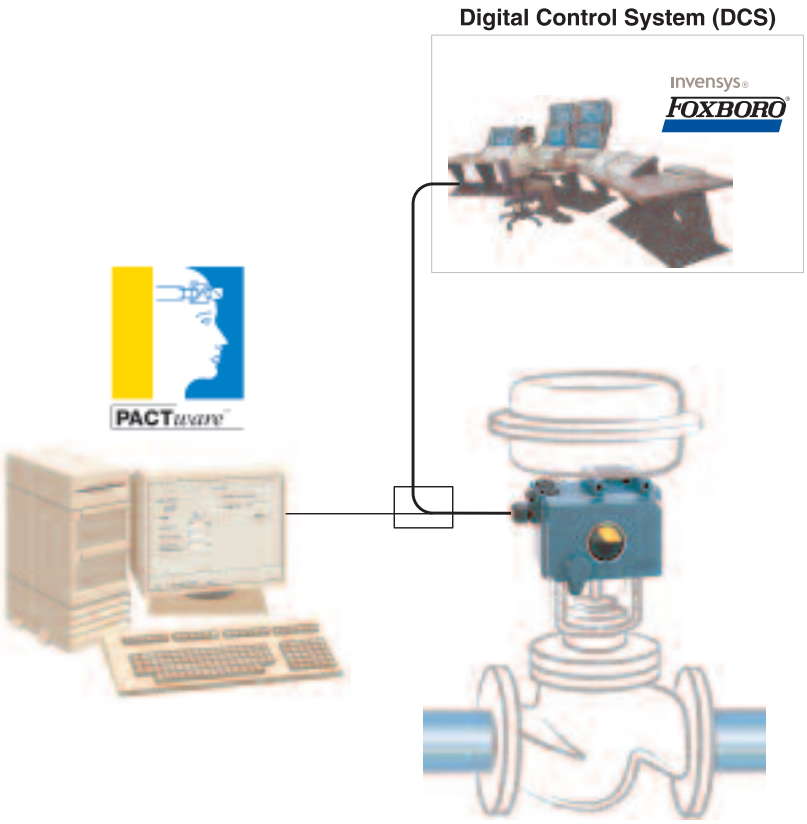
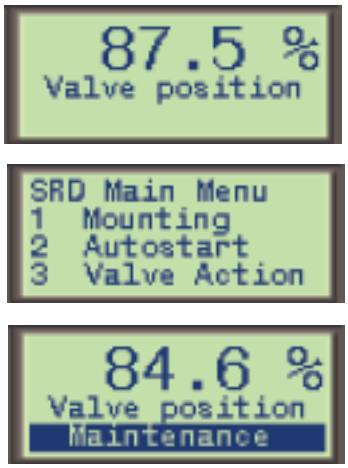
Valve Monitor Diagnostics for Positioners SRD960 / SRD991





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Intelligent Valve Diagnostics for Predictive Maintenance

The valve diagnostic software is available as Device Type Manager (DTM) for integration into control systems based on the Field Device Tool (FDT) technology such as the Foxboro I/A™ Series System. It is designed to support methods for evaluation of the valve health, operation and configuration. The DTMs support the communication protocols HART, Profibus PA, FOUNDATION Fieldbus (FF) and FoxCom.

- Predictive Maintenance Capabilities
- Intelligent Alarm Management
- Self-surveillance in accordance with NE107
- Service Management
- Histograms for Valve Position- and Response History
- Data collected for up to 60 months
- Data stored inside positioner memory
- Determination of Stem Friction to detect leakage and stuck stem
- Histogram for Friction History
- Partial Stroke Test function for ESD applications

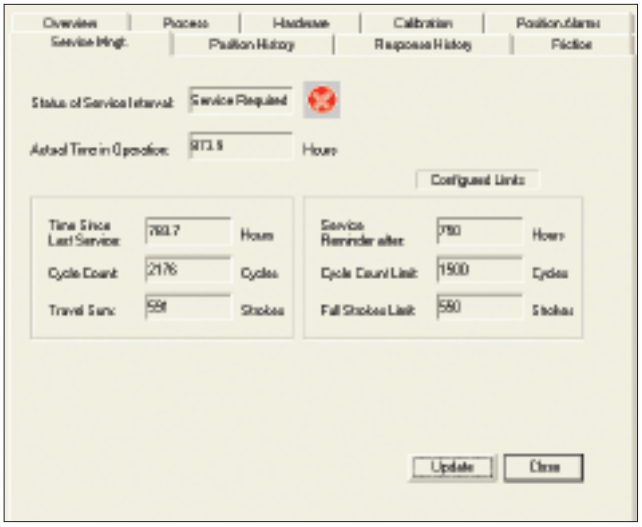
FDT/DTM-Technology

The FDT/DTM concept specifies a “frame application” with a uniform platform for software tools and provides the particular advantage of a simple, standardized and common implementation of field devices into any FDT compliant control system. It defines interfaces and mechanisms which provide a simple method of running a type of “printer driver” for field devices, the Device Type Manager (DTM).

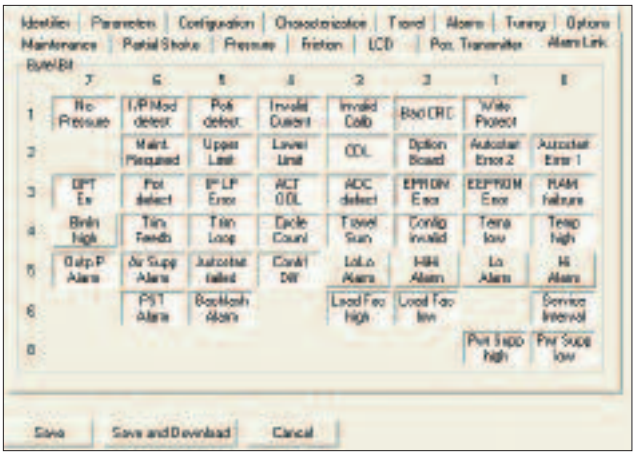
DTM describes the field device specific software component. Valve Monitor is such a “driver” and supports the communication protocols HART, Profibus PA, FOUNDATION Fieldbus and FoxCom. FDT supplements the DDL-technology, and offers much more, i. e. a unified architecture for all devices in a plant. Benefit, the “driver” can be integrated into any FDT compliant control system.

Predictive Maintenance

Valve Monitor is not only software to display the setpoint or measured values, but it also offers enhanced applications and methods to analyze data. The onboard memory automatically retrieves and stores all important valve data collected by the positioner during its’ operation. This feature enables the software to run on demand. As a result, it need not run continuously on the control system, and can therefore reduce unnecessary traffic on the communication signal.



The internal diagnostic routines continuously evaluate the status of the valve and inform the operator of any irregularities by executing a status and/or diagnostic message. This self surveillance method follows the NAMUR Recommendation NE107. The total operating hours of the device can be dis-



played. Service Intervals can be timed, using the Service Management. Histograms display the Valve Position History or Valve Response History. The Stem Friction can be measured to identify possible problems caused by a reduced (or increased) friction on the stem packing. The measured values are then displayed in the Histogram.

* Option Board: Additional Electronic Board added to the main electronics to enhance the positioners basic functionality

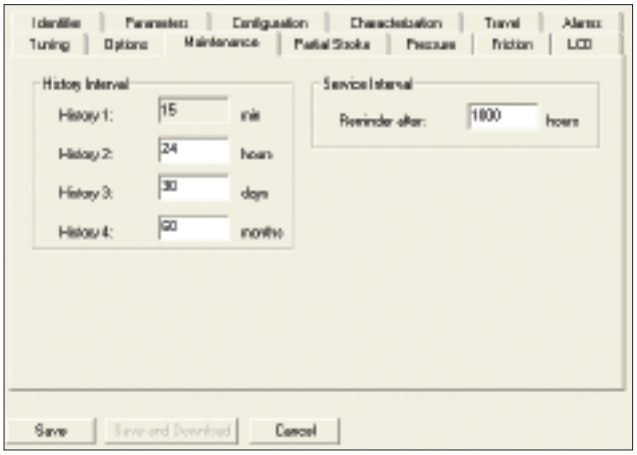
Alarm Link

The newly designed Alarm Link allows the operator to freely define and activate the alarm that he wants to display on his operating station, or on his Alarm channel of the Option Board*.

Maintenance Management

This feature allows configuration of the Service and History Intervals.

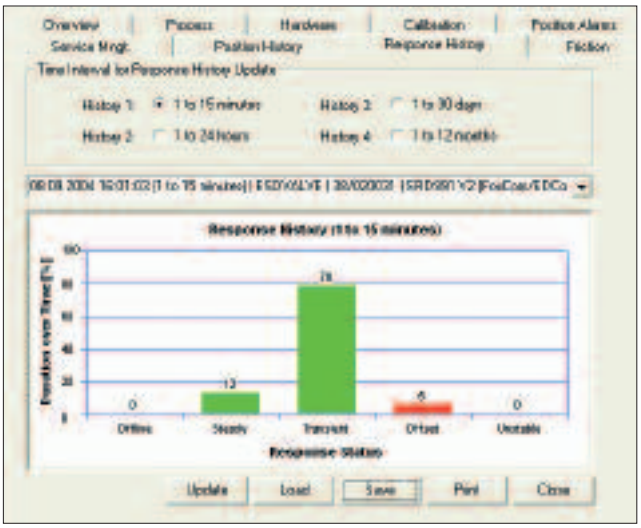
The Service Interval is used to automatically generate an alarm that a service to the device is required. The History Interval can be freely configured, defining the time window of the Histograms for the Response, Position, and Friction History, showing the last 15 minutes, 24 hours, 30 days or 60 months.



The indicated and illustrated data, such as the Valve Position History, and the Response History, can be ideally utilized for process optimization and predictive maintenance. This results in a more transparent and, at the same time, economic monitoring of the control process. Downtimes can be minimized, and service costs can therefore be reduced.

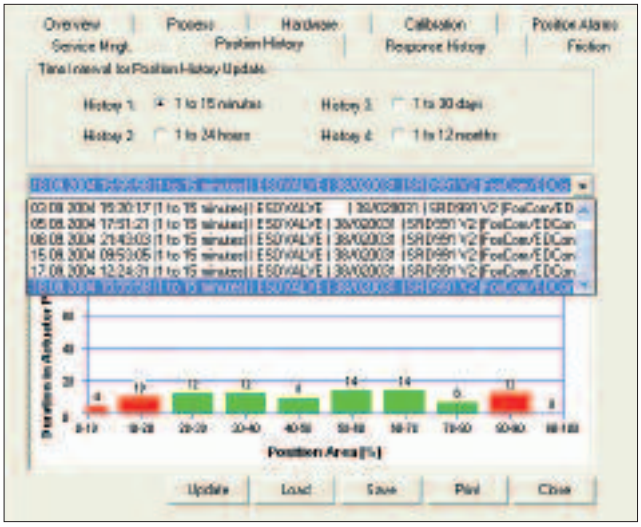
Tools for Predictive Maintenance

The positioner database can be analyzed at a later time by loading the data to a Control System (or to a PC) while the valve is still active in the process. Unnecessary down times are minimized, because the valve can be inspected while it's still in operation. The data can be visualized in different freely definable time intervals. This allows for the observation of the last 15 minutes, 24 hours, 30 days and up to 60 months. Color coding shows the operator if this is a critical (red) or non-critical (green) situation.



Response History

Shows the control behavior of the valve over time and identifies the state of the valve: offline, steady, transient, offset or unstable.



Position History

Shows the valve position over time and identifies if the valve is operating within or outside the specified range.

Alarm Management

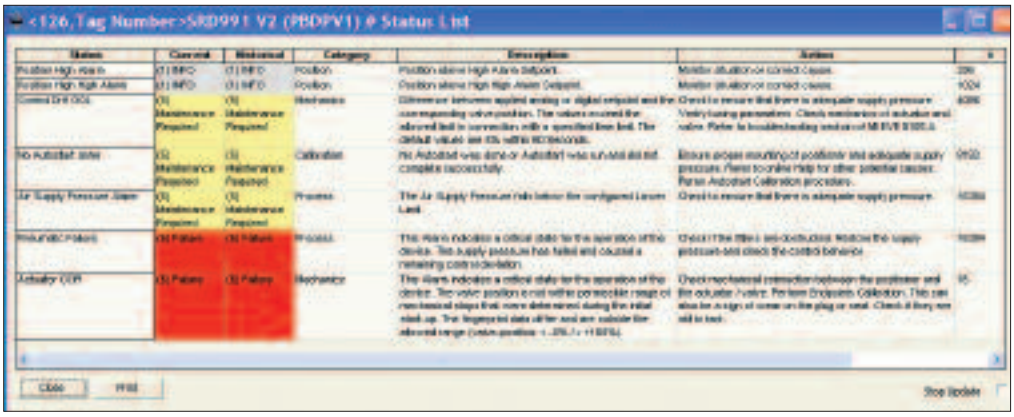
The SRD offers the most enhanced self surveillance and diagnostic monitoring capabilities available on the market.

Unified self-surveillance (NE107)

Self-surveillance and diagnostic monitoring following the Namur Recommendation NE107. This recommendation defines unified status messages for field devices, providing the user with information about the status of the field instrument. The available information indicates clearly what device-alarm was activated, from where the alarm initiated, possible reason for the alarm, and what corrective actions need to be initiated to restore it to a normal operating state.

In the following illustration, an example display is shown. All alarms are generated in the positioner and can be uploaded at any time. The columns show the displayed status messages, e.g. control difference, air supply pressure alarm, high friction alarm, current or his-

torical message, a full text description explaining the possible reason for the status message, and the recommended actions for maintenance.



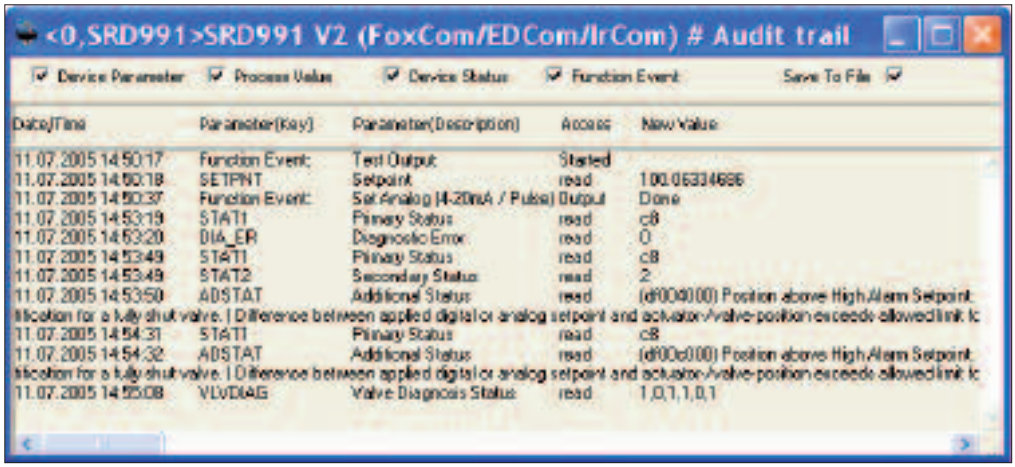
Status indicators are distinguished by messages and color-coding similar to traffic signals:

- Failure
- Maintenance Required
- OK
- INFO
- Out of Specification

Green indicates that no status messages are present; grey that a status message is present but no maintenance is required; yellow that maintenance is required but continued operation is still possible; red indicates a device failure that requires immediate service.

Audit Trail

The Audit Trail is designed to record all events realized by a positioner, listed by date and time. This event monitoring can be used to put a positioner under a special surveillance if there are uncertainties regarding its' operation.

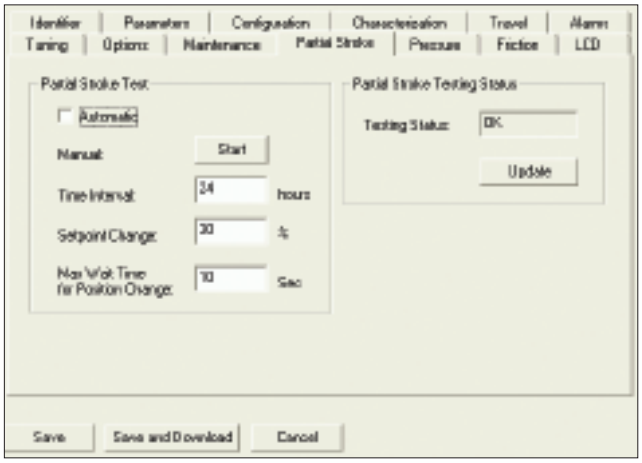


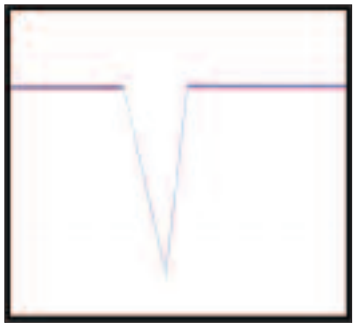
Concept of the Partial Stroke Test (PST) Solution

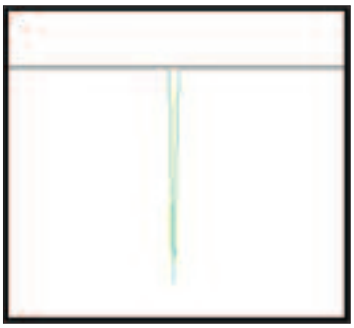
Final control elements in Emergency Shut Down (ESD) applications, such as ON-OFF, Blow Down, and Venting Valves remain in one position over a long period of time without any mechanical movement.

These valves can show a tendency to bind; and, as a result, might not operate on demand. This can have a severe impact to the functionality of a Safety System, and, potentially damaging results to the operating personnel, plant equipment, and environment.

The Partial Stroke Test (PST) offers operators a tool to identify the trouble-proof function of such ESD valves. The test can be easily executed via the operation and diagnostic tool - Valve Monitor.







In the **Manual mode** the test can be activated at any time, via a Start button (see above) and in the **Automatic mode**, the PST may be programmed to occur at any pre-determined interval. In both cases the valve can be stroked within a stroke-ratio of up to 30 %. The maximum wait time allows taking into account that each valve has a different dynamic behavior e.g. caused by the process media or the valve itself. If the valve has performed the test without any problems, the status for the partial stroke test will go to "OK". In case the valve does not move, and could be stuck, the operator will be informed by an alarm indicating an “Error”.

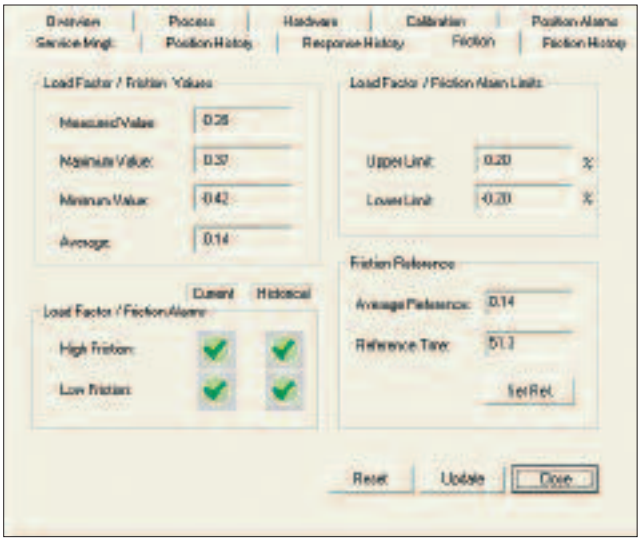
In addition to this, the device continuously monitors the health of the control valve, such as the stem friction, and supply output pressure.

Features of Partial Stroke Test

Activation of Test	Manual
	Automatic
Configuration	Test Interval [Hours]
	Setpoint Change [%]
	Maximum Wait Time [Seconds]
Testing Status	• Not Done • Running
	• Restricted • OK
Testing Alarms and Diagnostic	Error (Stuck Valve or Failed Test)
	Service Required (Service Mgmt.)
Alarm Text on Positioner LCD	“Maintenance”
	(Stuck Valve or Failed Test)
Additional Diagnostics	Stem Friction
	Supply- and Output-Pressure
	Device Temperature
	Hours in Operation
	Valve Position History
	Valve Response History

Stem Friction

The Stem Friction status is an indispensable feature for today’s predictive maintenance capabilities of any control valve. This feature allows predicting possible leakages, or stuck valves; and, in turn, prevents dangerous spills, injuries to personnel, damage to plant equipment, and the environment. This also saves expensive downtime of the valve.



Internal pressure sensors (optional) measure the output- pressure for each set-point change. In Milliseconds, the Microprocessor of the positioner calculates the friction of the stem against the packing. The actual friction value is then displayed as Measured and Average Values, with additional drag-pointers for the Maximum and Minimum Values.

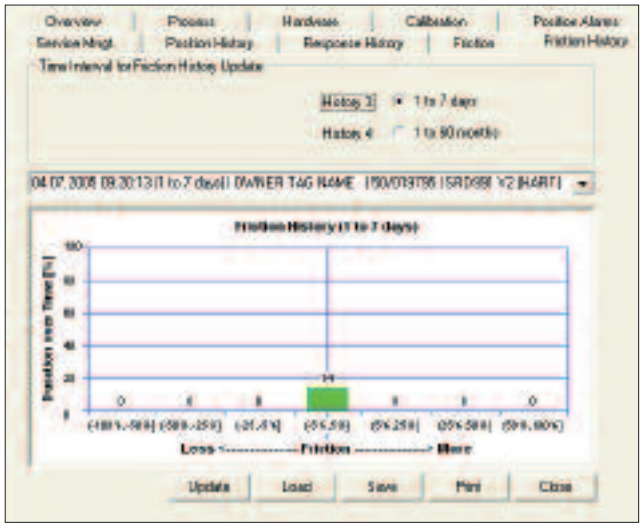
Friction Alarms can be configured to inform the operator if the Friction values have exceeded or gone below certain threshold limits.

Setting a Friction Reference allows the operator to set a fingerpoint showing the initial Average Friction in connection with the Reference Time.

This value will then be highlighted as a vertical line in the Histogram for the Friction History.

Stem Friction History

The Histogram for the Friction History is an easy tool to show the operator the actual condition of the stem packing over time. The vertical line shows the Reference value defined by the operator after the valve has “broken in”. From that moment everything is done automatically by the positioner. If there is Less friction, the histograms will shift to the left, if there is More friction, the histograms will shift to the right.



If Friction Alarms are set, the positioner will automatically execute a Diagnosis Alarm once the values of the configured thresholds are reached.

A comparison can be done between two different historians from 1 to 30 days and 1 to 60 months.

How to order

The CD-Rom for the Valve Monitor Software-package can be ordered under the ID.-No.: EW 556 932 049. This package includes PACTware™, Communication-DTMs and the SRD-DTM.

For more information

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