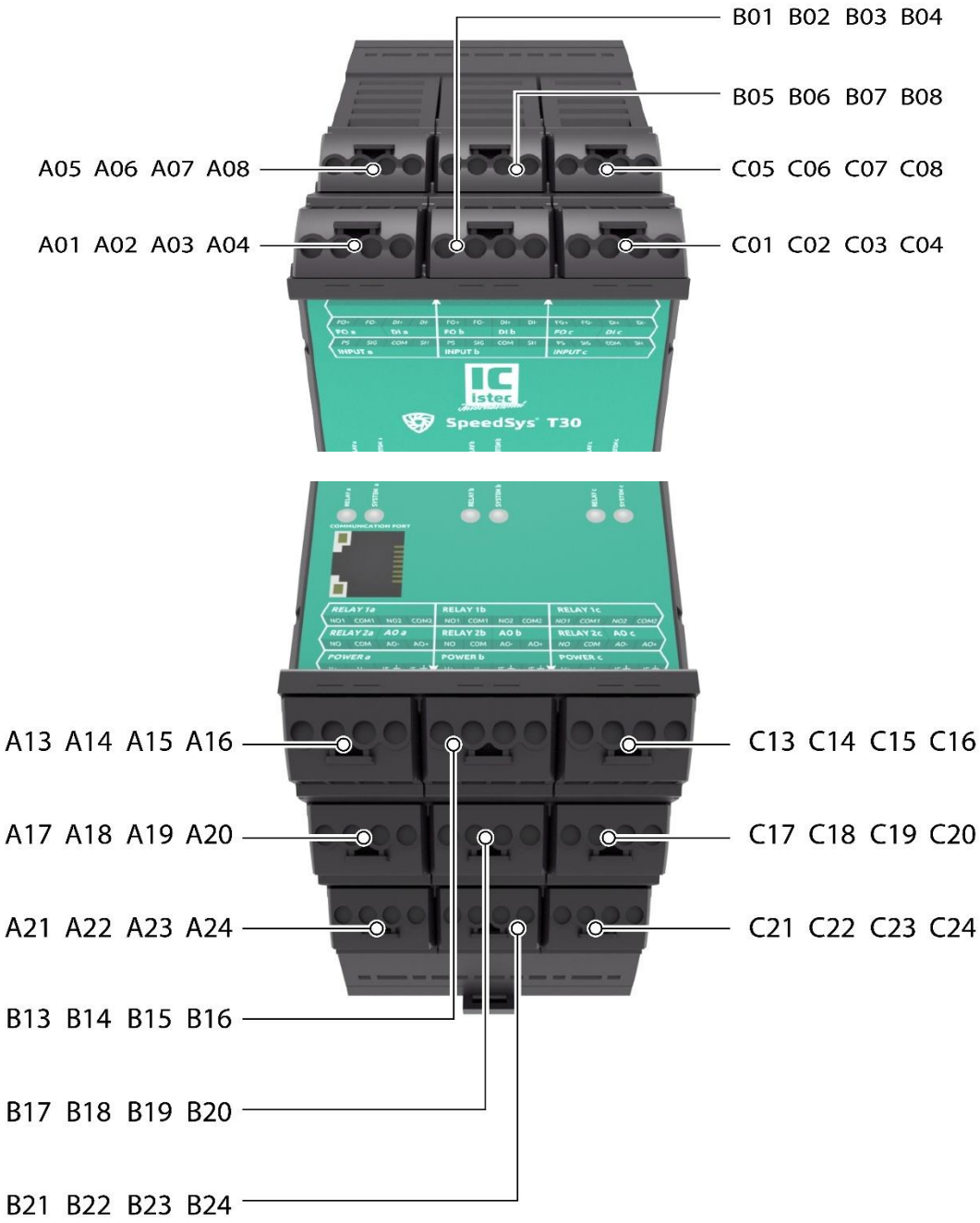
The figure below shows the electrical interfaces for the product. The sensor inputs are short circuit proof.

Observe the information in the datasheet before connecting electrical interfaces.



Note: The multichannel functions are version dependent and available for T20 and T30 versions.

3.4 Connector arrangement



3.5 Functional grounding

This product requires functional grounding to avoid potential ground noise and EMI effects that can cause unfavourable operating conditions.

Each SpeedSys Tx0 module/ channel must be grounded through the instrument earth connections on all the power supply connectors.

All connections must be installed with shielded cables. Connect all cable shields to instrument earth on the SpeedSys Tx0 module. For the 3-wire voltage sensor (Hall sensor) or the 2-wire voltage sensor, the cable shield must be connected to instrument earth at the device side. If both sides of the shield/screen are connected to instrument earth, due to induction, the signal might pick up disturbance.

Note: when the shield is connected to earth on both ends of the cable, verify that electromagnetic disturbances due to differences in grounding potential (ground loops) do not occur.

3.6 Cable lengths

The following cable parameters have been used for testing and approval:

	Cable length	Type
Sensor	≤30 meters	3-wire twisted and shielded
I/O	≤30 meters	2-wire twisted and shielded
Power supply	≤3 meters	2-wire twisted and shielded
TCP/IP	≤30 meters	CAT 5/6
Modbus RS485	≤30 meters	3-wire twisted and shielded

When using longer cable lengths, special precaution must be taken to ensure signal quality and compliance to certification parameters.

Cable quality is important to ensure a good signal transmission. Please select high quality cable and consider the following cross section recommendations:

Cable length ≤ 100m: 0.50 mm²
Cable length > 100m: 0.75 mm²

4 Programming

A SpeedSys Tx0 unit can be configured using the software application named SpeedSysTool. The latest version of this software can be downloaded for free on the Istec website www.istec.com.

The software requires Java Runtime Environment (JRE) and does not require any additional installation for the application itself. Therefore, if Java RE is present and running, the application can be exchanged between computers with impunity.

Note: The SpeedSysTool is only compatible with version 8 update 361 and above. Older versions were never tested and should therefore be used with caution.

Information circles and field types

For each field and button, a corresponding help text is available to provide guidance to the user. This help text can be seen by hovering the mouse over the information circle icon 'ⓘ' located next to each field or over the button.

The fields are categorized into three types indicated by the first word of the associated help text. These types are defined as follows:

- [TEXT]: denotes an editable field that has no impact on the operation of the unit.
- [INPUT]: denotes an editable field that has a direct effect on the operation of the unit.
- [OUTPUT]: denotes a non-editable field that provides feedback data from the unit.

Note: The availability of information fields varies depending on the version.

4.1 Get started: making a LAN connection.

To configure the SpeedSys Tx0 it must be connected to a computer over a Local Area Network (LAN) or as P2P connection.

Note: It may require some technical expertise and knowledge of TCP/IP network configurations, of which the details are beyond the scope of this manual. If you require support with this procedure, please consult your local IT department.

Turn SpeedSys Tx0 on by supplying power to the unit.

- Connect SpeedSys Tx0 to a computer using the TCP/IP connector on both devices and a suitable, high quality cable.

To connect to the SpeedSys Tx0 in the software, the computer and SpeedSys Tx0 will have to be in the same IP range and have suitable subnet masks.
The SpeedSys Tx0 comes with the following factory settings:

- Fixed IP: 10.10.1.100
- Subnet mask: 255.255.255.0
- Gateway: Empty

- Configure the TCP/IP settings of the computer to have a suitable IP and subnet mask to communicate with the SpeedSys Tx0.
  Example:

	PC	SpeedSys Tx0
IP address	10.10.1.101	10.10.1.100
Subnet mask	255.255.255.0	255.255.255.0
Gateway	Empty	Empty

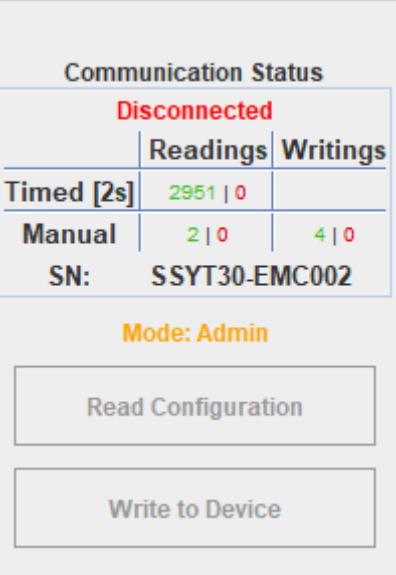
- Run the software by double clicking the icon.
  Note: Some anti-virus suites may block or require additional approvals to run third-party applications.

Note: The SpeedSys Tx0 series allows to change the fixed IP address but also change the settings to DHCP. These changes need to be well documented.

See also **[Settings]** and **[Device Tab]**

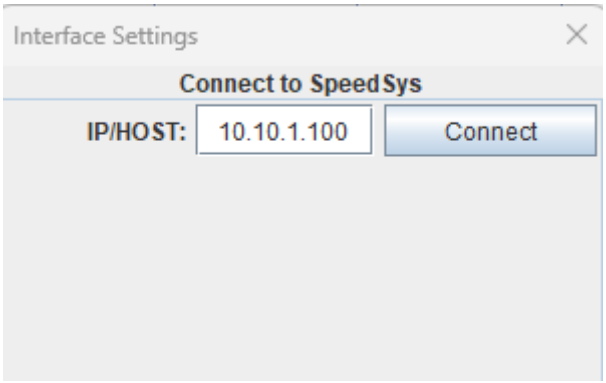
Note: In case the IP address is forgotten or cannot be retrieved the unit will no longer be accessible. To reset the IP address to its default value , first ensure that no speed is present during this procedure. Then supply 10 pulses between 0.2 and 0.5 seconds to the Digital Input , within a time window of 10 seconds. This will reset the IP address to the factory settings.

When the computer and SpeedSys Tx0 are not yet coupled the software shows the 'Disconnected' status in the top right corner as shown in the figure below.

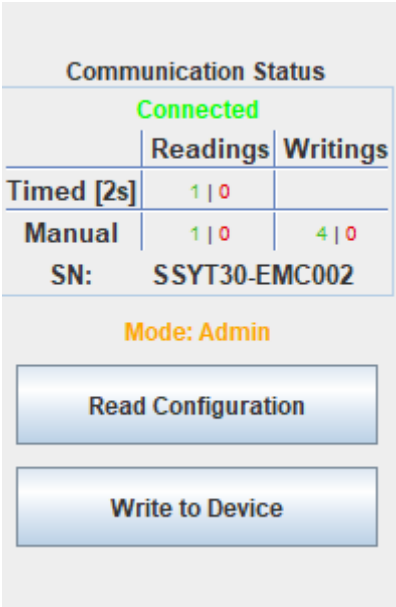


Note: The Input and Config counters will increase the green digit for each successful connection and red for each connection that failed.

- To establish a connection, click Settings and Interface Settings. Enter the IP address in the prompt that will appear and click connect as shown in the figure below.



After clicking the 'Connect' button a connection is established, and the software is displaying the text 'Connected!' to indicate a successful connection has been made as shown in the figure below. Also, the buttons 'Read Configuration' and 'Write to Device' will become active.



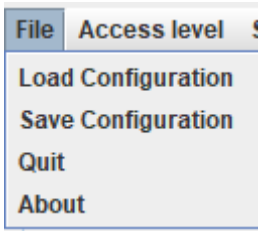
The SpeedSysTool will automatically load the configuration of the current connected Speedsys Tx0 module.

5 Menu and Tab functions

5.1 File menu

[Load Configuration] & [Save Configuration]

Loading and saving configuration files in the SpeedSys Tx0 application is a straightforward process. However, it's important to note that the software will save the exact input that is visible in the SpeedSysTool application, which allows for the creation of offline configurations.

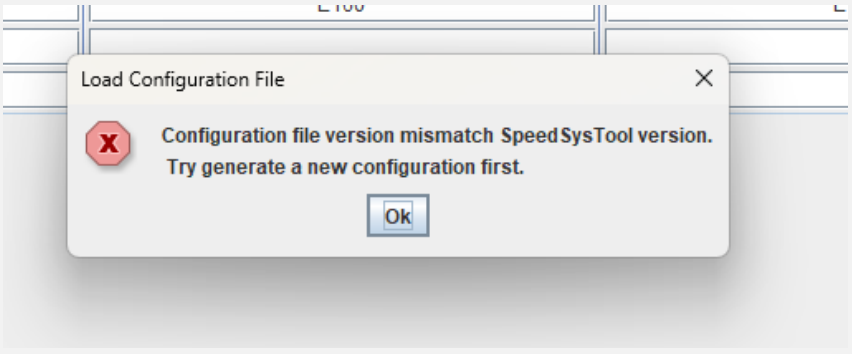


To save the configuration that is currently programmed on a unit, it is essential to first click the "Read Configuration" button. This will ensure that the current configuration is displayed before saving it to a file.

To write a configuration onto a SpeedSys Tx0 unit elevate the user status to 'Admin' level and click the 'Write to Device' button.

Note: the unit will reset itself when writing a new configuration. E.g., errors will be cleared and latched relays will be released.

Note: when a mis match is detected between the SW version and FW version an error will be shown. It than not possible to load the file..

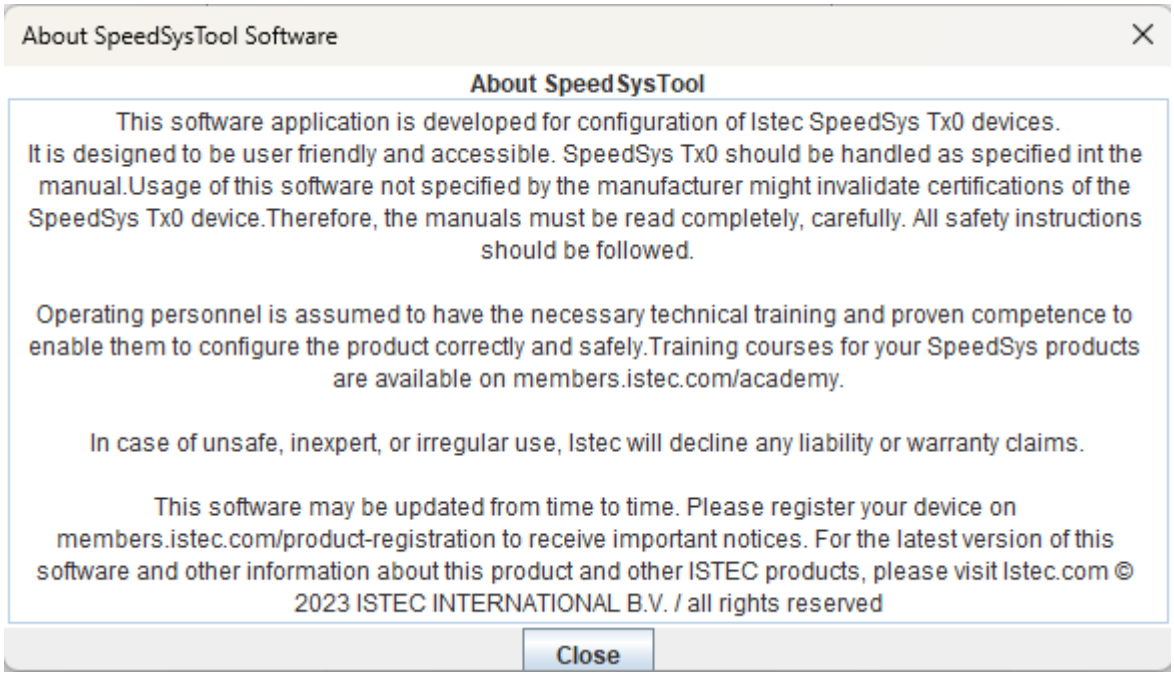


[Quit]

Selecting “Quit” from the menu will close the application. All unsaved information will be lost.

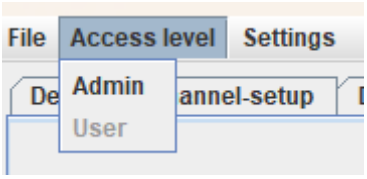
[About]

The About function contains following information:



5.2 Access Level menu

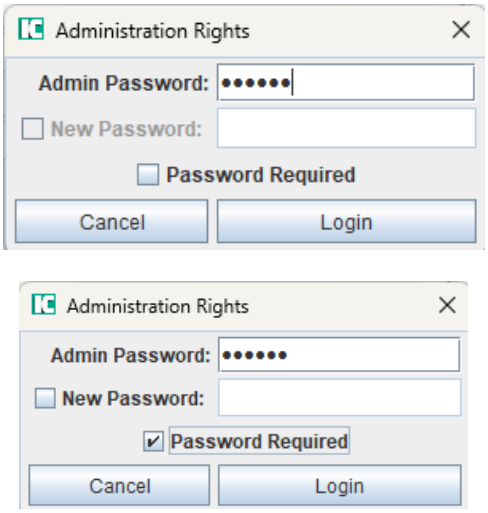
The user status can be elevated, by clicking Access level.



After selecting Admin and by entering the password. The default password to switch on the user level is “#01000”.

Note: the programming mode is by default Admin.

Note: The default password is “#01000”



After activating the password protection (Password Required tick box), configuration changes can only be done after entering the admin password.

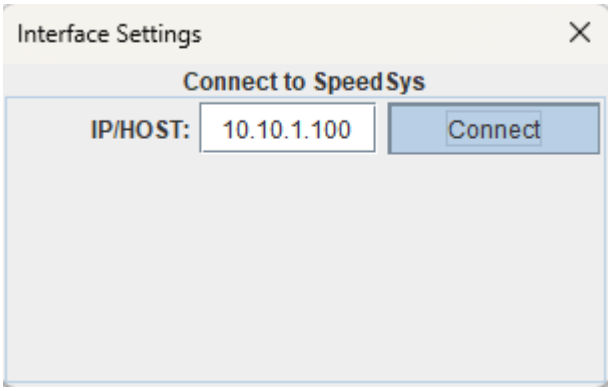
Changing the password after the first login is highly recommended. The admin password can be set only with admin level permissions. If the admin password is lost, the device must be returned to the manufacturer.

Note: the password is stored on the Tx0 unit itself. When the password is lost, it can only be retrieved at the factory.

5.3 Settings menu

Interface Settings

[INPUT]



In the menu interface settings, the IP address of the connected SpeedSys Tx0 must be entered. After selecting “Connect”, the unit will connect to the SpeedSys Tx0.

Please refer to chapter 4 for more information about the connection settings.

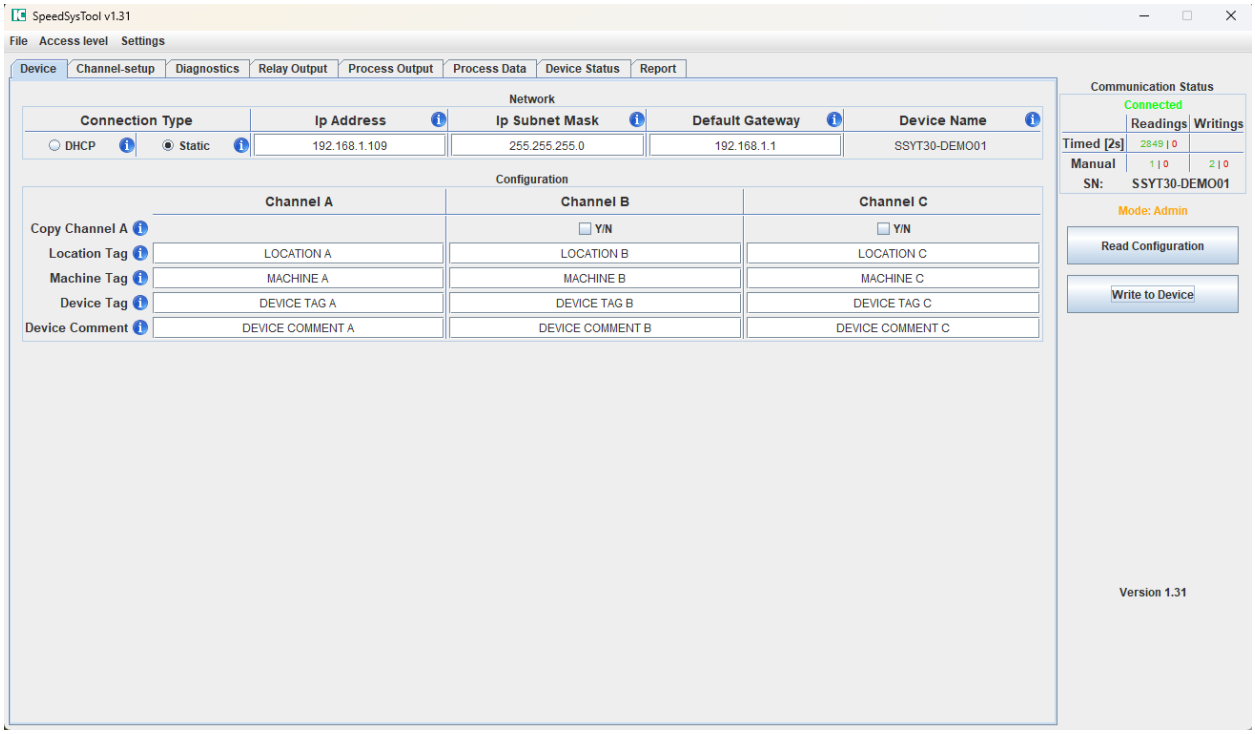
6 Commissioning

6.1 Device Settings

After the software has detected the connected module, the software is ready to read the configuration. The status and identification of the connected device is displayed on the right side of the window.

The first tab is the 'Device Settings' tab which mostly has administrative fields except for the 'Password' section as shown in the figure below.

Note: the greyed fields are not accessible. Access is version and product dependent.



Network

- **Connection Type**
  - **DHCP**

    [INPUT]

    When DHCP is selected only the DHCP protocol is supported. DHCP is a network protocol that automatically assigns IP addresses and configuration settings to devices joining a network, simplifying network setup and management. Devices send a request,

DHCP server offers an available IP address and settings, the device accepts, and the lease is established for a specific duration.

- **Static**

  [INPUT]

  IP address is a fixed, unchanging address manually assigned to a device on a network. It is useful for hosting services, remote access, security, networked devices, and certain applications that require consistent connectivity.

- **IP Address**

  [INPUT]

  An IP address is a unique identifier assigned to each device connected to a network. It is used to facilitate communication and enable devices to send and receive data over the internet. IP addresses allow devices to locate and connect with each other, forming the foundation of internet communication. The format is xxx.xxx.xxx.xxx

- **IP Subnet Mask**

  [INPUT]

  An IP subnet mask helps divide an IP address range into subnetwork and host segments, facilitating efficient routing and determining if devices are on the same subnetwork.

- **Default Gate Way**

  [INPUT]

  A default gateway address is the IP address of the router or gateway that connects a local network to external networks, such as the internet. It serves as the entry point for outgoing traffic from devices within the local network and enables communication with devices on other networks. The default gateway allows devices to send data to destinations outside their immediate network by forwarding it to the appropriate destination through the router or gateway. In essence, the default gateway is crucial for enabling connectivity between different networks and accessing external resources.

- **Device Name**

  [INPUT]

  The device name is set to the serial number of the device and cannot be changed.
  A device name is a user-friendly identifier given to a device on a network, making it easier to recognize and reference. It can be a unique name assigned to a computer, server, printer, or any networked device. Device names are beneficial for human interaction and simplifying network management tasks, as they are more memorable and intuitive than IP addresses.

NOTE: to use the device name please contact your IT specialist to set this up for your network

- **Copy Channel A**

  [INPUT]

  Allows to copy the parameters from Channel A into Channel B and/or Channel C, after copying the parameters can be stored and programmed onto the device.

Configuration

- **Location Tag**

  [TEXT]

  The Location Tag is a text input used for documentation purpose only.

- **Machine Tag**

  [TEXT]

  The Machine Tag is a text input used for documentation purpose only.

- **Device Tag**

  [TEXT]

  The Device Tag is a text input used for documentation purpose only.

- **Device Comment**

  [TEXT]

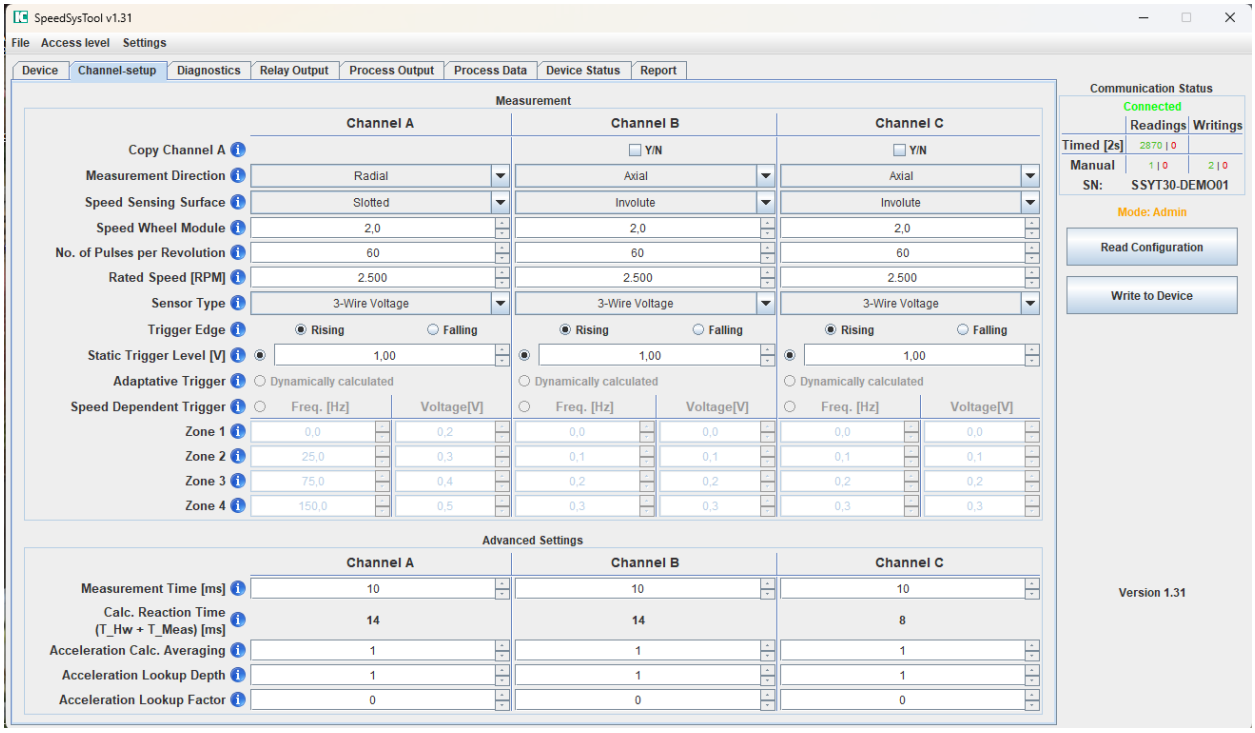
  The Device Comment Tag is a text input used for documentation purpose only.

6.2 Channel Setup

The CHANNEL SETUP tab defines the sensor input and the signal processing.

To create a configuration, all the necessary fields and boxes need to be filled and /or selected.

Note: Only channel A configuration is applicable and accessible for SpeedSys T10. For SpeedSys T20 channel A and B are accessible and for SpeedSys T30 channel A, B and C are accessible.



Measurement

- **Copy Channel A**

  [INPUT]

  {SpeedSys T20 and T30 only}

  Allows to copy the parameters from Channel A into Channel B and/or Channel C, after copying the parameters can be modified. And stored or downloaded to the device.

- **Measurement Direction**

  [TEXT]

Three measurement directions can be selected: Axial, Radial and Tangential. If Axial is selected, the sensor measures along the machine's axis. Selecting Radial switches to measuring perpendicular to the machine's axis. Tangential means measuring the axis under a certain angle.

- **Speed sensing surface**

  [TEXT]

  Five options for the speed sensing surface are available: Involute (typical gear wheel shape), Slotted (squared teeth on speed wheel), Pole band (toothed band around machine shaft), Holes (drilled holes which are typically located axially), and Blades (e.g., when the sensor is intended to detect turbine blades).

- **Module**

  [TEXT]

  [Range Min 0.0 / Max 100]
  [Default 2]

  Factor of speed wheel diameter divided by the number of teeth (e.g., a diameter of 200 mm and 100 teeth result in a module of 2).

- **Number of pulses per revolution**

  [INPUT]

  [Range Min 1 / Max 1500]
  [Default 60]

  Defines how many pulses refer to one revolution of the rotary setup. Required for correct rotational speed calculation.

- **Rated speed**

  [TEXT]

  Document the operational speed for of the machine.

- **Sensor type**

  [INPUT]

  The device supports two different sensor input types that activate the corresponding trigger functionality in the software upon activation:

  3-wire voltage is used for powered voltage sensors, e.g., Hall-effect sensors. Selecting it only allows for fixed triggering.

2-wire voltage is used for self-generating types of probes, e.g., variable reluctance (VR), electromagnetic probes (MPU) or passive sensors. The input voltage ranges from 100 mV_{RMS} to 80 V_{RMS}. Selecting this function also allows the options adaptive triggering and speed dependent triggering.

- **Trigger edge**

  [INPUT]

  Defines the trigger type as either a rising or falling flank.

- **Static Trigger level [V]**

  [INPUT]

  Configures the threshold for voltage signals. A signal that exceeds the trigger level is counted as a pulse. The following can be selected:

  - 3-wire voltage: trigger 1V per default, trigger range 0 – +12.0 Volt
  - 2-wire voltage: trigger 1V per default, trigger range +/- 12.0 Volt.

- **Adaptive Trigger**

  [INPUT]
  {2-wire voltage input only}

  The adaptive trigger is used to trace the input signal amplitude and automatically increase the trigger level to 67% of the measured peak amplitude.

- **Speed Dependent Trigger**

  [Input Frequency]

  [Range Min 0.0 Hz / Max 40.000 Hz]
  [Default: Zone Dependent]

  [Input Voltage]

  [Range Min 0.0 V / Max 12.0 V]
  [Default: Zone Dependent]

  {2 wire voltage input only}

  Speed Dependent Trigger configures a voltage threshold for four different frequencies, where any signal that exceeds the threshold is identified as a pulse. For 2-wire input:

  - 0 Hz (fixed frequency) - Trigger level programmable (0.5 V default)
  - 25 Hz (programmable) - Trigger level programmable (2 V default).
  - 75 Hz (programmable) - Trigger level programmable (4 V default).
  - 150 Hz (programmable) - Trigger level programmable (6 V default).

The Speed Dependent Trigger is used to increase the trigger level based on preset actual speed values.

- **Zone 1-4**

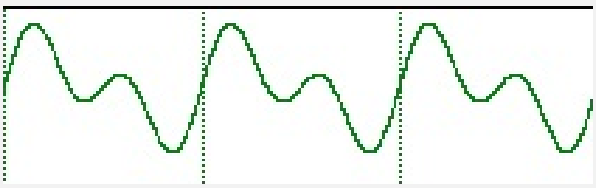
  [Input Frequency]

  [Range Min 0.0 Hz / Max 40.000 Hz]
  [Default: Zone Dependent]

  [Input Voltage]

  [Range Min 0.0 V / Max 12.0 V]

The adaptive trigger and speed dependent trigger are used to compensate the trigger level for phenomena caused by very specific speed wheels. E.g., blades or flattened surfaces, where a secondary pulse with a lower amplitude is superimposed onto the main signal and can inadvertently trigger the pulse detection.



The second pulse amplitude increases with speed. To allow for a correct measurement at high speed and thus higher signal amplitude, the trigger level needs to increase with the speed.
To program the settings of the speed dependent trigger, it is important to know the relation between the speed and the amplitude of the first and second pulse.

The pulse width of duty cycle is an important factor when selecting adaptive triggering or speed dependent triggering. Adaptive Triggering works up to approx. 4000 HZ for signals with a duty cycle of 10% or higher. For higher frequencies or smaller duty cycles the Speed Dependent Triggering is a better option.

Advanced settings

- **Measurement time (T_m).**

  [INPUT]

  [Range Min 2ms / Max 1000 ms]
  [Default: 10 ms]

  The measurement time can be programmed from 2 to 1000 ms. When the measurement time exceeds the period of the wave signal, averaging is automatically started equal to the number of periods fully fitting within the set measurement time.

E.g., T_m = 10 ms and the period T_p for the signal is 100 ms (10 Hz), no averaging will take place. since T_p >. T_m. For a signal with a frequency of 1 kHz T_p = 1ms. The averaging will then increase automatically increase, to 10 since T_p <. T_m and T_m/ T_p = 10.
The advantage is that the system reaction time at the predefined speed of interest (e.g., alarm level) is exactly known.

Note Acceleration functions are version dependent.

- **Calc. reaction time (T_h + T_m).**

  [OUTPUT]

  This value is an estimation of the SpeedSys response time. It is the sum of the hardware, and measurement reaction time (T_h + T_{m+}). T_h is a fixed value (4 ms). T_m is a predefined value in the settings and explained above.

- **Acceleration calc. averaging**

  [INPUT]

  T20 – T30 Only

- **Acceleration lookup depth**.

  [INPUT]

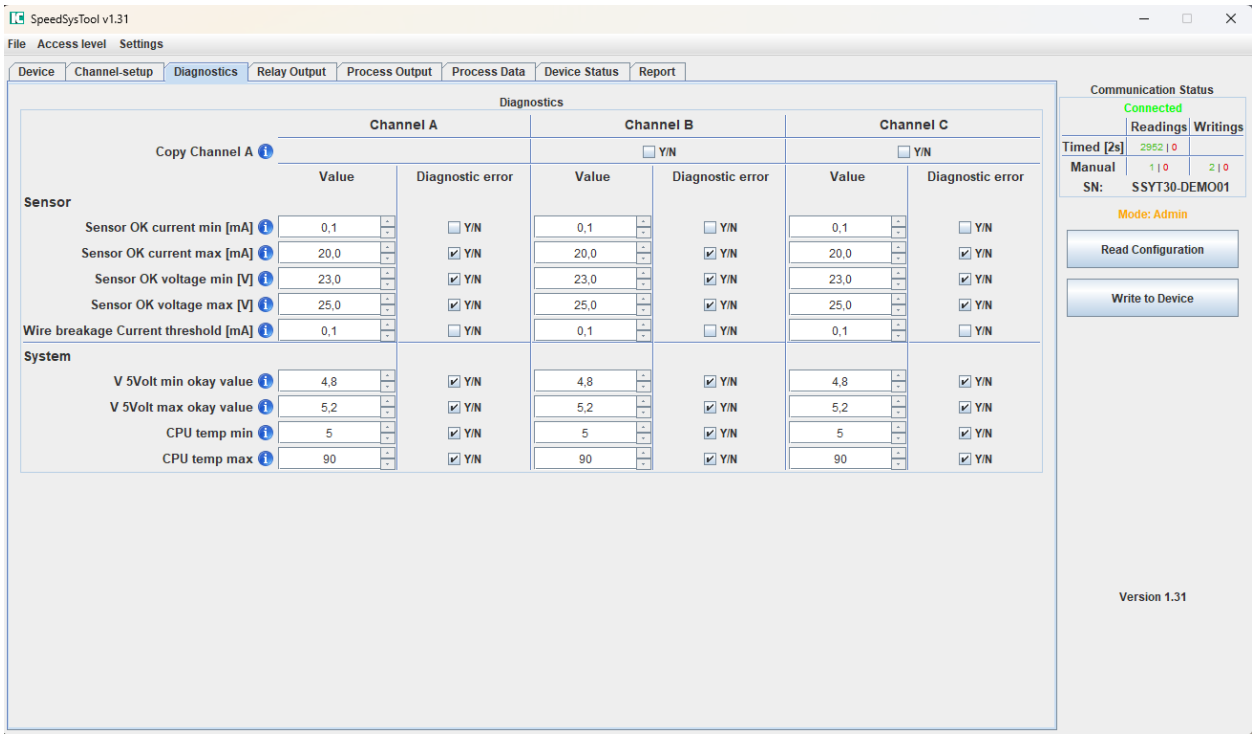
T20 – T30 Only

- **Acceleration lookup factor**

  [INPUT]

  T20 – T30 Only

6.3 Diagnostics



- **Copy Channel A**

  [INPUT]

  {SpeedSys T20 and T30 only}.

  Allows copying the parameters from Channel A into Channel B and/or Channel C, after copying the parameters can be modified and stored or downloaded to the device.

Sensor

- **Sensor OK current min [mA]**

  [INPUT]

  [Range Min 0.1mA / Max 25 mA]
  [Default 1.0 mA]

The Sensor Ok detection is used for powered sensors with these settings the sensor can be monitored for wire breakage, short circuit, and under load and overload conditions.

- **Sensor OK current max [mA]**

  [INPUT]

  [Range Min 0.1mA / Max 25 mA]
  [Default 20.0 mA]

  The Sensor Ok detection is used for powered sensors with these settings the sensor can be monitored for wire breakage, short circuit and under load and overload conditions.

- **Sensor OK voltage min [V]**

  [INPUT]

  [Range Min 22 V / Max 26 V]
  [Default 23 V]

  The Sensor Ok detection is used for powered sensors with these settings the sensor can be monitored for wire breakage, short circuit and under load and overload conditions.

- **Sensor OK voltage max [V]**

  [INPUT]

  [Range Min 22 V / Max 26 V]
  [Default 25 V]

  The Sensor Ok detection is used for powered sensors with these settings the sensor can be monitored for wire breakage, short circuit and under load and overload conditions.

- **Wire breakage current threshold**

  [INPUT]

  [Range Min 0.1mA / Max 2.2 mA]
  [Default 2.0 mA]

  The wire breakage current threshold is used to detect the wire breakage or other sensor connection failure. A small current is flowing through the sensor when connected. In case of a connection failure, the current will drop to zero.
  The wire breakage detection is only active at zero speed.

System

- **V 5 Volt min okay value**

  [INPUT]

  [Range Min 4.7V / Max 5.3 V]

[Default 4.8 V]

The V 5 Volt is an indication of the stability of the internal voltages. When drifting, the system is regarded unreliable. The min. and max. value can be monitored.

- **V 5 Volt max okay value**

[INPUT]

[Range Min 4.7V / Max 5.3V]
[Default 5.2 V]

The V 5 Volt is an indication of the stability of the internal voltages. When drifting the system is regarded unreliable. The min. and max. value can be monitored.

- **CPU temp min.**

[INPUT]

[Range Min -20 °C / Max + 110 °C]
[Default + 5 °C

The CPU temperature is an indication of the ambient temperature. In case the ambient temperature is increasing the CPU temperature will increase. 90 °C should be regarded as the highest allowable CPU temperature and 5 °C as minimum value. The min. and max. value can be monitored.

- .**CPU temp max.**

[INPUT]

[Range Min -20 °C / Max + 110 °C]
[Default + 90 °C

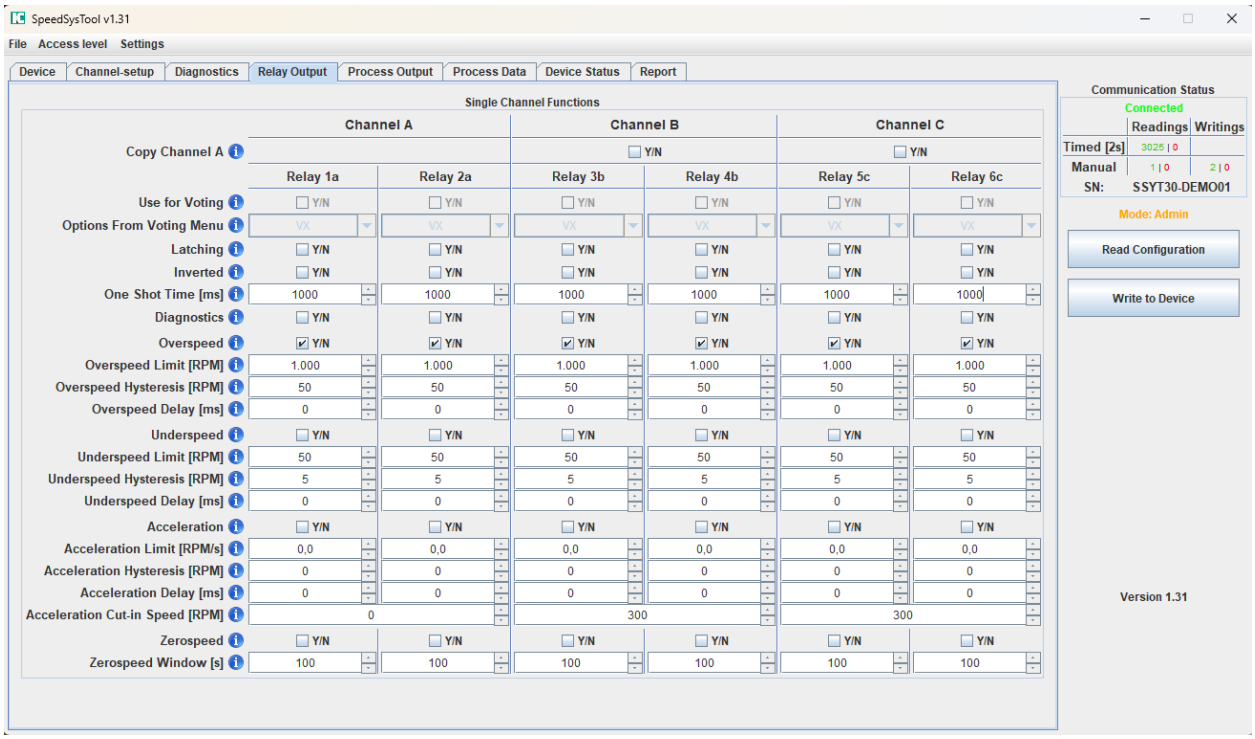
The CPU temperature is an indication of the ambient temperature. In case the ambient temperature is increasing the CPU temperature will increase. 90 °C should be regarded as the highest allowable CPU temperature and 5 °C as minimum value. The min. and max. value can be monitored.

6.4 Output configuration

The Relay Output tab enables the user to define the behaviour of the digital outputs.

Each relay can be configured individually. Note that relay 1 is a double pole relay that supports double pole hardwired voting structures. Relay 2 is a single pole relay.

If a relay is used for switching applications, it is recommended to program the relay as energized closed (inverted).



Digital outputs

- **Copy Channel A** (SpeedSys T20 and T30 only)

  [INPUT]

  Allows copying the parameters from Channel A into Channel B and/or Channel C, after doing so the parameters can be modified.

Use for voting

[INPUT]

Enables the relay function to react on the settings in the voting tab. (Note: Version dependent).

- **Options From Voting Menu**

  [INPUT]

  This allows the selection of the preconfigured setting in the Voting tab. (Note: Version dependent).
- **Latching.**

  [INPUT]

  Upon activation of an alarm the selected relay will switch to the NOT OK state and remain in this state, even when the alarm has ceased. The relay will return to its normal state after a reset. To reset the relay, use the “Test and Reset” function on the Process Data tab.

- **Inverted**

  [INPUT]

  Determines the energized/de-energized state of the relay.
  Enabled: Energized - normally closed
  Disabled: De-energized - normally open
- **One shot time.**

  [INPUT]

  Inoperable when latching is activated. It determines how long the relay is held after switching and it is released back to operational, given that a new alarm event does not occur, as that will reset the timer. This could be seen as a timed latch.

- **Diagnostics (alarm state)**

  [INPUT]

  Selecting diagnostic alarm couples, the selected diagnostic functions under the Diagnostics tab to the associated relays output.

- **Overspeed**

  [INPUT]

  This category parametrizes the overspeed alarm condition. Enable the checkbox to activate overspeed alarm for the respective output. The upper limit value of the rotational speed, as well as the hysteresis and delay can be individually configured.

- **Overspeed Limit**

  [INPUT]

  When the limit for overspeed has been violated, the alarm signal automatically latches.

- **Overspeed hysteresis**

  [Input]

  A latched speed limit will be reset when the speed drops below the limit value minus the hysteresis value.

- **Overspeed delay**

  [Input]

  The delay slows down the response of the output relay by the duration of the programmed time, this time is added to the total reaction time. Note: that the alarm is only initiated if the alarm conditions are continuously met during this time frame of the delay.

- **Underspeed**

  [INPUT]

  This category parametrizes the underspeed alarm condition. Enable the checkbox to activate overspeed alarm for the respective output. The lower limit value of the rotational speed, as well as the hysteresis and delay can be individually configured.

- **Underspeed Limit**

  [INPUT]

  When an underspeed limit has been violated, the alarm signal latches until it rises above the limit plus the hysteresis.

- **Underspeed hysteresis**

  [Input]

  A latched underspeed limit will be reset when the speed rises above the limit value plus the hysteresis value.

- **Underspeed delay**

[Input]

The delay slows down the response of the output relay by the duration of the programmed time, this time is added to the total reaction time. Note: that the alarm is only initiated if the alarm conditions are continuously met during this time frame of the delay.

- **Acceleration. (Note: version dependent).**

  [INPUT]

  Acceleration is defined by the rate of change of the speed per second (RPM/s). Speed acceleration

- **Acceleration limit**

  [INPUT]

  When the limit for acceleration overspeed has been violated, the alarm signal automatically latches.

- **Acceleration hysteresis**

  [Input]

  A latched underspeed limit will be reset when the speed rises above the limit value plus the hysteresis value.

- **Acceleration delay**

  [Input]

  The delay slows down the response of the output relay by the duration of the programmed time, this time is added to the total reaction time. Note: that the alarm is only initiated if the alarm conditions are continuously met during this time frame of the delay.

- **Acceleration cut-in speed. (VERSION DEPENDENT)**

  [INPUT]

  This value defines the minimal speed for which acceleration alarms are initiated. Below this speed, no acceleration alarms are evaluated.

  For VR/ MPU probes as these are passive probes, the amplitude varies with the speed. At low speeds this can give an unreliable signal . Leading to possible false alarms, preventing the machine to get through the startup phase.

- **Zero speed (VERSION DEPENDENT)**

  [OUTPUT}

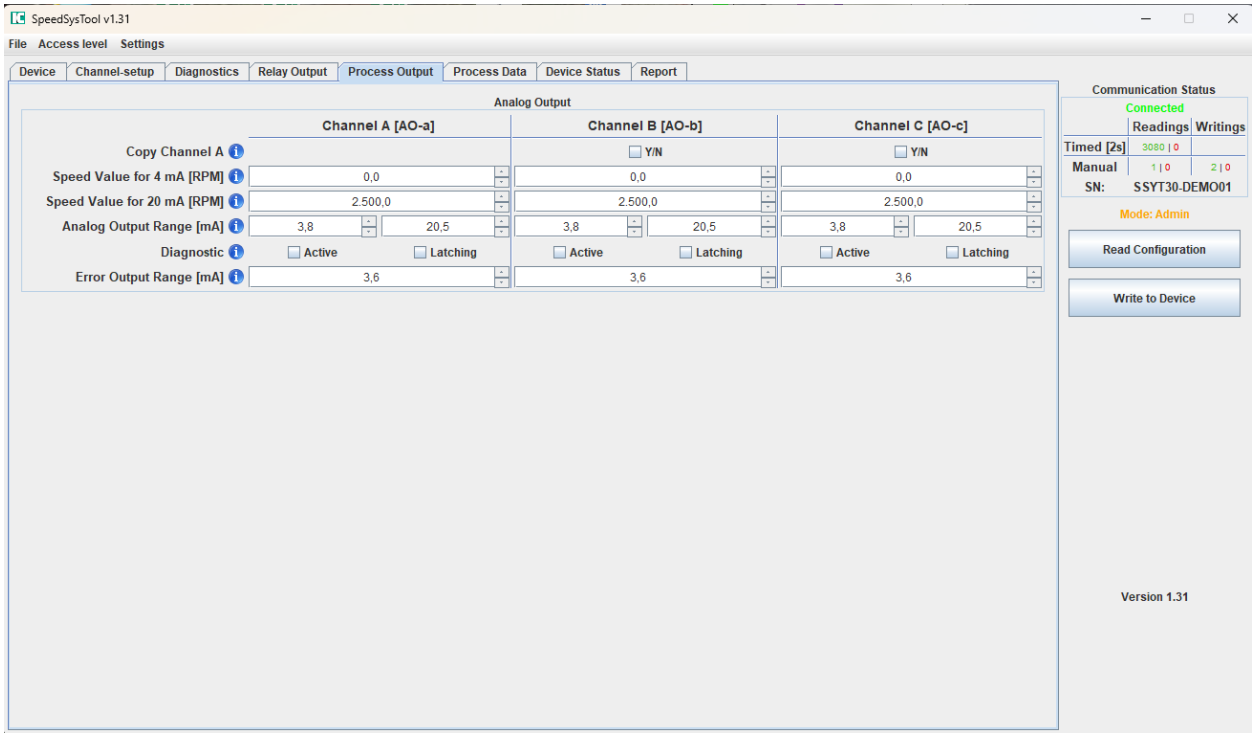
  Enable the checkbox to activate overspeed alarm for the respective relay output.

- **Zero speed windows (VERSION DEPENDENT)**

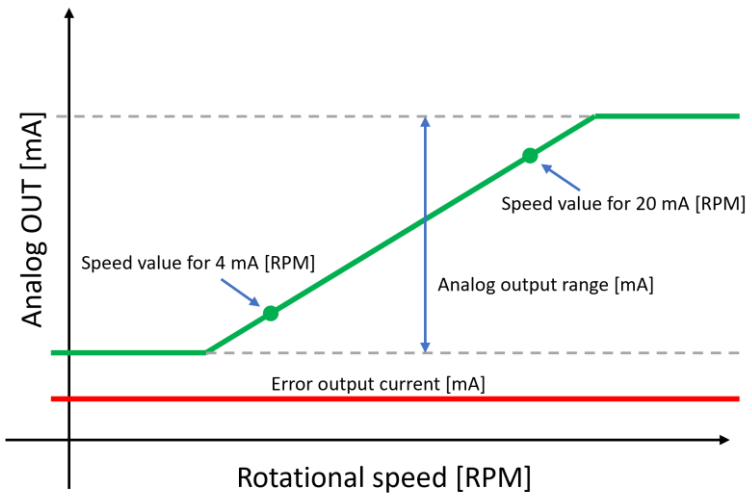
  [INPUT]

  When two pulses occur within the zero speed window, the alarm NOT Zero Speed is raised.

6.5 Process output



The current graph of the analog OUT as shown below can be defined with five values: the speed values for 4 and 20 mA, the two limits of the analog output range and the error output current.



The values can be entered into the Process Output tab.

- **Copy Channel A** (SpeedSys T20 and T30 only)

  [INPUT]

  Allows copying the parameters from Channel A into Channel B and/or Channel C, after doing so the parameters can be modified.
- **Speed value for 4 mA (RPM)**

  [OUTPUT}

  Calibrates the minimum value of the output.
  Note that the output can be configured for the complete range of the application or a split range (e.g., 1,000 – 2,500 RPM).

- **Speed value for 20 mA (RPM)**

  [OUTPUT}

  Calibrates the maximum value of the output.
  Note that the output can be configured for the complete range of the application or a split range (e.g., 1,000 – 2,500 RPM).

- **Analog output range**

  [INPUT]

  The output range defines the possible range of the 4-20 mA output. When exceeding the defined values for the 4-20 range, the output will be limited to the output range values

- **Diagnostic**

  [INPUT]

  When enabled, a diagnostic error will drive the A-out current to the set Error Output Range value.

  When enabling Latching, the error state will be hold until the error is removed and a reset is performed.

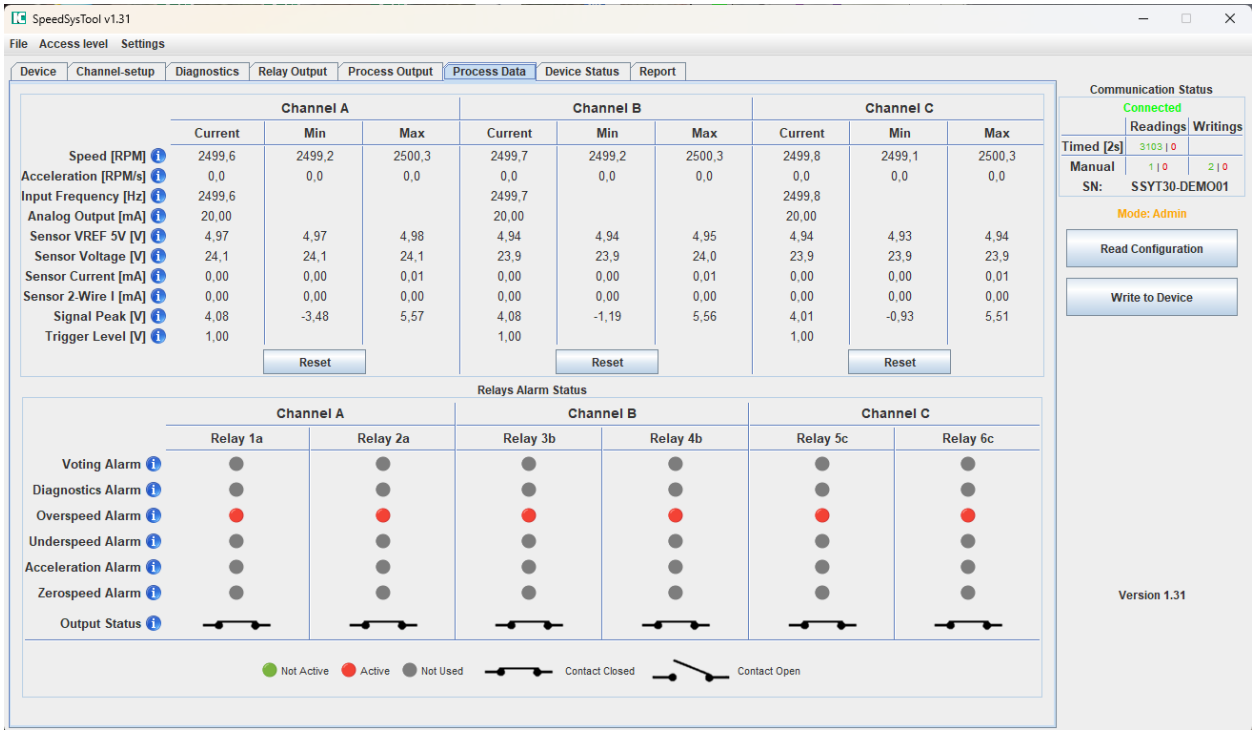
- **Error output current**

  [INPUT]

  The error output current is the output current when a diagnostic error occurs. This can be configured from 2.4 till 3.6 mA.

6.6 Process data

The Process Data tab displays relevant information about the current state of the process parameters as well as the status of the alarm relays. Furthermore, the minimum and maximum measurement values are stored for speed and acceleration.



- **Speed (RPM)**

  [OUTPUT]

  The values are representing the actual, min. and max. values of the speed measurements. The representation of the min. and max. values are the values registered after the last reset command.

- **Acceleration (RPM/S)**

  [OUTPUT]

  The values are representing the actual, min. and max values. of the speed acceleration measurements. The representation of the min. and max. values are the values registered after the last reset command.

- **Input Frequency (Hz)**

  [OUTPUT]

The values are representing the actual frequency measurements.

- **Analog Output (mA)**

  [OUTPUT]

  The values are representing the actual values of the analog output signal.

- **Sensor VREF (V)**

  [OUTPUT]

  The values represent the actual, min. and max. values of the internal comparator circuit and is a direct reference for the measurement accuracy and PSU out of range values. measurements. The representation of the min. and max. values are the values registered after the last reset command.

- **Sensor voltage (V)**

  [OUTPUT]

  The values represent the actual, min. and max. values of the speed sensor supply voltage measurements. The representation of the min. and max. values are the values registered after the last reset command.

- **Sensor Current (mA)**

  [OUTPUT]

  The values represent the actual, min. and max. values of the speed supply current measurements. The representation of the min. and max. values are the values registered after the last reset command.

- **Sensor 2-Wire**

  [OUTPUT]

  The values represent the actual, min. and max. values of the drain current through a MPU at zero speed. This measurement is used for detecting wire breakage. The representation of the min. and max. values are the values registered after the last reset command.

- **Signal Peak**

[OUTPUT]

The values represent the actual, min. and max. values of the measured amplitude of the speed input signal. The representation of the min. and max. values are the values registered after the last reset command.

Note: the peak signal is not absolute, at high and low frequencies it will deviate due to impedance mis match

- **Trigger Level**

  [OUTPUT]

  The values represent the actual, min. and max. values of the used trigger level. The representation of the min. and max. values are the values registered after the last reset command.

- **Reset** (button)

  Clicking the Reset button will clear the min. / max. memories and reset the relays.

- **Voting Alarm (VERSION DEPENDENT)**

  [OUTPUT]

  When the indicator is grey, the function is not active
  When the indicator is green, the function is active but no limits are exceeded.
  When the indicator is red, the function is active and one of the limits is exceeded.

- **Test and Reset**

  [OUTPUT]

  When the indicator is grey, the function is not used
  When the indicator is green, the function is active but no limits are exceeded.
  When the indicator is red the function is used and one of the limits is exceeded.

- **Diagnostics Alarm**

  [OUTPUT]

  When the indicator is grey, the function is not used
  When the indicator is green, the function is active but no limits are exceeded.
  When the indicator is red the function is used and one of the limits is exceeded.

- **Overspeed Alarm**

[OUTPUT]

When the indicator is grey, the function is not used
When the indicator is green, the function is active but no limits are exceeded.
When the indicator is red the function is used and one of the limits is exceeded.

- **Underspeed Alarm**

  [OUTPUT]

  When the indicator is grey, the function is not used
  When the indicator is green, the function is active but no limits are exceeded.
  When the indicator is red the function is used and one of the limits is exceeded.

- **Acceleration Alarm**

  [OUTPUT]

  When the indicator is grey, the function is not used
  When the indicator is green, the function is active but no limits are exceeded.
  When the indicator is red the function is used and one of the limits is exceeded.

- **Zero Speed Alarm**

  [OUTPUT]

  When the indicator is grey, the function is not used
  When the indicator is green, the function is active but no limits are exceeded.
  When the indicator is red the function is used and one of the limits is exceeded.

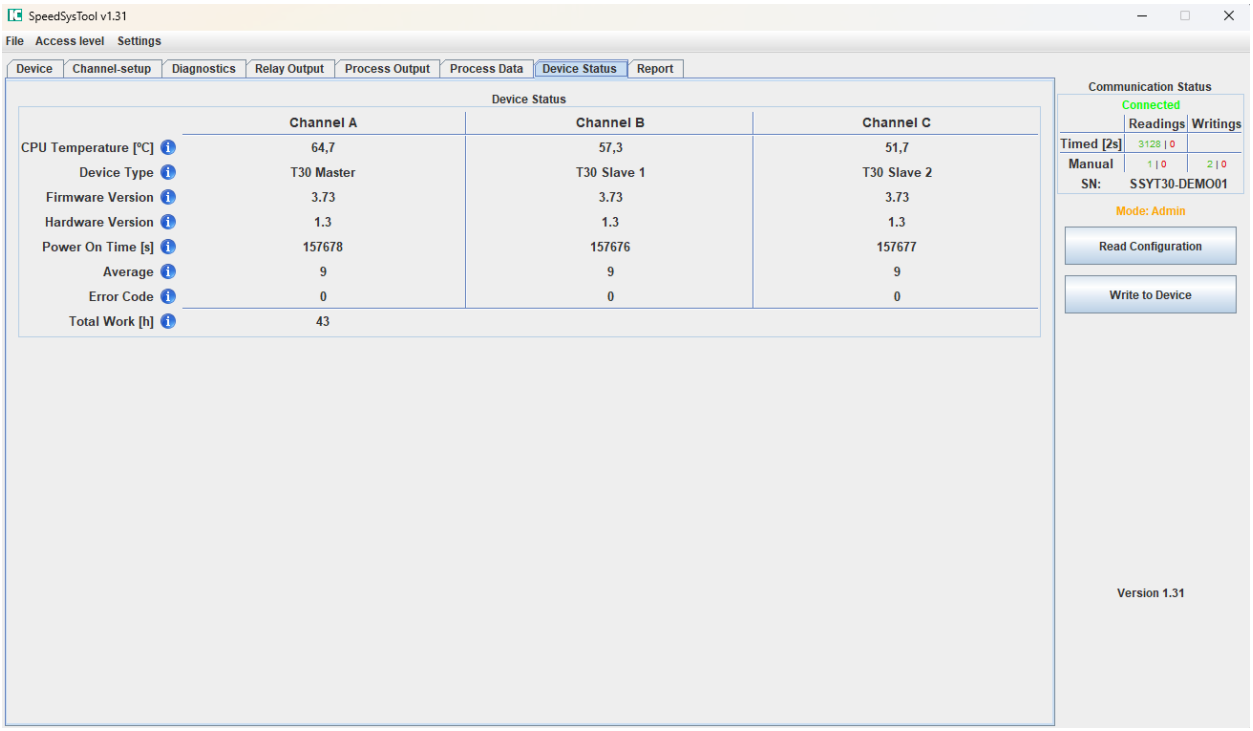
- **Output Status**

  [OUTPUT]

  The output status is representing the relay status. The status is based on the alarm status of one or more coupled functions and the inverse (energised normally closed) or not inverse (de-energised normally open).

6.7 Device status

The Device Status tab displays real-time information on different parameters. The CPU temperature, operating hours, and other relevant parameters for commissioning service, are displayed on this tab.



- **CPU Temperature**

  [OUTPUT]

  Actual CPU temperature.

- **Device Type**

  [OUTPUT]

  Device type shows the type of SpeedSys Tx0 that is connected.

- **Firmware Version**

  [OUTPUT]

  The Firmware version shows the FW version of the connected device.

- **Hardware Version**

  [OUTPUT]

The Hardware version shows the HW version of the connected device.

- **Power On Time**

  [OUTPUT]

  The power-on time is the time passed since the unit is switched on. This value resets to 0 after each power cycle.

- **Average**

  [OUTPUT]

  The average value shows the number of averages that is performed within the measuring time.

- **Error Code**

  [OUTPUT]

  ERROR_CODE_NO_ERROR 0x0000
  ERROR_CODE_SENS_I_MAX 0x0001
  ERROR_CODE_SENS_I_MIN 0x0002
  ERROR_CODE_SENS_V_MAX 0x0004
  ERROR_CODE_SENS_V_MIN 0x0008
  ERROR_CODE_VREF5V_MAX 0x0010
  ERROR_CODE_VREF5V_MIN 0x0020
  ERROR_CODE_CPU_TEMP_MAX 0x0040
  ERROR_CODE_CPU_TEMP_MIN 0x0080
  ERROR_CODE_WIRE_BREAKAGE 0x0100

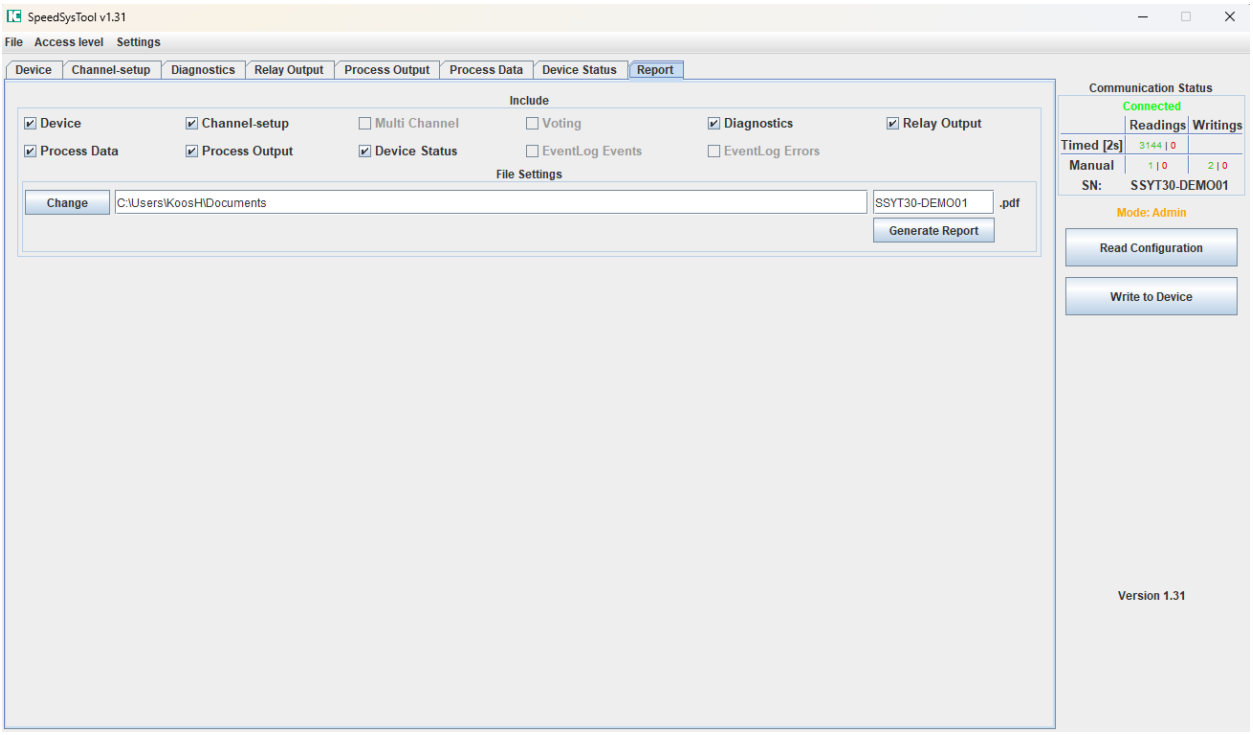
Note: Each code is unique. When multiple codes occur at the same time. The unique codes can be derived from combined code. SENS_I_Max (0x0001) and CPU_TEMPM_MAX (0x0040) will generate error code 0x0041.

- **Total Work**

  [OUTPUT]

  The total work is the accumulated Power on Time since the unit was installed.

6.8 Report



- **Device check box**
  Includes the information from the Device tab into the report.

- **Channel Setup check box**
  Includes the information from the Channel Setup tab into the report.

- **Diagnostics check box**
  Includes the information from the Diagnostics tab into the report.

- **Relay Output check box**
  Includes the information from the Relay Output tab into the report.

- **Process Output check box**
  Includes the information from the Process Output tab into the report.

- **Process Data check box**
  Includes the information from the Process Data tab into the report.

- **Device Status check box**
  Includes the information from the Device Status tab into the report.

- **Generate Report**
  Pressing Generate report will print the report into a PDF file.

Partial Report Example

SpeedSys Configuration Report

Device - Network

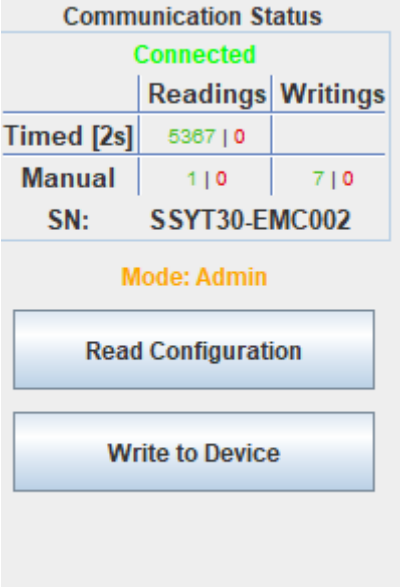
Network Type	Ip Address	Ip Subnet Mask	Default Gateway	Device Name
Static	192.168.1.109	255.255.255.0	192.168.1.1	SSYT30-DEMO01

Device - Configuration

Properties	Channel A	Channel B	Channel C
Location Tag	LOCATION A	LOCATION B	LOCATION C
Machine Tag	MACHINE A	MACHINE B	MACHINE C
Device Tag	DEVICE TAG A	DEVICE TAG B	DEVICE TAG C
Device Comment	DEVICE COMMENT A	DEVICE COMMENT B	DEVICE COMMENT C

6.9 Saving a configuration on to the SpeedSys Tx0

After configuring all parameters, the configuration must be written to the device. This is done by clicking on the Write to Device button and clicking OK in the prompt.



6.10 Status LEDs

The front panel of the SpeedSys has two LEDs per channel. See the table below for a detailed description of their status.

LED	Status	Description
Relay LED (yellow)	On	Relay 1 **and** Relay 2 switched
	Flashing	Relay 1 **or** Relay 2 switched
System LED (green)	On	Unit is powered
	Flashing	System error (see Diagnostics tab)

7 Service

HAZARD: The circuits inside the device must not be accessed. Do not repair the device yourself but replace it with an equivalent device. Repairs may only be carried out by the manufacturer.

7.1 Spare parts

Non listed.

7.2 Contact information.

Istec International
Meer en Duin 8
2163 HA LISSE
NETHERLANDS

+31 (0)252 433 400
www.istec.com

7.3 Questions and support.

We are ready to help you!
Visit www.istec.com/support

8 Technical information

8.1 Labels and certifications

Power supply: 24 V_{DC} (18.-.31.2 V_{DC}), max. 160 mA

Instrument earth connection (functional earth)

The manufacturer declares that the product conforms to the applicable standards.

The manufacturer declares that the product conforms to the applicable standards

The manufacturer declares that the product conforms to the applicable RoHS 2 directive 2011/65/EU.

Type Approved product DNV (serial number SSYTx0-002200 and up).

8.2 Product identifiers

MFR	H7368
Model	SSYTx0-000-00x
SER	SSYTx0-xxxxxx
PNR	ISTSSYTx0

8.3 Specifications

Please consult the datasheet for system specifications.