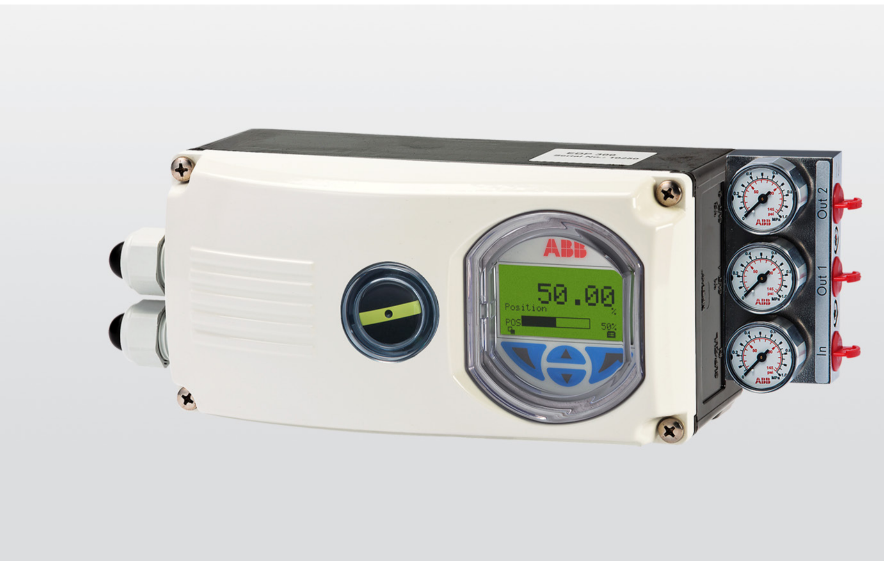
ABB MEASUREMENT & ANALYTICS | TECHNICAL DESCRIPTION | TD/EDP300/ASSET_MONITORS-EN REV. B

PositionMaster EDP300

Digital Positioner
Asset monitors



Get the most out of your EDP300 positioner.
A guide for more effective use of the EDP300 alerts and diagnostics.

—
EDP300

Introduction

This document provides an overview of the EDP300 digital positioner's state-of-the-art asset monitors as a quick user guide to help develop a plan for more effective use of these standard functions of the positioner.

The EDP300 incorporates a host of diagnostics that includes comprehensive valve signatures and alarms as indication of the valve performance and anomalies, these diagnostics provide the user with detailed information of the issue as well as recommended corrective action for predictive and proactive maintenance.

For more information

Additional documentation on PositionMaster EDP300 is available for download free of charge at www.abb.com/positioners.
Alternatively simply scan this code:

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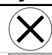
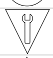
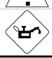
1 Introduction

The diagnostic structure of the EDP300 allows the user to customize the alarm messaging based on the application, while providing appropriate information for action needed to remedy the problem.
The categories are as follow:

Description	Symbol
Error or failure	
Function check required	
Out of specification	
Maintenance required	

As a part of the introduction it will be appropriate to mention that the EDP300 Digital Positioner is based upon the most up to date technology that enables easy and user friendly functionality and setup without the need for costly commissioning tools. All the required parameters and settings are accessible from the intuitive onboard LCD with pushbuttons and latest FDT based software programing.

The EDP300 is microprocessor-based and has the capability to precisely position a control valve from the process controller with a 4 to 20 mA setpoint signal. The diagnostics to alert the user of critical information before it affects the process are communicated in the following ways:

- HMI display as text
- HART protocol
- AO analog position feedback
- DO digital output alarm port

The user is free to use any of these methods as appropriate for the process and application.

For the purpose of describing the EDP300 asset monitors this document is structured according to the following categories:

- Alarm description
- Alarm mapping
- Valve health & performance reports
- Real-time performance observation
- Performance histogram
- FIM – Field Information Manager

Each of the asset monitors in the above categories are defined, described and clarified in the following way:

- Alarm description
- Possible cause
- Suggested action

2 Alarms & descriptions

FIM alarm management and priority assignment

The EDP300 provides an alarm priority assignment according to the categories as listed below.
For easy 'start and go' the EDP300 alarms are factory set for best case applications and can be customized by the user according to application requirement.
Ready to operate 'OK' is indicated with a green check box.

The FIM alarm priority levels are as follow:

- F - Failure
- C - Function check
- S - Out of specification
- M - Maintenance required

Figure 1: FIM Alarm priority levels

The following sections provide explanation of each alarm as follow:

- Alarm priority…
- Alarm severity…
- Alarm HMI display code…
- Alarm description…
- Possible cause…
- Suggested action…

Note

For additional information refer to EDP300 commissioning instructions (CI/EDP300) and operating instructions (OI/EDP300).

Position measurement failure (F090.000)

Alarm priority:	Failure
Alarm severity:	High
Alarm HMI display code:	F090.000
Alarm description:	The positioner provides a sensor integrity condition alarm and will detected a failure or problem with its travel sensor circuit. The positioner will active the safe mode when this alarm is active and move the valve to the safe position. The safe position is determined by the pneumatic control module, the options are; fail safe (close or open depending on application) or fail freeze (fail in place)
Possible cause:	Faulty position sensor or the electrical connection of the travel sensor is interrupted or not connected to the main electronic board of the positioner.
Suggested action:	First check the internal sensor cable to make sure it is securely plugged into the main electronics board, if the positioner has a remote sensor unit check the sensor cable for any damage or loose connections. If problem persist replace the position sensor.

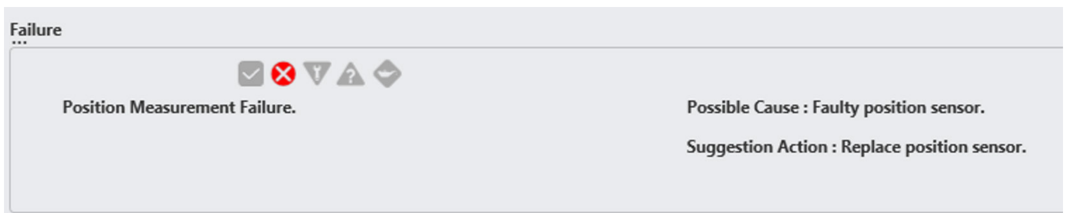


Figure 2: Example of FIM position measurement failure alarm

Table 1: Position measurement failure (F090.000)

… 2 Alarms & descriptions

Valve blocked (F091.001)

Alarm priority:	Failure
Alarm severity:	High
Alarm HMI display code:	F091.001
Alarm description:	The positioner continuously monitors the control position, if the control valve does not reach the setpoint the valve blocked alarm will be activated.
Possible cause:	The control valve may be stuck due to high friction or damage that prevents the control valve reaching the required set point value.
Suggested action:	Inspect the control valve for any visible damage such as bent valve/actuator stem and take the necessary corrective action. Verify that the supply pressure is correct according to the actuator pressure requirement. If possible mechanically move the valve to verify free travel in case any object is stuck in the final control element preventing valve movement. Check the valve stem packing for sufficient lubrication and correct torque setting. Check other positioner alarms relating to supply pressure, position timeout, friction and stiction to eliminate possible reasons for valve blocked alarm.

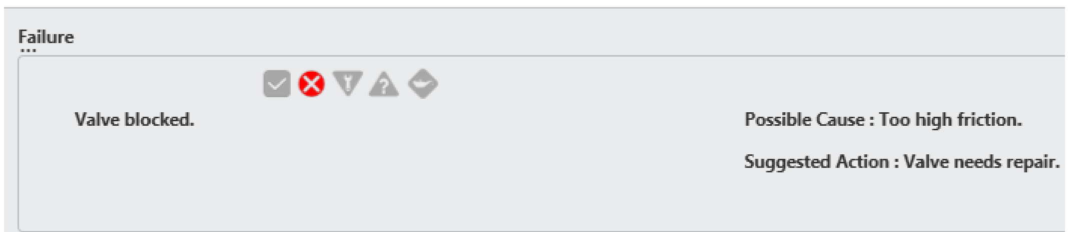


Figure 3: Example of FIM valve blocked alarm

Table 2: Valve blocked (F091.001)

Positioning timeout (M050.002)

Alarm priority: Maintenance required

Alarm severity: High

Alarm HMI display code: M050.002

Alarm description: The positioner continuously monitors the control position, if the control valve does not reach the setpoint within the user defined time the positioning timeout alarm will be activated. The control valve's actual travel time can be viewed in FIM under 'Diagnostic Settings' – 'Position loop monitoring' and the timeout alarm can be set according to application requirement.

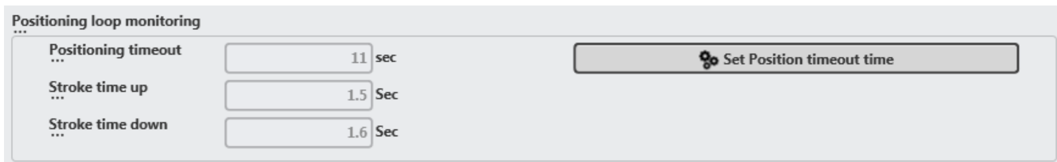


Figure 4: Example of FIM poitioning loop minitoring

Possible cause: Note that the control valve's actual travel time under load must be less than the positioning timeout alarm time setting. The timeout alarm provides an indication that the operating conditions of the valve has deteriorated and the control valve's positioning time no longer meets the application requirement. An aging control valve with high friction or stiction due to degraded valve stem packing or damage to valve trim will result in sluggish behavior. Travel speed is important to keep up with the process demand, any changes of the control valve performance will impact the process control efficiency.

Suggested action: Check the air supply pressure to the positioner to make sure it meets the required operating pressure for the actuator. Check valve packing and lubrication. Check for any mechanical damage to the valve or stem. Verify travel alarm time limit to make sure it is correct for the application. Check other positioner alarms relating to supply pressure, friction and stiction to eliminate possible reasons for actuator time-out alarm.

Take the necessary corrective action to remedy the problem.

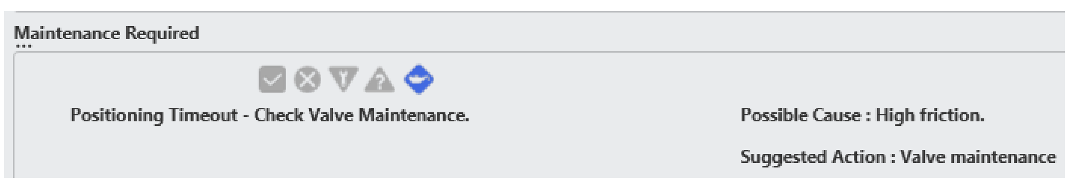


Figure 5: Example of FIM positioning timeout alarm

Table 3: Positioning timeout (M050.002)

… 2 Alarms & descriptions

Positioning unstable (M051.003)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M051.003
Alarm description:	The positioner continuously monitors the control position, if the control valve does maintain steady control behavior the positioning unstable alarm will be activated. The control valve is not tracking the setpoint demand signal, this will impact the process control loop.
Possible cause:	The actuator behavior is erratic or oscillating, this behavior may be caused by the following: Air leakage in the actuator or tubing from the positioner to the actuator or incorrect positioner control parameters.
Suggested action:	Check the actuator for any visible leaks and take the necessary corrective action. Run the leakage detection test to confirm that there are no further leaks such as internal actuator chamber seal leak that is possible in double acting actuators. An easy way to check for air leaks would be to switch the positioner to manual mode via the HMI and move the control valve to the most often used %-position, leave it for one minute while observing the valve position, any position deviation in either direction is an indication of air leakage in the actuator assembly. If no leaks are found, switch the positioner to adaptive mode to automatically optimize the control parameters (Kp, Tv, Y-offset, Dead band, Zone) of the positioner in real time.

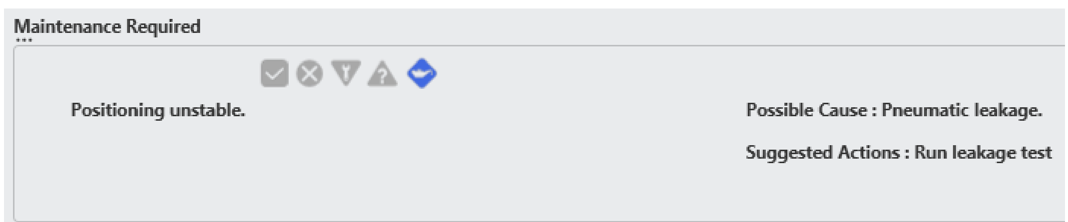


Figure 6: Example of FIM positioning unstable alarm

Table 4: Positioning unstable (M051.003)

Position out of travel range (M049.004)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M049.004
Alarm description:	This alarm indicates that the positioner's travel exceeded the travel sensor range. No damage will be done to the positioner but the alarm will indicate position out of travel range.
Possible cause:	The mounting of the positioner to the valve actuator requires that the valve travel be within the available positioner's travel sensor range, this require proper alignment and the auto adjust in accordance with linear or rotary actuators. Misalignment will cause a position out of range alarm during auto adjust or if the mounting bracket was damaged causing misalignment after the last auto adjust the position out of travel range alarm will be activated.
Suggested action:	Check the positioner mounting and linkage components for any misalignment or mechanical damage, take the necessary corrective action and then do a new auto adjust of the positioner.

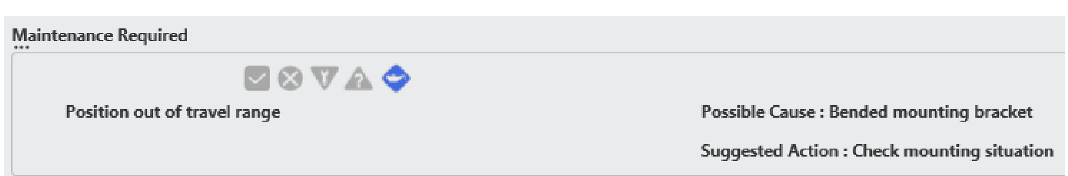


Figure 7: Example of FIM position out of travel range alarm

Table 5: Position out of travel range (M049.004)

Zero point displacement (M052.005)

Alarm priority:	Maintenance required
Alarm severity:	Medium
Alarm HMI display code:	M052.005
Alarm description:	This alarm indicates that the valve seat wear has exceeded the set limit. For critical zero leak valves this alarm would provide valuable information for planned maintenance purposes.
Possible cause:	The control valve's zero position has changed due to valve seat wear and deviates from the original zero position. The positioner's 0 % at 4 mA (for direct acting) or 0 % at 20 mA (for reverse acting) do not correspond with the seated position of the valve, the positioner detects this deviation when it is in the closed position.
Suggested action:	The positioner provides a zero position offset correction function, this can be done by selecting the 'zero' when doing the auto adjust-mode, the positioner will momentarily move the valve into the seat to determine the new close position and back to normal operating mode. For zero leak control valves make sure the positioner's end point behavior is set for tight shut. **Note** Only do this corrective action during plant shutdown or if the valve can be isolated during plant operation to prevent any process upset as the valve will momentarily move to determine the new zero position when this corrective function is initiated.

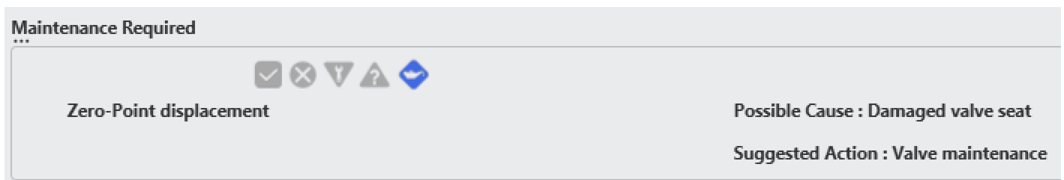


Figure 8: Example of FIM zero point displacement alarm

Table 6: Zero point displacement (M052.005)

… 2 Alarms & descriptions

Kp (Gain) up exceeded (M043.006)

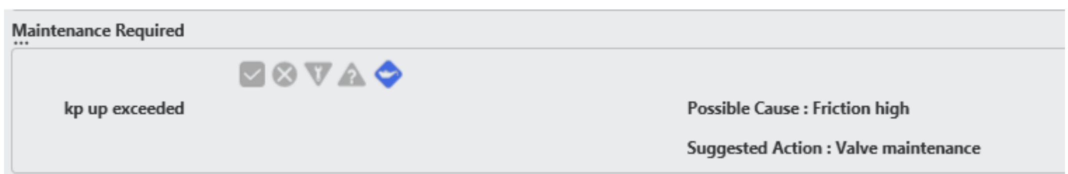
Alarm priority:	Maintenance required
Alarm severity:	Medium
Alarm HMI display code:	M043.006
Alarm description:	This alarm indicates a change of the Kp value in the up direction of the positioner due to changes in control behavior of the positioner and actuator assembly, changes in Kp is an indication of friction changes in the assembly. A reduction of Kp (lower gain) leads to smaller control valve movement for set point changes to keep up with the control loop dynamics as compared to the last auto adjust Kp parameter value. The alarm is triggered when the Kp up alarm limit is reached. Note that the positioner must be operating in the adaptive mode for this real time Kp condition alarm detection.
Possible cause:	An aging control valve operating in harsh conditions may experience degradation of stem packing gland material or problems with seal and lubrication in the cylinder that will create high friction conditions. The positioner is able to detect changes in valve condition related to wear, by monitoring changes in the Kp control parameter over time, while in the adaptive control mode and signal an alarm when this parameter reach the set limit.
Suggested action:	Check the valve and actuator assembly and inspect the packing material and related parts for degradation. Recondition the valve assembly as needed as part of the valve maintenance schedule. **Note** The Kp value is the gain of the positioner. The control speed and stability is influenced by the Kp value. With higher Kp values, the control speed increases, with lower Kp values the speed decreases.  **Figure 9: Example of FIM Kp up exceeded alarm**

Table 7: Kp (Gain) up exceeded (M043.006)

Kp (Gain) down exceeded (M044.007)

Alarm priority:	Maintenance required
Alarm severity:	Medium
Alarm HMI display code:	M044.007
Alarm description:	This alarm indicates a change of the Kp value in the down direction of the positioner due to changes in control behavior of the positioner and actuator assembly, changes in Kp is an indication of friction changes in the assembly. An increase of Kp (higher gain) leads to larger control valve movement for set point changes to keep up with the control loop dynamics as compared to the last auto adjust Kp parameter value. The alarm is triggered when the Kp down alarm limit is reached. Note that the positioner must be operating in the adaptive mode for this real time Kp condition alarm detection.
Possible cause:	An aging control valve operating in harsh conditions may experience degradation of stem packing gland material or problems with seal and lubrication in the cylinder that will create high friction conditions. The positioner is able to detect changes in valve condition related to wear, by monitoring changes in the Kp control parameter over time, while in the adaptive control mode and signal an alarm when this parameter reach the set limit.
Suggested action:	Check the valve and actuator assembly and inspect the packing material and related parts for degradation. Recondition the valve assembly as needed as part of the valve maintenance schedule. **Note** The Kp value is the gain of the positioner. The control speed and stability is influenced by the Kp value. With higher Kp values, the control speed increases, with lower Kp values the speed decreases.

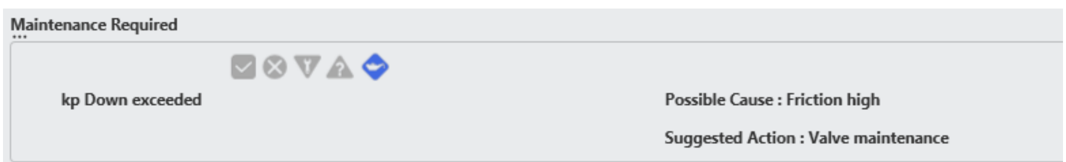


Figure 10: Example of FIM Kp down exceeded alarm

Table 8: Kp (Gain) down exceeded (M044.007)

Setpoint failure electronics (F092.008)

Alarm priority:	Failure
Alarm severity:	High
Alarm HMI display code:	F092.008
Alarm description:	This alarm indicates a malfunction of the positioner's main electronics. The positioner will active the safe mode when this alarm is active and move the valve to the safe position. The safe position is determined by the pneumatic control module, the options are; fail safe (close or open depending on application) or fail freeze (fail in place).
Possible cause:	The electronics has failed forcing the actuator to the safe position.
Suggested action:	Replace the electronics and perform a new auto adjust of the positioner.

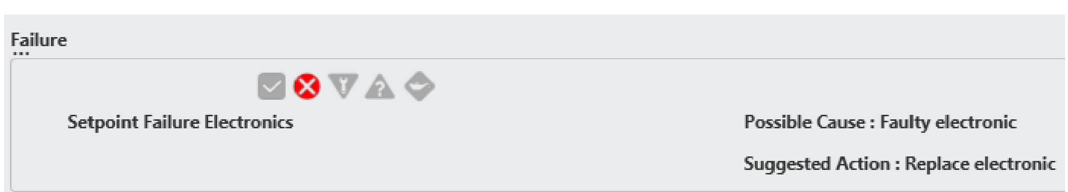


Figure 11: Example of FIM setpoint failure electronics alarm

Table 9: Setpoint failure electronics (F092.008)

… 2 Alarms & descriptions

Setpoint out of range (S070.009)

Alarm priority:	Out of specification
Alarm severity:	High
Alarm HMI display code:	S070.009
Alarm description:	This alarm indicates that the 4 to 20 mA input signal from the DCS / PLC is outside the 4 to 20 mA control range for example above 21.5 mA or below 3.8 mA.
Possible cause:	The positioner provides visibility to the status and health of the setpoint signal when is falls below the minimum and rises above the maximum setpoint range of the positioner, the positioner will continue working to track the setpoint signal when it is within the 4 to 20 mA control range.
Suggested action:	Check and validate the 4 to 20 mA signal from the DCS / PLC and take necessary corrective action to ensure signal integrity. If possible limit the DCS / PLC setpoint signal so that it does not drop below 4 mA or exceed 20 mA during normal control.

Figure 12: Example of FIM setpoint out of range alarm

Table 10: Setpoint out of range (S070.009)

Device not calibrated (C080.010)

Alarm priority:	Function check
Alarm severity:	High
Alarm HMI display code:	C080.010
Alarm description:	This alarm indicates that the positioner requires an 'Auto Adjust'-setup to function properly. The positioner may be new and requires an auto adjust or a factory reset was done and requires a new auto adjust.
Possible cause:	An indication that the positioner is unable to function on the application and requires setup with auto adjust.
Suggested action:	Refer to the EDP300 commissioning instruction for setup and auto adjust.

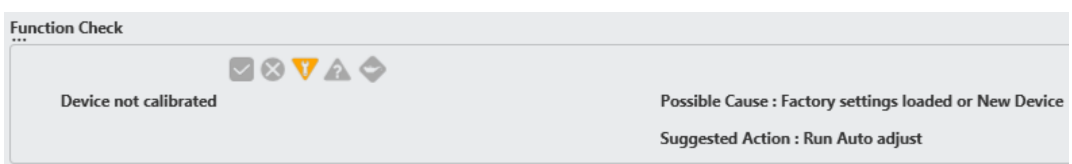


Figure 13: Example of FIM device not calibrated alarm

Table 11: Device not calibrated (C080.010)

Controller inactive (F079.011)

Alarm priority:	Function check
Alarm severity:	Medium
Alarm HMI display code:	F079.011
Alarm description:	This alarm indicates that the positioner is in the manual mode or test mode and will not follow the demand signal. Switch the positioner to control mode for continuous operation.
Possible cause:	The positioner is in manual mode via the HMI or from the HART host or the positioner test function is active that prevents the positioner to operate in the automatic mode to follow the set-point.
Suggested action:	Check the positioner control mode setting and test function setting, select automatic mode and / or exit from the test function to normal operating mode. The recommendation is to select adaptive control mode for best performance.

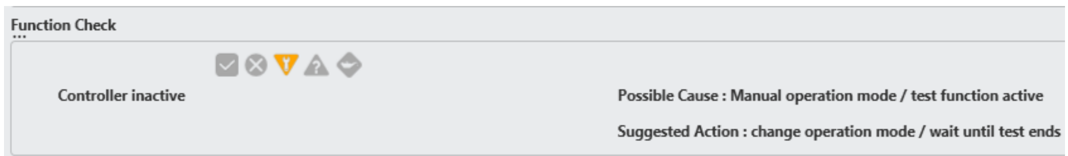


Figure 14: Example of FIM controller inactive alarm

Table 12: Controller inactive (F079.011)

… 2 Alarms & descriptions

Stroke counter limit exceeded (M053.012)

Alarm priority: Maintenance required

Alarm severity: Medium

Alarm HMI display code: M053.012

Alarm description: The stroke counter provides information of the final control element's duty cycle. The stroke count is every movement of the valve greater that the user defined hysteresis setting in the positioner, a typical setting can be 5 % or as defined by the control valve manufacturer. This alarm is very useful to know what the actual cycle load is of the control valve for predictive maintenance purposes. The movement count alarm can be used to detect valve dithering or improper tuning. It can also be used as a historical life cycle indicator to help predict wear of packing, diaphragm, and other wear prone components of the assembly.

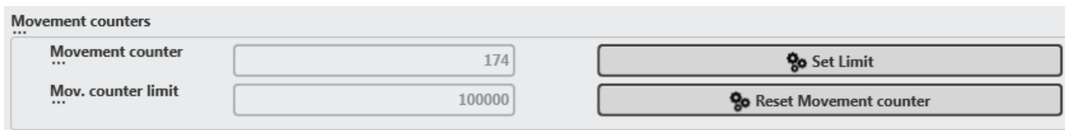


Figure 15: Example of FIM actual stroke count and stroke count alarm limit setting

Possible cause: The positioner counts every movement that is greater than the user defined hysteresis, the counter adds up the movements. The movement count alert is active when the value exceeds the preset movement counter limit. It clears after you reset the count to a value less than the alarm point.

Suggested action: Use the stroke count information to determine if the control valve needs any maintenance or refurbishment. The control valve may appear to be in good working condition, but has reached its limit for reliable performance based on the manufacturer's recommended maintenance and refurbishment schedule.
Note: This alarm should be used in conjunction with the travel counter information.

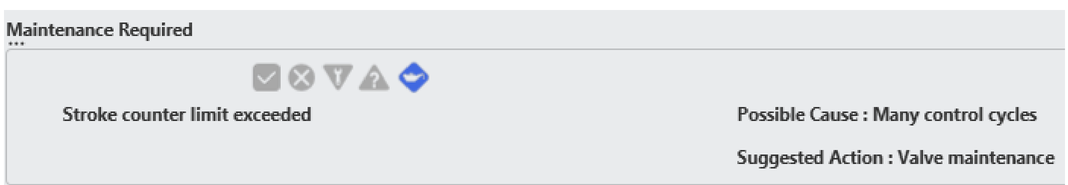


Figure 16: Example of FIM stroke counter limit exceeded alarm

Table 13: Stroke counter limit exceeded (M053.012)

Travel counter limit exceeded (M054.013)

Alarm priority:	Maintenance required
Alarm severity:	Medium
Alarm HMI display code:	M054.013

Alarm description:

The travel counter (accumulator) number provides information of the overall travel of the control valve as an indication of duty cycle. The counter adds up the travel as a percent of the set working range of the valve, the travel counter alarm limit is set by the user via the configuration tool and can be between 0 to 200,000,000. This alarm is very useful to know what the actual travel load is of the control valve for predictive maintenance purposes. It can also be used as a historical life cycle indicator to help predict wear of packing, diaphragm, and other wear prone components of the assembly. The alarm limit value can be set according to the manufactures recommendation for maintenance or refurbishment intervals or user experience limit based on typical expected application lifetime between maintenance intervals.

Figure 17: Example of FIM actual travel count and travel count alarm limit setting

Possible cause:

The travel counter alarm is active when the value exceeds the set limit. It clears after you reset the travel counter accumulator to a value less than the alarm point.

Suggested action:

Use the travel count information to determine if the control valve needs any maintenance or refurbishment. The control valve may appear to be in good working condition, but has reached its limit for reliable performance based on the manufacturer's recommended maintenance and refurbishment schedule.

Note

This alarm should be used in conjunction with the stroke counter information. As an example; high stroke count and low travel counter could be an indication of high frequency valve oscillation or improper control loop tuning.

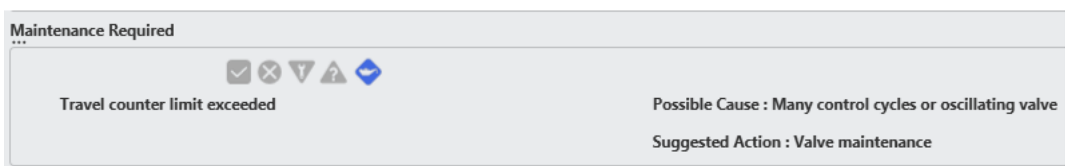


Figure 18: Example of FIM travel counter limit exceeded alarm

Table 14: Travel counter limit exceeded (M054.013)

… 2 Alarms & descriptions

Electronics temperature measurement failure (M055.014)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M055.014
Alarm description:	This alarm indicates that the positioner's internal temperature sensor is faulty.
Possible cause:	The positioner's internal temperature reading is used for position control compensation due to ambient temperature fluctuation to ensure highest possible measurement and control accuracy.
Suggested action:	Replace the EDP300 main board.

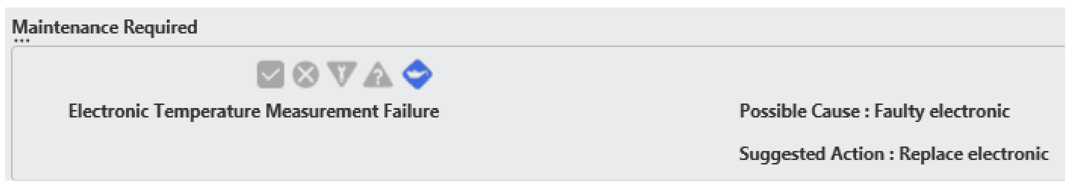


Figure 19: Example of FIM alarm information

Table 15: Electronics temperature measurement failure (M055.014)

Electronic temperature out of limit (S071.015)

Alarm priority:	Out of specifications
Alarm severity:	High
Alarm HMI display code:	S071.015
Alarm description:	The positioner measures the internal temperature of the electronics housing. The temperature alarm will be active when the ambient temperature at the positioner fall below or exceed the maximum operating temperature of −40 °C (−40 °F) and 85 °C (185 °F). Exceeding these operating limits will reduce the life expectancy of the positioner and/or failure of the positioner. Note that for protection the LCD of the positioner will switch off when the temperature exceeds these limits.
Possible cause:	The ambient temperature at the positioner is below or above the operating limits of −40 °C (−40 °F) or 85 °C (185 °F).
Suggested action:	Check the application and ambient temperature conditions at the control valve for any abnormalities, protect the positioner from any freezing conditions or direct radiant heat by applying suitable insulation. For elevated ambient temperature applications consider to install the optional high temperature remote mount positioner solution at a distance away from the high heat zone. Note that for the 100 °C (212 °F) high temperature remote mount positioner where the position sensor and electronics are in separate housings, the maximum temperature of the remote located electronics is still 85 °C (185 °F).

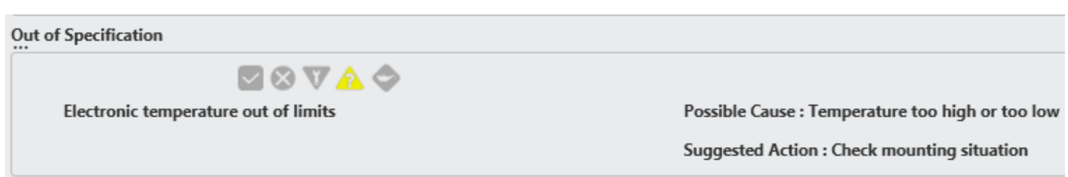


Figure 20: Example of FIM alarm information

Table 16: Electronic temperature out of limit (S071.015)

Configuration data failure (C089.016)

Alarm priority:	Function check
Alarm severity:	High
Alarm HMI display code:	C089.016
Alarm description:	The positioner will provide a configuration data alarm when there is a problem with the configuration and / or pneumatic air connections during installation and manual setup, the pneumatic piping does not match the selected configuration.
Possible cause:	The positioner's pneumatic output piping to the actuator is not correct.
Suggested action:	Check the mounting and piping of the positioners. The recommended commissioning procedure is to use the positioner's auto adjust function to adapt the positioner to the control valve assembly, if manual setup is needed for custom applications refer to instruction for details.

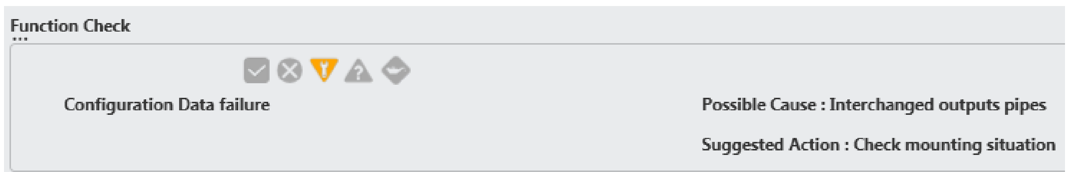


Figure 21: Example of FIM alarm information

Table 17: Configuration data failure (C089.016)

Electronics non-volatile chip defect (F095.017)

Alarm priority:	Failure
Alarm severity:	High
Alarm HMI display code:	F095.017
Alarm description:	The alarm indicates a fault or failure of the non-volatile (NV) memory chip of the positioner.
Possible cause:	Chip defect or failure. The positioner tests and verifies the integrity of the NV chip.
Suggested action:	Replace the positioner main board and perform a new autoadjust.

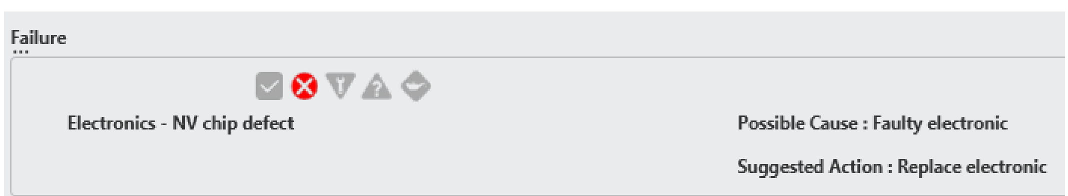


Figure 22: Example of FIM alarm information

Table 18: Electronics non-volatile chip defect (F095.017)

… 2 Alarms & descriptions

Nonvolatile data defect (F096.018)

Alarm priority:	Failure
Alarm severity:	High
Alarm HMI display code:	F096.018
Alarm description:	The alarm indicates a fault or failure of the non-volatile (NV) data of the positioner's memory chip.
Possible cause:	Chip data defect or failure. The positioner tests and verifies the integrity of the NV chip.
Suggested action:	Replace the positioner main board and perform a new auto adjust.

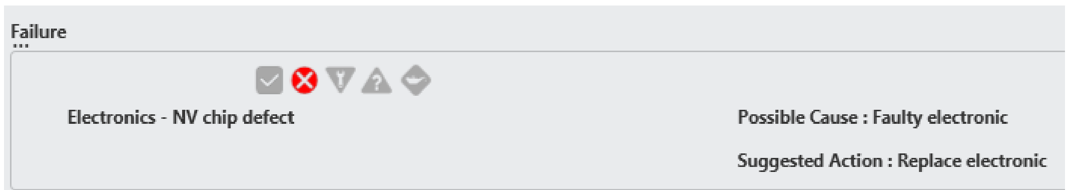


Figure 23: Example of FIM alarm information

Table 19: Nonvolatile data defect (F096.018)

Leakage during operation (M056.019)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M056.019
Alarm description:	The positioner monitors for air leaks during normal operation. This is accomplished by monitoring the control valve stability, five consecutive movements of the control valve in the same direction that is not due to set point changes is detected as air leakage. The positioner provides a real time leakage detection function, this alarm indicates an air leak during operation that will impact the control valve performance. Any air leaks will cause unstable control behavior and possible valve oscillation.
Possible cause:	Loose pipe fittings on the pneumatic air line from the positioner to the actuator or leakage in the actuator will trigger this diagnostic alarm.
Suggested action:	Check the positioner, actuator, tubing and fittings for any leakage, also check the actuator diaphragm, cylinder seals and actuator stem packing for any leakage. Take corrective action to remedy the problem then start the leakage test function of the positioner to verify that the leak issue is resolved. **Note** For internal leaks, a quick leak check can be done to verify the leak by switching the positioner to manual mode on the local HMI, then move the actuator to the typical control position, let it sit for 1 to 2 minutes, if the actuator drifts away from the manual position it confirms an internal leak. An actuator rebuild is needed by replacing the diaphragm or O-rings in case of piston type actuators. Also check the piston chamber for any wear, note that in case of severe chamber wear replacing the cylinder and seals is the recommended long term solution.

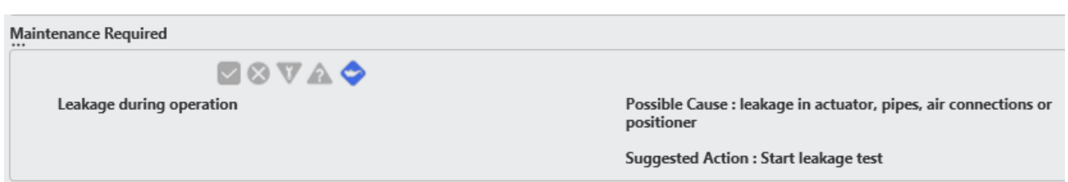


Figure 24: Example of FIM alarm information

Table 20: Leakage during operation (M056.019)

Leakage chamber 1 (M057.020)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M057.020
Alarm description:	Alarm M056.019 provide real-time detection of leakage during operation. It is possible to detect where the leak is by performing a leakage diagnostic test. During this test the assembly is kept in a 'hold' position to determine the location of the leak. Alarm M057.020 will trigger if the leak is on output 1 / chamber 1 of the actuator. Any air leaks will cause unstable control behavior and possible valve oscillation.
Possible cause:	Air leakage in chamber 1 of the actuator and / or loose pipe fittings on output one of positioner will trigger this diagnostic alarm.
Suggested action:	Check the tubing and fittings on output one of the positioner and diaphragm and seals on chamber 1 of the actuator for any leakage. Take corrective action to remedy the problem then start the leakage test function of the positioner to verify that the leak issue is resolved.

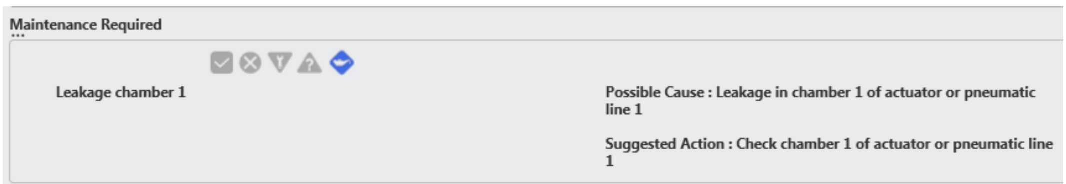


Figure 25: Example of FIM alarm information

Table 21: Leakage chamber 1 (M057.020)

Leakage chamber 2 (M058.021)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M058.021
Alarm description:	Alarm M056.019 provide real-time detection of leakage during operation. It is possible to detect where the leak is by performing a leakage diagnostic test. During this test the assembly is kept in a 'hold' position to determine the location of the leak. Alarm M057.021 will trigger if the leak is on output 2 / chamber 2 of the actuator. Any air leaks will cause unstable control behavior and possible valve oscillation.
Possible cause:	Air leakage in chamber 2 of the actuator and / or loose pipe fittings on output two of positioner will trigger this diagnostic alarm.
Suggested action:	Check the tubing and fittings on output two of the positioner and diaphragm and seals on chamber 2 of the actuator for any leakage. Take corrective action to remedy the problem then start the leakage test function of the positioner to verify that the leak issue is resolved.

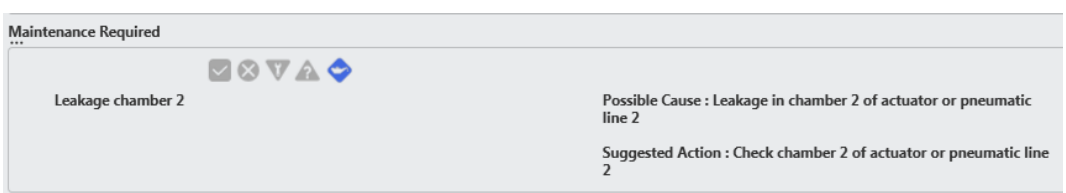


Figure 26: Example of FIM alarm information

Table 22: Leakage chamber 2 (M058.021)

… 2 Alarms & descriptions

Leakage in actuator (M059.022)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M059.022
Alarm description:	Alarm M056.019 provide real-time detection of leakage during operation. It is possible to detect where the leak is by performing a leakage diagnostic test. During this test the assembly is kept in a ‘hold’ position to determine the location of the leak. Alarm M059.022 will trigger if the leak is in the actuator. Any air leaks will cause unstable control behavior and possible valve oscillation.
Possible cause:	Loose pipe fittings on the pneumatic air line from the positioner to the actuator or leakage in the actuator will trigger this diagnostic alarm.
Suggested action:	Check the actuator for external leaks for example. tubing, fittings and diaphragm leaks, also check for internal actuator leaks (cylinder seals) for leakby that are often difficult to detect. For internal leaks, a quick leak test can be done by switching the positioner to manual mode on the local HMI, then move the actuator to the typical control position, let it sit for 1-2 minutes, if the actuator drifts away from the manual position it confirms an internal leak. An actuator rebuild is needed by replacing the diaphragm or O-rings in case of piston type actuators. Also check the piston chamber for any wear, note that in case of severe chamber wear replacing the cylinder and seals is the recommended long term solution.

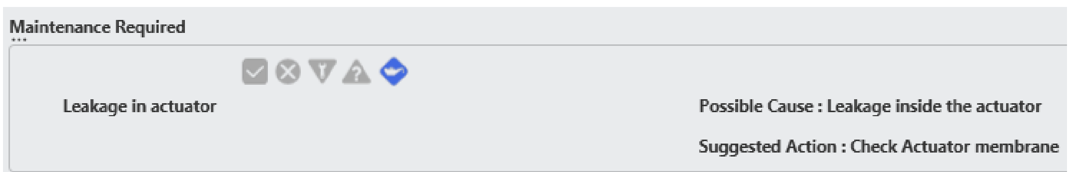


Figure 27: Example of FIM alarm information

Table 23: Leakage in actuator (M059.022)

Pressure NV data defect (M078.023)

Alarm priority:	Maintenance required
Alarm severity:	Medium
Alarm HMI display code:	M078.023
Alarm description:	The alarm indicates a fault or failure of the non-volatile (NV) data of the pressure sensor circuit. The positioner’s performance for control is not impacted by faulty sensors as these are not required for the control function of the positioner. The pressure sensor are only used for valve diagnostics, valve signature and pressure alarms.
Possible cause:	Fault or failure of the pressure sensor data.
Suggested action:	Check the positioner for any physical damage, check the wiring connection between the pressure sensor module and the main board. Replace the pressure sensor module and perform the sensor calibration as described in the operating instruction.

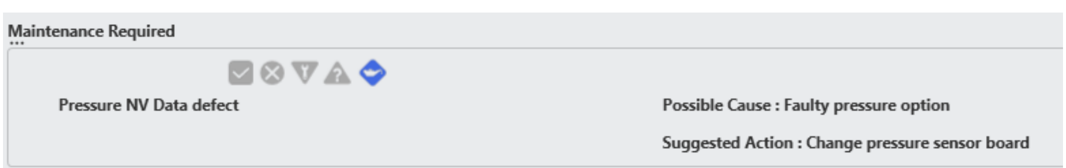


Figure 28: Example of FIM alarm information

Table 24: Pressure NV data defect (M078.023)

Pressure NV chip defect (M083.024)

Alarm priority:	Maintenance required
Alarm severity:	Medium
Alarm HMI display code:	M083.024
Alarm description:	The alarm indicates a fault or failure of the non-volatile (NV) chip of the pressure sensor circuit. The positioner's performance for control is not impacted by faulty sensors as these are not required for the control function of the positioner. The pressure sensor are only used for valve diagnostics, valve signature and pressure alarms.
Possible cause:	Fault or failure of the pressure sensor NV chip.
Suggested action:	Check the positioner for any physical damage, check the wiring connection between the pressure sensor module and the main board. Replace the pressure sensor module and perform the sensor calibration as described in the operating instruction.

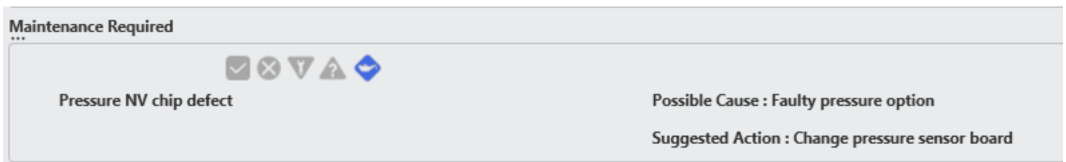


Figure 29: Example of FIM alarm information

Table 25: Pressure NV chip defect (M083.024)

Overpressure from supply (S073.025)

Alarm priority:	Out of specification
Alarm severity:	High
Alarm HMI display code:	S073.025
Alarm description:	This alarm indicates that the supply pressure exceeds the maximum pressure of the positioner, the maximum pressure is 10 bar (145 psi). Exceeding the maximum supply pressure will cause damage to the positioner's pneumatic system.
Possible cause:	To high instrument air supply pressure to the positioner. The pressure sensor option of the EDP300 is needed for this over pressure alarm.
Suggested action:	Install a pressure regulator on the air supply line to the positioner. If needed calibrate the pressure sensors in the positioner, refer to the instruction manual for details.

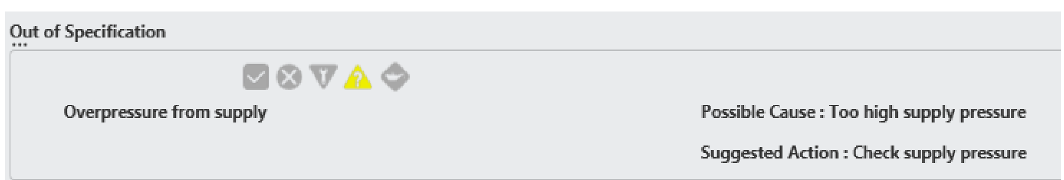


Figure 30: Example of FIM alarm information

Table 26: Overpressure from supply (S073.025)

… 2 Alarms & descriptions

Supply pressure limit low exceeded (S074.026)

Alarm priority:	Out of specification
Alarm severity:	High
Alarm HMI display code:	S074.026
Alarm description:	This alarm indicates that the supply pressure has fallen below the minimum alarm point. The alarm setting is done in the FIM configuration tool under 'Diagnostics' – 'Diagnostic Settings' – 'Pressure sensor limits'. The alarm limit should be set according to the minimum operating pressure of the control valve for stable control under load conditions and required seat-load to prevent valve leakage.
Possible cause:	Insufficient instrument air pressure at the positioner. The pressure sensor option of the EDP300 is needed for this low supply pressure alarm.
Suggested action:	Insufficient compressor sizing or high demand for instrument air during a plant upset can cause this alarm condition. Check and replace the air filter that may be blocked. Check the supply line to make sure it can deliver the required air flow during process control, undersized air lines will cause a supply pressure drop at the positioner as it controls the valve during setpoint changes. Check the air regulator and filter to make sure the air capacity specifications meet the actuator's air capacity demand, an undersized air regulator or filter will choke the air delivery to the positioner, a typical recommendation for the air regulator and filter is the maximum actuator air capacity x1.5. Check the alarm point in the positioner for correct setting.

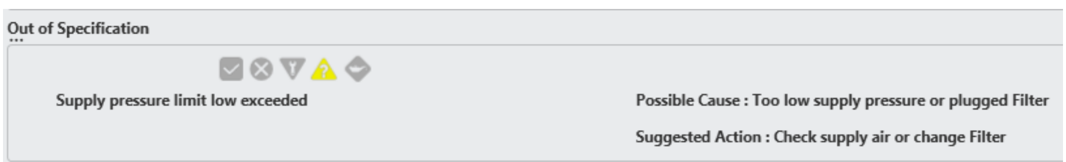


Figure 31: Example of FIM alarm information

Table 27: Supply pressure limit low exceeded (S074.026)

Supply pressure limit high exceeded (S075.027)

Alarm priority:	Out of specification
Alarm severity:	High
Alarm HMI display code:	S075.027
Alarm description:	This alarm indicates that the supply pressure exceeds the set alarm point. The alarm setting is done in the FIM configuration tool under ‘Diagnostics’ – ‘Diagnostic Settings’ – ‘Pressure sensor limits’. The alarm limit should be set according to the maximum operating pressure of the actuator or the maximum operating pressure of the valve, whichever is the lowest. Exceeding the maximum supply pressure is a dangerous condition and will also cause damage to the diaphragm and O-rings of the actuator.
Possible cause:	Supply pressure has exceeded the alarm limit. The pressure sensor option of the EDP300 is needed for this high pressure alarm.
Suggested action:	Check the instrument air supply pressure regulator and set the regulator to the required actuator and valve design pressure. If needed calibrate the pressure sensors in the positioner, refer to the instruction manual for details.

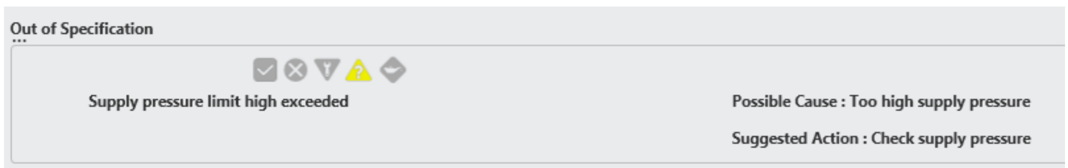


Figure 32: Example of FIM alarm information

Table 28: Supply pressure limit high exceeded (S075.027)

Pressure hammer from supply (S076.028)

Alarm priority:	Out of specifications
Alarm severity:	High
Alarm HMI display code:	S076.028
Alarm description:	The positioner monitors the stability of the supply pressure to the positioner, this alarm indicates that the supply pressure is erratic typically due to pressure hammer conditions.
Possible cause:	Unstable supply pressure to the positioner.
Suggested action:	Check the instrument air supply for any anomalies. Install an accumulator tank close to the positioner to absorb the pressure hammer, in addition install a pressure regulator at the positioner to provide a stable air supply pressure to the positioner.

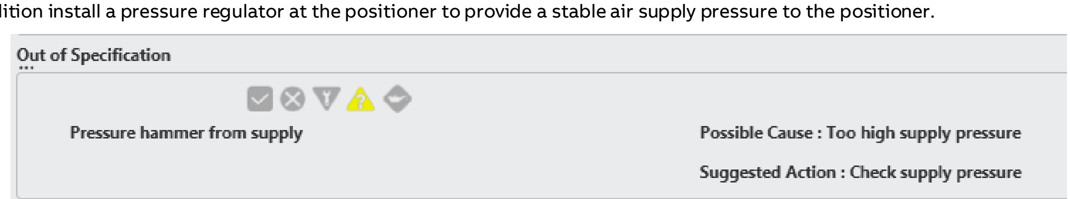


Figure 33: Example of FIM alarm information

Table 29: Pressure hammer from supply (S076.028)

… 2 Alarms & descriptions

TV (derivative) up exceeded (M040.029)

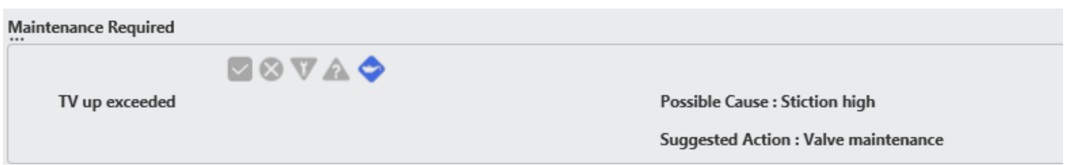
Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M040.029
Alarm description:	This alarm indicate a change of the TV value in the up direction of the positioner's travel due to change in stiction of the control valve assembly, the predetermined maximum TV limit is reached. The positioner is able to detect changes in valve condition related to wear by monitoring the derivative parameter change over time while in the adaptive control mode and signal an alarm when this parameter reach the maximum set limit. **Note** This real-time alarm function is only possible with the positioner operating in the Adaptive mode.
Possible cause:	An aging control valve operating in harsh conditions may experience degradation of packing gland material or reduced piston lubrication that will create stiction conditions, typically referred to as static friction.
Suggested action:	Check the valve and actuator assembly and inspect the packing material for degradation and related parts such as valve and actuator stem for any damage. Recondition the valve assembly as needed as part of the valve maintenance schedule. **Note** The TV value is the derivative time of the controller. The control speed and stability is affected by the TV value in such a way that it counteracts the Gain (KP) value dynamically. The control speed decreases as the TV value increases.  **Figure 34: Example of FIM alarm information**

Table 30: TV (derivative) up exceeded (M040.029)

TV (derivative) down exceeded (M045.030)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M045.030
Alarm description:	This alarm indicate a change of the TV value in the down direction of the positioner's travel due to change in stiction of the control valve assembly, the predetermined minimum TV limit is reached. The positioner is able to detect changes in valve condition related to wear by monitoring the derivative parameter change over time while in the adaptive control mode and signal an alarm when this parameter reach the maximum set limit. Note: This real-time alarm function is only possible with the positioner operating in the adaptive mode.
Possible cause:	An aging control valve operating in harsh conditions may experience degradation of packing gland material or reduced piston lubrication that will create stiction conditions, typically referred to as static friction.
Suggested action:	Check the valve and actuator assembly and inspect the packing material for degradation and related parts such as valve and actuator stem for any damage. Recondition the valve assembly as needed as part of the valve maintenance schedule. **Note** The TV value is the derivative time of the controller. The control speed and stability is affected by the TV value in such a way that it counteracts the Gain (KP) value dynamically. The control speed decreases as the TV value increases.

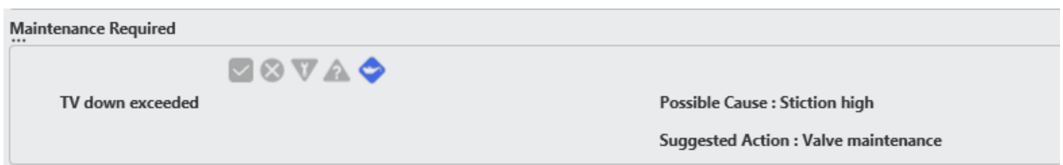


Figure 35: Example of FIM alarm information

Table 31: TV (derivative) down exceeded (M045.030)

… 2 Alarms & descriptions

Y-Offset up exceeded (M041.031)

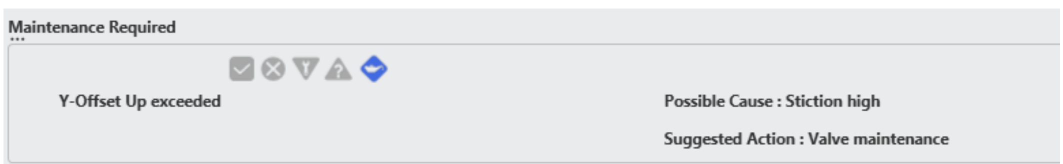
Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M041.031
Alarm description:	This alarm indicates a change of the Y-Offset value in the up direction of the positioner's travel due to change in friction of the control valve assembly, the predetermined maximum Y-Offset limit is reached. The positioner is able to detect changes in valve condition related to wear by monitoring the control parameter offset changes over time while in the adaptive control mode and signal an alarm when this parameter reach the set limit. **Note** This real-time alarm function is only possible with the positioner operating in the adaptive mode.
Possible cause:	An aging control valve operating in harsh conditions may experience degradation of packing gland material or reduced piston lubrication that will create high friction conditions referred to as dynamic friction.
Suggested action:	Check the valve and actuator assembly and inspect the packing material and related parts for degradation. Recondition the valve assembly as needed as part of the valve maintenance schedule. **Note** The 'Y-Offset' for the set-point signal linearizes the behavior of the I/P module and enables rapid compensation even in the case of small control deviations. The value is limited at the lower end by a minimum value (neutral zone). The offset significantly affects the control speed for control deviations of less than 5 %.  **Figure 36: Example of FIM alarm information**

Table 32: Y-Offset up exceeded (M041.031)

Y-Offset down exceeded (M042.032)

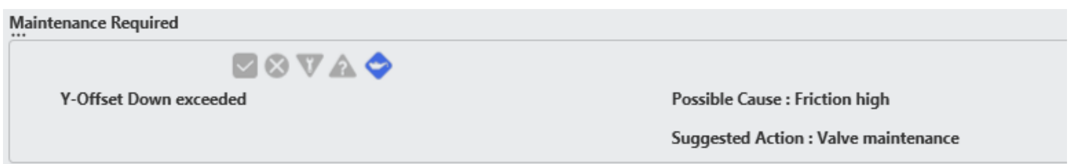
Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M042.032
Alarm description:	This alarm indicates a change of the Y-Offset value in the down direction of the positioner due to change in friction of the control valve assembly, the predetermined minimum Y-Offset limit is reached. The positioner is able to detect changes in valve condition related to wear by monitoring the control parameter offset changes over time while in the adaptive control mode and signal an alarm when this parameter reach the set limit. **Note** This real-time alarm function is only possible with the positioner operating in the adaptive mode.
Possible cause:	An aging control valve operating in harsh conditions may experience degradation of packing gland material or reduced piston lubrication that will create high friction conditions.
Suggested action:	Check the valve and actuator assembly and inspect the packing material and related parts for degradation. Recondition the valve assembly as needed as part of the valve maintenance schedule. **Note** The 'Y-Offset' for the set-point signal linearizes the behavior of the I/P module and enables rapid compensation even in the case of small control deviations. The value is limited at the lower end by a minimum value (neutral zone). The offset significantly affects the control speed for control deviations of less than 5 %.  **Figure 37: Example of FIM alarm information**

Table 33: Y-Offset down exceeded (M042.032)

… 2 Alarms & descriptions

Friction limit exceeded (M061.033)

Alarm priority: Maintenance required

Alarm severity: High

Alarm HMI display code: M061.033

Alarm description: This alarm indicates a mechanical problem related to excessive dynamic friction of the control valve assembly that will impact the control valve performance. The positioner is able to detect changes over time of the valve condition related to its control speed any degradation of responsiveness, while in the adaptive control mode it will providing an alarm when this parameter reaches the set limit.

Note

This alarm function is only possible with the positioner operating in the adaptive mode.

The min. and max. Friction alarm limit settings can be set in FIM under 'Diagnostics' – 'Diagnostic Settings' – 'Friction alarm detection'.

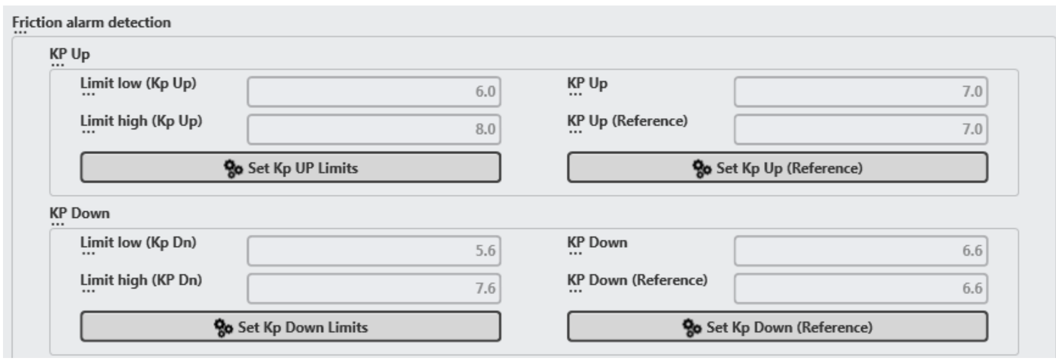


Figure 38: Example of FIM configuration and setup for friction alarm

Possible cause: A control valve assembly may experience high friction due to bent valve / actuator stem or valve trim friction due to misalignment, another factor could be related to overtight packing gland or incorrect packing material that creates high friction of the valve stem movement.

Suggested action: Check the valve and actuator assembly and inspect the packing material and related parts for degradation. Recondition the valve assembly as needed as part of the valve maintenance schedule.

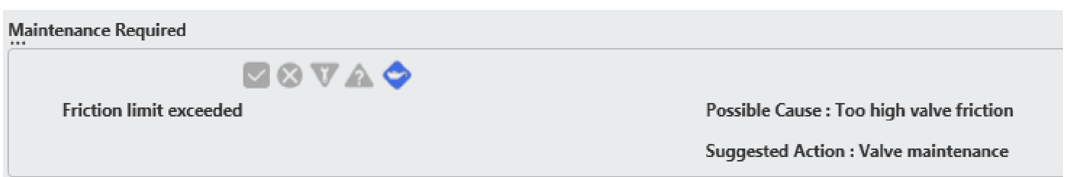


Figure 39: Example of FIM alarm information

Table 34: Friction limit exceeded (M061.033)

Stiction limit exceeded (M062.034)

<table>
<tr><td>Alarm priority:</td><td>Maintenance required</td></tr>
<tr><td>Alarm severity:</td><td>High</td></tr>
<tr><td>Alarm HMI display code:</td><td>M062.034</td></tr>
<tr><td>Alarm description:</td><td>This alarm indicates a mechanical problem related to excessive stiction (breakaway friction) of the control valve assembly that will impact the control valve performance. The min. and max. stiction alarm limit settings can be set in FIM under ‘Diagnostics’ – ‘Diagnostic Settings’ – ‘Friction alarm detection’
The change in Tv (up or down) during adaptive control mode indicates changes in control valve behavior that is directly related to stiction. An increase in Tv indicates a potential problem in the control valve assembly, a decrease in Tv indicate a reduction in stiction and possible improved control valve behavior.

Figure 40: Example of FIM configuration and setup for stiction alarm</td></tr>
<tr><td>Possible cause:</td><td>A control valve assembly may experience high stiction due to overtight packing gland or incorrect packing material that creates high stiction of the valve stem movement. The positioner is able to detect changes over time of the valve condition related to its control speed any degradation of responsiveness, while in the adaptive control mode will it will providing an alarm when this parameter reaches the set limit.</td></tr>
<tr><td>Suggested action:</td><td>Check the valve and actuator assembly and inspect the packing material and related parts for degradation. Recondition the valve assembly or replace the valve to reduce downtime.

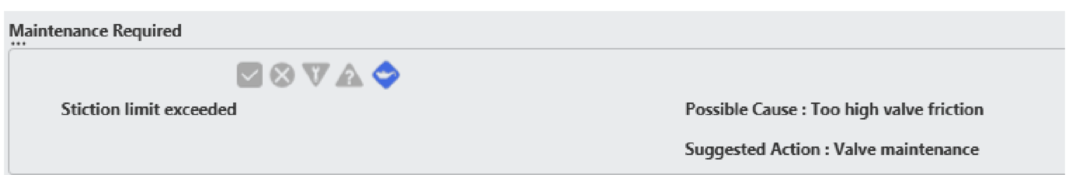


Figure 41: Example of FIM alarm information</td></tr>
</table>

Table 35: Stiction limit exceeded (M062.034)

… 2 Alarms & descriptions

Universal input out of range (S077.035)

Alarm priority:	Out of specification
Alarm severity:	High
Alarm HMI display code:	S077.035
Alarm description:	The positioner monitors the signal to the universal input (UI) module and provides an out of range alarm. A typical range from a field transmitter is 4 to 20 mA, the UI can be scaled for this range. Note: The current range limits can be freely configured between 4 to 18.4 mA. The range must not be smaller than 10 % (1.6 mA)
Possible cause:	The signal received from the external transmitter is out of range or incorrectly scaled or the UI module is faulty.
Suggested action:	Check the input signal and correct as needed. In case of module malfunction replace the module and reprogram according to the required scaling.

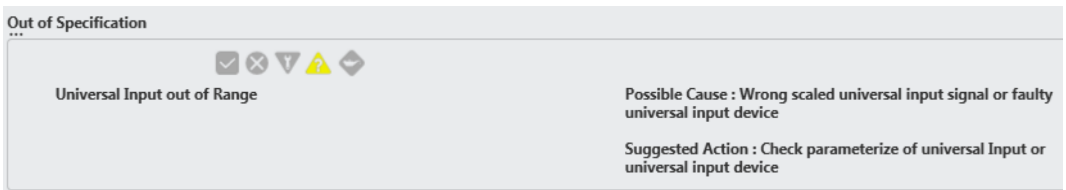


Figure 42: Example of FIM alarm information

Table 36: Universal input out of range (S077.035)

Partial stroke failed (M063.036)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M063.036
Alarm description:	In addition to the standard control function, the positioner incorporates a partial stroke test (PST) function for safety actuated valves that can be programmed by the user according to the PST application (refer to the instruction manual for setup and commissioning of this function). When PST in the positioner is activated the test will be done according to the preset parameters, if the valve movement do not meet the performance criteria an alarm is generated as indication of compliance (passed) or noncompliance (failed). The alarm provides information regarding the integrity of the safety actuated valve and actuator assembly, any mechanical problem related to unresponsiveness of the valve will show partial stroke failed.
Possible cause:	Partial stroke failed: The safety actuated valve does not meet the PST performance parameters. Possible problems are; stuck valve, degradation of valve packing causing sluggish valve movement, damage to valve.
Suggested action:	Check the valve and actuator and take necessary action to repair or refurbish the valve and actuator assembly. Perform a new PST to ensure performance compliance.

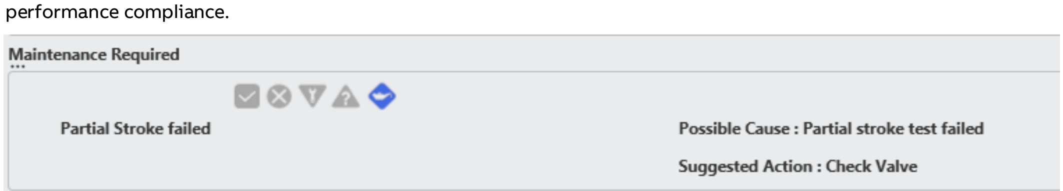


Figure 43: Example of FIM alarm information

Table 37: Partial stroke failed (M063.036)

Option module defect (M064.037)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M064.037
Alarm description:	The positioner tests and verifies the electrical functionality of the option modules such as; valve position feedback, universal analog input, digital output and provides an alarm for any detected abnormality. The alarm indicates malfunction of any installed modules in the positioner.
Possible cause:	Faulty or failed option module.
Suggested action:	Check the signal integrity of the external input and output circuits to and from the positioner for any anomalies that may have caused damage to the option module. Replace defective option module.

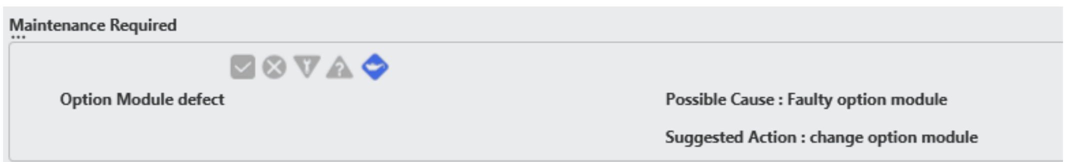


Figure 44: Example of FIM alarm information

Table 38: Option module defect (M064.037)

Universal input limit exceeded (M065.038)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M065.038
Alarm description:	The user defined alarm provides information of the input signal to the universal input module (UI) module. When the 4 to 20 mA input signal of the UI reaches the set alarm limit the alarm will be active.
Possible cause:	The input signal to the UI has reached the preset alarm point.
Suggested action:	Take action as determined by the process. If needed check the input signal source and confirm if the alarm values are set correct according to the application.

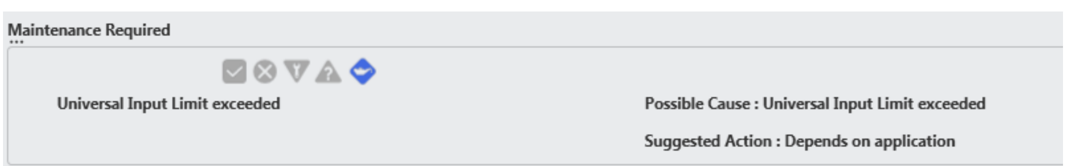


Figure 45: Example of FIM alarm information

Table 39: Universal Input limit exceeded (M065.038)

… 2 Alarms & descriptions

Analog output simulation active (C047.039)

Alarm priority:	Function check
Alarm severity:	High
Alarm HMI display code:	C047.039
Alarm description:	For commissioning purposes it is possible to switch the positioner's position feedback signal to simulation mode to check the complete signal loop. This alarm indicate that the 4 to 20 mA position feedback (AO) module is in simulation mode.
Possible cause:	The position feedback of the positioner is in simulation mode via the software configuration diagnostic program or handheld configurator.
Suggested action:	Verify that an authorized person is working on the positioner and that the simulation mode is active. On completion of the service work deactivate this function and return the positioner to the required operating mode.

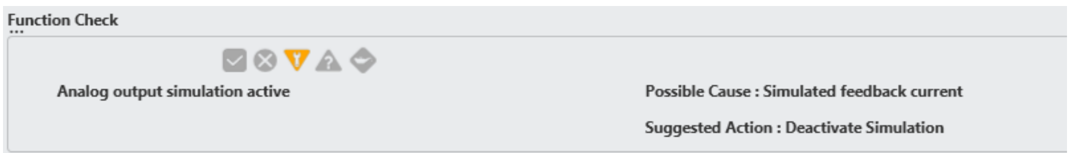


Figure 46: Example of FIM alarm information

Table 40: Analog Output simulation active (C047.039)

Binary output simulation active (C047.040)

Alarm priority:	Function check
Alarm severity:	High
Alarm HMI display code:	C047.040
Alarm description:	For commissioning purposes it is possible to switch the positioner's binary (digital) output signal to simulation mode to check the complete signal loop. This alarm indicate that the binary output (DO) module is in simulation mode.
Possible cause:	The digital output signal is in simulation mode via the software configuration diagnostic program or handheld configurator. The digital output signal represent the simulated active condition.
Suggested action:	Verify that an authorized person is working on the positioner and that the simulation mode is active. On completion of the service work deactivate this function and return the positioner to the required operating mode. **Note** The digital output is a standard function of the positioner representing the diagnostic alarms as a common alarm function.

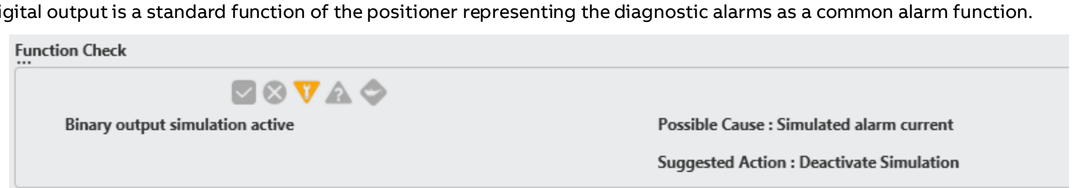


Figure 47: Example of FIM alarm information

Table 41: Binary output simulation active (C047.040)

Fail safe active via device error (F097.041)

Alarm priority:	Failure
Alarm severity:	High
Alarm HMI display code:	F097.041
Alarm description:	The positioner checks for any device errors that will impact functionality. Device errors will initiate an automatic fail safe action of the positioner moving the valve to the safe position. The safe position is determined by the pneumatic module of the positioner, the options are; fail safe (move to open or close) depending on the actuator type and pneumatic piping or fail freeze (fail in place) hold the actuator in the last valid position. This alarm indicates that the positioner is in the fail-safe state and is no longer following the set-point demand.
Possible cause:	The positioner has detected an electronics error and switched the positioner into the failsafe mode, the actuator will move to the safe position as determined by the pneumatic control module.
Suggested action:	Replace positioner's main board and perform a new autoadjust.

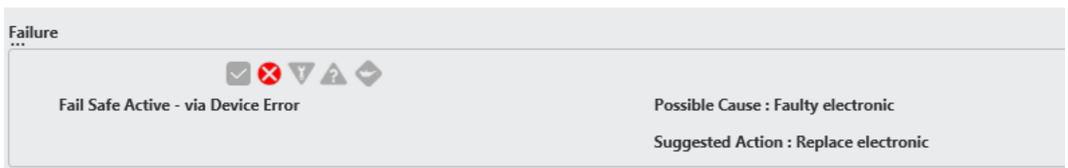


Figure 48: Example of FIM alarm information

Table 42: Fail safe active via device error (F097.041)

Fail safe active via user (C066.042)

Alarm priority:	Function check
Alarm severity:	High
Alarm HMI display code:	C066.042
Alarm description:	The user can switch the positioner to fail safe mode to check and verify the fail mode of the control valve assembly. The safe position is determined by the pneumatic module of the positioner, the options are; fail safe (move to open or close) depending on the actuator type and pneumatic piping or fail freeze (fail in place) hold the actuator in the last valid position. This alarm indicates that the positioner is in the fail safe state via user and is no longer following the set-point demand. The 'Fail Safe' mode can be switched on in the service mode of the positioner, this mode is only accessible via the HMI of the positioner.
Possible cause:	The service mode of the positioner is 'ON', the positioner moves the valve to the fail safe position as determined by the pneumatic control module of the positioner.
Suggested action:	Verify that an authorized person is working on the positioner and that the simulation mode is active. On completion of the service work deactivate this function and return the positioner to the required operating mode. The user can switch off the activated fail-safe function in the service mode section of the positioner.

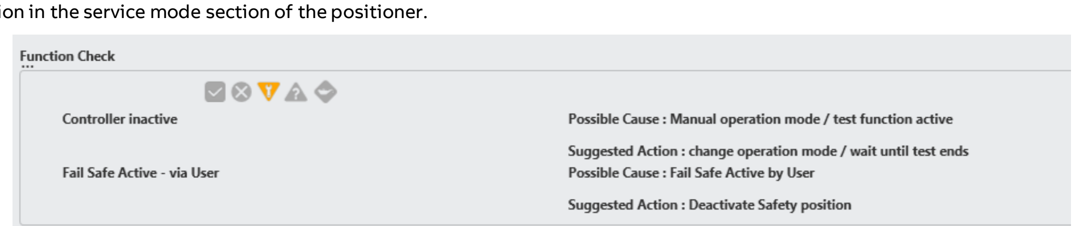


Figure 49: Example of FIM alarm information

Table 43: Fail safe active via user (C066.042)

… 2 Alarms & descriptions

Binary input active (F067.043)

Alarm priority:	Function check
Alarm severity:	High
Alarm HMI display code:	F067.043
Alarm description:	For commissioning purposes it is possible to switch the positioner's binary (digital) input signal to simulation mode to check and verify this function in the signal loop. Refer to the instruction manual for details of the functions and selection options. This alarm indicate that the binary input (DI) of the positioner is in simulation mode.
Possible cause:	The digital input signal is in simulation mode via the software configuration diagnostic program or handheld configurator. The digital input represent the simulated active condition to verify that the positioner is responding according to the configuration of the digital input setup.
Suggested action:	Verify that an authorized person is working on the positioner and that the simulation mode is active. On completion of the service work deactivate this function and return the positioner to the required operating mode. **Note** The digital input is a standard function of the positioner for protective functions such as emergency override or prevention of unauthorized access to device setup and programming.

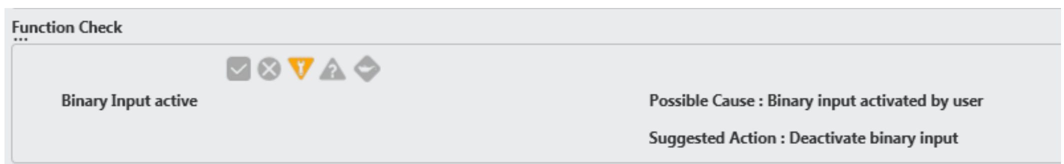


Figure 50: Example of FIM alarm information

Table 44: Binary input active (F067.043)

Switchpoint 1 exceeded (C068.044)

Alarm priority:	Function check
Alarm severity:	Medium
Alarm HMI display code:	C068.044
Alarm description:	The positioner provides an optional digital output module with two NAMUR travel alarm contacts, the alarm points can be configured by the user. The travel alarm can be used with a safety interlock scheme to protect process equipment or as indication of control valve position. This alarm indicate that switch point 1 is exceeded.
Possible cause:	The positioner provides a digital signal of the travel which, when exceeded, activates the specific travel alarm point.
Suggested action:	Application dependent, however check valve position to verify correct switch setting or process condition.

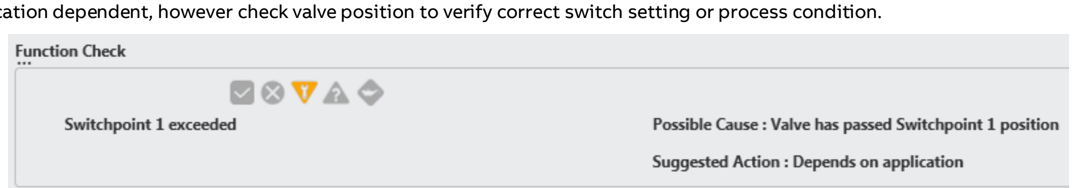


Figure 51: Example of FIM alarm information

Table 45: Switchpoint 1 exceeded (C068.044)

Switchpoint 2 exceeded (C069.045)

Alarm priority:	Function check
Alarm severity:	Medium
Alarm HMI display code:	C069.045
Alarm description:	The positioner provides an optional digital output module with two NAMUR travel alarm contacts, the alarm points can be configured by the user. The travel alarm can be used with a safety interlock scheme to protect process equipment or as indication of control valve position. This alarm indicate that switch point 2 is exceeded.
Possible cause:	The positioner provides a digital signal of the travel which, when exceeded, activates the specific travel alert point.
Suggested action:	Application dependent, however check valve position to verify correct switch setting or process condition.

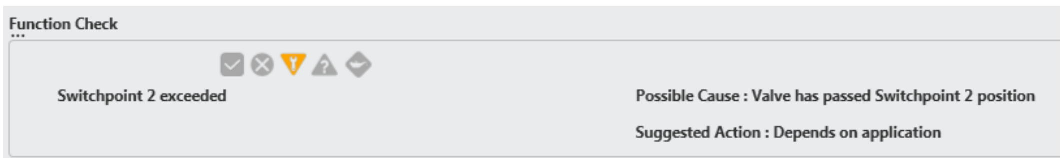


Figure 52: Example of FIM alarm information

Table 46: Switchpoint 2 exceeded (C069.045)

Analog output supply fault (M082.046)

Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M082.046
Alarm description:	The positioner provides an option module for valve position, this is two-wire 4 to 20 mA position transmitter that requires 24 VDC loop supply. The positioner monitors the condition of this option module to verify the power supply. This alarm indicate a missing or faulty supply power to the analog output (AO) module.
Possible cause:	Missing or faulty 24 VDC power supply.
Suggested action:	Check the power supply in the two-wire loop to verify compliance to the required voltage and polarity. **Note** If the AO module is not used it can be removed from the positioner to eliminate the alarm or disable the alarm in alarm masking of the FIM Configuration tool to prevent this alarm message.

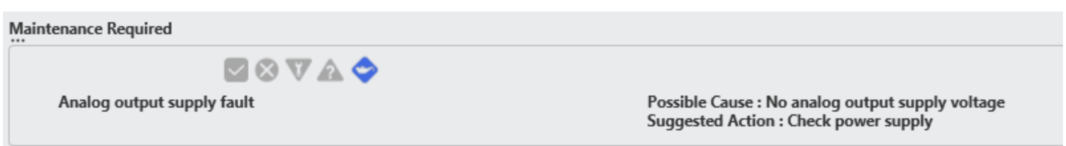


Figure 53: Example of FIM alarm information

Table 47: Analog output supply fault (M082.046)

… 2 Alarms & descriptions

Pressure measurement defective alarm (M081.047)

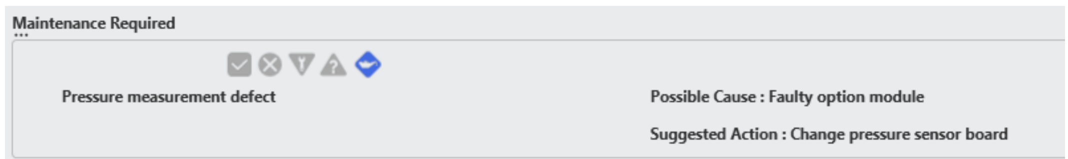
Alarm priority:	Maintenance required
Alarm severity:	High
Alarm HMI display code:	M081.047
Alarm description:	The positioner provides an option module for supply and output pressure measurement, this module is exclusively used for the valve diagnostics. This alarm indicate that the pressure sensor module of the positioner is defective.
Possible cause:	A defective pressure sensor or failure in the pressure sensor electrical circuit or loose connection of the ribbon cable to the main board.
Suggested action:	Check the ribbon cable connector to make sure it is plugged into the main board socket. If the problem persists replace the pressure sensor module and perform a new pressure sensor calibration.  **Figure 54: Example of FIM alarm information**

Table 48: Pressure measurement defective alarm (M081.047)

Error codes

The page numbers of the individual error codes can be found in the ‘Table of contents’.

Error messages / alarms	HMI error code	Possible cause
Position measurement	F090.000	Faulty position sensor
Valve blocked	F091.001	To high friction
Position timeout	M050.002	To high friction
Positioning unstable	M051.003	Pneumatic leakage
Position out of travel range	M049.004	Bent mounting bracket
Zero point displacement	M052.005	Damaged valve seat
Kp – Gain up exceeded	M043.006	Friction high
Kp – Gain down exceeded	M004.007	Friction high
Setpoint failure electronics	F092.008	Faulty electronics
Setpoint out of range	S070.009	Faulty DCS card
Device nor calibrated	C080.010	Factory settings loaded or new device
Controller inactive	F079.011	Manual mode or test function active
Stroke counter limit exceeded	M053.012	Excessive control cycles
Travel counter limit exceeded	M054.013	Excessive control cycles or oscillating valve
Electronics temp. measurement	M055.014	Faulty electronics
Electronics temp. out of limit	S071.015	Temperature to high or low
Configuration data failure	C089.016	Interchanged output pipes
Electronics NV chip defect	F095.017	Faulty electronics
Nonvolatile data defect	F069.018	Faulty electronics
Leakage during operation	M056.019	Leak in pneumatic system
Leakage chamber 1	M057.020	Leak on output one of positioner
Leakage chamber 2	M058.021	Leak on output two of positioner
Leakage in actuator	M059.022	Leak inside the actuator
Pressure NV data defect	M078.023	Faulty pressure option
Pressure NV chip defect	M083.024	Faulty pressure option
Overpressure from supply	S073.025	To high supply pressure
Supply pressure low limit exceeded	S074.026	To low supply pressure or blocked filter
Supply pressure limit high exceeded	S075.027	To high supply pressure
Pressure hammer from supply	S076.028	To high supply pressure
TV – Derivative up exceeded	M040.029	Stiction high
TV – Derivative down exceeded	M045.030	Stiction high
Y-Offset up exceeded	M041.031	Friction high
Y-Offset down exceeded	M042.032	Friction high
Friction limit exceeded	M061.033	To high valve friction
Stiction limit exceeded	M062.034	To high valve stiction
Universal input out of range	S077.035	Wrong scale on UI or faulty input on UI
Partial stroke failed	M063.036	Partial stroke test failed

Table 49: Summary HMI error codes

… 2 Alarms & descriptions

… Error codes

Error messages / alarms	HMI error code	Possible cause
Option module defect	M064.037	Faulty option module
Universal input limit exceeded	M065.038	UI limit exceeded
Analog output simulation active	C047.039	Simulated feedback current
Binary output simulation active	C047.040	Simulated alarm current
Fail safe active via device error	F097.041	Faulty electronics
Fail safe active via user	C066.042	Fail safe active via user
Binary input active	F067.043	Binary input activated by user
Switch point 1 exceeded	C068.044	Valve has passed switchpoint 1 position
Switch point 2 exceeded	C068.045	Valve has passed switchpoint 2 position
Analog output supply fault	M082.046	No analog output supply voltage
Pressure measurement defect	M081.047	Faulty option module

… Table 49: Summary HMI error codes

3 Alarm mapping and masking

Alarm output mapping

The EDP300 positioner provides alarm mapping to the onboard digital output (DO) and / or the optional analog feedback (AO) module for the alarms as listed in section A. The user can select the appropriate alarms to suite the application and assign these to the DO and / or AO as required.

Figure 55: Example of FIM alarm mapping screen view

Alarm Assignment

Alarm mapping to digital output

The factory default is set to 'on' for alerts via the digital output, the alarm output categories can be customized by selecting 'Change Assignment'.

Alarm mapping to analog feedback

The factory default is set to 'off' for alerts via the analog feedback, the alarm outputs can be switched on for each category by selecting 'Change Assignment'.

Note that the analog feedback is the position feedback option module of the positioner.

… 3 Alarm mapping and masking

Alarm monitor masking

The alarm monitoring is divided into five groups (see figure 56 below). The alarm monitoring can be customized by switching off any alarms that may not be important based on the application specific needs.

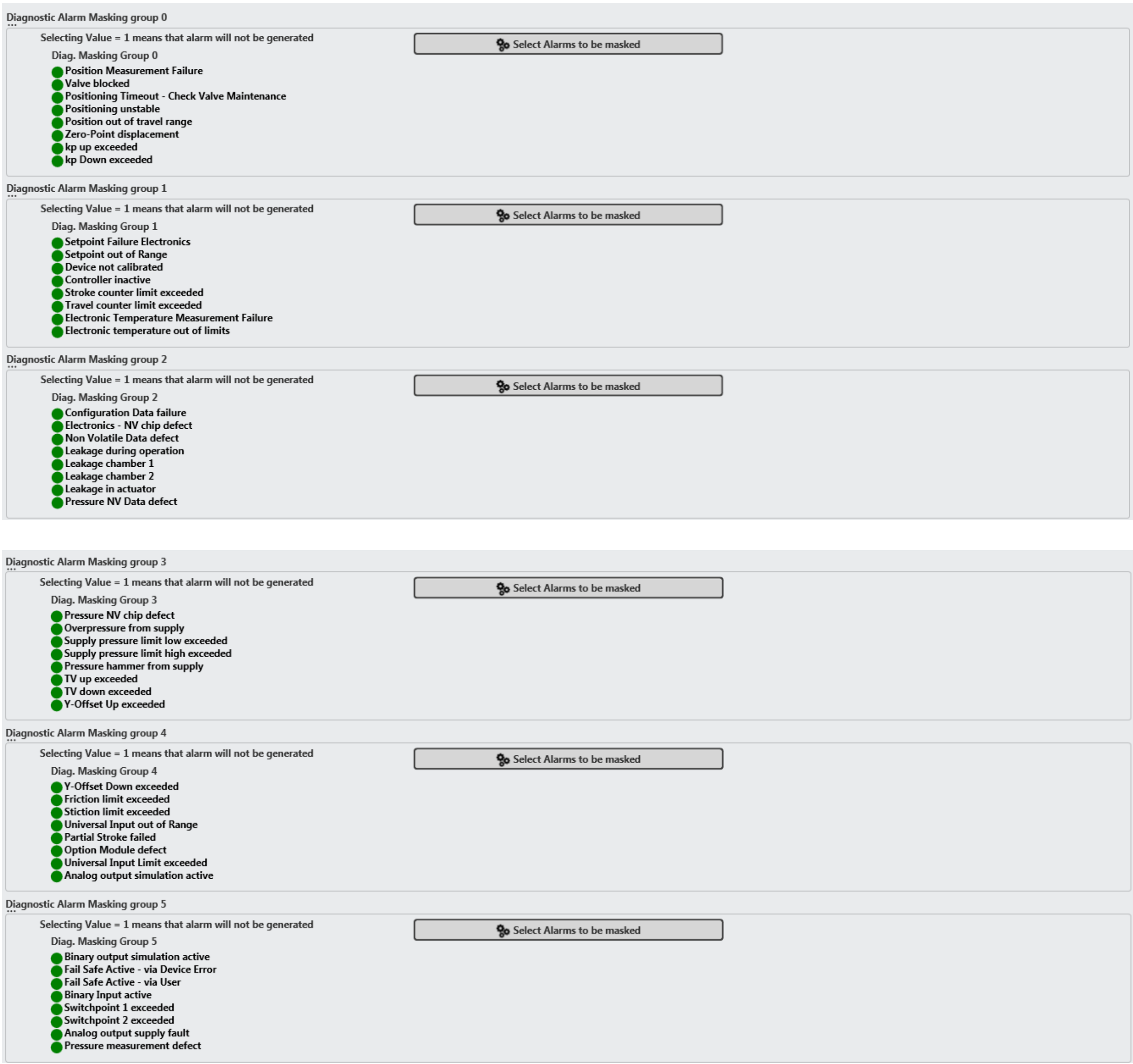


Figure 56: Example of FIM screen view for EDP300 monitoring categories

Alarm masking

The alerts in each category can be switched off to mask the alarm, in this case the alarm will not appear on the DO (Digital Output) or the AO (Analog output) as described in Alarm output mapping (**Fehler! Verweisquelle konnte nicht gefunden werden.**).

The red color indicate that the alert is masked for example switched off, while a green color indicate that the alert is being monitored. Activation is done by selecting ‘Select Alarms to be masked’ and changing the color from green to red.

4 Valve health & performance reports

Valve signature

Alarm description:	The field information manager (FIM) software program provides a valve signature that plots actuator pressure versus valve travel to provide an indication of the control valve health. **Note** This test requires the optional pressure sensor module of the EDP300.
Function:	The valve signature, primarily used to determine valve and actuator mechanical condition is displayed via the FIM Device Package, this test detects the static and sliding friction of the valve, the valve hysteresis is also displayed. For this purpose the various positions across the entire valve range are approached in steps. When the valve signature starts, the entire valve operating range for the ‘closed to open’ travel is covered in an uncontrolled manner (open loop test). During this process, the pressure patterns of the diagnostic pressure sensors are recorded based on the user selected steps from 10 to 100, more steps increases the time duration of the test but provide more precise results. The valve signature of a new or refurbished assembly provides valuable data as the baseline performance for comparison of valve and actuator condition as part of routine valve performance verification. Issues such as incorrect control parameters worn / bent valve or actuator stem, insufficient air supply, frictional forces and stuck valve are examples of the issues that can be found using this test.
Suggested action:	Take corrective action as needed based on the diagnostic results to resolve any issues.

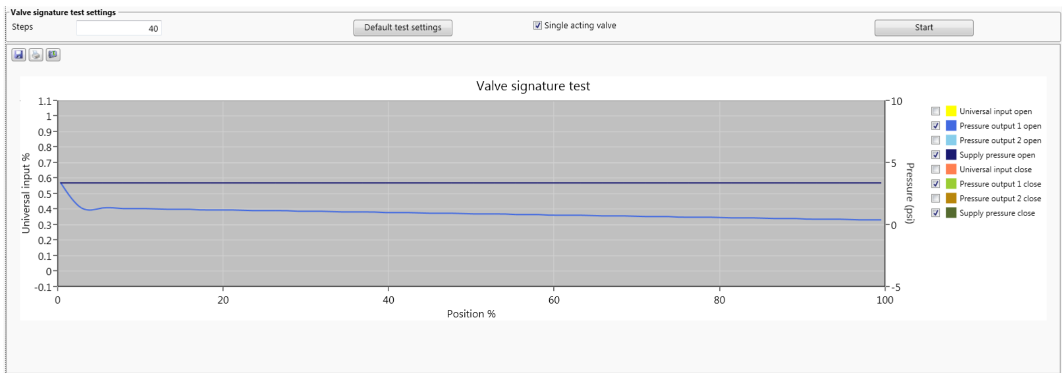


Figure 57: Example of FIM valve signature on double acting actuator

Table 50: Position measurement failure (F090.000)

... 4 Valve health & performance reports

Step response

<table>
<tr><td>Alarm description:</td><td>The field information manager (FIM) software program provides a step response test that plots valve travel versus the time it takes to move through the specified stroke range.

Note
This test requires the optional pressure sensor module of the EDP300.</td></tr>
<tr><td>Function:</td><td>This test checks the response of the entire valve assembly while monitoring and providing trend information of the supply pressure to the positioner and the output 1 in case of single acting positioner and output 2 in case of an double acting positioner. The user specified setpoint step change is generated internally by the positioner and a high-resolution plot is created for the valve position and pressure patterns of the supply to the positioner and output to the actuator. The pattern of the graph provides information about the performance of the valve and actuator, this can be used as the baseline or fingerprint data in the case of a new valve assembly. It gives an indication of the effectiveness of the tuning of the positioner and mounting.
The valve signature of a new or refurbished assembly provides valuable data as the baseline performance for comparison of Valve and Actuator condition as part of routine valve performance verification. Issues such as incorrect control parameters worn / bent valve or actuator stem, insufficient air supply, frictional forces and stuck valve are examples of the issues that can be found using this test.</td></tr>
<tr><td>Suggested action:</td><td>The step response test graph provides information for the user to determine if the valve and actuator assembly performance is acceptable for the application, any anomalies will be visible on the step graph such as the positioner's control behavior as it approached the setpoint. Observe if there is any overshoot or oscillation before settling into the setpoint. Other important factors such as adequate supply air pressure and delivered air pressure to the actuator can easily be observed on this step response graph.

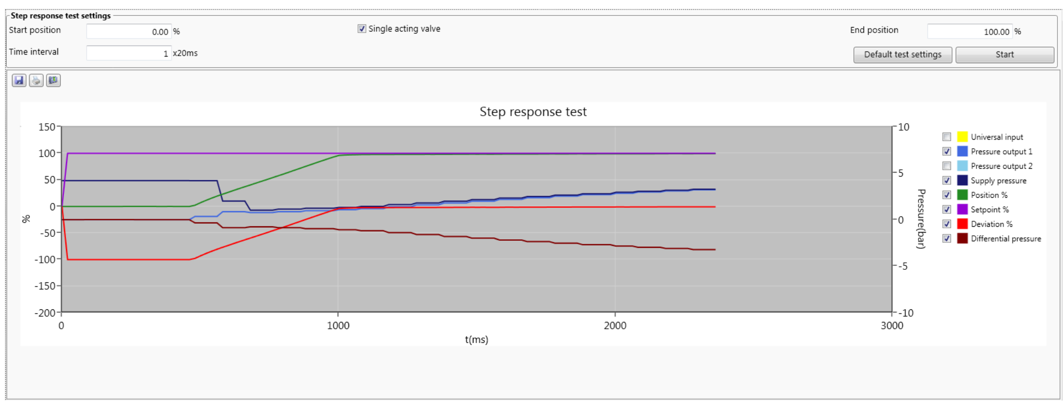
Note
Take corrective action as needed based on the diagnostic results to resolve any issues.


Figure 58: Example of FIM step response test on double acting actuator</td></tr>
</table>

Table 51: Step response

Speed over position

Alarm description:	The field information manager (FIM) software program provides a test that records the sliding friction of the actuator and valve in the shortest possible time. The graph reliably depicts partial friction as a reduction in valve travel speed. **Note** This test does not require the optional pressure sensor module of the EDP300.
Function:	With the 'Speed Over Position Test' the entire valve range for both open and closed directions is covered by sending a constant user determined air volume (air capacity) from the positioner to the actuator, in this special test the valve travel in an uncontrolled manner using a definable degree of openness (Y offset) for the positioner's pneumatics providing this constant air capacity to the actuator. The valve will move at a rate depending on the air capacity selected, through the entire stroke of the valve, if any abnormal conditions exist with regards to the valve and actuator integrity such as high stem packing friction bent or worn valve stem it will be evident by the speed of travel and clearly show any problems on the graphical trend of the test. The advantage of this test is the fast and easy way to determine if any friction conditions are present that would impact the performance of the positioner to control the actuator during the normal process operation.
Suggested action:	The expected speed over position trend would be as smooth as possible for the entire up and down travel of the control valve, any abnormal conditions will be indicated as a slowdown or drop (spike) of the %/s speed towards 0 on the X-axis. These abnormalities will impact the control valve performance in the process loop that would otherwise be undetected. **Note** Take corrective action as needed based on the diagnostic results to resolve any issues.

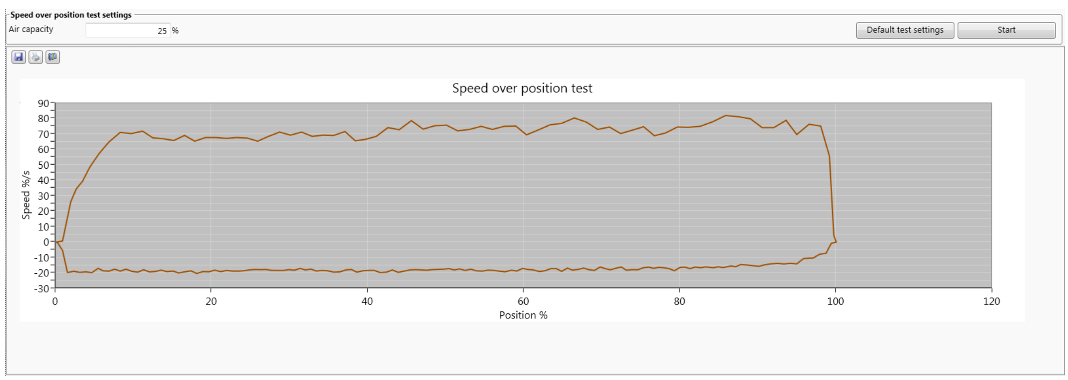


Figure 59: Example of FIM speed over position test

Table 52: Speed over position

… 4 Valve health & performance reports

… Speed over position

How to interpret the speed over position test

The test in figure 59 was done on a spring return rising stem actuator. The 'Position %' trend line from 0 % to 100 % above 0 on the 'Speed % / s' scale represents the valve travel in open direction against the spring force. The 'Position %' trend line from 100 % to 0 % below the 0 on the 'Speed % / s' scale represents the valve travel in the close direction with the spring force.

For this graph the valve integrity for friction and stiction does indicate some anomalies at the start of the test at 0 %to 8 % of travel shown by the curve and decreasing speed, and further with spikes across the full travel to full open. This behavior is an indication of some friction in the trim of the valve as it leaves the seat and possible stiction due to poor stem packing as indicated by the spikes across the travel of the actuator.
Control valve issues such as bent valve or actuator stem, binding taking place in the valve trim or a problem with valve packing such as packing wear and degradation will show a non-linear trend with deviation away from the 0 line of the 'Speed % / s' scale.

The test results will be different at different air capacity settings, running the test at lower air capacity will provide slower valve travel as related to speed % / s and will show more evidence of friction and stiction. User experience of control valve behavior will be a benefit to do further valve performance analyses based on the speed over position test.

Test case for speed over position test

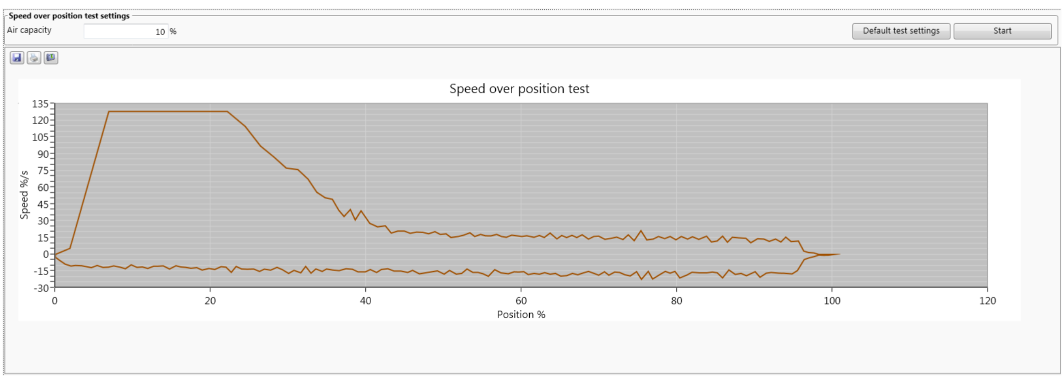


Figure 60: Example of test case for speed over position test

The test in figure 60 was done on a spring return rising stem actuator. The test results show excessive friction and stiction of the valve from 0 % to 40 % of valve travel, this behavior is an indication of a problem in the control valve trim.
Control valve issues such as bent valve or actuator stem, binding taking place in the valve trim or a problem with valve packing such as packing wear and degradation will show a non-linear trend with deviation away from the 0 line of the 'Speed % / s' scale. The test results will be different at different air capacity settings, running the test at lower air capacity will provide slower valve travel as related to Speed % / s and will show more evidence of friction and stiction.
User experience of control valve behavior will be a benefit to do further valve performance analyses based on the speed over position test.

Butterfly test

Alarm description:

The field information manager (FIM) software program provides a test that is referred to as a butterfly diagnostics test (not related to butterfly valves), this test provides valve friction and stiction information and involves displaying the positioners control parameter values in a graphical way for the purpose of determining valve performance changes over time, this is done by comparing current vs. baseline control parameter data.

Note

This test does not require the optional pressure sensor module of the EDP300.

Function:

With this diagnostic test the graph which relates to a number of relevant positioner parameter values can be used to draw conclusions about the valve and actuator performance regarding friction (dynamic friction) and stiction (static friction) for the purpose of preventive maintenance. If the diagnostic parameters should have changed as compared with the archived parameters, a triangle is displayed.

The color and size of these triangles represent the direction and amount of the change. Thus, a red triangle indicates an increase of the friction; a green triangle indicates decrease of the friction. The selection of the archived control parameters enables a comparison with the current control parameters and displays a graphical view of the condition over a period of time.

Suggested action:

The comparison of current control parameters vs. archived control parameters will provide either a green triangle indicating an improvement of the valve assembly related to friction and stiction or a red triangle indicating a deterioration in the valve assembly relating to friction and stiction. The size of the triangle is an indication of how significant the changes are, and applies to green and red conditions. Up to five, time and date stamped data sets can be archived for future comparison against actual parameters.

The valve friction changes have a direct impact on the Kp (Gain) and Y-offset (I/P control speed) of the positioner whereas the valve stiction has an impact on the Tv (Derivative) rate of change parameter. When the EDP300 is operating with adaptive mode enabled it provides real time performance optimization, the EDP300 will automatically make small corrective changes to its control parameters to counter the change of control valve behavior to maintain optimum performance. The user can at any time save the latest data set for comparison against the last saved data set.

Note

Take corrective action as needed based on the diagnostic results to resolve any issues.

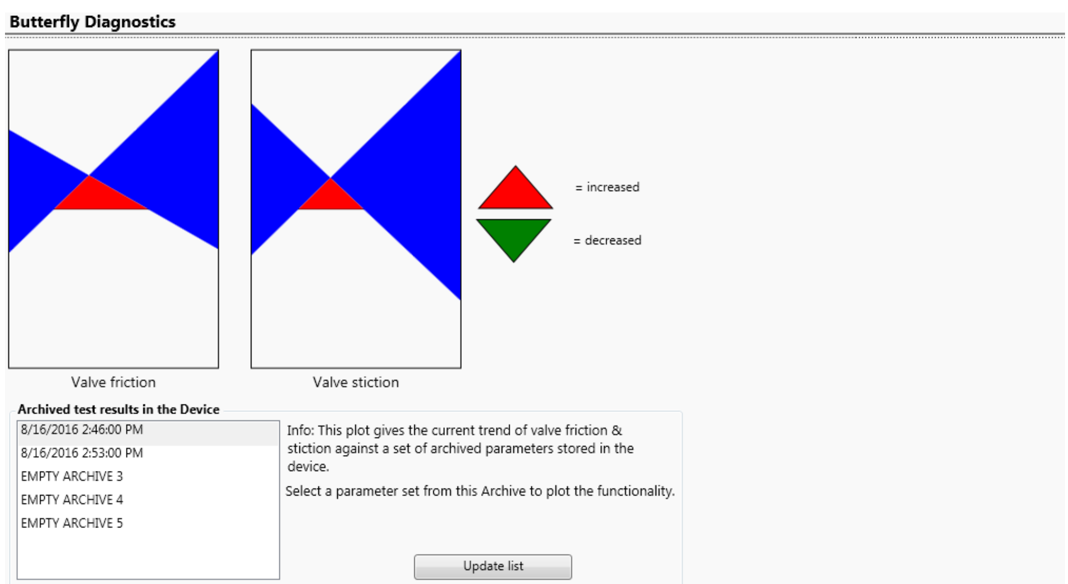


Figure 61: Example of FIM butterfly diagnostics test

Table 53: Butterfly test

… 4 Valve health & performance reports

Leakage test

Alarm description:
The field information manager (FIM) software program provides a leakage test function to test for any air leaks in the actuator and related tubing and fittings. The test function monitors the control valve stability, any drifts away from set point while the set point is stable is an indication of air leakage.

Note
This test requires the optional pressure sensor module of the EDP300.

Function:
The leak test provides information of any air leakage in the actuator, fittings and tubing. Air leakage causes control instability typically observed as valve oscillation. The positioner is able to determine if there is any instrument air leakage from the output of the positioner to the actuator including any diaphragm leakage or piston seal leak. The leak test result is indicated as Test passed or Test fail.

Suggested action:
Take immediate action: Further inspection of the control valve assembly is needed to determine the severity of the problem, the actuator may need to be removed for refurbishment or replaced.

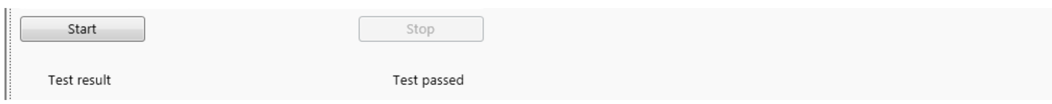


Figure 62: Example of FIM leakage test screen view

Table 54: Leakage test

Valve seat test

Alarm description:
The FIM (field information manager) software program provides a valve seat test function. The test will check for seat wear and seat buildup. The test requires user information relating to acceptable wear or buildup based on % valve travel. Changes to the valve seat surface is an important diagnostic as part of proactive valve maintenance.

Note
This test does not require the optional pressure sensor module of the EDP300.

Function:
During the test the valve actuator is moved into the end position at maximum force, any deviation between valve zero position vs positioner zero position is an indication of a worn valve seat or buildup due to corrosion or debris on the valve seat. The test allows the user to enter a minimum & maximum tolerance for an acceptable offset to determine zero position as a Test passed or Test failed.

Suggested action:
This is an offline test and done during plant outage. The corrective action is based on the test findings and may require the following action. Short term solution: Perform positioner zero position autoadjust to align the valve zero with positioner zero. Long term solution: As part of control valve maintenance replace the valve seat and trim and perform a new Positioner full autoadjust.

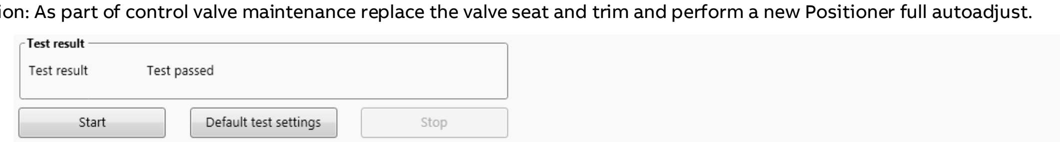


Figure 63: Example of FIM valve seat test screen view

Table 55: Valve seat test

Partial stoke test (PST)

Alarm description:	The Field Information Manager (FIM) software provides the setup and test program for the Partial Stroke Test (PST) of the EDP300. This test is an online verification done at predetermined intervals or as the application requires to check the integrity of the safety related valve and to verify that it is not stuck in the open position. The PST of the EDP300 can be initiated in several ways, for example: • From the HMI of the EDP300 • Via the digital input (DI) as a binary signal from the DCS / PLC • Via HART® communication using DTM or FDI **Note** This test does not require the optional pressure sensor module of the EDP300.
Function:	The PST prevents unexpected failure of the safety function by breaking down buildup of solids in the valve body or the onset of corrosion that may prevent valve travel when needed for the shutdown. Monitoring is performed to establish whether the valve has moved out of its end position within a defined period of time 'dead time' with recovery within the defined 'timeout value' period. If this has not occurred, the test is cancelled as a 'failed' test and an alarm is generated. A successfully executed PST demonstrates that certain unresolved errors that would otherwise go undetected are checked to guarantee reliable ESD functionality.
Suggested action:	Refurbish or replace valves that failed the PST test. **Note** Take corrective action as needed based on the diagnostic results to resolve any issues.

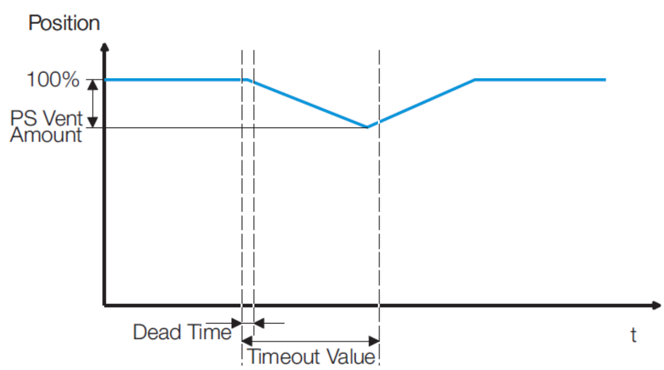


Figure 64: Example of FIM PST indicating required parameters for the test

Table 56: Partial stoke test (PST)

… 4 Valve health & performance reports

Fast trend

Alarm description:	The field information manager (FIM) software program provides a fast trend with high resolution valve position vs setpoint for control valve performance analysis. The fast trend test provides useful information to determine how the control valve is tracking the set point, using this tool eliminate the need to use DCS / PLC trend data for loop performance analysis. **Note** This trend view does not require the optional pressure sensor module of the EDP300.
Function:	The positioner provides a 20 ms high resolution FIFO buffer memory data storage of the valve position and setpoint. By connecting the FIM software configuration and diagnostics software program this high resolution data can be transferred via HART® to the FIM program for detailed analysis. Use this function as a diagnostics to monitor the loop independent from the control system for performance checks or fault finding such as valve oscillation or lagging valve movement. This test can be done on-line without any interference to the control loop and also archived for further analysis.
Suggested action:	Allow the trend to run for as long as needed to identify any control valve movement anomalies. Scrolling back in history is easy and with the zoom function the trend data can be analyzed as needed. Take corrective action as needed based on the diagnostic results to resolve any issues.

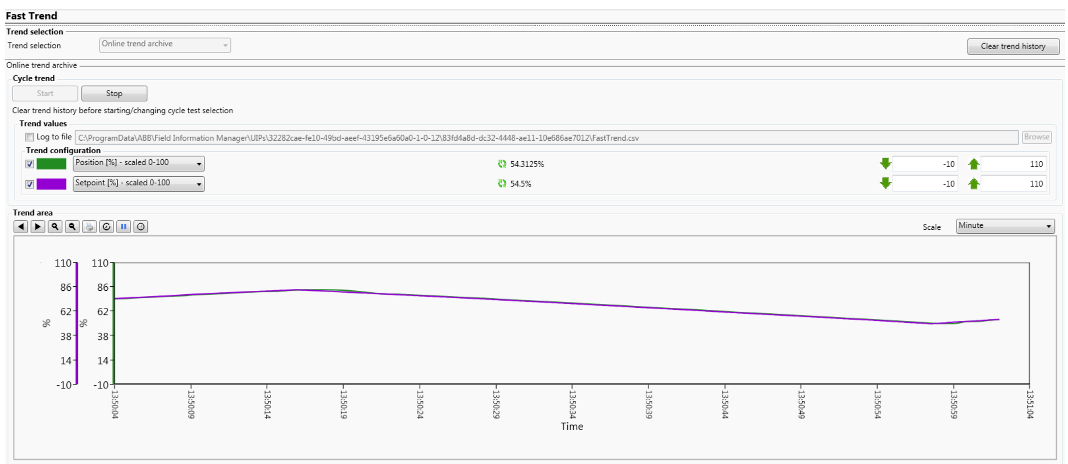


Figure 65: Example of FIM fast trend process screen view

Table 57: Fast trend

Cycle test

Alarm description:

The field information manager (FIM) software program provides a cycle test function to simulate valve movement for performance verification of the control valve assembly, this test can be done before the valve is installed in the process or during maintenance outages. FIM provides a list of cycle test profiles to choose from for the cycle test, the results can be analyzed and archived for future reference and performance comparisons.

The following cycle test profiles are available:

- Test profile – Step response test
- Test profile – One million cycle test
- Test profile – Auto adjust
- Test profile – IEC 61514
- Test profile – Rectangle pulse slow
- Test profile – Rectangle pulse medium
- Test profile – Rectangle pulse fast
- Test profile – Trainable pulse slow
- Test profile – Triangle pulse medium
- Test profile – Triangle pulse fast
- Test profile – Sine sweep

Note

This test does not require the optional pressure sensor module of the EDP300.

Function:

The test gives an indication of the effectiveness of the tuning of the positioner and accessories. The positioner provides a 20 ms high resolution FIFO buffer memory data storage of the valve position vs. cycle trend setpoint. By connecting the FIM software configuration and diagnostics software program this high resolution cycle trend data can be transferred via HART® to the FIM program for detailed analysis. Use this function to generate a control valve bench test baseline performance signature using any of the cycle profiles available in FIM.

Suggested action:

Use the cycle test as an offline control valve performance simulation test. Perform a cycle test based on the same profile as the last baseline test to compare deviation in control valve behavior. Take corrective action as needed based on the diagnostic results to resolve any issues.

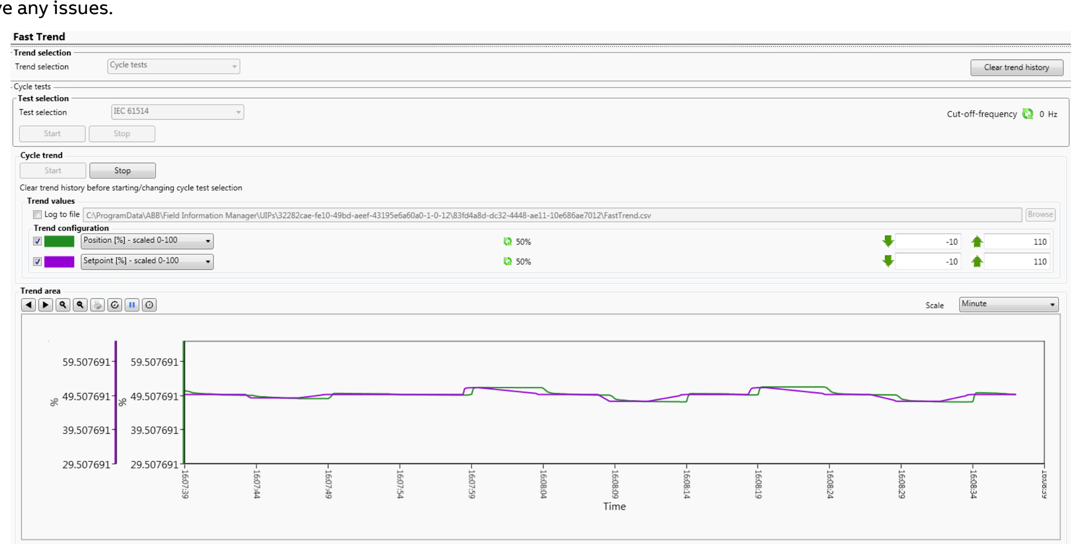


Figure 66: Example of FIM fast trend simulation test screen view

Table 58: Cycle test

5 Real-time performance monitoring

Overview

Alarm description:	Positioner overview monitoring provides an easy and fast way to verify positioner status and alarm notification.
Function:	The bar and trend window provides a view of the positioner’s setpoint vs. position and actual mA setpoint value. This information is very useful as a quick view of the control valve. In addition any alarm that is active in the positioner will be indicated on the alarm menu based on the alarm type assignment. Observe the diagnostics alarm status under the EDP300 picture on the screen. Take corrective action as needed based on the diagnostic results to resolve any issues.

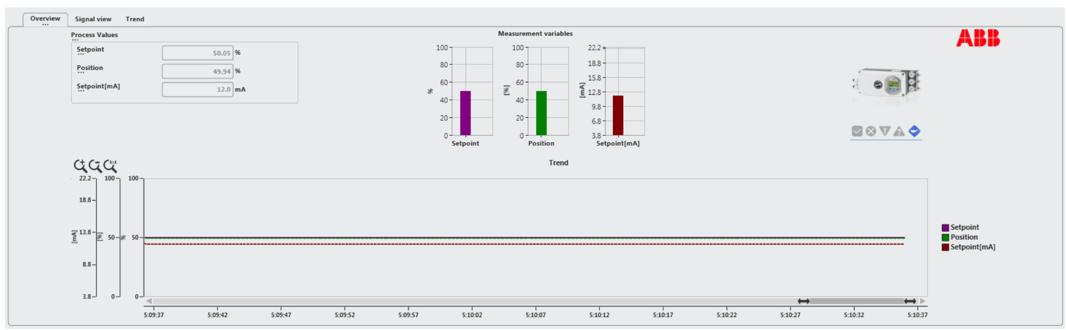


Figure 67: Example of FIM process values screen view

Table 59: Overview

Signal view

Alarm description:	Positioner signal view monitoring provides an easy and fast way to verify positioner control status.
Function:	The signal view provides at a glance information of the EDP300 operation such as: input, setpoint, deviation, supply pressure, output pressure, positioner temperature and most important the travel and movement counters. This information is very useful as a quick view of the control valve. Take corrective action as needed based on the observation of positioner performance to resolve any issues.

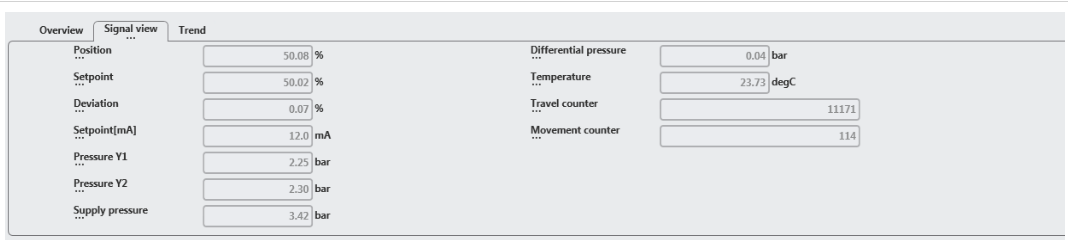


Figure 68: Example of FIM positioner signals screen view

Table 60: Signal View

Position trend

Alarm description:	Position monitoring provides an easy and fast way to verify positioner control status.
Function:	The trend window provides a view of the positioner's setpoint vs. position, the deviation and actual mA setpoint value. This information is very useful as a quick view of the control valve.

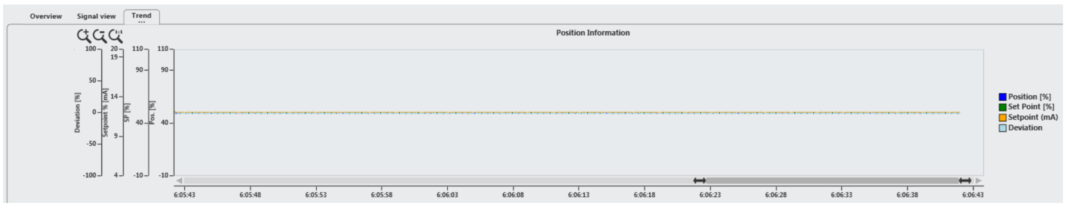


Figure 69: Example of FIM positioner position trend screen view

Table 61: Position trend

Pressure trend

Alarm description:	Pressure monitoring provides an easy and fast way to verify the supply pressure to the positioner and output pressure to the control valve.
Function:	The trend window provides a view of the positioner's supply pressure, output 1 for single acting actuators, and output 2 for double acting actuators. The differential pressure provides information of the output 1 and output 2 pressure difference as an indication of actuator pressure load. This information is very useful as a quick view of the positioner and valve assembly instrument air pressures.

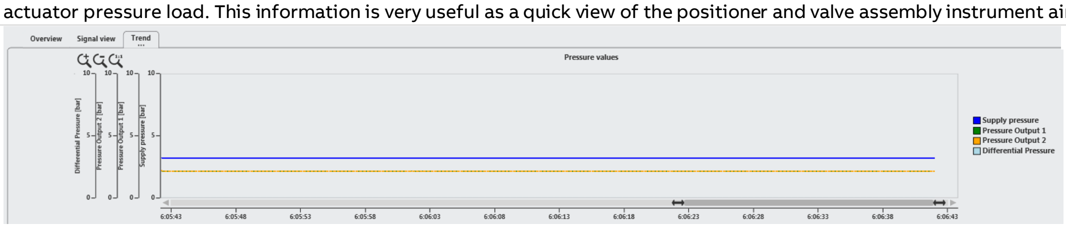


Figure 70: Example of FIM positioner pressure values screen view

Table 62: Pressure trend

… 5 Real-time performance monitoring

Temperature trend

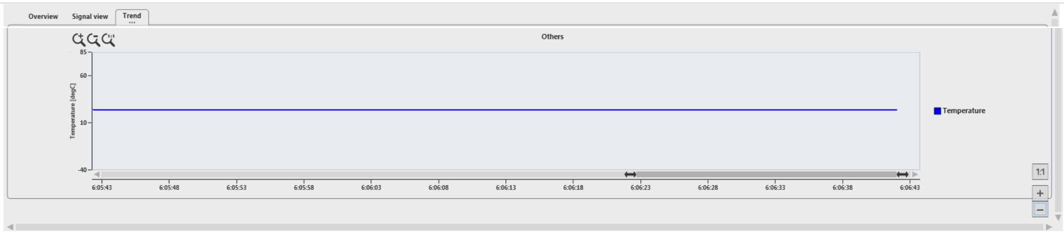
Alarm description:	Temperature monitoring provides an easy and fast way to verify the temperature of the positioner.
Function:	The trend window provides a view of the positioner's temperature and is useful in cases where the control valve ambient temperature under operating conditions may cause damage to the positioner resulting in premature failure of the electronics or pneumatic mechanism.
	 **Figure 71: Example of FIM positioner temperature screen view**

Table 63: Temperature trend

6 Performance histogram

Control deviation histogram

Alarm description:	Control deviation history provides information of the control valve deviation from setpoint over time.
Function:	The bar graph indicators, which is plotted against valve position over time in 3 different intervals, hourly (not shown), daily and continues, indicate the % control deviation from setpoint across the full travel of the valve. With this information it is possible to plan preventive action so that valve performance in terms of the control valve variability can be avoided. An increase of the control deviation is an indication of valve performance degradation.
Suggested action:	Action will depend on control deviation results. If needed switch the positioner to adaptive mode to activate the real time optimization of the control parameters. Observe the valve performance over a 24 hr period, if the control deviation does not improve further control valve maintenance is needed.

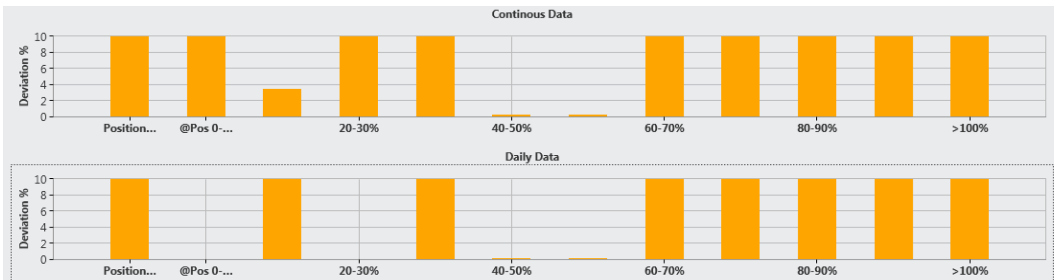


Figure 72: Example of FIM control deviation view

Table 64: Control deviation histogram

Position timeout histogram

Alarm description:	Position timeout history provides information of the control valve not reaching the setpoint within the predetermined positioning time.
Function:	The bar graph indicators, which is plotted against valve position over time in 3 different intervals, hourly (not shown), daily and continues across the valve travel indicate the % of time that the valve did not meet the required time to reach setpoint. A control valve not meeting this time will impact the process performance and efficiency, the bar graph indicators provides information of anomalies in the control valve and related position. With this information it is possible to plan preventive action so that valve performance in terms of the control valve variability can be avoided.
Suggested action:	Check the position timeout setting in the positioner to make sure it is set correctly (see Positioning timeout alarm 'A.3') Check the air supply to the positioner and make sure the air capacity is sufficient to meet the actuator travel time. Switch the positioner to Adaptive mode to activate the real time optimization of the control parameters. Observe the valve performance over a 24hr period, if the control deviation does not improve further control valve maintenance is needed.

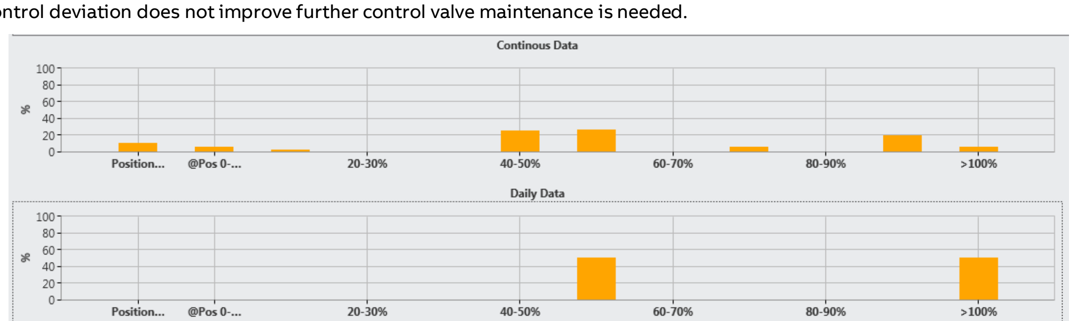


Figure 73: Example of FIM position timeout view

Table 65: Position timeout histogram

… 6 Performance histogram

Valve movement histogram

Alarm description:	Valve movement history provides information of the control valve movements across the valve travel.
Function:	The bar graph indicators, which is plotted against valve position over time in 3 different intervals, hourly (not shown), daily and continues indicate the valve movement across the full travel of the control valve. The control valve movement's vs control valve position provides information of the process stability. With this information it is possible to monitor the process stability over time since process stability is essential for efficiency and energy saving.
Suggested action:	Check the control loop gain and other control parameters, optimize accordingly. Switch the positioner to Adaptive mode to activate the real time optimization of the control parameters. Observe the valve performance over a 24 hr period, if the control deviation does not improve further control valve maintenance is needed.

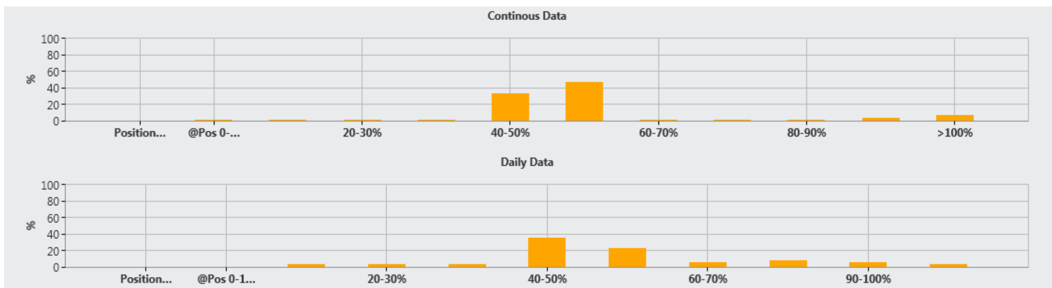


Figure 74: Example of FIM valve movement view

Table 66: Valve movement histogram

Main used valve position histogram

Alarm description:	Main used valve position history provides information of the control valve position as a % of valve travel.
Function:	The bar graph indicator, which is plotted against valve position over time in 3 different intervals, hourly (not shown), daily and continues provides information regarding valve sizing. An oversized valve may show low operating position that may lead to poor process control, on the other hand continuously high % operating position may be an indication of an undersized valve that does not meeting the required process throughput. The bar graph indicators are shown against 0-100% valve position.
Suggested action:	Check the control valve sizing to make sure its meets the process demand.

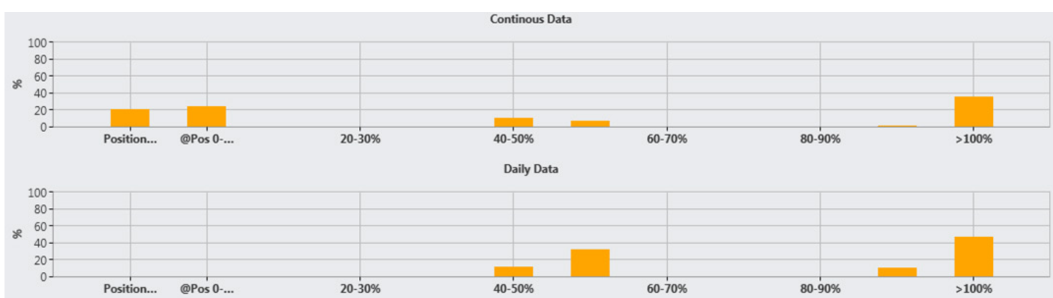


Figure 75: Example of FIM main used valve position view

Table 67: Main used valve position histogram

Valve cycle histogram

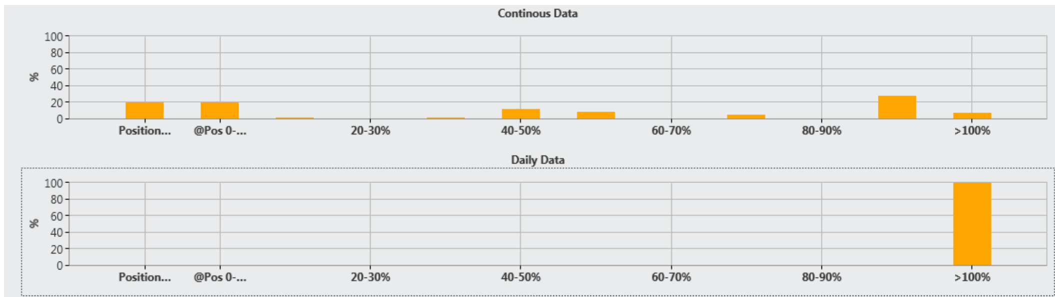
Alarm description:	Valve cycle history provides information of the control valve's operation in the loop related to process control dynamics and is shown as % valve cycles across the 0 to 100 % travel of the valve.
Function:	The bar graph indicators, which is plotted against valve position over time in 3 different intervals, hourly (not shown), daily and continues provides information of the loop dynamics as relating to process load.
Suggested action:	Take action as needed based on valve cycle information: The data can be useful as part of control loop performance optimization requirements and predictive control vale maintenance.  **Figure 76: Example of FIM main used valve position view**

Table 68: Valve cycle histogram

Friction histogram

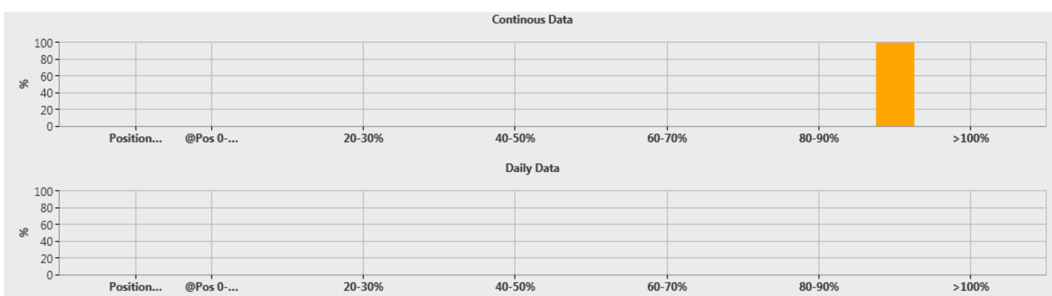
Alarm description:	Valve friction limit exceeded history provides information of friction problems in the control valve assembly.
Function:	The bar graph indicators, which is plotted against valve position over time in 3 different intervals, hourly (not shown), daily and continues provides information of the friction at different positions across the control valve travel. With this information it is possible to determine if any anomalies exist in the valve assembly. High friction can be related to dry valve stem packing, damage to the valve stem or trim material. High friction causes control valve performance issues and impacts the control loop.
Suggested action:	Take action as needed based on valve friction information. Check the torque settings of the valve stem packing gland. Refurbish the valve as part of the valve maintenance program.  **Figure 77: Example of FIM friction limit exceeded view**

Table 69: Friction histogram

… 6 Performance histogram

Stiction histogram

Alarm description:	Valve stiction limit exceeded history provides information of stiction problems in the control valve assembly.
Function:	The bar graph indicators, which is plotted against valve position over time in 3 different intervals, hourly (not shown), daily and continues provides information of the stiction at different positions across the control valve travel. With this information it is possible to determine if any anomalies exist in the valve assembly. High stiction or sometimes referred to as slip-stick can be related to valve stem packing degradation, incorrect packing material or damage to the valve stem. High friction causes control valve performance issues and impacts the control loop.
Suggested action:	Take action as needed based on valve friction information. Inspect the control valve packing material and check if the packing material type used during the last refurbishment meets the manufacturer's specification. Refurbish the control valve as part of the valve maintenance program.

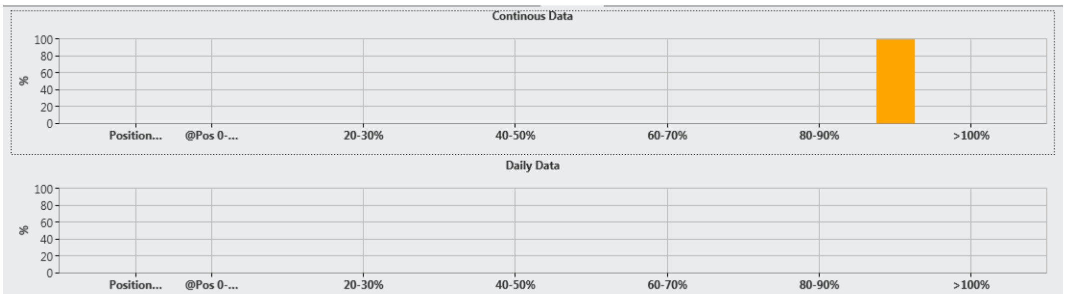


Figure 78: Example of FIM stiction limit exceeded view

Table 70: Stiction histogram

Temperature histogram

Alarm description:	Temperature limits exceeded history provides information of positioner's temperature.
Function:	The bar graph indicators, which is plotted over time in 3 different intervals, hourly, daily and continues and based on minimum, average and maximum condition accumulation, provides information of the positioners operating temperature. The minimum & maximum temperature limits of the positioner is −40 °C to 85 °C (−40 °F to 185 °F), exceeding these limits will impact the performance of the positioner and cause premature failure.
Suggested action:	Take action as needed based on temperature information. Check the control valve assembly for any issues relating to abnormal operating conditions. If required install a remote mounted EDP300 positioner to move the electronics to a location that meets the operating temperature limits of the positioner.

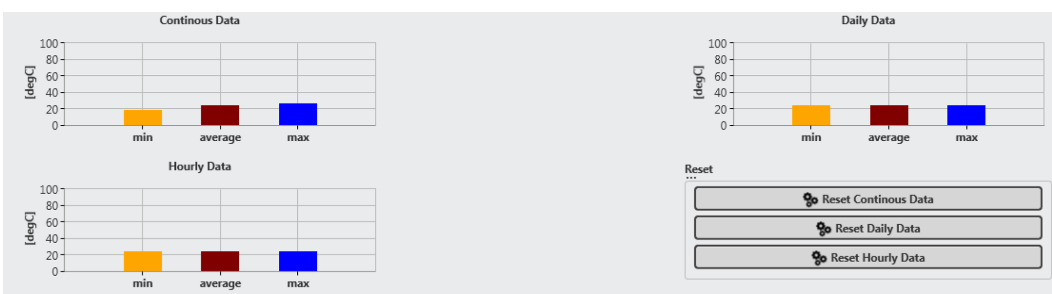


Figure 79: Example of FIM temperature view

Table 71: Temperature histogram

Supply pressure histogram

Alarm description:	Supply pressure limits exceeded history provides information of the supply pressure to the positioner.
Function:	The bar graph indicators, which is plotted over time in 3 different intervals, hourly, daily and continues and based on minimum, average and maximum conditions accumulation provides, information of the instrument air supply pressure to the positioner. For reliable control valve performance the supply pressure must meet the design pressure of the valve actuator for the application such as severe duty valves that require high seat load for tight shut conditions. The data can be useful to determine compressor performance and reliable instrument air supply pressure. The supply pressure limits are 1.4 bar to 10 bar (20 psi to 145 psi) exceeding these limits will impact the performance of the positioner, a high pressure will cause premature failure.
Suggested action:	Take action as needed based on temperature information. Check the supply pressure regulator to ensure the correct operating pressure for the control valve assembly.

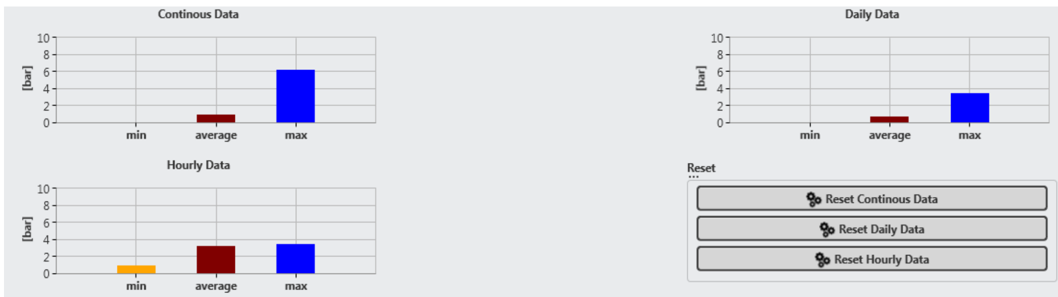


Figure 80: Example of FIM supply pressure view

Table 72: Supply pressure histogram

Control deviation histogram

Alarm description:	Control deviation history provides information of the % control valve setpoint deviation.
Function:	The bar graph indicators, which is plotted over time in 3 different intervals, hourly, daily and continues and based on minimum, average and maximum conditions accumulation, provides information of the control valve deviation from setpoint. This information is useful to determine how well the control valve is tracking the process demand signal. Unacceptable control deviations will impact the process efficiency.
Suggested action:	Take action as needed based on control deviation information. Check the control loop gain and make needed adjustments to optimize the loop. Check the instrument air supply to make sure it meets the control valve requirements. Switch the positioner to Adaptive mode to activate the real time optimization of the control parameters.

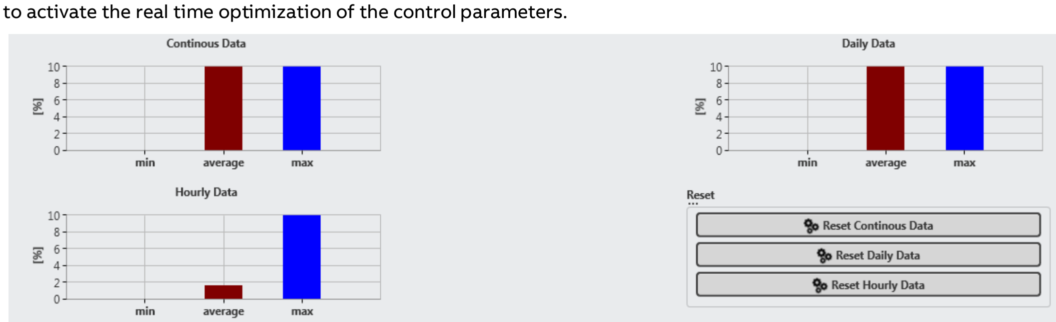


Figure 81: Example of FIM control deviation view

Table 73: Control deviation histogram

… 6 Performance histogram

Differential pressure histogram

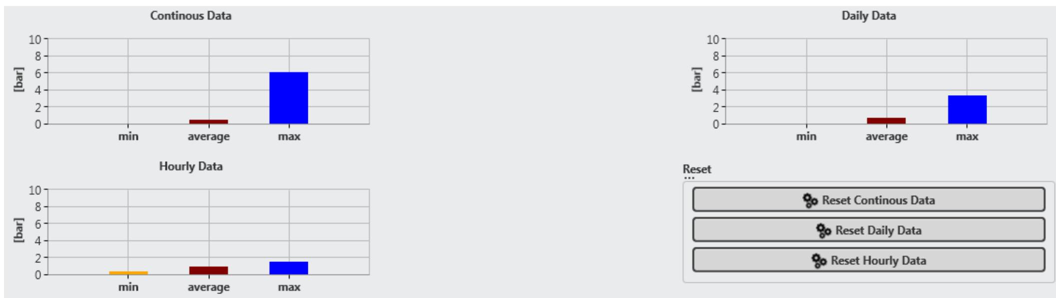
Alarm description:	Differential pressure history provides information of the output 1 and output 2 differential pressure applicable to double acting actuators.
Function:	The drag indicator trend, which is plotted over time in 3 different intervals, hourly, daily and continues and based on minimum, average and maximum conditions accumulation, provides information of the differential pressure of the positioner between output 1 and output 2. This information is useful to determine the pressure load on the double acting valve actuator.
Suggested action:	Take action as needed based on the differential pressure information. Check the supply pressure to the positioner and make sure it meets the control valve requirements.  **Figure 82: Example of FIM differential pressure view**

Table 74: Differential pressure histogram

7 Field Information Manager – FIM

Valve health wizard using FDI technology with UIP functionality

The Field Information Manager (FIM) configuration and software program is based on the latest FDI (Field Device Integration) technology with UIP (User Interface Plug-in) capability.
The valve health wizard UIP incorporates a manual or automatic valve health test report for the following:

- Valve signature test
- Step response test
- Speed over position test
- Leakage test
- Valve seat test

These tests provides valuable data regarding the valve health as baseline data, any valve performance can be compared to the baseline performance and use to determine valve maintenance as part of predictive and preventative maintenance.

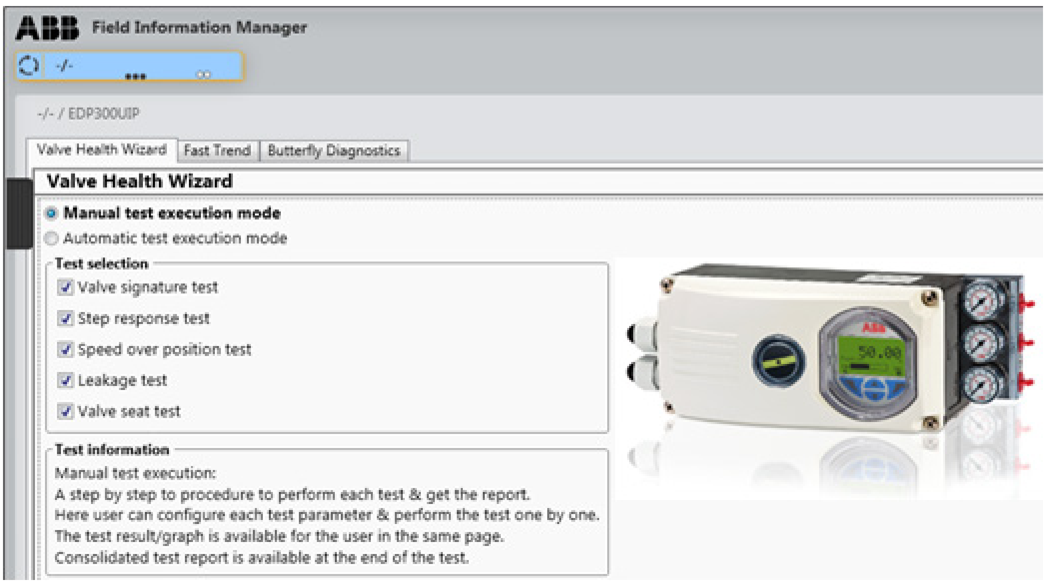


Figure 83: Manual test execution

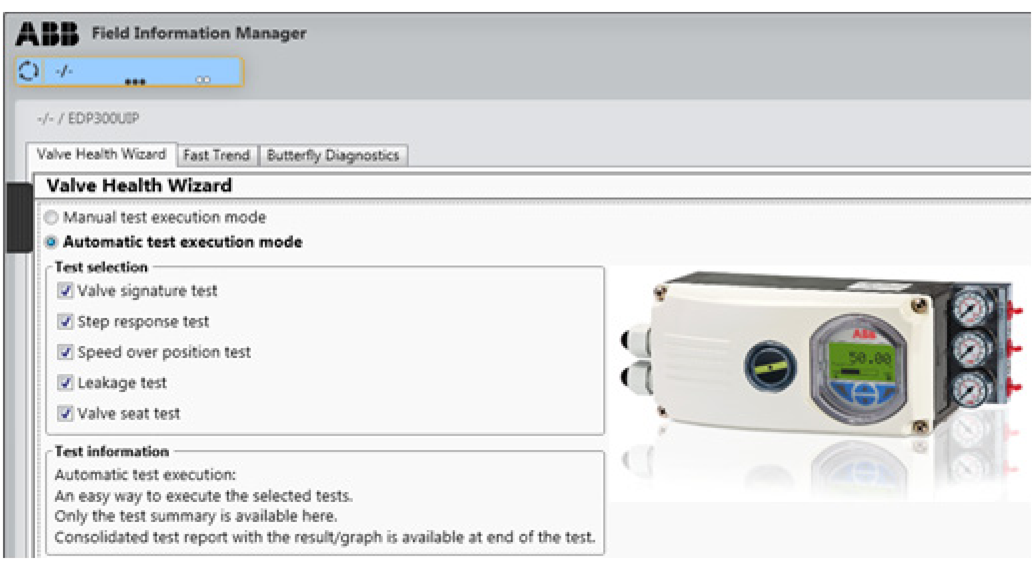


Figure 84: Automatic test execution

… 7 Field Information Manager – FIM

… Valve health wizard using FDI technology with UIP functionality

Tag : -/-
Device type : EDP300 - Hart 7
Detailed Report

Position Master EDP300 - Valve Health Report

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Name :	Valve Health Test	Telephone :	123-456-7890
Created:	09/01/2016	Email :	edp300@myvalve.com
Department :	Projects	Plant tag :	Test 1
Company :	ABC	Actuator type	ABC
Address :	Performance drive,Control Town	Serial number :	123
		Version :	A1

Valve data

Tag	-/-
Long tag	-/-
Descriptor	-/-
Message	-/-

Positioner data

Device type	EDP300 - Hart 7
Device serial no.	6292992
Final assembly no.	0
Device revision	2
Hart revision	7
Hardware revision	1
Software revision	1
Pneumatic type	Double act.,fail safe
Device options	Analog feedback module,Pressure sensors,HART communication

Device configuration

Actuator type	Rotary
Vent position	Position 0 %
Setpoint direction	Direct
Characteristic curve	Linear
Lower valve range [°]	-43.3 °
Upper valve range [°]	44.4 °
Lower working range [%]	0.0 %
Upper working range [%]	100.0 %
Tight shut [End position 0%]	1.0 %
Dead angle [End position 0%]	0.0 %
Tight shut [End position 100%]	100.0 %
Dead angle [End position 100%]	100.0 %

Control parameters

Kp up	4.7
Kp down	2.1
Tv up	68.5 msec
Tv down	205.9 msec
Y-offset up	49.13 %
Y-offset down	34.47 %
Dead band	0.2 %
Zone	1.0 %
Supply pressure	3.38 bar

Test settings

Valve signature test

Steps	100

Step response test

Start position	10.00 %
End position	90.00 %
Time interval	1 x20ms

Speed over position test

Air capacity	10 %

Valve seat test

Acceptable tolerence min	-1.0 %
Acceptable tolerence max	1.0 %
Acceptable universal input min	-1.0
Acceptable universal input max	1.0

Figure 85: Valve health report – Part 1

Tag : -/-
Device type : EDP300 - Hart 7
Detailed Report

Position Master EDP300 - Valve Health Report

Power and productivity for a better world™ ABB

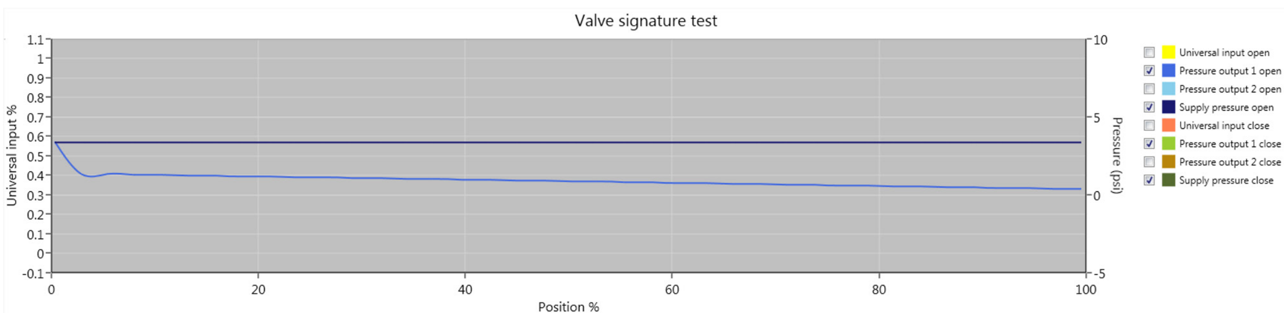
Test summary

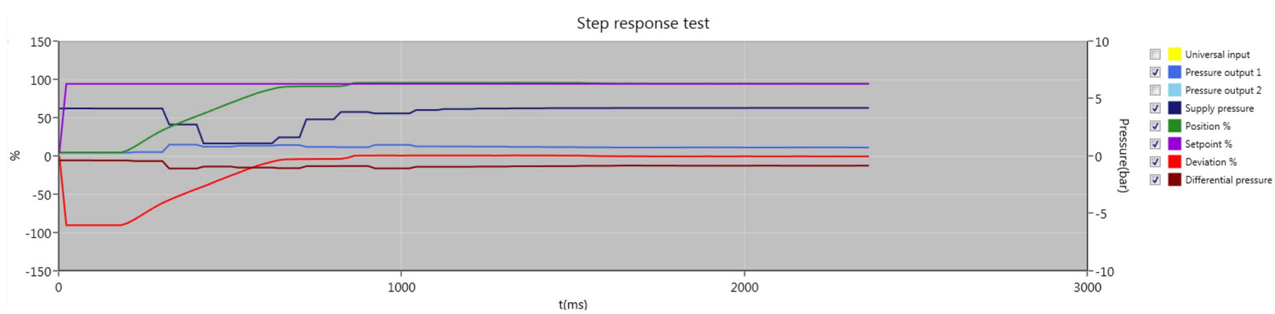
Test execution statistics

Test performed date	09/01/2016	
Valve signature test	Test passed	✓
Step response test	Test passed	✓
Speed over position test	Test passed	✓
Leakage test	Test passed	✓
Valve seat test	Test passed	✓

Test result

Leakage test	Test passed
Valve seat test	Test passed





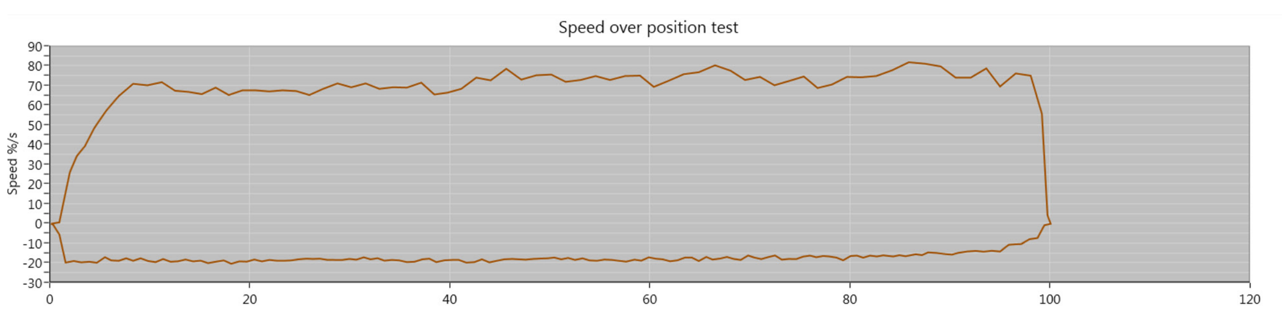


Figure 86: Valve health report – Part 2

Notes

Notes

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ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
www.abb.com/positioners

3KXE341310R2901

TD/EDP300/ASSET_MONITORS-EN Rev. B 08.2024 Original instruction