

HART interface for Electric Actuators

Operation instructions



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Attachment

- List of parameters HART 13-26

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 HART interface for SEVEN electric actuators.

You can find more detailed information about the electric actuators in the Y070.302/EN (PROFITRON/HiMod) operation instructions.



This operation instructions is complete only in combination with the operation instructions of the respective actuator.
The safety information contained in the operation instructions must be heeded at all times when working with the actuators!

2 General HART description

HART is a communication protocol for field devices.

HART can be implemented with two technologies differing in terms of transmission physics:

- Wired HART communication in brief called HART, and
- Wireless HART communication in brief called "WirelessHART".

Wired HART is based on an analog 4 – 20 mA signal.

"WirelessHART" is based on standardized radio technology in the 2.4 GHz license free frequency band.

2.1 Data exchange principle using HART

HART (Highway Addressable Remote Transducer) is an open protocol for bidirectional data exchange between DCS and field device, enabling both analog and digital communication at the same time.

HART always requires an analog current signal 4 – 20 mA for data exchange. Higher frequency, digital HART signals are superimposed by means of an FSK (frequency shift keying) modem.

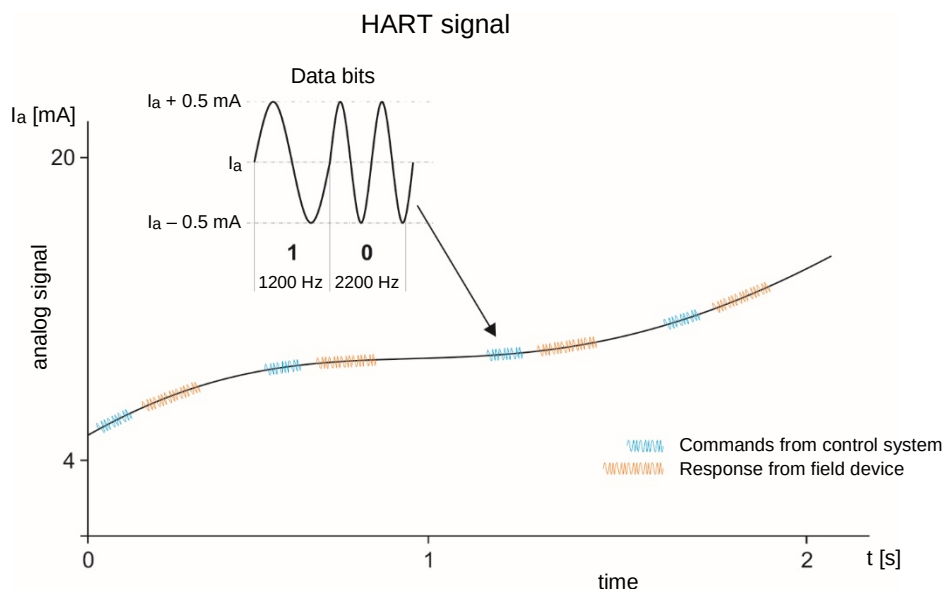


Fig.: Digital HART signal (1,200 Hz = 1 / 2,200Hz = 0) superimposed on the analog current signal (4 – 20 mA)

2.2 Access rights - data exchange

In HART applications, distinction is made between DCS/operating device (master) and field device (slave).

HART communication between DCS/operating device and field device is implemented using data exchange (half-duplex) while the field device only issues an acknowledgment upon receiving a command message.

Depending on the actual process data, complete data exchange with both command telegram issued by the master and acknowledgment telegram issued by the slave requires 0.5 s on an average.

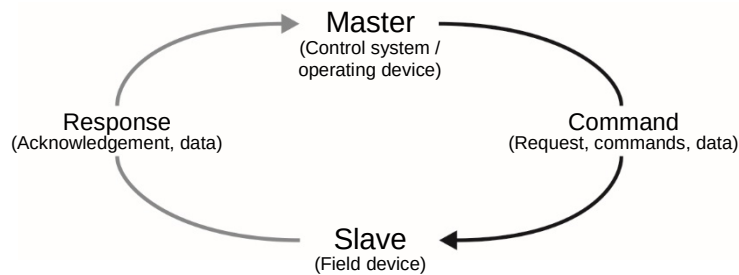


Fig.: HART data transaction with command and acknowledgment telegram

2.3 Topology – HART device wiring

Similar to typical fieldbus systems, HART applications accept two masters: the primary master as control system in the DCS and, for sporadic use in the field, the secondary master as handheld terminal or a PC/laptop with preceding FSK modem. For field devices and the handheld terminal, the FSK modem, also called HART modem, is integral part of the device.

HART applications accept different wiring options. Typically the point-to-point connection is implemented, whereby the master is only communicating to one HART field device.

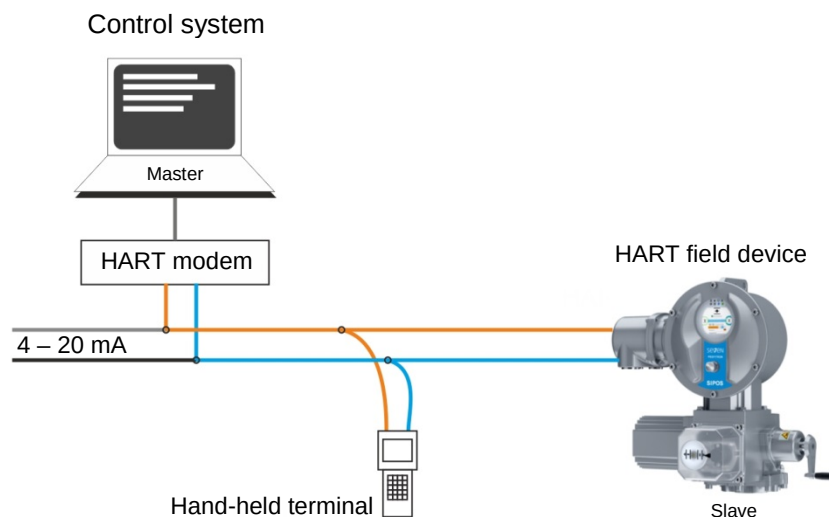


Fig.: Point-to-point connection

Within a multidrop connection, several field devices are connected to a HART communication cable. In this case, the analog signal as carrier of HART communication is set to 4 mA.

Each field device (max. 63 devices) must be assigned a HART address which can be entered at the local control unit of the actuator. The address is set to "0" in the factory.

Communication between all participants (master and slave) is exclusively performed via digital HART commands or responses.

When using this technology, consider the comparatively slow data exchange rate of approx. 0.5 s per field device.

2.4 HART communication cables

Selecting the appropriate HART communication cables is of crucial importance. Selection depends on length and cross section as well as the environment in case external signals might cause interference.



- To ensure trouble-free data transmission, the following must be considered:
 - Total load (incl. cable resistance) of a HART device of minimum 230 Ohm and maximum 1,100 Ohm and
 - Heed sufficient distance to power cables!
- The communication cables must have a sufficient cross section and an appropriate length.
We recommended using twisted two-wire lines shielded in pairs!

3 HART interface



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

3.1 Identification data

Identification data for the HART interface registered for SEVEN actuators:

- Manufacturer ID: 0x607C
- Model Name: SEVEN
- Device Type: 0xE1FE

3.2 Basics on the HART interface

The HART interface converts the digital control commands (OPEN, CLOSE, STOP and EMERGENCY) modulated to the analog output AO2 (standard) or analog input AI2 (option "C80") for controlling the actuator by means of the integrated HART modem into binary control commands.

Furthermore, all parameters which can be set and read in the local mode (e.g. for commissioning, diagnostic, status signals) can be transmitted as digital commands (command = write parameter, request = read parameters).

On the other hand, the actuator will send on request the states of its binary signaling outputs, the actual value/setpoint at the analog outputs/inputs as well as the confirmation of parameters changes or requested parameter data as telegram via the HART modem to the DCS/the operating device.



Unless ordered otherwise, analog output AO2 is used for transmission of the HART communication!

Independent of the digital HART communication, all binary and analog inputs/outputs are still available.

It is therefore still possible to operate the actuator via binary control commands (OPEN, CLOSE, STOP and EMERGENCY) and send binary signals to the DCS while HART communication is only applied for commissioning and diagnostics.



Should the control commands be defined via HART, "Control mode" or "Alternative control mode" "Fieldbus: ..." must be programmed!

In this instance, the analog value communicated via the analog output AO2 or analog input AI2 to/from the DCS is not influenced.

3.3 Establishing the HART connection

The HART connection is performed via the round plug of the electrical connection, refer also to the enclosed wiring diagram.

Connection to round plug for HART communication via

- Analog output AO2 (standard),
HART device category "Current Output";
→ round plug, pins 49 and 50
+ pin 48 (option "C67") for passive
24 V DC supply of the analog output.
- Analog input AI2 (option "C80"),
HART device category "Actuator";
→ round plug, pins 13 and 14.

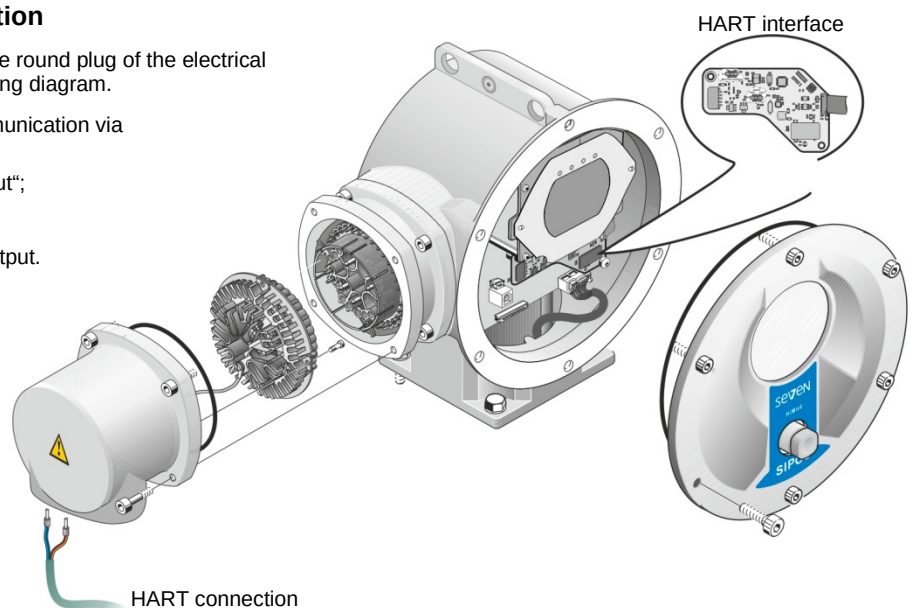


Fig.: Establishing the HART connection



For "WirelessHART" communication, option "C26", the wireless adapter is already fitted and connected to the electrical connection!

"WirelessHART" communication via HART interface is internally wired to analog output AO2.

3.4 Setting the HART communication

The HART interface, also called additional module for HART connection is integrated into the electronics unit and connected to the control board via flat-ribbon cable.

DIP switches S1 and S2 are located on the HART interface, they are used to set the signal transmission for HART communication via AO2, via AI2 or wireless.

The DIP switch positions of S1 and S2 required for HART communication transmission have been set and tested according to the order in the factory.



Opening the electronics unit is only required if the HART communication is to be transmitted via a different analog signal after delivery or if the actuator was retrofitted for "WirelessHART" communication!

Subsequent modification of the HART communication transmission can be achieved by changing DIP switch positions S1 and S2. For this, the cover of the electronics unit must be removed.

DIP switches S1 and S2 have the same setting options:

- **DIP switch S1**

- No = wired HART communication (default setting).
- Yes = wireless HART communication "WirelessHART";
→ is set if option "C26" was ordered.

- **DIP switch S2**

- AE2 = HART communication is transmitted via analog input AI2;
→ is set if option "C80" was ordered.
- AA2 = HART communication is transmitted via analog output AO2 (default setting).
→ This setting is also required for wireless HART communication (option "C26").

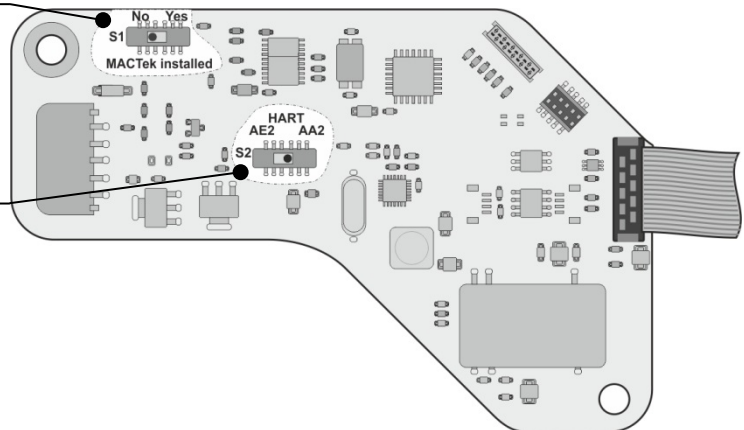


Fig.: DIP switch setting at HART interface

3.5 Integration into the DCS software

To ensure device-specific parameters of the operating device software (DCS, hand-held terminal) can be correctly applied and interpreted, basic knowledge of their meaning is required. This information is contained as device description in an Electronic Device Description, in short EDD, which is standardized in terms of structure, contents and coding. The EDD is provided on request.

4 HART commands



SIPOS support the instructions of the HART protocol of revision 7.4!

Two dynamic variables are implemented.

- HART device category "**Current Output**" with HART communication via analog output AO2 (standard):
 - PV (primary variable) = Actual position value [... %] ,
 - SV (secondary variable) = Setpoint [... %]).
- HART device category "**Actuator**" with HART communication via analog input AI2 (option "C80 "):
 - PV (primary variable) = Setpoint [... %]) ,
 - SV (secondary variable) = Actual position value [... %]!

4.1 Universal commands

Commands from Master				Response from Slave	
No.	Function	Byte	Data in command	Byte	Data in reply
0	Read Unique Identifier		none	0 1-2 3 4 5 6 7, Bit 0-2 7, Bit 3-7 8 9-11 12 13 14-15 16 17-18 19-20 21	"254" Expanded Device Type (Default value 0xE1FE) Minimum Number of Preambles Request Message (Default value 5) HART Protocol Major Revision (Default value 7) Device Revision Level Software Revision Level Physical Signaling Code Hardware Revision Level of the electronics Flags Device Identification Number Minimum Number of preambles for Response Message Maximum Number Device Variables Configuration Change Counter Extended Field Device Status Manufacturer Identification Code (Default value 0x607C) Private Label Distributor Code (= Byte 17-18) Device Profile
1	Read primary variable		none	0 1-4	Unit "percent" „Primary variable“ in 0.1 %
2	Read current and percent of range		none	0-3 4-7	PV in mA PV in %
3	Read current and dynamic variables		none	0-3 4 5-8 9 10-13 14 15-18 19 20-23	PV in mA Primary variable code Primary variable Secondary variable code Secondary variable unused unused unused unused
6	Write polling address	2	0 1	0 1	Polling address (0..63) Loop Current Mode (0- disabled .. 1- enabled)
7	Read loop configuration		none	0 1	Polling address (0..63) Loop Current Mode (0- disabled .. 1- enabled)

Commands from Master				Response from Slave	
No.	Function	Byte	Data in command	Byte	Data in reply
8	Read dynamic variable classification		none	4	According HART specification
9	Read device variables with status		1..8	Variable	According HART specification
11	Read unique identifier associated with tag			see function 0	see function 0
12	Read message		none	0-23	Message
13	Read tag, descriptor, date		none	0-5 6-17 18-20	Tag Descriptor Date
14	Read primary variable sensor information		none	0-2 3 4-7 8-11 12-15	Transducer Serial Number Transducer Limits and Minimum Span Units Code Upper Transducer limit Lower Transducer limit Minimum Span
15	Read output information		none	0 1 2 3-6 7-10 11-14 15 16 17	PV Alarm Selection Code PV Transfer Function Code PV Units Code PV Upper Range value PV Lower Range value PV Damping Value Write protect Code Reserved Not Used PV Analog Channel Flags
16	Read final assembly number		none	0-2	Final assembly number
17	Write message	0-23	Message	0-23	Message
18	Write tag, descriptor, date	0-5 6-17 18-20	Tag Descriptor Date	0-5 6-17 18-20	Tag Descriptor Date
19	Write final assembly number	0-2	Final assembly number	0-2	Final assembly number
20	Read long tag		none	0-31	Long tag
21	Read unique identifier associated with long tag	0-31	Long tag	0-21	If Long tag is OK, response as with command 0
22	Write long tag	0-31	Long tag	0-31	Long tag
38	Reset configuration changed flag	0-1	Value from Configuration changed counter	0-1	Value from Configuration changed counter

Commands from Master				Response from Slave
No.	Function	Byte.Bit	Data in command	Data in reply
48	Read additional device status			The command is acknowledged with one of the following response codes: 0 = no 1 = yes
	corresponds to list of parameters HART, ParNo 10	0.0	ready + remote	
		0.1	EMERGENCY operating possible	
		0.2	sum fault signal	
		0.3	motor lock active via mode input	
		0.4	factory programming OK	
		0.5	end positions OK	
		0.6	actuator parameterization OK	
		0.7	commissioning local OK	
		1.0	hand wheel/crank operated	
		1.1	remote active	
		1.2	actuator in end position CLOSE	
		1.3	actuator in end position OPEN	
		1.4	tripping torque CLOSE reached	
		1.5	tripping torque OPEN reached	
		1.6	actuator running in CLOSE direction	
		1.7	actuator running in OPEN direction	
	corresponds to list of parameters HART, ParNo 11	2.0	command „EMERGENCY“ active	
		2.1	intermediate contact CLOSE active	
		2.2	intermediate contact OPEN active	
		2.5	warning motor temperature	
		2.6	motor protection active	
		2.7	motor warranty present	
		3.0	maintenance necessary	
		3.3	positioner with split-range functionality enabled	
		3.4	travel dependent output speed adjustment enabled	
		3.5	analog output speed setpoint enabled	
	corresponds to list of parameters HART, ParNo 9	3.6	positioner enabled	
		3.7	process controller enabled	
		4.4	travel dependent freely adjustable positioning times enabled	
		4.5	Bluetooth available	
		4.6	customer variant subject to charges	
		4.7	customer variant subject to charges enabled	
		5.0	electronic temperature sensor available	
		5.1	non-intrusive position encoder available	
		5.2	travel dependent freely adjustable positioning times valid	
		5.3	add-on PCB AI2/AO2 enabled	
	Ext. Field Device Status	5.4	add-on PCB AI2/AO2 with HART interface enabled	
		5.5	error remote source	
		5.6	keep actual process value	
		5.7	approach fixed setpoint value	
		6.0	Maintenance required	
		6.1	Device variable alert	
		6.2	Critical power failure	
		6.3	Failure	
		6.4	Out of specification	
		6.5	Function check	

Commands from Master				Response from Slave
No.	Function	Byte.Bit	Data in command	Data in reply
48	Read additional device status			The command is acknowledged with one of the following response codes: 0 = no 1 = yes
	Standardized Status 0	8.0	Device variable simulation active (= 0)	
		8.1	Non-volatile memory defect	
		8.2	Volatile memory defect (= 0)	
		8.3	Watchdog reset executed (= 0)	
		8.4	Power supply conditions out of range	
		8.5	Environmental conditions out of range (= 0)	
		8.6	Electronic defect	
		8.7	Device configuration locked (= 0)	
	Standardized Status 1	9.0	Status simulation active (= 0)	
		9.1	Discrete variable simulation active (= 0)	
		9.2	Event notification overflow (= 0)	
	Analog Channel Saturated	10.0	Analog channel saturated	
	Standardized Status 2	11	(= 0)	
	Standardized Status 3	12	(= 0)	
	Analog Channel Fixed	13	(= 0)	
	corresponds to list of parameters HART, ParNo 70	14.1	Flash Memory defect	
		14.2	RAM defect	
		14.3	EEPROM defect	
		14.4	internal voltage faulty	
		14.5	Watchdog active	
		14.6	high current converter	
		15.0	main supply voltage fault	
		15.1	high voltage	
		15.2	low voltage	
		15.3	moved too far	
		15.4	no signal potentiometer	
		15.5	no signal motor temperature	
	corresponds to list of parameters HART, ParNo 71	16.0	analog input AI2 I > 21 mA or I < 3.6 mA	
		16.1	analog input AI1 I > 21 mA or I < 3.6 mA	
		16.2	analog output AO1 defect	
		16.5	blocked in move	
		16.6	run time error	
		16.7	motor temperature too high	
		17.1	fault Bluetooth	
		17.2	fault electronic temperature	
		17.3	no signal non-intrusive position encoder	
		17.4	no communication non-intrusive position encoder	
		17.6	no signal standstill sensor	

Commands from Master				Response from Slave
No.	Function	Byte.Bit	Data in command	Data in reply
48	Read additional device status			The command is acknowledged with one of the following response codes: 0 = no 1 = yes
	corresponds to list of parameters HART. ParNo 72	18.0	fault analog PCB AI2/AO2	
		18.1	failure HART communication	
		18.2	fault analog output AO2	
	Device Specific Status	20	(= 0)	
		21	(= 0)	
		22	(= 0)	
		23	(= 0)	

4.2 Device specific commands

Commands from Master				Response from Slave	
No.	Function	Byte.Bit	Data in command	Byte	Data in reply
128	Write actuator control	0.0	control command CLOSE		The command is acknowledged with one of the following response codes: 0 = success 5 = error - Insufficient data received
		0.1	control command OPEN		
		0.2	setpoint valid		
		0.3	fault signal reset		
		0.4	control command EMERGENCY		
		0.5 – 0.7	unused		
		1.0 – 1.7	unused		
		2.0 – 2.7	setpoint (high-byte)		
		3.0 – 3.7	setpoint (low-byte)		
			0 ... 10000 (= 0-100%)		
129	Read actuator output signals		none	1	The actuator signals whether the signal at the respective signaling output is active or inactive: Bit 0 → Output 1 Bit 1 → Output 2 Bit 2 → Output 3 Bit 3 → Output 4 Bit 4 → Output 5 Bit 5 → Output 6 Bit 6 → Output 7 Bit 7 → Output 8
160	Read parameter	2	Includes the parameter number (bytes 0 – 1) The parameter number is listed in the appendix "HART parameter list" under "ParNo".	3 – 6	The response includes parameter number (bytes 0 – 1), parameter value (bytes 2 – 5) ¹⁾ as well as one of the following response codes: 0 = success 2 = error - Forbidden parameter number selection (PARAM_NOT_OK) 5 = error - Insufficient data received
161	Write parameter	3 – 6	Includes the parameter number (bytes 0 – 1) and the parameter value (bytes 2 – 5) ¹⁾ The parameter number is listed in the appendix "HART parameter list" under "ParNo".	2	The response includes parameter number (bytes 0 – 1), as well as one of the following response codes 0 = success 2 = error - Forbidden parameter number selection (PARAM_NOT_OK) 3 = error - Parameter value too large 5 = error - Insufficient data received

¹⁾ The data length depends on the format of the parameter value:

- Byte parameter (byte 2),
- Word parameter (bytes 2 – 3),
- Double word parameter (bytes 2 – 5).

List of parameters HART

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ParNo	Value	Name of parameters	Rotary actuator 2SA7	Part-turn actuator 2SG7 /2SQ7	Type	ECOTRON 1) 2S.70 2S.73	PROFITRON 1) 2S.70 2S.73 2S.75 2S.78	HiMod	Remark
9		status word 3 (ZSW3)			unsigned16		r	r	
	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) 3)		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					
10		status word 1 (ZSW1)			unsigned16		r	r	
		standard		Siemens PG (see ParNo 109)					
	bit 0	ready + remote		1 = yes; 0 = no					
	bit 1	EMERGENCY operating possible		1 = yes; 0 = no					
	bit 2	sum fault signal		1 = yes; 0 = no					
	bit 3	motor lock active via mode input		1 = yes; 0 = no					
	bit 4	factory programming OK		1 = yes; 0 = no					from firmware 3.08
	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) 3)		1 = yes; 0 = no					
	bit 9	remote active		1 = yes; 0 = no					
	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					
11		status word 2 (ZSW2)			unsigned16		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 2)		1 = yes; 0 = no					
	bit 6	motor protection active		1 = yes; 0 = no					
	bit 7	motor warranty present		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					
12		actual duty			unsigned8		r	r	
	0 ... 9	(see ParNo 110)							
13		actual position value			integer16		r	r	
		0.01% OPEN							
14		actual process value			integer16		r	r	
		((0.01%))							
1)	r = read		2) not for 2SG7	3) not for 2SQ7					

List of parameters HART

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ParNo	Value	Name of parameters		Part-turn actuator 2SG7 /2SQ7	Type	ECOTRON 1)		PROFITRON 1)		Remark
		Rotary actuator 2SA7				2S.70 2S.73	2S.75	2S.70 2S.73	2S.75 2S.78	
15		actual output speed	actual positioning time		unsigned8			r	r	7-step speed setting (for continuous setting see ParNo 631)
	0	1.25 rpm	80 $\frac{\text{sec}}{\text{90}^\circ}$							
	1	1.75 rpm	56 $\frac{\text{sec}}{\text{90}^\circ}$							
	2	2.50 rpm	40 $\frac{\text{sec}}{\text{90}^\circ}$							
	3	3.50 rpm	28 $\frac{\text{sec}}{\text{90}^\circ}$							
	4	5.00 rpm	20 $\frac{\text{sec}}{\text{90}^\circ}$							
	5	7.00 rpm	14 $\frac{\text{sec}}{\text{90}^\circ}$							
	6	10.0 rpm	10 $\frac{\text{sec}}{\text{90}^\circ}$							
	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								
16		motor temperature 2)			integer16			r	r	
		0.01 °C								
17		DC-link voltage converter [V]			unsigned16			r	r	
18		analog input AI1 + analog input AI2			unsigned32			r	r	
	0 .. 15	analog input 1: 0-10000 scaling, 0=0mA, 10000=20mA, independent of parameterization								
	16 .. 31	analog input 2: 0-10000 scaling, 0=0mA, 10000=20mA, independent of parameterization								
19		binary input , independent of parameterization high/low active			unsigned16			r	r	
	0	binary input CLOSE								
	1	binary input OPEN								
	2	binary input STOP								
	3	binary input EMERGENCY								
	4	binary input Mode								
25		binary input , according parameterization high/low active			unsigned16			r	r	
	0	binary input CLOSE								
	1	binary input OPEN								
	2	binary input STOP								
	3	binary input EMERGENCY								
	4	binary input Mode								
	5	no signal analog input AI1								
	6	no signal analog input AI2								
26		analog input AI1			unsigned16			r	r	
		0-10000 scaling, according parameterization (ParNo. 108 or at the graphics display)								
27		analog input AI2			unsigned16			r	r	
		0-10000 scaling, according parameterization (ParNo. 108 or at the graphics display)								
29		electronics temperature (1 = 0.1 °C)	0 = temperature sensor not available		signed16			r	r	
30		switching cycles per hour			unsigned16			r	r	
31		relative operational time			unsigned8			r	r	
32		number of switching cycles			unsigned32			r	r	
33		number of travel dependence cut-offs			unsigned16			r	r	
34		number of torque dependence cut-offs			unsigned16			r	r	
35		electronics unit operating hours			unsigned32			r	r	
36		motor/gear unit operating hours			unsigned16			r	r	
38		number of write access attempts to customer parameters			unsigned16			r	r	

1) r = read

2) not for 2SG7

List of parameters HART

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ParNo	Value	Name of parameters		Part-turn actuator 2SG7 /2SQ7	Type	ECOTRON 1)		HiMod PROFITRON 1)		Remark
		Rotary actuator 2SA7				2S.70 2S.73	2S.75	2S.70 2S.73	2S.75 2S.78	
46		setpoint from DCS (setpoint before adaptation to valve curve)			signed16			r	r	only with activated valve curve adaptation
47		0-10000 scaling (1 = 0.01% OPEN)			signed16			r	r	
		actual valve to DCS (actual value after adaptation to valve curve: in controlled state = flow rate)								
		0-10000 scaling (1 = 0.01% OPEN)								
50		valve maintenance limits:			unsigned32			r	r	
51		switching cycles			unsigned16			r	r	
52		torque cut-offs			unsigned16			r	r	
		motor operating hours			unsigned16			r	r	
60	bit 0	torque curves recording possible 2) 3)		1 = yes; 0 = no				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 2 active		1 = yes; 0 = no						
61		number of recorded curves (first curve) 2) 3)			unsigned16			r	r	
62		number of recorded curves (second curve) 2) 3)			unsigned16			r	r	
63		number of recorded curves (third curve) 2) 3)			unsigned16			r	r	
65		run time determined by the actuator in direction CLOSE from 100 % OPEN to 0 % OPEN			unsigned16			r	r	
	0 ... 65535 (1 = 0.1 sec)			0 = run time not yet determined						
66		run time determined by the actuator in direction OPEN from 0% OPEN to 100% OPEN			unsigned16			r	r	
	0 ... 65535 (1 = 0.1 sec)			0 = run time not yet determined						
67		move in revolutions/stroke (for non-intrusive position encoder) 2) 3)			unsigned32			r	r	
	0 ... 4294967295 (1 = 0.1 rev/stroke)									
70		0 = no non-intrusive position encoder or no end position available or set revolutions/stroke < 0.1			unsigned16			r	r	
	fault signal 1									
	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 2)		1 = yes; 0 = no						
71		fault signal 2			unsigned16			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 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	fault Bluetooth		1 = yes; 0 = no						
	bit 10	fault electronic temperature		1 = yes; 0 = no						
	bit 11	no signal non-intrusive position encoder 2) 3)		1 = yes; 0 = no						
	bit 12	no communication non-intrusive position encoder 2) 3)		1 = yes; 0 = no						
	bit 14	no signal standstill sensor 2) 3)		1 = yes; 0 = no						
1) r = read						2) not for 2SG7		3) not for 2SQ7		

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ParNo	Value	Name of parameters Rotary actuator 2SA7	Part-turn actuator 2SG7 /2SQ7	Type	ECOTRON 1) 2S.70 2S.73	PROFITRON 1) 2S.70 2S.73	HiMod 2S.75 2S.78	Remark
72		fault signal 3		unsigned16		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					
73		fault signal 4		unsigned16		r	r	
	bit 0	no signal analog output AO2	1 = yes; 0 = no					
	bit 2	no signal torque switch	1 = yes; 0 = no					
80 - 84		former errors (last 5 errors)		unsigned32		r	r	
	bit 0-7	(see ParNo 71, bit 0-7)	1 = yes; 0 = no					
	bit 8-23	(see ParNo 70, bit 0-13)	1 = yes; 0 = no					
	bit 24-29	(see ParNo 71, bit 8-14)	1 = yes; 0 = no					
100		output speed in direction CLOSE	positioning time in direction CLOSE	unsigned8		r+w	r+w	7-step speed setting (for continuous setting see ParNo 632 – 635)
	0	1.25 rpm	80 $\frac{\text{sec}}{\text{rpm}}$					
	1	1.75 rpm	56 $\frac{\text{sec}}{\text{rpm}}$					
	2	2.50 rpm	40 $\frac{\text{sec}}{\text{rpm}}$					
	3	3.50 rpm	28 $\frac{\text{sec}}{\text{rpm}}$					
	4	5.00 rpm	20 $\frac{\text{sec}}{\text{rpm}}$					
	5	7.00 rpm	14 $\frac{\text{sec}}{\text{rpm}}$					
	6	10.0 rpm	10 $\frac{\text{sec}}{\text{rpm}}$					
	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						
101		output speed in direction OPEN	positioning time in direction OPEN	unsigned8		r+w	r+w	
	0 ... 14	(see ParNo 100)						
102		EMERGENCY output speed in direction CLOSE	positioning time in direction CLOSE by EMERGENCY	unsigned8		r+w	r+w	
	0 ... 14	(see ParNo 100)						
103		EMERGENCY output speed in direction OPEN	positioning time in direction OPEN by EMERGENCY	unsigned8		r+w	r+w	
	0 ... 14	(see ParNo 100)						
104		tripping torque in end position CLOSE in % of ParNo 199 2)	100% T _{c max.}	unsigned8		r+w	r+w	
	0	100% T _{c max.}				r+w	r+w	
	1	90% T _{c max.}				r+w	r+w	
	2	80% T _{c max.}				r+w	r+w	
	3	70% T _{c max.}				r+w	r+w	
	4	60% T _{c max.}				r+w	r+w	
	5	50% T _{c max.}				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	
105		tripping torque in end position OPEN in % of ParNo 199 2)		unsigned8		r+w	r+w	
	0 ... 7	(see ParNo 104)						
106		end position range CLOSE from 0% to parameter value		unsigned16		r+w	r+w	
	200 ... 2000	(0.01% OPEN)						
107		end position range OPEN from 100% to parameter value		unsigned16		r+w	r+w	
	8000 ... 9800	(0.01% OPEN)						

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

2) for 2SG7 and 2SQ7 only 100% T_{c max.} readable

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ParNo	Value	Name of parameters	Rotary actuator 2SA7	Part-turn actuator 2SG7 /2SQ7	Type	ECOTRON 1) 2S.70 2S.73	PROFITRON 1) 2S.70 2S.73	HiMod 2S.75 2S.78	Remark
108		structure code 1			unsigned16			r+w	
	bit 0	clockwise rotation CLOSE		1 = yes; 0 = anti-clockwise				r+w	if changed, new commissioning necessary
	bit 1	travel dependent cut-off in end position CLOSE		1 = yes; 0 = torque dependence cut-off					
	bit 2	travel dependent cut-off in end position OPEN		1 = yes; 0 = torque dependence cut-off					for 2SG7 / 2SQ7 fixed at 0
	bit 3	close tightly		1 = yes; 0 = no					
	bit 4-5	control source fault							
	0	keep position							
	1	move to EMERGENCY position							only with process controller
	2	keep actual process value							
	3	move to fixed setpoint							
	bit 6	„NC“ on binary input EMERGENCY		1 = yes; 0 = "NO"					
	bit 7	„NC“ on binary inputs (OPEN, CLOSE, STOP, Mode)		1 = yes; 0 = "NO"					
	bit 9	analog input AI1 setpoint input with live zero 4 to 20 mA		1 = yes; 0 = with dead zero 0 to 20 mA					
	bit 10	analog input AI1 setpoint with slope rising		1 = yes; 0 = with slope falling					
	bit 11	analog input AI2 with live zero 4 to 20 mA		1 = yes; 0 = with dead zero 0 to 20 mA					
	bit 12	analog input AI2 with rising slope		1 = yes; 0 = with slope falling					
	bit 13	analog output AO1 with actual process value		1 = yes; 0 = with actual position value					
	bit 14	analog output AO1 with live zero 4 to 20 mA		1 = yes; 0 = with dead zero 0 to 20 mA					
	bit 15	analog output AO1 with rising slope		1 = yes; 0 = with slope falling					
109		structure code 2			unsigned16			r+w	
	bit 0	motor heating ON		1 = yes; 0 = no					
	bit 1	ZSW1 with Siemens PG assignment		1 = yes; 0 = standard					in position "remote"
	bit 2	local blocked		1 = yes; 0 = no					
	bit 3	analog output AO2 active		1 = yes; 0 = no					
	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							
		0 = without							
		1 = equal percentage							
		2 = quick opening							
	bit 12	feedback		1 = flow rate; 0 = valve position	bit			r+w	
110		remote control			unsigned8			r+w	only with process controller
	0	analog: process controller AI1							
	1	fieldbus: process controller							
	2	internal: process controller with fixed setpoint value							
	3	analog: positioner AI1							only with positioner
	4	fieldbus: positioner							
	6	binary: permanent contact signal							
	7	fieldbus: permanent contact signal							
	8	binary: pulse contact signal							
	10	binary: proportional operation							only with positioner
	11	fieldbus: proportional operation							
	12	analog: process controller AI2							only with process controller
	13	analog: positioner AI2							only with positioner
111		alternative control mode			unsigned8			r+w	
	255	not active (else, see ParNo 110)							
112		EMERGENCY position			unsigned16			r+w	
	0 ... 10000 (0.01% OPEN)								
113		intermediate contact CLOSE			unsigned16			r+w	
	0 ... 10000 (0.01% OPEN)								
114		intermediate contact OPEN			unsigned16			r+w	
	0 ... 10000 (0.01% OPEN)								
1) r+w = read+write									

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ParNo	Value	Name of parameters		Part-turn actuator 2SG7 /2SQ7	Type	ECOTRON 1)		PROFITRON 1)		HiMod	Remark
		Rotary actuator 2SA7				2S.70 2S.73	2S.75	2S.70 2S.73	2S.75 2S.78		
115		rise time 1 ... 100 (0.1 sec), for 2S.75.. and 2S.78.. 1 ... 200			unsigned8			r+W	r+W		
116		dc-brake 0 ... 250 %			unsigned8			r+W	r+W		
117		retry to get over torque block when out of travel limit areas 0 ... 5 (0 = no repeated start)			unsigned8			r+W	r+W		
118	bit 0	separate mounting		1 = >10m with sine filter; 0 = none or <=10m	bit			r+W	r+W		
119		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									
	3	move to fixed setpoint									
	4	execute last command									only with process controller
130		output 1			unsigned8			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. 2)									
	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									
	23	travel end OPEN									
	bit 7	NC (low-active)		1 = yes; 0 = NO (high active)							from firmware 3.10
131		output 2 (see ParNo 130)			unsigned8			r+W	r+W		
132		output 3 (see ParNo 130)			unsigned8			r+W	r+W		
133		output 4 (see ParNo 130)			unsigned8			r+W	r+W		
134		output 5 (see ParNo 130)			unsigned8			r+W	r+W		
135		output 6 (see ParNo 130)			unsigned8			r+W	r+W		
136		output 7 (see ParNo 130)			unsigned8			r+W	r+W		

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

2) not for 2SG7

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ParNo	Value	Name of parameters		Part-turn actuator 2SG7 /2SQ7	Type	ECOTRON 1)		PROFITRON 1)		HiMod	Remark
		Rotary actuator 2SA7				2S.70 2S.73	2S.75	2S.70 2S.73	2S.75 2S.78		
137		output 8 (see ParNo 130)			unsigned8			r+W	r+W	r+W	
138		warning motor temperature at ... °C 2 -20°C ... 155°C (0.01°C)			integer16			r+W	r+W	r+W	
139		language on the Display			unsigned8			r+W	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									
140		customer variant 0 ... 127			unsigned8			r+W	r+W	r+W	
150		interval value switching cycles			unsigned32			r+W	r+W	r+W	
		0 ... 30 Mio. (for 2S.75.. and 2S.78..)									
		0 ... 100000 (for 2S.70.. and 2S.73..)									
151		interval value torque dependent cut-offs			unsigned16			r+W	r+W	r+W	
		0 ... 20000 (for 2S.75.. and 2S.78..)									
		0 ... 10000 (for 2S.70.. and 2S.73..)									
152		interval value motor operating hours			unsigned16			r+W	r+W	r+W	
		0 ... 2500									
160		tag number			Visible-String			r+W	r+W	r+W	
161		0. - 3. digit									
162		4. - 7. digit									
163		8. - 11. digit									
164		12. - 15. digit									
		16. - 19. digit									

1) r+w = read+write

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ParNo	Value	Name of parameters		Type	ECOTRON 1)		HiMod		Remark
		Rotary actuator 2SA7	Part-turn actuator 2SG7 /2SQ7		2S.70 2S.73	2S.75	PROFITRON 1)	2S.70 2S.73	
180		control word torque curve 2) 3)		unsigned16			r+w	r+w	
	bit 0	start recording							
	bit 1	cancel recording							
	bit 8 - 15	Select curve No.							
		0 = curve 1							
		1 = curve 2							
		2 = curve 3							
181		run time in direction CLOSE for control via proportional operation		unsigned16			r+w	r+w	
		0 or 50 ... 32760 (1=0.1s)							
182		run time in direction OPEN for control via proportional operation		unsigned16			r+w	r+w	
		0 or 50 ... 32760 (1=0.1s)							
185		process controller: amplification Kp		signed16			r+w	r+w	
		-100 ... 100 (1 = 0.01%)							
186		process controller: reset time Tn		unsigned16			r+w	r+w	
		0 ... 30000 (1 = 0.1 s)							
187		process controller: fixed setpoint value		unsigned8			r+w	r+w	
		0 ... 200 (1 = 0.5 %)							
197		function control		unsigned8			w	w	
	1	delete former errors							
199		max. tripping torque (T _{e,max} [Nm])		unsigned16			r	r	
		0 ... 6000 (1 = 1 Nm)							
200		manufacturer		Visible-String			r	r	
		0. - 3. digit							
		4. - 7. digit							
		8. - 11. digit							
203		Serial number		unsigned32			r	r	
		9. - 12. digit							
205		ordering no.		unsigned16			r	r	
		0. - 3. digit							
206				Visible-String			r	r	
		4. - 7. digit							
207									
		8. - 11. digit							
208									
		12. - 15. digit							
211		firmware version		Visible-String			r	r	
		0. - 3. digit							
212									
		4. - 7. digit							
213									
		8. - 11. digit							
215		original serial number		unsigned32			r	r	
		0. - 8. digit							
216				unsigned16			r	r	
		9. - 12. digit							
221		speed curve - position 1		unsigned8			r+w	r+w	
		0 ... 100 (% OPEN; 0 = end position CLOSE)							
222-		speed curve - position 2-10		unsigned8			r	r	
		see ParNo 221)							
230				unsigned8			r+w	r+w	
		1) r = read; w = write; r+w = read+write							
		2) not for 2SG7							
		3) not for 2SQ7							

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ParNo	Value	Name of parameters		Type	ECOTRON 1)		PROFITRON 1)		Remark
		Rotary actuator 2SA7	Part-turn actuator 2SG7 /2SQ7		2S.70 2S.73	2S.75	2S.70 2S.73	2S.75	
231		speed curve - speed 1		unsigned8			r+W	r+W	7-step speed setting (for continuous setting see ParNo 636 – 645)
	0	1.25 rpm	positioning time 1						
	1	1.75 rpm	80 $\frac{\text{sec}}{\text{90}^\circ}$						
	2	2.50 rpm	56 $\frac{\text{sec}}{\text{90}^\circ}$						
	3	3.50 rpm	40 $\frac{\text{sec}}{\text{90}^\circ}$						
	4	5.00 rpm	28 $\frac{\text{sec}}{\text{90}^\circ}$						
	5	7.00 rpm	20 $\frac{\text{sec}}{\text{90}^\circ}$						
	6	10.0 rpm	14 $\frac{\text{sec}}{\text{90}^\circ}$						
	7	14.0 rpm	10 $\frac{\text{sec}}{\text{90}^\circ}$						
	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							
232-		speed curve - speed 2-10		unsigned8			r+W	r+W	
240		(see ParNo 231)							
241		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						
245		split range function: current value 1	0 ... 200 (1 = 0.1 mA)	unsigned8			r+W	r+W	smaller than current value 2
246		split-range function: position value 1	0 ... 100 (1 = 1% Open)	unsigned8			r+W	r+W	unequal position 2
247		split-range function: current value 2	0 ... 200 (1 = 0.1 mA)	unsigned8			r+W	r+W	larger than current value 1
248		split-range function: position value 2	0 ... 100 (1 = 1% Open)	unsigned8			r+W	r+W	unequal position 1
250		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						
251		travel-positioning time-curve: position 1		unsigned8			r+W	r+W	
	0 ... 100 (% OPEN; 0 = end position CLOSE)								
252-		travel-positioning time-curve: position 2 up to position 5		unsigned8			r+W	r+W	
255		(see ParNo 251)							
256		travel-positioning time-curve: positioning time 1		unsigned16			r+W	r+W	
	0 ... 60000 (1 = 1 sec)								
257-		travel-positioning time-curve: positioning time 2 up to positioning time 5		unsigned16			r+W	r+W	
260		(see ParNo 256)							
261-		travel-positioning time-curve: position 6 up to position 10		unsigned8			r+W	r+W	
265		(see ParNo 251)							
266-		travel-positioning time-curve: positioning time 6 up to positioning time 10		unsigned16			r+W	r+W	
270		(see ParNo 256)							
271		travel-positioning time-curve: EMERGENCY factor		unsigned16			r+W	r+W	
		1 ... 100 (1 = 0.1)							

1) r+W = read+write

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ParNo	Value	Name of parameters		Type	ECOTRON 1)		PROFITRON 1)		HiMod	Remark
		Rotary actuator 2SA7	Part-turn actuator 2SG7 /2SQ7		2S.70 2S.73	2S.75	2S.70 2S.73	2S.75 2S.78		
280		minimum dead zone positioner 0.2 ... 5%		unsigned16			r+w	r+w		
		20 ... 500 (1 = 0.01%)								
281		maximum dead zone positioner 0.2 ... 5%		unsigned16			r+w	r+w		
		20 ... 500 (1 = 0.01%)								
282		delay time undervoltage signal 0 ... 25 sec		unsigned8			r+w	r+w		
		0 ... 250 (1 = 0.1 sec)								
283		masking value for ZSW1		unsigned16			r+w	r+w		
284		masking value for ZSW2		unsigned16			r+w	r+w		
300		customer parameter 1 for customer variant		unsigned16			r+w	r+w		
		0 ... 65534								
301		customer parameter 2 for customer variant		unsigned16			r+w	r+w		
		0 ... 65534								
302		customer parameter 3 for customer variant		unsigned16			r+w	r+w		
		0 ... 65534								
303		customer parameter 4 for customer variant		unsigned16			r+w	r+w		
		0 ... 65534								
410		lowest adjustable tripping torque		unsigned8			r	r		
		30 ... 100 (1 = 1% max. tripping torque)								
411		highest adjustable tripping torque		unsigned8			r	r		
		30 ... 100 (1 = 1% max. tripping torque)								
500		Special parameters		unsigned16			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							
502	0	test operation		unsigned8			r+w	r+w		
		normal operation								
503	1	test operation active		unsigned16			r+w	r+w		
		test operation: runtime CLOSE								
504	0 ... 65530 (1 = 0.1 sec)	test operation: pause CLOSE		unsigned16			r+w	r+w		
	0 ... 65530 (1 = 0.1 sec)									
505	0 ... 65530 (1 = 0.1 sec)	test operation: runtime OPEN		unsigned16			r+w	r+w		
	0 ... 65530 (1 = 0.1 sec)									
506	0 ... 65530 (1 = 0.1 sec)	test operation: pause OPEN		unsigned16			r+w	r+w		
	0 ... 65530 (1 = 0.1 sec)									
520	data: year			unsigned16			r+w	r+w		
	1 ... 99									
521	data: month			unsigned8			r+w	r+w		
	1 ... 12									
522	data: day			unsigned8			r+w	r+w		
	1 ... 31									
523	time: hours			unsigned8			r+w	r+w		
	0 ... 23									
524	time: minutes			unsigned8			r+w	r+w		
	0 ... 59									
525	time: seconds			unsigned8			r+w	r+w		
	0 ... 59									
530	Mode input			unsigned8			r+w	r+w		
	0	no function								
	1	interlock LOCAL/REMOTE								
	2	enable motor operation								
	3	enable LOCAL								
1) r = read; r+w = read+write										
										from firmware 3.08
										from firmware 3.10

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ParNo	Value	Name of parameters		Part-turn actuator 2SG7 /2SQ7	Type	ECOTRON 1)		PROFITRON 1)		HiMod	Remark
		Rotary actuator 2SA7				2S.70 2S.73	2S.75	2S.70 2S.73	2S.75 2S.78		
533		display orientation			unsigned8			r+w	r+w		
	0	standard									
	1	turned 90° to the left									from firmware 3.07
	2	turned 180°									
534	3	turned 90° to the right			unsigned8			r+w	r+w		from firmware 3.07
		lower limit value for wire break detection at analog inputs									
	0 ... 36 (1 = 0.1 mA)										
		upper limit value for wire break detection at analog inputs									
535		200 ... 220 (1 = 0.1 mA)			unsigned8			r+w	r+w		
		bit parameter									
	bit 0	Bluetooth activated		1 = yes; 0 = no	unsigned8			r+w	r+w		
		state									
550	bit 0	actuator rotates (pulses from standstill sensor or nIP available)		1 = yes; 0 = no	unsigned8			r	r		
	bit 1	standstill sensor detected		1 = yes; 0 = no							
		status signal at binary outputs									
	bit 0	binary output 1		1 = active; 0 = not active	unsigned8			r	r		
551	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							
		analog output AO1			unsigned16			r	r		
552		0-10000 scaling, 0=0mA, 10000=20mA, independent of parameterization									
553		analog output AO2			unsigned16			r	r		
		0-10000 scaling, 0=0mA, 10000=20mA, independent of parameterization									
		end position speed			unsigned8			r+w	r+w		
	0	normal									
555	1	quick start									
	2	quick start/stop									
		DCS acceptance time									
556		0 ... 255 (1 = 0.1 s)			unsigned8			r+w	r+w		
557		torque measurement flange: connection 2)			unsigned8			r+w	r+w		
	0	not available									
	1	at analog input AI1									
	2	at analog input AI2									
558		torque measurement flange: current torque 2)			signed16			r	r		
		-32768 ... +32767 (1 = 0.1 Nm)									
		torque measurement flange: offset 2)			signed16			r	r		
		-32768 ... +32767 (1 = 0.1 Nm)									
559		torque measurement flange: perform zero adjustment (current torque is stored as offset) 2)			unsigned8			w	w		
560	bit 0	torque measurement flange: perform zero adjustment (current torque is stored as offset) 2)		1 = yes; 0 = no							

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

2) only for 2SA7.1 ... 2SA7.6

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ParNo	Value	Name of parameters		Part-turn actuator 2SG7 /2SQ7	Type	ECOTRON 1)		HiMod		Remark
		Rotary actuator 2SA7				2S.70 2S.73	2S.75 2S.78	PROFITRON 1) 2S.70 2S.73	2S.75 2S.78	
561		additional gear: gear type 2) 3)			unsigned8			r+W	r+W	
	0	not available								
	1	rotary gearbox								
	2	part-turn gearbox								
	3	linear thrust unit								
564		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)								
565		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)								
566		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)								
567		additional gear: max. input speed 2) 3)			unsigned16			r+W	r+W	
		1 ... 1000 (1 = 1 rpm)								
568		additional gear: spindle pitch 2) 3)			unsigned16			r+W	r+W	
		10 ... 1000 (linear thrust unit: 1 = 0.1 mm)								
569		additional gear: factor input torque/output force 2) 3)			unsigned16			r+W	r+W	
		10 ... 1000 (linear thrust unit: 1 = 0.1)								
570		additional gear: max. output force 2) 3)			unsigned16			r+W	r+W	
		1 ... 1000 (linear thrust unit: 1 = 1 kN)								
571		additional gear: positioning angle 2) 3)			unsigned16			r+W	r+W	
		1 ... 360 (part-turn gearbox: 1 = 1 °)								
572		additional gear: stroke 2) 3)			unsigned16			r+W	r+W	
		1 ... 10000 (linear thrust unit: 1 = 1 mm)								
573		additional gear: rev./stroke 2) 3)			unsigned32			r+W	r+W	
		1 ... 99000 (rotary gearbox: 1 = 0.1 rev./stroke)								
574		additional gear: proposed signaling gear setting 2)			unsigned32			r	r	
		(1 = 0.1 rev./stroke)								
580		Bluetooth address			Visible-String			r	r	
581		0. - 3. digit								
582		4. – 7. digit								
		8. - 11. digit								
583		HART: Data transmission via analog signal 4 – 20mA "Loop Current Mode"			unsigned8			r	r	
	0	deactivated (for multidrop mode: current signal continuously set to 4 mA)								
	1	activated (for point-to-point connection)								
584		HART: Device address „Polling Address"			unsigned8			r+W	r+W	
		0 ... 63 (default address: 0)								
585		HART: Monitoring time (max. time until communication failure is detected)			unsigned16			r+W	r+W	
		0 ... 36000 (1 = 0.1 s)								
586		HART: Device category „DeviceConnectionType"			unsigned8			r	r	
	2	Current Output (communication via analog output AA2)								
	7	Actuator (communication via analog input AE2)								
587		HART: Min Number of Request Preambles			unsigned8			r+W	r+W	
		5 ... 20								
1) r = read; r+W = read+write										
2) only for 2SA7.1 ... 2SA7.6										
3) can be changed for user-defined additional gear										

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ParNo	Value	Name of parameters		Part-turn actuator 2SG7 /2SQ7	Type	ECOTRON 1)		HiMod PROFITRON 1)		Remark
		Rotary actuator 2SA7				2S.70 2S.73	2S.75	2S.70 2S.73	2S.75 2S.78	
588		HART: Min Number of Response Preambles 5 ... 20			unsigned8			r+w	r+w	
589		HART: Manufacturer Identification Code 24700 (hexadezimal: 607C)			unsigned16			r	r	
590		HART: Expanded Device Type 57854 (hexadezimal: E1FE)			unsigned16			r	r	
591		HART: Device Identification Number 0 ... 16777215			unsigned24			r	r	
592		HART: Revision-Info bit 0-7 Device Revision Level bit 8-15 Software Revision Level bit 16-23 Hardware Revision Level bit 24-31 Protocol Revision Level			unsigned32			r	r	
593		HART: „Configuration Change Counter“ Increase for the following commands: - 6 (Write Polling Address), - 17 (Write Message), - 18 (Write Tag, Descriptor, Date), - 19(Write Final Assembly Number) and - 22 (Write Long Tag) 0 ... 65535			unsigned16			r	r	
595		HART: „Final Assembly Number“ 0 ... 16777215 (changed by "Command" 19)			unsigned24			r	r	
596		HART: „Descriptor“ 0. - 3. digit 4. - 7. digit 8. - 11. digit 12. - 15. digit			Visible-String			r+w	r+w	
597										
598										
599										
600		HART: „Message“ 0. - 3. digit 4. - 7. digit 8. - 11. digit 12. - 15. digit 16. - 19. digit 20. - 23. digit 24. - 27. digit 28. - 31. digit			Visible-String			r+w	r+w	
601										
602										
603										
604										
605										
606										
607										
608		HART: „Long Tag“ 0. - 3. digit 4. - 7. digit 8. - 11. digit 12. - 15. digit 16. - 19. digit 20. - 23. digit 24. - 27. digit 28. - 31. digit			Visible-String			r+w	r+w	
609										
610										
611										
612										
613										
614										
615										
616		HART: „Tag“ 0. - 3. digit 4. - 7. digit			Visible-String			r+w	r+w	
617										
618		HART: wireless communication 0 not active 1 active			unsigned8			r	r	
619		HART: Communication 0 not active 1 active 2 Data Exchange			unsigned8			r+w	r+w	

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

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ParNo	Value	Name of parameters		Part-turn actuator 2SG7 /2SQ7	Type	ECOTRON 1)		PROFITRON 1)		Remark
		Rotary actuator 2SA7				2S.70 2S.73	2S.75	2S.70 2S.73	2S.75 2S.78	
620		standby screen			unsigned8			r+w	r+w	from firmware 3.07
	0	standard								
	1	position								
	2	position+filling								
	3	position+bar+status								
630	4	fast to LOCAL								
		speed setting in steps or continuously			unsigned8			r	r	from firmware 3.10
	0	7-step setting								continuous speed setting from firmware 3.08
	1	continuous setting			unsigned16			r	r	
		actual speed								
631		125 ... 1000 (1 = 0.1 % n_{max})								
		output speed in direction CLOSE			unsigned16			r+w	r+w	(for 7-step setting see ParNo 100 – 103)
		125 ... 1000 (1 = 0.1 % n_{max})								
		output speed in direction OPEN			unsigned16			r+w	r+w	
		125 ... 1000 (1 = 0.1 % n_{max})								
632		EMERGENCY output speed in direction CLOSE			unsigned16			r+w	r+w	
		125 ... 1000 (1 = 0.1 % n_{max})								
		EMERGENCY output speed in direction OPEN			unsigned16			r+w	r+w	
		125 ... 1000 (1 = 0.1 % n_{max})								
		speed curve - speed 1			unsigned16			r+w	r+w	
633		125 ... 1000 (1 = 0.1 % n_{max})								
		speed curve - speed 2-10			unsigned16			r+w	r+w	
		125 ... 1000 (1 = 0.1 % n_{max})								
		positioning time in direction CLOSE			unsigned32			r	r	(for 7-step setting, see ParNo 231 – 240)
		(1 = 0.1 sec.)								
634		positioning time in direction OPEN			unsigned32			r	r	(for 7-step setting, see ParNo 100 – 103)
		(1 = 0.1 sec.)								
		positioning time in direction CLOSE by EMERGENCY			unsigned32			r	r	
		(1 = 0.1 sec.)								
		positioning time in direction OPEN by EMERGENCY			unsigned32			r	r	
635		(1 = 0.1 sec.)								
		remote control unit RCU: signal quality			unsigned8			r	r	from firmware 3.10
		0 ... 100 (0 = 0%)								
		torque measurement flange + additional gear: current torque / current force			signed32			r	r	
		(rotary gearbox and part-turn gearbox: 1 = 0.1 Nm; linear thrust unit: 1 = 0.1 kN)								
636		standby time			unsigned32			r+w	r+w	
		1 ... 1000 (1 = 1 min)								
		activate standby			unsigned32			w	w	
		activate standby screen								
	1	activate standby								
637	bit 0	torque measurement flange: reset zero adjustment (offset is set to zero) 2)			unsigned8			w	w	from firmware 3.11
		torque measurement flange: measuring range 2)								
	0	±120 Nm (2SX7100-6A..)						r+w	r+w	
	1	± 500 Nm (2SX7100-6B..)								
	2	± 1000 Nm (2SX7100-6C..)								

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

