SRD991 / SRD960 Intelligent Positioners – Communication with HART Hand-Held Terminal –

The intelligent electro-pneumatic positioners SRD991/SRD960 are designed to operate pneumatic valve actuators from control systems and electronic controllers with the analog control signal 4 ... 20 mA, superimposed by the HART communication signal. Digital operation by means of HART or FOXCOM is also available.

FEATURES

- Auto-start with self-calibration
- Self diagnostics
- Communication HART or FOXCOM
- Configuration by means of local keys, hand-held terminal, PC or I/A Series system
- Low air consumption
- Low vibration effect in all directions
- Stroke 8 to 100 mm (0.3 to 4 in)
- Angle range up to 95 °
- Easy operation with three key pads
- Supply air pressure up to 6 bar (90 psig)
- Single or double-acting
- Mechanical travel indicator
- Mounting on linear actuators direct or according to IEC 534, Part 6 (NAMUR)
- Mounting on rotary actuators according to VDI/VDE 3845
- Protection class IP 65
- Explosion protection:
  EEx ia IIC T4 and EEx ia IIC acc. to ATEX or "Intrinsic safety" according to FM and CSA
- Built-in independent inductive limit switches (optional)
- Sensors for supply air pressure and output pressure (optional)
- Booster relay to minimize stroke time (optional)

FOXBORO ECKARDT

NOTES

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1 SETTING SRD991 / SRD960 WITH HAND-HELD TERMINAL

1.1 General information

The communications interface to HART provides the user, both when using the hand-held terminal or a PC with DTM (VALcare or Valve Monitor), with a large number of configuration and programming possibilities.

Both are equipped with the same basic range of functions, and the differences in operation result from the different screen sizes and ability to use password protection in the PC. Detailed, self-explaining help texts are integrated in the PC user interface, while with the Hand Held Terminal this documentation should be consul- ted for more extensive explanations (see Chap. 2.4).

The general operation of the HHT is described in MI EMO 0110A-(en).

1.2 Commissioning with hand-held terminal

The positioner must be connected, electrically ready for operation and linked to an Hand Held Terminal, as described in MI EVE0105 A -(en) in Chap. 6.2 and 8.1. The safety regulations must be observed, as described in
MI EVE0105 A -(en) in Chap. 10 !

The positioner is preadjusted by the manufacturer with default parameters, and instrument-specific data are permanently stored. The current input and the angle are calibrated.

During the first commissioning the user-specific data must be entered. These are shown in bold print in the following list. Further data for configuration, setting parameters, diagnosis and local display can be entered. If no entry is made, the default parameters are retained.

List of enterable data in the order of the menu sequence (selection):

- TAG No.
- Date
- Model code of actuator
- Serial number of valve
- Valve type
- **Angle linearization**
- Spring
- **Characteristic selection**
- Unit of position
- Range of stroke or angle of rotation
- **Power-Up Action**
- Limit value for the summarized stroke
- Dead band for this limit value
- Limit value for the number of cycles
- Limit value for control difference
- Time for this limit value
- **Setpoint source**
- **Input signal range**
- **Inversion**
- Threshold value GAP for control
- Rise time limits
- Cutoff range
- Hysteresis of this range
- Limit values of valve position
- Four possible alarm limits
- Hysteresis of alarms
- Failsafe behavior
- Time limit value (for failsafe)
- Default value
- Temperature unit
- Limit values for temperature
- Unit for pressure measurements
- Freely selectable texts can also be entered.

The menu sequence is described in Chap. 3.2 and 3.4 with reference to the ordinal numbers within the document.

After the desired data have been entered, commissioning can take place.

During first commissioning an autostart must be carried out. For the automatic determination of the operating range, “Short autostart” is carried out, and for automatic determination of the operating range and the control parameters, “Autostart” is carried out. The positioner is set to the OUT SERVICE mode in the software*. Actuating “Autostart” resp. “Short autostart” (3.3.1.10.1)** initiates the procedure, the green LED1 lights up on the positioner and the range limits are determined. Then the control parameters are determined.
The Autostart procedure may take several minutes. Following this the instrument automatically switches into the IN SERVICE mode. Historic fault status messages (3.3.1.13.4)** will be automatically deleted.

If the “Autostart” procedure is aborted prematurely after determining the operating range (green LED2 on positioner lights up), then the instrument remains in the OUT SERVICE mode. It must be switched into the IN SERVICE mode (3.3.1.2)**.
The control parameters must be determined and entered manually (3.3.1.6)**.

After carrying out a “Short autostart”, the control parameters must be determined and entered manually (3.3.1.6)**.

Testing settings:
By selecting the function “Test Controlbeh.” (3.3.1.11)** input steps can be simulated. If the step response is not as expected during observation, the control parameters (3.3.1.6) can be manually adapted.

The instrument is now completely configured and calibrated.

* The software modes are described in MI EVE0105 A-(en) in Chap. 1.3.3.

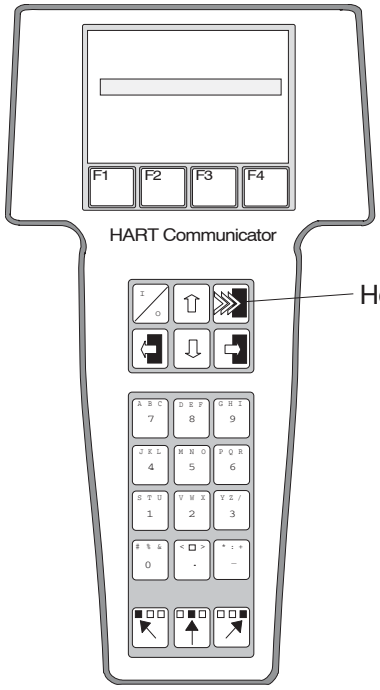
** Ordinal numbers within the document for designating the menu items and HART commands

2 USING THE HAND-HELD TERMINAL HHT WITH SRD991/960

2.1 General information

The basic operation of the hand-held terminal is described in MI EMO 0110 A -(en).

In the following the special menus for the operation of the intelligent positioner SRD991 are described using the ordinal numbers within the document.



Example of a local menu display on the user interface of the hand-held terminal: Submenu “Characterization” (3.3.1.4.9)**

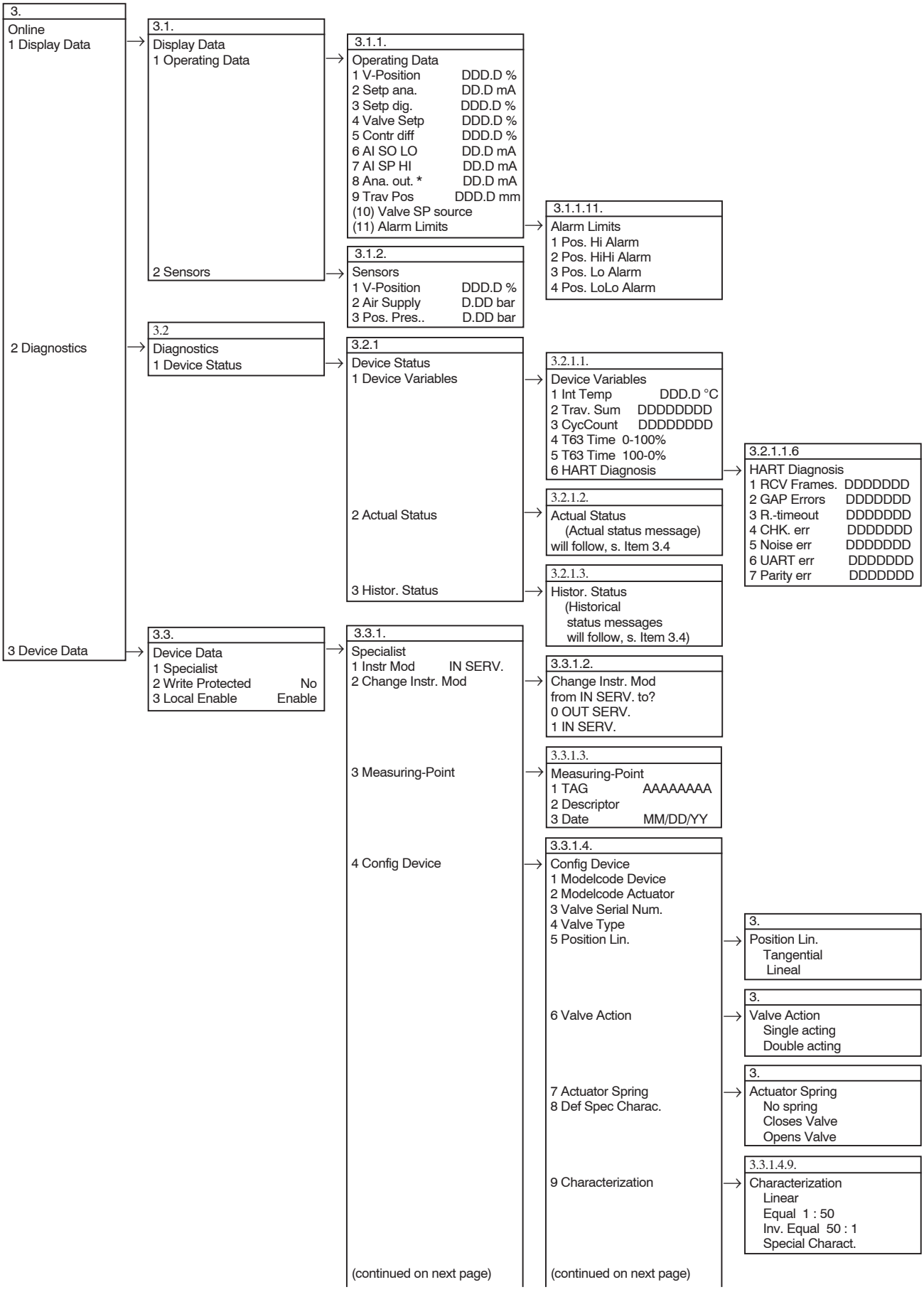
Function of the Hot key:
Pressing the Hot key switches for the respectively selected menu item to the “Display Data" menu item (3.1.1)**. The current operating data are displayed. Pressing the Hot key again switches back to the selected menu item.

Point 3 provides an overview of the menus of the HHT for the SRD991 in frames. Each frame contains the ordinal number and the local menu display on the user interface of the hand-held terminal.

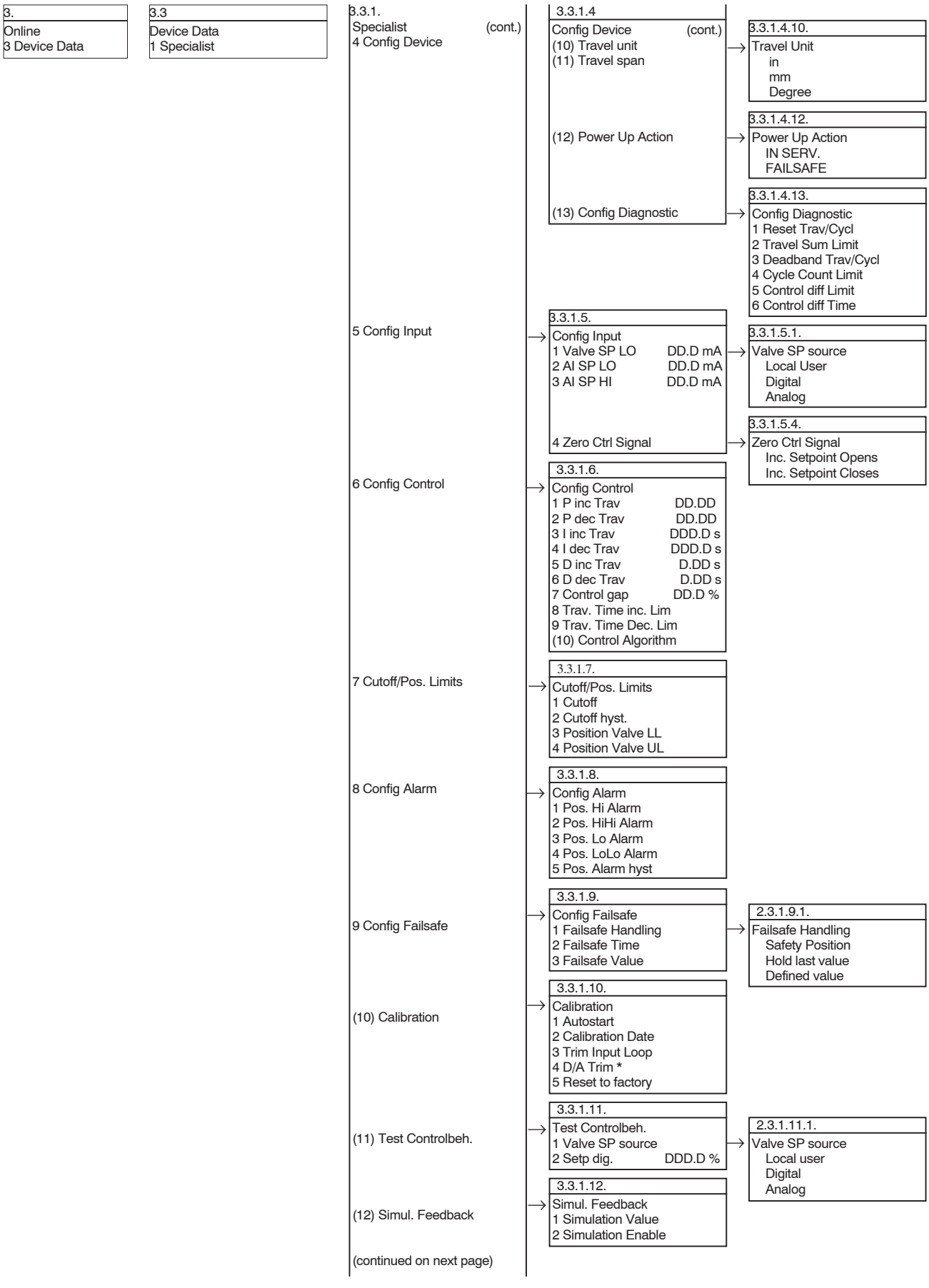
In 4 menu items and HART commands are assigned to the ordinal numbers in alphabetical order.

In 5 the menu items are described in detail in the order of the ordinal numbers.

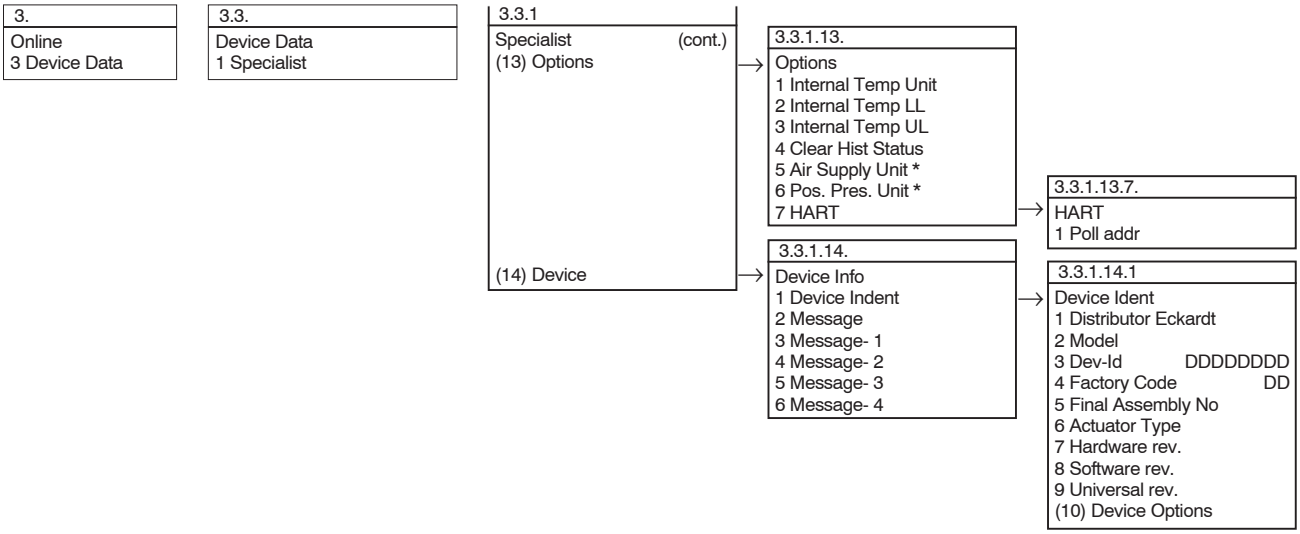
3 Hand Held Terminal Menus for the SRD991 / SRD960 Overview



3.2 Hand Held Terminal Menus for the SRD991/SRD960 Overview (continued)



3.2 Hand Held Terminal Menus for the SRD991/SRD960 Overview (continued)



4 Menu Items, HART Commands

DESIGNATION	Ordinal No.
Actual Status	**3.2.1.2.**
Actuator Spring	3.3.1.4.7.
Actuator Type	3.3.1.14.1.6.
AI SP HI	3.1.1.7.
AI SP HI	3.3.1.5.3.
AI SP LO	3.1.1.6.
AI SP LO	3.3.1.5.2.
Air Supply	3.1.2.2.
Air supply Unit	3.3.1.13.5.
Alarm Limits	**3.1.1.11.**
Ana. Out.	3.1.1.8.
Auto start	3.3.1.10.1.
Calibration	**3.3.1.10.**
Calibration Date	3.3.1.10.2.
Change Instr. Mode	**3.3.1.2.**
Characterization	3.3.1.4.9.
CHK. err	3.2.1.1.6.4.
Clear Hist Status	3.3.1.13.4.
Config Alarm	**3.3.1.8.**
Config Control	**3.3.1.6.**
Config Device	**3.3.1.4.**
Config Diagnostic	**3.3.1.4.13.**
Config Failsafe	**3.3.1.9.**
Config Input	**3.3.1.5.**
Contr diff	3.1.1.5.
Contr diff Limit	3.3.1.4.13.5.
Contr diff Time	3.3.1.4.13.6.
Control Algorithm	3.3.1.6.10.
Control gap	3.3.1.6.7.
Cutoff	3.3.1.7.1.
Cutoff hyst.	3.3.1.7.2..
Cutoff/Pos. Limits	**3.3.1.7.**
CycCount	3.2.1.1.3.
Cycle Count Limit	3.3.1.4.13.4.
D dec Trav	3.3.1.6.6.
D inc Trav	3.3.1.6.5.
D/A Trim	3.3.1.10.4.
Date	3.3.1.3.3.
Deadband Trav/Cycl	3.3.1.4.13.3.
Def Spec Charac.	3.3.1.4.8.
Descriptor	3.3.1.3.2.
Dev-id	3.3.1.14.1.3.
Device Data	3.3.
Device Info	**3.3.1.14.**

Alphabetical series

DESIGNATION	Ordinal No.
Device Status	3.2.1.
Device Variables	**3.2.1.1.**
Diagnostics	3.2.
Display Data	3.1.
Distributor Eckardt	3.3.1.14.1.1.
Factory code	3.3.1.14.1.4.
Failsafe Handling	3.3.1.9.1.
Failsafe Time	3.3.1.9.2.
Failsafe Value	3.3.1.9.3.
Final Assembly No	3.3.1.14.1.5.
GAP Errors	3.2.1.1.6.2.
Hardware rev.	3.3.1.14.1.7.
HART	3.3.1.13.7.
HART Diagnosis	**3.2.1.1.6.**
Histor. Status	**3.2.1.3.**
I dec Trav	3.3.1.6.4.
I inc Trav	3.3.1.6.3.
Instr Mod	3.3.1.1.
Int Temp	3.2.1.1.1.
Internal Temp LL	3.3.1.13.2.
Internal Temp UL	3.3.1.13.3.
Internal Temp Unit	3.3.1.13.1.
Local enable	3.3.3.
Measuring-Point	**3.3.1.3.**
Message	3.1.14.2.
Message 1 to 4	3.3.1.14.3 - 6.
Model	3.3.1.14.1.2.
Modelcode Actuator	3.3.1.4.2.
Modelcode Device	3.3.1.4.1.
Noise err	3.2.1.1.6.5.
Operating Data	3.1.1.
Options	**3.1.13.**
P dec Trav	3.3.1.6.2.
P inc Trav	3.3.1.6.1.
Parity err	3.2.1.1.6.7.
Poll addr	3.3.1.13.7.1.
Pos. alarm hyst.	3.3.1.8.5.
Pos. Hi Alarm	3.1.1.11.1.
Pos. Hi Alarm	.3.1.8.1.
Pos. HiHi Alarm	3.1.1.11.2.
Pos. HiHi Alarm	3.3.1.8.2.
Pos. Lo Alarm	3.1.1.11.3.
Pos. Lo Alarm	3.3.1.8.3.
Pos. LoLo Alarm	3.1.1.11.4.

DESIGNATION	Ordinal No.
Pos. Pres.	3.1.2.3.
Pos. Pres. Unit	3.3.1.13.6.
Position Lin.	3.3.1.4.5.
Position Valve LL	3.3.1.7.3.
Position Valve UL	3.3.1.7.4.
Power Up Action	3.3.1.4.12.
R.-timeout	3.2.1.1.6.3.
RCV Frames	3.2.1.1.6.1.
Reset to factory	3.3.1.10.5.
Reset Trav/Cycl	3.3.1.4.13.1.
Sensors	3.1.2.
Setp ana.	3.1.1.2.
Setp dig.	3.3.1.11.2.
Setp dig.	3.1.1.3.
Simul. Feedback	3.3.1.12.
Simulation Enable	3.3.1.12.2
Simulation Value	3.3.1.12.1.
Software rev.	3.3.1.14.1.8.
Specialist	3.3.1.
T63 Time 0 - 100 %	3.2.1.1.4.
T63 Time 100 - 0 %	3.2.1.1.5
TAG	3.3.1.3.1.
Test Controlbeh.	**3.3.1.11.**
Trav. Pos	3.1.1.9.
Trav. Sum	3.2.1.1.2.
Trav. Time Dec. Limit	3.3.1.6.9.
Trav. Time Inc. Limit	3.3.1.6.8.
Travel span	3.3.1.4.11.
Travel Sum Limit	3.3.1.4.13.2.
Travel Unit	3.3.1.4.10.
Trim Input Loop	3.3.1.10.3.
UART err	3.2.1.1.6.6.
Universal rev.	3.3.1.14.1.9.
V-Position	3.1.1.1.
V-Position	3.1.2.1.
Valve Action	3.3.1.4.6.
Valve Serial Num	3.3.1.4.3.
Valve Setp	3.1.1.4.
Valve SP source	3.1.1.10.
Valve SP source	3.3.1.11.1.
Valve SP source	3.3.1.5.1.
Valve Type	3.3.1.4.4.
Write Protected	3.3.2.
Zero Ctr Signal	3.3.1.5.4.

5 Description of menu items

The menu items are described in the following tables.

The menu order is indicated before each table. This specifies, starting from the main menu, the menus to be selected in order to reach the individual menu items.

Menu sequence: Main menu → Menu → Menu →

Ordinal No.	Menu item	"Help text" and Interpretation	Type	Format

The following information is contained in the table:

Column 1: Ordinal No.
The ordinal number indicates the location of the individual menu items in the submenus (see Chap. 3).
Example:
Ordinal Number 3.3.1.4.9. means:
In the Main menu 2 Menu Online
In the Online menu 3 Device Data menu
In the Device Data menu 1 Specialist menu
In the Specialist menu 4 Config Device menu
In the Config Device menu 9 Characterization menu

Column 2: Menu item
Designation of the individual menu item or HART command (see Chap. 4).
Menu items marked with * only occur in the menu when the corresponding options exist in the positioner (e.g. analog output). As a result, the numbering of the following menu items may change.

Column 3: "Help text" and interpretation
Indication of the help text and explanations which can be called in the selected menu item.

Column 4: Type
Variable designations
r Read-only variable
r/w Read-write variable
w Write-only variable, starts a procedure
!! Attention: Changes may interfere your process
d Dynamic variable, is continuously updated as long as the menu item concerned is selected
_ Non-dynamic variable (no designation) is only read when the menu item is opened for the first time
The variables are selected with the cursor keys or, for variables up to Number 9, faster by entering the corresponding number within the menu.

Column 5: Format
Indication of the alternatives to variables or to the format of variables.

5 Description of menu items (continued)

Displays

In Menu 3.1. **Display Data**, the positioner values currently renewed in the cycle are shown. The commands used for communication are read-only commands and do not influence the process.

Displays of operating state
In Menu 3.1.1. **Operating Data**, operating states are shown.
Menu sequence: Online → Display Data → Operating Data →

Ordinal No.	Menu item	"Help text" and Interpretation	Type	Format
3.1.1.1.	1 V-Position	"Process variable / Valve position (Feedback) in percent". This value indicates the current valve position, measured with the internal position transmitter as a percentage of the total travel span.	r, d	DDD.D %
3.1.1.2.	2 Setp ana.	"Analog loop current in mA".	r, d	DD.D mA
3.1.1.3.	3 Setp dig.	"Setpoint digital in percent of openness". This value indicates either the digital input signal for a digital setpoint generator or the internal digital signal assigned to the analog input signal following a standardization in percent.	r, d	DDD.D %
3.1.1.4.	4 Valve Setp	"Valve setpoint in percent of openness". Setpoint for the actuator position converted depending on the zero control signal (2.3.1.5.4) or specified linearization for the actuator position. This value is the input value of the PID controller in percent.	r, d	DDD.D %
3.1.1.5.	5 Contr diff	"Control difference of the device". This value indicates the control difference between the controller setpoint (Valve Setpoint) and the value returned by the position transmitter (V-Position) in percent.	r, d	DDD.DD %
3.1.1.6.	6 AI SP L0	"Displays the loop current of analog input for 0% digital setpoint". This value is used to assign the starting value of a partial range, e.g. for split range, with an analog input signal.	r	DD.D mA
3.1.1.7.	7 AI SP HI	"Displays the loop current of analog input for 100 % digital setpoint". This value is used to assign the end value of a partial range, e.g. for split range, with an analog input signal.	r	DD.D mA
3.1.1.8.	8 Ana. out *	"Value at the analog output". Analog output current assigned to the valve position in mA, given by a position feedback circuit available as an option to the SRD991. It is converted from V-Position. This menu item is eliminated if the option is not installed.	r, d	DD.D mA
3.1.1.9.	9 Trav Pos	"Travel position in mm, inch or Degree". This value indicates the current position of the actuator in physical units. It is derived from V-Position.	r, d	DDD.D mm DD.DD inch DDD.D Degree
3.1.1.10.	Valve SP source	"This parameter determines where the valve positioner gets its setpoint". LOCAL USER: Only the master, which has set the valve SP source to LOCAL USER is able to write configuration data and a digital setpoint into the device. Another master, which tries to write in, receives the response code 16 (access restricted). DIGITAL: Specification of the setpoint by a digital setpoint generator. ANALOG: Specification of the setpoint by an analog setpoint generator.	r	LOCAL USER DIGITAL ANALOG
3.1.1.11.	Alarm Limits	Selecting the menu item Alarm Limits opens a submenu which shows all set alarm limits.		
3.1.1.11.1.	1 Pos. Hi Alarm	"First upper alarm limit for the valve position".	r	DDD.D %
3.1.1.11.2.	2 Pos. HiHi Alarm	"Main upper alarm limit for the valve position".	r	DDD.D %
3.1.1.11.3.	3 Pos. Lo Alarm	"First lower alarm limit for the valve position".	r	DDD.D %
3.1.1.11.4.	4 Pos. LoLo Alarm	"Main lower alarm limit for the valve position".	r	DDD.D %

Displays of measured values of sensors (optional)
The Menu 3.1.2. **Sensors**, only appears when the corresponding option is installed.

Menu sequence: Online → Display Data → Sensors →

2.1.2.1.	1 V-Position	This local display is repeated for technical reasons.	r, d	DDD.D %

5 Description of menu items (continued)

Diagnosis

In Menu 3.2. **Diagnostics**, the device status can be interrogated.

Instrument variables
In Menu 3.2.1.1. **Device Variables**, the current and historic status of the positioner is shown. The submenu HART Diagnosis provides an overview of the errors which have occurred in the past period during a HART communication.

Menu sequence: Online → Diagnostics → Device Status → Device Variables →

Ordinal No.	Menu item	"Help text" and Interpretation	Type	Format
3.2.1.1.1.	1 Int Temp	"Internal temperature of the device". The temperature in the positioner housing displayed in physical units.	r, d	DDDD °C DDDD °F
3.2.1.1.2.	2 Trav. Sum	"Travel Sum indicated as multiples of the travel span". The value of all travel/angle movements by the actuator, which are greater than a specified minimum value, were added and divided by the stroke/rotation angle range. The currently travelled total travel/angle, shown as the number of strokes/rotation angle is a measure of the valve and actuator wear.	r, d	DDDDDDDD
3.2.1.1.3.	3 CycCount	"Number of movements greater as the defined deadband witlh changing direction".	r, d	DDDDDDDD
3.2.1.1.4.	4 T63 Time 0 - 100 %	"Measured T63 percent time for the actuator/valve combination for a whole increasing stroke". (Definition as per Entech Version 2.1) The value indicates the time measured during the Autostart, which the positioner-actuator-valve combination requires with set control parameters for an input step from 0 to 100 %, until 63 % of the stroke/rotation angle is reached. This value is a relative measure of the control speed in the increasing direction.	r, d	DDD.D s
3.2.1.1.5.	5 T63 Time 100 - 0 %	"Measured T63 percent time for the actuator/valve combination for a whole decreasing stroke". (Definition as per Entech Version 2.1) The value indicates the time measured during the Autostart, which the positioner-actuator-valve combination requires with set control parameters for an input step from 100 to 0 %, until 63 % of the stroke/rotation angle is reached. This value is a relative measure of the control speed in the decreasing direction.	r, d	DDD.D s
3.2.1.1.6.	6 HART Diagnosis	In the submenu HART Diagnosis the errors which have occurred in the past period during a communication are indicated.		
3.2.1.1.6.1.	1 RCV Frames	"Received frames by the device"	r, d	DDDDDDD
3.2.1.1.6.2.	2 GAP Errors	"GAP Errors at received HART-frames"	r, d	DDDDDDD
3.2.1.1.6.3.	3 R.-timeout	"Response timeouts between receiving and responding"	r, d	DDDDDDD
3.2.1.1.6.4.	4 CHK. err	"Check sum errors at received HART-frames"	r, d	DDDDDDD
3.2.1.1.6.5.	5 Noise err	"Noise errors at received HART-frames"	r, d	DDDDDDD
3.2.1.1.6.6.	6 UART err	"UART errors at received HART-frames"	r, d	DDDDDDD
3.2.1.1.6.7.	7 Parity err	"Parity errors at received HART-frames"	r, d	DDDDDDD

5 Description of menu items (continued)

Actual status

In Menu 3.2.1.2. **Actual Status**, the current device status is output.

Menu sequence: Online → Diagnostics → Device Status → Actual Status

Ordinal No.	Menu item	"Help text" and Interpretation	Type	Format
3.2.1.2.	Actual Status	The current device status is displayed. In addition, instructions are provided, on how to react. Behind the status message OFF/ON shows, whether the status is set. The local displays Field Dev. Stat. X-Y are place holders for non-assigned status bits. Messages: RAM failed, workshop EEPROM failed, workshop EPROM programmcode wrong, workshop ADC failed, workshop Actuator failed, workshop I/P Loop failed, workshop Potentiometer failed, workshop Device temp too high, check device Device temp too low, check device Configuration not valid, check configuration Travel Sum Limit reached, change stuffing box Cycle Count Limit reached, change stuffing box Trimming of input loop current failed, workshop Feedback Trim failed, workshop Travel Position high alarm, check chain Travel Position low alarm, check chain Travel Position high high alarm, check chain Travel Position low low alarm, check chain Control Diff. out of limit, check chain/control parameters Autostart failed, check chain Air supply pressure low alarm Output pressure not plausible, check chain		

Historic Status

IIn Menu 3.2.1.3 **Histor. Status**, the historic device status is output.

Menu sequence: Online → Diagnostics → Device Status → Histor. Status

3.2.1.3.	Histor. Status	The historic device status is displayed. In addition, instructions are provided, on how to react. Behind the status message OFF/ON shows, whether the status is set. The local displays Field Dev. Stat. X-Y are place holders for non-assigned status bits. Messages: RAM had been failed, workshop EEPROM had been failed, workshop EPROM programmcode was wrong, workshop ADC had been failed, workshop Actuator had been failed, workshop I/P Loop had been failed, workshop Potentiometer had been failed, workshop Device temp was too high, check device Device temp was too low, check device Configuration was not valid, check configuration Travel Sum Limit had been reached, change stuffing box Cycle Count Limit had been reached, change stuffing box Trimming of input loop current had been failed, workshop Feedback Trim had been failed, workshop Travel Position had high alarm, check chain Travel Position had low alarm, check chain Travel Position had high high alarm, check chain Travel Position had low low alarm, check chain Control Diff. was out of limit, check chain/control parameters Autostart had been failed, check chain Air supply pressure had low alarm Output pressure was not plausible, check chain		

5 Description of menu items (continued)

Instrument data

In Menu 2.3. **Device Data**, it is shown whether the positioner can be written to and whether local operation is possible. Otherwise all data can only be read. The positioner data are, with very few exceptions, read into the memory of the hand-held terminal once when the connection is made and displayed from there when selected. The exceptions are device modes and the corresponding control parameters, which are interrogated cyclically as soon as the corresponding menu has been opened (dynamic data).

Menu sequence: Online → Device Data →

Ordinal No.	Menu item	"Help text" and Interpretation	Type	Format
3.3.1.	1 Specialist	**Important**: The Specialist menu and the following submenus contain data and procedures, which represent an intervention in the ongoing process when written in or selected, and which may interfere with this process. They are marked with **!!**.		
3.3.2.	2 Write Protected	It is shown, whether or not the device is write-protected. The write protection can only be cancelled with the write-protection program WPP991	r	Ja/Nein
3.3.3.	3 Local enable	It is indicated, whether local operation, e.g. with a hand-held terminal is possible.	r, d	Ein

Instrument mode

In Menu 2.3.1.1. **Instr. Mode**, the device mode is displayed.

Menu sequence: Online → Device Data → Specialist → Instr Mod

3.3.1.1.	1 Instr Mod	"Displays the mode of the control algorithm processing. When in IN SERVICE, the output tracks the setpoint. When in OUT SERVICE, the setpoint is frozen and the output is fixed to that setpoint value". **An Autostart can only be carried out at OUT SERVICE.** In the IN SERVICE mode all commands can be carried out except Autostart. This menu item (OUT SERVICE, IN SERVICE, FAILSAFE, DIAGNOSIS and CALIBRATE) is dynamic, to show, in wich mode the positioner is currently in. OUT SERVICE and IN SERVICE can be changed in the next menu item, for the others it is necessary to wait, until the status changes again by itself.	r, d	OUT SERVICE IN SERVICE FAILSAFE DIAGNOSIS CALIBRATE

Changing instrument mode

In Menu 3.3.1.2. **Change Instr. Mode**, the device can be switched over from IN SERVICE to OUT SERVICE or vice-versa. If the device is in the FAILSAFE mode, this device mode can be exited here.

Menu sequence: Online → Device Data → Specialist → Change Instr. Mode

3.3.1.2.	Change Instr. Mode	"Set new instrument mode for the positioner". The device mode is switched over from IN SERVICE to OUT SERVICE with the question: Change device mode from current status to ? 0 OUT SERVICE 1 IN SERVICE OUT SERVICE is necessary e.g. for Autostart. After an Autostart the device is automatically set back to IN SERVICE.		

Measuring point

The Menu 2.3.1.3. **Measuring Point** describes the current location of the device.

Menu sequence: Online → Device Data → Specialist → Measuring-Point →

3.3.1.3.1.	1 TAG	"Field Device Tag". Text in connection with the installation of the field device. Use is freely selectable. A recommended use is for the field unit in drawings or in process control systems. This variable is also used as an address for data linking.	r,w	AAAAAAAA
3.3.1.3.2.	2 Descriptor	"Field Device Descriptor". Freely selectable text stored in the field device. There is no recommended use.	r,w	16 x A
3.3.1.3.3.	3 Date	"Month / Day / Year". The date shows the time the TAG No. is written in.	r,w	MM/DD/YY

5 Description of menu items (continued)

Configuration of instrument

In Menu 3.3.1.4. **Config Device**, the characteristic data of positioner, actuator and valve are read or entered.

Menu sequence: Online → Device Data → Specialist → Config Device →

Ordinal No.	Menu item	"Help text" and Interpretation	Type	Format
3.3.1.4.1.	1 Modelcode Device	"Model Code of the Positioner". The Model Code of the positioner is entered by the manufacturer and can not be changed by the user.	r	16 x A
3.3.1.4.2.	2 Modelcode Actuator	"Model Code of the Actuator". The Model Code of the actuator is entered when positioner and actuator are assembled. It normally does not need to be changed by the user.	r/w	16 x A
3.3.1.4.3.	3 Valve Serial Num.	"Valve Serial Number".	r/w	16 x A
3.3.1.4.4.	4 Valve Type	"Defines the type of the valve". The following are specified: Globe / Rotary / Butterfly / Ball / Diaphragm	r/w	Globe Rotary Butterfly Ball Diaphragm
3.3.1.4.5.	5 Position Lin.	"Defines the linearization of the pickup-system". The conversion error of the actuator mechanism will be corrected. Tangential: The conversion of the stroke movement to a rotary movement results in a tangential error, which is corrected mathematically. Linear: With rotary actuators there is no conversion error.	r/w !!	Tangential Linear
3.3.1.4.6.	6 Valve Action	"Selection between single acting and double acting actuator". The corresponding positioner version must be present. The valve action is normally entered by the manufacturer and need not be changed by the user.	r/w	Single acting Double acting
3.3.1.4.7.	7 Actuator Spring	"Defines the action of the spring". It is possible to select: No spring / spring closes valve / spring opens valve. Autostart can automatically recognize spring closing and opening and changes this value accordingly. In special cases this value must be changed manually.	r/w, d	No spring Closes Valve Opens Valve
3.3.1.4.8.	8 Def Spec Charac.	Entries: Number of value pairs (maximum of 22) Xn value: unit % Yn value: unit % The characteristic must be entered completely. If the entry is aborted prematurely, the alarm characteristic aborted appears and the previous characteristic remains active.	r/w !!	DD DD.DD % DD.DD %
3.3.1.4.9.	9 Characterization	"Defines signal characterization for analog or digital setpoint values". It is specified, whether a correction of the valve characteristic is done, and if which one. A choice must be made between Linear (no correction), Equal 1 : 50 (equal percentage), Inverse Equal 50 : 1 (corresponds to the Quick open function) and Special Charact. (customized characteristic, which must have been defined in the above menu item beforehand).	r/w !!	Linear Equal 1 : 50 Inverse Equal 50 : 1 Special Charact.
3.3.1.4.10.	Travel Unit	"Engineering units of the travel position and their limits". It is possible to choose between mm, inch and degrees.	r/w	mm in Degree
3.3.1.4.11.	Travel span	"Travel Span in mm, inch or Degree". The travel range of the actuator is specified in mm or inch, the rotation angle in degrees. Input of the travel span is only possible if the travel unit is mm or inch.	r/w	DD.D mm D.DD in DDD.D Degree
3.3.1.4.12.	Power Up Action	"Defines the state after Power-Up". It is possible to choose between IN SERVICE and FAILSAFE. Normally, IN SERVICE is selected with an analog operating signal. With a digital operating signal FAILSAFE can be useful. The FAILSAFE mode is automatically reset when a digital setpoint write is received. The default setting of an unconfigured device is OUT SERVICE. After Autostart the device automatically switches the Power Up Action to IN SERVICE.	r/w	IN SERVICE FAILSAFE

5 Description of menu items (continued)

Configuration of Instrument (continued)

In Menu 3.3.1.4. **Config Device**, the characteristic data of positioner, actuator and valve are read or entered.

Menu sequence: Online → Device Data → Specialist → Config Device →

Ordinal No.	Menu item	"Help text" and Interpretation	Type	Format
3.3.1.4.13.	Config Diagnostic	Selecting the menu Config Diagnostic opens a submenu in which values for diagnosis can be read or entered.		
3.3.1.4.13.1.	1 Reset Trav/Cycl	"Reset summarized travel and cycle count to zero". Following warning messages, the command is acknowledged. Resetting may only be carried out following a repair, e.g. of the bonnet. Otherwise the information is lost.	w	
3.3.1.4.13.2.	2 Travel Sum Limit	"Travel Sum Limit indicated as multiples of the travel span". The limit value of the travel sum of the actuator, which is viewed as the wear limit, must be specified. Here the number of the limit value to be specified is the sum of all distances travelled by the actuator, which are greater than the specified Deadband Trav/Cycl divided by the travel range.	r/w	DDDDDDDD
3.3.1.4.13.3.	3 Deadband Trav/Cycl	"Configurable deadband for the summarized travel value or cycle count".	r/w	DD.D %
3.3.1.4.13.4.	4 Cycle Count Limit	"Limit for the number of movements greater as the defined deadband". The limit value of the number of actuator movements with changing direction greater than a specified deadband. The value defined in the menu item Deadband Trav/Cycl is used as the deadband.	r/w	
3.3.1.4.13.5.	5 Control diff Limit	"If the control difference exceeds this limit for a time greater than the control difference time an alarm bit is set". This limit value is used for diagnosis information. Its value must be adapted to the control behavior to obtain conclusive data.	r/w	DD.D %
3.3.1.4.13.6.	6 Control diff Time	"Time for the control difference limit". This value is also used for diagnosis information. Its value must be adapted to the control behavior over time or to the control time set by hand in order to obtain conclusive data.	r/w	DDD.D s

Configuration of input signal

In Menu 3.3.1.5. **Config Input**, the input signal is described, which specifies the setpoint for the positioner, and which is to be processed like this signal by the device. Here split range and inversion are of particular importance.

Menu sequence: Online → Device Data → Specialist → Config Input →

3.3.1.5.1.	1 Valve SP source	"This parameter determines where the valve positioner gets it setpoint". It is specified whether the device is to be operated analog or digital setpoint source in case of operation. Local User is only important for a digital setpoint specification, as this specifies, from which device the positioner may accept the setpoint. See also 2.1.1.10.	r/w	Local User Digital Analog
3.3.1.5.2.	2 AI SP LO	"Displays the loop current of analog input for 0 % digital setpoint in mA". This value is used to assign the starting value of a partial span, e.g. for split range, with an analog input signal.	r/w !!	DD.D mA
3.3.1.5.3.	3 AI SP HI	"Displays the loop current of analog input for 100 % digital setpoint in mA". This value is used to assign the end value of a partial span, e.g. for split range, with an analog input signal.	r/w !!	DD.D mA
3.3.1.5.4.	4 Zero Ctrl Signal	"Designate whether increasing current opens or closes the valve". Selection between Opens with incr. setpoint and Closes with incr. setpoint.	r/w !!	Incr. Setpoint Opens Incr. Setpoint Closes

5 Description of menu items (continued)

Configuration of control data

In Menu 3.3.1.6. **Config Control**, the data are dynamic. This is important, as these data change automatically when Autostart is completed. The opportunity is given to change the control parameters manually.

Menu sequence: Online → Device Data → Specialist → Config Control →

Ordinal No.	Menu item	"Help text" and Interpretation	Type	Format
3.3.1.6.1.	1 P inc Tav	"P-Parameter of the PID control algorithm for increasing stroke". The value is a measure of the circuit amplification in the upward direction.	r/w !! d	DD.DD
3.3.1.6.2.	2 P dec Trav	"P-Parameter of the PID control algorithm for decreasing stroke". The value is a measure of the circuit amplification in the downward direction.	r/w !! d	DD.DD
3.3.1.6.3.	3 I inc Trav	"I-Parameter of the PID control algorithm for increasing stroke". The value 999 sets the I share to zero.	r/w !! d	DDD.D s
3.3.1.6.4.	4 I dec Trav	"I-Parameter of the PID control algorithm for decreasing stroke". The value 999 sets the I share to zero.	r/w !! d	DDD.D s
3.3.1.6.5.	5 D inc Trav	"D-Parameter of the PID control algorithm for increasing stroke".	r/w !!	D.DD s
3.3.1.6.6.	6 D dec Trav	"D-Parameter of the PID control algorithm for decreasing stroke".	r/w !!	D.DD s
3.3.1.6.7.	7 Control gap	"Control gap of the positioner". A range of the control difference is specified in % in which the operating variable is not to change. This is particularly intended to prevent oscillations in valves and actuators with a high degree of adhesive friction. If the control difference exceeds this GAP range, the position changes suddenly.	r/w !!	DD.D %
3.3.1.6.8.	8 Trav. Time Inc. Lim	"Configurable T63 percent time limit for increasing full span travel".	r/w !!	DDD.D s
3.3.1.6.9.	9 Trav. Time Dec. Lim	"Configurable T63 percent time limit for decreasing full span travel".	r/w !!	DDD.D s
3.3.1.6.10.	Control Algorithm	"Defines the control algorithm". A PID algorithm is currently permanently defined.		

Configuration of cutoff and valve position limits

In Menu 3.3.1.7. **Cutoff/Pos. Limits**, the values for the cutoff range and stroke limitations are read or entered.

Menu sequence: Online → Device Data → Specialist → Cutoff/Pos. Limits →

3.3.1.7.1.	1 Cutoff	"Cutoff of the valve". It must often be ensured that the valve really closes tightly at 0% input. Therefore, a range can be defined in % in which the valve does not follow the input signal and remains tightly closed. At the end of the cutoff range the valve position jumps.	r/w	DD.D %
3.3.1.7.2.	2 Cutoff hyst.	"Hystereses for the cutoff of the valve". As the valve jumps at the end of the cutoff range, hysteresis must be provided for the range variable to prevent permanent vibration.	r/w	DD.D %
3.3.1.7.3.	3 Position Valve LL	"Lower limit of the valve position in percent".	r/w	DDD.D %
3.3.1.7.4.	4 Position Valve UL	"Upper limit of the valve position in percent".	r/w	DDD.D %

5 Description of menu items (continued)

Configuration of alarms

In Men| 3.3.1.8. **Config Alarm**, pre-alarms and main alarms are entered.

Menu sequence: Online → Device Data → Specialist → Config Alarm →

Ordinal No.	Menu item	"Help text" and Interpretation	Type	Format
3.3.1.8.1.	1 Pos. Hi Alarm	"First upper alarm limit for the valve position".	r/w	DDD.D %
3.3.1.8.2.	2 Pos. HiHi Alarm	"Main upper alarm limit for the valve position".	r/w	DDD.D %
3.3.1.8.3.	3 Pos. Lo Alarm	"First lower alarm limit for the valve position".	r/w	DDD.D %
3.3.1.8.4.	4 Pos. LoLo Alarm	"Main lower alarm limit for the valve position".	r/w	DDD.D %
3.3.1.8.5.	5 Pos. alarm hyst	"Hystereses for the position alarm limits"	r/w	D.DD %

Configuration of failsafe handling

Menu 3.3.1.9. **Config Failsafe** is only important for digital setpoint specification. It is specified how the positioner is to behave following a failure of the digital setpoint.

Menu sequence: Online → Device Data → Specialist → Config Failsafe →

3.3.1.9.1.	1 Failsafe Handling	"Defines the failsafe handling to failures". The following choices are available: Safety position / Hold last value / Defined value		Safety Position Hold last value Defined value
3.3.1.9.2.	2 Failsafe Time	"The time in seconds from detection of communication failure to a reaction".	r/w	DDD.D s
3.3.1.9.3.	3 Failsafe Value	"In case of a failure the digital setpoint is set to this failsafe value". Only useful if the Defined value has been selected in the menu item failsafe handling.	r/w	DDD.D %

Calibration

In Menu 3.3.1.10. **Calibration** all calibration procedures are carried out. An intervention in the process takes place!! Proceed with extreme care, because values can be changed which can only be redetermined with additional auxiliary devices. An angle calibration should only be carried out in the workshop. An incorrect angle specification leads to a linearity error.

Menu sequence: Online → Device Data → Specialist → Calibration →

3.3.1.10.1.	1 Auto start	"Adapting of the positioner for the valve". **Only starts in the OUT SERVICE mode.** It is possible to choose between Autostart and Short autostart. Short autostart is a shortened Autostart where only the end positions are recognized and no control parameters are determined. **Important: When conducting an Autostart the original control parameters are overwritten.**	w !!	
3.3.1.10.2.	2 Calibration Date	"Date of the last instrument calibration. Format Month / Day / Year". The date of the last calibration is entered.	r/w	MM/DD/YY
3.3.1.10.3.	3 Trim Input Loop	"Trimming of the Input Loop Current allows the calibration with an external reference for the loop current". This function is usually a workshop function. They are also used to adapt the positioner to this input in the case of a poorly adjusted current input. Example: Instead of 4 to 20 mA, the input range is incorrectly set to 4.1 to 19.8 mA. The A/D converter is correspondingly untuned by this manipulation. The calibration procedure is self-explaining. Important: A device untuned in this way does not operate exactly in the 4 to 20 mA circuit. Recalibration is required.	w	DDD.D %
3.3.1.10.4.	4 D/A Trim *	Only for analog output option.	w	

5 Description of menu items (continued)

Test of control behavior

With Menu 3.3.1.11. **Test Controlbeh.**, the setpoint can be specified locally, and various simulations can be carried out to test the particularly dynamic behavior of the valve with a step response.
As a result, the operator is given the opportunity to check the effect of the set control parameters locally. Checking for quality takes place in the usual manner (listening, seeing, feeling). With the hand-held terminal an input step to the desired step height can be specified. It also continues to be possible for the user to park the actuator at a specified setpoint with this function.

Menu sequence: Online → Device Data → Specialist → Test Controlbeh. →

Ordinal No.	Menu item	"Help text" and Interpretation	Type	Format
3.3.1.11.1.	1 Valve SP source	"This parameter determines where the valve positioner gets it setpoint". The following can be selected: Local User / Analog / Digital. **For this test the Local User status must be set and changed back again following the test.** See also 2.3.1.5.1.	r/w	Local User Digital Analog
3.3.1.11.2.	2 Setp dig.	"Setpoint digital in percent of openess". The current position is displayed and the desired setpoint can be entered. Following the Send command the controller carries out the jump to the desired setpoint.	r/w !! d	DDD.D %

Simulation of feedback
With Menu 3.3.1.12. **Simul. Feedback**, the feedback can be tested.
For the digital feedback and the analog feedback option, it is possible to check the function of the feedback or the output current loop 4-20 mA with simulated feedback signals without interfering with the function of the positioner.

Menu sequence: Online → Device Data → Specialist → Simul. Feedback →

3.3.1.12.1.	1 Simulation value	"Value used when simulation is enabled for the valve position in percent".	r/w	DDD.D %
3.3.1.12.2.	2 Simulation Enable	"Enables the simulation value for the valve position".	r/w	Enable

Miscellaneous
With Menu 3.3.1.13. **Options** other data can be written in or read out.

Menu sequence: Online → Device Data → Specialist → Options →

3.3.1.13.1.	1 Internal Temp Unit	"Engineering units of the internal temperature of the device". The various temperatures and limit values are displayed in the specified physical unit. °C und °F can be selected.	r/w	°C °F
3.3.1.13.2.	2 Internal Temp LL	"Lower Limit of the internal temperature of the device". This variable is read-only.	r	DDD °C/F
3.3.1.13.3.	3 Internal Temp UL	"Upper Limit of the internal temperature of the device". This variable is read-only.	r	DDD °C/F
3.3.1.13.4.	4 Clear Hist Status	"Clear the historical status information. The historical status information is not automatically cleared when the failure is removed. They have to be cleared manually".	w	Clear historic status? 1 No 2 Yes
3.3.1.13.5.	5 Air supply Unit *	"Engineering units of the air supply". Possible selections: psi, bar and kPa.	r/w	psi bar kPa
3.3.1.13.6.	6 Pos. Pres. Unit *	"Engineeering units of the positioning pressure". Possible selections: psi, bar and kPa.	r/w	psi bar kPa
3.3.1.13.7.	7 HART	In the HART submenu the poll address can be selected.		
3.3.1.13.7.1	1 Poll addr	"Polling Address - Address used by the Host to identify a Field Device, and changeable by the user. Range: 0 ... 15 ".	r/w	DD

5 Description of menu items (continued)

Instrument information

In Menu 3.3.1.14. **Device Info**, information is provided on the manufacturing data of the positioners. The user is given the opportunity to write/read any information into/out of the memory of the SRD991 / SRD960.

Menu sequence: Online → Device Data → Specialist → Device Info →

Ordinal No.	Menu item	"Help text" and Interpretation	Type	Format
3.3.1.14.1.	1 Device Ident	Submenu Device Ident		
3.3.1.14.1.1.	1 Distributor Eckardt	"Privat Label Distributor - References the company that is responsible for the distribution of this Field Device to customers". Usually the name of the company which manufactures the corresponding field unit. The company code of Foxboro Eckardt GmbH is 63. Read-only.	r	
3.3.1.14.1.2.	2 Model	"Model - References the type of Field Device, usually an advertised model number, that is unique to a single manufacturer". SRD991 appears, possibly with an additional code.	r	SRD991 / SRD960
3.3.1.14.1.3.	3 Dev-id	"Field Device Identification - Uniquely identifies the Field Device when combined with the Manufacturer Identification and Device Type. Therefore, this variable cannot be modified by the Host user". Here the device is understood to be the electronics circuit of the device which is provided with a serial number by the manufacturer.	r	DDDDDDDD
3.3.1.14.1.4.	4 Factory code	"Code used for manufacturing purposes". This number is written in by the manufacturer and cannot be changed by the user.	r	DD
3.3.1.14.1.5.	5 Final Assembly No	"Final Assembly Number - Number that is used for identification purposes, and is associated with the overall Field Device". This mumber is written in by the manufacturer and cannot be changed by the user.	r	DDDDDDDD
3.3.1.14.1.6.	6 Actuator Type	"Defines the technology used to position the valve". For the SRD991 it is fixed to el-pneu.	r	el-pneu
3.3.1.14.1.7.	7 Hardware rev.	"Hardware-Revision - Revision that corresponds to the electronics hardware of the Field Device".	r	DDD
3.3.1.14.1.8.	8 Software rev.	"Field Device Software-Revision - This revision corresponds to the software or firmware, that is embedded in the Field Device".	r	DDD
3.3.1.14.1.9.	9 Universal rev.	"Universal-Revision - Revision of the HART protocol that the Field Device conforms to".	r	DDD
3.3.1.14.1.10.	Device Options	"Device Options". The installed device options are marked with ON those not installed with OFF. Possible device options: Ext. Pos. Transmission Int. Pres. Sensors Ext. Binary Sensors Ext. Binary Output Ext. Analog Sensor	r	
3.3.1.14.2.	2 Message	"Message - Text that is associated with the Field Device". This text can be used by the user in any way. There is no recommended use.	r/w	30 x A
3.3.1.14.3-6.	3-6 Message 1 ... 4	"Message - Text that is associated with the Field Device". This text can be used by the user in any way. There is no recommended use.	r/w	30 x A

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