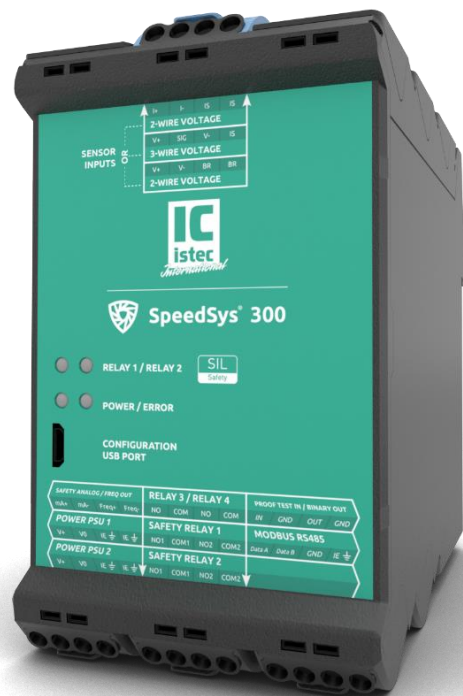


OVERSPEED PROTECTION SYSTEM

SpeedSys 300

MODBUS MANUAL



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Doc.-No.: MSSY00038

IMPORTANT NOTICE

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

ISTEC has made every effort to include all specific 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 to the intended application.

This manual is written for operators and integrators of the SpeedSys 300 product. All operating personnel is expected to follow the specific safety related procedures and all applicable other (general) 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, inexperienced or irregular use, ISTEC will decline any liability or warranty claims.

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1 General information



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

This document outlines the specific Modbus RTU functionality of the the SpeedSys 300 system.

SpeedSys 300 is part of the SpeedSys ODS family, which also includes the SpeedSys 200, which does not feature Modbus RTU.

To ensure clarity and easy reference, the extensive information regarding this functionality has been segregated into this standalone manual. For a comprehensive understanding of the SpeedSys 300 system and encompassing detailed product descriptions, it is recommend consulting the SpeedSys ODS manual.

This manual is applicable to the following models:

- SpeedSys 300

1.1 Symbols used in this manual



This symbol indicates information, 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.

2 Module details

2.1 Connector arrangement

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

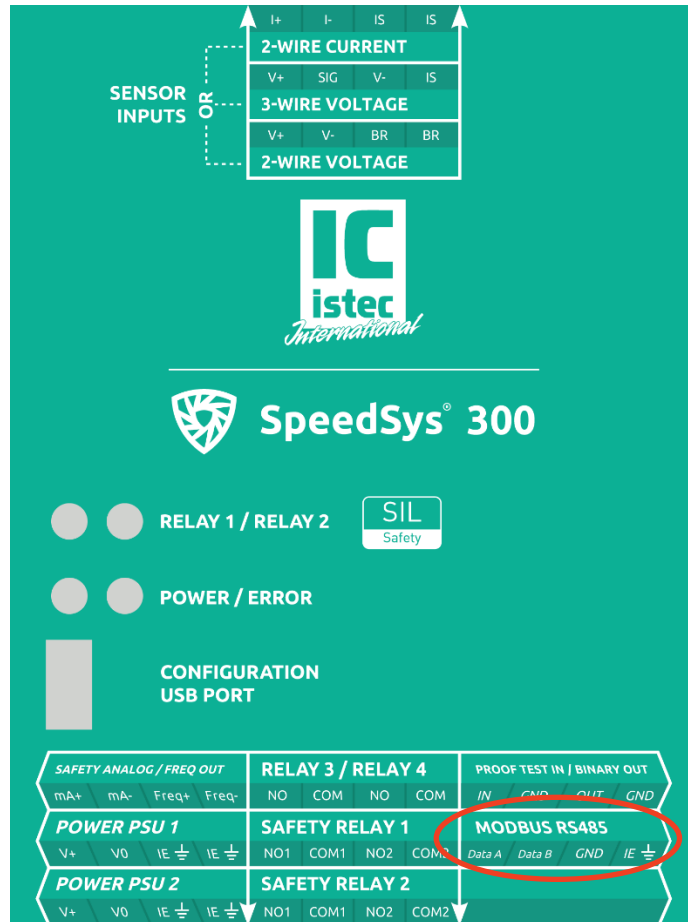


Figure 1: SpeedSys 300 front label with the Modbus indicated on the bottom right.

We can identify the location for the Modbus RTU on the bottom right of the front label as can be seen in Figure 1. Where RS-485 stands for a standard defining the electrical characteristics of the hardware used for communication. It specifies how data is transmitted and received over a serial connection.

To find the connector slide the label virtually in the direction of the white arrows and the label will overlap with the connectors and screw terminals, which are numbered C17 to C20 as can be seen in Figure 2.

2.2 Connection diagram

The electrical interfaces for the product can be seen in Figure 2 with the Hazardous area on the left and the safe area on the right with the Modbus RTU outlined in red.



Observe the information in the datasheet before connecting electrical interfaces.

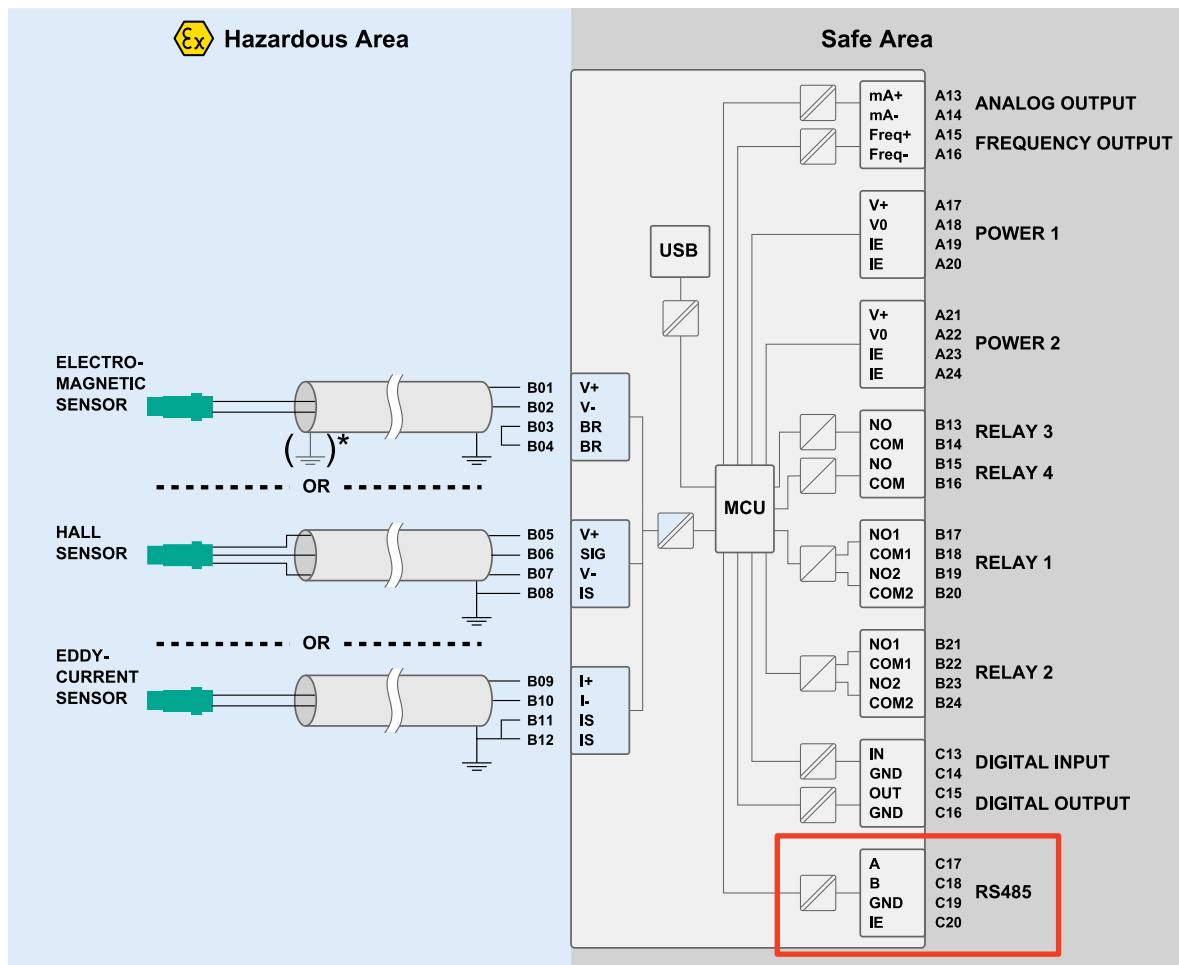


Figure 2: SpeedSys 300 connection scheme. *) install in controlled electromagnetic environment or connect both sides of cable shield to intrinsically safe earth

2.3 Grounding

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

All connections must be installed with shielded cables. Connect all cable shields in the non-explosive area to instrument earth (IE) at both sides of the cable, including the Modbus RS-485 connection, as is shown in Figure 3. This might require connecting a IE terminal of another connector to IE to ground the complete IE plane of the device.

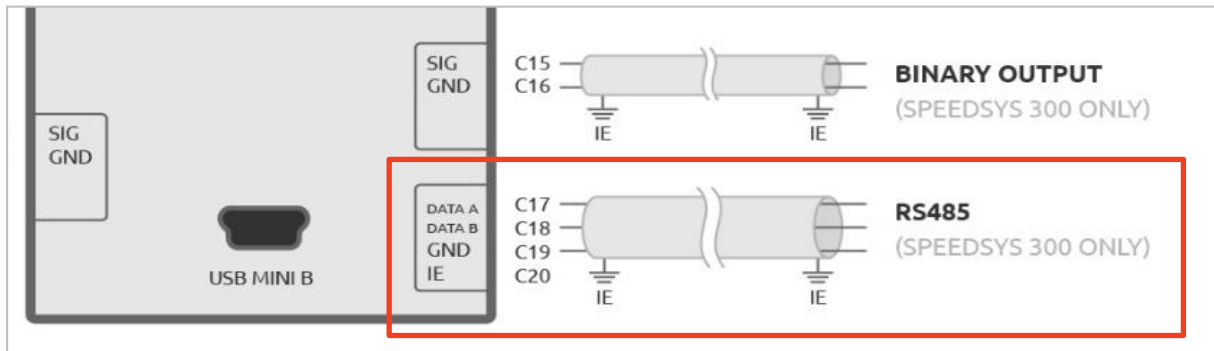


Figure 3: the Modbus RS-485 connection requires a shielded cable with grounding to IE on both sides.

3 Connections

SpeedSys 300 has two independent Modbus channels, USB – serial converter and RS-485 interface. Both channels can read the Modbus registers on the unit, but differ in programming permissions and address configurations:

Table 1: differences between the two Modbus channels, USB – serial converter and RS-485 interface.

	USB - serial converter	RS-485 interface,
Purpose	Programming and testing outside of operational use.	Read registers into a DCS or PLC during operational use
Connector Location	Connected through USB configuration port on the front the unit.	Connected through the connector at the bottom of the unit
Permissions	Registers can be read and programmed through this channel	Registers can be read, but NOT programmed through this channel
Hardware interface	USB Mini-B	RS-485 connection, half-duplex. No auto-negotiation
Data interface	USB 1.0 or higher	Master-slave protocol. 1 master and up to 60 slaves.
Address	This channel responds to any Modbus address. It is used as a point-to-point connection	Modbus address is configurable (1 to 247)
Wiring	Regular USB cable with at least one side USB mini-B	2-wire, maximum 30 m. Longer wires are not covered in the certification



The USB – serial connection is not intended to be permanently connected in an operational environment. Permanent connection is not covered in the certifications.

For more details on how the Modbus protocol is working, refer to: https://www.Modbus.org/docs/Modbus over serial line V1_02.pdf

4 Programming

This programming manual is applicable to the software version 1.0 and all firmware versions.

4.1 Get started: connect to PC

Connect to PC

Power up the device by providing 24 V_{DC} (18 to 36 V_{DC}) on at least one of the power inputs.

Connect the device to a PC using the USB interface. The first time it may take a while for the computer to find and install the USB COM port.

Open the SpeedSys 300 software

The software is supported by Windows version 7 or higher.

The latest version of the software can be downloaded from Istec's website:

www.istec.com.

Place the software on a desired location on the PC. The software doesn't require installation and can be exchanged between computers with impunity. Start the software by double clicking the executable.

Note: some anti-virus suites may block or require additional approvals to run third party applications.

Select the COM port

In the software, select the COM port the product is connected to by clicking *Settings -> Interface Setup* as shown in Figure 4. If the device is connected via USB, make sure the checkbox *USB connection* is enabled.

If the device has been connected after start-up, you may have to click *Rescan* in order to see the device's COM port.

If multiple COM ports are showing in the dropdown list, connect/disconnect the device from the PC and see which one of the COM ports appears/disappears, when clicking *Rescan*. That is the COM port you need! Select it and click OK. The Device Status on the right of the window should now show *Connected* and a *Serial number* should be visible. The device is now connected with the software. Continue with the configuration.

Note: You can use the Windows Device Manager to check the COM port. Open the *Device Manager* in Windows and select *Ports (COM & LPT)*. Look for the port *USB Serial Port (COMx)*.

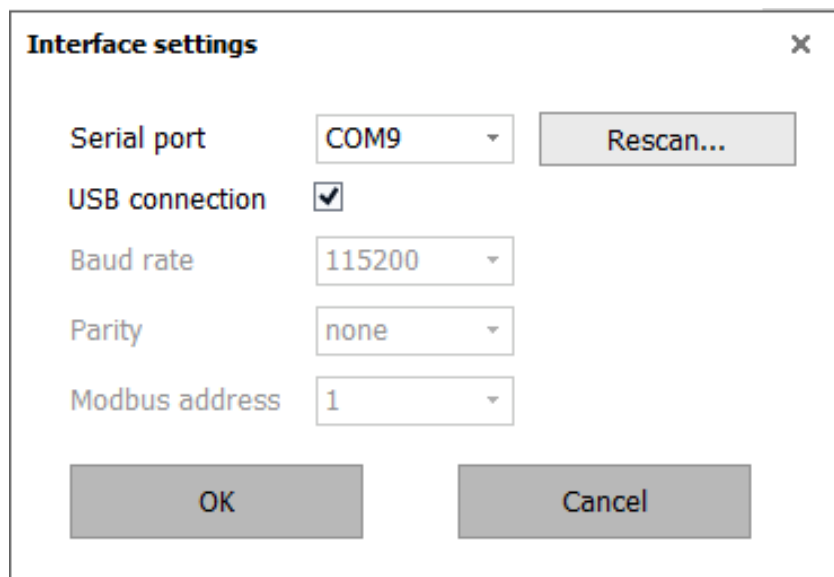


Figure 4: interface settings prompt to configure the connection.

Modbus configuration

The Modbus configuration settings limit themselves only to the DEVICE tab.

The DEVICE tab has two layers of permissions, called Access levels. The active access level for the session can be seen in the right column of the software application under *Access level* as shown in Figure 5. It will always start in *User* and can be elevated to *Admin* by providing the password.

The default password is "speedsys".

Both levels can read all settings that are programmed on the device. On the DEVICE tab the *User* access level has writing permissions only to *Configuration – user* section as can be seen in Figure 5. Settings such as machine and device tag can be configured here as well as Modbus address, transmission speed, parity, and line termination.

To write settings to the *Configuration – admin* section on the DEVICE tab and any other tab in the software, the access level needs to be elevated to *Admin* by clicking *Access level -> Admin* at the top of the window and providing the correct password.

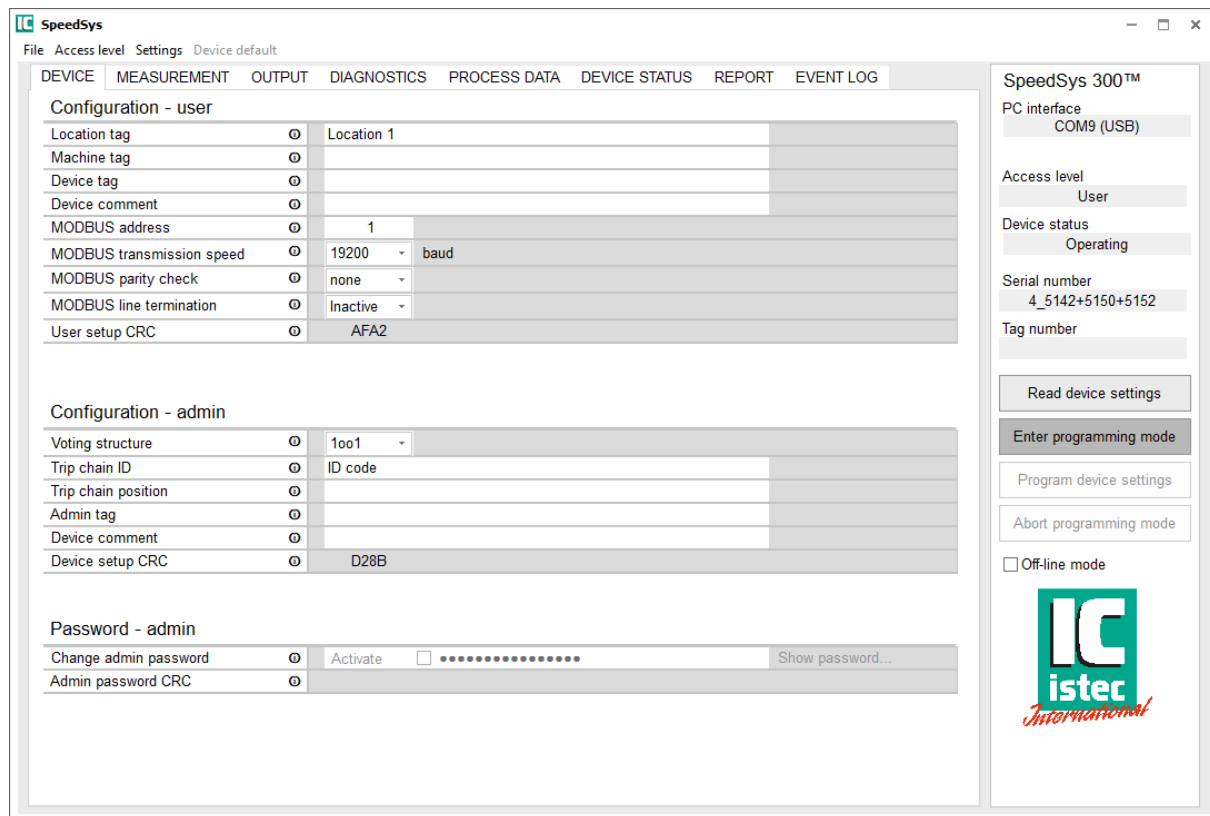


Figure 5: the DEVICE tab. Programming the “Configuration – user” section does not require a password.

5 MODBUS functions

The following MODBUS functions are implemented (on both channels).

- **Function 3: Read Holding Registers**
Read access to status and configuration data

- **Function 4: Read Input Registers**
Read access to Log-File data

- **Function 6: Preset Single Register**
Write access to status and configuration data
 - Only through USB-serial interface
 - Only Read/Write data, depends on access level,

- **Function 16: Preset Multiple Registers**
Write access to status and configuration data
 - Only through USB-serial interface
 - Only Read/Write data, depends on access level

The accessible MODBUS register blocks and their containing registers are listed in section '7 Modbus communication map'.

In this Modbus manual the RS-485 Interface is described using only the read only registers.

6 Modbus registers

6.1 Error messages

The error codes listed in Table 2 are the same codes that can be found on the EVENT LOG tab in the software.

Table 2: errors summary

Error name	Error mask	Latching	Device restart	Reset by PPT	Description
NSF PARAM CRC	0x00000001	Yes	No	No	Bad CRC of parameter group 'configuration - user' (DEVICE tab) or bad CRC of non-volatile status.
SFT PARAM CRC	0x00000002	Yes	No	No	Bad CRC in one or more of following parameter groups: <ul style="list-style-type: none"> • DEVICE tab: configuration - admin • MEASUREMENT tab • OUTPUT tab • DIAGNOSTICS tab
FACT PARAM CRC	0x00000004	Yes	No	No	Bad CRC in one or more of following parameter groups: <ul style="list-style-type: none"> • DEVICE configuration-factory • DIAGNOSTICS-factory • OUTPUT-factory • Default DEVICE configuration-user • Default DEVICE configuration-admin • Default MEASUREMENT • Default DIAGNOSTICS-admin • Default OUTPUT-admin
PARITY ERR	0x00000008	Yes	Config	No	Basic RAM error check on binary level.
SELF CHECK	0x00000010	Yes	Config	No	One or more of internal diagnostic tests failed. i.e. program sequence monitoring, assertion, stack overrun, interrupt execution, main-loop execution timing, ALU and register check, calculation surveillance, clock surveillance.
ROM CHECK	0x00000020	Yes	Config	No	Checksum error of internal ROM.
RAM CHECK	0x00000040	Yes	Config	No	Checksum error of internal RAM.
SENS ERR	0x00000080	Config	No	Yes	Sensor error detected. The 'Sensor OK' ranges entered on the DIAGNOSTICS tab were exceeded.
BAD PULSE	0x00000200	Config	No	Yes	The measured pulses are led through two comparison channels. At least two non-synchronism through the comparison channels
SLV-COMM	0x00000400	Config	Config	Yes	Communication between master and slave MCU failed.
SLV ADOUT	0x00000800	Config	Config	Yes	The diagnosis on the user defined trigger level value on the MEASUREMENT tab and the actual internally used value failed.
SLV SUPPL	0x00001000	Config	Config	Yes	Slave MCU supply voltage or sensor supply voltage out of range
AOUT ERR	0x00002000	Config	No	Yes	Analog output readback difference, as defined on the DIAGNOSTICS tab, was exceeded.
RAIL SUPPL	0x00004000	Config	Config	Yes	Internal rail supply out of range
24V SUPPL	0x00008000	Config	Config	Yes	External main supply voltage out of range
VCC SUPPL	0x00010000	Config	Config	Yes	Master MCU supply voltage out of range
REL PST	0x00020000	Yes	Config	Yes	Cyclic operability check of the relays failed. One or more of the relays cannot be controlled as intended.

PARAM VAL	0x00040000	Config	No	No	Parameter values stored in internal memory are out of permissible range.
CPU TEMP	0x00080000	Config	Config	Yes	MCU temperature out of range
USB ACTIVE	0x00100000	Config	No	Yes	Safe state activated upon connecting a USB device.
INIT SAFE	0x00200000	Config	No	Yes	Safe state activated upon connecting a USB device.
UART WDG	0x00400000	Config	No	Yes	The slave MCU has stopped communication, which causes the device to enter the safe state.
SLV WDTRG	0x00800000	Config	No	Yes	Slave MCU was reset by watchdog during normal operation
SLV ERRWD	0x01000000	Config	No	Yes	Slave MCU was reset by watchdog during initial self-check (ROM, RAM, CPU)

7 Modbus communication map

7.1 Modbus access data dictionary — status and diagnostics

7.1.1 Modbus registers

The data interface consists of a set of Modbus registers. These registers provide status information and life data. See section 6 about the MODBUS register for a complete overview.

Section 7.1 lists the Modbus input registers. For each register the following is listed:

Table 3: Modbus register parameters

• Adr	The address of the first register. Addresses are 0-based. Additional registers are all consecutive until the next listed address.
• Name	A descriptive name.
• Type	The type of the register(s). See below for supported types.
• Range/unit	<u>Range:</u> For scalar types this gives the value range. For enumerated types this lists the implemented values and a value description. If the type is a string, this field specifies than maximum string length. <u>Unit:</u> where applicable it shows the unit the register value is expressed in
• Access	R/O, Level 0, 1, 2 & 3

The Modbus standard does not specify data types outside the 16-bit registers. The SpeedSys 300 implements the following data types based on the default registers structure.

• UINT16	Unsigned, 16-bit integer. A single register value ranging from 0 to 65 535
• UINT32	Unsigned, 32-bit integer. A single register value ranging from 0 to 4 294 967 295
• Char16	Character data type, 16-bit. A single register value representing a 16-bit character
• Char32	Char32: Character data type, 32-bit. A single register value representing a 32-bit character
• Single	32-bit floating-point value. A single register value representing a 32-bit floating-point number

7.1.2 Main status

All data in Table 4 is read only.

Table 4: Modbus registers – Parameter block ‘Main Status’

Adr.	Name	Type	Range/unit	Access	Description
0000	device ID	uint16		R/O	Device identification code. SSY300 ID is 2300
0001	device ver	uint16		R/O	Current firmware version
0002	ROM CRC	uint16		R/O	Current Program-ROM CRC
0003	pp test active	uint16		R/O	proof test request active (digital input or Modbus register)
0004	serial num	char16		R/O	Serial number. Copy of ‘Device config - Factory’ serial num
0012	err status	uint32		R/O	Current error status. Main error register. B0 - Non-safety parameter CRC B1 - Safety parameter CRC B2 - Factory parameter CRC B3 - Parity error interrupt B4 - Self check (see reg. 6513) B5 - ROM CRC check B6 - RAM check B7 - Sensor error (short/break) B8 - Watchdog trigger B9 - Bad pulse B10 - Slave communication failed B11 - Slave threshold read back B12 - Slave supplies B13 - Aout read back error B14 - Rail supply off range B15 - 24V supply off range B16 - Master Vcc off range B17 - Relay PST error B18 - Parameter value invalid B19 - Master temperature over/under range B20 - USB interface active B21 - Initial safe B22 - UART Watch dog B23 - Slave runtime watchdog error B24 - Slave startup watchdog error B25..B31 - n.u.
0014	access level	uint16		R/O	Current access level. 0 - User; 1 - Admin; 2 - Factory
0015	prog state	uint16		R/O	programming status B7..B0:1 - normal operation mode; 0 - parameters programming mode in progress B15..B8: last successfully executed command code or 0xff in case of command execution error.
0016	param chk result	uint16		R/O	Result of check of Parameters ranges. Bitwise coded. Bit set means ‘Parameters out of range’ or block CRC incorrect B0 - Device config - user B1 - Device config - admin B2 - Device config - factory B3 - Measurement config B4 - Diagnostics - admin B5 - Diagnostics - factory B6 - Output - admin B7 - Output - Factory B8 - Admin password B9 - Device config - user (De-fault settings) B10 - Device config - admin (De-fault settings) B11 - Measurement config (De-fault settings) B12 - Output - admin (Default settings)
0017	safe state	uint16		R/O	Value ‘1’ signal ‘device in safe state’
0018	power on time	uint32		R/O	Time elapsed since last power cycle

0020	total work	uint32		R/O	Total power on time since factory release
0022	CPU temperature	single		R/O	Current Master MCU temperature
0024	err status mem	uint32		R/O	Error status memory. Read/Write access for each level

7.1.3 Control

Possible write access and conditions are mentioned in column 'Description'. Write access is possible only using USB-Serial interface.

Table 5: Modbus registers – Parameter block 'Control'

Adr.	Name	Type	Range/unit	Access	Description
0100	access pass	char16		level 0	Writing this register controls device access level. Read/Write Access for each level. Writing string equal to parameter 'admin pass' (#01000) grant 'Admin'-level access Writing factory password grant 'Factory' level access required! Writing other value set 'User'-level access.
0108	prog mode	uint16		level 0	Programming mode setting command. Read/Write Access for eachlevel. Code 0x33 - enter parameter programming mode Code 0x55 - restore admin default Code 0x66 - save current as de-fault Code 0x77 - restore current set-tings Code 0xaa - save settings. See
0109	PWM output	uint16		level 2	Current value of PWM-setting for analog output. Read/Write for factory access level. Used for factory output calibration
0110	output disable	uint16		level 2	Disable updating 'Pwm output' by output routine. Read/Write for factory access level setting value 1 in this object disable output control routine to update analog output. It makes possible to use 'PWM output' object for analog output calibration.
0111	diag cmd	uint16		level 0	Diagnostic command Read/write for each access level. Writing '1' to: B0 - resets Min/Max values of 'min rpm', 'max rpm', 'min acc', 'max acc' B1 - resets system error memory only B2 - resets loop exec times B3 - reset slave error memory B4 - reset event log (factory-level access required)
0112	proof req	uint16		level 0	B0 - Simulate digital input 'Proof Test' Read/write for each access level

7.1.4 Current values

All data in Table 6 is read only.

Table 6: Modbus registers – Parameter block ‘Current Values’

Adr.	Name	Type	Range/unit	Access	Description
0500	curr rpm	single		R/O	Current velocity [RPM]
0502	curr acc	single		R/O	Current acceleration [RPM/s]
0504	curr freq	single		R/O	Current input frequency used as base for velocity calculation [Hz].
0506	curr acc freq	single		R/O	Current input frequency used for acceleration calculation [Hz]
0508	curr acc base	single		R/O	Current acceleration [Hz/s]. Used as base for RPM/s calculation
0510	curr aout	single		R/O	Current analog output value [mA]
0512	curr aout fb	single		R/O	Current analog output feedback value [mA]
0514	max rpm	single		R/O	Maximum velocity value registered since power up or min/max reset (see object 'diag cmd', addr. 111) [RPM]
0516	min rpm	single		R/O	Minimum velocity value registered since power up or min/max reset (see object 'diag cmd', addr. 111) [RPM]
0518	max acc	single		R/O	Maximum acceleration value registered since power up or min/max reset (see object 'diag cmd', addr. 111) [RPM/s]
0520	min acc	single		R/O	Minimum acceleration value registered since power up or min/max reset (see object 'diag cmd', addr. 111) [RPM/s]
0522	master vcc	single		R/O	Current value of master Vcc voltage [V]
0524	v rail	single		R/O	Current value of rail voltage [V]
0526	v supl	single		R/O	current value of main supply voltage [V]
0528	CPU temp	single		R/O	current master MCU temperature [grad C]
0530	slave vcc	single		R/O	Average slave MCU Vcc value within last 50 ms [V]
0532	slave vcc max	single		R/O	Max. slave MCU Vcc value within last 50 ms [V]
0534	slave vcc min	single		R/O	Min. slave MCU Vcc value within last 50 ms [V]
0536	slave suppl max	single		R/O	Max. slave sensor supply voltage within last 50 ms [V]
0538	slave suppl min	single		R/O	Min. slave sensor supply voltage within last 50 ms [V]
0540	slave i1 max	single		R/O	Max. sensor current (path 1) within last 50 ms [mA]
0542	slave i1 min	single		R/O	Min. sensor current (path 1) within last 50 ms [mA]
0544	slave i2 max	single		R/O	Max. sensor current (path 2) within last 50 ms [mA]
0546	slave i2 min	single		R/O	Min. sensor current (path 2) within last 50 ms [mA]
0548	slave v1 max	single		R/O	Max. sensor voltage (path 1) within last 50 ms [V]
0550	slave v1 min	single		R/O	Min. sensor voltage (path 1) within last 50 ms [V]
0552	slave v2 max	single		R/O	Max. sensor voltage (path 2) within last 50 ms [V]
0554	slave v2 min	single		R/O	Min. sensor voltage (path 2) within last 50 ms [V]
0556	pp test stat	uint16		R/O	Partial proof test input status. '1' - input active, '0' - inactive
0557	al Rel1 active	uint16		R/O	Active alarms for relay 1. Coded bitwise as follows: B0 - n.u. B1 - n.u. B2 - Overspeed B3 - Underspeed B4 - Acceleration Max. B5 - Acceleration Min. B6 - Self check B7 - Partial Proof Test B8 - Non Safety Error
0558	al Rel2 active	uint16		R/O	Active alarms for relay 2. Coded as above
0559	al Rel3 active	uint16		R/O	Active alarms for relay 3. Coded as above
0560	al Rel4 active	uint16		R/O	Active alarms for relay 4. Coded as above
0561	al dout active	uint16		R/O	Active alarms for digital output. Coded as above

0562	dout stat	uint16		R/O	Digital output status. Output coded bitwise. Bit set means 'output active' B0 - Relay 1 B1 - Relay 2 B2 - Relay 3 B3 - Relay 4 B4 - Digital output
0563	reserve	uint16		R/O	
0564	freq 2 curr	single		R/O	Current frequency measured on second pulse input (auxiliary frequency measurement) [Hz]
0566	freq 2 max	single		R/O	Maximum auxiliary frequency value registered since power upon min/max reset (see object 'diag cmd', addr. 111) [Hz]
0568	freq 2 min	single		R/O	Minimum auxiliary frequency value registered since power upon min/max reset (see object 'diag cmd', addr. 111) [Hz]

7.1.5 Diagnostics data

All data in Table 7 is read only.

Table 7: Modbus registers – Parameter block 'Diagnostics'

Adr.	Name	Type	Range/ unit	Access	Description
6500	ram chk cnt	uint32		R/O	Ram check counter. Incremented each time ram check complete
6502	last chk pulses	uint32		R/O	Reference clock pulses encountered in last second
6504	aout chk diff	single		R/O	Difference between analog output value and analog output readback
6506	fram read stat	uint32		R/O	FRAM read status (CRC bad). Bitwise coded: B0 - 1st copy of 'Device config -user' B1 - 2nd copy of 'Device config -user' B2 - 1st copy of 'Device config -admin' B3 - 2nd copy of 'Device config -admin' B4 - 1st copy of 'Device config -factory' B5 - 2nd copy of 'Device config -factory' B6 - 1st copy of 'Measurementconfig' B7 - 2nd copy of 'Measurementconfig' B8 - 1st copy of 'Diag Config -admin' B9 - 2nd copy of 'Diag Config -admin' B10 - 1st copy of 'Diag Config -factory' B11 - 2nd copy of 'Diag Config -factory' B12 - 1st copy of 'output config -admin' B13 - 2nd copy of 'output config -admin' B14 - 1st copy of 'output config -factory' B15 - 2nd copy of 'output config - factory' B16 - 1st copy of 'admin pass' B17 - 2nd copy of 'admin pass' B18 - Factory setting for 'Deviceconfig - user' B19 - Factory setting for 'Deviceconfig - admin' B20 - Factory setting for 'Measurement config' B21 - Factory setting for 'Diagnostic config - admin' B22 - Factory setting for 'Outputconfig - admin' B23 - 1st copy of NV-Status B24 - 2nd copy of NV-Status
6508	mloop avr tm	uint32		R/O	Average main loop time [ns]
6510	mloop min tm	uint16		R/O	Min. main loop time [us]
6511	mloop max ignored	uint16		R/O	Max. main loop time for cycles with FRAM access (ignored for error time check) [us]
6512	mloop max tm	uint16		R/O	Max. main loop time for standard cycles [us]
6513	exec error	uint16		R/O	Execution error status. Bitwise coded: B0 - Execution completion error B1 - Assertion error B2 - Stack Overrun B3 - Interrupt error B4 - Main loop time exceeded B5 - MCU check error B6 - Acceleration calculation error B7 - Frequency calculation error B8 - MCU clock error
6514	slv assert err	uint32		R/O	Slave assert error address

6516	slv err stat	uint16		R/O	Slave error status. Bitwise coded: B0 - ROM CRC error B1 - RAM-check error B2 - MCU-check error B3 - General execution error (see B8-B15) B4 - ADC not ready B5..B7 - n.u. B8 - Execution completion error B9 - Assertion error B10 - Stack overrun B11 - Interrupt check error B12 - max. main loop time override B13..B15 - n.u.
6517	slv rom crc	uint16		R/O	Slave ROM CRC. Updated only in slave error response. Value 0 means 'no slave errors'
6518	slv mloop tm	uint16		R/O	Slave main loop time [us]. Updated only in slave error response. Value 0 means 'no slave errors'
6519	slv com err	uint16		R/O	Slave communication error. Bitwise coded: B0 - n.u. B1 - Message counter mismatch B2 - Message CRC error B3 - Message format error B4 - Context error (response w/o request) B5 - Slave internal error (slave diagnostics)
6520	slv com err mem	uint16		R/O	Slave communication error memory.
6521	ma fb raw	uint16		R/O	Current output feedback raw value
6522	raw ad in 1	uint16		R/O	Internal a/d converter raw input for main supply (24 V)
6523	raw ad in 2	uint16		R/O	Internal a/d converter raw input for rail supply
6524	raw ad in 3	uint16		R/O	Internal a/d converter raw input for MCU Vcc
6525	raw ad in 4	uint16		R/O	Internal a/d converter raw input for MCU temperature measurement
6526	t calib	uint32		R/O	MCU temperature calibration factor
6528	pulse count a	uint32		R/O	Pulse count on input a
6530	pulse count b	uint32		R/O	Pulse count on input b
6532	calc count eval f	uint32		R/O	Count of evaluated frequency calculation
6534	calc count eval a	uint32		R/O	Count of evaluated acceleration calculation
6536	calc count est f	uint32		R/O	Count of estimated frequency calculation
6538	calc count est a	uint32		R/O	Count of estimated acceleration calculation
6540	assert err	uint32		R/O	Master assert error address

7.1.6 Slave communication status

All data in Table 8 is read only.

Table 8: Modbus registers – Parameter block 'Slave Status'

Adr.	Name	Type	Range/ unit	Access	Description
7000	resp msg cnt	uint16		R/O	Slave response – message counter
7001	event stat	uint16		R/O	B8 - watch dog trigger detected B9 - communication error occurred B9 - A/D converter not ready
7002	measure cmd fb	uint16		R/O	Command feedback: B0, B1 - key selector
7003	cpu temperature	uint16		R/O	slave MCU temperature. Unit: 0.1grad C
7004	min ad 1	uint16		R/O	Min. value of A/D raw input 1 (I- monitor 1)
7005	min ad 2	uint16		R/O	Min. value of A/D raw input 2 (V- monitor 1)
7006	min ad 3	uint16		R/O	Min. value of A/D raw input 3 (A/D feedback 1)
7007	min ad 4	uint16		R/O	Min. value of A/D raw input 4 (I-monitor 2)
7008	min ad 5	uint16		R/O	Min. value of A/D raw input 5 (V-monitor 2)
7009	min ad 6	uint16		R/O	Min. value of A/D raw input 6 (D/A feedback 2)
7010	min ad 7	uint16		R/O	Min. value of A/D raw input 7 (V-Ref)
7011	min ad 8	uint16		R/O	Min. value of A/D raw input 8 (Vcc)
7012	max ad 1	uint16		R/O	Max. value of A/D raw input 1 (I-monitor 1)
7013	max ad 2	uint16		R/O	Max. value of A/D raw input 2 (V-monitor 1)
7014	max ad 3	uint16		R/O	Max. value of A/D raw input 3 (A/D feedback 1)
7015	max ad 4	uint16		R/O	Max. value of A/D raw input 4 (I-monitor 2)
7016	max ad 5	uint16		R/O	Max. value of A/D raw input 5 (V-monitor 2)
7017	max ad 6	uint16		R/O	Max. value of A/D raw input 6 (D/A feedback 2)
7018	max ad 7	uint16		R/O	Max. value of A/D raw input 7 (V-Ref)
7019	max ad 8	uint16		R/O	Max. value of A/D raw input 8 (Vcc)
7020	smp count	uint16		R/O	Number of samples in request period
7021	slave rom crc	uint16		R/O	Slave ROM CRC
7022	req msg cnt	uint16		R/O	Slave request message counter
7023	measure cmd	uint16		R/O	Measurement command: B0, B1- key selector
7024	da out 1	uint16		R/O	requested D/A output value for output 1
7025	da out 2	uint16		R/O	requested D/A output value for output 2

7.2 Modbus parameters and configuration settings

7.2.1 Parameter block 'Device Config – User'

Table 9: Modbus registers – Parameter block 'Device Config – User'

Adr.	Name	Type	Range/ unit	Access	Description
2000	tag 1	char16		level 0	
2008	tag 2	char16		level 0	
2016	tag 3	char16		level 0	
2024	dev comment	char32		level 0	
2040	Modbus addr	uint16	1 .. 254	level 0	Modbus address for RS485 interface
2041	baud rs485	uint16	0 .. 5	level 0	Coded baud rate for RS485 interface: 0 - 4800 1 - 9600 2 - 19200 3 - 38400 4 - 57600 5 - 115200
2042	reserve	uint16		level 0	

2043	parity rs485	uint16	0 .. 2	level 0	0 - no parity; 1 - even; 2 - odd
2044	rs485 term	uint16	0 .. 1	level 0	0 - RS485 termination off; 1 - on
2045	crc dev user	uint16		level 0	Parameter block CRC

7.2.2 Parameter block 'Device Config - Admin

Table 10: Modbus registers – parameter block 'Device Config – Admin'

Adr.	Name	Type	Range/unit	Access	Description
2500	tag 1 adm	char16		level 1	
2508	tag 2 adm	char16		level 1	
2516	tag 3 adm	char16		level 1	
2524	dev comment adm	char32		level 1	
2540	voting struct	uint16		level 1	voting structure - only for reporting
2541	crc dev adm	uint16		level 1	Parameter block CRC

7.2.3 Parameter block 'Device Config – Factory'

Table 11: Modbus registers – module configuration – factory

Adr.	Name	Type	Range/unit	Access	Description
3000	serial number	char16		level 2	
3008	schem version	char16		level 2	
3016	PCB code	char16		level 2	
3024	device option	uint16		level 2	device personality (bit pattern) 0010b: SpeedSys 200 0011b: SpeedSys 300
3025	crc dev fact	uint16		level 2	Parameter block CRC

7.2.4 Parameter block 'Measurement Config'

Table 12: Modbus registers – measurement configuration

Adr.	Name	Type	Range/unit	Access	Description
4000	wheel_shape	uint16	0 .. 3	level 1	Type of wheel (information only)
4001	wheel teeth	uint16	1 .. 10000	level 1	Number of pulses per revolution
4002	sensor type	uint16	0 .. 2	level 1	Sensor Type 0: 2-Wire current loop 1: 3-Wire voltage 2: 2-Wire voltage
4003	freq avr	uint16	1 .. 1000	level 1	Frequency averaging window for frequency measurement
4004	freq avr acc	uint16	1 .. 1000	level 1	Frequency averaging window for acceleration measurement
4005	acc depth	uint16	1 .. 5000	level 1	Acceleration calculation depth (used when 'Acc d factor' = 0)
4006	acc d factor	uint16	0 .. 1000	level 1	Acceleration calculation depth factor. Define frequency dependent acceleration calculation depth = f/Acc d factor. Factor value = 0 means fixed calculation depth is to apply (param.: 'Acc depth'). E.g. factor value 100 means for current frequency 20000 Hz acceleration calculation depth is 200
4007	meas mode	uint16		level 1	info field - only for reporting
4008	rated speed	single	0 .. 2100000	level 1	Nominal speed range defined in 'output config -factory'
4010	trig level I	single	0 .. 20.5	level 1	Trigger level for current input
4012	trig level U	single	0 .. 24	level 1	Trigger level for voltage input
4014	meas edge	uint16	0 .. 1	level 1	Measurement edge 0 - rising edge 1 - falling edge
4015	module	uint16		level 1	info field - only for reporting
4016	low freq cut	single	0 .. 35000	level 1	Minimum frequency value for sensor measurement activation (low frequency cut-off)
4018	reserve	uint16		level 1	
4019	crc measurement	uint16		level 1	Parameter block CRC

7.2.5 Parameter block “DIAG Config – admin

Table 13: Modbus registers - Parameter block 'Diag Config – Admin'

Adr.	Name	Type	Range/unit	Access	Description
4500	bad pulse tout	uint32	bp tout min bp tout max	level 1	Time-out for bad pulses: Min time period of good pulses per one bad pulse. Unit: 1 ms, Value 0 cause each bad pulse raises immediately diagnostic error. Range defined in 'Diag. Config - factory'
4502	max sens l	single	i sens min i sens max	level 1	Maximum sensor current Range defined in 'Diag. Config - factory'
4504	min sens l	single	i sens min i sens max	level 1	Minimum sensor current Range defined in 'Diag. Config - factory'
4506	max sens u	single	v sens min v sens max	level 1	Maximum sensor voltage Range defined in 'Diag. Config - factory'
4508	min sens u	single	v sens min v sens max	level 1	Minimum sensor voltage Range defined in 'Diag. Config - factory'
4510	aout chk	single	aout chk min aout chk max	level 1	Analog output read-back difference [mA] Range defined in 'Diag. Config -factory'
4512	e latch mask adm	uint32		level 1	Error latching mask. Bit set means SpeedSys stays in safe state even if error reason vanishes. B0 - User level 0 parameter CRC B1 - User level 1 parameter CRC B2 - User level 2 parameter CRC B3 - n.u. B4 - n.u. B5 - n.u. B6 - n.u. B7 - Sensor Error (short/break) B8 - n.u. B9 - Bad Pulses B10 - Slave communication Failed B11 - Threshold read back error B12 - Slave supplies B13 - Aout read back error B14 - Rail supply off range B15 - 24 V supply off range B16 - Master Vcc off range B17 - n.u. B18 - Parameter value invalid B19 - Master temperatureover/under range B20 - USB interface active B21 - n.u. (initial safe always latching) B22 - UART Watch dog B23 - Slave runtime watchdog error B24 - Slave start-up watchdog error B25..B31 - n.u. This mask is 'or'-ed with corresponding mask in factory diagnostic parameter set
4514	proof chk	uint16	0 .. 1	level 1	Proof check active. 0 - not active (only error reset) 1 - active (proof check and error reset)
4515	USB active	uint16	0 .. 1	level 1	USB activate action 0 - no action 1 - enter safe state (Error bit B20)
4516	sif disable	uint16		level 1	B0 - disable analog output check B1 - Disable analog output error signalling (no error in safe state) B2 - Disable initial safe state after power cycle or watchdog reset
4517	crc diag adm	uint16		level 1	Parameter block CRC

7.2.1 Parameter block 'Output Config – Admin'

Table 14: Modbus registers - Parameter block 'Output Config – Admin'

Adr.	Name	Type	Range/unit	Access	Description
5500	rel1 config	uint16		level 1	Relay 1 (SIL) Status B0 - Latching B1 - n.u. B2 - Overspeed B3 - Underspeed B4 - Acceleration MAX B5 - Acceleration MIN B6 - n.u. B7 - Prooftest B8 - Non-Safety Error
5501	rel2 config	uint16		level 1	Relay 2 (SIL) Status B0 - Latching B1 - n.u. B2 - Overspeed B3 - Underspeed B4 - Acceleration MAX B5 - Acceleration MIN B6 - n.u. B7 - Prooftest B8 - Non-Safety Error
5502	rel3 config	uint16		level 1	Relay 3 (Non-SIL) Status B0 - Latching B1 - Inverted B2 - Overspeed B3 - Underspeed B4 - Acceleration MAX B5 - Acceleration MIN B6 - Self Diagnostics B7 - Prooftest B8 - Non-Safety Error
5503	rel4 config	uint16		level 1	Relay 4 (Non-SIL) Status B0 - Latching B1 - Inverted B2 - Overspeed B3 - Underspeed B4 - Acceleration MAX B5 - Acceleration MIN B6 - Self Diagnostics B7 - Prooftest B8 - Non-Safety Error
5504	dout config	uint16		level 1	Digital Output (Non-SIL) Status B0 - Latching B1 - Inverted B2 - Overspeed B3 - Underspeed B4 - Acceleration MAX B5 - Acceleration MIN B6 - Self Diagnostics B7 - Prooftest B8 - Non-Safety Error
5505	reserve	uint16		level 1	
5506	r1 one shot tm	uint32	1 .. 1000000	level 1	Relay 1 One-shot time. Unit: 1 ms
5508	r2 one shot tm	uint32	1 .. 1000000	level 1	Relay 2 One-shot time. Unit: 1 ms
5510	r3 one shot tm	uint32	1 .. 1000000	level 1	Relay 3 One-shot time. Unit: 1 ms
5512	r4 one shot tm	uint32	1 .. 1000000	level 1	Relay 4 One-shot time. Unit: 1 ms
5514	do one shot tm	uint32	1 .. 1000000	level 1	Dig. out one-shot time. Unit: 1 ms
5516	r1 del sp max	uint32	0 .. 1000000	level 1	Relay 1 delay for overspeed alarm. Unit: 1 ms
5518	r2 del sp max	uint32	0 .. 1000000	level 1	Relay 2 delay for overspeed alarm. Unit: 1 ms
5520	r3 del sp max	uint32	0 .. 1000000	level 1	Relay 3 delay for overspeed alarm. Unit: 1 ms
5522	r4 del sp max	uint32	0 .. 1000000	level 1	Relay 4 delay for overspeed alarm. Unit: 1 ms
5524	do del sp max	uint32	0 .. 1000000	level 1	Digital out delay for overspeed alarm. Unit: 1 ms

5526	r1 del sp min	uint32	0 .. 1000000	level 1	Relay 1 delay for underspeed alarm. Unit: 1 ms
5528	r2 del sp min	uint32	0 .. 1000000	level 1	Relay 2 delay for underspeed alarm. Unit: 1 ms
5530	r3 del sp min	uint32	0 .. 1000000	level 1	Relay 3 delay for underspeed alarm. Unit: 1 ms
5532	r4 del sp min	uint32	0 .. 1000000	level 1	Relay 4 delay for underspeed alarm. Unit: 1 ms
5534	do del sp min	uint32	0 .. 1000000	level 1	Digital out delay for underspeed alarm. Unit: 1 ms
5536	r1 del acc max	uint32	0 .. 1000000	level 1	Relay 1 delay for max. accel. alarm. Unit: 1 ms
5538	r2 del acc max	uint32	0 .. 1000000	level 1	Relay 2 delay for max. accel. alarm. Unit: 1 ms
5540	r3 del acc max	uint32	0 .. 1000000	level 1	Relay 3 delay for max. accel. alarm. Unit: 1 ms
5542	r4 del acc max	uint32	0 .. 1000000	level 1	Relay 4 delay for max. accel. alarm. Unit: 1 ms
5544	do del acc max	uint32	0 .. 1000000	level 1	Digital out delay for max. accel. alarm. Unit: 1 ms
5546	r1 del acc min	uint32	0 .. 1000000	level 1	Relay 1 delay for min. accel. alarm. Unit: 1 ms
5548	r2 del acc min	uint32	0 .. 1000000	level 1	Relay 2 delay for min. accel. alarm. Unit: 1 ms
5550	r3 del acc min	uint32	0 .. 1000000	level 1	Relay 3 delay for min. accel. alarm. Unit: 1 ms
5552	r4 del acc min	uint32	0 .. 1000000	level 1	Relay 4 delay for min. accel. alarm. Unit: 1 ms
5554	do del acc min	uint32	0 .. 1000000	level 1	Digital out delay for min. accel. alarm. Unit: 1 ms
5556	r1 sp max	single	v min - v max	level 1	Relay 1 overspeed alarm value Range defined in 'output config-factory'
5558	r2 sp max	single	v min - v max	level 1	Relay 2 overspeed alarm value Range defined in 'output config-factory'
5560	r3 sp max	single	v min - v max	level 1	Relay 3 overspeed alarm value Range defined in 'output config-factory'
5562	r4 sp max	single	v min - v max	level 1	Relay 4 overspeed alarm value Range defined in 'output config-factory'
5564	do sp max	single	v min - v max	level 1	Digital out overspeed alarm value Range defined in 'output config-factory'
5566	r1 sp min	single	v min - v max	level 1	Relay1 underspeed alarm value Range defined in 'output config-factory'
5568	r2 sp min	single	v min - v max	level 1	Relay 2 underspeed alarm value Range defined in 'output config-factory'
5570	r3 sp min	single	v min - v max	level 1	Relay 3 underspeed alarm value Range defined in 'output config-factory'
5572	r4 sp min	single	v min - v max	level 1	Relay 4 underspeed alarm Value Range defined in 'output config-factory'
5574	do sp min	single	v min - v max	level 1	Digital out underspeed alarm value Range defined in 'output config-factory'
5576	r1 acc max	single	acc min - acc max	level 1	Relay 1 max. accel. Alarm value Range defined in 'output config-factory'
5578	r2 acc max	single	acc min - acc max	level 1	Relay 2 max. accel. Alarm value Range defined in 'output config-factory'
5580	r3 acc max	single	acc min - acc max	level 1	Relay 3 max. accel. Alarm value Range defined in 'output config-factory'
5582	r4 acc max	single	acc min - acc max	level 1	Relay 4 max. accel. Alarm value Range defined in 'output config-factory'
5584	do acc max	single	acc min - acc max	level 1	Digital out max. acceleration alarm value Range defined in 'output config-factory'
5586	r1 acc min	single	acc min - acc max	level 1	Relay 1 min. accel. alarm value Range defined in 'output config-factory'
5588	r2 acc min	single	acc min - acc max	level 1	Relay 2 min. accel. alarm value Range defined in 'output config-factory'
5590	r3 acc min	single	acc min - acc max	level 1	Relay 3 min. accel. alarm value Range defined in 'output config-factory'
5592	r4 acc min	single	acc min - acc max	level 1	Relay 4 min. accel. alarm value Range defined in 'output config-factory'
5594	do acc min	single	acc min - acc max	level 1	Digital out min. acceleration alarm value Range defined in 'output config-factory'
5596	r1 sp max hyst	single	v min - v max	level 1	Relay 1 overspeed alarm hysteresis. Range defined in 'output config-factory'
5598	r2 sp max hyst	single	v min - v max	level 1	Relay 2 overspeed alarm hysteresis Range defined in 'output config-factory'
5600	r3 sp max hyst	single	v min - v max	level 1	Relay 3 overspeed alarm hysteresis Range defined in 'output config-factory'
5602	r4 sp max hyst	single	v min - v max	level 1	Relay 4 overspeed alarm hysteresis

					Range defined in 'output config -factory'
5604	do sp max hyst	single	v min- -v max	level 1	Digital out overspeed alarm hysteresis Range defined in 'output config -factory'
5606	r1 sp min hyst	single	v min- -v max	level 1	Relay 1 underspeed alarm hysteresis Range defined in 'output config -factory'
5608	r2 sp min hyst	single	v min- -v max	level 1	Relay 2 underspeed alarm hysteresis Range defined in 'output config -factory'
5610	r3 sp min hyst	single	v min- -v max	level 1	Relay 3 underspeed alarm hysteresis Range defined in 'output config -factory'
5612	r4 sp min hyst	single	v min- -v max	level 1	Relay 4 underspeed alarm hysteresis Range defined in 'output config -factory'
5614	do sp min hyst	single	v min- -v max	level 1	Digital out underspeed alarm hysteresis Range defined in 'output config -factory'
5616	r1 acc max hyst	single	acc min - acc max	level 1	Relay 1 max. accel. alarm hysteresis Range defined in 'output config -factory'
5618	r2 acc max hyst	single	acc min - acc max	level 1	Relay 2 max. accel. alarm hysteresis Range defined in 'output config -factory'
5620	r3 acc max hyst	single	acc min - acc max	level 1	Relay 3 max. accel. alarm hysteresis Range defined in 'output config -factory'
5622	r4 acc max hyst	single	acc min - acc max	level 1	Relay 4 max. accel. alarm hysteresis Range defined in 'output config -factory'
5624	do acc max hyst	single	acc min - acc max	level 1	Digital out max. accel. alarm hysteresis Range defined in 'output config -factory'
5626	r1 acc min hyst	single	acc min - acc max	level 1	Relay 1 min. accel. alarm hysteresis Range defined in 'output config -factory'
5628	r2 acc min hyst	single	acc min - acc max	level 1	Relay 2 min. accel. alarm hysteresis Range defined in 'output config -factory'
5630	r3 acc min hyst	single	acc min - acc max	level 1	Relay 3 min. accel. alarm hysteresis Range defined in 'output config -factory'
5632	r4 acc min hyst	single	acc min - acc max	level 1	Relay 4 min. accel. alarm hysteresis Range defined in 'output config -factory'
5634	do acc min hyst	single	acc min - acc max	level 1	Digital out min. accel. alarm hysteresis Range defined in 'output config -factory'
5636	acc cutoff speed	single	v min - v max	level 1	minimal speed for accel.-alarm processing. Below this speed acceleration alarms are not evaluated
5638	aout v 4ma	single	0 .. 2100000	level 1	Speed value for 4 mA output Range defined in 'output config -factory'
5640	aout v 20ma	single	0 .. 2100000	level 1	Speed value for 20 mA output Range defined in 'output config -factory'
5642	aout max	single	3.6 .. 21.0	level 1	MIN Limit value for Aout swing
5644	aout min	single	3.6 .. 21.0	level 1	MIN Limit value for Aout swing
5646	aout error	single	0 .. 3.6	level 1	Analog output error value (Output value in safe state)
5648	reserve	uint16		level 1	
5649	crc out adm	uint16		level 1	Parameter block CRC

7.2.2 Parameter block 'Diag Config – Factory'

Table 15: Modbus registers – Parameter block 'Diag Config – Factory'

Adr.	Name	Type	Range/unit	Access	Description
5000	slv u ref	single	2.4 .. 2.6	level 2	Reference voltage value (Slave) [V]
5002	slv vcc max	single	3.3 .. 3.8	level 2	Slave Vcc voltage Max-lim.
5004	slv vcc min	single	3.0 .. 3.3	level 2	Slave Vcc voltage Min-lim.
5006	supl sens max	single	12 .. 30	level 2	Max value of sensor supply voltage (slave)
5008	supl sens min	single	12 .. 30	level 2	Min value of sensor supply voltage (slave)
5010	u diff thrs	uint16	0 .. 4095	level 2	Threshold voltage read back difference. Abs. value in A/D readings digits. (slave)
5011	reserve	uint16		level 2	
5012	m u ref	single	2.4 .. 2.6	level 2	Master reference voltage
5014	m vcc max	single	3.3 .. 3.8	level 2	Master Vcc voltage Max-lim.
5016	m vcc min	single	3.0 .. 3.3	level 2	Master Vcc voltage Min-lim.
5018	rail u max	single	12 .. 16	level 2	Supply Rail voltage Max (master)
5020	rail u min	single	9 .. 12	level 2	Supply Rail voltage Min (master)
5022	u 24v max	single	24 .. 40	level 2	24 V supply voltage Max (master)
5024	u 24v min	single	10 .. 24	level 2	24 V supply voltage Min (master)
5026	e latch mask	uint32		level 2	Error latching mask. Bit set means SpeedSys stays in safe state even if error reason vanishes. B0 - User level 0 parameter CRC B1 - User level 1 parameter CRC B2 - User level 2 parameter CRC B3..B6 - n.u. B7 - Sensor Error (short/break) B8 - n.u. B9 - Bad Pulses B10 - Slave communication Failed B11 - Threshold read back error B12 - Slave supplies B13 - Aout read back error B14 - Rail supply off range B15 - 24 V supply off range B16 - Master Vcc off range B17 - n.u. B18 - Parameter value invalid B19 - Master temperature over/under range B20 - USB interface active B21 - n.u. (initial safe always latching) B22 - UART Watch dog B23 - Slave runtime watchdog error B24 - Slave startup watchdog error B25..B31 - n.u.
5028	e-reset mask	uint32		level 2	Error Reset mask. Bit set means in case of error SpeedSys reset itself (stops watchdog retrigger). Bit not set means it stays insafe state until power cycle. B0..B2 - n.u. B3 - Parity error B4 - ROM check CRCB5 - RAM check B6 - Self check B7..B31 - n.u.
5030	aout chk max	single	0.02 .. 20	level 2	Aout read back error max value
5032	aout chk min	single	0.02 .. 20	level 2	Aout read back error min value
5034	i sens max	single	0 .. 30	level 2	Max value of sensor current limit setting
5036	i sens min	single	0 .. 30	level 2	Min value of sensor current limit setting
5038	v sens max	single	0 .. 24	level 2	Max value of sensor voltage limit setting
5040	v sens min	single	0 .. 10	level 2	Min value of sensor voltage limit setting

5042	temp max	single	-40 .. 120	level 2	Max value of MCU temperature
5044	temp min	single	-40 .. 120	level 2	Min value of MCU temperature
5046	bp tout max	uint32	0 .. 2000000000	level 2	Min value of bad pulse time-out setting. Unit: 1 ms. Value 0 is always allowed
5048	bp tout min	uint32	0 .. 2000000000	level 2	Max value of bad pulse time-out setting. Unit: 1 ms
5050	sens break lim	single	0.0 .. 6.0	level 2	Sensor break limit for 2-wire voltage sensor [V]
5052	sens u offset	single	0.0 .. 6.0	level 2	Sensor reference offset for 2-wire voltage sensor [V]. Only used for information.
5054	reserve	uint16		level 2	
5055	crc diag fact	uint16		level 2	Parameter block CRC

5.1.1 Parameter block 'Output Config – Factory'

Table 16: Modbus registers – Parameter block 'Output Config – Factory'

Adr.	Name	Type	Range/unit	Access	Description
6000	cal aout 4ma	uint16	100 .. 24000	level 2	PWM value for 4 mA
6001	cal aout 20ma	uint16	100 .. 24000	level 2	PWM value for 20 mA
6002	cal ain 4ma	uint16	0 .. 16383	level 2	Current read-back for 4 mA
6003	cal ain 20ma	uint16	0 .. 16383	level 2	Current read-back for 20 mA
6004	-v max	single	0 .. 2100000	level 2	Max-Limit for speed settings
6006	v min	single	0 .. 2100000	level 2	Min-Limit for speed settings
6008	acc max	single	-100000 - 100000	level 2	Max-Limit for acceleration settings
6010	acc min	single	-100000 - 100000	level 2	Min-Limit for acceleration settings
6012	reserve	uint16		level 2	
6013	crc out fact	uint16		level 2	Parameter block CRC

8 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.

8.1 Spare parts

-none listed-

8.2 Contact information

Questions and support?

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

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