istec

SpeedSys® T10
SpeedSys® T11
SpeedSys® T20
SpeedSys® T30

Speed monitoring systems

Manual

MAN_SSYTxx_202510V2.0.0

MAN_SSYTxx_202512V1.70-2

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
1.70-2	Approved	Update T11 rear label and AO+/- labelling
1.70-1	Approved	Textual corrections
1.70	Approved	Updated Display control
1.69 T11	For Approval	Added T11 Help Text
1.67-T11	For Approval	Added T11 functionality
1.67	Release	Changed zero speed control status to blue. Added error log explanation and clarification, Added T11
1.65	Release	Changed configuration structure, updated help files, added diagnostic delay time
1.42	Release	Distinction between T10, T20 and T30 in error and config files introduced

Approval

1.70-2	26-11-2024	K Hemmes		L van Ruiten	26-11-2024	
1.70-1	07-11-2024	K Hemmes		L van Ruiten	07-11-2024	
1.70	01-10-2024	K Hemmes		L van Ruiten	01-10-2024	
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1.42	22-08-2023	K Hemmes		W Verschuren	22-08-2023	
revision	**date**	**prepared**	**approved**	**checked by**	**date**	**approved**

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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 Txx 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 Txx

SpeedSys Txx 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.

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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® T11
- 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 T11

- SpeedSys T11 module
- 1 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.

SpeedSys T11 is a 1-channel device with display that offers sensor signal conditioning, speed monitoring functions, highly accurate analog signal for further processing and fast responding relays.

2.2 Concept

The SpeedSys Txx 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 T11 is a 1-channel device with display that offers sensor signal conditioning, speed monitoring functions, highly accurate analog signal for further processing and fast responding relays.

Note: In the manual, T11 functions are restricted to channel A Function 1A only

- 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.

2.3 Application

SpeedSys Txx 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 Txx 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	95%. Condensation to be avoided.	
Ingress protection	IP20 according to IEC 60529	

3 Mounting and installation

3.1 Module details

3.1.1 Tx0

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.

3.1.2 T11

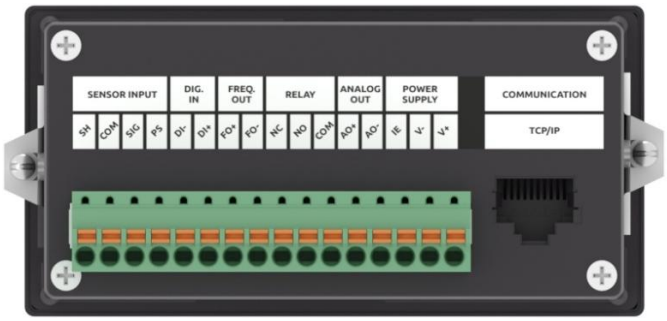
The top side sticker of the module has connections the product label. frequency output (FO) and digital input (DI) on the middle row, and sensor input on the front row.

The rear has connections for power and grounding, relay (1), analog out (AO), frequency output (FO) and digital input (DI) and sensor input.

The front panel contains basic information about the functions and displays the measured value.

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.

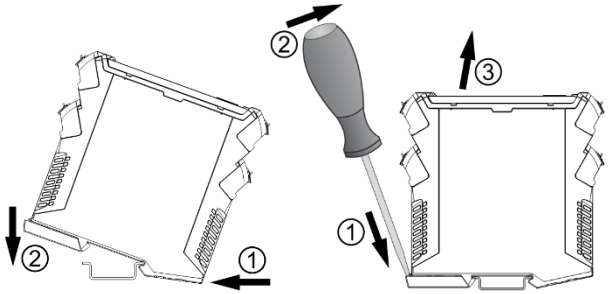


The connections for all I/O are on the rear side.

3.2 Module dimensions and installation

3.2.1 Tx0

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).

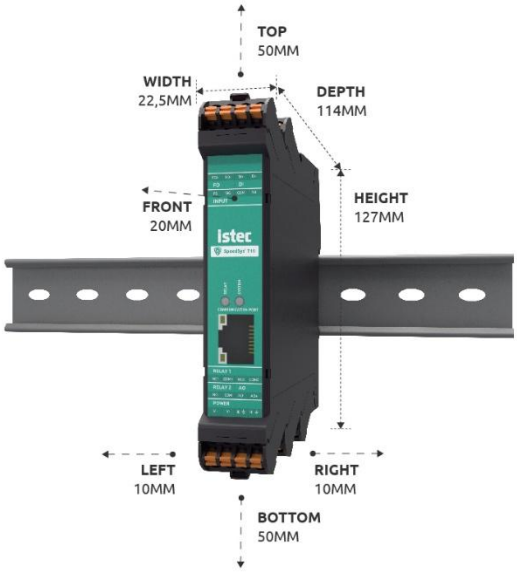


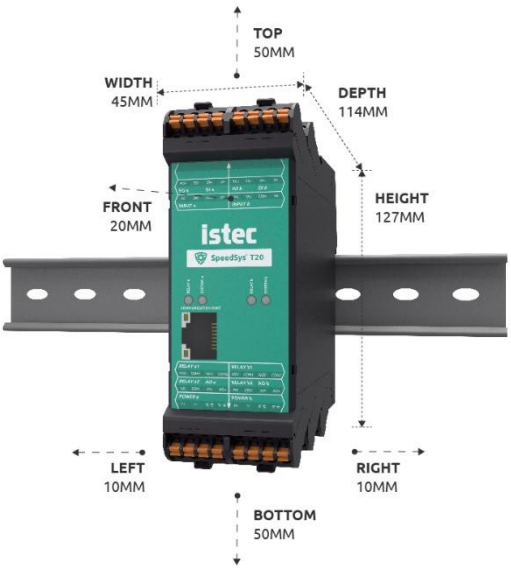
Mounting (left) and demounting (right) of the unit.

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.

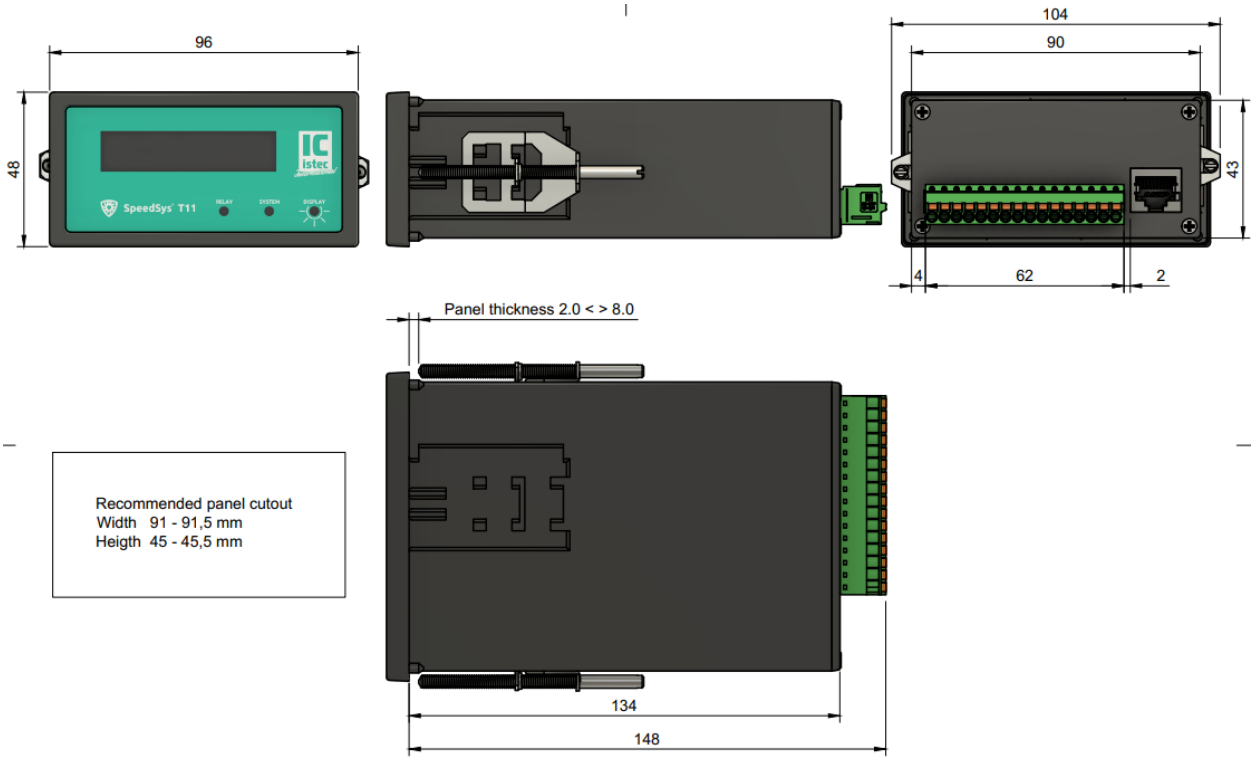
Observe the minimum clearances as shown in the figures below to allow for sufficient cooling.





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.

3.2.2 T11

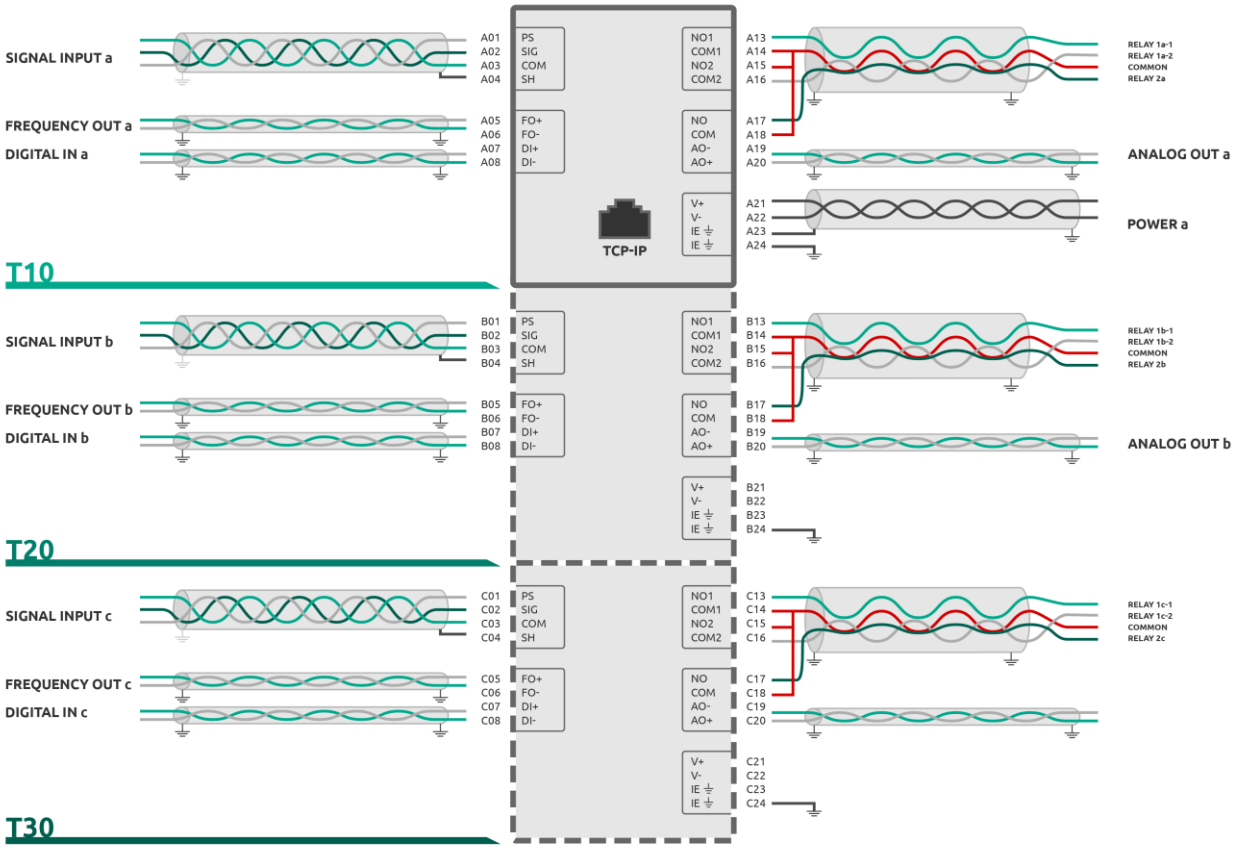

96
48
104
90
43
4
62
2
Panel thickness 2.0 < > 8.0
134
148
Recommended panel cutout
Width 91 - 91,5 mm
Heigth 45 - 45,5 mm

3.3 Connection diagram

3.3.1 Tx0

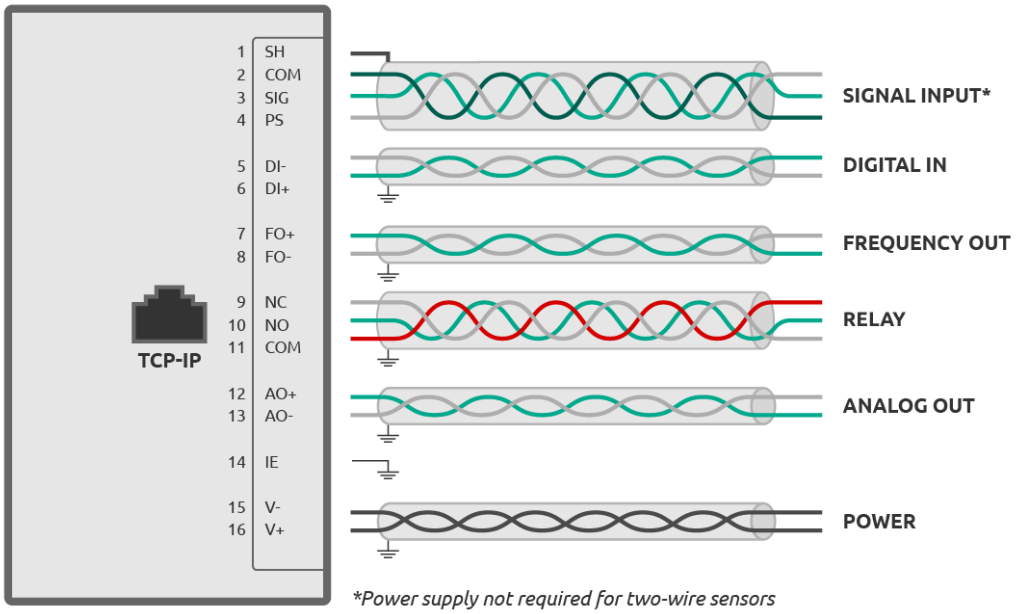
The figure below shows the electrical interfaces for the product. The sensor inputs are short circuit proof.

Observe the information in the datasheet before connecting electrical interfaces.



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

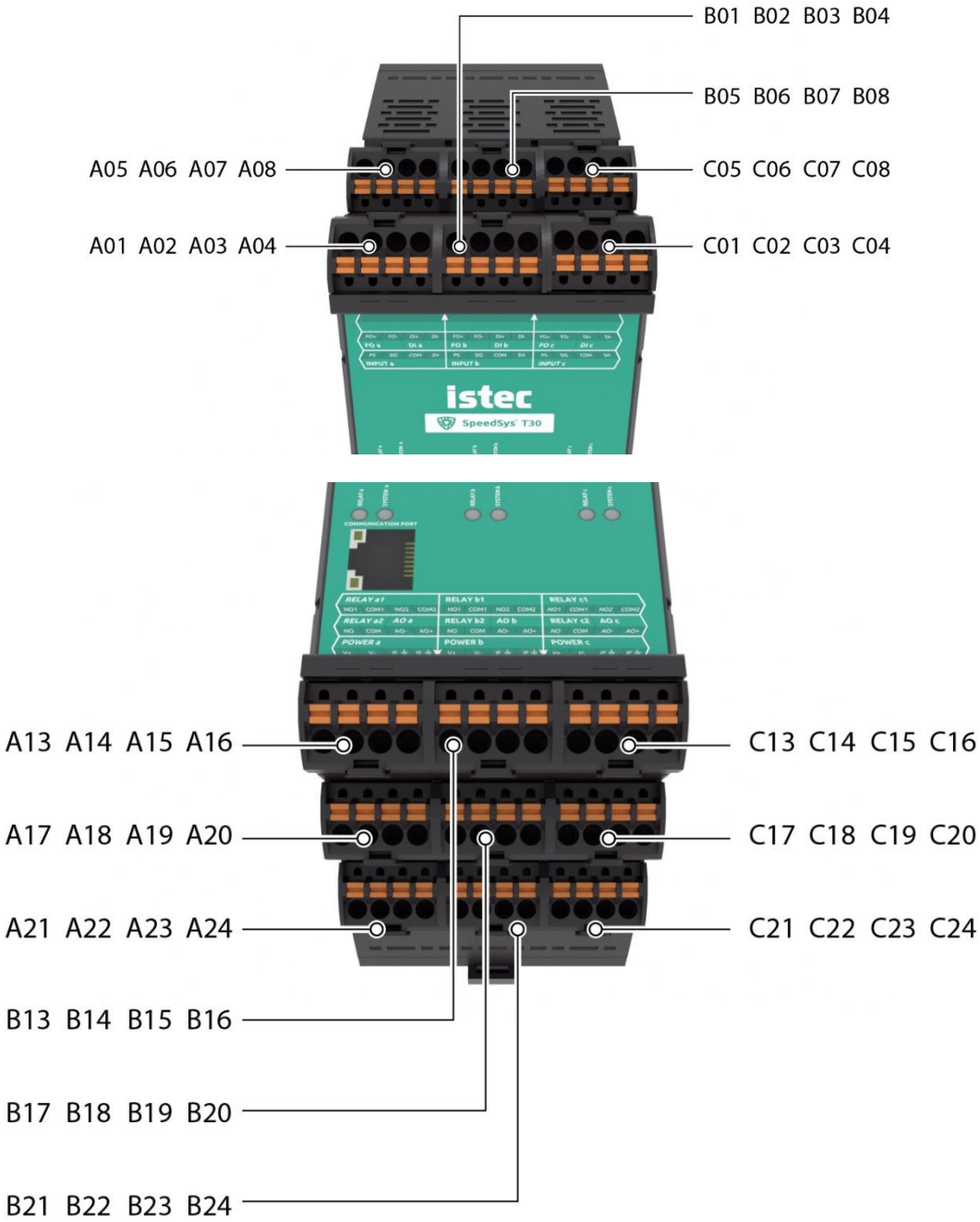
3.3.2 T11



**Power supply not required for two-wire sensors*

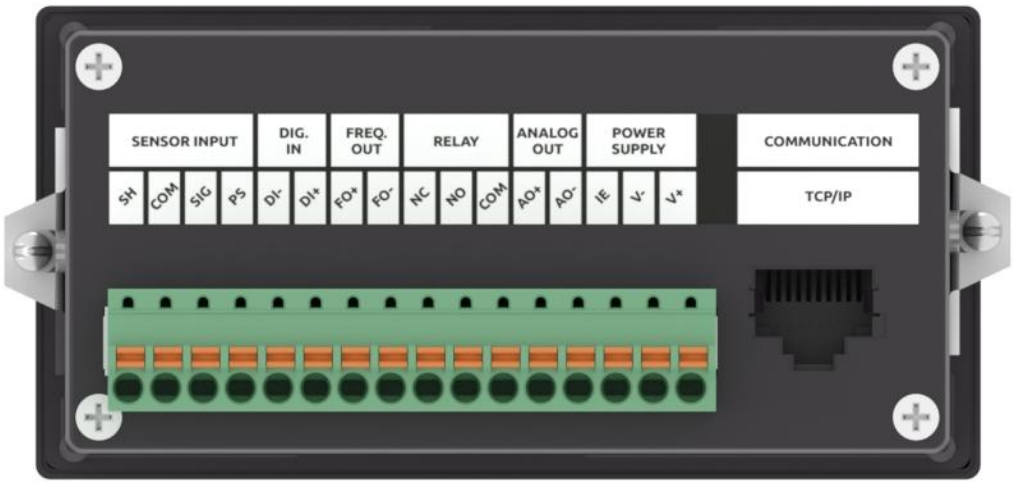
3.4 Connector arrangement

3.4.1 Tx0



3.4.2 T11

Rear view left to right.



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 Txx 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 Txx 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

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 ≤ 100 m: minimal 0.50 mm²
Cable length > 100 m: minimal 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 Txx 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 Txx 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 Txx in the software, the computer and SpeedSys Txx will have to be in the same IP range and have suitable subnet masks.
The SpeedSys Txx 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 Txx.
  Example:

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

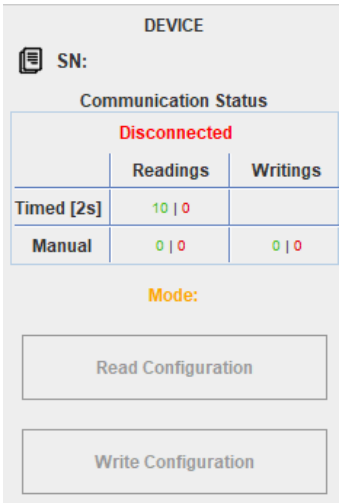
- Run the software by double clicking the icon.
  Note: Some anti-virus suites may block or require additional approvals to run third-party applications.

Note: The SpeedSys Txx 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]**

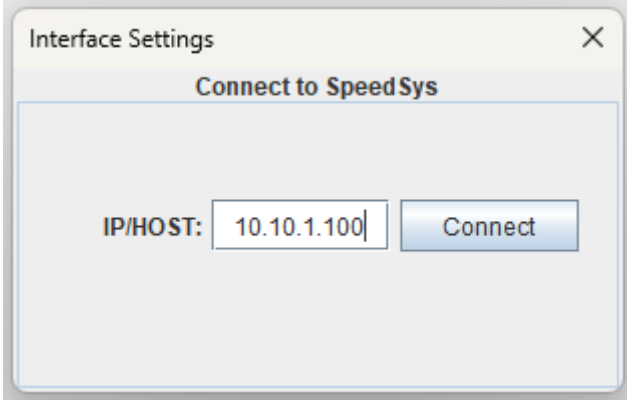
Note: In case the IP address is forgotten or cannot be retrieved the unit will no longer be accessible. To reset the IP address to its default value , first ensure that no speed is present during this procedure. Then supply 10 pulses between 0.2 and 0.5 seconds to the Digital Input , within a time window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

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

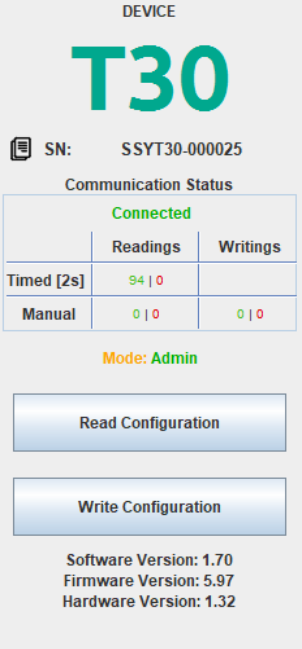


Note: The Input and Config counters will increase the green digit for each successful connection and red for each connection that failed.

- 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.



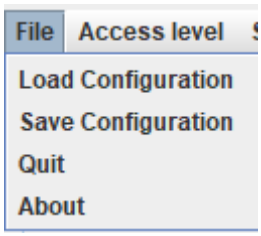
The SpeedSysTool will automatically load the configuration of the current connected Speedsys Txx module.

5 Menu and Tab functions

5.1 File menu

[Load Configuration] & [Save Configuration]

Loading and saving configuration files in the SpeedSys Txx 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.

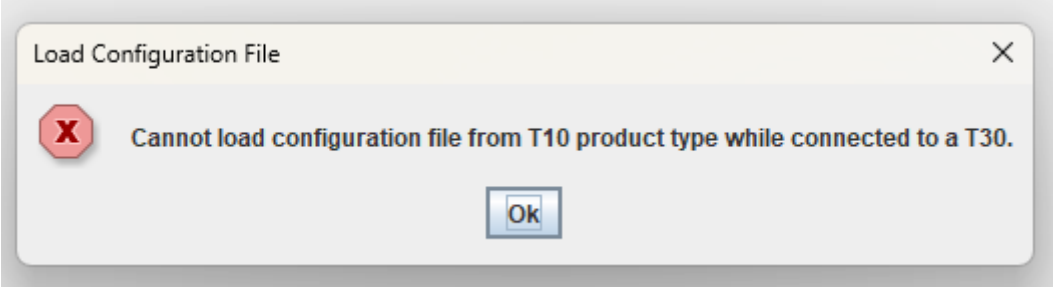


To save the configuration that is currently programmed on a unit, it is essential to first click the "Read Configuration" button. This will ensure that the current configuration is displayed before saving it to a file.

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

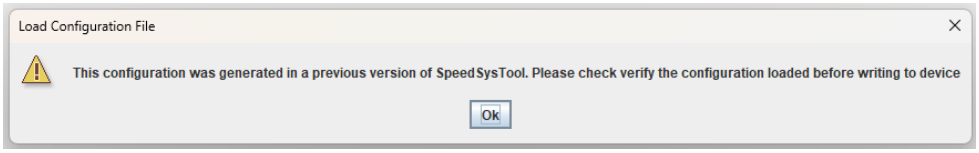
Note: the unit will reset itself when writing a new configuration. E.g., errors will be cleared and latched relays will be released.

When a mismatch occurs between the T10, T11, T20, T30 config file to load and the module connected to the SpeedSysTool and error will be generated. Only a matching configuration can be loaded.



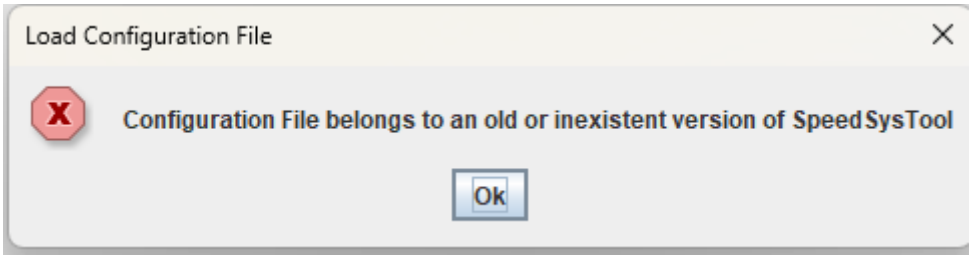
When a mismatch occurs between the SpeedSysTool and the FW on a connected unit.

Warning Message:



When a mismatch occurs between the SpeedSysTool and the version of a configuration file.

Error Message:

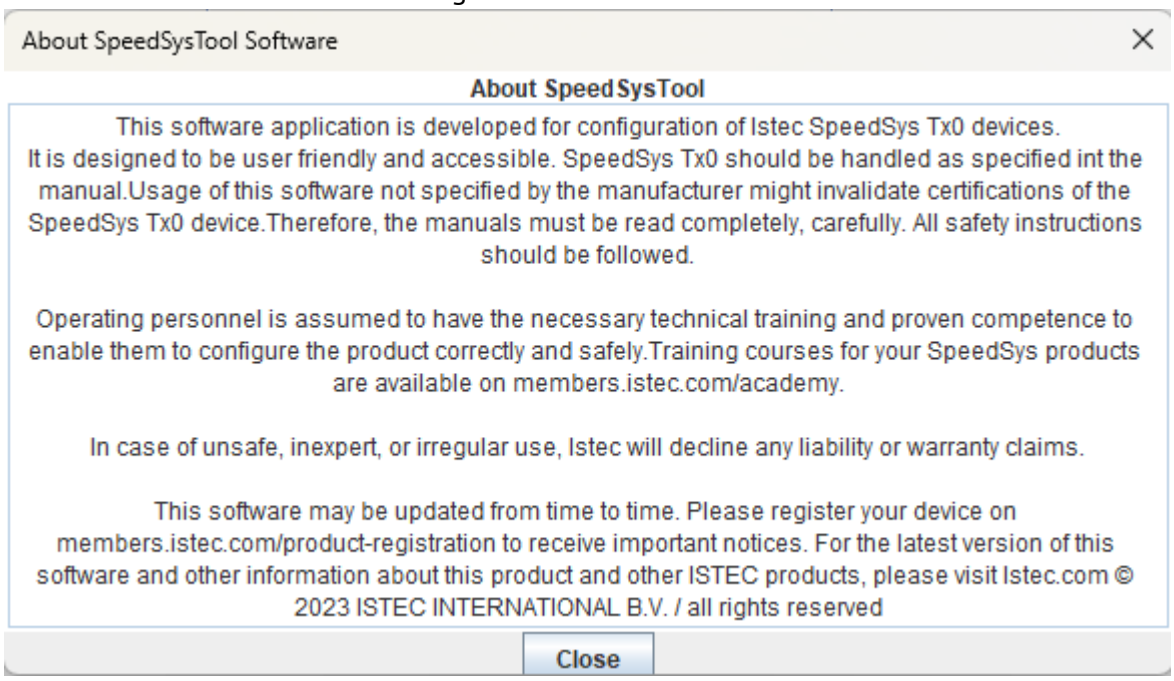


[Quit]

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

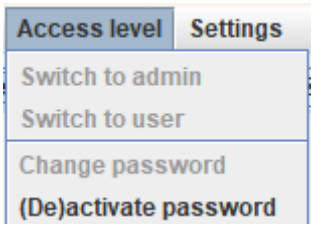
[About]

The About function contains following information:



5.2 Access Level menu

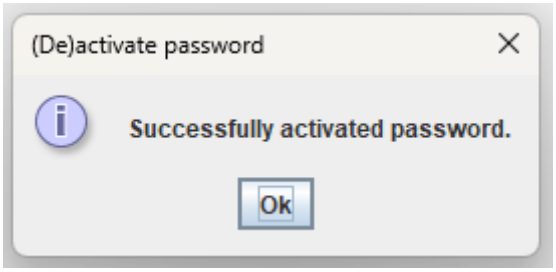
The user status can be elevated, by clicking Access level.

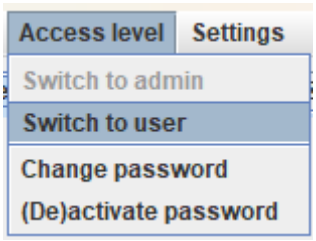


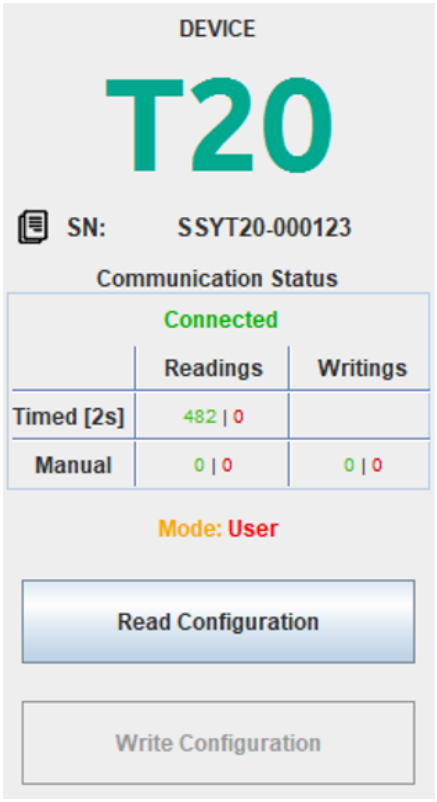
After selecting Admin and by entering the password. The default password to switch on the user level is “#01000”.

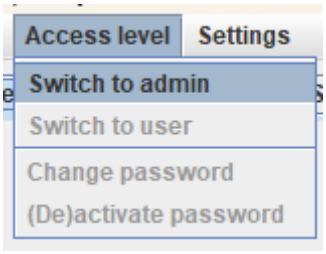
Note: the programming mode is by default Admin.

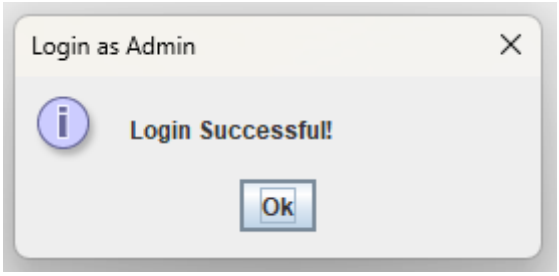
Note: The default password is “#01000”

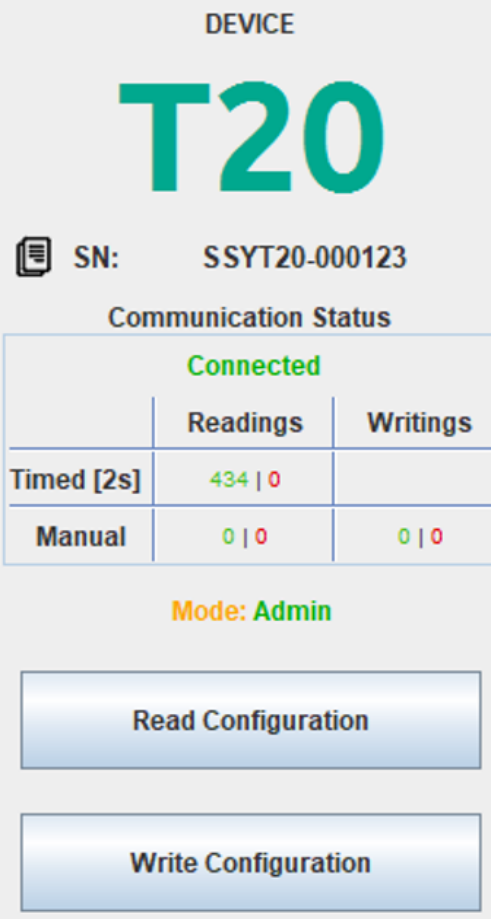





DEVICE
T20
SN: SSYT20-000123
Communication Status
Connected
Readings
Writings
Timed [2s]
482 | 0
Manual
0 | 0
0 | 0
Mode: User
Read Configuration
Write Configuration


Access level
Settings
Switch to admin
Switch to user
Change password
(De)activate password


Login as Admin
Login Successful!
Ok



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

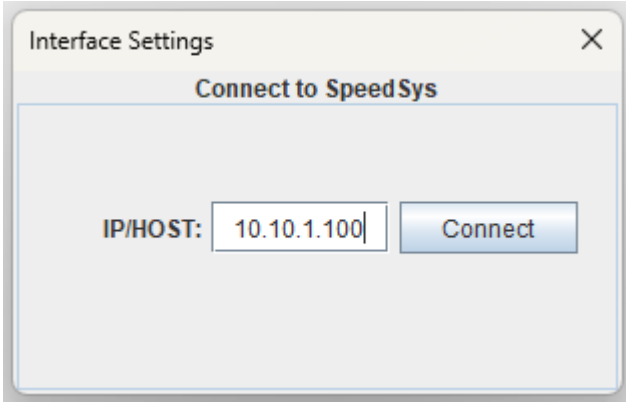
Changing the password after the first login is highly recommended. The admin password can be set only with admin level permissions. If the admin password is lost, the device must be returned to the manufacturer.

Note: the password is stored on the Txx 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 Txx must be entered. After selecting “Connect”, the unit will connect to the SpeedSys Txx.

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

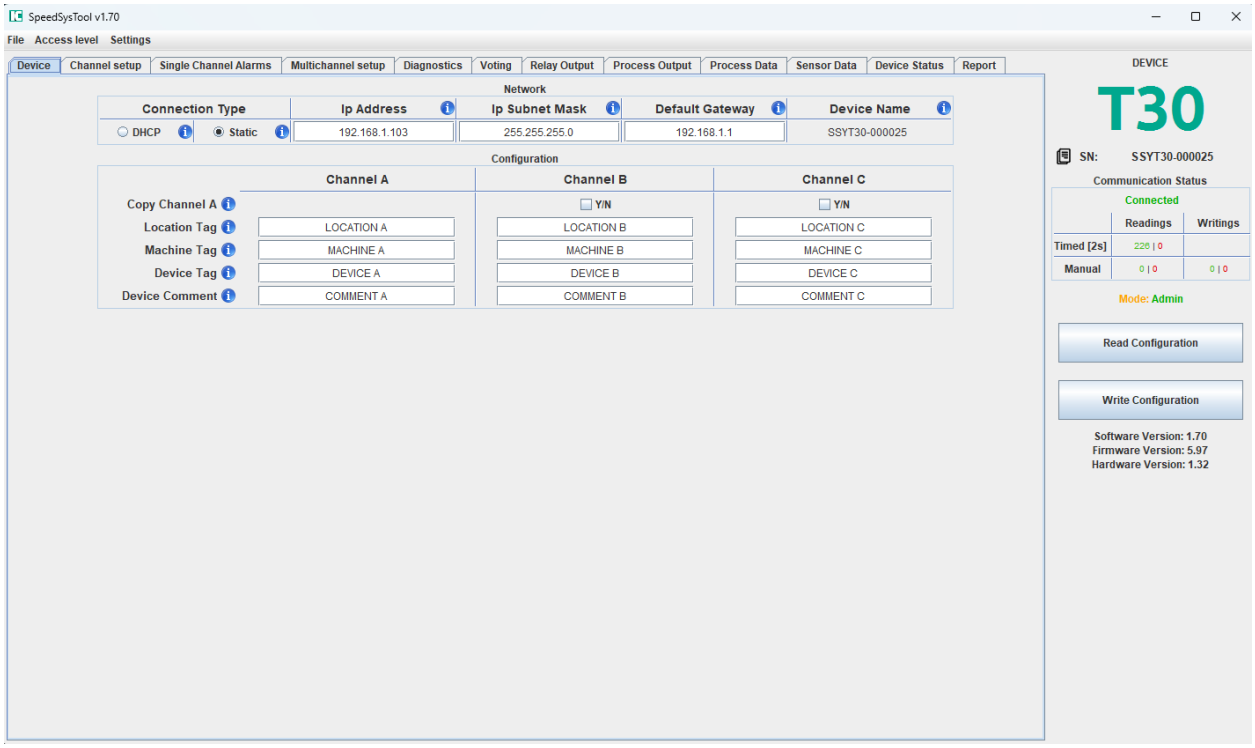
6 Commissioning

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]

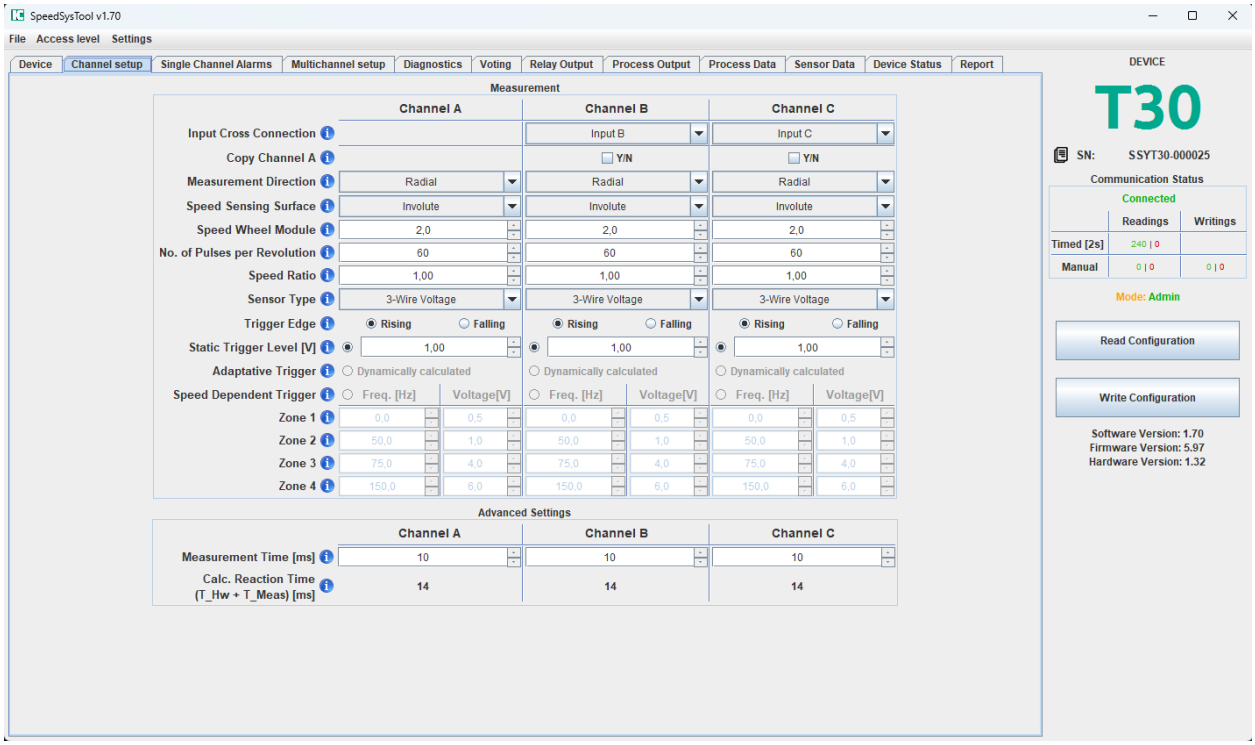
  The Device Comment Tag is a text input used for documentation purpose only.

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/T11. For SpeedSys T20 channel A and B are accessible and for SpeedSys T30 channel A, B and C are accessible.



Note: the input signals are decoupled at the input providing a better signal to noise ratio. As a result, the signal is superimposed as an AC signal around an off-set. The actual internal triggering is based on this offset.

However, the trigger value entered represent the trigger level as if the decoupling did not take place and is re-calculated to the actual internal trigger level.

Measurement

- **Input Cross Connection**

  [INPUT]

  (SpeedSys T20 and T30 only)

  Allows to link channel B and/or C to input A, Signal condition is then only performed on channel A, the conditioned signal is then routed over the internal bus to channel B and or C. Function like sensor selection and trigger options are not functioning anymore.

Note it is not possible to couple Chaneel B to input C or vice versa.

- **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.

Note: Speed Ratio is a function supported from FW 5.97 and up, when connected to pervious FW versions, The value is set to 1 and can not be changed. Previous this field was used for nominal speed and a text input only.

- **Speed Ratio.**

  [INPUT]

  [Range Min 0,01 / Max 1500]
  [Default 1,00]

  The speed ratio (often denoted as = R or SR) is defined as the ratio of the speed of the input shaft (driving shaft) to the speed of the output shaft (driven shaft). Mathematically, it is expressed as:

  Speed Ratio=Speed of Input Shaft / Speed of Output Shaft

  Alternatively, it can also be represented in terms of gear teeth numbers:

  Speed Ratio = Number of Teeth on Output Gear / Number of Teeth on Input Gear

- **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, PNP type proximity switches. Selecting it allows for fixed triggering only.

  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.

  NPN Proximity switches, this function automatically enables the internal pull up function. Selecting it allows for fixed triggering only.

- **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**

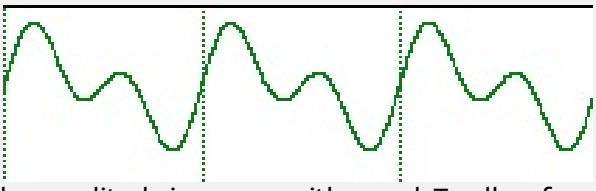
  [Input Frequency]

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

[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.

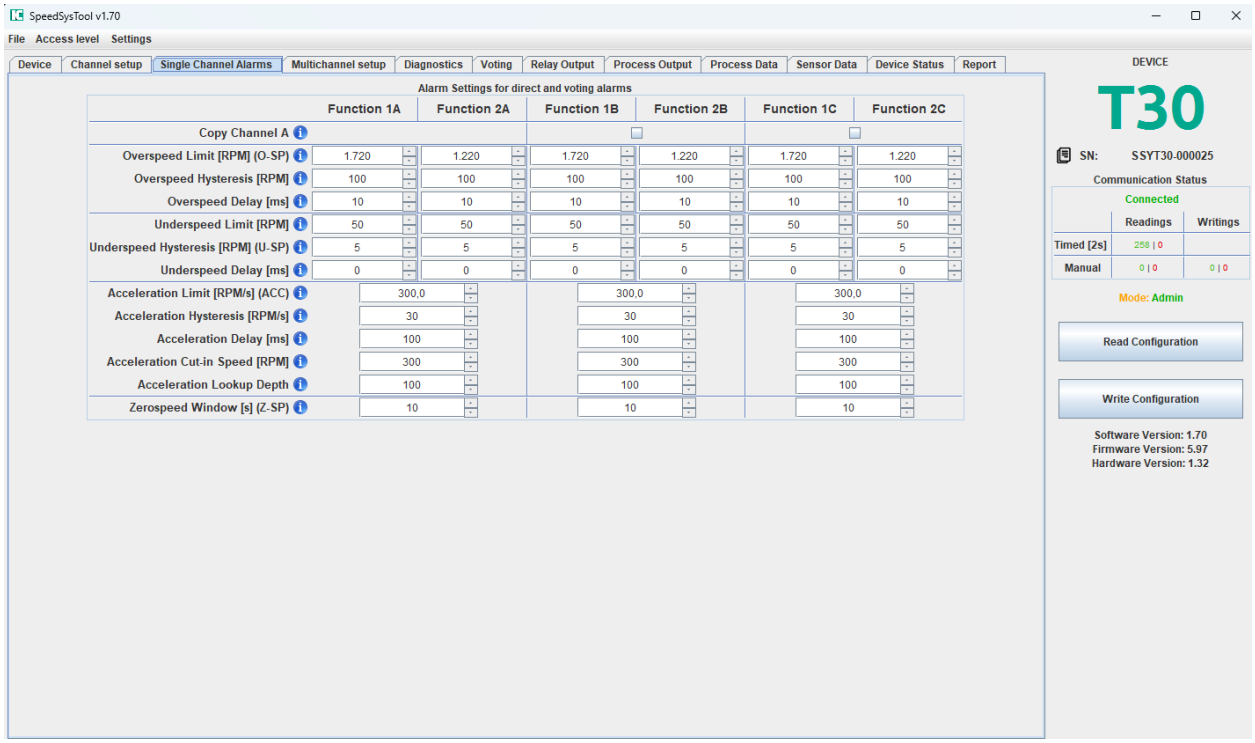
E.g., T_m = 10 ms and the period T_p for the signal is 100 ms (10 Hz), no averaging will take place. since T_p >. T_m. For a signal with a frequency of 1 kHz T_p = 1ms. The averaging will then increase automatically increase, to 10 since T_p <. T_m and T_m/ T_p = 10.
The advantage is that the system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

- **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.

6.3 Singel Channel Alarms



In the menu tab Singel Channel Alarms the settings and limits for use in the voting and Relay Output are configured. Based on the T10/T11, T20 or T30 fields are accessible or not.

Note: T11 only supports Function 1A setting

For Overspeed and underspeed the Function 1(A/B/C) and Function 2(A/B/C) can be configured individually. For the remaining function only one set-point can be configured

- **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.

Overspeed (O-SP)
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 (U-SP)
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 un-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. (ACC)
(Note: version dependent).
Acceleration is defined by the rate of change of the speed per second (RPM/s). Speed acceleration.
T20-T30 Only

- **Acceleration limit**

  [INPUT]

  When the limit for acceleration overspeed has been violated, the alarm signal automatically latches.
  T20-T30 Only

- **Acceleration hysteresis**

  [Input]

  A latched underspeed limit will be reset when the speed rises above the limit value plus the hysteresis value.
  T20-T30 Only

- **Acceleration delay**

  [Input]

  T20 and T30 only
  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. (T20, T30 Only)**

  [INPUT]

  T20-T30 Only
  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.

  Acceleration calc. averaging.

  [INPUT]

  T20 – T30 Only
  The function is currently disabled and intended for future use.

- **Acceleration lookup depth.**

  [INPUT]

  T20 – T30 Only
  The Acceleration lookup dept defines the number of samples used to calculate the acceleration value. The larger the number, the more stable the reading will be. However, the time to detect the acceleration value will be delayed. For each application an optimum needs to be established.

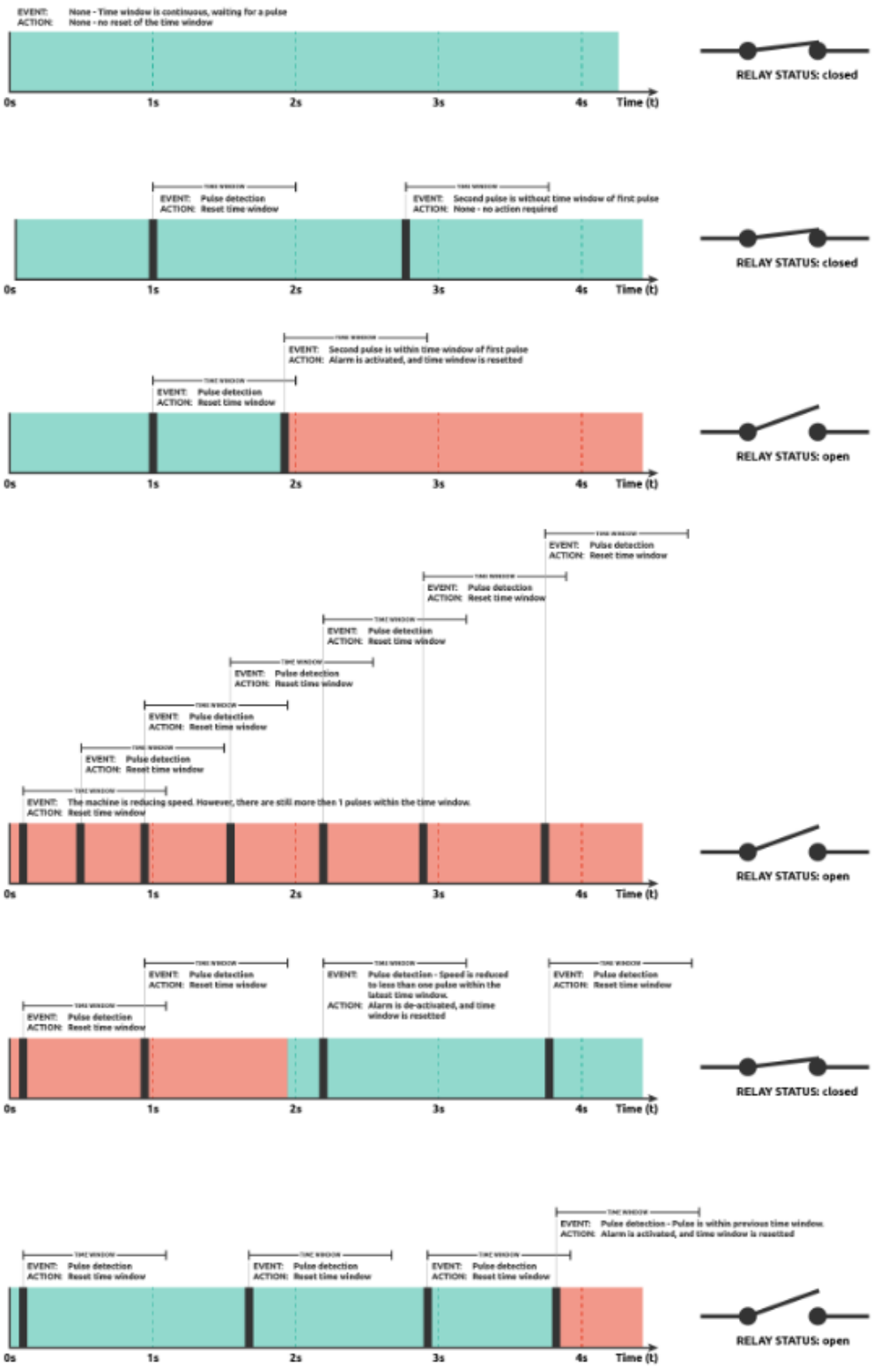
  - **Acceleration lookup factor**

  [INPUT]

  T20 – T30 Only
  The function is currently disabled and intended for future use.

Zero speed (Z-SP).
The zero speed function allows to detect standstill or creep of rotating equipment. When within a time window more than one pulse occurs, the machine is regarded to rotate and the zero speed function will become into its alarm state (unsafe condition) When one or zero pulses are detected within the time window the alarm will be deactivated and the situation will be regarded as safe.

Note: Zero Speed is regarded a control function and therefore, great care must be taken when combining Zero Speed with functions like Overspeed or Under Speed since these functions based on the intended functionality can collide with the intended function of the Zero Speed.


EVENT: None - Time window is continuous, waiting for a pulse
ACTION: None - no reset of the time window
0s
1s
2s
3s
4s
Time (t)
RELAY STATUS: closed
EVENT: Pulse detection
ACTION: Reset time window
EVENT: Second pulse is without time window of first pulse
ACTION: None - no action required
RELAY STATUS: closed
EVENT: Second pulse is within time window of first pulse
ACTION: Alarm is activated, and time window is resetted
RELAY STATUS: open
EVENT: The machine is reducing speed. However, there are still more then 1 pulses within the time window.
RELAY STATUS: open
EVENT: Pulse detection - Speed is reduced to less than one pulse within the latest time window.
ACTION: Alarm is de-activated, and time window is resetted
RELAY STATUS: closed
EVENT: Pulse detection - Pulse is within previous time window.
RELAY STATUS: open

- **Zero speed windows**

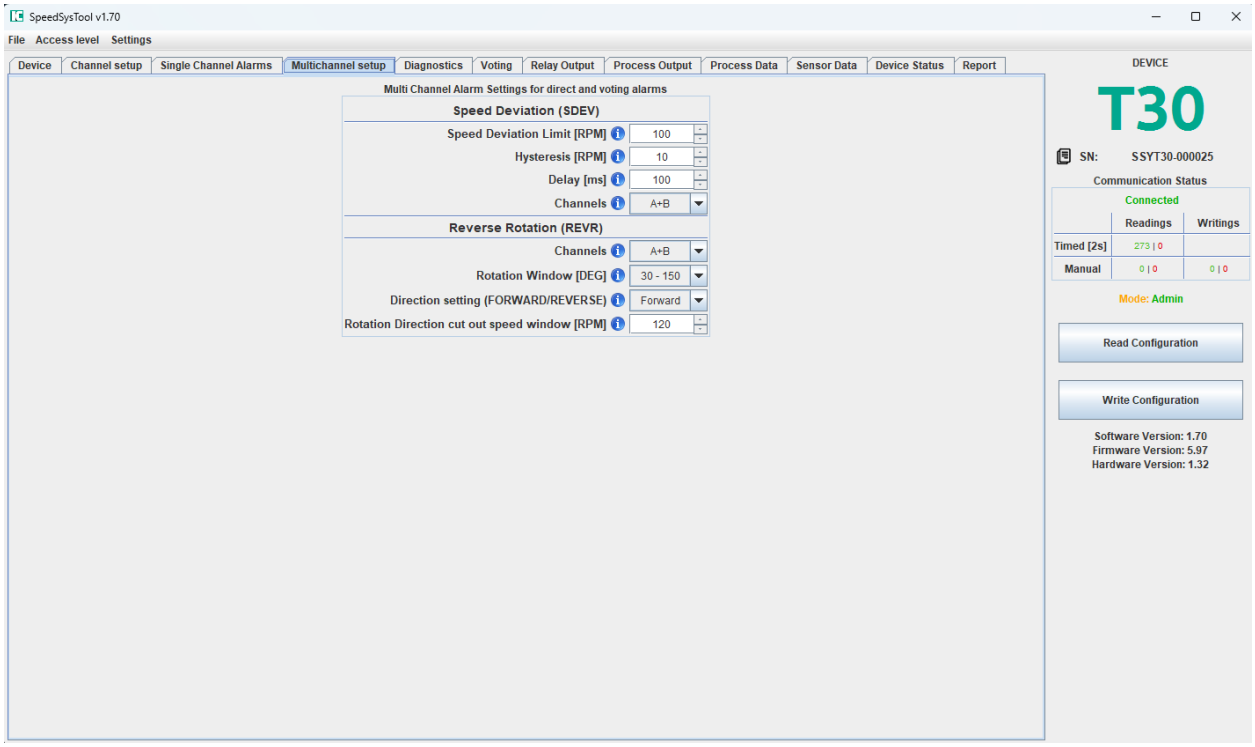
  [INPUT]

  T20-T30 Only
  When two pulses occur within the zero speed window, the alarm NOT Zero Speed is raised.

Note: zero-speed protection is intended to prevent the engagement of e.g. the torn engine at speeds where it is not designed for. This is important to avoid damage to the engine components and ensure a safe start-up procedure.

Note: zero-speed protection can conflict with other alarm functions when assigned to the same output relay. It is advice to test the output functionality if multiple functions are together with the zero speed function are assigned to one output relay.

6.4 Multi Channel setup



- **Speed Deviation Limit Active.**

  [INPUT]

  T20-T30 only
  Selecting the tick box activates the speed deviation function.

- **Speed Deviation Limit [RPM].**

  [INPUT]

  T20-T30 only
  The limit defines the maximum spread between the channels selected under the Channels

- **Hysteresis [RPM].**

  [INPUT]

  T20 – T30 Only
  A un-latched Speed Deviation Limit will be reset when the deviation drops below the limit value minus the hysteresis value.

- **Delay [ms].**

[INPUT]

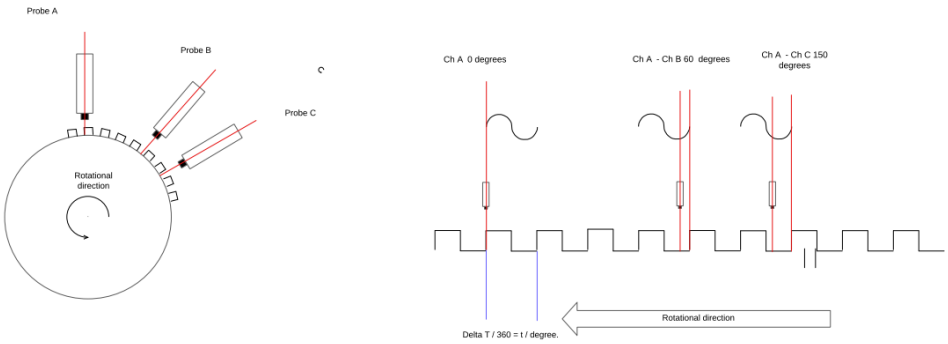
T20 – T30 Only
The delay slows down the response of the output of the function by the duration of the programmed time, this time is added to the total reaction time of this function. Note: that the alarm is only initiated if the alarm conditions are continuously met during this time frame of the delay.

- **Channels.**

[INPUT]

T20 – T30 Only
With the field channels, the inputs for comparing are selected. T20, A+B, T30 A=B, B+C, C+A or A=B+C

Reverse Rotation (REVR).



Note: T20-T30 only.

- **Channels.**

[INPUT]

T20 – T30 Only
With the field channels, the inputs for comparing are selected. T20, A+B, T30 A+B, B+C, C+A

- **Rotation Window [DEG].**

[INPUT]

Selection (30-150) or (210-330)

T20-T30 only
The Rotating Window defines the difference between the angles that are allowed for detecting Reverse Rotation. When the Angels are outside the selected window, Reverse Rotation can not be detected.

- **Direction setting (Forward/ Reverse)**

[INPUT]

Selection (FORWARD) or (REVERSE)

T20-T30 only
Forward or reverse is a label that is attached to define which rotation direction is regarded as the safe condition (forward) and the alarm (reverse) condition.

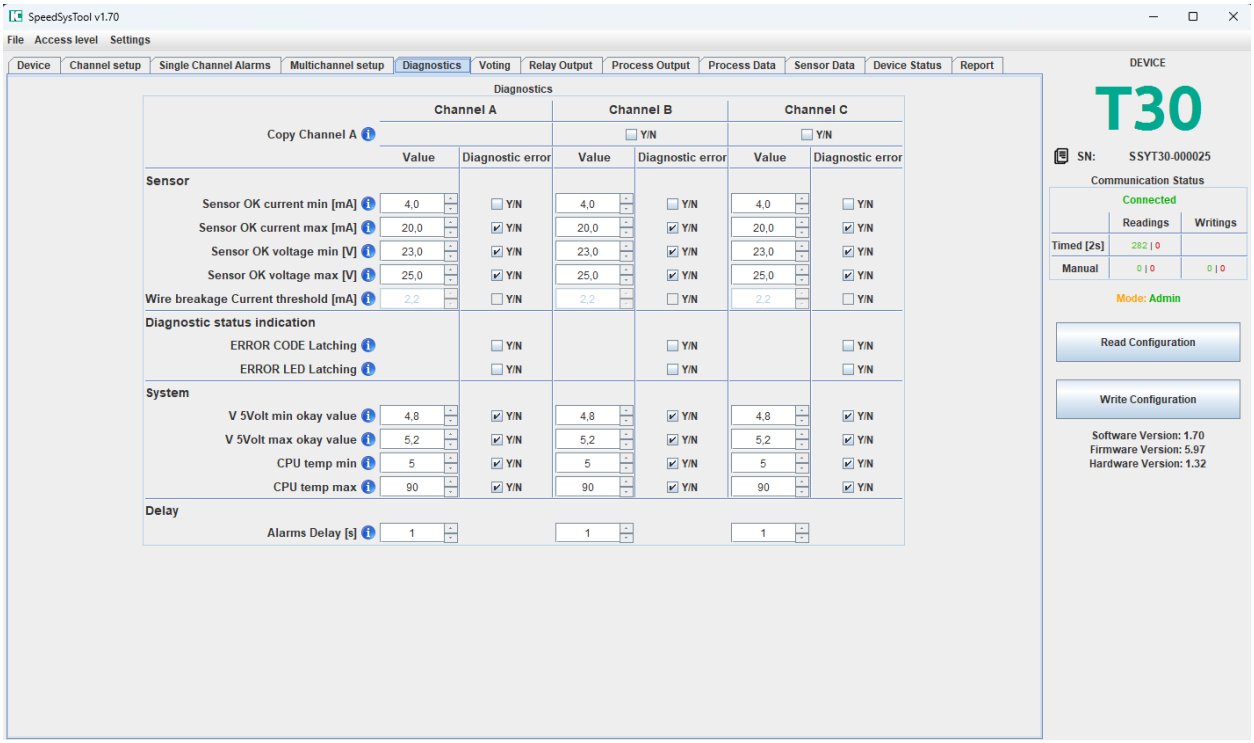
- **Rotation Direction cut out speed window [RPM].**

[INPUT]

T20 – T30 Only
The cut out speed defines above which speed the function is frozen.

Note: Reverse rotation starts to operate from 2 RPM and up to the cut out speed..

6.5 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.

  Note: When used in combination with 3 wire sensor input function, the function allows for the use of an NPN type of speed sensor. When selecting NPN Sensor input, this function is automatically activated and greyed out.

Diagnostic status indication

- **ERROR CODE Latching**

  [INPUT]

  Selecting the tick box activates the latching mode. Only a reset will clear the ERROR CODE

- **ERROR LED Latching**

[INPUT]

Selecting the tick box activates the LED latching mode. Only a reset will clear the ERROR CODE. When not selected, the ERROR LED will automatically stop blinking when the cause for the error is removed

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.

Delay

- **Alarm Delay (s)**

  [INPUT]

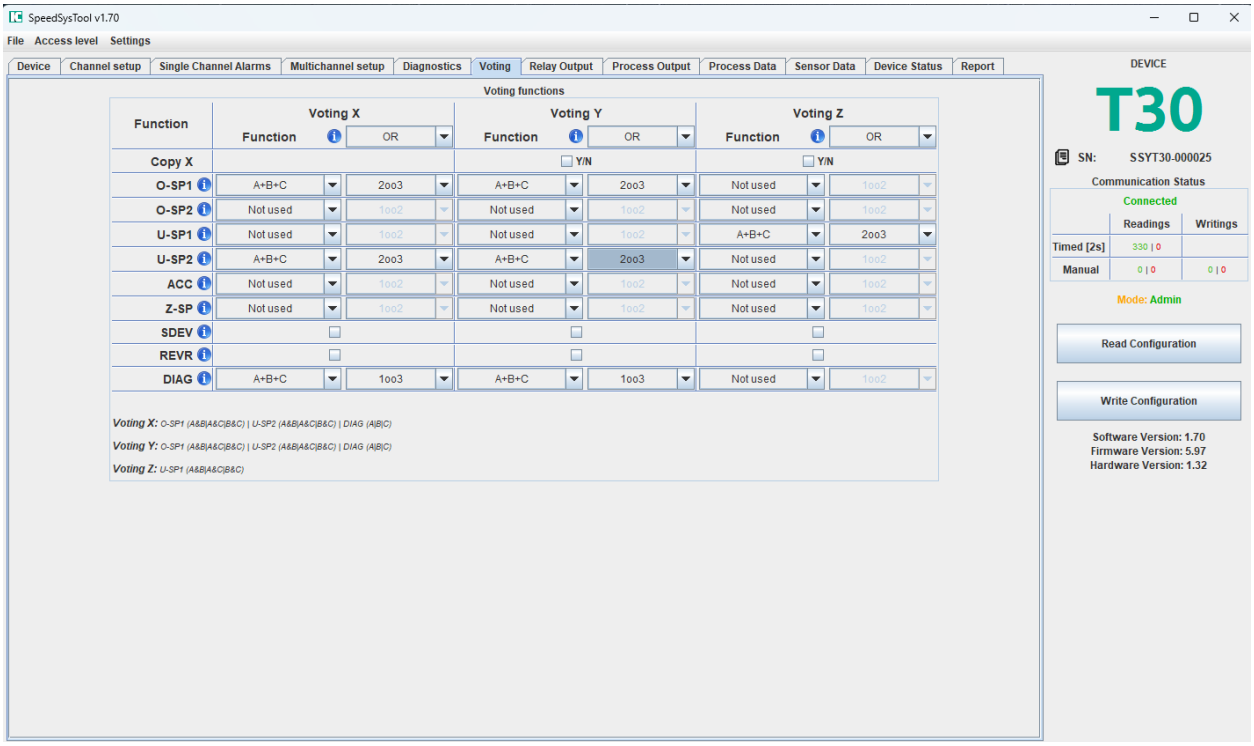
  [Range Min 0s / Max 100 s]

  [Default 0 s]

  The alarm delay function will delay activating the diagnostic error. Further after the delay time is initiated by a diagnostic error, the error still needs to persist at the end of the set alarm delay error. If the condition is not met, the diagnostic alarm will be ignored.

  When set to zero, there will be no alarm delay, neither will a verification take place.

6.6 Voting



Note: the voting options are allowing for a great deal of freedom, there is no verification if the chosen solution is viable or not. Always perform a system verification to check if the function is working as intended.

Note: each channel is performing its voting function for the selected channels. The actual voting is on the processed result from each channel.

SW voting is allowing a combination of alarms, derived from 2 or more channels to be coupled to one output relay. The settings for the alarms are configured under the Singel Channel and Multi Channel TABs.

There are three Voting functions Voting X, Voting Y and Voting Z. Each voting function can be a combination from any selected input.

The function can either be either an OR, or AND function of the selected alarms. For the T20, the voting per function can be: 1oo2 and 2oo2.

For the T30, the voting per function can be: 1oo3, 2oo3, 3oo3

Spead deviation SDEV and Reverse rotation REVR are already multichannel function and therefore do not allow an additional function voting.

FUNCTION

- **Voting X AND/OR**

  [INPUT]

  Setting the option to OR will create an OR function for the selected alarms in the voting X table. As a result, only one of the selected alarms must be active before the output status of the voting X function will change from no alarm to active alarm.
  Setting the option AND will create an AND function for the selected alarms in the voting X table. As a result, all selected alarms must be active before the out put status of the voting X function will change from no alarm to active alarm.

- **Voting Y AND/OR**

  [INPUT]

  Setting the option to OR will create an OR function for the selected alarms in the voting Y table. As a result, only one of the selected alarms must be active before the output status of the voting Y function will change from no alarm to active alarm.
  Setting the option AND will create an AND function for the selected alarms in the voting Y table. As a result, all selected alarms must be active before the out put status of the voting Y function will change from no alarm to active alarm.

- **Voting Z AND/OR**

  [INPUT]

  Setting the option to OR will create an OR function for the selected alarms in the voting Z table. As a result, only one of the selected alarms must be active before the output status of the voting Z function will change from no alarm to active alarm.
  Setting the option AND will create an AND function for the selected alarms in the voting Z table. As a result, all selected alarms must be active before the out put status of the voting Z function will change from no alarm to active alarm.

- **Overspeed Set Point 1 (O-SP1)**

  [INPUT]

  The function is derived from the Single Channel Alarm TAB Overspeed Limit [RPM] (O-SP) Function 1(T 20: A,B, T30: A,B,C)

- **Overspeed Set Point 2 (O-SP2)**

  [INPUT]

  The function is derived from the Single Channel Alarm TAB Overspeed Limit [RPM] (O-SP) Function 2(T 20: A,B, T30: A,B,C)

- **Under speed Set Point 1 (U-SP1)**

  [INPUT]

  The function is derived from the Single Channel Alarm TAB Under speed Limit [RPM] (U-SP) Function 1(T 20: A,B, T30: A,B,C)

- **Under speed Set Point 2 (U-SP2)**

  [INPUT]

  The function is derived from the Single Channel Alarm TAB Under speed Limit [RPM] (U-SP) Function 2(T 20: A,B, T30: A,B,C)

- **Acceleration Limit [RPM/s} (ACC)**

  [INPUT]

  The function is derived from the Single Channel Alarm TAB Acceleration Limit [RPM/s] (ACC)

- **Zero speed Window [s] (Z-SP)**

  [INPUT]

  The function is derived from the Single Channel Alarm TAB Zero [s] (Z-SP)

- **Speed Deviation alarm(SDEV)**

  [INPUT]

  The function is derived from the Multi Channel Alarm TAB Speed Deviation (SDEV) alarm

- **Reverse Rotation alarm (REVR)**

  [INPUT]

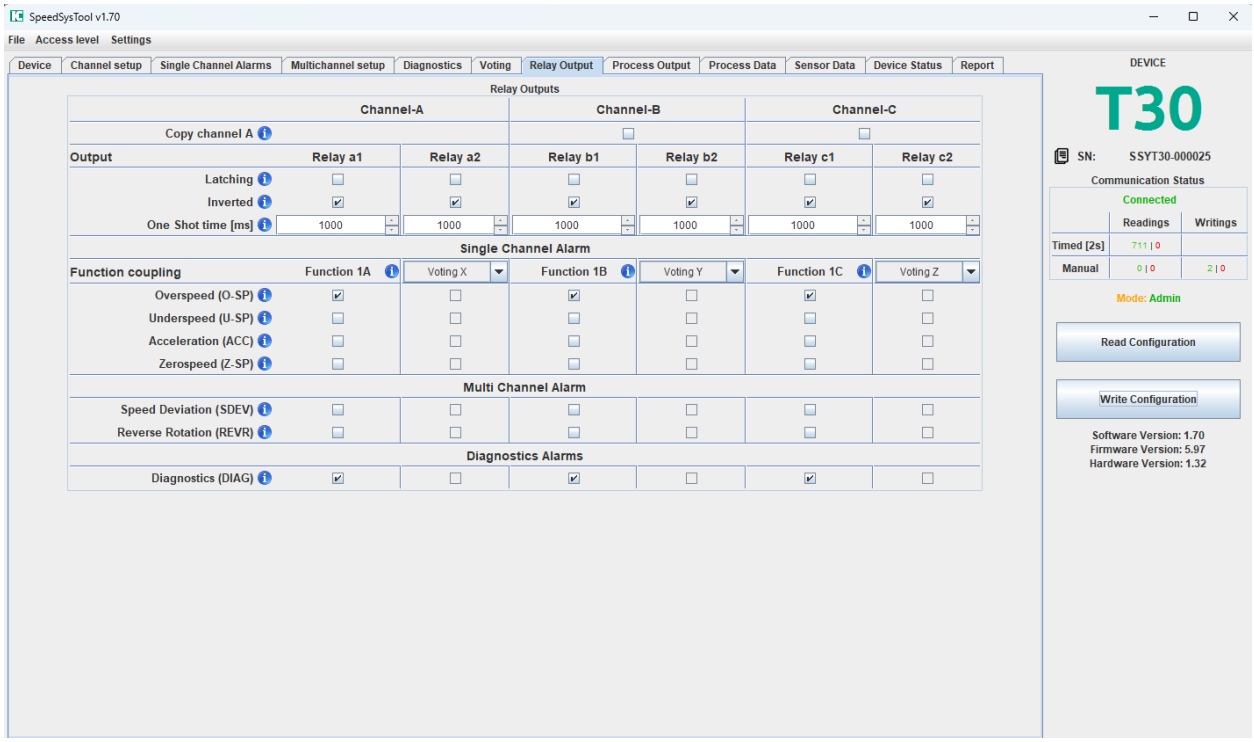
  The function is derived from the Multi Channel Alarm TAB Speed Deviation (SDEV) Reverse alarm

- **Diagnostic Alarm (DIAG)**

  [INPUT]

  The function is derived from the Diagnostics Tab Based on the selected Diagnostic error functions. The Diagnostic alarm, is, already an OR function of the selected diagnostic alarms

6.7 Relay Output



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.

Note: T20 and T30 only, SW voting function Voting X, Voting Y and Voting Z can only be coupled the relay 2(A,B,C) of each channel Where Voting X can only be coupled to Relay a2, Voting Y can only be coupled to Relay b2 and Voting Z can only be coupled to Relay c2

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

Relay Outputs

- **Copy Channel A**

  [INPUT]

  T20 and T30 only
  Allows copying the parameters from Channel A into Channel B and/or Channel C, after doing so the parameters can be modified.

OUTPUT

- **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.

SINGEL CHANNEL ALARM

- **Function Coupling:**

Voting Relay A2,B2, C3

[INPUT]

When selecting respectively Voting X, Voting Y and Voting Z the programmed set6ting under the TAB voting are connect to the relay’s, it is then no longer possible not connect direct functions to the relay.

Singel Channel Alarm Functions

- **Overspeed (O-SP)**

  [INPUT]

  Coupling the function as set under the TAB single channel alarms
  Relay a1 can be coupled to Singel Channel alarm Function 1A O-SP
  Relay a2 can be coupled to Singel Channel alarm Function 2A O-SP
  Relay b1 can be coupled to Singel Channel alarm Function 1B O-SP
  Relay b2 can be coupled to Singel Channel alarm Function 2B O-SP
  Relay c1 can be coupled to Singel Channel alarm Function 1C O-SP
  Relay c2 can be coupled to Singel Channel alarm Function 2C O-SP

- **Underspeed (U-SP)**

  [INPUT]

  Coupling the function as set under the TAB single channel alarms
  Relay a1 can be coupled to Singel Channel alarm Function 1A U-SP
  Relay a2 can be coupled to Singel Channel alarm Function 2A U-SP
  Relay b1 can be coupled to Singel Channel alarm Function 1B U-SP
  Relay b2 can be coupled to Singel Channel alarm Function 2B U-SP
  Relay c1 can be coupled to Singel Channel alarm Function 1C U-SP
  Relay c2 can be coupled to Singel Channel alarm Function 2C U-SP

- **Acceleration (ACC)**

  [INPUT]

  Coupling the function as set under the TAB single channel alarms
  Relay a1 can be coupled to Singel Channel alarm Function A ACC
  Relay a2 can be coupled to Singel Channel alarm Function A ACC
  Relay b1 can be coupled to Singel Channel alarm Function B ACC
  Relay b2 can be coupled to Singel Channel alarm Function B AAC
  Relay c1 can be coupled to Singel Channel alarm Function C ACC
  Relay c2 can be coupled to Singel Channel alarm Function C ACC

- **Zerospeed (Z-SP)**

  [INPUT]

  Coupling the function as set under the TAB single channel alarms
  Relay a1 can be coupled to Singel Channel alarm Function A Z-SP
  Relay a2 can be coupled to Singel Channel alarm Function A Z-SP
  Relay b1 can be coupled to Singel Channel alarm Function B Z-SP
  Relay b2 can be coupled to Singel Channel alarm Function B Z-SP
  Relay c1 can be coupled to Singel Channel alarm Function C Z-SP

Relay c2 can be coupled to Singel Channel alarm Function C ACC

Function Coupling: Multi Channel Alarm Functions

- **Speed Deviation (SDEV)**

  [INPUT]

  Coupling the function as set under the TAB multichannel setup
  Relay a1 can be coupled to Singel Channel alarm Function A S-DEV
  Relay a2 can be coupled to Singel Channel alarm Function A S-DEV
  Relay b1 can be coupled to Singel Channel alarm Function B S-DEV
  Relay b2 can be coupled to Singel Channel alarm Function B S-DEV
  Relay c1 can be coupled to Singel Channel alarm Function C S-DEV

- **Reverse Rotation (REVR)**

  [INPUT]

  Coupling the function as set under the TAB multichannel setup
  Relay a1 can be coupled to Singel Channel alarm Function A REVR
  Relay a2 can be coupled to Singel Channel alarm Function A REVR
  Relay b1 can be coupled to Singel Channel alarm Function B REVR
  Relay b2 can be coupled to Singel Channel alarm Function B REVR
  Relay c1 can be coupled to Singel Channel alarm Function C REVR

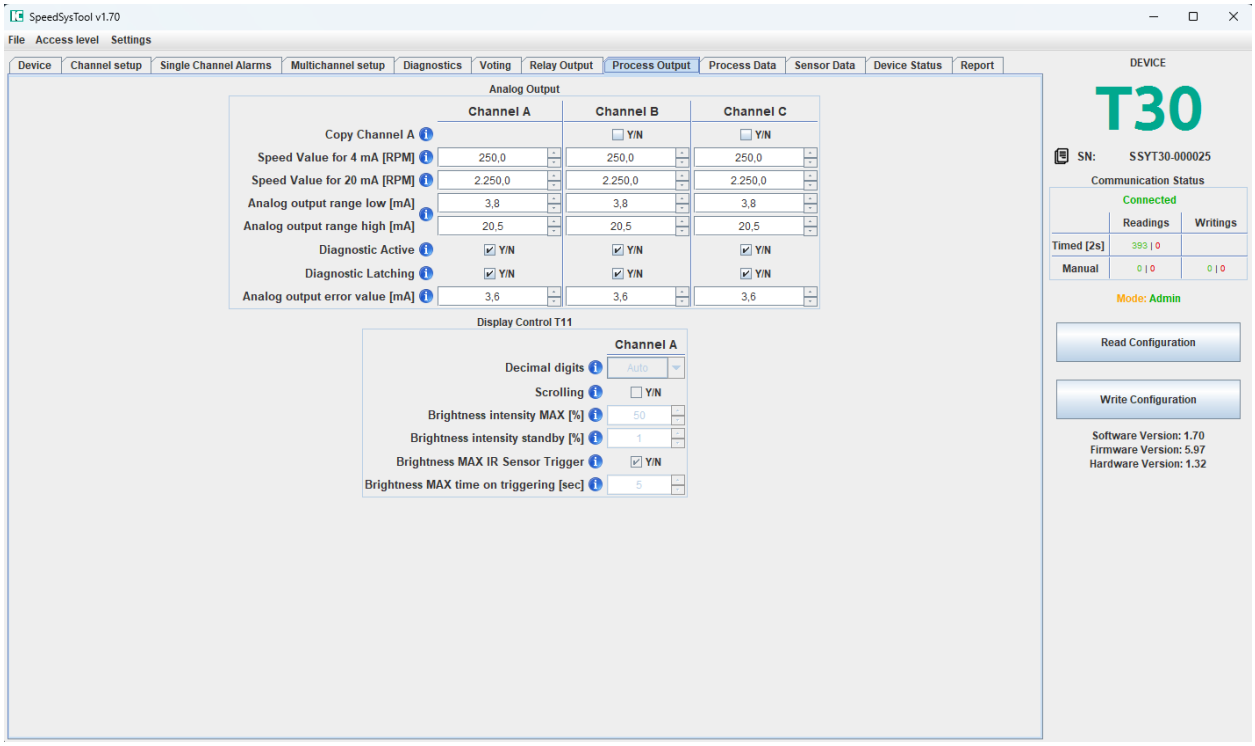
Function Coupling: Diagnostics Alarms

- **Diagnostics (DIAG)**

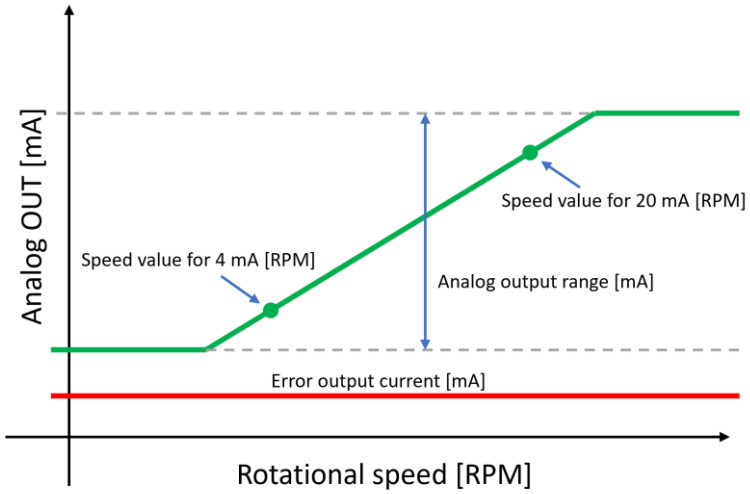
  [INPUT]

  Coupling the function as set under the TAB diagnostics
  Relay a1 can be coupled to Singel Channel alarm Function A DIAG
  Relay a2 can be coupled to Singel Channel alarm Function A DIAG
  Relay b1 can be coupled to Singel Channel alarm Function B DIAG
  Relay b2 can be coupled to Singel Channel alarm Function B DIAG
  Relay c1 can be coupled to Singel Channel alarm Function C DIAG

6.8 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**

  [INPUT]

  T20-T30 Only
  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 Active**

  [INPUT]

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

- **Diagnostic Latching**

  [INPUT]

  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.

- **Decimal Digits**

  [INPUT]

  [Range Auto, 0,1,2]

  Allows to automatically range the display scale or have a fixed decimal.

  Scrolling

  [INPUT}

  allows to activate scrolling to prevent burn in of pixels and thus extending the life span of the display.

- **Brightness Intensity Max (%)**

  [INPUT}

  [Range 20-100 %]

  Specifies the default MAX brightness, default value when the trigger mode is not activated. When the Brightness MAX IR sensor trigger is activated Brightness Intensity MAX will be active during the set period.

- **Brightness Intensity standby (%)**

  [INPUT}

  [Range 0-80 %]

  Specifies the default standby brightness, default value when the trigger mode is activated.

- Brightness MAX IR sensor trigger

  [INPUT]

  When active the Infrared Sensor status will define the selected brightness mode, standby or MAX. for the set period.

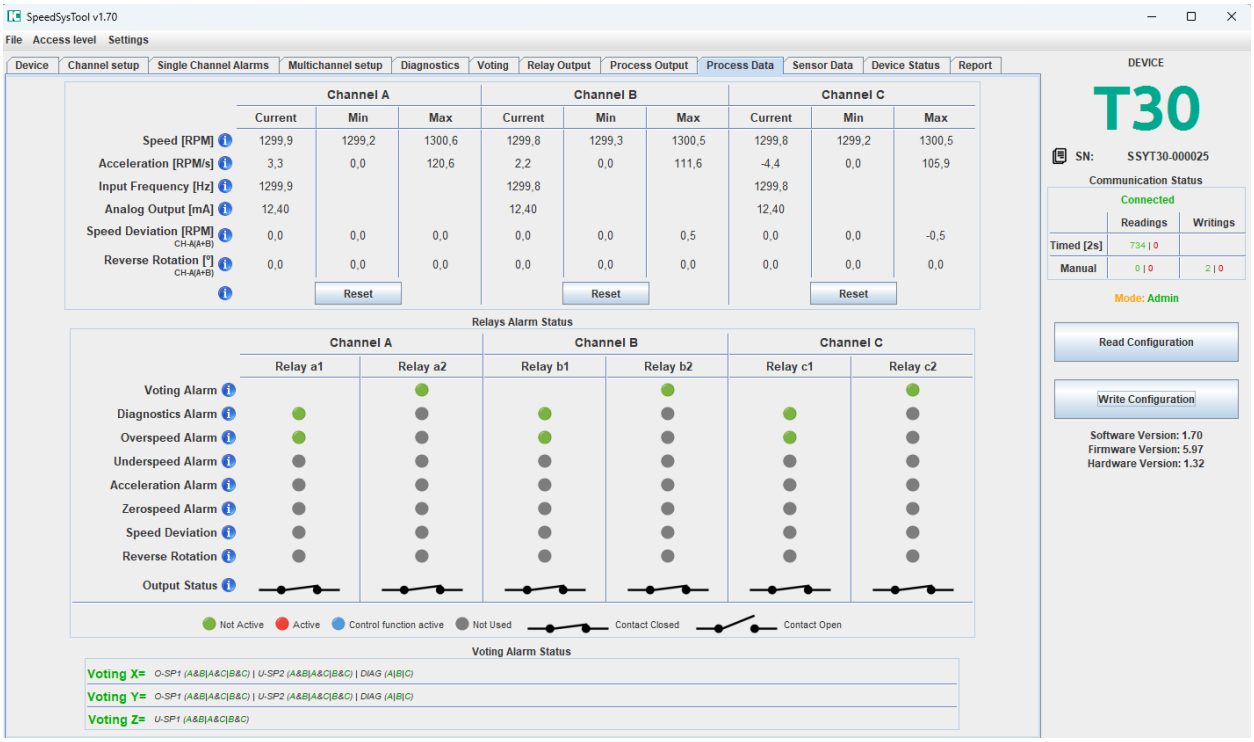
- Brightness MAX time on trigger [s]

  [INPUT]

  When the Infrared Sensor status is active, the Brightness intensity MAX will be on during the set period.

6.9 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.



Note: the character next to the alarm status indicates the use of the alarm function: None, no alarm function used, R directly coupled to the HW relays, V coupled to a voting relay, B coupled to a HW relay and a voting relay.

- **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.

- **Speed Deviation (Depending on the selected option: AB, BC, AC or ABC) [RPM]**

  [OUTPUT]

  T20-T30 Only
  The values represent the actual difference speed difference between the A and B or C channel and Min and Max value for T20-T30 functions e.g., Speed Deviation.

- **Reverse Rotation (Depending on the selected option: AB, BC, AC)S [°]**

  [OUTPUT]

  T20-T30 Only
  The values represent the actual measured phase angels between the selected channels and Min and Max value for T20-T30 functions e.g., Reverse Rotation.

- **Reset**

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

- **Voting Alarm**

  [OUTPUT]

  T20-T30 Only
  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.

- **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]

  T20-T30 Only
  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]

  T20-T30 Only
  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.

- **Speed Deviation**

  [OUTPUT]

  T20-T30 Only
  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.

- **Reverse Rotation**

  [OUTPUT]

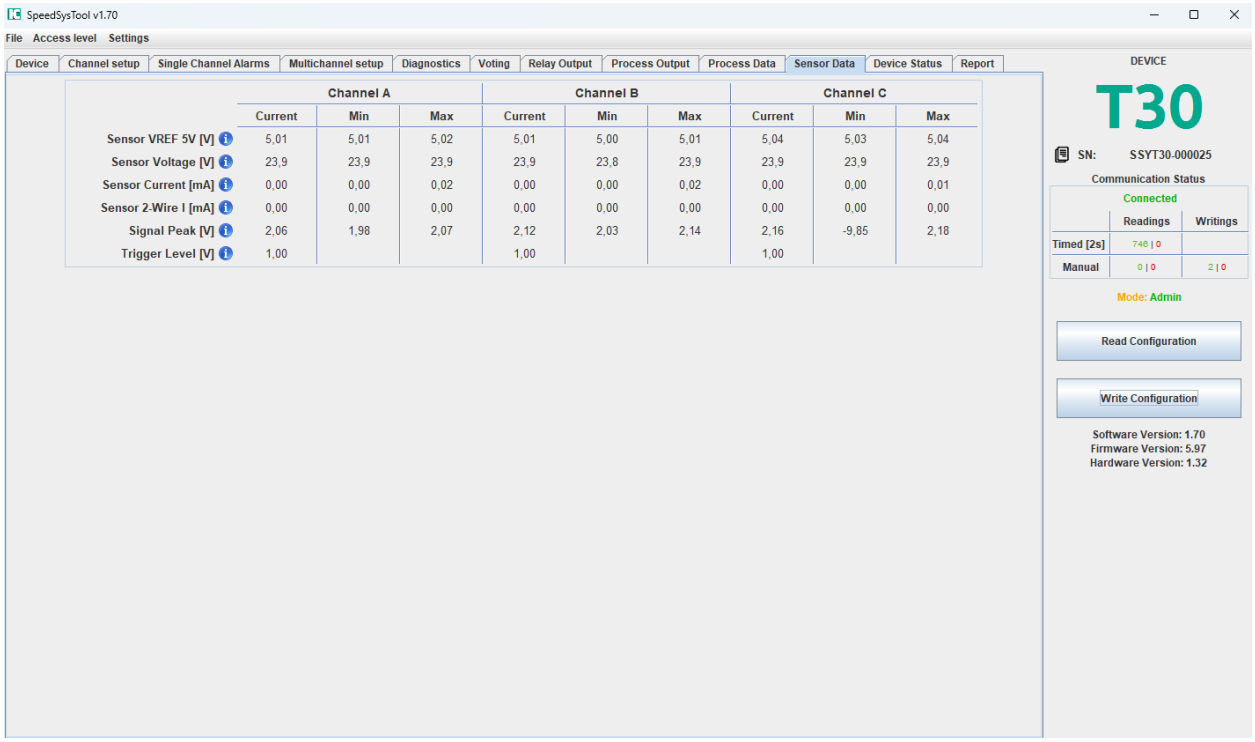
T20-T30 Only
When the indicator is grey, the function is not used
When the indicator is green, the function is active but no limits are exceeded.
When the indicator is red the function is used and the limits is exceeded.

- **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 (energized normally closed) or not inverse (de-energized normally open).

6.10 Sensor Data



- **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

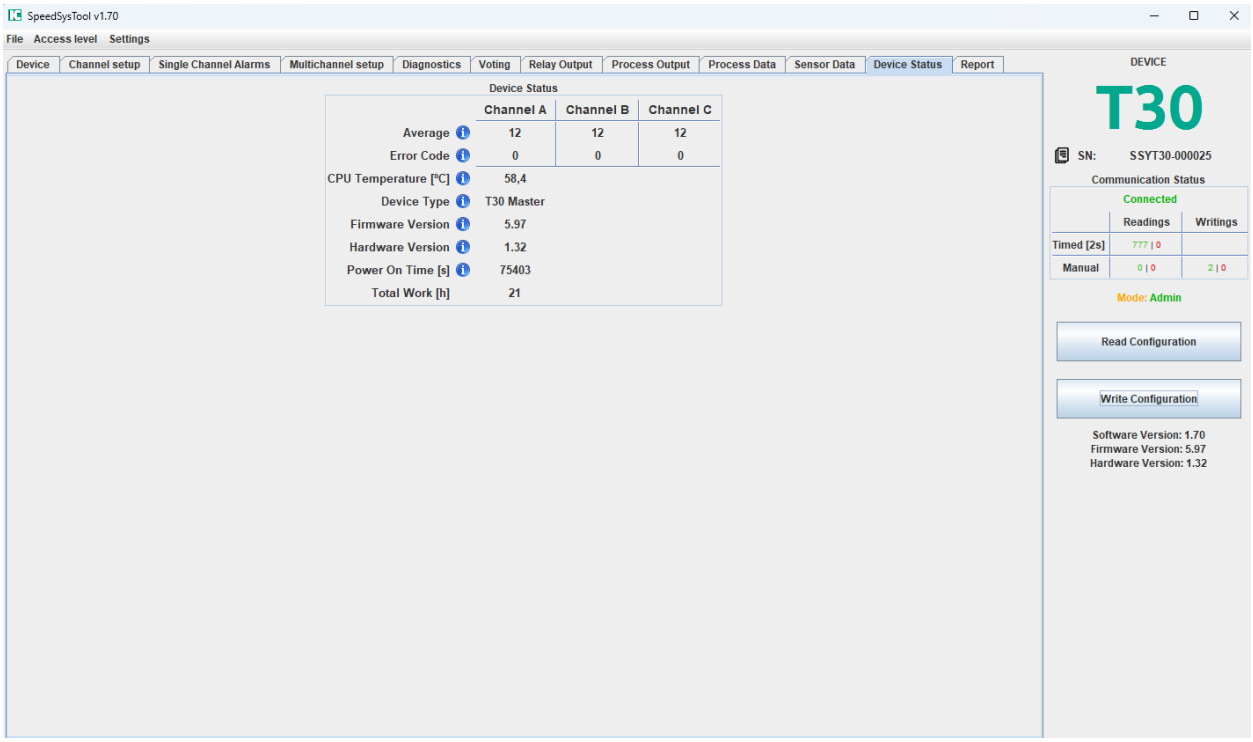
- **Trigger Level**

  [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.

6.11 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.



- **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

Error Codes details:

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.

- **CPU Temperature**

  [OUTPUT]

  Actual CPU temperature.

- **Device Type**

  [OUTPUT]

  Device type shows the type of SpeedSys Txx 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.

- **Total Work**

  [OUTPUT]

  Accumulated power on-time in hours.

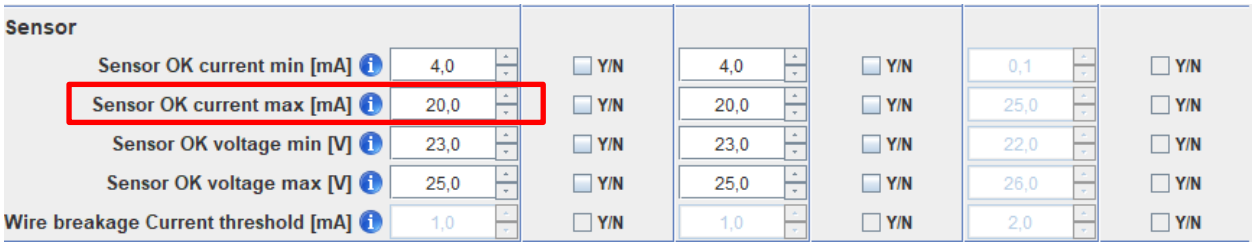
6.11.1 Error Codes details:

Following text describes in more details the error code and the possible solution to fix the cause.

1. ERROR_CODE_NO_ERROR 0x0000: No error present
2. ERROR_CODE_SENS_I_MAX 0x0001:

This coded describes that the sensor current supply diagnostic setting is above the I-max setting. This could indicate and short circuit of the wiring or a wrong configuration. This setting is typically used for a 3 wire HALL sensor.

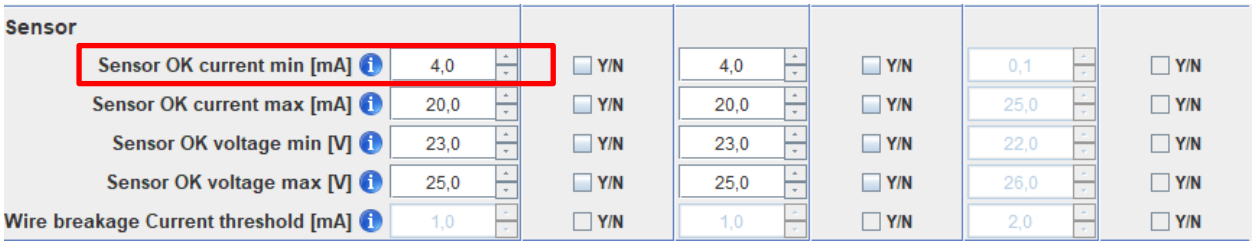
[TAB DIAGNOSTIC]



3. ERROR_CODE_SENS_I_MIN 0x0002

This coded describes that the sensor current supply diagnostic setting is below the I-min setting. This could indicate and broken wire or a wrong configuration. This setting is typically used for a 3 wire HALL sensor.

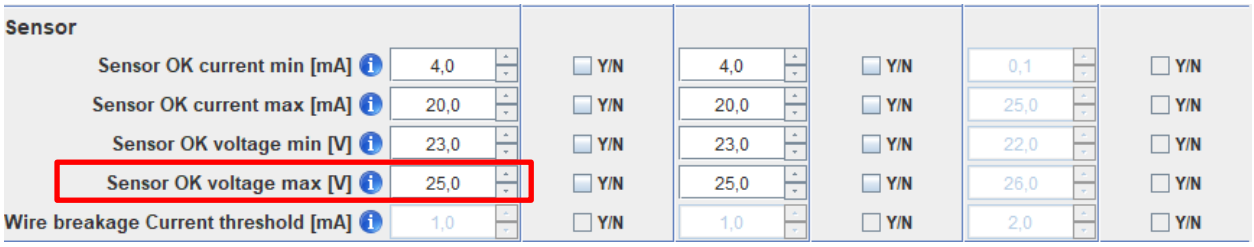
[TAB DIAGNOSTIC]



4. ERROR_CODE_SENS_V_MAX 0x0004

This coded describes that the sensor voltage supply diagnostic setting is above the V Max setting. This could indicate the use of an external sensor power unit or a wrong configuration. This setting is typically used for a 3 wire HALL sensor.

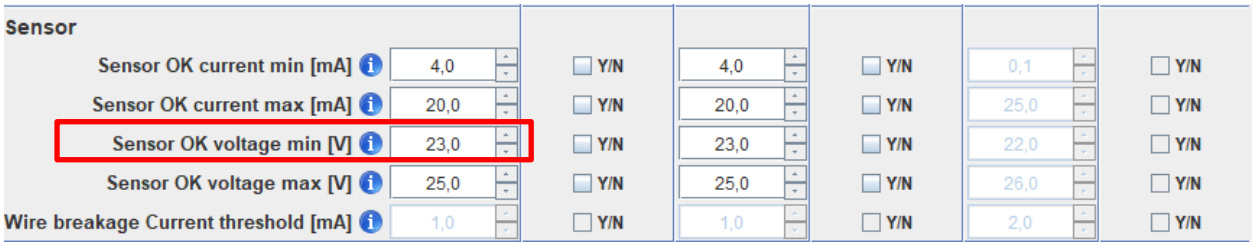
[TAB DIAGNOSTIC]



5. ERROR_CODE_SENS_V_MIN 0x0008

This coded describes that the sensor voltage supply diagnostic setting is below the V Min setting. This could indicate a to high load of the sensor power supply, a short circuit or a wrong configuration. This setting is typically used for a 3 wire HALL sensor.

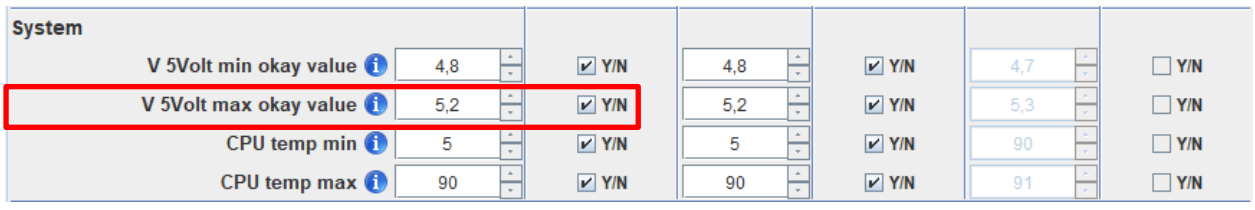
[TAB DIAGNOSTIC]



7. ERROR_CODE_VREF5V_MAX 0x0010

VREF5V is the reference voltage against which, amongst others, Signal amplitude, trigger level and signal condition are relying on. When deviating to much from the defined level, (5 Volt) the measurement can be compromised. When exceeding the set level, the unit should be returned to the factory for inspection.

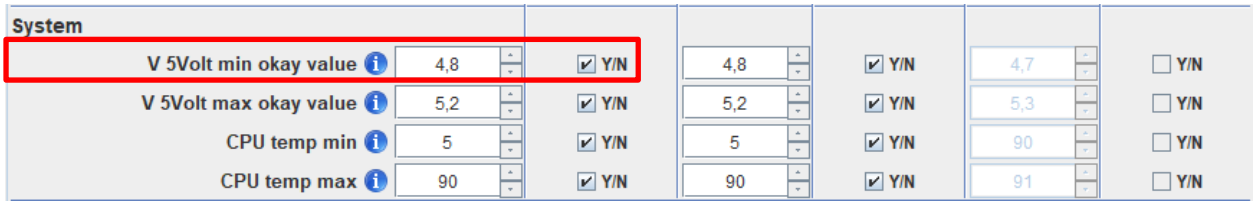
[TAB DIAGNOSTIC]



8. ERROR_CODE_VREF5V_MIN 0x0020

VREF5V is the reference voltage against which, amongst others, Signal amplitude, trigger level and signal condition are relying on. When deviating to much from the defined level, (5 Volt) the measurement can be compromised. When exceeding the set level, the unit should be returned to the factory for inspection.

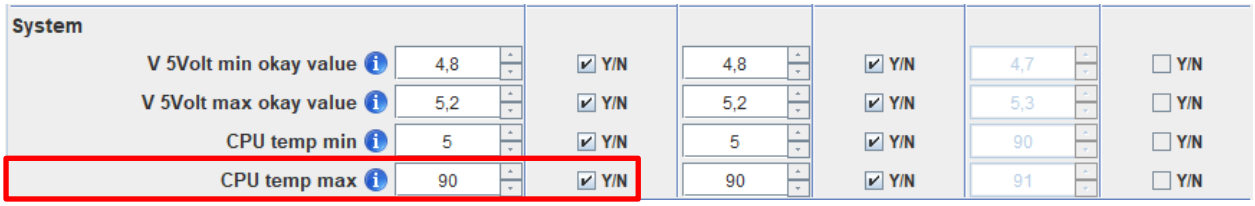
[TAB DIAGNOSTICS]



9. ERROR_CODE_CPU_TEMP_MAX 0x0040

CPU temperature limits are regarded as the max limit where the CPU should be allowed to operate. Exceeding the limits will shorten the life span of the unit. In case the limits are exceeded , measures need to be taken to meet the environmental requirements.

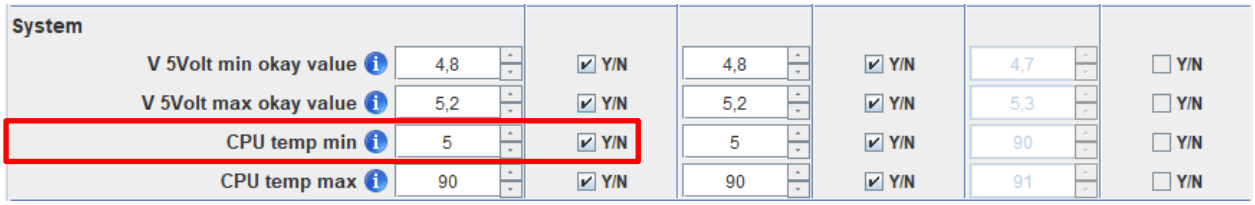
[TAB DIAGNOSTICS]



7. ERROR_CODE_CPU_TEMP_MIN 0x0080

CPU temperature limits are regarded as the max limit where the CPU should be allowed to operate. Exceeding the limits will shorten the life span of the unit. In case the limits are exceeded , measures need to be taken to meet the environmental requirements.

[TAB DIAGNOSTICS]



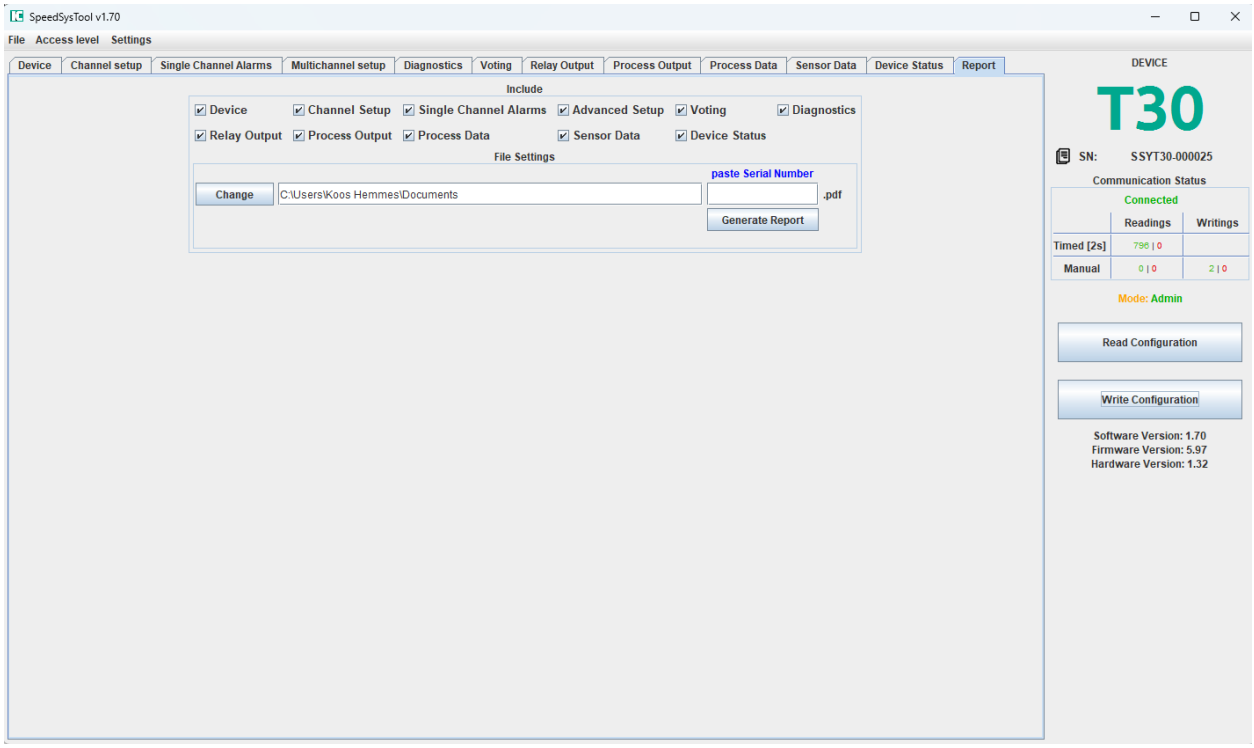
8. ERROR_CODE_WIRE_BREAKAGE 0x0100

This coded describes that in case of a two wire sensor (MPU, VR) the wire break detector is below the set value, indicating a broken wire or a wrong configuration. This setting is typically used for a 2 magnetic pick-up.

[TAB DIAGNOSTIC]

Sensor						
Sensor OK current min [mA]	4,0	Y/N	4,0	Y/N	0,1	Y/N
Sensor OK current max [mA]	20,0	Y/N	20,0	Y/N	25,0	Y/N
Sensor OK voltage min [V]	23,0	Y/N	23,0	Y/N	22,0	Y/N
Sensor OK voltage max [V]	25,0	Y/N	25,0	Y/N	26,0	Y/N
Wire breakage Current threshold [mA]	1,0	Y/N	1,0	Y/N	2,0	Y/N

6.12 Report



A report file name can be freely selected. In case the serial number of the unit shall be used a copy paste function is available to directly copy the serial number into the file name field.

- **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	192.168.1.103	255.255.255.0	192.168.1.1	SSYT30-000025

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 A	DEVICE B	DEVICE C
Device Comment	COMMENT A	COMMENT B	COMMENT C

6.13 Saving a configuration on to the SpeedSys Txx

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.

6.14 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 (T11 Relay 1 only)
	Flashing	Relay 1 **or** Relay 2 switched (T11 not applicable)
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 (T11 Pending)

	Power supply: 24 V_{DC} (18.-.31.2 V_{DC}), max. 160 mA
	Instrument earth connection (functional earth)
CE	The manufacturer declares that the product conforms to the applicable standards.
UK CA	The manufacturer declares that the product conforms to the applicable standards
RoHS 2	The manufacturer declares that the product conforms to the applicable RoHS 2 directive 2011/65/EU.
DNV	Type Approved product DNV (serial number SSYTx0-002200 and up, SSYT11-000001 and up)

8.2 Product identifiers

MFR	H7368
Model	SSYTxx-000-00x
SER	SSYTxx-xxxxxx
PNR	ISTSSYTxx

8.3 Specifications

Please consult the datasheet for system specifications.