Installation, Operation and Maintenance Manual
VCIOM-15596-EN Rev. 0
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Bettis RTS - Partial Valve Stroke Test (PVST)

Electric Actuator

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Section 1: General

For a PVST (Partial Valve Stroke Test) the actuator performs in regular intervalls a defined movement. This also moves the connected valve.

With the PVST, only a part of the full valve stroke is passed through. If the full valve stroke is passed through, this is called FVST (Full Valve Stroke Test) or FST (Full Stroke Test).

Typically, a PVST is applied to valves that are in the OPEN limit position for a long time (e.g., emergency shutdown valves). These valves are only used in the event of system malfunctions, maintenance or functional tests. Between these events, the plant operator has no information if the valve can still be closed if required.

Normally a short, small movement of the valve in the closing direction is not disturbing the system process. The PVST performs this movement regularly. As a result, on the one hand, a fixation of mechanical components is reduced and, on the other hand, errors are detected prematurely before any emergency shutdown is required.

This procedure increases the security system metrics.

The PVST can either be triggered by the control unit on the actuator itself (internally) or by the control system (externally).

Internal trigger:

Manual trigger of the PVST via the menu of the control unit: see parameter P16.11.

Time based trigger of the PVST: see parameter P16.7, P16.9 und P16.10.

External trigger:

The PVST can be triggered via the binary inputs or an optional fieldbus system.

Procedure of the PVST:

1. The actuator must be in the start position which is set in parameter P16.2. The set hysteresis in parameter P1.8 is taken into account.
2. The actuator must be in the REMOTE mode and READY state.
3. Release of the PVST (internal or external).
4. The status of PVST is set as PVST-Active.
5. The actuator moves from the start position to the test range which is defined in parameter P16.3.
6. After reaching the final test position the actuator remains in this position for a specific time, defined in parameter P16.4.
7. Then the actuator moves back to the start position.
8. If the PVST was successful the status will be set to PVST-OK otherwise to PVST-Error.
9. The status of the PVST can be monitored continuously via the binary outputs or via the optional fieldbus.

Result of the PVST:

For a successful PVST the following terms must be fulfilled:

1. The actuator must be in the start position.
2. The actuator must be in the REMOTE mode and READY state during the whole PVST (no error).
3. The PVST must not be interrupted by an other command (binary inputs, commands from optional fieldbus).
4. The switch-off torque must not be exceeded during the PVST.
5. The total time of the PVST must be lower than the maximum time, set in parameter P16.8. If one or more of the above terms are violated the PVST is not successful.

Section 2: Parameter Menu

2.1 Parameter Group: PVST

Table 1.

	Menu Item	Subitem	Options	Explanations/Comments
P16.1	Stroke test	Stroke test		This parameter activates the PVST. For standard actuators (without fail-safe function) the PVST is only viable electrically by motor. For fail-safe actuators the PVST can additionally be executed as fail-safe operation in fail-safe direction by spring.
			0	No stroke test is executed.
			1	Stroke test is executed electrically.
			2	Stroke test is executed in fail-safe operation by spring.
			3	Two stroke tests. 1. Test: electrically 2. Test: in fail-safe operation
			4	Two stroke tests. 1. Test: in fail-safe operation 2. Test: electrically
P16.2	Stroke test	Start position	0-100%	Start position for the PVST. This value must be 0% or 100%. If the actuator is not in one of this positions in case of a PVST start the test is not executed and not successful concluded.
P16.3	Stroke test	Test range	0-100%	In this range the actuator is moved during the PVST. e.g. Start position: 100%, test range: 30% The PVST starts at 100% and moves the actuator to 70% (100%-30%). After that the actuator moves back to 100%.
P16.4	Stroke test	Resting time	0-10s	Amount of seconds how long the actuator remains in the end position of the PVST before moving back to the start position.
P16.5	Stroke test	Speed open	0-100%	With this parameter it is possible to set the speed in the OPEN direction for the PVST as far as the actuator has this capability.
P16.6	Stroke test	Speed close	0-100%	With this parameter it is possible to set the speed in the CLOSE direction for the PVST as far as the actuator has this capability.

	Menu Item	Subitem	Options	Explanations/Comments
P16.7	Stroke test	Time trigger		If this value is set greater than 0 the PVST will be repeated cyclic according the specific set value. The start command for the PVST is set for one minute and is reseted after the test till the next caclic start.
			0	Off
			1	Every hour
			2	Every 2 hours
			3	Every 3 hours
			4	Every 4 hours
			5	Every 6 hours
			6	Every 8 hours
			7	Every 12 hours
			8	Every day
			9	Every week
			10	Every 2 weeks
			11	Every month
			12	Every 2 months
			13	Every 3 months
			14	Every 4 months
			15	Every 6 months
			16	Every year
P16.8	Stroke test	Max. time	0-120s	Maximum timespan for the duration of the PVST. If the test takes longer than the adjusted time it is not successful. The function is deactivated by setting the value to 0.
P16.9	Stroke test	Start date	yyyy-mm-dd	With this parameter the date for the first PVST is set. Parameter is only relevant if P16.7 Time trigger is greater 0.
P16.10	Stroke test	Start time	hh:mm:ss	With this parameter the time for the first PVST is set. The value for the seconds is not relevant. The start command is active for the whole minute independent from the adjusted seconds. Parameter is only relevant if P16.7 Time trigger is greater 0.
P16.11	Stroke test	Start test	0-1	With this parameter the PVST function can be started from the control menu to test the adjusted values. When the parameter is set to 1, the PVST starts once the actuator is in REMOTE mode.

2.2 Parameter Group: Binary Inputs (Extension)

Table 2.

	Menu Item	Subitem	Options	Explanations/Comments
P9.x	Bin. Input	Input x	53: PVST Start	If signal is active the PVST is started.
			54: PVST Start inv.	If signal is not active the PVST is started (active low).

2.3 Parameter Group: Binary Outputs (Extension)

Table 3.

	Menu Item	Subitem	Options	Explanations/Comments
P10.x	Bin. Output	Output x	65: PVST OK	The last PVST was successful.
			66: PVST Error	The last PVST was not successful.
			67: PVST Active	A PVST is currently running.

Section 3: Troubleshooting

3.1 Error List (Extension)

Table 4.

Error	Description
#54: PVST Error #55: PVST OK	The last PVST was not successful. The last PVST was successful.
#61: PVST> Start	The Partial Valve Stroke Test was started.

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