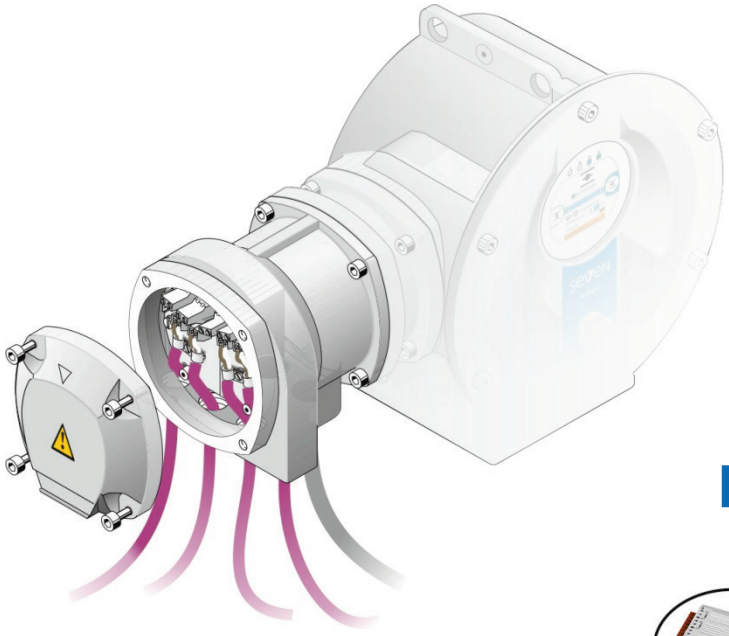
SIPOS AKTORIK

seven

Modbus interface for Electric Actuators

Instructions

Modbus RTU



Modbus TCP/IP

Issue 11.20
Subject to changes without notice!

Y070.400/EN

Contents

Attachments

1 General information

1.1 Safety instructions: Used symbols and their meanings

Warning marks activities which, if not carried out correctly, can affect the safety of persons or property.

Notice marks activities which have major influence on the correct operation. Non-observance of these notes may lead to consequential damage.

1.2 Notes to the operation instructions

This manual describes the Modbus interface for SEVEN electric actuators.
You can find more detailed information about the electric actuators, including the electrical and mechanical connections, parameterization and commissioning in the Y070.302/EN (PROFITRON/HiMod) and Y070.301/EN (ECOTRON) manuals.

This manual is complete only in combination with the instruction manual of the respective actuator.
The safety information contained in the instruction manuals must be heeded at all times when working with the actuators. This manual only contains specific information about the Modbus interface!

2 The Modbus interface for SEVEN

The Modbus interface is pre-installed and tested in all devices that leave the factory "Modbus-capable"!

2.1 General description

General information about Modbus

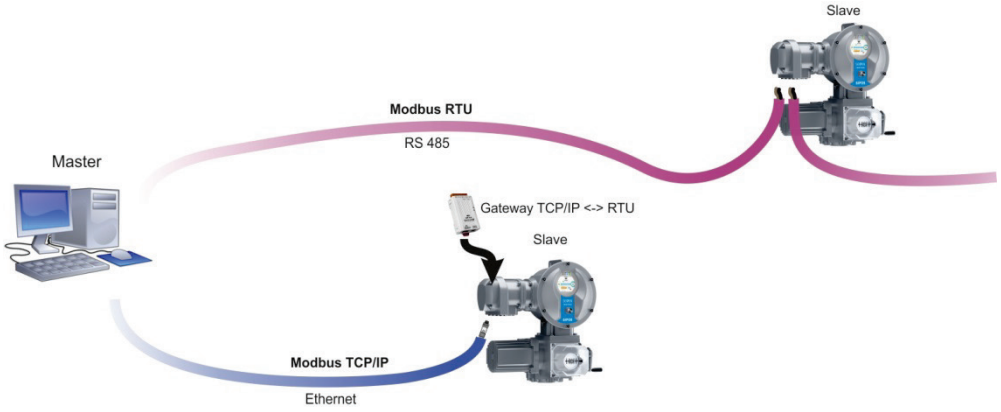
Modbus is an international, open fieldbus standard and allows the communication with field devices connected to the same network. As a fieldbus protocol which is easy to implement, Modbus is successfully used throughout the world. The application range includes automation in the areas of manufacturing, processing and building.

Basic characteristics

Modbus determines the technical and functional features of a fieldbus system with which distributed digital field devices can be interconnected. It is designed for fast data transmission on the field level.

SEVEN actuator support the two Modbus network protocols:

- **Modbus RTU** for data exchange with RS-485 connection
  (RTU = Remote Terminal Unit) and
- **Modbus TCP/IP** for data exchange via an Ethernet network
  (TCP/IP = Transmission Control Protocol/Internet Protocol).
  SEVEN actuators with Modbus TCP/IP interface have an integrated network protocol converter (TCP/IP <-> RTU gateway) with fast web server.



Modbus distinguishes between master and slave devices.

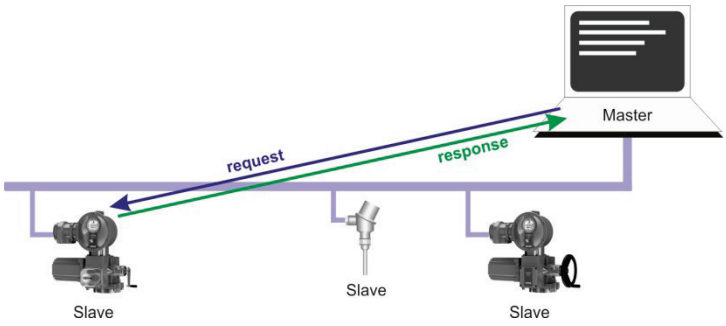
- **Master devices** control the data traffic on the Bus. A master is allowed to send messages without an external request.
- **Slave devices** such as SEVEN actuators for example are field devices. They do not have bus access, i.e. they may only acknowledge received messages or, at the request of a master, transmit messages to that master. Slaves are also called “passive stations”.

The following generally applies:

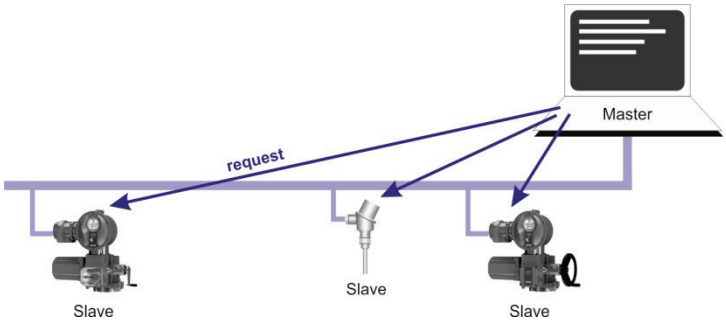
- only 1 master may be active at a bus branch (mono-master bus system)
- the communication is always initiated by the master; the slaves have to respond to the requests of the master

The master has two options for communication with the field devices (slaves):

- **Unicast mode -** direct request to a certain field device (slave address not equal to ”0“). "Standard" operation: Master sends a request to a field device, to which the latter has to respond.



- **Broadcast mode -** general request to all field devices (slave address ”0“). The master sends a request (telegram) to all bus stations, to send an emergency command, for example, to which none of the field devices may respond. For further information, refer to chapter 6.1.



2.2 Modbus interface

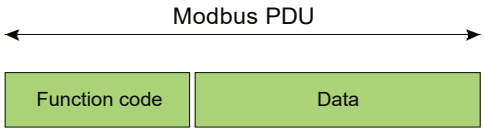
- In 1- or 2-channel (not with FO and Ethernet) version.
- For ECOTRON, PROFITRON and HiMod.
- Electric standard connection of all SEVEN actuators for RS-485, FO as well as Ethernet.
- Modbus can be retrofitted at any time.
- User interface:
  - SEVEN actuators can both be parameterized and controlled via Modbus,
  - control mix also possible, e.g.:
    - Control via binary/analog inputs and
    - Observe/parameterize via fieldbus.
- Observe Modbus cable specifications!
  - Modbus RTU : twisted, screened copper cable acc. to IEC 61158 resp. FO cable acc. to DIN VDE 0880 part 3,
  - Modbus TCP/IP: cable recommendation Cat. 6_A acc. to IEC IEEE 802.3.

2.3 Modbus – Basic functions

2.3.1 Telegram structure

Serial data transmission is used as the basis, transmission is done bit per bit.

Protocol data unit (PDU)
The Modbus PDU (protocol data unit) consists of the function code and the actual data.



2.3.2 Message frame for communication via Modbus

Modbus RTU: serial RS 485 communication

Slave address	Function code	Data	CRC (cyclic redundancy check)	
1 byte	1 byte	0 up to 252 byte(s)	2 bytes	
			CRC Low	CRC High

Modbus TCP/IP: digital communication with Industrial Ethernet

MBAP Header (Modbus Application Protocol header)	Function code	Data
7 byte	1 byte	0 up to 252 byte(s)

Transaction ID, Protocol ID, Length, Slave address

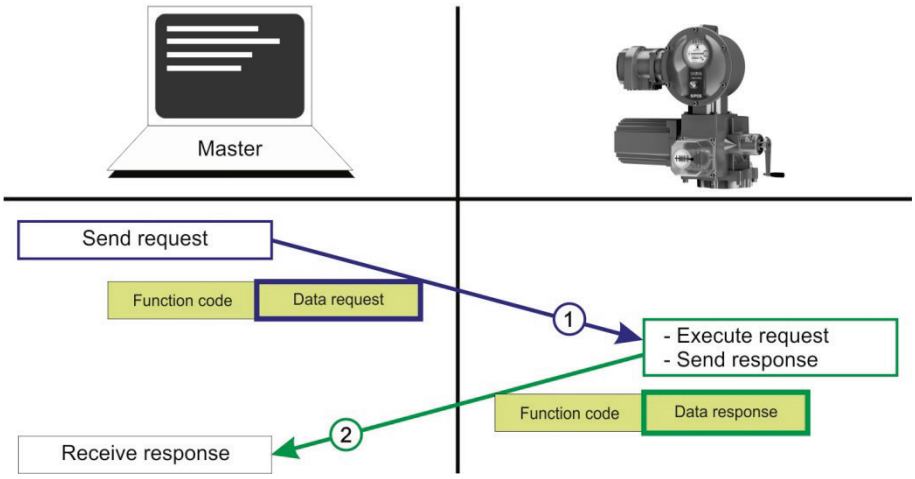
2.3.3 Three PDU types – communication procedure

Three different communication types are used for communication.

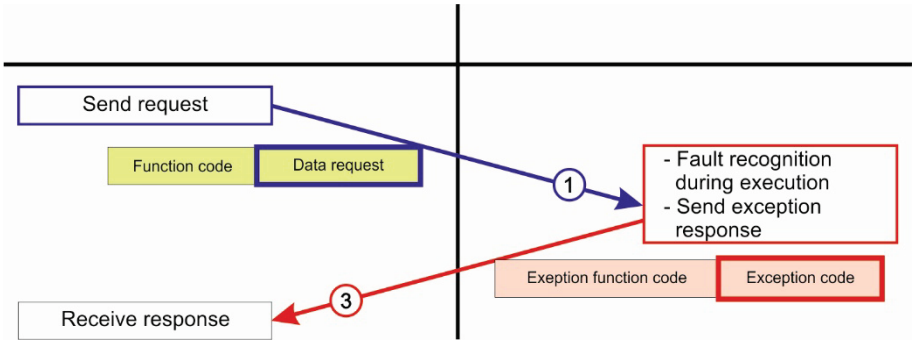
1. **Request** – request from DCS/controls (master)
2. **Response** – for fault-free processing by the field device (slave)
3. **Exception reply**: The field device returns the request with a modified function code (highest bit is set); the exception code contains information on the cause of the fault

Communication procedure:

- **Fault-free**



- **Fault**



Causes for the fault:

- Message (request telegram) is incomplete → Slave does not respond, fault counter is incremented by one
- The request in the message is generally not supported by the slave ➔ exception code
- Slave is in one of the fault states and cannot execute the request at the moment ➔exception code

2.3.4 Data model

The data model of the Modbus fieldbus is the mapping of the input and output values of a field device (e.g. SEVEN) on a storage structure. Using bus commands, you may access the storage structure and therefore operate the field device.
Available data types in the Modbus data model:

- There are 2 data types differing in size: 1-bit values and 16-bit values.
- Both data types are available in 2 versions: a Read-Only version and a Read-Write version.

➔ All in all, there are 4 different storage areas:

Storage area	Data type	Access rights	Description
Discretes Input	Single-Bit	Read-Only	Signal end position OPEN/CLOSED, fault, etc.
Coils	Single-Bit	Read-Write	Control OPEN, CLOSE, EMERGENCY (per bit)
Input Registers	16-Bit-Word	Read-Only	Signal end position OPEN/CLOSED, fault, etc. as well as actual position value
Holding Registers	16-Bit-Word	Read-Write	Control OPEN, CLOSE, EMERGENCY, setpoint as well as parameter data

2.3.5 Function codes – supported services

The master uses the so-called function code in the Modbus telegram to inform the slave:

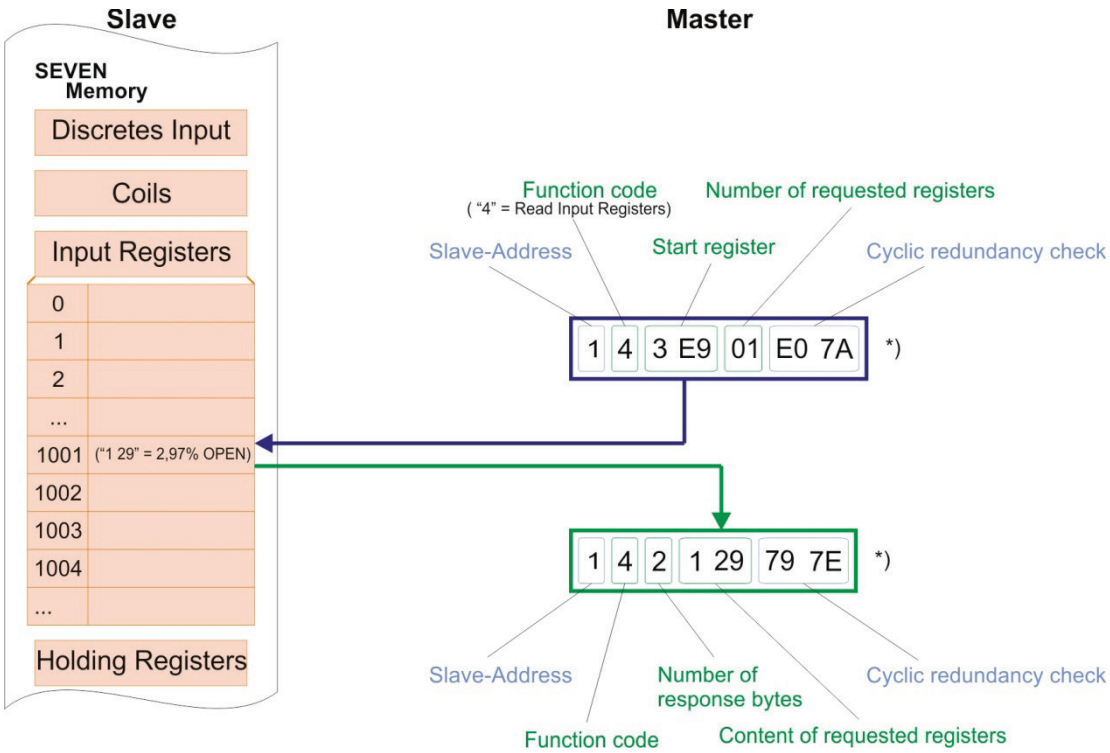
- what it would like to read or write,
- whether it would like to request diagnostic data.

Function codes are therefore commands to access the data model via bus.
➔ The function codes already determine the answer of the slave.

There are several predefined function codes. For a detailed description of the function codes, refer to chapter 3.1.

Example for a master request to the actuator:

Read access to Input Register 1001: current actual position value



***)** hexadecimal presentation of the telegram values

3 Technical Data

3.1 SEVEN with Modbus interface

Electrical connection / Fieldbus connection		
Supply voltage **Tolerances**	1-ph AC 110 - 115 V 1-ph AC 220 - 230 V 3-ph AC 190 - 200 V 3-ph AC 380 - 460 V Permissible voltage tolerances: -10 %/+15 % Frequency range: 40 – 70 Hz	
Automatic phase sequence correction	The direction of rotation of the output shaft is independent of the phase sequence	
Optional external power supply of the electronics	24 V DC ± 25 % (protected against polarity reversal) Current consumption of the electronics: Modbus RTU 1 channel: max. 160 mA, Modbus RTU 2 channel: max. 180 mA, Modbus TCP/IP: max. 190 mA	
Voltage output	24 V DC, max. 125 mA (floating and protected against polarity reversal)	
Electrical connection with Modbus interface	Round plug connector with 50-pin screw connections. • Modbus RTU: RS 485 connection on integrated bus termination board with switchable bus termination resistors. • Modbus TCP/IP Ethernet connection via M12 connector led out at the electrical connection. Max. lead cross section - Modbus RTU: 1.5 mm² - Modbus TCP/IP M12 connector, D-coded - analog / binary signals: 2.5 mm² - mains: 6 mm²	
RS 485-interface (only Modbus RTU)	EIA-485 (RS 485), cable recommendation: Copper cable acc. IEC 61158 ➔ refer to chapter 3.2.1 “Communication parameters of the Modbus RTU interface”	
Ethernet-interface (only Modbus TCP/IP)	IEC IEEE 802.3, cable recommendation: Cat. 6_A ➔ refer to chapter 3.2.2 “Communication parameters of the Modbus TCP/IP interface”	
Fiber optic interface (option with Modbus RTU)	Fiber optic interface for the realization of star and line structures. ➔ refer to chapter 3.2.1 “Communication parameters of the Modbus RTU interface”	
Overvoltage protection (option with Modbus RTU)	Protection of the electronics and motor against over voltage up to 6 kV on the bus terminals, at a guaranteed Modbus communication up to baud rate 115,200 Bit/s	
Inputs, outputs / other features		
Control	Control and feedback signal via Modbus ➔ details see “Parameterizing of Modbus”	
analog / binary inputs	ECOTRON - 3 binary 24/48 V DC inputs (OPEN, CLOSE, STOP) Status transmission possible via Modbus.	PROFITRON/HiMod - 5 binary 24/48 V DC inputs (OPEN, CLOSE, STOP, EMERGENCY, Mode) - 1 analog 0/4..20 mA input AI1 for e.g. positioner (option at PROFITRON) - 1 analog 0/4..20 mA input AI2 (option) Status transmission possible via Modbus.
analog / binary outputs	- 5 binary outputs (programmable) - 1 analog output AO1 for actual position value	- 8 binary outputs (programmable) - 1 analog 0/4..20 mA output AO1 - 1 analog 0/4..20 mA output AO2 (option)
Galvanic separation	- Binary inputs and outputs - analog inputs and outputs	
Modbus redundancy (option with Modbus RTU)	Hardware (separate FIFO memories and DC/DC-converters)	
Local controls	Standard: - Drive Controller (option: lockable) - 2 indication lights for LOCAL (yellow) and REMOTE (blue) - Indication lights for CLOSE (yellow) and OPEN (green): run and end position indication - 2 indication lights (green and red) for status and fault signals (ECOTRON only) - Plain text status display on color graphics display (PROFITRON/HiMod only) - USB interface (ECOTRON: internally on control PCB; PROFITRON/HiMod: externally at the electronics housing) - Bluetooth interface for parameterizing and controlling (PROFITRON/HiMod only)	
Remote control	Control by remote depending on the parameter setting of “Control mode“ and “Alternative control mode “: - Conventional interface (24/48 V binary or 0/4-20 mA analog) - Fieldbus interface	

Parameters / functions actuator	
Parameter settings	- via Modbus - menu based, via illuminated color graphics display with plain text display (operation with password-protection via Drive Controller of the local controls) (only PROFITRON/HiMod) - menu based, via illuminated LC display (only ECOTRON) - via the programming software COM-SIPOS
Language settings (only PROFITRON/HiMod)	CS, DA, DE, EL, EN, ES, FI, FR, IT, NL, NO, PL, PT, RU, SV, TR, ZH → other languages on request
Output speed / positioning time settings	- in 7 steps adjustable within the selected speed range (only ECOTRON) - continuous setting within the selected speed range (only PROFITRON/HiMod) Different settings possible for OPEN, CLOSE, EM. OP and EM. CL
Soft start	Constant torque with reduced speed in to and out of the end positions: - no overtorque - Starting current ≤ rated current
Positioner (option PROFITRON only) (only PROFITRON/HiMod)	Adaptive three-step controller Setpoint via Modbus or analog 0/4..20 mA signal, (rising/falling slope) Adjustable automatic adaptation of the dead band based on the quality of the setpoint and feedback signals. Speed reduction before reaching the setpoint
Process controller (option) (PROFITRON/HiMod only)	Setpoint via analog input AI1 or AI2 (0/4 … 20 mA), via Modbus or fixed setpoint Actual process value via analog input AI2 or AI1 (0/4 ... 20 mA)
Programmable travel dependent output speed (option) (only PROFITRON/HiMod)	Travel dependent speed setting via up to 10 interpolation points (value pairs): travel [% OPEN] in 1 % steps – speed [rpm]
External output speed setting (option) (only PROFITRON/HiMod)	Speed setpoint via Modbus or analog 0/4 ... 20 mA signal
Travel dependent freely adjustable positioning times (option) (only PROFITRON/HiMod)	The positioning times between up to 10 intermediate positions can be programmed independently: travel 0....100 [% OPEN], positioning time 0 ... 60000 [sec] For EMERGENCY operation via positioning time curve possible with adjustable factor.
Torque-curve recording from the valve (not for 2SG7 and 2SQ7) (only PROFITRON/HiMod)	Recording of up to 3 torque reference curves for pre-emptive valve monitoring: sampling rate in 1 % travel increments; can be saved and downloaded. The recorded values are reference values and can deviate from the absolute values especially in the end positions and when changing output speeds.
Retry torque block (only PROFITRON/HiMod)	Automatic retry to get over torque block (max. 5 x programmable)
Diagnostics	
Diagnosis data	- switching cycles/hour - number of switching cycles / travel dependent and torque dependent cut-offs - relative operating time - operating hours of electronics unit and motor
Maintenance limits /maintenance intervals (regarding valve) (only PROFITRON/HiMod)	- switching cycles - torque dependent cut-offs - motor operating hours
Fault memory	former five faults are displayed
Electronic rating-plate	- manufacturer - ordering no. - Serial number - original Serial number - tag number actuator
Monitoring and safety functions	internal diagnosis: - runtime - motor protection - travel sensor

Settings / Parameterizing of Modbus interface		
Baud rate setting	… as well as parity setting: fixed and identical for all devices	
Connection monitoring	can be set from 0 s to 25.5 s	
Coils **(1 bit, Read / Write)** **Selected control commands** **➔ to the actuator**	e.g. - OPEN - CLOSE - EMERGENCY - fault signal reset - maintenance carried out - etc.	Full configuration see attachment ”**Coils**"
Discretes Input **(1 bit, Read-Only)** **Selected status data** **from the actuator**	e.g. - ready + remote - actuator in end position „OPEN“ / “CLOSE“ - travel position „OPEN“ / “CLOSE“ active - running indication „OPEN“ / “CLOSE“ - end position OK - actuator parameterization OK - hand wheel / crank operated - local active - remote active - command "EMERGENCY“ active - maintenance necessary - Modbus channel 1 / 2 is active channel - Modbus channel 1 / 2 is present - etc.	Full configuration see attachment ” **Discretes Input”**
Holding Registers **(16 bit, Read / Write)** **Control commands and** **parameterization data** **➔ to the actuator**	e.g. - OPEN - CLOSE - EMERGENCY - setpoint for position, process or output speed - fault signal reset - maintenance carried out Parameterization such as: - tripping torque in end position CLOSE - tripping torque in end position OPEN - output speed in direction CLOSE - output speed in direction OPEN - etc.	Full configuration see attachment ”**Holding Registers**"
Input Registers **(16 bit, Read-Only)** **Status data** **from the actuator**	e.g. - actual position value (0.01 % steps) - ready + remote - actuator in end position „OPEN“ / “CLOSE - intermediate contact ”OPEN“/“CLOSE“ active - running indication „OPEN“ / “CLOSE - output speed / positioning time - end position OK - actuator parameterization OK. - hand wheel / crank operated - local active - remote active - command „EMERGENCY“ active - warning motor temperature - motor temperature - electronics temperature - maintenance necessary - diagnosis data - maintenance limits - Modbus channel 1 / 2 is active channel - Modbus channel 1 / 2 is present **fault signals:** - sum fault signal - not ready - travel sensor signal fault - blocked in move - open circuit analog input - motor temperature too high - etc.	Full configuration see attachment ”**Input Registers”** (not for 2SG7) (not for 2SG7) (PROFITRON/HiMod only) (PROFITRON/HiMod only) (PROFITRON/HiMod only)

Supported function codes	**01 Read Coil Status**	Reads the contents of the Coils information (bit values) from the actuator
	02 Read Input Discrete	Reads the contents of the Discretes Input information (bit values) from the actuator
	03 Read Holding Registers	Reads the contents of the Holding Registers information (16 bit-words) from the actuator
	04 Read Input Registers	Reads the contents of the Input Registers information (16 bit-words) from the actuator
	05 Force Single Coil	Writes data to a Coil (bit value) within the actuator to ON or OFF
	06 Preset Single Register	Writes data to a single Holding Register (16 bit-word) of the actuator
	07 Read Exception Status	see attachment E "**Telegrams**"
	08 Diagnose	Sub-function: 00 Loopback 10 Clear Counters and Diagnostic Register 11 Return Bus Message Count 12 Return Bus Communication Error Count 13 Return Bus Exception Error Count 14 Return Slave Message Count 15 Return Slave No Response Count 16 Return Slave NAK Count
	15 Force Multiple Coils	Writes data to several sequential Coils within the actuator to ON or OFF
	16 Preset Multiple Registers	Writes data to several sequential Holding Registers within the actuator
	17 Report Slave ID	see attachment E "**Telegrams**"
	43 Read Device Identification	see attachment E "**Telegrams**"
Behavior in case of communication breakdown	the reaction of the actuator is programmable: - keep position - move to EMERGENCY position (PROFITRON/HiMod only) - keep actual process value (PROFITRON/HiMod with process controller only) - move to fixed setpoint (PROFITRON/HiMod with process controller only) - execute last command	

Ambient conditions

Ambient temperature	-20 °C to +60 °C			
Enclosure protection according to EN 60529	standard: IP68			
Vibration resistance		acceleration	frequency range	duration
	Germanischer Lloyd	0.7 g	5 ... 200 Hz , in the resonance frequencies	min. 1.5 h in 3 directions
	EN 60068-2-6	2 g	5 ... 500 Hz octave/min	20 sweeps (10 cycles) in 3 directions
	Loads according to EN 60068-2-6 up to 5 g for separate mounting of electronics and gear unit on request. The actuators can withstand a continuous load caused by plant-generated vibrations within a frequency range of 5 … 200 Hz at up to 0.5 g.			

3.2 General data of the Modbus interface

3.2.1 Modbus RTU interface

- **Connection via copper cable – 1 and 2 channel (redundant)**

Communication protocol	Modbus RTU according to IEC 61158 and IEC 61784
Network topology	Line (BUS) structure. Tree structures can also be realized. Coupling and uncoupling of stations during operation without affecting other stations is possible.
Transmission medium	twisted, screened 2-wire copper cable according to IEC 61158
Interface	EIA-485 (RS-485)
Transmission rate	300; 600; 1,200; 2,400; 9,600; 19,200; 38,400; 57,600; 115,200 bit/s.
Max. cable length	**without** repeater: 1,200 m **with** repeater: approx. 10 km
Station types	- Modbus-Master, e.g. central controllers such as PLC, PC etc. - Modbus-Slave, e.g. SEVEN actuators, devices with binary and/or analog inputs/outputs, sensors.
Number of stations	32 stations without repeater; with repeaters expandable up to 247 stations
Bus access	Mono-Master systems: Access to the slaves via polling.

- **Connection via fiber optics (FO)**

  Fiber optics interface for the realization of star and line structures.

  ➔ Details see supplement to operation instructions: „Fieldbus connection with fiber optics (FO) in line/star topology“ Y070.399/EN.

3.2.2 Modbus TCP/IP interface (based on Modbus RTU)

Communication protocol	Modbus TCP/IP according to IEC 61158 and IEC 61784
Network topology	Star structure, point-to-point wiring Coupling and uncoupling of stations during operation without affecting other stations is possible.
Transmission medium	IEC IEEE 802.3, cable recommendation: Cat. 6_A
Transmission rate	Baud rate of 10/100 Mbit/s Independent setting of the possible transmission rate (Auto-negotiation).
Max. cable length	100 m
Bus access	Client-server model: Access to the slaves via polling.
Configuration IP address	via web server integrated in the actuator (Gateway RTU <-> TCP/IP) Default settings of the IP interface: **IP Address Selection** • Address Type Static IP • Static IP Address 192.168.255.1 • Subnet Mask 255.255.0.0 • Default Gateway 192.168.0.1
Gateway RTU <-> TCP/IP settings	Modbus TCP/IP-RTU gateway settings can be adapted by means of the integrated web server via a browser. Login password (default setting in the factory): **admin** If required, only the IP interface must be adapted to the requirements of the Modbus TCP/IP network. All further settings of the Modbus TCP/IP-RTU gateway (particularly the port number **502** required for communication via the Industrial Ethernet network) are set as default in the factory.

3.3 Connection to the fieldbus system

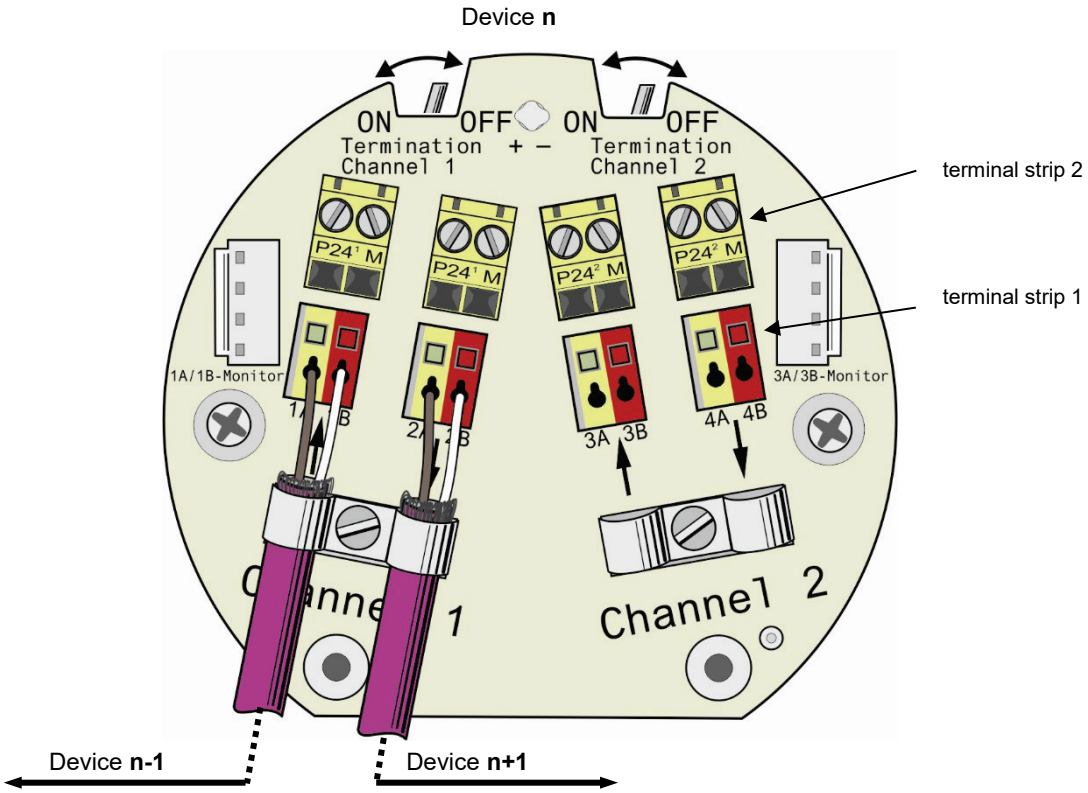
3.3.1 Modbus RTU

Connection via copper cable – 1 and 2 channel (redundant)

To comply with the RFI regulations, the shield has to be connected flatly with the housing by means of the screen strap.

This applies analogously to both channels of the version with a redundant Modbus interface.

Correct pole-connection of the data-wire on terminal strip 1 is necessary for Modbus data exchange. Please make sure that .A or .B connections are always done with the same lead.



Channel 1 - 1A/1B	Input Modbus-connection channel 1
Channel 1 - 2A/2B	Output Modbus- connection channel 1
Channel 2 - 3A/3B	Input Modbus-connection channel 2
Channel 2 - 4A/4B	Output Modbus-connection channel 2

The 24 V DC external supply can be realized via the terminal strip 2. By doing this, the bus data exchange can be continued even if the main power supply (110-115V, 190-200V, 220-230V resp. 380-460V) is disconnected. The 24 V is internally connected with the pins 38 and 39 of the round plug.

Adjustment of the DIP-switches

Termination:	**OFF**	no bus termination resistor
	ON	bus termination resistor switched on and 2A/2B or 4A/4B separated from 1A/1B or 3A/3B

Bus cable

Only bus cables meeting the requirements of the cable specification for RS-485 (Modbus RTU) may be used.

Impedance:	135 to 165 Ohm, at a frequency of 3 to 20 MHz
Cable capacity:	< 30 pF per meter
Cable diameter:	> 0.64 mm
Core diameter:	> 0.34 mm² (corresponds to AWG 22), max. 1.5 mm²
Loop resistance:	< 110 Ohm per km
Screening:	Cu shielding braid or shielding braid and shielding foil

The bus cable must be laid at a distance of at least 20 cm from other cables. It should be laid in a separate, conductive and earthed cable trunking.
It must be ensured that there are no potential differences between the individual stations on the Modbus.

There is no defined color coding for RS-485. The usual code is: .A → brown and .B → white.

3.3.2 Modbus TCP/IP

Connection via Ethernet cable with M12 connector, D-coded

To connect the actuator to the Industrial Ethernet network, a Category 6_A Ethernet cable is recommended. With the connection of the M12 connector on the actuator the connection is established to the Industrial Ethernet network.

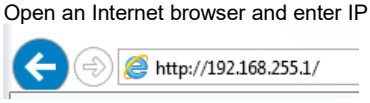
After establishing the connection, the configuration data can be set.

The network interface of the gateway can be adjusted by the utility program "eSearch Utility" included on CD!

Contact your network administrator for a correct and working network configuration (for example, IP, Mask, Gateway)!

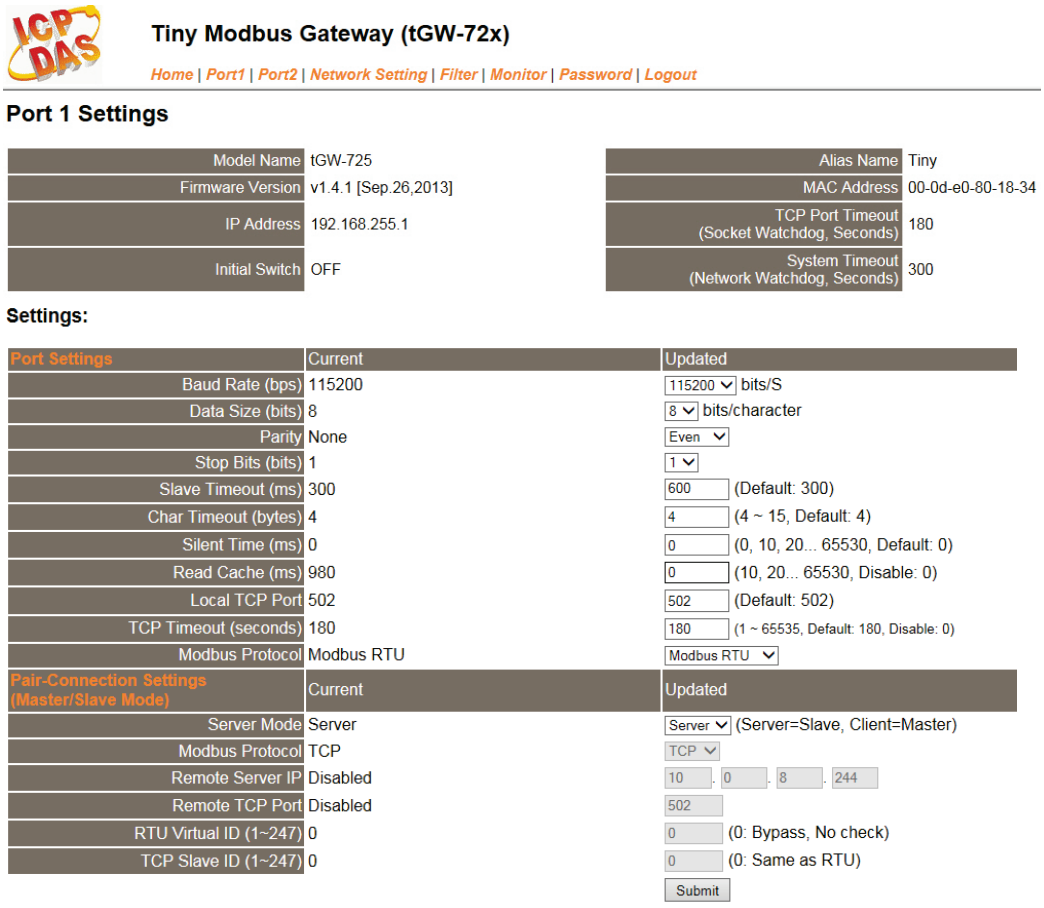
View / change configuration data

1. Open an Internet browser and enter IP address (default: „**192.168.255.1**“).



2. Enter password (default: „**admin**“).

3. Select "**Port1**" to change configuration data.
   The following entry mask shows the factory settings!
   resp.
   Select "**Password**" to change the password.



4 Setting the communication parameters for Modbus

Each device on the bus is handled via the bus address (field device address). This address must be unique on one bus line. SEVEN actuators are delivered with the default bus address 247. If the actuators are ordered with customer specific parameterization (order code „Y11"), the bus address is set to the specified value. In case of SEVEN actuators with redundant Modbus interface, both channels are set to the default address 247.

4.1 Communication parameters for Modbus

- Bus addresses: 1 to 247
- Baud rates: 300; 600; 1,200; 2,400; 4,800; 9,600; 19,200; 38,400; 57,600; 115,200 bit/s
- Parities: even parity or odd parity with 1 stop bit
  no parity with 2 stop bits
- Connection control time: 0 to 25.5 s.

Structure per byte: 1 start bit + 8 data bits + 1 parity bit + 1 stop bit or
1 start bit + 8 data bits + 2 stop bits,

The communication parameter can be set separately for both channels and are stored fail-safe in the EEPROM.

Modbus has no automatic adaptation of the communication parameters. I.e. the settings of the communication parameters within the field device have to match the communication parameters in the DCS/controls (master).

- Default values
  - Modbus RTU: Address 247, 19,200 bit/s, even parity, 1 stop bit, connection control time 3s.
  - Modbus TCP/IP: Adresse 247, 115,200 bit/s, even parity, 1 stop bit, connection control time 3s

For Modbus TCP / IP operation, the default setting should be retained.

4.2 Options / tools for setting

The Modbus communication parameters for SEVEN can be set via:

- via the local control unit (PROFITRON/HiMod only).
  ➔ Changes will be effective immediately!

• **Address**	**Channel 1:** 1 ... 247	default: **247**
	Channel 2: 1 ... 247	default: **247**
• **Data transmission speed**	300 bit/s ... 115.2 kbit/s	default **RTU**: **19.2 kbit/s** default **TCP/IP**: **115.2 kbit/s**
• **Parity/stop bit**	None / 2 stop bits **Even / 1 stop bit** Odd / 1 stop bit	Default **Even / 1 stop bit**
• **Monitoring time**	**Channel 1:** 0 ... 25.5 s	default: **3 s**
	Channel 2: 0 ... 25.5 s	default: **3 s**

For setting the parameters via the local control unit, see the operation instructions Y070.302/EN.

- with the PC-parameterization program COM-SIPOS (connection via USB interface or Bluetooth (PROFITRON/HiMod only)).
  ➔ Changes will be effective immediately!

  COM-SIPOS is available as accessory including software, data cable and description, Order-no.: **2SX7100-3PC02**.

The latest COM-SIPOS version can be downloaded from our website www.sipos.de.

- Modbus telegram. For that, the actuator must be connected to the bus. Please take care, that only one single actuator with default address 247 is connected to the bus at a time. The Holding Registers can be used to assign a new bus address to the actuator.

  The active channel can be selected in Coil 36/37 and in Holding Register 1002.

5 Using actuators with Modbus interface

5.1 Control via Modbus

For safety reasons an operation command sent via Modbus (OPEN/CLOSE/EMERGENCY and ”Setpoint valid“) will be deleted after:
- changing over from Remote to Local,
- manual operation,
- power failure,
- change of active channel!

Furthermore, a previously sent EMERGENY operation command will be deleted once the EMERGENCY position has been reached!

- **Permanent contact via Modbus – "Permanent contact fieldbus“**

  For the “Permanent contact fieldbus“ setting, the actuator is controlled via permanent contact via Modbus, using OPEN and CLOSE commands:

  - Coils: OPEN, CLOSE, EMERGENCY
  - Holding Registers: OPEN, CLOSE, EMERGENCY bit in register ”0“ or in register ”1000“ (compatible to AUMA Modbus)

- **Positioner with setpoint via Modbus – „Positioner fieldbus“**

  For the “Positioner fieldbus“ setting and in position “REMOTE”, the actuator is controlled with the setpoint value via Modbus:

  - Setting the setpoint via Holding Register "1" or within the register “1001” (compatible to AUMA Modbus)

  Actuator will only implement the new set value, if the " setpoint is valid " bit is set to the value "1".
  Set in Holding Register "0" or within the register “1000” (compatible to AUMA Modbus)
  If the “setpoint is valid“ bit is set to “0”, the actuator remains in the current position
  ➔ Changes of the setpoint are therefore ignored.

- **Process controller with setpoint via Modbus – ”Process controller fieldbus“**

  For the “Process controller fieldbus“ setting and in position “REMOTE”, the actuator is controlled with the setpoint value as input variable for the integral process controller via Modbus:

  - Setting the setpoint for the process controller via Holding Register "1" or within the register “1001” (compatible to AUMA Modbus)

  Actuator will only implement the new set value, if the " setpoint is valid " bit is set to the value "1".
  Set in Holding Register "0" or within the register “1000” (compatible to AUMA Modbus)
  If the “setpoint is valid“ bit is set to “0”, the actuator remains in the current position
  ➔ Changes of the setpoint are therefore ignored.

5.2 Inhibiting of the local control unit

The switch function for changing between remote control and local control by pressing the button on the local control unit can be disabled by means of a Modbus command. The appropriate bit has to be set in Holding Register 21. The blockage is automatically reset if the communication via Modbus is interrupted (“No communication” connection status, refer also to chapter 8).

5.3 Fault messages on display

Error messages concerning the Modbus interface and communication via the Modbus are output in plain text on the PROFITRON/HiMod display of the local control unit.

These error messages must either be dealt with by the owner of the plant (parameters and settings, ambient temperature too high, electrical connections not made properly, etc.), or they are due to circumstances outside his control (voltage fluctuations, power failures, etc.).

6 Broadcast mode and safety functions

6.1 Broadcast messages

In the **Broadcast mode**, the DCS may, e.g., address all actuators uniformly and with a single command. The master has to send a “Write Holding Registers" message to **slave address 0**.

- The following commands are important:
  - emergency signal
  - reset
  - change of active channel (channel 1 or channel 2)
- Further commands:
  - OPEN
  - CLOSE
  - setpoint

6.2 Modbus safety functions

SEVEN supports all standard Modbus safety functions:

- parity check for each message byte
- CRC (“cyclic redundancy check“, checksum for all sent bytes) for each message
- Watchdog for communication monitoring with adjustable safety behavior. This is a cyclic monitoring at the actuator with adjustable connection control time (refer also to chapter 8).

7 Redundancy for Modbus RTU

The SEVEN actuator can be connected to the DCS via two fieldbus cables (option) to increase plant safety.
The Modbus sub-assembly is designed as 2-channel (redundant) version.

In this case, the FIFO memory, the driver devices, the opto isolator and the DC/DC converter are separately provided on the Modbus board for each channel.

The channel which is the first to enter the cyclic user data communication („Data Exchange”) when the actuator is switched on is the active channel. Via this channel, read and write access to the actuator is possible. This includes process mode, i.e. the drive is moved via this channel. The second channel is the passive channel, via which only data is sent from the actuator to the digital control system. The digital control system therefore can only observe the actuator via this passive channel but cannot move it.

- The telegrams can be received simultaneously by both channels. They are evaluated separately within the firmware.
- Simultaneous reading/writing via both channels is possible.
- The operation commands OPEN, CLOSE and setpoint are executed by the active channel only. The operation commands of the passive channel are ignored.

By means of Input Register 32, the digital DCS control system is able to determine which channel is the active one.
The active channel can also be read via the display (PROFITRON/HiMod) and via COM-SIPOS.
Use Holding Register 1002 to explicitly select the active channel.

Changeover criteria

A changeover to the other channel is necessary whenever data is no longer being exchanged over the active channel.

The changeover criteria are as follows:

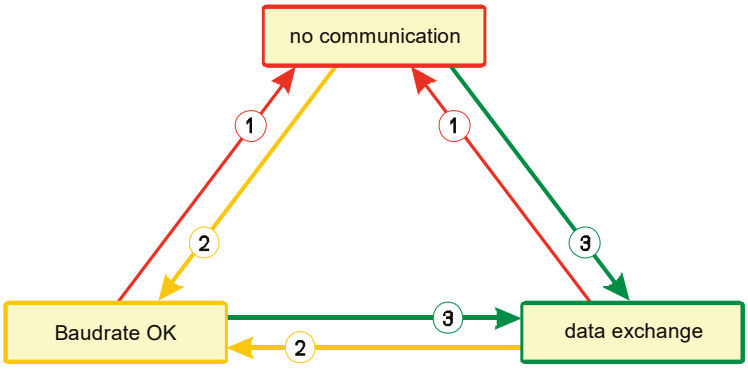
- connection control time exceeded (e.g. master failure)
- loss of bus connection (cable break)
- change-over command from the active or passive channel

8 Connection status and fault signal

8.1 Connection status

Each bus station receives all telegrams sent during data exchange between DCS/controls (master) and the field devices (slaves) within the query-response cycle (polling procedure).

Status transition overview



1 **No valid telegram** received within the connection control time

2 **No valid telegram sent to the own address received** within the connection control time, however, a **valid telegram for another bus station** was recorded

3 **Valid telegram** sent to **own address** within the connection control time

The connection status is displayed separately for each channel and has always one of the following three values:

- **no communication**
  "no communication" indication is set if
  - there is no communication (telegram) between DCS/controls and one of the field devices,
  - no valid telegram was received within the connection check time ➔ fault,
- "**Baudrate OK" communication parameter ok**
  "Baudrate OK" indication is set if
  - communication with a valid telegram between DCS/controls and another field device is established. A valid telegram sent to another field device is recorded:
    ➔ The communication parameters of the own address are correctly set.

  "Baudrate OK" signals the fault, that the slave does not receive the usual telegram within the connection control time.
- **"Data Exchange" cyclic data transmission**
  "Data Exchange" indication is set if
  - a communication with valid telegrams between DCS/controls and the own fieldbus address is established (Unicast mode),
  - communication with valid telegrams between DCS/controls and all field devices is established (Broadcast-Modus).

  Usually all bus stations are addressed via a telegram during the connection control time, i.e. in fault free operation, one of the slaves is in the "Data Exchange" state.
  When leaving the "**Data Exchange**" state, the control commands "OPEN", "CLOSE" as well as „setpoint is valid" are deleted internally and have to be reset if required.

The connection status can be read out via the:

- **Display** (PROFITRON/HiMod) – Main menu ➔ Observe ➔ Inputs and outputs ➔ Modbus
- **Modbus telegram**
- **COM-SIPOS** – Fieldbus tab

8.2 Bus communication fault/checksum fault

The bus communication fault is set, if no Modbus channel is in the "Data Exchange" state.
The prerequisite is that one of the slave addresses is not equal to the default address 247.

The bus communication fault can be read out via the:

- **Display** (PROFITRON/HiMod) - „33 Fault fieldbus" is displayed
- **Modbus telegram** - Input Register 81
- **COM-SIPOS** - State of unit tab, „33 Fault fieldbus".

The bus communication fault sets the "sum fault signal". This is signaled in the Input Register 81 and the Discretes Input, address 7 or 1017.

The bus communication fault sets the "Ready + REMOTE" message to 0, if the "Control mode" parameter is set to bus control (Permanent contact fieldbus, Positioner fieldbus or Process controller fieldbus).

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
0		manufacturer 0. – 1. digit (high-byte = 0. digit)		ASCII	r	r	r	r	
1		2. – 3. digit							
2		4. – 5. digit							
3		6. – 7. digit							
4		8. – 9. digit							
5		serial number 0. – 1. digit (high-byte = 0. digit)		ASCII	r	r	r	r	
6		2. – 3. digit							
7		4. – 5. digit							
8		6. – 7. digit							
9		8. – 9. digit							
10		10. – 11. digit							
11		12. – 13. digit							
12		ordering no. 0. – 1. digit (high-byte = 0. digit)		ASCII	r	r	r	r	
13		2. – 3. digit							
14		4. – 5. digit							
15		6. – 7. digit							
16		8. – 9. digit							
17		10. – 11. digit							
18		12. – 13. digit							
19		14. – 15. digit							
20		firmware version 0. – 1. digit (high-byte = 0. digit)		ASCII	r	r	r	r	
21		2. – 3. digit							
22		4. – 5. digit							
23		6. – 7. digit							
24		8. – 9. digit							
25		max. tripping torque ($T_{c\,max.}$ [Nm])		unsigned16	r	r	r	r	
		0 – 6000 (1 = 1 Nm)							
26		move in revolutions/stroke (for non-intrusive position encoder) 2) (high word)		unsigned16	r	r	r	r	
		0 – 4294967295 (1 = 0.1 rev/stroke)							
		0 = no non-intrusive position encoder or no end position available or set revolutions/stroke < 0.1							
27		move in revolutions/stroke (for non-intrusive position encoder) 2) (low word)		unsigned16	r	r	r	r	
		0 – 4294967295 (1 = 0.1 rev/stroke)							
		0 = no non-intrusive position encoder or no end position available or set revolutions/stroke < 0.1							
28		lowest adjustable tripping torque		unsigned8	r	r	r	r	
		30 – 100 (1 = 1 % max. tripping torque)							
29		highest adjustable tripping torque		unsigned8	r	r	r	r	
		30 – 100 (1 = 1 % max. tripping torque)							

1) r = read

2) not for 2SQ7

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
30		status word 1		unsigned16	r	r	r	r	
	bit 0	ready + remote	**1** = yes; **0** = no						
	bit 1	EMERGENCY operation possible	**1** = yes; **0** = no						
	bit 2	sum fault signal	**1** = yes; **0** = no						
	bit 4	factory setting OK	**1** = yes; **0** = no						
	bit 5	end positions OK	**1** = yes; **0** = no						
	bit 6	actuator parameterization OK	**1** = yes; **0** = no						
	bit 7	commissioning local OK	**1** = yes; **0** = no						
	bit 8	hand wheel/crank operated **2)**	**1** = yes; **0** = no						
	bit 9	remote active	**1** = yes; **0** = local active						
	bit 10	actuator in end position CLOSE	**1** = yes; **0** = no						
	bit 11	actuator in end position OPEN	**1** = yes; **0** = no						
	bit 12	tripping torque CLOSE reached	**1** = yes; **0** = no						
	bit 13	tripping torque OPEN reached	**1** = yes; **0** = no						
	bit 14	actuator running in CLOSE direction	**1** = yes; **0** = no						
	bit 15	actuator running in OPEN direction	**1** = yes; **0** = no						
31		status word 2		unsigned16	r	r	r	r	
	bit 0	command „EMERGENCY“ active	**1** = yes; **0** = no						
	bit 1	intermediate contact CLOSE active	**1** = yes; **0** = no						
	bit 2	intermediate contact OPEN active	**1** = yes; **0** = no						
	bit 5	warning motor temperature	**1** = yes; **0** = no						
	bit 6	motor protection active	**1** = yes; **0** = no						
	bit 7	motor warranty valid	**1** = yes; **0** = no						
	bit 8	maintenance necessary	**1** = yes; **0** = no						
	bit 11	positioner with split-range functionality enabled	**1** = yes; **0** = no						
	bit 12	travel dependent output speed adjustment (speed curve) enabled	**1** = yes; **0** = no						
	bit 13	analog output speed setpoint enabled	**1** = yes; **0** = no						
	bit 14	positioner enabled	**1** = yes; **0** = no						
	bit 15	process controller enabled	**1** = yes; **0** = no						
32		status word 3		unsigned16	r	r	r	r	
	bit 0	Modbus channel 1 available	**1** = yes; **0** = no						
	bit 1	Modbus channel 2 available	**1** = yes; **0** = no						
	bit 2	Modbus channel 1 is active channel	**1** = yes; **0** = no						
	bit 3	Modbus channel 2 is active channel	**1** = yes; **0** = no						
	bit 4	travel dependent freely adjustable positioning times (travel-positioning time-curve) enabled	**1** = yes; **0** = no						
	bit 5	Bluetooth available	**1** = yes; **0** = no						
	bit 6	customer variant subject to charges	**1** = yes; **0** = no						
	bit 7	customer variant subject to charges enabled	**1** = yes; **0** = no						
	bit 8	electronic temperature sensor available	**1** = yes; **0** = no						
	bit 9	non-intrusive position encoder available **2)**	**1** = yes; **0** = no						
	bit 10	travel dependent freely adjustable positioning times (stroke-time curve) valid	**1** = yes; **0** = no						
	bit 11	add-on PCB AI2/AO2 enabled	**1** = yes; **0** = no						
	bit 12	add-on PCB AI2/AO2 with HART interface enabled	**1** = yes; **0** = no						
	bit 13	Error remote source	**1** = yes; **0** = no						
	bit 14	keep actual process value (if the "process setpoint“ control source has failed)	**1** = yes; **0** = no						only with process controller
	bit 15	approach fixed setpoint value (if the "process setpoint“ control source has failed)	**1** = yes; **0** = no						
33		actual duty		unsigned8	r	r	r	r	
	0 – 9	(see Holding Register RegNo 22)							
34		actual position value		integer16	r	r	r	r	
		0.01 % OPEN							

1) r = read

2) not for 2SQ7

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
35		actual process value (0.01 %)		integer16				r	only with enabled process controller
36		actual output speed	actual positioning time	unsigned8	r	r	r	r	7-step speed setting (for continuous setting see RegNo 109)
	0	1.25 rpm	80 $^{sec}/_{90°}$						
	1	1.75 rpm	56 $^{sec}/_{90°}$						
	2	2.50 rpm	40 $^{sec}/_{90°}$						
	3	3.50 rpm	28 $^{sec}/_{90°}$						
	4	5.00 rpm	20 $^{sec}/_{90°}$						
	5	7.00 rpm	14 $^{sec}/_{90°}$						
	6	10.0 rpm	10 $^{sec}/_{90°}$						
	7	14.0 rpm							
	8	20.0 rpm							
	9	28.0 rpm							
	10	40.0 rpm							
	11	56.0 rpm							
	12	80.0 rpm							
	13	112 rpm							
	14	160 rpm							
	15	0 rpm							
37		motor temperature 0.01 °C		integer16	r	r	r	r	
38		DC-link voltage converter [V]		unsigned16	r	r	r	r	
39		status channel 1		unsigned8	r	r	r	r	
	0	no communication	**1** = yes; **0** = no						
	1	Baudrate Ok	**1** = yes; **0** = no						
	2	data exchange	**1** = yes; **0** = no						
40		status channel 2		unsigned8	r	r	r	r	
	0 – 2	(see RegNo 39)							
41		binary inputs , independent of parameterization high/low active		unsigned16					
	0	binary input CLOSE			r	r	r	r	
	1	binary input OPEN			r	r	r	r	
	2	binary input STOP			r	r	r	r	
	3	binary input EMERGENCY					r	r	
	4	binary input Mode					r	r	
42		analog input AI1 0 – 10000 scaling, 0 = 0 mA, 10000 = 20 mA, independent of parameterization		unsigned16			r	r	
43		analog input AI2 0 – 10000 scaling, 0 = 0 mA, 10000 = 20 mA, independent of parameterization		unsigned16			r	r	
44		binary inputs, according parameterization high/low active		unsigned16					
	0	binary input CLOSE			r	r	r	r	
	1	binary input OPEN			r	r	r	r	
	2	binary input STOP			r	r	r	r	
	3	binary input EMERGENCY					r	r	
	4	binary input Mode					r	r	
	5	no signal analog input AI1					r	r	
	6	no signal analog input AI2					r	r	
45		analog input AI1 0 – 10000 scaling, according parameterization		unsigned16			r	r	
46		analog input AI2 0 – 10000 scaling, according parameterization		unsigned16			r	r	
47		electronics temperature (1 = 0 – 1 °C)	**0** = temperature sensor not available	signed16			r	r	

1) r = read

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
48		setpoint from DCS (setpoint before adaptation to valve curve) 0 – 10000 scaling (1 = 0.01 % OPEN)		signed16			r	r	only with activated valve curve adaptation
49		actual valve to DCS (actual value after adaptation to valve curve: in controlled state = flow rate) 0 – 10000 scaling (1 = 0.01 % OPEN)		signed16			r	r	
50		switching cycles per hour		unsigned16	r	r	r	r	
51		relative operational time		unsigned8	r	r	r	r	
52		number of switching cycles	(high word)	unsigned16	r	r	r	r	
53		number of switching cycles	(low word)	unsigned16	r	r	r	r	
54		number of travel dependence cut-offs		unsigned16	r	r	r	r	
55		number of torque dependence cut-offs		unsigned16	r	r	r	r	
56		electronics unit operating hours	(high word)	unsigned16	r	r	r	r	
57		electronics unit operating hours	(low word)	unsigned16	r	r	r	r	
58		motor/gear unit operating hours		unsigned16	r	r	r	r	
65		valve maintenance limits: switching cycles	(high word)	unsigned16	r	r	r	r	
66		valve maintenance limits: switching cycles	(low word)	unsigned16	r	r	r	r	
67		valve maintenance limits: torque cut-offs		unsigned16	r	r	r	r	
68		valve maintenance limits: motor operating hours		unsigned16	r	r	r	r	
75	bit 0	torque curves recording possible 2)	**1** = yes; **0** = no	unsigned16			r	r	
	bit 1	curve recording curve 1 active	**1** = yes; **0** = no						
	bit 2	curve recording curve 2 active	**1** = yes; **0** = no						
	bit 3	curve recording curve 3 active	**1** = yes; **0** = no						
76		number of recorded curves (first curve) 2)		unsigned16			r	r	
77		number of recorded curves (second curve) 2)		unsigned16			r	r	
78		number of recorded curves (third curve) 2)		unsigned16			r	r	
80		fault signal 1		unsigned16	r	r	r	r	
	bit 1	Flash Memory defect	**1** = yes; **0** = no						
	bit 2	RAM defect	**1** = yes; **0** = no						
	bit 3	EEPROM defect	**1** = yes; **0** = no						
	bit 4	internal voltage faulty	**1** = yes; **0** = no						
	bit 5	Watchdog active	**1** = yes; **0** = no						
	bit 6	high current converter	**1** = yes; **0** = no						
	bit 8	main supply voltage fault	**1** = yes; **0** = no						
	bit 9	high voltage	**1** = yes; **0** = no						
	bit 10	low voltage	**1** = yes; **0** = no						
	bit 11	moved too far	**1** = yes; **0** = no						
	bit 12	no signal potentiometer	**1** = yes; **0** = no						
	bit 13	no signal motor temperature	**1** = yes; **0** = no						
81		fault signal 2		unsigned16	r	r	r	r	
	bit 0	analog input AI2 I > 21 mA or I < 3.6 mA (live zero)	**1** = yes; **0** = no						
	bit 1	analog input AI1 I > 21 mA or I < 3.6 mA (live zero)	**1** = yes; **0** = no						
	bit 2	analog output AO1 defect	**1** = yes; **0** = no						
	bit 4	no bus communication channel 1 and 2	**1** = yes; **0** = no						
	bit 5	Blocked in move	**1** = yes; **0** = no						
	bit 6	Run time error	**1** = yes; **0** = no						
	bit 7	motor temperature too high	**1** = yes; **0** = no						
	bit 8	no signal fiber optics	**1** = yes; **0** = no						
	bit 9	fault Bluetooth	**1** = yes; **0** = no						
	bit 10	fault electronic temperature	**1** = yes; **0** = no						
	bit 11	no signal non-intrusive position encoder 2)	**1** = yes; **0** = no						
	bit 12	no communication non-intrusive position encoder 2)	**1** = yes; **0** = no						
	bit 14	no signal standstill sensor 2)	**1** = yes; **0** = no						

1) r = read

2) not for 2SQ7

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
82 – 91		last faults (5 x 2 registers)		unsigned16	r	r	r	r	
82, 84, 86, 88 and 90	bit 0	analog input AI2 I > 21 mA or I < 3.6 mA (live zero)	**1** = yes; **0** = no						
	bit 1	analog input AI1 I > 21 mA or I < 3.6 mA (live zero)	**1** = yes; **0** = no						
	bit 2	analog output AO1 defect	**1** = yes; **0** = no						
	bit 4	no bus communication channel 1 and 2	**1** = yes; **0** = no						
	bit 5	Blocked in move	**1** = yes; **0** = no						
	bit 6	Run time error	**1** = yes; **0** = no						
	bit 7	motor temperature too high	**1** = yes; **0** = no						
	bit 9	Flash Memory defect	**1** = yes; **0** = no						
	bit 10	RAM defect	**1** = yes; **0** = no						
	bit 11	EEPROM defect	**1** = yes; **0** = no						
	bit 12	internal voltage faulty	**1** = yes; **0** = no						
	bit 13	Watchdog active	**1** = yes; **0** = no						
	bit 14	high current converter	**1** = yes; **0** = no						
83, 85, 87, 89 and 91	bit 0	main supply voltage fault	**1** = yes; **0** = no						
	bit 1	high voltage	**1** = yes; **0** = no						
	bit 2	low voltage	**1** = yes; **0** = no						
	bit 3	moved too far	**1** = yes; **0** = no						
	bit 4	no signal potentiometer	**1** = yes; **0** = no						
	bit 5	no signal motor temperature	**1** = yes; **0** = no						
	bit 8	no signal fiber optics	**1** = yes; **0** = no						
	bit 9	fault Bluetooth	**1** = yes; **0** = no						
	bit 10	fault electronic temperature	**1** = yes; **0** = no						
	bit 11	no signal non-intrusive position encoder **2)**	**1** = yes; **0** = no						
	bit 12	no communication non-intrusive position encoder **2)**	**1** = yes; **0** = no						
	bit 14	no signal standstill sensor **2) 3)**	**1** = yes; **0** = no						
92		run time determined by the actuator in direction CLOSE from 100 % OPEN to 0 % OPEN		unsigned16	r	r	r	r	
		0 – 65535 (1 = 0.1 s)	**0** = run time not yet determined						
93		run time determined by the actuator in direction OPEN from 0 % OPEN to 100 % OPEN		unsigned16	r	r	r	r	
		0 – 65535 (1 = 0.1 s)	**0** = run time not yet determined						
95		fault signal 3		unsigned16	r	r	r	r	
	bit 0	fault analog PCB AI2/AO2	**1** = yes; **0** = no						
	bit 1	failure HART communication	**1** = yes; **0** = no						
	bit 2	fault analog output AO2	**1** = yes; **0** = no						
96		fault signal 4		unsigned16	r	r	r	r	
	bit 0	no signal analog output AO2	**1** = yes; **0** = no						
	bit 1	failure communication to the remote control unit	**1** = yes; **0** = no						from firmware 3.09
	bit 2	no signal torque switch	**1** = yes; **0** = no						
100		torque measurement flange: current torque **3)**		signed16			r	r	from firmware 3.04
		-32768 – +32767 (1 = 0.1 Nm)							
101		torque measurement flange: offset **3)**		signed16			r	r	
		-32768 – +32767 (1 = 0.1 Nm)							

1) r = read **2)** not for 2SQ7 **3)** only for 2SA7.1 – 2SA7.6

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
107		proposed signaling gear setting 2) 8 – 40200 (1 = 0.1 rev/stroke)		unsigned16			r	r	from firmware 3.05
108		speed setting in steps or continuously		unsigned8	r	r	r	r	continuous speed setting from firmware 3.08
	0	7-step setting							
	1	continuous setting							
109		actual speed 125 – 1000 (1 = 0.1 % $n_{max.}$)		unsigned16	r	r	r	r	
110		DC link current (1 = 0.1 A)		signed16			r	r	from firmware 3.08
111		state		unsigned8	r	r	r	r	from firmware 3.10
	bit 0	actuator rotates (pulses from standstill sensor or niP available)	**1** = yes; **0** = no						
	bit 1	standstill sensor detected	**1** = yes; **0** = no						
112		status signal at binary outputs		unsigned8	r	r	r	r	
	bit 0	binary output 1	1 = active; 0 = not active						
	bit 1	binary output 2	1 = active; 0 = not active						
	bit 2	binary output 3	1 = active; 0 = not active						
	bit 3	binary output 4	1 = active; 0 = not active						
	bit 4	binary output 5	1 = active; 0 = not active						
	bit 5	binary output 6	1 = active; 0 = not active						
	bit 6	binary output 7	1 = active; 0 = not active						
	bit 7	binary output 8	1 = active; 0 = not active						
113		analog output AO1		unsigned16	r	r	r	r	
		0 – 10000 scaling, 0 = 0 mA, 10000 = 20 mA, independent of parameterization							
114		analog output AO2		unsigned16			r	r	
		state							
115		Bluetooth address 0. – 1. digit (high-byte = 0. digit)		ASCII			r	r	
116		2. – 3. digit							
117		4. – 5. digit							
118		6. – 7. digit							
119		8. – 9. digit							
120		10. – 11. digit							
121		positioning time in direction CLOSE	(high word)	unsigned16			r	r	continuous speed setting
122		(1 = 0.1 sec.)	(low word)	unsigned16			r	r	from firmware 3.10
123		positioning time in direction OPEN	(high word)	unsigned16			r	r	
124		(1 = 0.1 sec.)	(low word)	unsigned16			r	r	
125		positioning time in direction CLOSE by EMERGENCY	(high word)	unsigned16			r	r	
126		(1 = 0.1 sec.)	(low word)	unsigned16			r	r	
127		positioning time in direction OPEN by EMERGENCY	(high word)	unsigned16			r	r	
128		(1 = 0.1 sec.)	(low word)	unsigned16			r	r	
129		remote control unit RCU: signal quality		unsigned8			r	r	from firmware 3.10
		0 – 100 (0 = 0 %)							
130		torque measurement flange + additional gear: current torque / current force	(high word)	signed16			r	r	
131		(rotary gearbox and part-turn gearbox: 1 = 0.1 Nm; linear thrust unit: 1 = 0.1 kN)	(low word)	signed16			r	r	

1) r = read

2) only for 2SA7.1 … 2SA7.6

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
		compatible to AUMA-MODBUS from register 1000 upwards							
1000		messages – actuator logics		unsigned16	r	r	r	r	
	bit 0	no signal motor temperature	**1** = yes; **0** = no						
	bit 1	end positions OK	**1** = yes; **0** = no						
	bit 2	remote active	**1** = yes; **0** = local active						
	bit 3	local active	**1** = yes; **0** = remote active						
	bit 4	intermediate contact OPEN	**1** = yes; **0** = no						
	bit 5	intermediate contact CLOSE	**1** = yes; **0** = no						
	bit 6	tripping torque OPEN reached	**1** = yes; **0** = no						
	bit 7	tripping torque CLOSE reached	**1** = yes; **0** = no						
	bit 8	actuator in end position OPEN	**1** = yes; **0** = no						
	bit 9	actuator in end position CLOSE	**1** = yes; **0** = no						
	bit 10	setpoint reached	**1** = yes; **0** = no						from firmware 3.09
	bit 11	not ready + remote	**1** = yes; **0** = no						
	bit 12	actuator running in OPEN direction	**1** = yes; **0** = no						
	bit 13	actuator running in CLOSE direction	**1** = yes; **0** = no						
	bit 15	sum fault signal	**1** = yes; **0** = no						
1001		actual position value 1 = 0.1 % OPEN		integer16	r	r	r	r	
1002		messages traveling		unsigned16	r	r	r	r	
	bit 4	actuator running in OPEN or CLOSE direction	**1** = yes; **0** = no						
	bit 5	hand wheel/crank operated **2)**	**1** = yes; **0** = no						
	bit 6	remote active and actuator running in OPEN or CLOSE direction	**1** = yes; **0** = no						
	bit 7	local active and actuator running in OPEN or CLOSE direction	**1** = yes; **0** = no						
	bit 8	actuator in end position CLOSE	**1** = yes; **0** = no						
	bit 9	actuator in end position OPEN	**1** = yes; **0** = no						
	bit 10	remote active	**1** = yes; **0** = no						
	bit 11	blocked in move and torque dependent cut-off “CLOSE”	**1** = yes; **0** = no						
	bit 12	blocked in move and torque dependent cut-off “OPEN”	**1** = yes; **0** = no						
	bit 14	not ready + remote	**1** = yes; **0** = no						
	bit 15	sum fault signal	**1** = yes; **0** = no						
1003		option (binary inputs)		unsigned16	r	r	r	r	
	bit 8	intermediate contact CLOSE	**1** = yes; **0** = no						
	bit 9	intermediate contact OPEN	**1** = yes; **0** = no						
	bit 12	binary input CLOSE	**1** = yes; **0** = no						
	bit 13	binary input OPEN	**1** = yes; **0** = no						
	bit 14	binary input STOP	**1** = yes; **0** = no						
	bit 15	binary input EMERGENCY	**1** = yes; **0** = no						
1004		analog input AI1 0 – 1000 scaling, according parameterization		unsigned16			r	r	
1007		warnings		unsigned16	r	r	r	r	
	bit 2	no signal potentiometer	**1** = yes; **0** = no						
	bit 6	no signal analog input AI2	**1** = yes; **0** = no						
	bit 7	no signal analog input AI1	**1** = yes; **0** = no						
	bit 9	Modbus channel 2 is active channel	**1** = yes; **0** = no						
	bit 13	adjustment end positions necessary	**1** = yes; **0** = no						
1008		analog input AI2 0 – 1000 scaling, according parameterization		unsigned16			r	r	

1) r = read

2) not for 2SQ7

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
0		control commands		unsigned8	w	w	w	w	
	bit 0	control command CLOSE	**1** = yes; **0** = no						
	bit 1	control command OPEN	**1** = yes; **0** = no						
	bit 2	control command EMERGENCY	**1** = yes; **0** = no						
	bit 3	reset fault message	**1** = yes; **0** = no						
	bit 4	maintenance done	**1** = yes; **0** = no						
	bit 5	setpoint is valid	**1** = yes; **0** = no						
	high-byte	desired speed in % (13 – 100 % $n_{max.}$)							
1		setpoint (dependent of duty mode) 0 – 10000 (1 = 0.01 % OPEN)		integer16			r+w	r+w	
2		tag number 0. – 1. digit (high-byte = 0. digit)		ASCII	r+w	r+w	r+w	r+w	
3		2. – 3. digit							
4 – 11		4. – 5. digit to 18. – 19. digit (see RegNo 3)							
12		output speed in direction CLOSE	positioning time in direction CLOSE	unsigned8	r+w	r+w	r+w	r+w	7-step speed setting (for continuous setting see RegNo 166 – 169)
	0	1.25 rpm	80 $^{sec}/_{90°}$						
	1	1.75 rpm	56 $^{sec}/_{90°}$						
	2	2.50 rpm	40 $^{sec}/_{90°}$						
	3	3.50 rpm	28 $^{sec}/_{90°}$						
	4	5.00 rpm	20 $^{sec}/_{90°}$						
	5	7.00 rpm	14 $^{sec}/_{90°}$						
	6	10.0 rpm	10 $^{sec}/_{90°}$						
	7	14.0 rpm							
	8	20.0 rpm							
	9	28.0 rpm							
	10	40.0 rpm							
	11	56.0 rpm							
	12	80.0 rpm							
	13	112 rpm							
	14	160 rpm							
13		output speed in direction OPEN	positioning time in direction OPEN	unsigned8	r	r	r+w	r+w	
	0 – 14	(see RegNo 12)							
14		EMERGENCY output speed in direction CLOSE	positioning time in direction CLOSE by EMERGENCY	unsigned8	r	r	r+w	r+w	
	0 – 14	(see RegNo 12)							
15		EMERGENCY output speed in direction OPEN	positioning time in direction OPEN by EMERGENCY	unsigned8	r	r	r+w	r+w	
	0 – 14	(see RegNo 12)							
16		tripping torque in end position CLOSE in % of Input-RegNo 25 **2)**		unsigned8					
	0	100 % $T_{c\,max.}$	100 % $T_{c\,max.}$		r+w	r+w	r+w	r+w	
	1	90 % $T_{c\,max.}$			r+w	r+w	r+w	r+w	
	2	80 % $T_{c\,max.}$			r+w	r+w	r+w	r+w	
	3	70 % $T_{c\,max.}$			r+w	r+w	r+w	r+w	
	4	60 % $T_{c\,max.}$			r+w	r+w	r+w	r+w	
	5	50 % $T_{c\,max.}$			r+w	r+w	r+w	r+w	
	6	40 % $T_{c\,max.}$ (only 2S.70.. and 2S.73..)			r+w		r+w		
	7	30 % $T_{c\,max.}$ (only 2S.70.. and 2S.73..)			r+w		r+w		
17		tripping torque in end position OPEN in % of Input-RegNo 25 **2)**		unsigned8	r+w	r+w	r+w	r+w	
	0 – 7	(see RegNo 16)							
18		end position range CLOSE from 0 % to register value 200 – 2000 (0.01 % OPEN)		unsigned16	r	r	r+w	r+w	
19		end position range OPEN from 100 % to register value 8000 – 9800 (0.01 % OPEN)		unsigned16	r	r	r+w	r+w	

1) r = read; w = write; r+w = read+write

2) 2SQ7 only 100 % $T_{c\,max.}$ readable

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
20		structure code 1		unsigned16					from firmware 3.13: r
	bit 0	clockwise rotation CLOSE	**1** = yes; **0** = anti-clockwise						if changed, new
	bit 1	travel dependence cut-off in end position CLOSE	**1** = yes; **0** = torque dependence cut-off						commissioning necessary
	bit 2	travel dependence cut-off in end position OPEN	**1** = yes; **0** = torque dependence cut-off						
	bit 3	close tightly	**1** = yes; **0** = no		r	r	r+w	r+w	for 2SQ7 fixed at 0
	bit 4 – 5	control source fault			r+w	r+w	r+w	r+w	
	0	keep position							
	1	move to EMERGENCY position							
	2	keep actual process value							only with process controller
	3	move to fixed setpoint							
	bit 6	„NC“ on binary input EMERGENCY	**1** = yes; **0** = “NO”		r	r	r+w	r+w	
	bit 7	„NC“ on binary inputs (OPEN, CLOSE, STOP, Mode)	**1** = yes; **0** = “NO”		r	r	r+w	r+w	
	bit 9	analog input AI1 setpoint input with live zero 4 to 20 mA	**1** = yes; **0** = with dead zero 0 to 20 mA		r	r	r+w	r+w	
	bit 10	analog input AI1 setpoint with slope rising	**1** = yes; **0** = with slope falling		r	r	r+w	r+w	
	bit 11	analog input AI2 with live zero 4 to 20 mA	**1** = yes; **0** = with dead zero 0 to 20 mA		r	r	r+w	r+w	
	bit 12	analog input AI2 with rising slope	**1** = yes; **0** = with slope falling		r	r	r+w	r+w	
	bit 13	analog output AO1 with actual process value	**1** = yes; **0** = with actual position value		r	r	r+w	r+w	
	bit 14	analog output AO1 with live zero 4 to 20 mA	**1** = yes; **0** = with dead zero 0 to 20 mA		r	r	r+w	r+w	
	bit 15	analog output AO1 with rising slope	**1** = yes; **0** = with slope falling		r	r	r+w	r+w	
21		structure code 2		unsigned16					
	bit 0	motor heating ON	**1** = yes; **0** = no		r+w	r+w	r+w	r+w	
	bit 2	local blocked	**1** = yes; **0** = no						in position “remote”
	bit 3	analog output AO2 active	**1** = yes; **0** = no		r	r	r+w	r+w	
	bit 4	analog output AO2 with actual process value	**1** = yes; **0** = with actual position value						
	bit 5	analog output AO2 with live zero 4 to 20 mA	**1** = yes; **0** = with dead zero 0 to 20 mA						
	bit 6	analog output AO2 with rising slope	**1** = yes; **0** = with slope falling						
	bit 8 – 11	valve curve adaptation		4 bit			r+w	r+w	
		0 = without							
		1 = equal percentage							
		2 = quick opening							
	bit 12	feedback	**1** = flow rate; **0** = valve position	bit	r	r	r+w	r+w	
22		remote control		unsigned8					
	0	analog: process controller AI1					r+w	r+w	only with process controller
	1	fieldbus: process controller					r+w	r+w	
	2	internal: process controller with fixed setpoint value					r+w	r+w	
	3	analog: positioner AI1					r+w	r+w	only with positioner
	4	fieldbus: positioner					r+w	r+w	
	6	binary: permanent contact signal			r+w	r+w	r+w	r+w	
	7	fieldbus: permanent contact signal			r+w	r+w	r+w	r+w	
	8	binary: pulse contact signal			r+w	r+w	r+w	r+w	
	10	binary: proportional operation					r+w	r+w	only with positioner
	11	fieldbus: proportional operation					r+w	r+w	
	12	analog: process controller AI2					r+w	r+w	only with process controller
	13	analog: positioner AI2					r+w	r+w	only with positioner
23		alternative control mode		unsigned8	r	r	r+w	r+w	
	255	not active (else, see RegNo 22)							
24		EMERGENCY position		unsigned16	r	r	r+w	r+w	
		0 – 10000 (0.01 % OPEN)							
25		intermediate contact CLOSE		unsigned16	r	r	r+w	r+w	
		0 – 10000 (0.01 % OPEN)							
26		intermediate contact OPEN		unsigned16	r	r	r+w	r+w	
		0 – 10000 (0.01 % OPEN)							

1) r = read; r+w = read+write

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
27		rise time		unsigned8	r	r	r+w	r+w	
		1 – 100 (0.1 sec), for 2S.75.. and 2S.78.. 1 – 200							
28		dc-brake		unsigned8	r	r	r+w	r+w	
		0 – 250 %							
29		retry to get over torque block when out of travel limit areas		unsigned8	r+w	r+w	r+w	r+w	
		0 – 5 (0 = no repeated start)							
30		output (message) 1		unsigned8	r	r	r+w	r+w	
	bit 0 – 6								
	0	not used							
	1	end position CLOSED							
	2	end position OPEN							
	3	torque CLOSE reached							
	4	torque OPEN reached							
	5	torque CL/OP reached							
	6	fault							
	7	blinker							
	8	ready							
	9	ready+remote							
	10	local							
	11	intermediate contact CL							
	12	intermediate contact OP							
	13	fault motor temperature							
	14	warning motor temp.							
	15	fault external voltage							
	16	maintenance							
	17	run indication CLOSE							
	18	run indication OPEN							
	19	run indication CLOSE/OPEN							
	20	blinker + end position CL							
	21	blinker + end position OP							
	22	travel end CLOSE							from firmware 3.10
	23	travel end OPEN							
	bit 7	NC (low-active)	**1** = yes; **0** = NO (high active)						
31		output 2		unsigned8	r	r	r+w	r+w	
		(see RegNo 30)							
32		output 3		unsigned8	r	r	r+w	r+w	
		(see RegNo 30)							
33		output 4		unsigned8	r	r	r+w	r+w	
		(see RegNo 30)							
34		output 5		unsigned8	r	r	r+w	r+w	
		(see RegNo 30)							
35		output 6		unsigned8			r+w	r+w	
		(see RegNo 30)							
36		output 7		unsigned8			r+w	r+w	
		(see RegNo 30)							
37		output 8		unsigned8			r+w	r+w	
		(see RegNo 30)							
38		warning motor temperature at … °C		integer16	r+w	r+w	r+w	r+w	
		-20 °C – 155 °C (0.01 °C)							

1) r = read; r+w = read+write

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
39		language on the Display		unsigned8			r+w	r+w	
	0	German							
	1	English							
	2	French							
	3	Spanish							
	4	Italian							
	5	Polish							
	6	Czech							
	7	Swedish							
	8	Netherlands							
	9	Portuguese							
	10	Finnish							
	11	Chinese							
	12	American							
	13	Russian							
	14	Danish							
	15	Turkish							
	16	Romanian							
	17	Arabic							
	18	Slovakian							
	19	Greek							
	20	Brazilian							
	21	Japanese							
	22	Egyptian							
	23	Bulgarian							
	24	Indian							
	25	Korean							
	26	Croatian							
	27	Norwegian							
	28	Slovene							
	29	Hungarian							
	30	Thai							
	31	Franconian							
40		interval value switching cycles	(high word)	unsigned16			r+w	r+w	
		0 – 30 Mio. (for 2S.75.. and 2S.78..)							
		0 – 100000 (for 2S.70.. and 2S.73..)							
41		interval value switching cycles	(low word)	unsigned16			r+w	r+w	
		0 – 30 Mio. (for 2S.75.. and 2S.78..)							
		0 – 100000 (for 2S.70.. and 2S.73..)							
42		interval value torque dependent cut-offs		unsigned16			r+w	r+w	
		0 – 20000 (for 2S.75.. and 2S.78..)							
		0 – 10000 (for 2S.70.. and 2S.73..)							
43		interval value motor operating hours		unsigned16			r+w	r+w	
		0 – 2500							
44		process controller: amplification Kp		signed16			r+w	r+w	
		-100 – +100 (1 = 0.01 %)							
45		process controller: reset time Tn		unsigned16			r+w	r+w	
		0 – 30000 (1 = 0.1 s)							
46		function control		unsigned8	w	w	w	w	
	1	delete former errors							

1) w = write; r+w = read+write

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
47		speed curve – position 1 0 – 100 (% OPEN; 0 = end position CLOSE)		unsigned8			r+w	r+w	
48 – 56		speed curve – position 2 – 10 (see RegNo 47)		unsigned8			r+w	r+w	
57		speed curve – speed 1	positioning time 1	unsigned8			r+w	r+w	7-step speed setting (for continuous setting see RegNo 170 – 179)
	0	1.25 rpm	80 $^{sec}/_{90°}$						
	1	1.75 rpm	56 $^{sec}/_{90°}$						
	2	2.50 rpm	40 $^{sec}/_{90°}$						
	3	3.50 rpm	28 $^{sec}/_{90°}$						
	4	5.00 rpm	20 $^{sec}/_{90°}$						
	5	7.00 rpm	14 $^{sec}/_{90°}$						
	6	10.0 rpm	10 $^{sec}/_{90°}$						
	7	14.0 rpm							
	8	20.0 rpm							
	9	28.0 rpm							
	10	40.0 rpm							
	11	56.0 rpm							
	12	80.0 rpm							
	13	112 rpm							
	14	160 rpm							
58 – 66		speed curve; speed 2 – 10 (see RegNo 57)	positioning time 2-10	unsigned8			r+w	r+w	
67		speed – function selection		unsigned8			r+w	r+w	
	bit 0	speed curve setting: local via speed curve	**1** = yes; **0** = parameterized OPEN/CLOSE speeds						
	bit 1	speed curve setting: remote via speed curve	**1** = yes; **0** = parameterized OPEN/CLOSE speeds						
	bit 2	speed curve setting: local via external speed setpoint	**1** = yes; **0** = parameterized OPEN/CLOSE speeds						
	bit 3	speed curve setting: remote via external speed setpoint	**1** = yes; **0** = parameterized OPEN/CLOSE speeds						
	bit 4	external speed setpoint via analog input AI1	**1** = yes; **0** = via analog input AI2						
	bit 7	activate curve position / curve speed	**1** = yes						
68		split range function: current value 1 0 – 200 (1 = 0.1 mA)		unsigned8			r+w	r+w	smaller than current value 2
69		split range function: position value 1 0 – 100 (1 = 1 % OPEN)		unsigned8			r+w	r+w	unequal position 2
70		split range function: current value 2 0 – 200 (1 = 0.1 mA)		unsigned8			r+w	r+w	larger than current value 1
71		split range function: position value 2 0 – 100 (1 = 1 % OPEN)		unsigned8			r+w	r+w	unequal position 1

1) r+w = read+write

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
72		travel-positioning time-curve		unsigned8			r+w	r+w	
	bit 0	active at “local operation”	**1** = yes; **0** = no						
	bit 1	active at “remote operation”	**1** = yes; **0** = no						
	bit 2	active at “EMERGENCY operation”	**1** = yes; **0** = no						
	bit 7	position values/ -positioning times activate	**1** = yes; **0** = no						
73		travel-positioning time-curve: position 1 0 – 100 (% OPEN, 0 = end position CLOSE)		unsigned8			r+w	r+w	
74 – 77		travel-positioning time-curve: position 2 up to position 5 (see RegNo 73)		unsigned8			r+w	r+w	
78		travel-positioning time-curve: positioning time 1 0 – 60000 (1 = 1 sec)		unsigned16			r+w	r+w	
79 – 82		travel-positioning time-curve: positioning time 2 up to positioning time 5 (see RegNo 78)		unsigned16			r+w	r+w	
83 – 87		travel-positioning time-curve: position 6 up to position 10 (see RegNo 73)		unsigned8			r+w	r+w	
88 – 92		travel-positioning time-curve: positioning time 6 up to positioning time 10 (see RegNo 78)		unsigned16			r+w	r+w	
93		travel-positioning time-curve: EMERGENCY factor 1 – 100 (1 = 0.1)		unsigned16			r+w	r+w	
94		minimum dead zone positioner 0,2 – 5 % 20 – 500 (1 = 0.01 %)		unsigned8			r+w	r+w	
95		maximum dead zone positioner 0,2 – 5 % 20 – 500 (1 = 0.01 %)		unsigned8			r+w	r+w	
96		delay time undervoltage signal 0 – 25 sec 0 – 250 (1 = 0.1 sec)		unsigned8	r+w	r+w	r+w	r+w	
97	bit 0	separate mounting	**1** = >10 m with sine filter; **0** = none or <=10 m	bit	r+w	r+w	r+w	r+w	
98		customer variant 0 – 127		unsigned8	r+w	r+w	r+w	r+w	
99		run time in direction CLOSE for control via proportional operation 0 or 50 – 32760 (1 = 0.1 s)	**0** = run time determined by the actuator (Input-RegNo 92) is used	unsigned16			r+w	r+w	
100		run time in direction OPEN for control via proportional operation 0 or 50 – 32760 (1 = 0.1 s)	**0** = run time determined by the actuator (Input-RegNo 93) is used	unsigned16			r+w	r+w	
101		process controller: fixed setpoint value 0 – 200 (1 = 0.5 %)		unsigned8			r+w	r+w	
102		customer parameter 1 for customer variant 0 – 65534		unsigned16	r+w	r+w	r+w	r+w	
103		customer parameter 2 for customer variant 0 – 65534		unsigned16	r+w	r+w	r+w	r+w	
104		customer parameter 3 for customer variant 0 – 65534		unsigned16	r+w	r+w	r+w	r+w	
105		customer parameter 4 for customer variant 0 – 65534		unsigned16	r+w	r+w	r+w	r+w	
106		Output signal sets		unsigned8	r+w	r+w			

		Output 1	Output 2	Output 3	Output 4	Output 5
1	Set 1	Travel end OPEN, NO	Travel end CLOSE, NO	Torque CL/OP reached, NC	Ready + Remote, NO	Warning motor temp, NC
2	Set 2	End position OPEN, NO	End position CLOSED, NO	Blinker, NO	Ready + Remote, NO	Warning motor temp, NC
3	Set 3	End position OPEN, NO	End position CLOSED, NO	Fault NC	Local, NO	Warning motor temp, NC
4	Set 4	Travel end OPEN, NO	Travel end CLOSE, NO	Ready + Remote, NO	Torque OPEN reached, NC	Torque CLOSE reached, NC

1) r+w = read+write

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
107		bit parameter		unsigned8			r+w	r+w	
	bit 0	Bluetooth activated	**1** = yes; **0** = no						
	bit 1	USB deactivated	**1** = yes; **0** = no						from firmware 3.13
108		display orientation		unsigned8			r+w	r+w	
	0	standard							
	1	turned 90° to the left							from firmware 3.07
	2	turned 180°							
	3	turned 90° to the right							from firmware 3.07
109		data: year		unsigned16			r+w	r+w	from firmware 3.04
		1 – 99							
110		data: month		unsigned8			r+w	r+w	
		1 – 12							
111		data: day		unsigned8			r+w	r+w	
		1 – 31							
112		time: hours		unsigned8			r+w	r+w	
		0 – 23							
113		time: minutes		unsigned8			r+w	r+w	
		0 – 59							
114		time: seconds		unsigned8			r+w	r+w	
		0 – 59							
120		end position speed		unsigned8	r+w	r+w	r+w	r+w	from firmware 3.05
	0	normal							
	1	quick start							
	2	quick start/stop							
121		DCS acceptance time		unsigned8	r+w	r+w	r+w	r+w	
		0 – 255 (1 = 0.1 s)							
130		torque measurement flange: connection **2)**		unsigned8			r+w	r+w	from firmware 3.04
	0	not available							
	1	at analog input AI1							
	2	at analog input AI2							
131		torque measurement flange: zero adjust **2)**		unsigned8			w	w	
	bit 0	perform zero adjustment (current torque is stored as offset)	**1** = yes; **0** = no						
	bit 1	reset zero adjustment (offset is set to zero)	**1** = yes; **0** = no						from firmware 3.11
132		torque measurement flange: measuring range **2)**		unsigned8			r+w	r+w	
	0	±120 Nm (2SX7100-6A..)							
	1	±500 Nm (2SX7100-6B..)							
	2	±1000 Nm (2SX7100-6C..)							
135		additional gear: gear type **2) 3)**		unsigned8			r+w	r+w	from firmware 3.05
	0	not available							
	1	rotary gearbox							
	2	part-turn gearbox							
	3	linear thrust unit							
137		additional gear: reduction ratio **2) 3)**		unsigned16			r+w	r+w	
		rotary gearbox: 100 – 10000 (1 = 0.01); part-turn gearbox: 1 – 10000 (1 = 1)							
138		additional gear: factor output/input torque **2) 3)**		unsigned16			r+w	r+w	
		10 – 50000 (rotary gearbox: 1 = 0.01; part-turn gearbox: 1 = 0.1)							
139		additional gear: max. output torque **2) 3)**		unsigned16			r+w	r+w	
		1 – 50000 (rotary gearbox: 1 = 1 Nm; part-turn gearbox: 1 = 10 Nm)							
140		additional gear: max. input speed **2) 3)**		unsigned16			r+w	r+w	
		1 – 1000 (1 = 1 rpm)							

1) w = write; r = read; r+w = read+write **2)** only for 2SA7.1 – 2SA7.6 **3)** can be changed for user-defined additional gear

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
141		additional gear: spindle pitch 2) 3)		unsigned16			r+w	r+w	from firmware 3.05
		10 – 1000 (linear thrust unit: 1 = 0.1 mm)							
142		additional gear: factor input torque/output force 2) 3)		unsigned16			r+w	r+w	
		10 – 1000 (linear thrust unit: 1 = 0.1)							
143		additional gear: max. output force 2) 3)		unsigned16			r+w	r+w	
		1 – 1000 (linear thrust unit: 1 = 1 kN)							
144		additional gear: positioning angle 2) 3)		unsigned16			r+w	r+w	
		1 – 360 (part-turn gearbox: 1 = 1°)							
145		additional gear: stroke 2) 3)		unsigned16			r+w	r+w	
		1 – 10000 (linear thrust unit: 1 = 1 mm)							
146		additional gear: rev./stroke 2) 3)	(low word)	unsigned16			r+w	r+w	
		1 – 99000 (rotary gearbox: 1 = 0.1 rev./stroke)							
147		additional gear: rev./stroke 2) 3)	(high word)	unsigned16			r+w	r+w	
		1 – 99000 (rotary gearbox: 1 = 0.1 rev./stroke)							
150		special parameters		unsigned16	r+w	r+w	r+w	r+w	
	bit 0	deactivate "Maintenance required" signal	**1** = yes; **0** = no						
	bit 1	deactivate DC link voltage limitation	**1** = yes; **0** = no						
	bit 2	deactivate runtime monitoring	**1** = yes; **0** = no						
	bit 3	deactivate end position adaptation for torque-dependent cut-off	**1** = yes; **0** = no						
151		test operation		unsigned8			r+w	r+w	
	0	normal operation							
	1	test operation active							
152		test operation: runtime CLOSE		unsigned16			r+w	r+w	
		0 – 65530 (1 = 0.1 sec)							
153		test operation: pause CLOSE		unsigned16			r+w	r+w	
		0 – 65530 (1 = 0.1 sec)							
154		test operation: runtime OPEN		unsigned16			r+w	r+w	
		0 – 65530 (1 = 0.1 sec)							
155		test operation: pause OPEN		unsigned16			r+w	r+w	
		0 – 65530 (1 = 0.1 sec)							
160		Mode input		unsigned8			r+w	r+w	
	0	no function							
	1	interlock LOCAL/REMOTE							
	2	enable motor operation							from firmware 3.08
	3	enable LOCAL							from firmware 3.10
164		lower limit value for wire break detection at analog inputs		unsigned8			r+w	r+w	from firmware 3.05
		0 … 36 (1 = 0.1 mA)							
165		upper limit value for wire break detection at analog inputs		unsigned8			r+w	r+w	
		200 – 220 (1 = 0.1 mA)							
166		output speed in direction CLOSE		unsigned16			r+w	r+w	continuous speed setting from firmware 3.08
		125 – 1000 (1 = 0.1 % $n_{max.}$)							
167		output speed in direction OPEN		unsigned16			r+w	r+w	
		125 – 1000 (1 = 0.1 % $n_{max.}$)							
168		EMERGENCY output speed in direction CLOSE		unsigned16			r+w	r+w	(for 7-step setting see RegNo 12 – 15)
		125 – 1000 (1 = 0.1 % $n_{max.}$)							
169		EMERGENCY output speed in direction OPEN		unsigned16			r+w	r+w	
		125 – 1000 (1 = 0.1 % $n_{max.}$)							
170		speed curve - speed 1		unsigned16			r+w	r+w	(for 7-step setting see RegNo 57 – 66)
		125 – 1000 (1 = 0.1 % $n_{max.}$)							
171-179		speed curve - speed 2 – 10		unsigned16			r+w	r+w	
		125 – 1000 (1 = 0.1 % $n_{max.}$)							

1) r+w = read+write (les- und überschreibbar) **2)** only for 2SA7.1 – 2SA7.6 **3)** can be changed for user-defined additional gear

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
180		standby screen		unsigned8			r+w	r+w	from firmware 3.07
	0	standard							
	1	position							
	2	position+filling							
	3	position+bar+status							
	4	fast to LOCAL							from firmware 3.10
181		control source fault		unsigned8	r+w	r+w	r+w	r+w	from firmware 3.10
	0	keep position							
	1	move to EMERGENCY position							
	2	keep actual process value							only with process controller
	3	move to fixed setpoint							
	4	execute last command							

1) r+w = read+write

RegNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
		compatible to AUMA-MODBUS from register 209 upwards							
209		baudrate channel 1		unsigned8	r+w	r+w	r+w	r+w	
	0	300 bit/s							
	1	600 bit/s							
	2	1200 bit/s							
	3	2400 bit/s							
	4	4800 bit/s							
	5	9600 bit/s							
	6	19200 bit/s (default)							
	7	38400 bit/s							
	8	57600 bit/s							
	9	115200 bit/s							
210		parity definition channel 1		unsigned8	r+w	r+w	r+w	r+w	
	0	no parity with 2 stop bits,							
	1	even parity with 1 stop bit (default)							
	2	odd parity with 1 stop bit							
212		connection control time channel 1		unsigned8	r+w	r+w	r+w	r+w	
	0 – 255	(1 = 0.1 sec, default = 30)	**0** = no connection monitoring						
213		slave address channel 1		unsigned8	r+w	r+w	r+w	r+w	
		1 – 247 (default address = 247)							
219		baudrate channel 2		unsigned8	r+w	r+w	r+w	r+w	
	0 – 7	(see RegNo 209)							
220		parity definition channel 2		unsigned8	r+w	r+w	r+w	r+w	
	0 – 2	(see RegNo 210)							
222		connection control time channel 2		unsigned8	r+w	r+w	r+w	r+w	
	0 – 255	(1 = 0.1 sec, default = 30)	**0** = no connection monitoring						
223		slave address channel 2		unsigned8	r+w	r+w	r+w	r+w	
		1 – 247 (default address = 247)							
		compatible to AUMA-MODBUS from register 1000 upwards							
1000		control commands		unsigned16	w	w	w	w	
	bit 8	control command OPEN	**1** = yes; **0** = no						
	bit 9	control command CLOSE	**1** = yes; **0** = no						
	bit 10	setpoint is valid	**1** = yes; **0** = no						
	bit 11	reset fault message	**1** = yes; **0** = no						
1001		setpoint (dependent of duty mode)		unsigned16			r+w	r+w	
		0 – 1000 (1 = 0.1 % OPEN)							
1002		auxiliary commands		unsigned16	r+w	r+w	r+w	r+w	
	bit 12	channel 1 active	**1** = yes; **0** = no						
	bit 13	channel 2 active	**1** = yes; **0** = no						
2000 – …		From Holding Register 2000 upwards mirroring of the Input Register from 0 upwards (see page 18 ff.).							

1) r = read; w = write; r+w = read+write

AddNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1)		HiMod PROFITRON 1)		Remark
					2S.70 2S.73	2S.75	2S.70 2S.73	2S.75 2S.78	
		AUMA-compatible part is listed first (AddNo 0 to 15)							
0		actuator in end position OPEN		Boolean	r	r	r	r	
1		actuator in end position CLOSE		Boolean	r	r	r	r	
3		not ready + remote		Boolean	r	r	r	r	
4		traveling OPEN + remote		Boolean	r	r	r	r	
5		traveling CLOSE + remote		Boolean	r	r	r	r	
7		sum fault signal		Boolean	r	r	r	r	
8		no signal motor temperature		Boolean	r	r	r	r	
9		sum fault signal (without blocked in move) or not end positions OK		Boolean	r	r	r	r	
10		remote active		Boolean	r	r	r	r	
11		local active		Boolean	r	r	r	r	
12		intermediate contact OPEN active		Boolean	r	r	r	r	
13		intermediate contact CLOSE active		Boolean	r	r	r	r	
14		tripping torque OPEN reached		Boolean	r	r	r	r	
15		tripping torque CLOSE reached		Boolean	r	r	r	r	
1000		ready + remote		Boolean	r	r	r	r	
1001		remote active		Boolean	r	r	r	r	
1002		traveling CLOSE		Boolean	r	r	r	r	
1003		traveling OPEN		Boolean	r	r	r	r	
1004		actuator in end position CLOSE		Boolean	r	r	r	r	
1005		actuator in end position OPEN		Boolean	r	r	r	r	
1006		tripping torque CLOSE reached		Boolean	r	r	r	r	
1007		tripping torque OPEN reached		Boolean	r	r	r	r	
1008		intermediate contact CLOSE active		Boolean	r	r	r	r	
1009		intermediate contact OPEN active		Boolean	r	r	r	r	
1010		hand wheel/crank operated		Boolean	r	r	r	r	
1011		command „EMERGENCY“ active		Boolean	r	r	r	r	
1012		warning motor temperature		Boolean	r	r	r	r	
1013		motor protection active		Boolean	r	r	r	r	
1014		motor warranty present		Boolean	r	r	r	r	
1015		maintenance necessary		Boolean	r	r	r	r	
1016		EMERGENCY operating possible		Boolean	r	r	r	r	
1017		sum fault signal		Boolean	r	r	r	r	
1018		factory programming OK		Boolean	r	r	r	r	
1019		end positions OK		Boolean	r	r	r	r	
1020		actuator parameterization OK		Boolean	r	r	r	r	
1021		commissioning local OK		Boolean	r	r	r	r	
1022		Modbus channel 1 available		Boolean	r	r	r	r	
1023		Modbus channel 2 available		Boolean	r	r	r	r	
1024		Modbus channel 1 in data exchange		Boolean	r	r	r	r	
1025		Modbus channel 2 in data exchange		Boolean	r	r	r	r	
1026		Modbus channel 1 is active channel		Boolean	r	r	r	r	
1027		Modbus channel 2 is active channel		Boolean	r	r	r	r	

1) r = read

AddNo	Value	Name of parameters Rotary actuator 2S**A**7	Part-turn actuator 2S**Q**7	Type	ECOTRON 1) 2S.70 2S.73	ECOTRON 1) 2S.75	HiMod PROFITRON 1) 2S.70 2S.73	HiMod PROFITRON 1) 2S.75 2S.78	Remark
0		control command OPEN		Boolean	r+w	r+w	r+w	r+w	
1		control command CLOSE		Boolean	r+w	r+w	r+w	r+w	
2		setpoint is valid		Boolean	r+w	r+w	r+w	r+w	
3		reset fault message		Boolean	r+w	r+w	r+w	r+w	
36		channel 1		Boolean	r+w	r+w	r+w	r+w	
37		channel 2		Boolean	r+w	r+w	r+w	r+w	
		Coil 0 to 255 is AUMA-compatible							
256		control command CLOSE		Boolean	r+w	r+w	r+w	r+w	
257		control command OPEN		Boolean	r+w	r+w	r+w	r+w	
258		control command EMERGENCY		Boolean	r+w	r+w	r+w	r+w	
259		reset fault message		Boolean	r+w	r+w	r+w	r+w	
260		maintenance done		Boolean	r+w	r+w	r+w	r+w	
261		setpoint is valid		Boolean	r+w	r+w	r+w	r+w	
262		reset fault history		Boolean	r+w	r+w	r+w	r+w	

1) r+w = read+write

- Telegram „**Read Exception-Status**“ – (Function code 07)

bit-no	Name of parameters		Type	ECOTRON 1)	HiMod PROFITRON 1)	Remark
bit 0	ready + remote	**1** = yes; **0** = no	bool	r	r	
bit 1	remote active	**1** = yes; **0** = no				
bit 2	traveling CLOSE	**1** = yes; **0** = no				
bit 3	traveling OPEN	**1** = yes; **0** = no				
bit 4	actuator in end position CLOSE	**1** = yes; **0** = no				
bit 5	actuator in end position OPEN	**1** = yes; **0** = no				
bit 6	tripping torque/force CLOSE reached	**1** = yes; **0** = no				
bit 7	tripping torque/force OPEN reached	**1** = yes; **0** = no				

- Telegram „**Report-Slave ID**“ – (Function code 17)

Byte	Value	Description	Type	ECOTRON 1)	HiMod PROFITRON 1)	Remark
0	3	ECOTRON	unsigned 8	r		„Slave ID“ (Coding of the electronics version)
	4	PROFITRON/HiMod			r	
1	0	not ready + remote	unsigned 8	r	r	“run indicator status”
	255	ready + remote				
2 – 19		manufacturer („SIPOS Aktorik GmbH“)	ASCII	r	r	
20 – 37		ordering no. (e.g. 2SA7510-0CD00-4EA4)	ASCII	r	r	
38 – 50		firmware version (v.vv dd.mm.jj, e.g. „3.04 10.05.16“)	ASCII	r	r	
51 – 70		tag number	ASCII	r	r	
71 – 83		serial number (e.g. „0839387002002“)	ASCII	r	r	
84 – 96		original serial number (e.g. „0839387002002“)	ASCII	r	r	

- Telegram „**Read Device Identification**“ – (Function code 43)

Object ID	category	Description	Type	ECOTRON 1)	HiMod PROFITRON 1)	Remark
0	Basic	manufacturer („SIPOS Aktorik GmbH“)	ASCII	r	r	„VendorName“
1		ordering no. (e.g. 2SA7510-0CD00-4EA4)	ASCII	r	r	„Productcode“
2		firmware version (v.vv dd.mm.jj, e.g. „3.04 10.05.16“)	ASCII	r	r	“MajorMinorRevision”
3	Regular	homepage of the manufacturer („www.sipos.de“)	ASCII	r	r	„VendorUrl“
4		product name „SIPOS SEVEN“	ASCII	r	r	„ProductNamel“
5		electronics version „ECOTRON“ or „PROFITRON“/„HiMod“)	ASCII	r	r	„ModelName“
6		tag number	ASCII	r	r	„UserApplicationName“
128	Extended	serial number (e.g. „0839387002002“)	ASCII	r	r	
129		original serial number (e.g. „0839387002002“)	ASCII	r	r	

1) r = read

Im Erlet 2 • D-90518 Altdorf
www.sipos.de