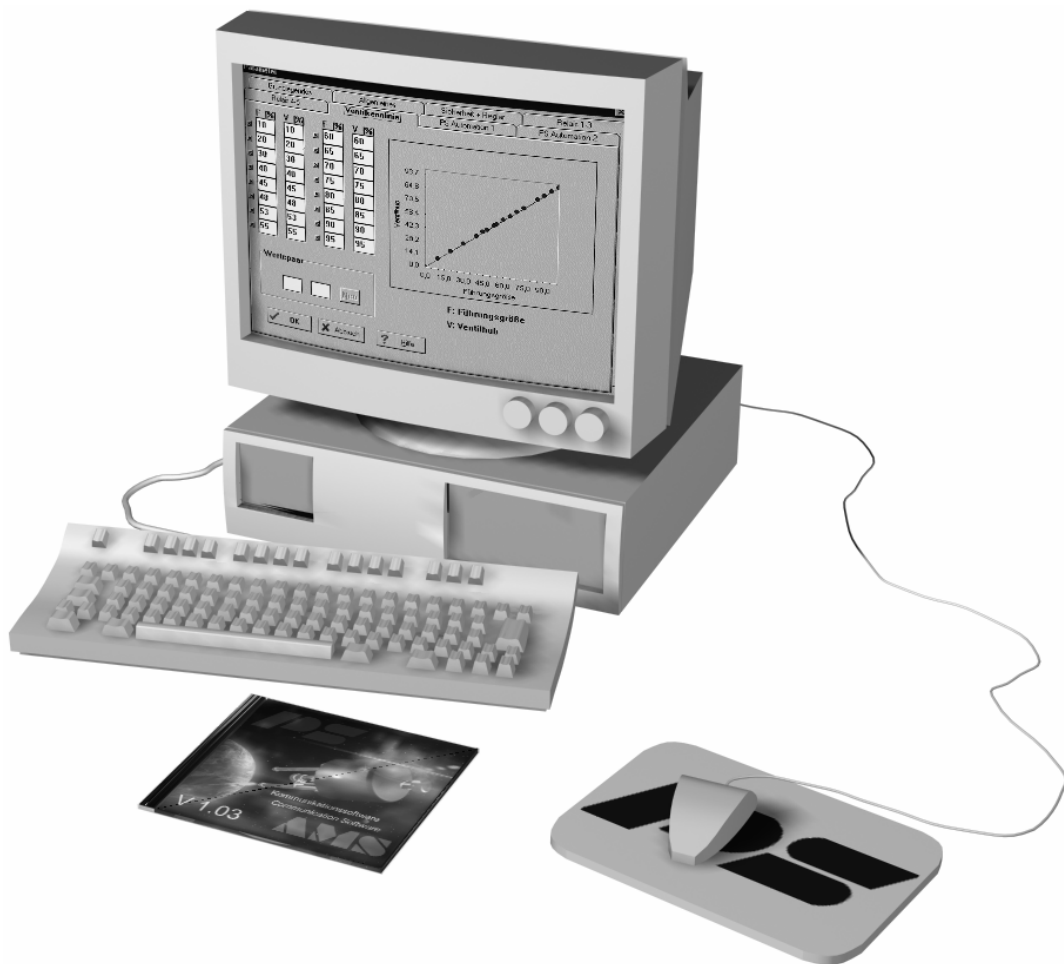


Instruction Manual Communication Software PSCS for PS-AMS[®]



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1. System requirements

To operate the software PSCS the following computer requirements have to be met as a minimum:

Operating system: Windows 98, Windows 2000 or Windows XP

Processor: Pentium minimum 300MHz

Free RAM: ca. 10MB

Interfaces: RS232 or USB

2. License agreement

During installation of the software, the wording of a licence agreement is displayed. Please read this carefully and confirm with OK if you agree in all points.

3. Installation

3.1. Software PSCS

The software and all auxiliary files are included in an application of the form „Setup_PSCS____.exe“. The recent version is available on our homepage www.PS-Automation.com under „News“- „Downloads“ - „Options for smart actuators“. Store this file to one of your drives and start the application. An „Install Shield“ will guide you through the whole installation.

Attention: You need to have all access rights (Administrator) to be allowed to install the software PSCS and the driver for the USB-to-RS232-adapter to your PC!

3.2. USB-Driver

The USB-Driver is required if you use an USB-to-RS232-adapter (virtual interface) at your PC instead of a physical RS232-interface (COM 1). After installing PSCS the installation of the USB-to-RS232-adapter will then be started automatically. The driver provides a virtual serial interface on your PC for communication with the actuator. Please check the allocation of the virtual COM-port under "Start" - "Control panel" - "System" - page "Hardware" - "Device Manager" after installation of the driver. For this, open in "Device Manager" the tree "Ports (COM und LPT)". There the USB-driver "Prolific USB-to-Serial Comm Port" has to be listed with a port allocation (e.g. COM 5).

The installation files required for the USB-driver will be stored under ...\\usb_driver to the installation directory of the software PSCS; from there they can be used for re-installation, if required.

Attention: You must plug the USB-to-RS232-adapter into the PC, and have all access rights to get the virtual interface displayed!

Attention: When using the USB-to-RS232-adapter together with a virtual Bluetooth interface, a PC interface may be double-allocated (Bug in Windows XP). You can correct this under properties of the USB-driver "Prolific USB-to-Serial Comm Port". For this, click on the driver "Prolific USB-to-Serial Comm Port" - right mouse button - "Properties" - "Interface properties" - "Extended". In the lower section of the displayed file card adjust the number of the COM-port. Click on the selection box to display all allocated COM-ports. Move the COM-port-allocation to a COM-port not used so far.

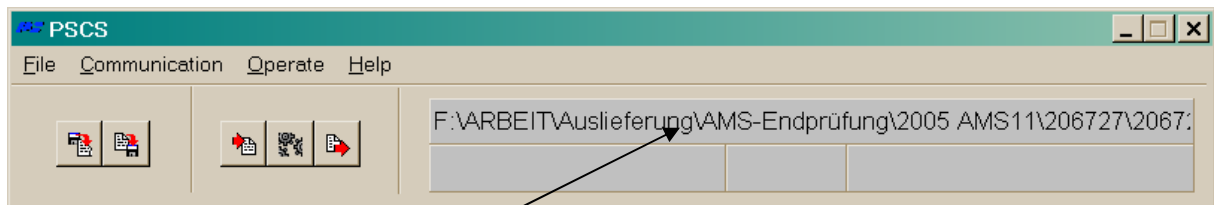
4. Function

The software PSCS serves for adjustment, commissioning and diagnostic interrogation of smart PS-actuators of series AMS11 and AMS12.

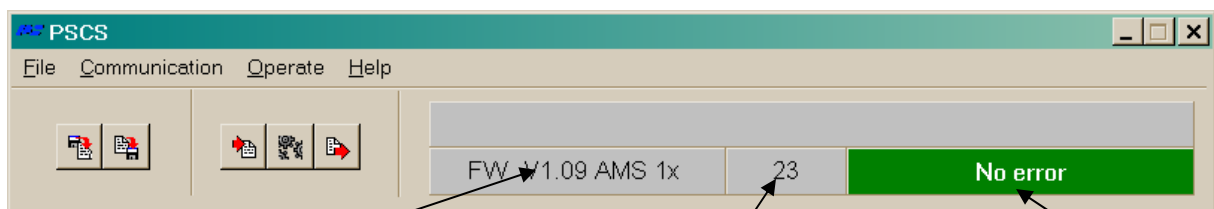
5. Menu structure

5.1. Status window

Depending from where the active dataset has been loaded, the right hand section of the status window displays either (after loading from the a data medium) the file name (1) of the active dataset, or (after loading from an actuator) the firmware version (2) and serial number (3) of the actuator, plus the current operating status in plain text (4).



①



②

③

④

5.2. Shortcuts



loads a dataset of the type *.ams (for actuators AMS01 / 02 / 03) or *.am1 (for actuators AMS11 / 12) from a data medium



stores the current dataset as file of the type *.ams or *.am1 to a data medium



loads the active dataset from an operational actuator

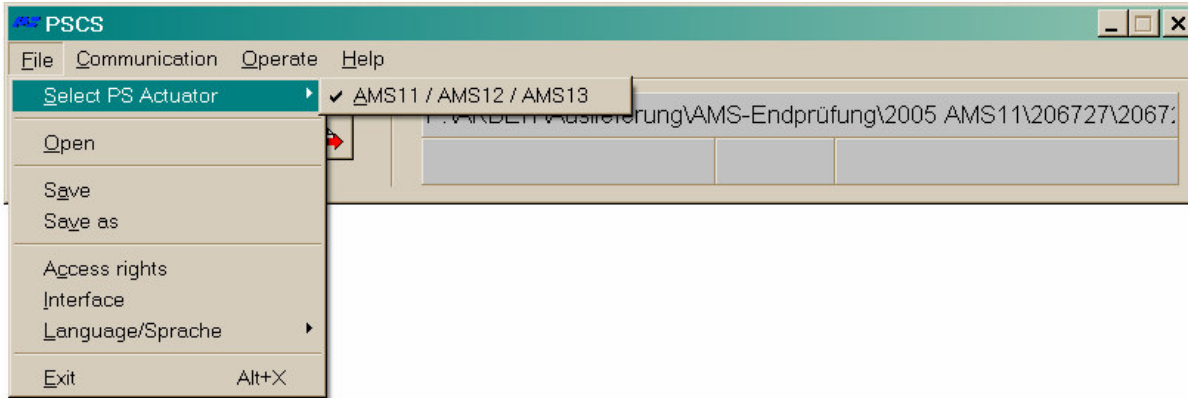


opens the window „Parameter AMS“ (same as “Operate” - “Configuration”)



transmits the currently displayed dataset or the dataset edited lastly to the actuator

5.3. File



This menu allows the following actions:

Select a PS-AMS-actuator type: distinction is between actuators AMS01 / 02 / 03 and actuators AMS11 / 12 / 13.

File management with „Open“, „Save“, „Save as“

Access rights need not be entered for normal operation; it is required only for PS service staff.

- The selection of the **Interface** (COM-port) as RS232 or USB by a selection window. This will be stored permanently to the PC; it has to be corrected only in case the interface structure of the PC is changed, or the software is newly installed. A routine for **automatic** allocation is available, which requires connection to an operational PS-AMS-actuator. This routine can lead to a system crash, if a large portion of the COM-ports of the PC is already in use. In this case, abort via Task Manager, and reduce the number of COM-ports in use while performing the routine.

Manual allocation of the COM-ports is possible as well.

- Selection of menu **language** (English or German)

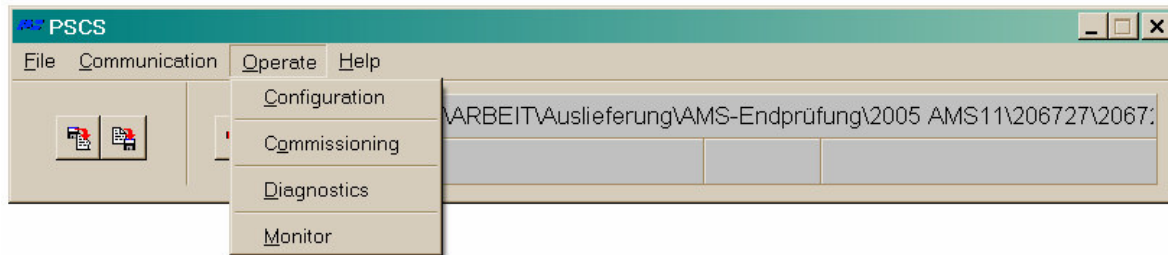
5.4. Communication



This menu allows the following actions:

- **Load** the current dataset from the actuator to the PSCS
- **Send** the displayed or lastly edited dataset to the actuator. Before sending, a dataset **MUST** be loaded, either from the actuator or from a data medium.
- **Close** an existing connection between PSCS and actuator, in case it seems to be instable or disturbed.

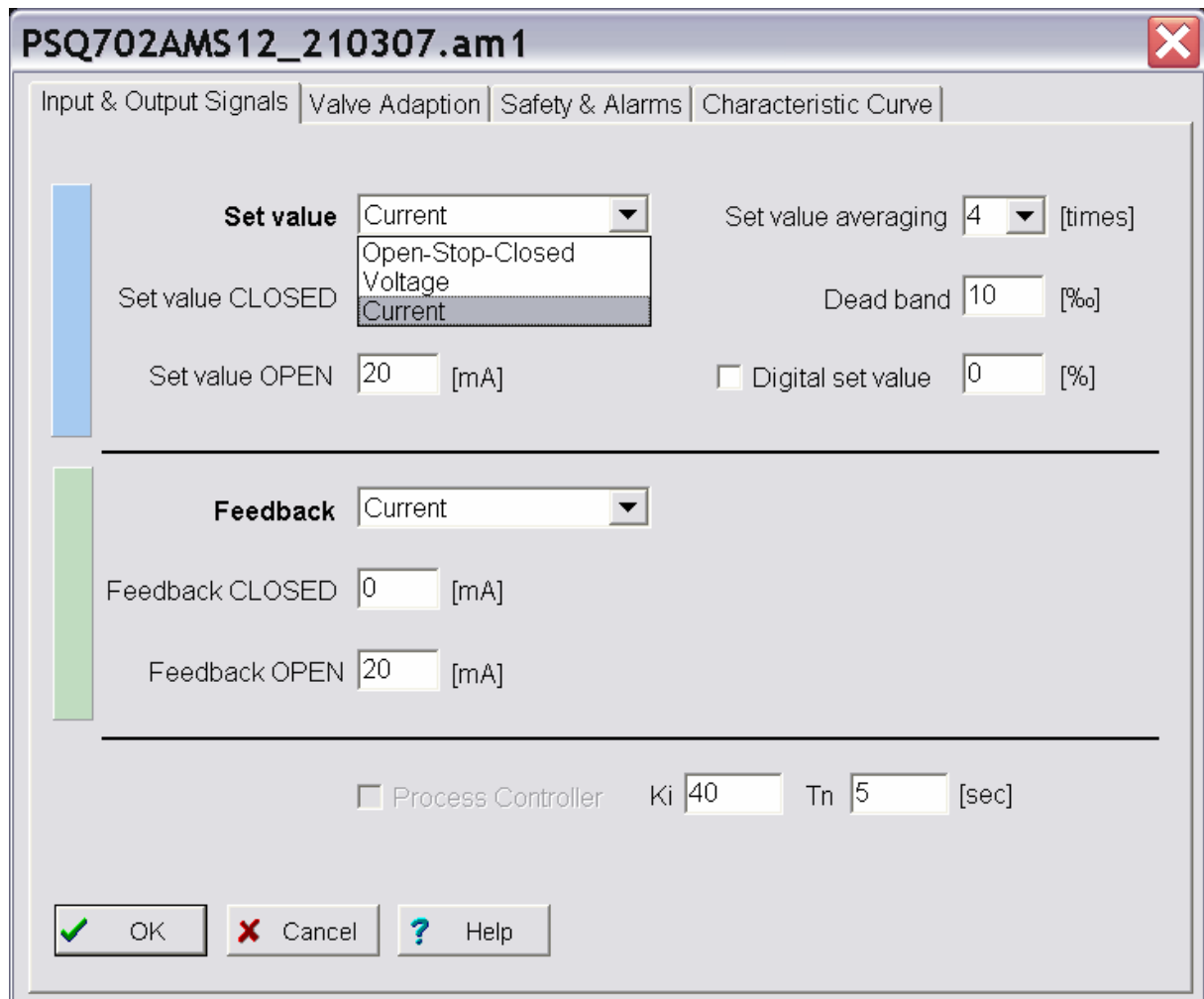
5.5. Operate



5.5.1. Configuration

Changes of configuration in PSCS will be active in the actuator only after sending the dataset to the actuator. Changes on one or more pages have to be transferred to the temporary memory of the PC by confirming with “OK” before leaving the page.

5.5.1.1. Set Value & Feedback



- Under **Set Value** the mode of control of the actuator has to be defined: as modulating set value (current or voltage input) or as 3-point control service (Open-Stop-Close). The range of values is 0 mA to 20 mA for the current signal and 0 V to 10 V for the voltage signal. Upper and lower limits may be selected freely, even inverted, according to the process requirements.

Open- and close-signals have always priority over modulating and digital set value. This means that the actuator may be driven by phase signal for open/close even if control by modulating set value is selected. It drives to the respective direction as long as the phase for opening or closing is applied. After switching off the phase, the actuator returns to the position corresponding to the applied/entered set value, or drives to the position that is defined for "Set value error".

- **Set Value Filter:** The applied set value is measured by the electronics inside the AMS-actuator each 10 ms and the control deviation against the momentary position is calculated. The responding behaviour on this deviation is adjustable via the number of reading points (maximum 32 points) that are being averaged. A small number of points will result in quick reaction on process changes. Default setting is averaging over 8 points.
- **Dead Band** allows adjustment in one-tenths of a percent of the maximum possible value of the set value range (20 mA and 10 V respectively) in the range of 5 ‰ to 50 ‰. Default setting is 10 ‰.
- **Digital Set Value** is a fixed set value in % of the adjusted valve travel, activated by the tick box. It has priority over the modulating set value. Typical application is a fixed set-point control loop. Limit values for the modulating set value can be entered only if the fixed digital set value is inactive. Digital set value **must** be activated in case the actuator is controlled via the optionally available bus interface!
- **Feedback** allows configuration of an active position feedback. It can be selected as signal of current (in the range of 0 mA to 20 mA) or voltage (in the range of 0 V to 10 V), with free choice of end points, depending on the process requirements.
- **Process Controller:** An integrated PI-process-controller plus power supply output for an external process sensor is available as option in PS-AMS. If this option is included in the actuator, it may be activated by ticking the box in this menu. Adapting the controller to the behaviour of the control loop requires adjustment of delay time T_N and amplification factor K_P . The range of values is 50 msec to 100 sec for T_N , and 1 to 250 for K_P . A useful tool for doing this adjustment is the "Monitor" function under "Operate" in the software PSCS.

5.5.1.2. Valve Adaptation

- **Closing Direction** defines, with view on the valve, the direction/orientation in which the actuator shall move the valve to closed position. It is displayed as **valve stem retracting / extending** (at linear actuators PSL-AMS) or **cw = clockwise / ccw = counter-clockwise** (looking at the actuator from the top, at quarter-turn actuators PSQ-AMS). The allocation of “open” and “closed” positions for set value, feedback, etc. is resulting from this field.
- **Valve Travel** defines the actual travel of the valve, in mm at linear actuators PSL-AMS and in ° (degrees) at quarter-turn actuators PSQ-AMS.
- The **Cut-Off** in either end position has to be selected dependent on the design of the valve, either **by position** or **by position automatic** or **by force/torque**. Automatic commissioning of the actuator to the valve is conducted if at least one cut-off is defined “by position automatic” or “by force/torque”.
- **Torque Increase** can be used to break away a closed valve from its seat. An increase by maximum 50% of the nominal force/torque for a maximum **duration** of 2.5 sec may be adjusted.
- **Maximum Force/Torque** and **Maximum Speed/Actuation time** allow a reduction of the switch-off force/torque and actuation speed to minimum 50% and an extension of the actuation time to maximum 200% with respect to the specific nominal values for an actuator.
- **Positions** allows to define up to 5 actuator positions that should be approached in the case of various failures of the actuator (see „Safety & Failures“).

5.5.1.3. Safety & Messages

	Action on failure	Alarm signal
Set value failure	Actuator stop	<input checked="" type="checkbox"/>
Torque error	Actuator stop	<input type="checkbox"/>
Power failure	Actuator stop	<input type="checkbox"/>
Critical temperature	50% Speed	<input type="checkbox"/>
Maximum temperature	Actuator stop	<input type="checkbox"/>
Set value failure at Process controller	Actuator stop	<input type="checkbox"/>
Actuator not commissioned to the valve		<input type="checkbox"/>
Mechanical damage		<input type="checkbox"/>
Electronics error		<input type="checkbox"/>
Limit of Design live reached		<input type="checkbox"/>
Position over-run		<input type="checkbox"/>
Position not reached		<input type="checkbox"/>

All **Safety Functions** and **Statuses** listed here are displayed by two LEDs in the terminal compartment with specific light sequences. The optionally available potential-free monitor relay allows transmission of the ticked items as (summarised) binary alarm to a control board.

- **Set Value Failure** occurs if the applied set value is below 50% of the parameterised minimum set value. In this case the actuator may be driven to a selected position, or stopped immediately.
- **Torque Error** means that the actuator has to deliver the maximum adjusted force / torque apart from the stored end positions, for example when the valve plug is blocked. One option is to stop the actuator immediately („Actuator Stop“). The other is to drive back (i.e. away from the found obstacle) and then again to the originally desired (“Retry”) - up to three times; then the actuator will be stopped. After such a stopping the actuator can only drive on in the direction opposite to the initial one.
- The safety function **Power Failure** is used to drive the valve to a freely selectable safety position. With the optional Power-Fail safe device PSEP the actuator drives to that position in case a loss of power supply is detected. If no PSEP is installed, this safety drive may be activated by putting 230 VAC to the terminals 12/13 in the terminal compartment.

- **Critical Temperature** inside the actuator indicates thermal overload, typically due to very high ambient temperature or excessive number of activations. As instantaneous measure the actuator may be stopped in a selected position, or be driven with 50% only of the adjusted speed, which both will result in cooling down inside the actuator. During use as per specification however (see specific limits in the relevant data sheets) the critical temperature cannot be reached, so the reasons for this event have to be found and eliminated to ensure full lifetime of the actuator.
- When **maximum** allowed **Temperature** is reached, the actuator has to stop in a selected position to avoid damage due to further heat generation in continuing operation. This maximum temperature is reached only at lack of success of the remedies on critical temperature. The reasons for this destructive rise in temperature have to be eliminated to prevent serious damage to the actuator and further disturbance of the process.
- **Set Value Failure at Process Controller** indicates that the set value coming from the process sensor is below 50% of the parameterised minimum set value. In this case the actuator may be driven to a selected position, or stopped immediately.
- **Actuator not commissioned to the valve** means that no commissioning has been performed with this actuator yet. This must be made after mechanical mounting in any case, and is done via “Operate” - “Commissioning”, either automatically or manually, depending on the mode of cut-offs selected.
- **Mechanical Damage** is displayed if no change in position of the actuator’s output is detected with the motor turning for 120 sec and longer. The actuator is non-functioning and requires service.
- **Electronics Error** reports an inconsistency of data in the actuator’s internal memory. The actuator is non-functioning and requires service. Consistency check is done at each electronics start-up after switching on of the power supply.
- **Limit of Design Life reached:** This function is not yet implemented.
- A difference of more than 1.5% between actually reached position and calculated desired position results in a message of “**Position overrun**” or “**Position not reached**”, depending on the direction of the deviation. This is for information only and does not affect the actuator’s readiness for operation.

5.5.1.4. Characteristic Curve

The screenshot shows a software window titled "PSQ702AMS12_210307.am1" with a tab labeled "Characteristic Curve". The window contains a table for defining characteristic curve points, a graph, and control buttons.

	S [%]	V [%]	S [%]	V [%]
<input checked="" type="checkbox"/>	10	20	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	20	40	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	

S: Set value
V: Valve travel

Pair of values:

The graph shows Valve travel [%] on the y-axis (0 to 100) and Set value [%] on the x-axis (0 to 100). A curve is plotted with points at (0,0), (10,20), (20,40), and (100,100). Below the graph are buttons for "LIN" and "LOG".

At the bottom of the window are buttons for "OK", "Cancel", and "Help".

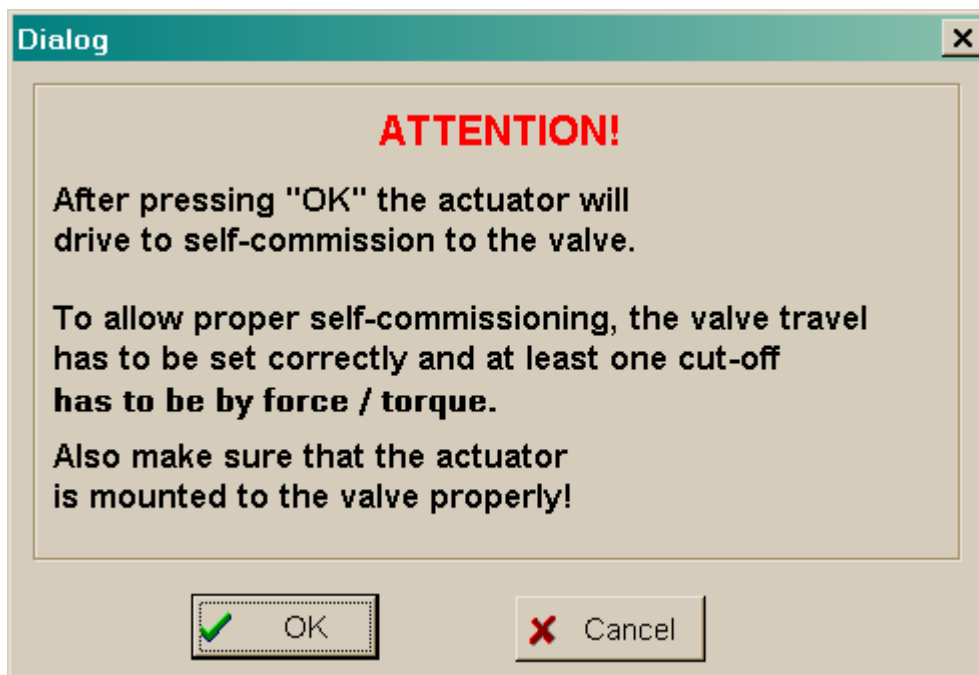
The valve travel in reference to the set value may be modified by the actuator electronics. Linear (LIN) and equal-percentage (LOG) pre-defined characteristic curves are available via buttons. Furthermore, a free curve of up to 16 pairs of values may be defined. Enter the respective pairs for set value and actuator position to the field below "Pair of values" and confirm with the button "New". They will then be transferred to the table above and to the graphics curve. The buttons marked "x" activate / de-activate the respective pair.

5.5.2. Commissioning

After mechanical mounting, commissioning is mandatorily required to match the limits of the actuator to the end positions of the valve.

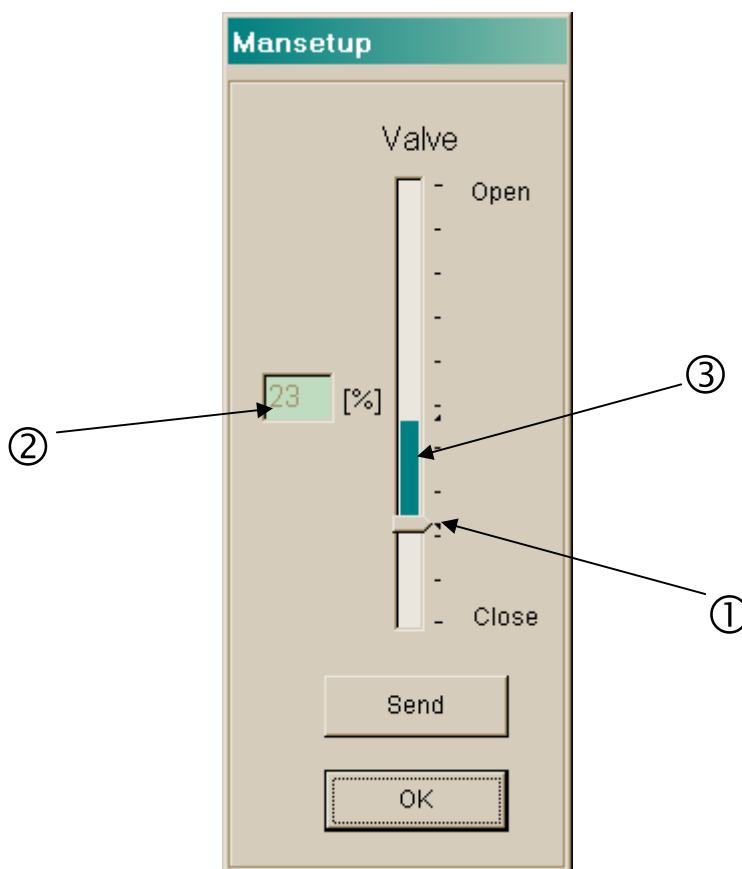
5.5.2.1. Automatic Commissioning

Commissioning is conducted automatically if **at least one** end position is selected to be **by force / by torque** or **by position automatic**. After "Operate" - "Commissioning" and confirming the below window by "OK" the actuator will drive to either end position and store the measured values permanently.



5.5.2.2. Manual Commissioning

Commissioning has to be made manually using the software PSCS in case **both** end positions are selected **by position**.



Attention: When doing manual commissioning, make sure that the correct set value for the closed position, or the binary signal for driving to closed position is permanently applied, depending on the parameterised mode of operation. See “Instruction manual PS-AMS11”, section “Manual Commissioning”.

The window displays a sliding bar arrangement. The arrow at its basis (1) indicates the closed point of the valve as it is momentary active in the actuator. This point is also displayed in the field aside (2) as percentage of the possible travel of the actuator. The vertical bar itself (3) above the arrow indicates the currently parameterised valve travel. It also shows how far the closed-point can be shifted before the travel is reduced automatically because it exceeds the maximum travel of the actuator (i.e. the bar is exceeding the possible travel).

Attention: The display is not reflecting the selected closing direction of the actuator!

The actuator may be moved to any position by shifting the arrow and pressing “Send”. Thus the valve has to be moved by the actuator to closed position. When this is reached, proved by visual examination at the valve, confirm by “OK” to store the found value to the actuator’s permanent memory.

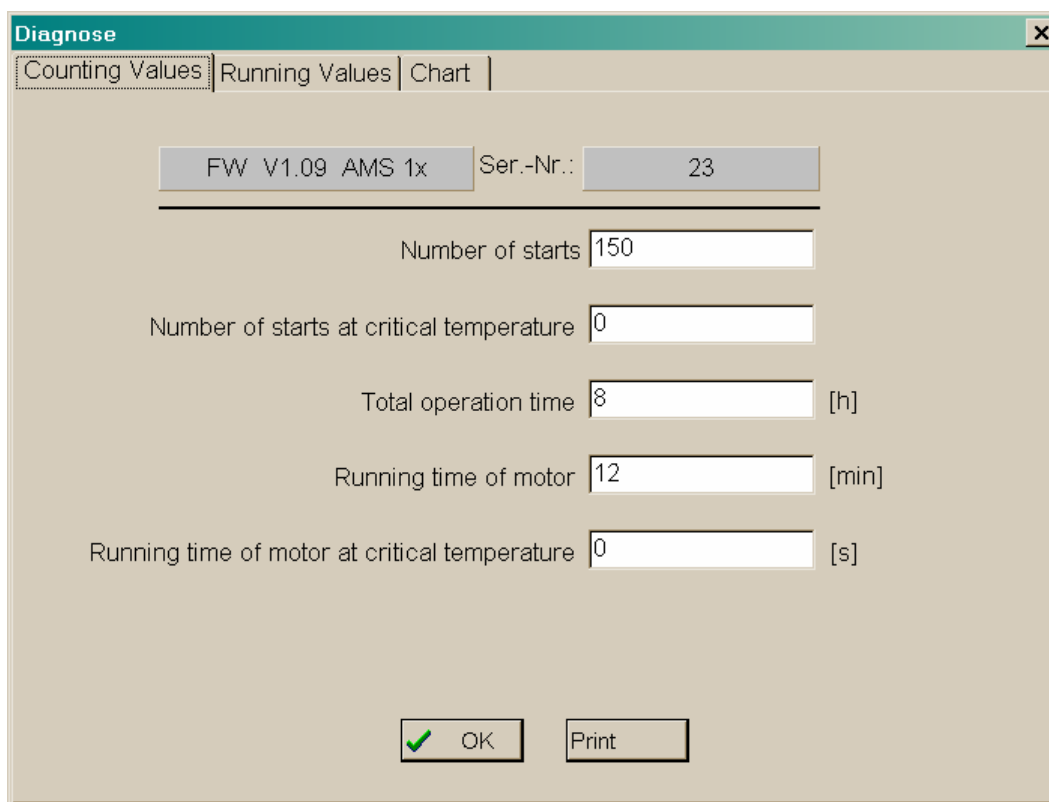
5.5.3. Diagnostics

This function requires connection to an operational PS-AMS-actuator. Several sets of data about the recent status and function of the actuator are being read out and displayed. Additionally there is an indication about the recent working status of the actuator in the bottom right corner.

Counting Values

At each starting of the actuator, totalling is done of

- number of starts
- number of starts at critical temperature
- total operation time of the actuator, in hours
- running time of the motor, in minutes
- running time of the motor at critical temperature, in seconds



The screenshot shows a software window titled "Diagnose" with a close button (X) in the top right corner. The window has three tabs: "Counting Values" (selected), "Running Values", and "Chart". Below the tabs, there is a header section with two fields: "FW V1.09 AMS 1x" and "Ser.-Nr.: 23". A horizontal line separates this header from the main data area. The data area contains five rows of labels and input fields:

Label	Value	Unit
Number of starts	150	
Number of starts at critical temperature	0	
Total operation time	8	[h]
Running time of motor	12	[min]
Running time of motor at critical temperature	0	[s]

At the bottom of the window, there are two buttons: "OK" (with a green checkmark icon) and "Print".

Running Values

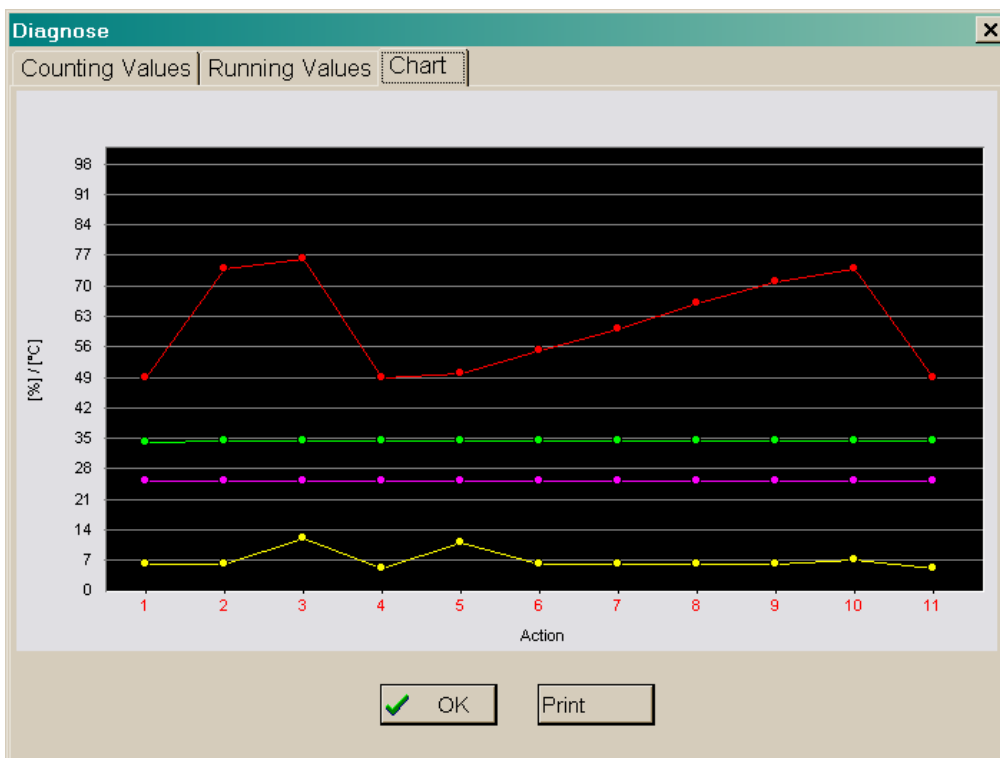
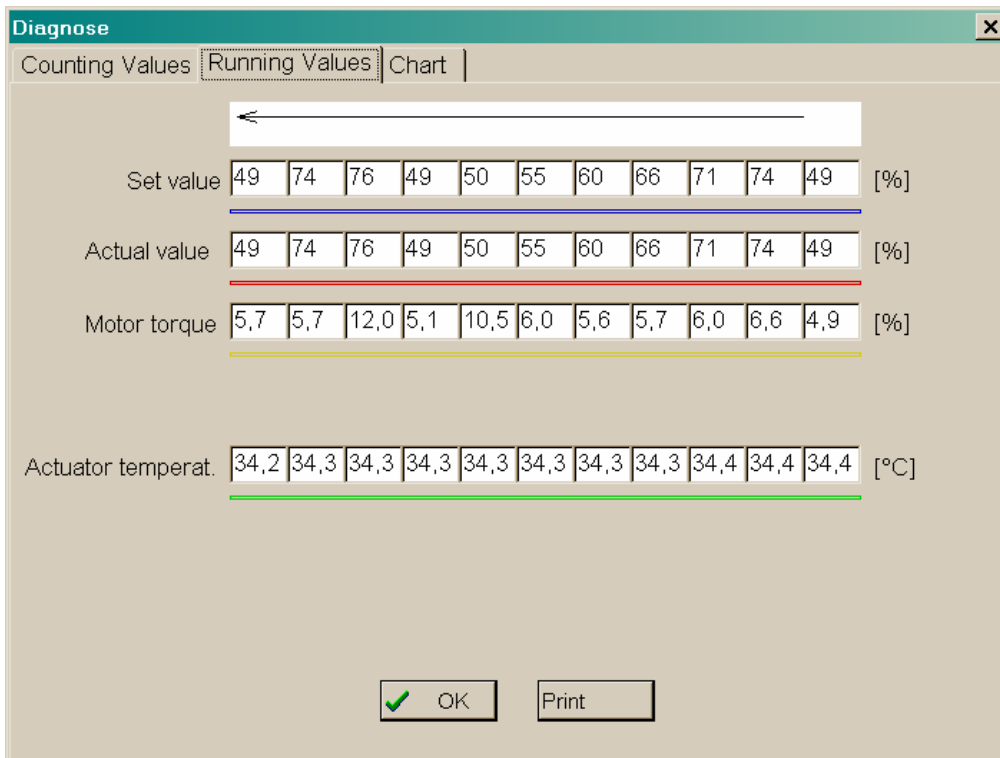
At each starting of the actuator the values for applied set value,

reached feedback value,

generated motor torque,

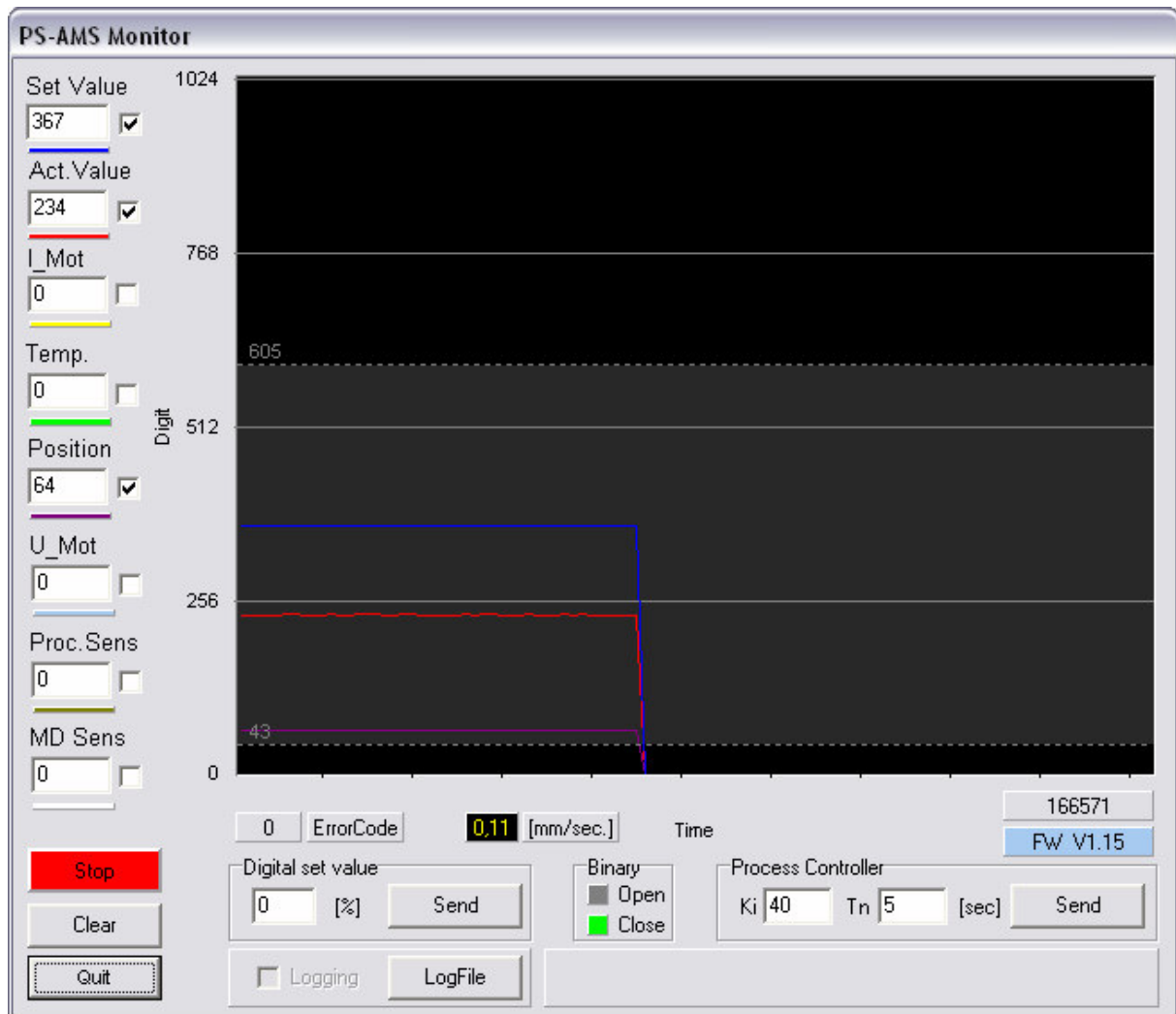
temperature inside the actuator

are measured and stored to a sequential memory of 11 data sets. They may be displayed as table or as graph.



5.5.4. Monitor

This function requires connection to an operational PS-AMS-actuator. It is used for on-line monitoring of function and performance of control, and for optimising the optionally available integrated process controller.



The display shows non-standardised basic data; for example, a value of 4 mA out of a range of 20 mA (= 1023 digits) will be displayed as 205 digits. Displaying the value may be selected by marking the respective click box, the graph screen is erased by "Clear". "Stop" holds the currently visible curve. "Quit" closes the monitor.

- **Set Value:** shows the actually applied value
- **Feedback Value:** momentary value as calculated from the actuator position and readable at the terminals for Active Feedback
- **I_Mot:** Current that is supplied to the motor by the electronics. This is approximately proportional to the output torque of the motor.
- **Temp:** temperature inside the actuator
- **Position:** momentary travel position of the actuator
- **U_Mot:** Voltage that is supplied to the motor by the electronics. This is approximately proportional to the motor speed.
- **Proc. Sens:** Feedback from the (optionally available) integrated process sensor.

- **MD Sens:** Momentary value of the torque sensor at PSQ-AMS (optional).
- **ErrorCode** displays the status of the actuator as per the error codes below.

Error Code	Description of Status
Working condition	
0	Normal operation
1	Actuator doing auto-commissioning
2	Actuator not commissioned to the valve
Peripheral errors	
3	Set value error
4	Torque error
5	Fail Safe-action is started
6	Set value error of the process sensor
12	Position passed over
13	Position nor reached
11	Undervoltage at supply
Errors in actuator	
7	Mechanical / positioning error
8	Critical / maximum temperature reached
9	Electronics error / CRC
10	Limit of wear reached

- **[mm/sec.]** at PSL-AMS and **[°/sec]** respectively shows the actual output speed.
- **Digital Set Value** can be altered and sent from here if “Digital Set Value” is activated under “Input & Output Signals”. However, this value here is only temporarily used and not permanently stored to the actuator!
- **LogFile** allows readout of the displayed curves as sets of values in an unformatted log-file. Pressing “LogFile” prompts creating a file <filename>.log in any directory. Ticking the box in front of “Logging” writes sets of values to that file each 500 msec, in a form as shown below. Writing is done as long as “Logging” is active. These data may be used for further evaluation.

```
PS Automation GmbH AMS1x LogFile ID 166571; FW V1.15; 16:31:38; 22.02.2007
Time;Setvalue;Actualvalue;I_Mot;Temp;Pos;U_Mot;PR_Ist;MD_Sens;ErrNo.
16:31:40;367;464;4;632;221;338;0;726;0
16:31:41;367;463;4;632;221;338;0;727;0
16:31:41;367;463;4;633;221;339;0;727;0
16:31:42;367;463;4;632;221;339;0;726;0
16:31:42;367;463;4;631;221;339;0;727;0
16:31:43;367;457;4;632;125;144;0;728;0
```

- **Binary** indicates the presence of a binary signal for driving Open or Close by showing one of the two fields in green.
- **Process controller:** In case the optionally available process controller is activated (requires release by the PS Automation factory), in these arrays the values for TN and KP may be entered and adjusted here. „Send“ writes the values to the actuator. TN is delay time and KP is proportional amplification factor.

- Furthermore **Firmware version** and **Serial number** of the actuator are indicated in the lower right corner.

5.6. Help

shows the version and issue date of the software PSCS in use.

6. Tracing Faults

In case no communication is possible with the actuator, please check:

- Supply voltage has to be connected and switched on
- The plugs of the communication cable must be firmly plugged in the sockets at both actuator and computer.
- The correct COM-port has to be selected via software PSCS, and it must not be assigned to other devices. At laptop PCs, COM 1 is often used internally for a touch panel. Furthermore some installed software (e.g. for synchronising with a handheld) may block some ports. See “Interface” under “File” in the chapter “Menu Structure”.