USER MANUAL

Intelligent Diagnostic Positioner

IDP24-A
IDP24-AF

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1 General

This manual covers software version:

Software ID (HART): DDP-SW-004 version: 2.06
Software ID (Modbus): DDP-SW-002 version: 2.06

This manual covers hardware revision:

IDP24-A	Rev. 3
IDP24-AF	Rev. 2

1.1 Safety instructions

For a safe installation of a positioner, the following must be observed. The module must only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this product as well as all instructions in this manual.

The information in this user manual is subject to changes without notice.

2 Application

The IDP24 is an Intelligent Diagnostic Positioners developed by Val Controls.

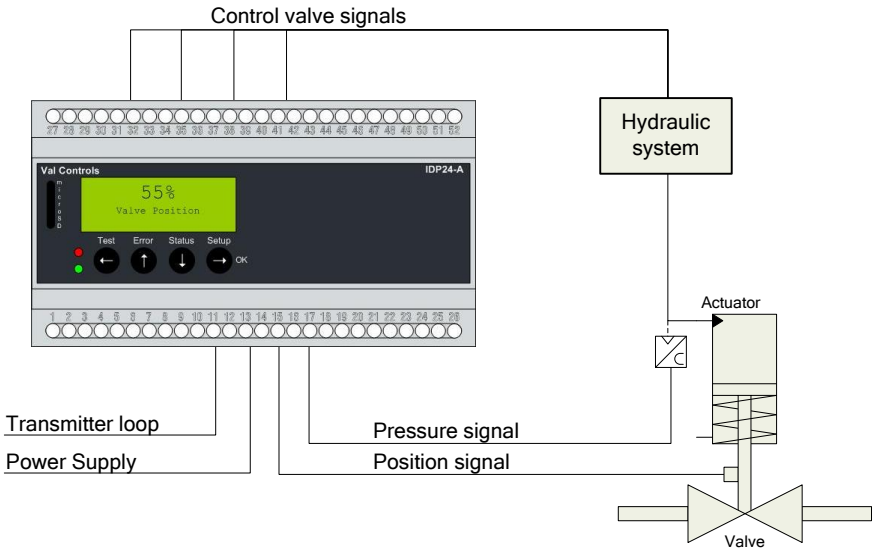
The system is very easy to install and adjust and it offers a very simple but efficient test of the ESD system. It can be installed on new and old installation.

The IDP24 can control an ON/OFF valve with a hydraulic or pneumatic system with up to two control valves. A power supply at 24 VDC must be connected to the IDP which then powers the control valves.

A position feedback must be connected to the IDP. The signal can either be a potentiometer or a 4-20mA loop.

A pressure transmitter must be connected to the IDP through a powered 4-20mA signal.

The tests can be performed directly on the unit through the menu system. All configuration and calibration is also performed through the menu.



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3 Installation guide

1. Connect all wires and make sure that all is connected correctly according to the hardware manual/installation drawings.

2. Configure the unit using ValConnect or the display and keyboard
    a. Configure the position feedback, see 6.4.2 Advanced menu
    b. Configure the pressure feedback, see 6.4.2 Advanced menu

3. Auto calibrate the unit by pushing CAL button or using ValConnect, see 6.1.1 Automatic.

4. After a successful calibration the green indicator will light. If the red is light, there was an error during calibration. Connect ValConnect and see what the error message is and go to the manual to get an explanation on the error no. and how to solve it, see 8 System errors.

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4 Specifications

4.1 Environment

Operating temperature: -30 to 80 ˚C
Storage temperature: -30 to 80 ˚C

Relative Humidity: < 95% (No condensation)

The hardware is coated for tropical climate conditions on exposed areas.

4.2 Terminals

IDP24-A:
Screw torque: 0.4Nm (3.6 lb in)
Wire diameter: 28-12 AWG 2.5mm^2

IDP24-AF:
Screw torque: 3.5 lb in
Wire diameter: AWG 12-22

4.3 Dimension and mounting

Dimensional drawings can be found on www.valcontrols.com.

IDP24-A:
DDP-DD-001
Mounting: 35mm DIN rail according to EN50022.

IDP24-AF:
DDP-DD-002

Connect the IDP to ground to avoid electromagnetic interference.

After installation the lid has to be closed properly to maintain the IP rating.
The O-ring is as standard treated with Molykote 55 O-ring grease. To maintain the IP rating the O-ring has to be treated every 2nd year with Molykote 55 O-ring grease or similar.

4.4 Battery and SD card

The backup battery to the watch can be changed by removing the front panel of the IDP. The battery is placed to the left of the display. The power to the IDP must be turned off.

Estimated lifetime: 10 years

Please contact Val Controls for a replacement battery.

The SD card is used to store signatures. The SD card must not be moved between devices.

4.5 Electrical specifications for standard configuration

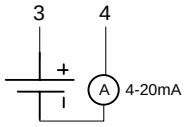
Transmitter loop – AO0 (optional)	
Impedance	< 470 ohm @20mA and 9,4VDC
Linearity	< 0.1%
Temperature coefficient	0.01% / 1°C
Galvanic isolated	
Power supply	
Power supply	20.4 – 27.6VDC
Power dissipation, no position sensor/loop or valves are connected.	< 2W
Power dissipation, with maximum load on all inputs and outputs	< 5W
Position sensor – AI10	
Potentiometer size	5 Kohm to 20 Kohm
Minimum use operating area	40%
Cable length	1.5 meters
Linearity	< 0.1%
Temperature coefficient	0.01% / 1°C
Position loop – AI1	
External position loop max Rload	585 ohm @20mA and 11.5VDC
Operating area	4 – 20mA
Minimum span	12mA
Cable length	1000 meters
Linearity	< 0.1%
Temperature coefficient	0.01% / 1°C
Rin	< 100 ohm
Pressure loop – AI2	
External position loop max Rload	585 ohm @20mA and 11.5VDC
Operating area	4 – 20mA
Cable length	1000 meters
Linearity	< 0.1%
Temperature coefficient	0.01% / 1°C
Digital output – DO	
Max load per digital output	up to 48W @24VDC only if powered through terminal 5 and 6
Max load total	up to 192W @24VDC if powered through terminal 5 and 6. If powered through terminal 21 and 22 the max load is 2W @24VDC
Digital input - DI	
Type	Normally open / normally close
Cable length (unknown resistance)	20 meters
Maximum cable resistance	100 ohm
Internal Watch	
Time deviation	Δf/fo = +/- 20ppm

Aging	Δf/fo = +/- 3ppm / Year
Temperature Coefficient	β = 0.034 +/- 0.006ppm/°C²

Important:
All external components must have specifications that fit the desired performance and requirements of the valve/actuator system.

4.5.1 Transmitter loop – AO0

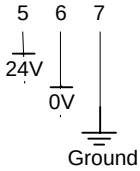
The positioner can send a 4-20mA transmitter loop signal to the control room. This signal is a repeated signal of the position feedback.



Note: The transmitter loop is only available in some models.

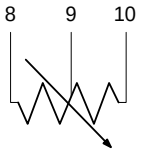
4.5.2 Power supply

Connection for an external power supply. Consult separate SIL manual for correct use.



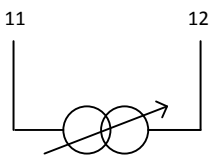
4.5.3 Position sensor – AI10

The position feedback can be delivered from a 3-wire potentiometer.

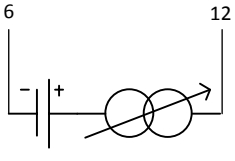


4.5.4 Position loop – AI1

The position feedback can also come from a 4-20mA loop powered transmitter.



Passiv loop



Active loop

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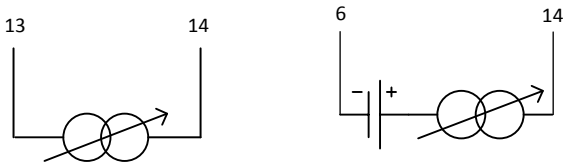
4.5.5 Pressure loop – AI2

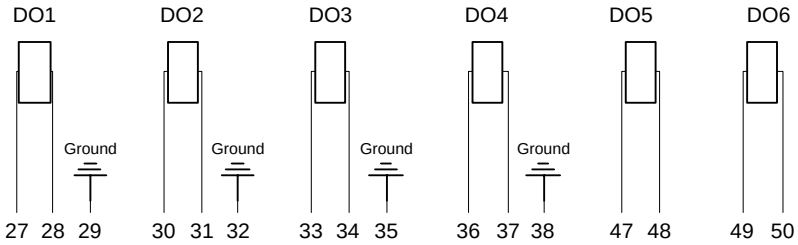
The pressure loop can be used to connect passive 4-20mA sensors to the IDP.
Note: The analogue inputs can be calibrated in the advanced menu (2.2)



Passiv loop Active loop

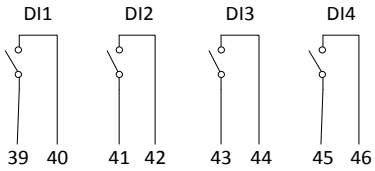
4.5.6 Digital output – DO1, DO2, DO3, DO4, DO5, DO6

The positioner has 6 digital outputs to control 24VDC devices.



4.5.7 Digital input – DI1, DI2, DI3, DI4

The digital inputs can be used for connecting digital input signals.



4.5.8 Terminals

See the chart below to see how to connect to the terminals on the positioner.

Transmitter loop (optional)	**Digital output**
3. Transmitter loop (+) 4. Transmitter loop (-)	27. DO 1 (+) 28. DO 1 (-) 29. Ground 30. DO 2 (+) 31. DO 2 (-) 32. Ground 33. DO 3 (+) 34. DO 3 (-) 35. Ground 36. DO 4 (+) 37. DO 4 (-) 38. Ground 47. DO 5 (+) 48. DO 5 (-) 49. DO 6 (+) 50. DO 6 (-)
Power supply	
5. External 24 VDC power supply (+) 6. External 24 VDC power supply (-) 7. Ground	
Position sensor	
8. Position sensor – High 9. Position sensor – Wiper 10. Position sensor – Low	
Position loop	
11. Position loop (+) 12. Position loop (-)	
Pressure loop	
13. Pressure loop (+) 14. Pressure loop (-)	
	Digital input
	39. DI 1 (+) 40. DI 1 (-) 41. DI 2 (+) 42. DI 2 (-) 43. DI 3 (+) 44. DI 3 (-) 45. DI 4 (+) 46. DI 4 (-)

Note: Terminal 7 must be connected to Ground. All grounds are connected internally.

4.6 Electrical specifications for Expansion board 3:3

When using the Emergency Shutdown Controller (SIL), must the unit only be power as shown in section 4.6.2.

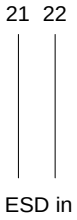
Digital input - DI	
Power supply	20.4 to 27.6VDC
Power dissipation, no position sensor/loop or valves are connected.	< 2W
Power dissipation, with maximum load on all inputs and outputs	< 5W
Digital output - DO	
Max load per digital output	up to 48W @24VDC

4.6.1 Terminals

Digital input	**Digital output**
21. Power supply (+) 22. Power supply (-)	23. ESD1 out (+) 24. ESD1 out (-) 25. ESD2 out (+) 26. ESD2 out (-)

4.6.2 Power supply

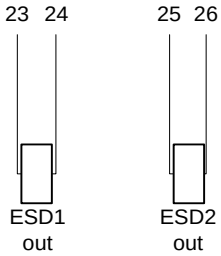
The power supply to the positioner is taken from the ESD line.



4.6.3 Digital output

The ESD line is continued through the IDP as two outputs. The outputs are inversed, that is when one is power the other is power off. Both outputs require power on the ESD in line to be active.

ESD1 out is active to open the valve, while ESD2 out is active to close the valve.



4.7 Electrical specifications for Expansion board 3:4

When using the Emergency Shutdown Controller (SIL) + extra 24VDC power supply, the unit must be power as shown in section 4.5.2.

Digital input - DI	
ESD line input high	20.4 to 27.6VDC
ESD line input low	0.0 to 1.0VDC
Digital output - DO	
Max load per digital output	up to 48W @24VDC

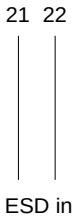
Note: The IDP must be connected to an external power supply on terminal 5 and 6.

4.7.1 Terminals

Digital input	**Digital output**
21. ESD in (+) 22. ESD in (-)	23. ESD1 out (+) 24. ESD1 out (-) 25. ESD2 out (+) 26. ESD2 out (-)

4.7.2 ESD in

The power supply to the positioner is taken from the ESD line.



4.7.3 Digital output

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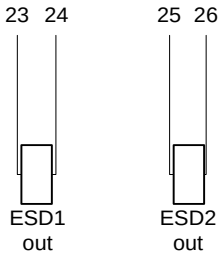


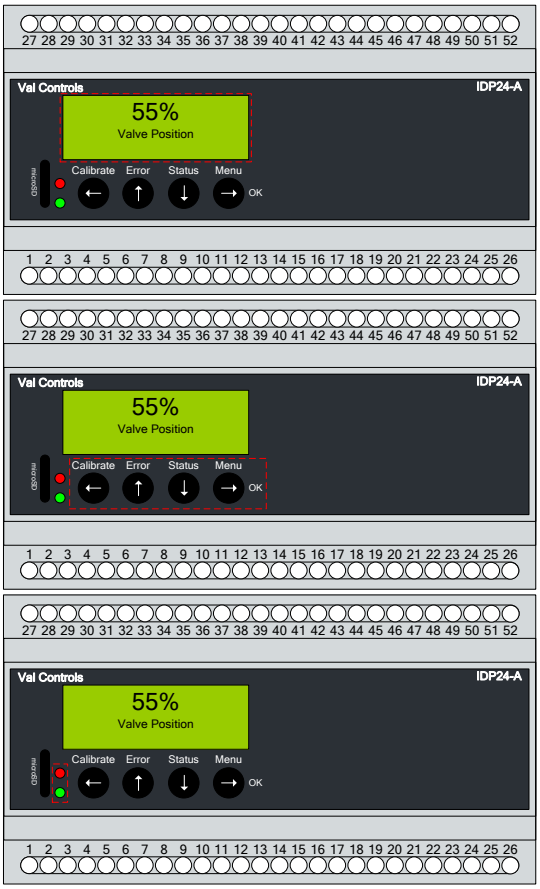
5 User interface

To control and monitor the intelligent diagnostic positioner, it is fitted with a graphical display, four buttons and two indicators.

Display

Keyboard

Indicators



5.1 Display

The display is a four lined graphical display were it is possible to turn on backlight and change the contrast. See section 6.4.1 for turning on backlight and changing the contrast.

5.2 Keyboard

The keyboard has four buttons, which has the following functions.

Button	Menu	Menu navigation	Confirmation
←	Calibrate	Back	
↑	Error	Up	
↓	Status	Down	
→	Menu	Forward	OK

5.2.1 Indicator

The indicator lights will work as follow:

- Red indicator: Glows when an error has occurred in the positioner
- Green indicator: Glows when there is no errors in the positioner

6 Menus

The positioner has four menus. All menus can be directly activated by pressing one of the four buttons.

- Calibration ←, you will enter the calibration menu
- Error ↑, you will enter the error menu
- Status ↓, you will enter the status menu
- Menu →, you will enter the setup menu

6.1 Calibration

Calibration	Description
1 Automatic	Automatic find endpoints and reference curve
2 Endpoint	Calibrate the position endpoints
3 PST reference	Record a partial stroke reference signature
4 FST reference	Record a full stroke reference signature
5 SOT reference	Record a solenoid test reference signature

6.1.1 Automatic

The automatic calibration will find the end points of the travel. After that a reference partial stroke, a reference full stroke and a solenoid test signature is recorded.

The reference strokes are used to set the error and warning parameters. These parameters are used further on to determine the state of the valve system during a test.

The steps in the automatic calibration can be performed individually from the calibration menu.

6.1.2 Endpoint calibration

The endpoints calibration set the endpoints. It can be used if the position signal has been changed. There will not be recorded any reference curves.

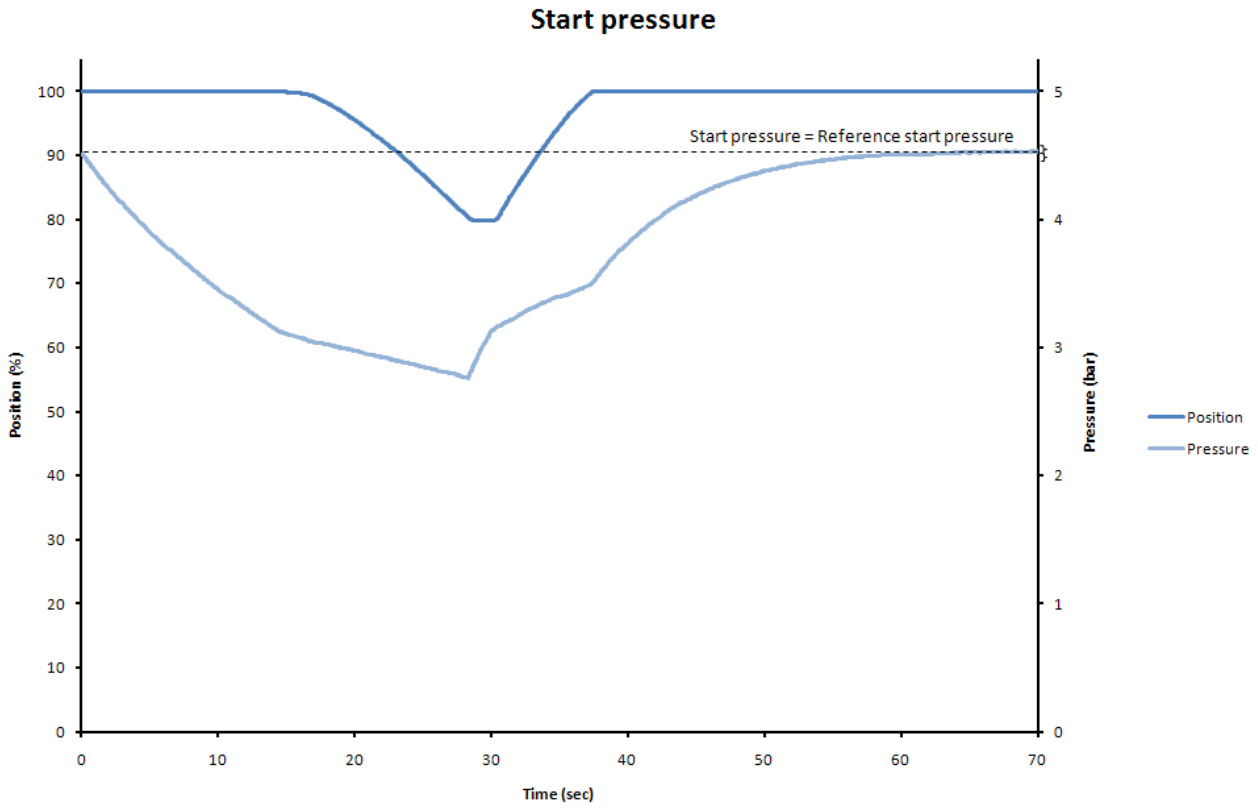
6.1.3 PST reference curve

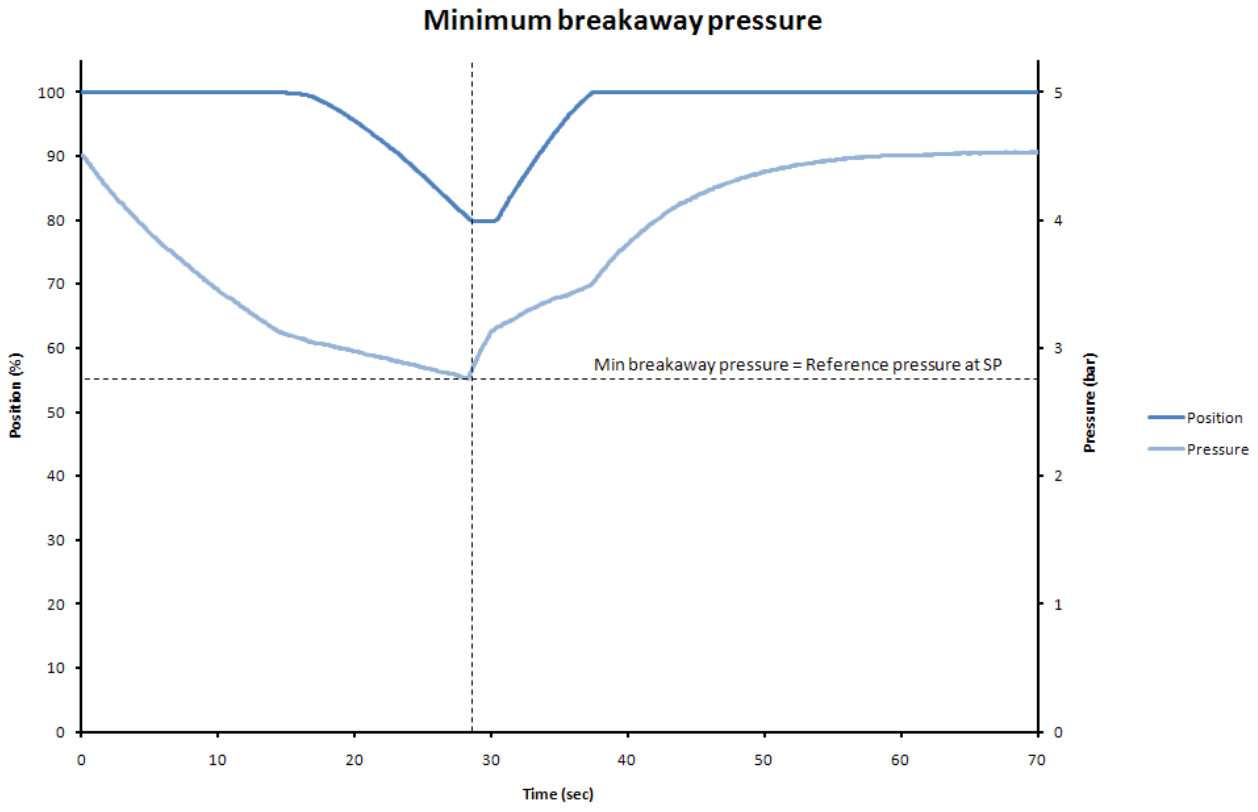
Record a partial stroke reference curve and set the partial stroke error and warning parameters like in the automatic calibration.

For the partial stroke the error parameters are set to the following values:

- Minimum breakaway pressure = Reference pressure at SP
- Breakaway timeout = Reference breakaway time + reference closing time
- Closing timeout = Reference total time
- Opening timeout = 2 * Reference total time
- Minimum allowed pressure = Reference minimum pressure – 10% of Reference start pressure

The Start pressure error limits is not set automatically.





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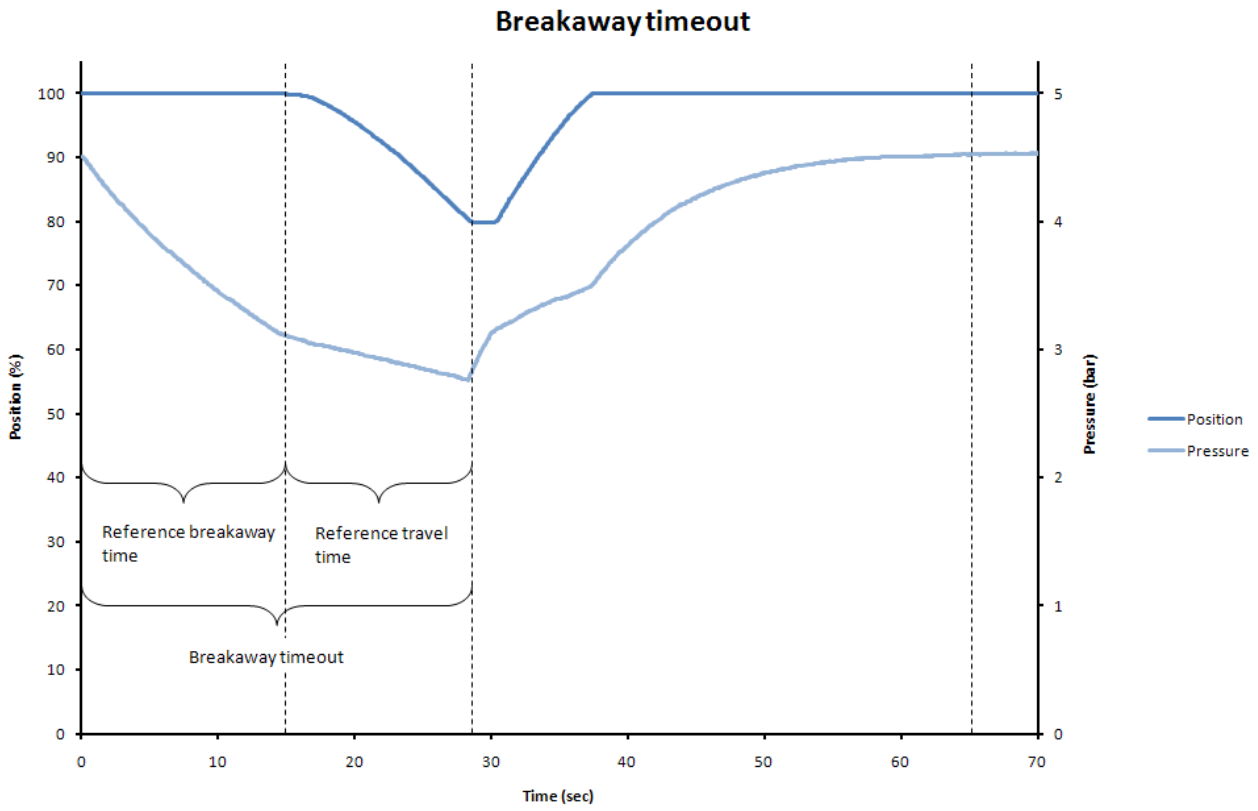
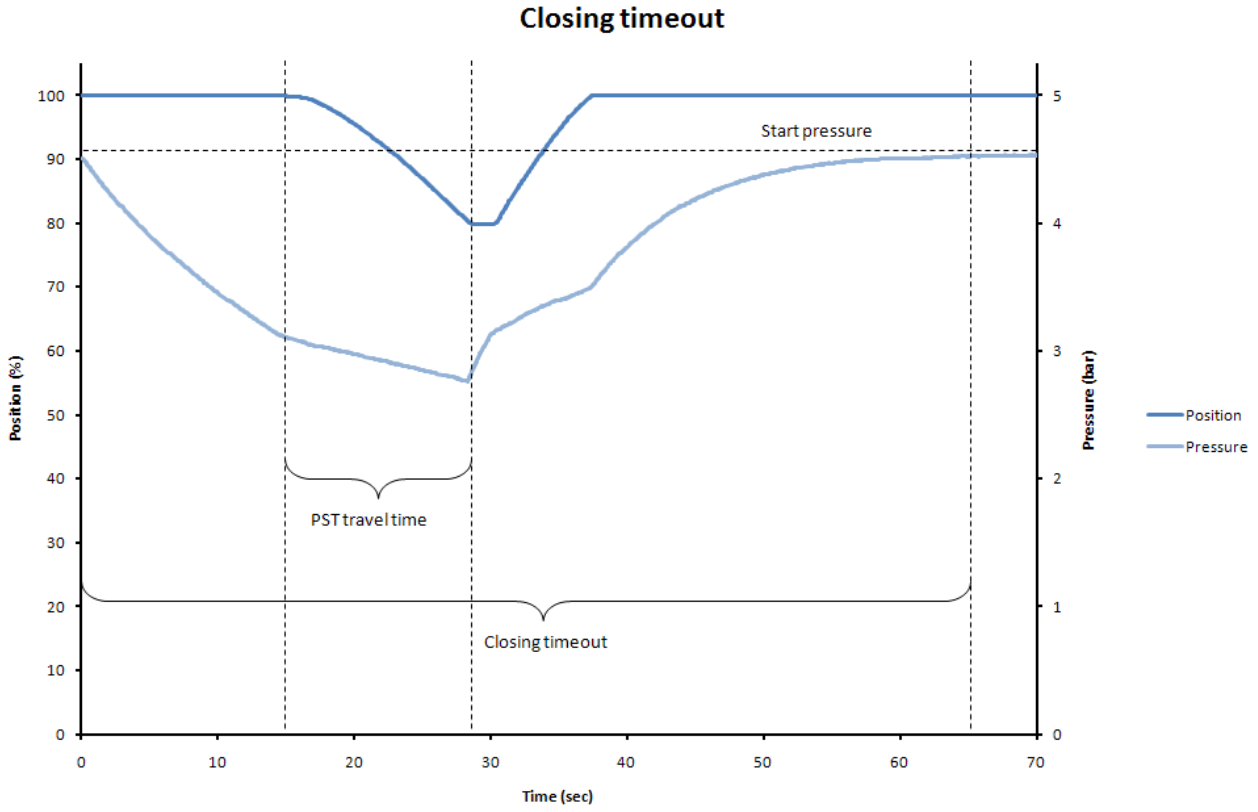
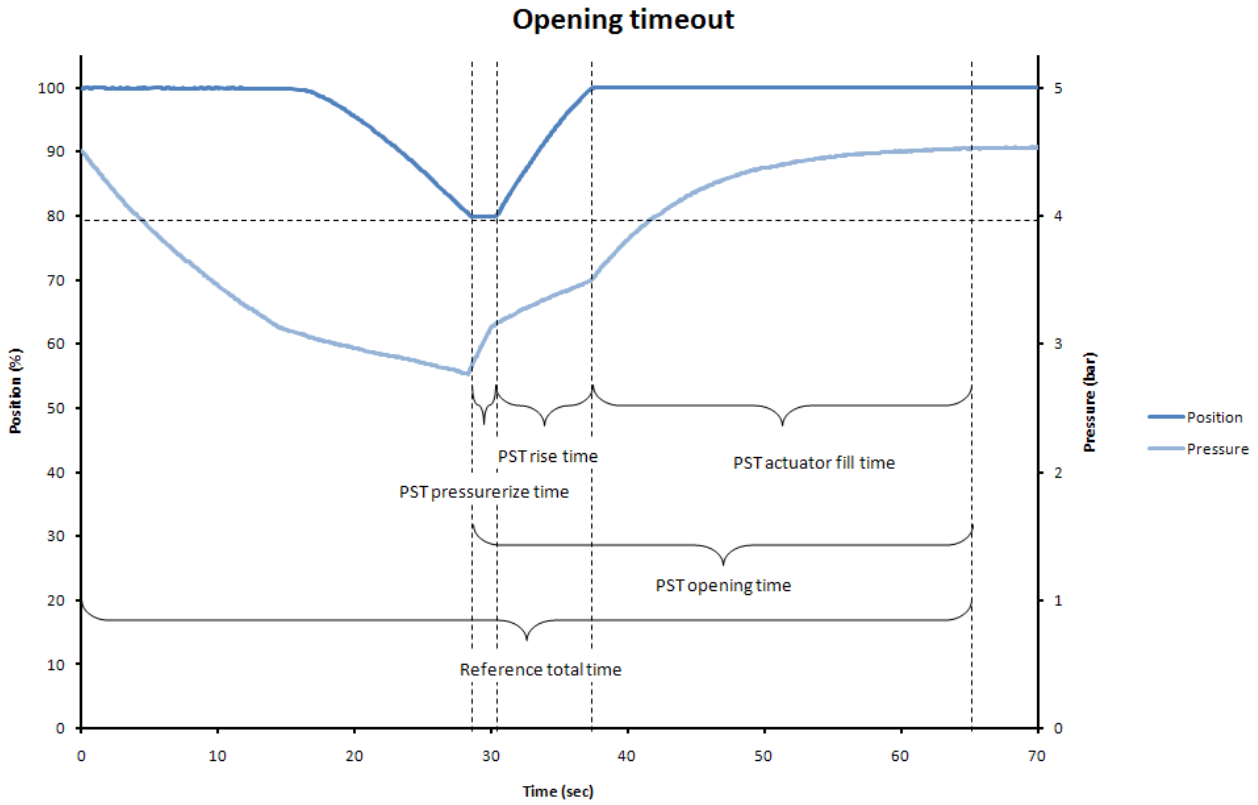

Breakaway timeout
Position (%)
Pressure (bar)
Time (sec)
Position
Pressure
Reference breakaway time
Reference travel time
Breakaway timeout


Closing timeout
Position (%)
Pressure (bar)
Time (sec)
Position
Pressure
Start pressure
PST travel time
Closing timeout



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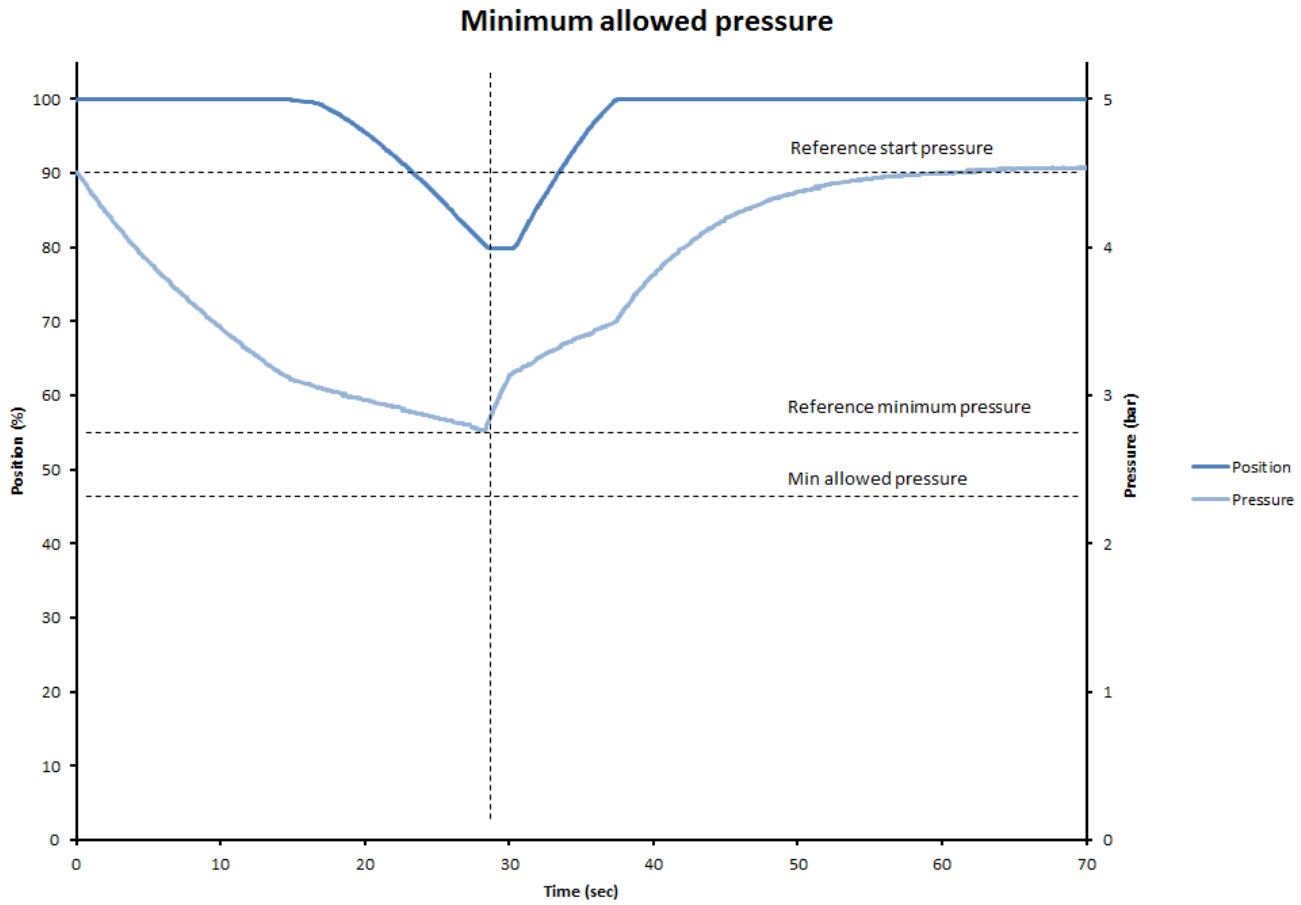

Minimum allowed pressure
Reference start pressure
Reference minimum pressure
Min allowed pressure
Position (%)
Pressure (bar)
Time (sec)
Position
Pressure
0
10
20
30
40
50
60
70
80
90
100
1
2
3
4
5

The partial stroke warning parameters are set to the following values after a successful calibration:

- Low breakaway time = Reference breakaway time – 50%
- High breakaway time = Reference breakaway time + 50%
- Low breakaway pressure = Reference breakaway pressure – 50%
- High breakaway pressure = Reference breakaway pressure + 50%
- Low closing time = Reference closing time – 50%
- High closing time = Reference closing time + 50%
- Maximum travel = Move at reference stroke + 5 %

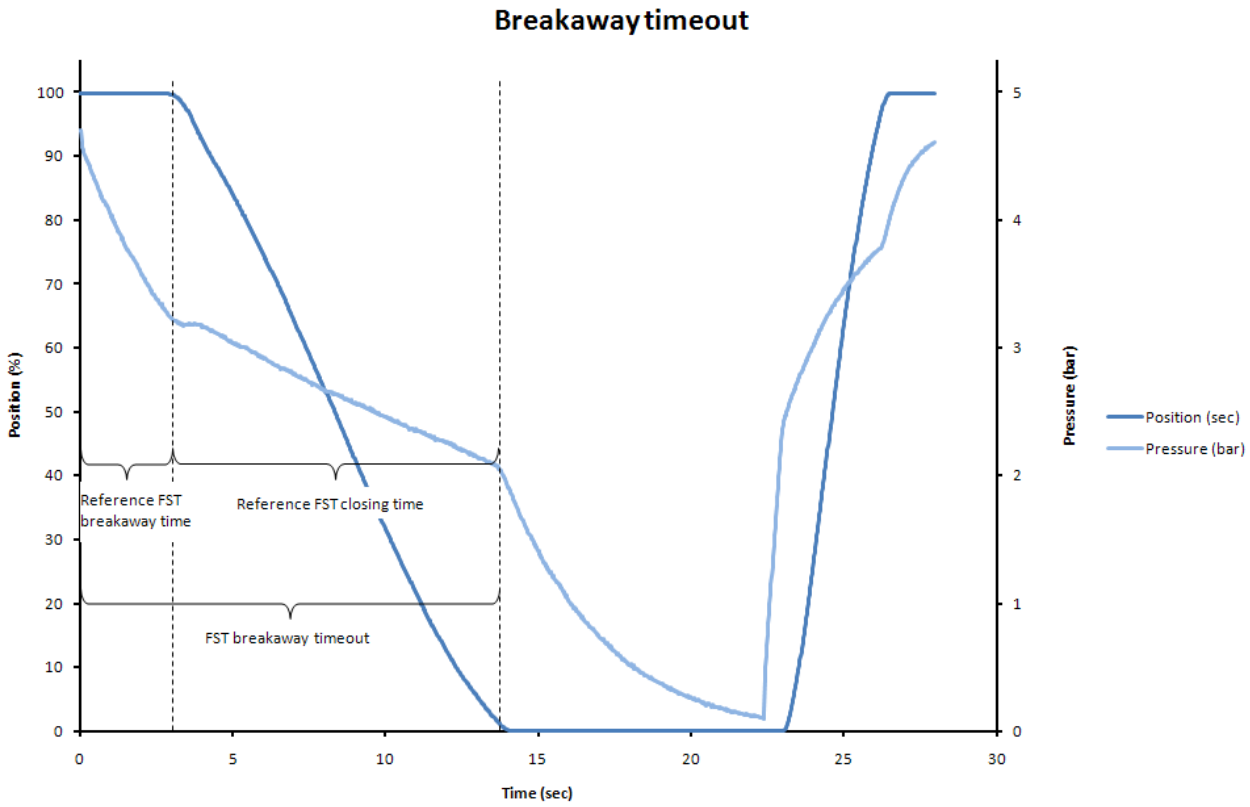
6.1.4 FST reference curve

Record a full stroke reference curve and set the full stroke error and warning parameters like in the automatic calibration.

For the full stroke the error parameters are set to the following values:

- Minimum breakaway pressure = Reference pressure at 50%
- Breakaway timeout = Reference closing time
- Closing timeout = Reference total time
- Depressurising timeout = 2 * Reference total time
- Total timeout = 2 * Reference total time

The Start pressure error limits is not set automatically.



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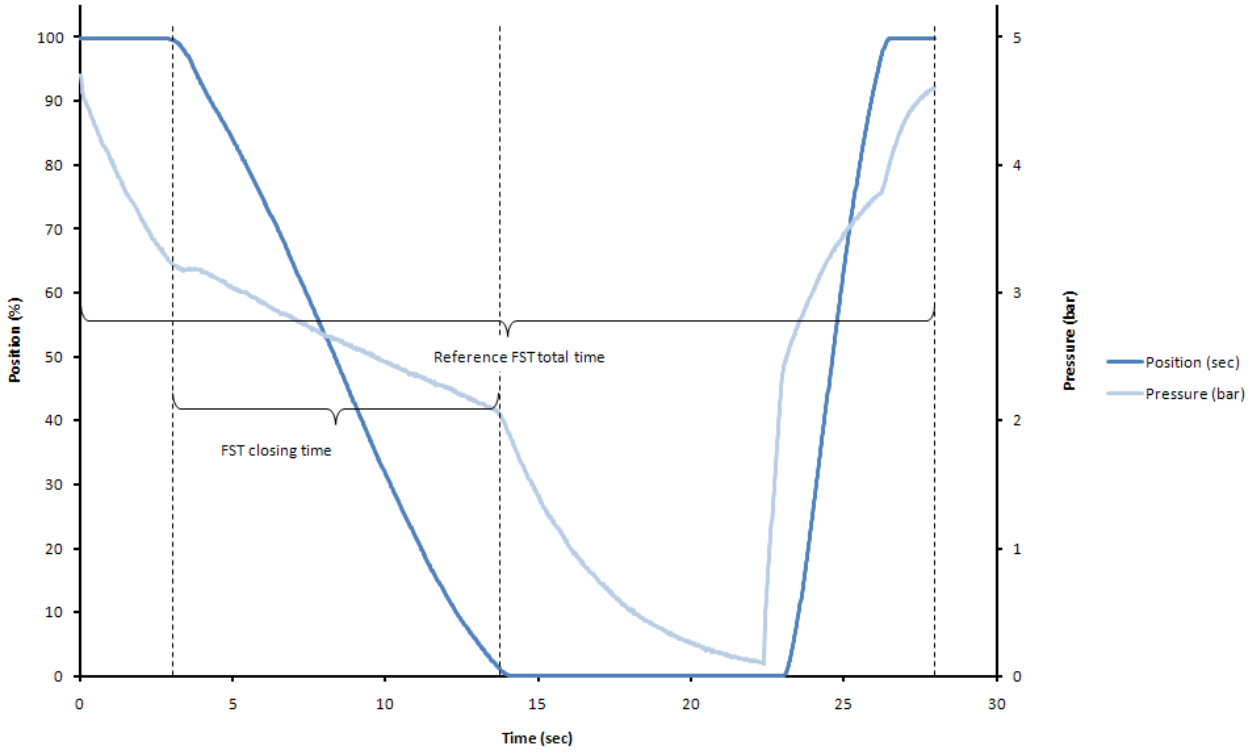
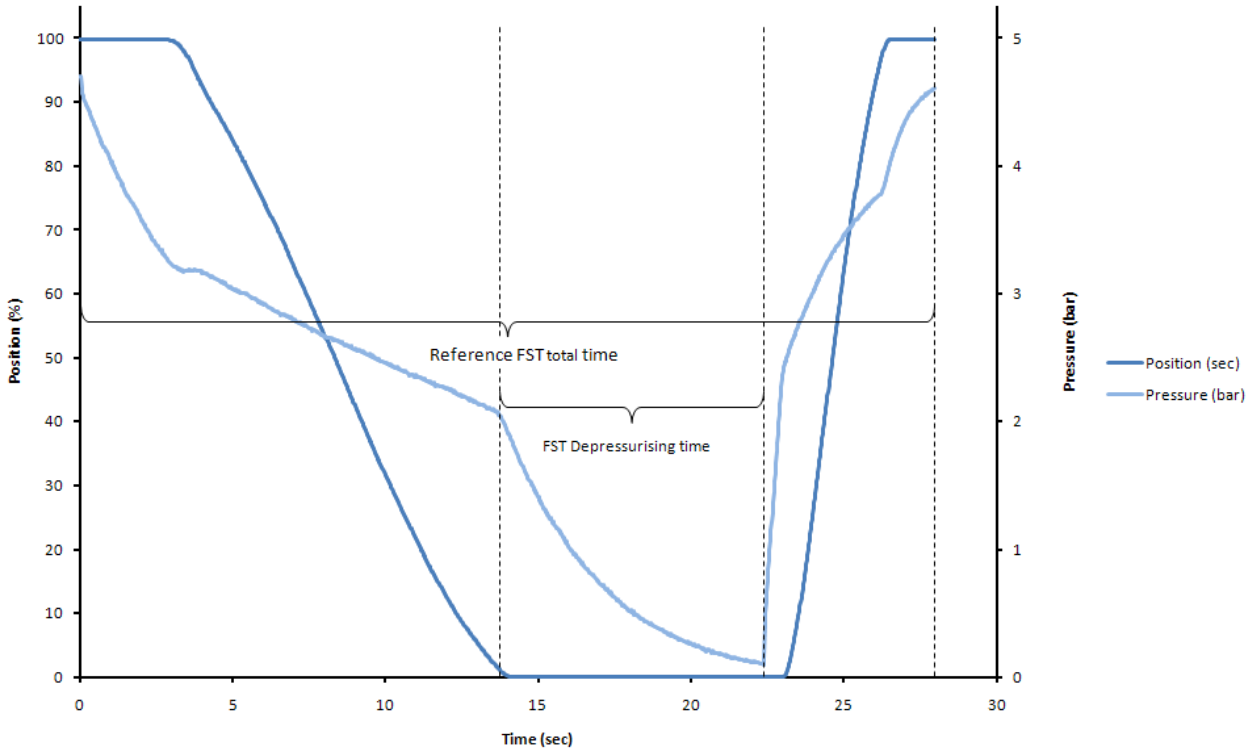
Closing timeout



Depressurising timeout



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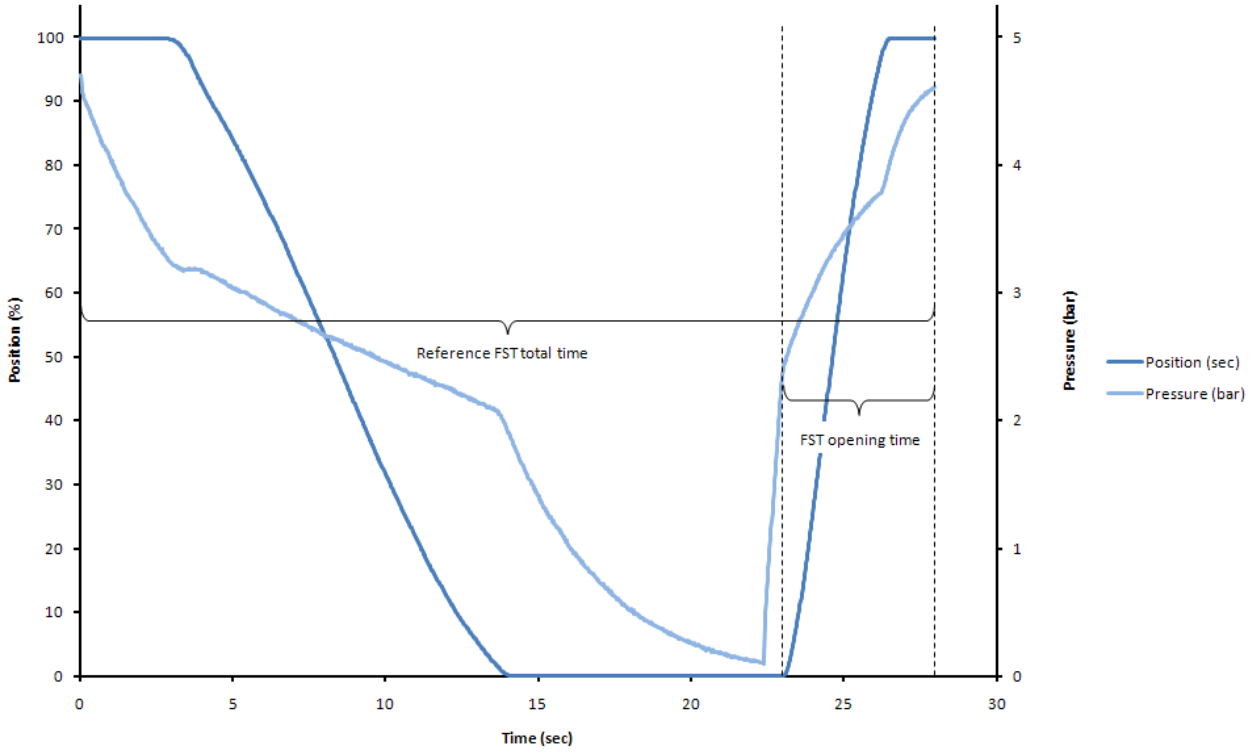
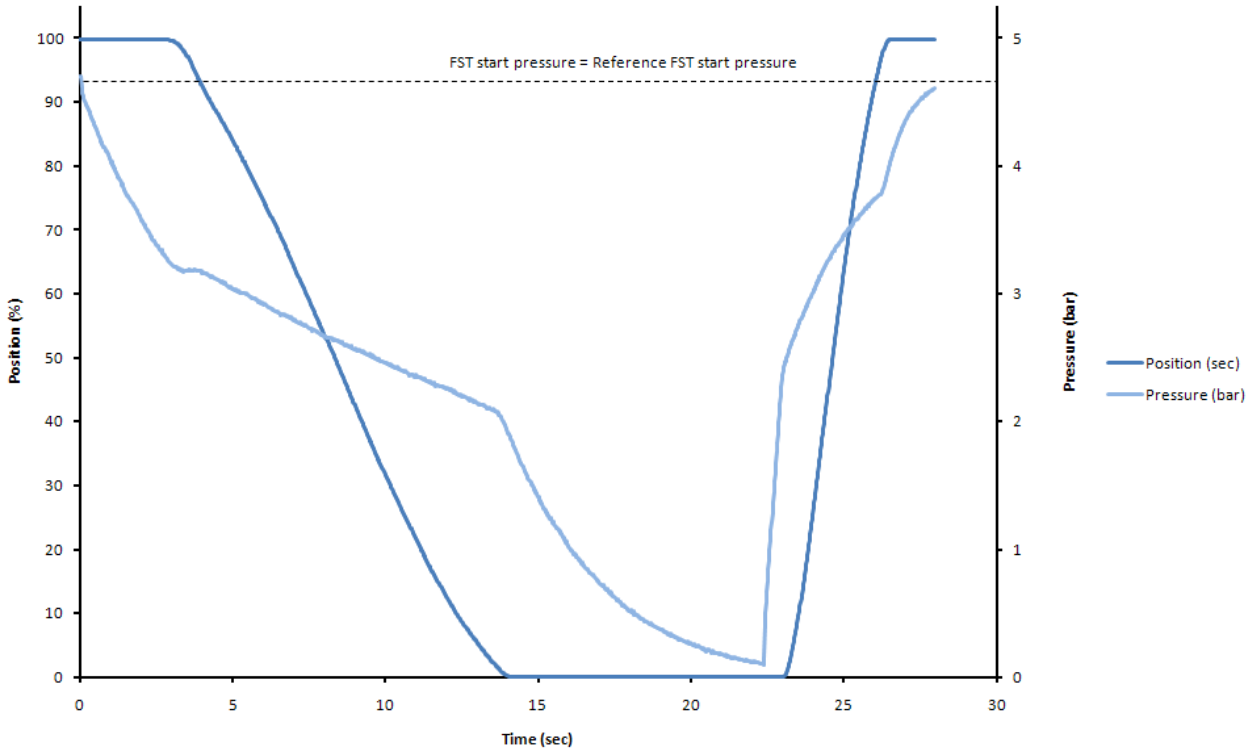
Opening timeout



Start pressure



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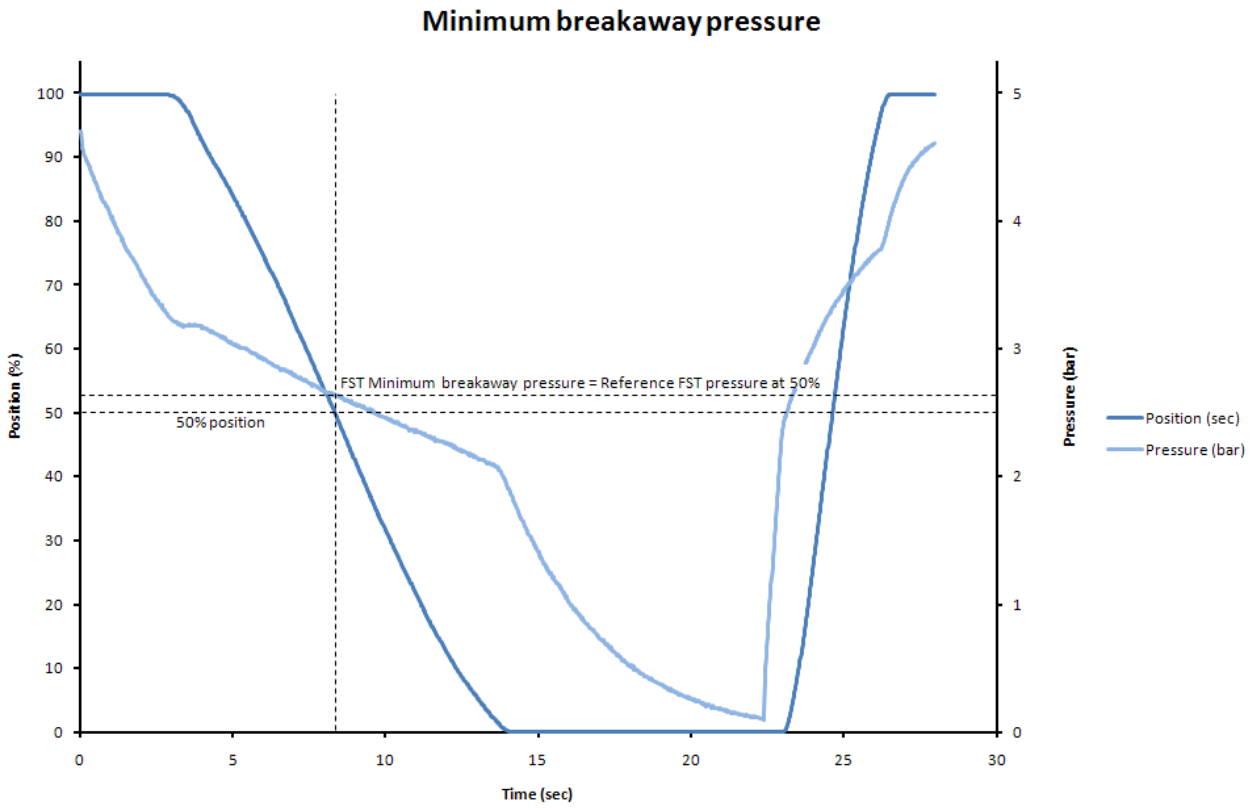


The full stroke warning parameters are set to the following values:

- Low breakaway time = Reference breakaway time – 50%
- High breakaway time = Reference breakaway time + 50%
- Low breakaway pressure = Reference breakaway pressure – 50%
- High breakaway pressure = Reference breakaway pressure + 50%
- Low closing time = Reference closing time – 50%
- High closing time = Reference closing time + 50%

The calibration can take from 120 seconds up to an hour depending on the travel time for the actuator. The valve must not have a travel time larger than 20 minutes.

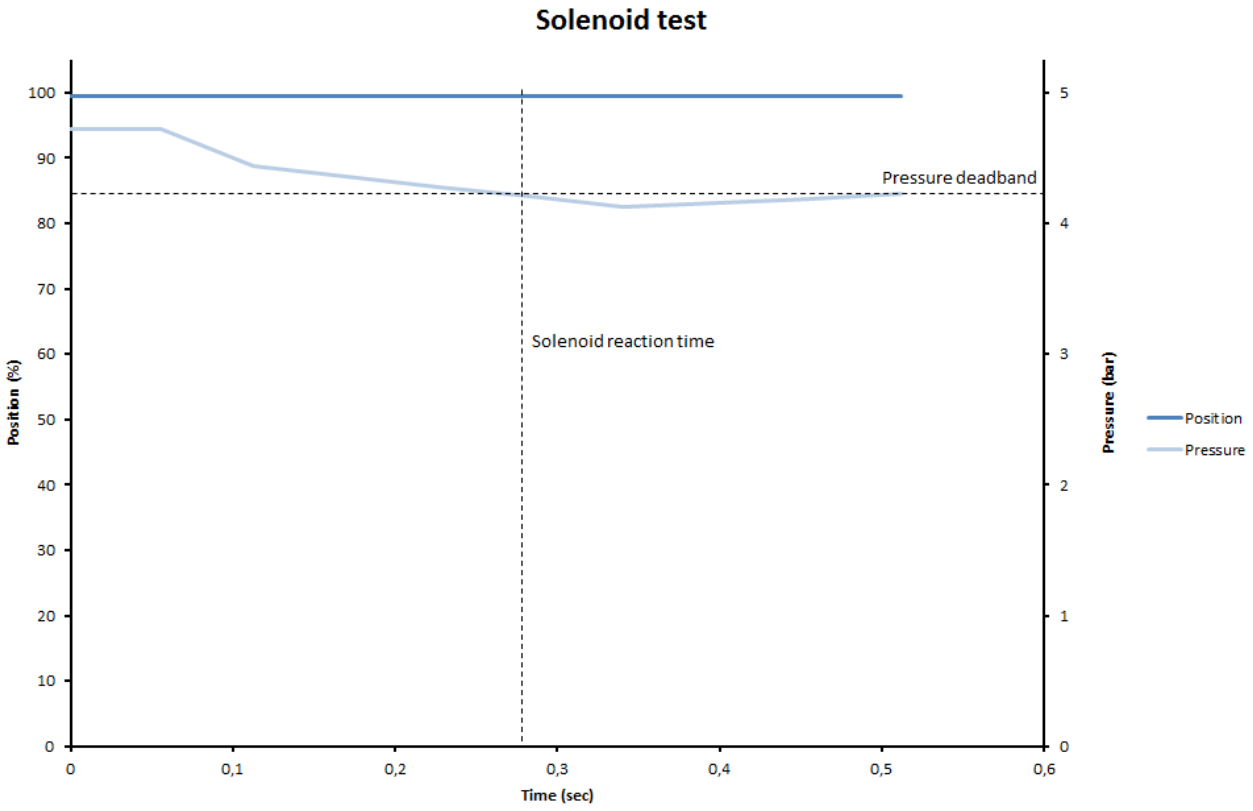
6.1.5 SOT reference curve

Record a solenoid test reference curve and set the solenoid test error parameters like in the automatic calibration.

For the solenoid test the error parameters are set to the following values:

- Max time = Reference breakaway time

The Start pressure error limits is not set automatically.



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6.2 Error

The error menu has three submenues.

Error	Description
1 System errors	List the system errors
2 Events	Event log
3 Test errors	Test related errors

6.2.1 System errors

System errors are errors which relates to the IDP, like configuration, connection and calibration. To see a chart over the error messages see section 8.

6.2.2 Event log

The event log contains the last ten event logged on the system. For a chart with all event log number see section 10.

Some events will carry the most significant test error code.

6.2.3 Test errors

Test errors relates to the performed tests of the valve and actuator. To remove errors from this log a successful test must be performed. To see a chart over the error messages see section 8.

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6.3 Status

If the user want to get a live status on the control parameters or a general view over the chosen configuration parameters, it is possible by pressing the "↓" key while the IDP is showing the front page.

Status	Description
1 Live status	Show updated values
State	State of the IDP (Operational/failure)
ESD Line	ESD line status
Time	Current time
Date	Current date
PV - Travel	% value of the position loop/sensor - Travel
TM - Flow	% value of the transmitter loop - Flow
PV - mA	mA value of the position loop
TM - mA	mA value of the transmitter loop to control room
Pressure	Pressure meassured at AI1
DO1	Current status of DO1
DO2	Current status of DO2
DO3	Current status of DO3
DO4	Current status of DO4
DO5	Current status of DO5
DO6	Current status of DO6
DI1	Current status of DI1
DI2	Current status of DI2
DI3	Current status of DI3
DI4	Current status of DI4
Pressure - mA	mA value of the input
2 Identification	Values to identify the product
Manu	Manufacture
Type	Product type
Bluetooth	Is Bluetooth installed
SW-ID	Software ID
SW ver.	Software version
PCB	Printed circuit board unique number
Tag no.	Tag number

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6.4 Menu

In the setup menu you can choose three submenus, basic and advanced for changing parameters and test to start a test.

Setup	Description
1 Basic	Basic control settings
2 Advanced	Advanced control settings
3 Test	Start a test

In the basic menu you can change some basic control parameters. These changes can be made while the IDP is still in service. In the advanced menu you can change some more advanced parameters. These changes will change how the IDP is working and should not be changed when the system is in production.

The changes in the basic and advanced menu will not have effect before the user leaves the menu and confirms the changes.

In the test menu the diagnostic tests can be started.

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6.4.1 Basic menu

Basic	Default	Values	Reset	Description
1 Transmitter				Transmitter settings
1 Transmitter action				Transmitter action
1 Direct	√		B A	0% flow = 4mA
2 Reverse				0% flow = 20mA
2 Transmitter fail position				Transmitter fail
1 None	√			During failure the transmitter will show the position
2 3.5 mA			B A	During failure the transmitter will be 3.5mA
3 21.5 mA				During failure the transmitter will be 21.5mA
2 Partial stroke				Partial stroke setings
1 Test settings				
1 Pressure deadband	1%	0-10%	B A	The deadband used for the pressure
2 Position deadband	1%	0-10%	B A	The deadband used for the position
3 PST travel	20%	0-100%	B A	Partial stroke travel
2 Error parameters				
1 Start pressure	0-500 bar	0-500.0 bar	B A	The start pressure must be within these values
2 Min breakaway pressure	Auto	0-500.0 bar	B A	Abort the test is the pressure is low and there is no breakaway
3 Breakaway timeout	Auto	0-1200.0 sec	B A	Abort the test if no breakaway within this time limit
4 Closing timeout	Auto	0-1200.0 sec	B A	Timeout from breakaway to SP
5 Total timeout	Auto	0-1200.0 sec	B A	Timeout for entire partial stroke
6 Min allowed pressure	Auto	0-500.0 bar	B A	Abort the test if the pressure is below this limit
3 Warning parameters				
1 Hide warnings	Yes	Yes/no	B A	Hide partial stroke warnings
2 Breakaway pressure	Auto	0-500.0 bar	B A	High and low warning for the breakaway pressure
3 Breakaway time	Auto	0-500.0 bar	B A	High and low warning for the breakaway time
4 Closing time	Auto	0-1200.0 sec	B A	High and low warning for the closing time
5 Maximum travel	Auto	0-100.0%	B A	Warning for maximum travel
3 Full stroke				Full stroke settings
1 Test settings				
1 Pressure deadband	1%	0-10.0%	B A	The deadband used for the pressure
2 Position deadband	1%	0-10.0%	B A	The deadband used for the position
3 Wait at fail pos	10 sec	0-60 sec	B A	During caliobration wait this time at fail position
2 Error parameters				
1 Start pressure	0-500 bar	0-500.0 bar	B A	The start pressure must be within these values
2 Min breakaway pressure	Auto	0-500.0 bar	B A	Abort the test is the pressure is low and there is no breakaway
3 Breakaway timeout	Auto	0-1200.0 sec	B A	Abort the test if no breakaway within this time limit
4 Closing timeout	Auto	0-1200.0 sec	B A	Timeout from breakaway to SP
5 Depressurerising t.o.	Auto	0-1200.0 sec	B A	Timeout from 0% to pressure reaches 0 bar
6 Total timeout	Auto	0-1200.0 sec	B A	Timeout for entire full stroke
3 Warning parameters				
1 Hide warnings	Yes	Yes/no	B A	Hide full stroke warnings
2 Breakaway pressure	Auto	0-500.0 bar	B A	High and low warning for the breakaway pressure
3 Breakaway time	Auto	0-1200.0 sec	B A	High and low warning for the breakaway time
4 Closing time	Auto	0-1200.0 sec	B A	High and low warning for the closing time
4 Solenoid				Partial stroke setings
1 Test settings				
1 Pressure deadband	1%	0-10%	B A	The deadband used for the pressure
2 Position deadband	1%	0-10%	B A	The deadband used for the position
2 Error parameters				
1 Start pressure	0-500 bar	0-500.0 bar	B A	The start pressure must be within these values
2 Max time	Auto	0-1200.0 sec	B A	Abort the test if no pressure drop within this time limit

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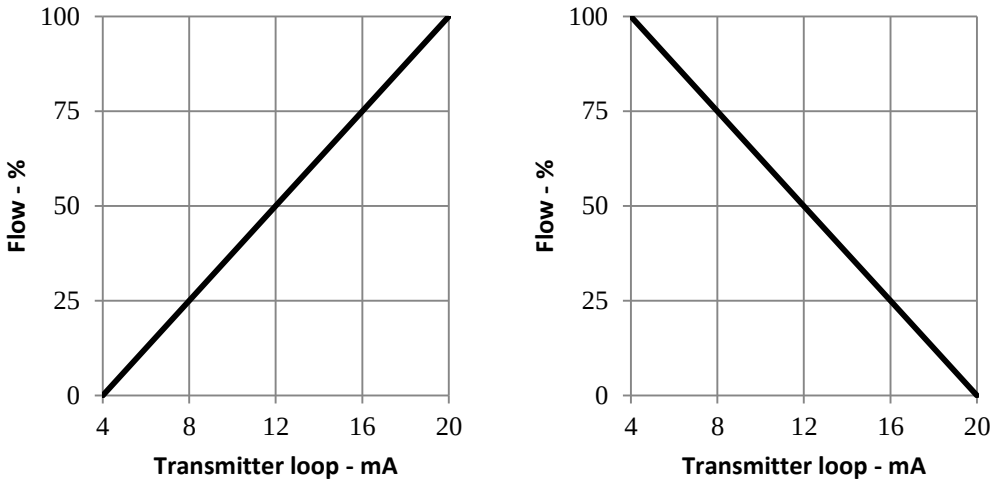
Basic	Default	Values	Reset	Description
5 Display				Display settings
1 Display light	Off	Off/on/auto	B A	Controlling the diplay light
2 Contrast	5	0 - 10	B A	Controlling the diplay contrast
3 Valve action	Direct	Direct/reverse	B A	Set the direction of the valve position on the frontpage

Transmitter

Menu to select the Transmitter Loop to be Direct or Reverse.

- Direct: 0% flow = 4mA
- Reverse: 0% flow = 20mA



When an error is present on the system the transmitter can go into an error position. It is possible to choose the two positions:

- None
- 3.5mA +/- 0.2mA
- 21.5mA +/- 0.2mA

Note: The transmitter loop is only available on some models, even though the menu entry is present on all models.

Partial stroke test settings

Menu to set the settings which are related to the test.

- Deadband pressure
  This setting is a percentage of the pressure loop range
- Deadband position
  Used to detect when the valve is full open
- PST travel
  After moving this distance will the valve open again

Partial stroke error parameters

The parameters in this menu are used to abort the partial stroke test

- Start pressure
  When a test is initiated the pressure is compared with this value. If the pressure deviates more than the pressure deadband from this value a partial stroke cannot be started
- Min. breakaway pressure
  The test is aborted if the pressure is below this limit before breakaway
- Breakaway timeout
  The valve must breakaway within this limit
- Closing timeout
  The valve must move the distance specified in PST travel within this limit
- Total timeout
  The valve must be open again within this time limit
- Min. allowed pressure
  The test is aborted if the pressure is lower than this limit

Partial stroke warning parameters

The parameters in this menu are checked after the partial stroke.

- Disable all partial stroke warnings
- Breakaway time
- Breakaway pressure
- Travel time
- Maximum travel

Full stroke test settings

Menu to set the settings which are related to the test.

- Deadband pressure
  This setting is a percentage of the pressure loop range
- Deadband position
  Used to detect when the valve is full open

Full stroke error parameters

The parameters in this menu are used to abort the full stroke test.

- Start pressure
  When a test is initiated the pressure is compared with this value. If the pressure deviates more than the pressure deadband from this value a partial stroke cannot be started
- Min. breakaway pressure
  The test is aborted if the pressure is below this limit before breakaway
- Breakaway timeout
  The valve must breakaway within this limit
- Closing timeout
  The valve must close within this limit
- Depressurising timeout
  The pressure must reach 0 bar within this time limit
- Total timeout
  The valve must be open again within this time limit

Full stroke warning parameters

The parameters in this menu are checked after the full stroke. They are used to warn the operator that the valve system has changed performance.

- Disable all full stroke warnings
- Breakaway pressure
- Breakaway time
- Closing time

Display

- In this menu it is possible to turn the display light on, off or set it to automatic. When set on automatic the display light will turn on when using the keyboard and turn off after 5 min. not using the keyboard.
- The contrast level of the display can be adjusted.
- The direction of the position shown on the front page can be reversed.

6.4.2 Advanced menu

Advanced	Default	Value	Reset	Description
1 Manual control				Manual control of positioner.
1 Pulse				Manual close valve when button is pushed
2 Hold				Manual shift and hold open and close state of valve
2 Signal calibration				Calibration of signals to control room
1 Transmitter loop				Calibration of 4-20 mA transmitter signal
2 Position loop				Calibration of 4-20 mA position signal
3 Pressure loop				Calibration of 4-20 mA analogue input 1
3 Configuration				Configuration of in- and outputs
1 Position feedback				Position feedback input
1 Position sensor	√		A	Potentiometer input
2 Position loop				4-20mA input
2 Pressure feedback				Configuration of pressure signal
1 Loop configuration				Configure the connected pressure transmitter
1 Loop 4mA value	0 bar	0 - 500 bar	A	Pressure at 4mA
2 Loop 20mA value	120 bar	0 - 500 bar	A	Pressure at 20mA
3 Start test				Configuration of start partial stroke button
1 PST input signal	Not used		A	Select input signal to start a PST
2 FST input signal	Not used		A	Select input signal to start a FST
3 SOT input signal	Not used		A	Select input signal to start a SOT
4 Local control				Configuration of start partial stroke button
1 Operational input signal	Not used		A	Select input signal to set the IDP in operational positior
2 Fail pos. input signal	Not used		A	Select input signal to set the IDP in fail position
5 Test status				Signal is active when the last PST or FST failed
1 Fail output signal	Not used		A	Signal which is active when last test failed
2 Fail timeout				Turn off the signal after the specified time
1 Status	On/Off	Off	A	Turn the time out on and off
2 Time	1-240 min	10 min	A	The timeout time
3 Pass output signal	Not used		A	Signal which is active when last test passed
4 Pass timeout				Turn off the signal after the specified time
1 Status	On/Off	Off	A	Turn the time out on and off
2 Time	1-240 min	10 min	A	The timeout time
5 Test output signal	Not used		A	Signal which is active when test is in progress
6 Reset				Require a reset to get the valve to the operational positi
1 Active	Off	Off/On	A	Activate the reset function
2 Reset on power on	Off	Off/On	A	Require reset after power on
3 Output signal	Not used		A	Ready to reset signal output
7 End position				Configuration of endposition signal
1 Output signal 0%	Not used		A	Select output which is active at 0%
2 Output signal 100%	Not used		A	Select output which is active at 100%
3 Deadband	0.5%		A	Deadband for endpoint signal
8 Position endpoints				Adjust position endpoints
1 Pos. ADC 1st end			A	Adjust 1st endpoint ADC
2 Pos. ADC 2nd end			A	Adjust 2nd endpoint ADC
9 PST scheduler				PST scheduler
1 Status	Off	Off/On	A	Enable the scheduler
2 Months	None	Jan - Dec	A	Set month to run a PST
3 Days	None	1-31	A	Set days to run a PST
4 Hour	9	0-23	A	Set Hour to run a PST

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Advanced	Default	Value	Reset	Description
4 Conf. Logging				Clock settings
1 Set clock			A	Set the clock
2 Sample time	Auto	2-250ms	A	Set the sample time
5 Reset				Resetting of positioner
1 Basic reset				Resets all marked with B
2 Advanced reset				Resets all marked with A and B
6 HART/Modbus				See seperate manual

Manual control

In manual control it is possible to control the ESD output manually.

Signal calibration

In this menu the user can calibrate analogue input and output signals.

Configuration

In configuration the user can choose the desired position feedback. All input and output signals can also be configured.

- Position feedback
  Select the position input, either a potentiometer or a 4-20mA loop
- Pressure feedback
  Set the pressure range of the pressure transmitter
- Start test
  - PST input signal: Select an input which can start a partial stroke test. The input must be activated 3 seconds to start the test.
  - FST input signal: Select an input which can start a full stroke test. The input must be activated 3 seconds to start the test.
  - SOT input signal: Select an input which can start a solenoid test. The input must be activated 3 seconds to start the test.
    (Do not initiate a test when retrieving signatures through a communication bus)
- Local control
  - Operational: Select an input which can set the IDP in normal operation. The input must be activated 3 seconds
  - Fail Position: Select an input which can set the IDP in fail position. The input must be activated 3 seconds
- Test status
  - Fail output signal: Select one output to be active when the last test failed
  - Fail status: Configuration to turn the output off after some time
  - Pass output signal: Select one output to be active when the last test passed
  - Pass status: Configuration to turn the output off after some time
  - Test output signal: Select one output to be active when a test is in progress
- Reset
  - When the reset function is active the IDP will require an operational signal to activate the solenoid after an ESD is detected
  - Reset on power on will require an operational signal after power on. Active must be set to on.
  - Select the output signal which is active when the IDP is ready to reset

- End position
  Select two outputs which where one will be active when the valve is open and one is active the valve is closed. The deadband set the distance to respectively 0% and 100% which will activate the output.
- Position endpoints
  Adjust the position endpoints. This setting should never be changed
- PST scheduler
  The scheduler can be activated and set to perform a PST in different month, up to 4 days per month and once per day

Configuration logging
The built in clock can be adjusted as well as the sample time used for recording the signature files. Increasing this value will decrease the size of the files.

Reset
In this menu it is possible to reset the positioner back to standard setting.

Basic reset: Reset the parameters in the basic menu.

Advanced reset: Reset the calibration and all the parameters except the calibration of the transmitter loop. Use this if moving the positioner to another system.

6.4.3 Test

The valve can be tested using the menu.

Test	Description
1 Partial stroke test	Start the partial stroke test
2 Full stroke test	Start the full stroke test
3 Solenoid test	Start the solenoid test

Do not initiate a test when retrieving signatures through a communication bus.

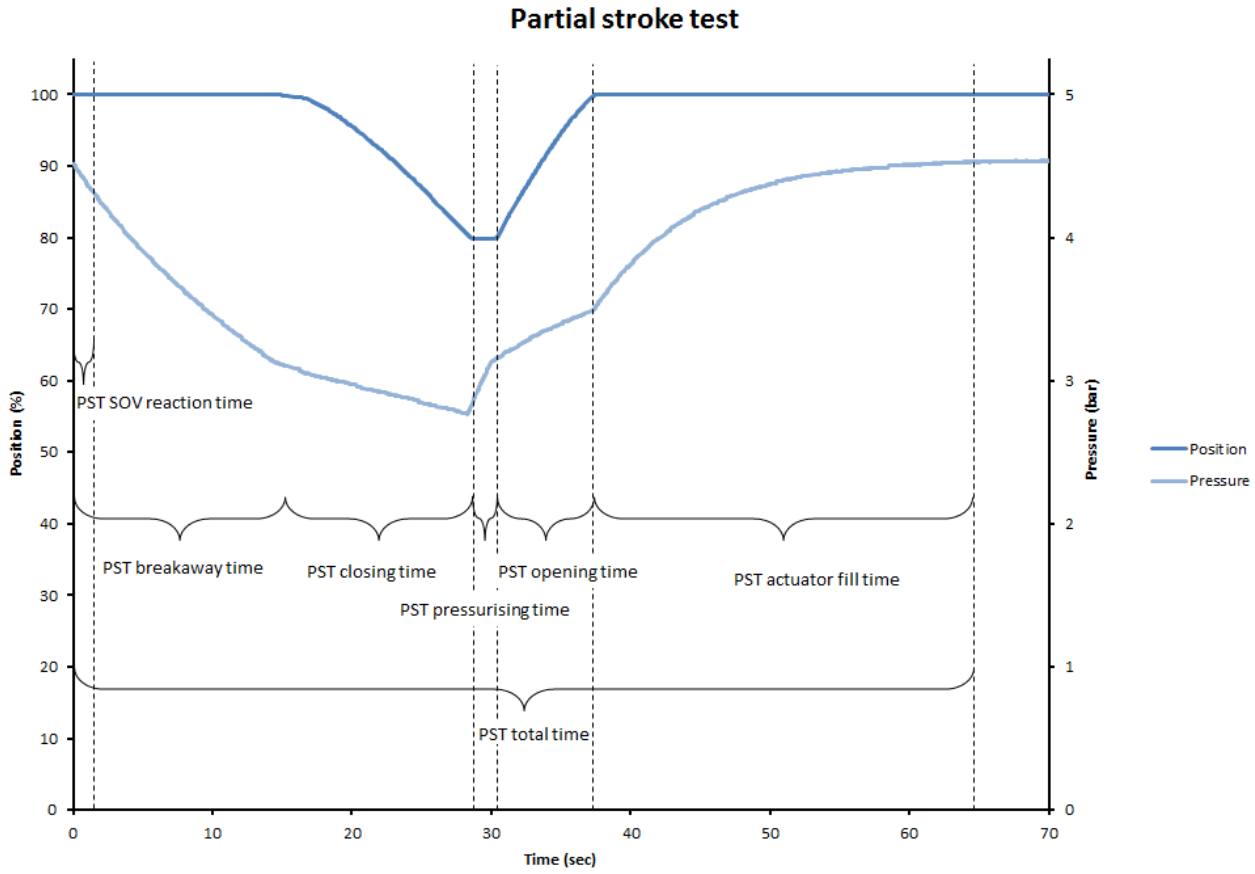
7 Tests

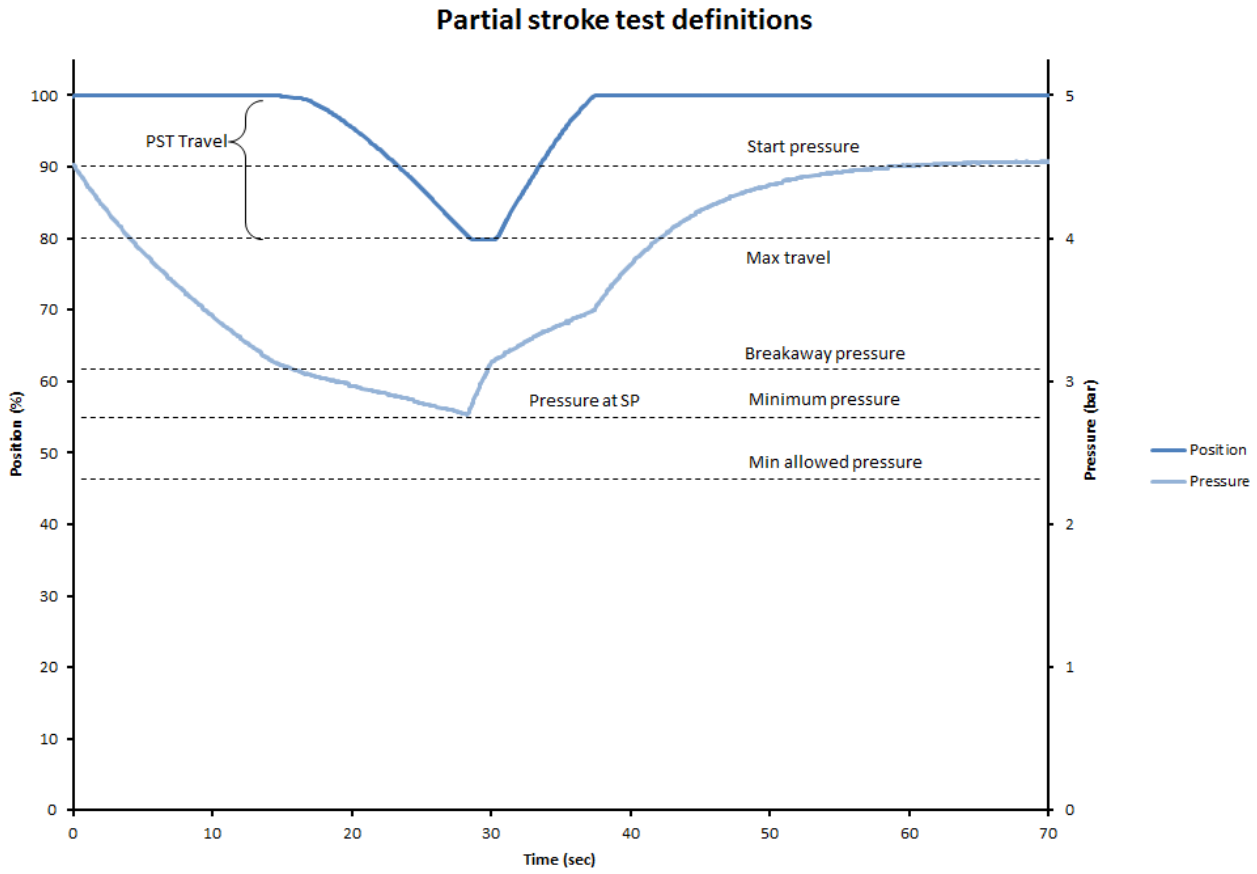
7.1 Partial stroke test

The partial stroke exercises the actuator and the valve and confirms that the actuator can move the valve. The test can be initiated from the test menu (1).

The actuator will move the distance specified by “PST travel” in the basic setup menu (2.1.3) and then go back to its operating position. If PST travel is 20%, the actuator will move from 100% to 80% and back again. The short travel will only impact the flow in the valve insignificantly and therefore can the test be performed while the system is in production.

Below is a signature from typical partial stroke shown, including definitions on the different terms further used in this manual.





Before the IDP is able to perform a partial stroke the system must be calibrated. The calibration consists of two steps, an endpoint calibration and a reference where a reference signature is recorded and the test settings, warning and alarm parameters are set. For more information on the calibration see page 16.

When a partial stroke is started the position and pressure are evaluated. The valve must be full open before the partial stroke can start as well as the pressure must be within the pressure deadband of the start pressure. The signatures and measured times will not be compared with the reference stroke if the start conditions are not correct. An error will be indicating what the problem is.

The IDP monitors the position and pressure during the partial stroke. The IDP aborts the partial stroke and report an error if the limits in the error parameters are reached.

If a partial stroke does not reach the limits it will run until finished and then the warning parameters are evaluated.

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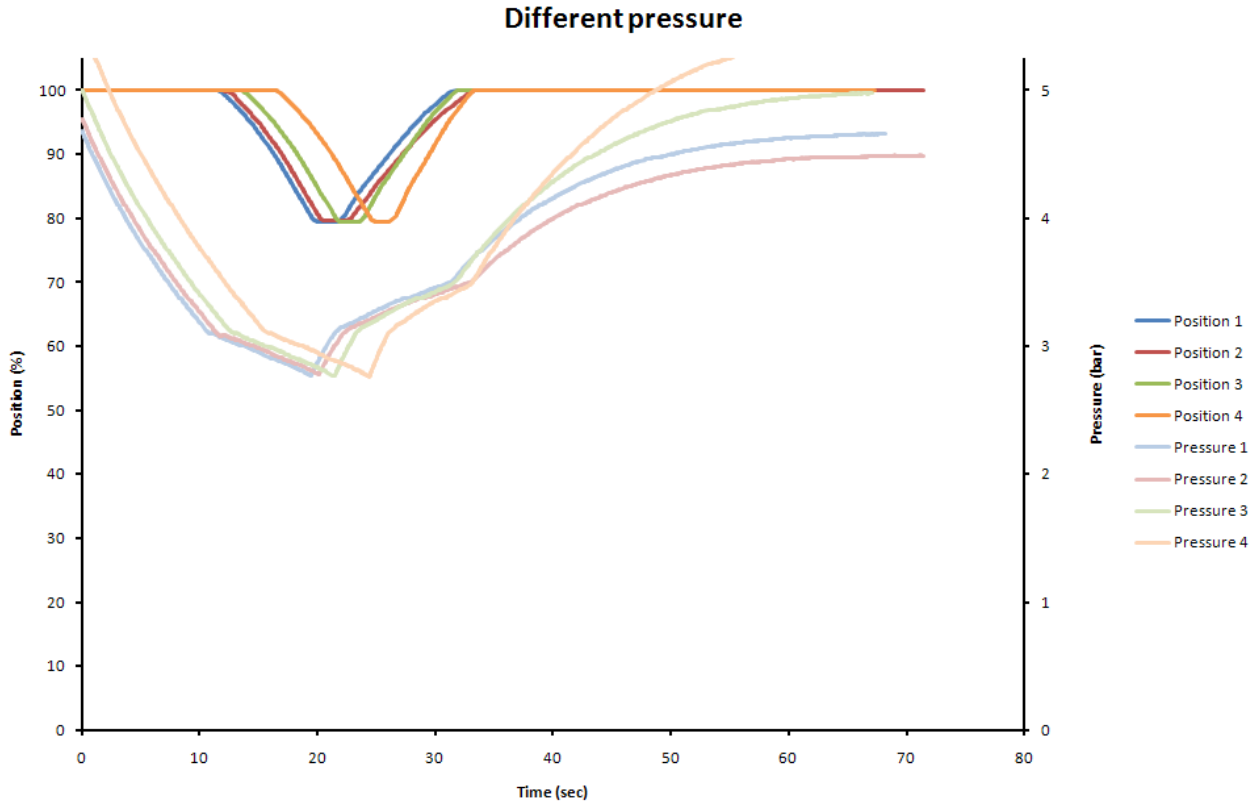
7.1.1 Partial stroke errors

The error and warning parameters are automatically set during calibration but can be manually adjusted in the basic menu (2.2 and 2.3).

PST start condition: Not full open (Error: 401)

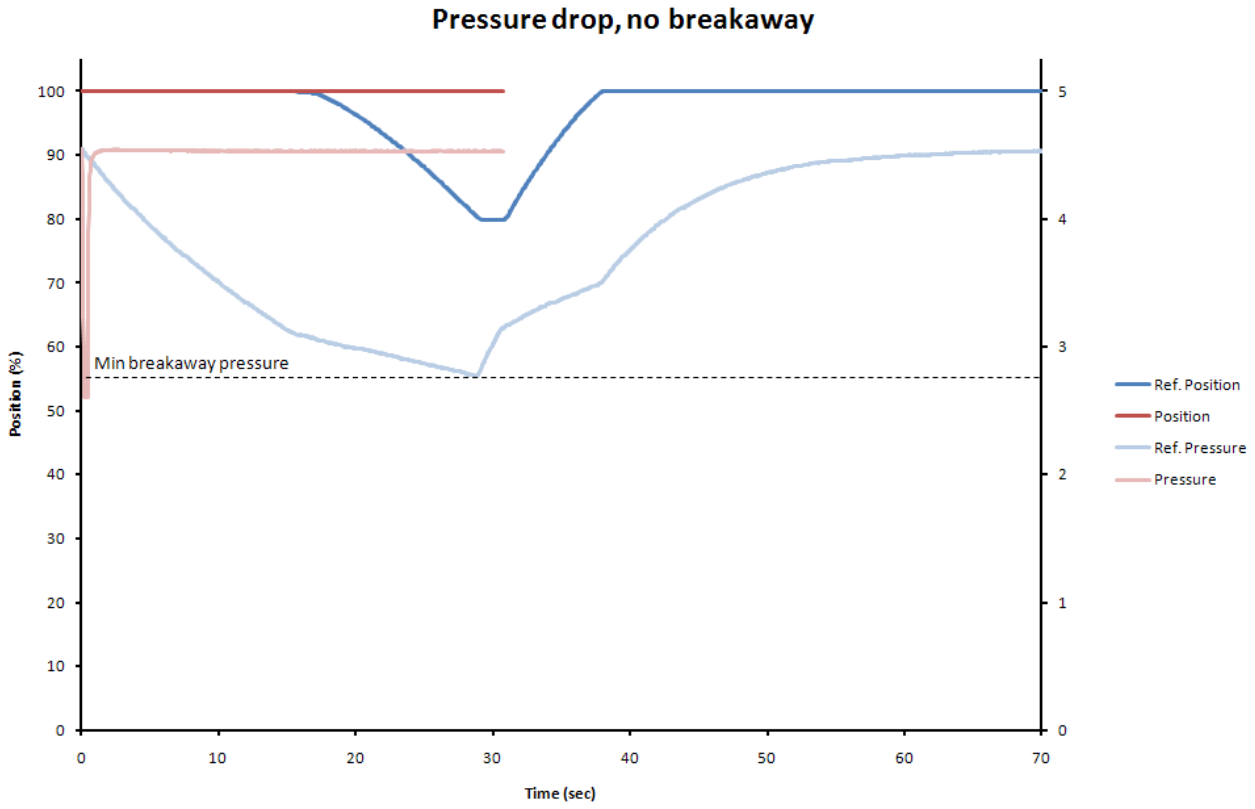
The valve must be full open to perform a partial stroke. All measured times and pressures depends on that the valve is full open.

PST start condition: Low/High start pressure (Error: 402 and 403)
The IDP measures time and pressure values and uses these to evaluate the status of the valve and actuator. The graph below shows signatures for partial stroke tests on the same system with different pressures. The pressure influences the breakaway time and opening time.



PST error: Pressure drop, no breakaway (Error: 411)

This arises when pressure goes below the minimum breakaway pressure before the breakaway is detected. It can happen if the valve is stuck.



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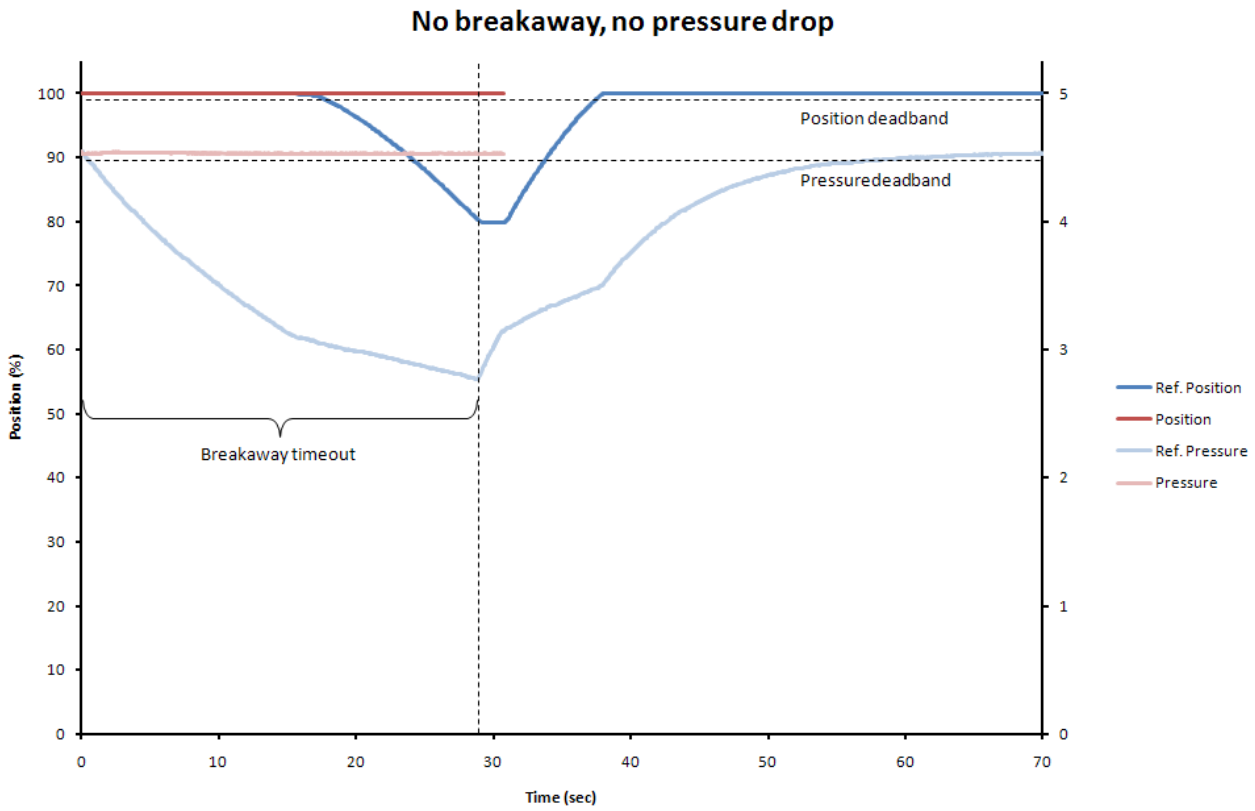
PST error: No breakaway, No press. drop (Error: 412)
This arises if neither position signal nor pressure signal has changed within the breakaway timeout.

This can occur if the solenoid valve is not reacting or the output of the solenoid valve is blocked.



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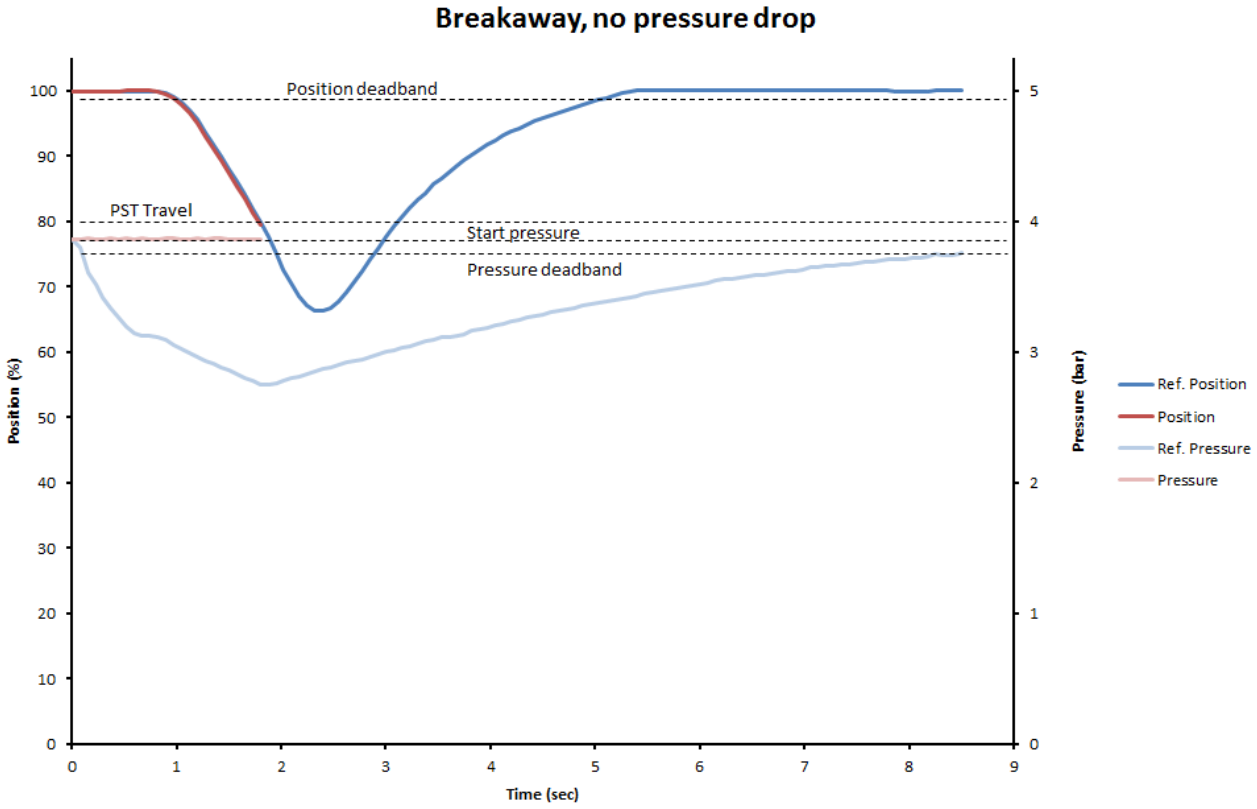
PST error: Breakaway, no pressure drop (Error: 413)
This arise if there is not detected any change on pressure signal before breakaway is detected.

The pressure transmitter is not detecting the pressure drop. The start conditions ensure that the pressure transmitter is connected and hence the problem must be a blocked pressure transmitter not a disconnected pressure transmitter.



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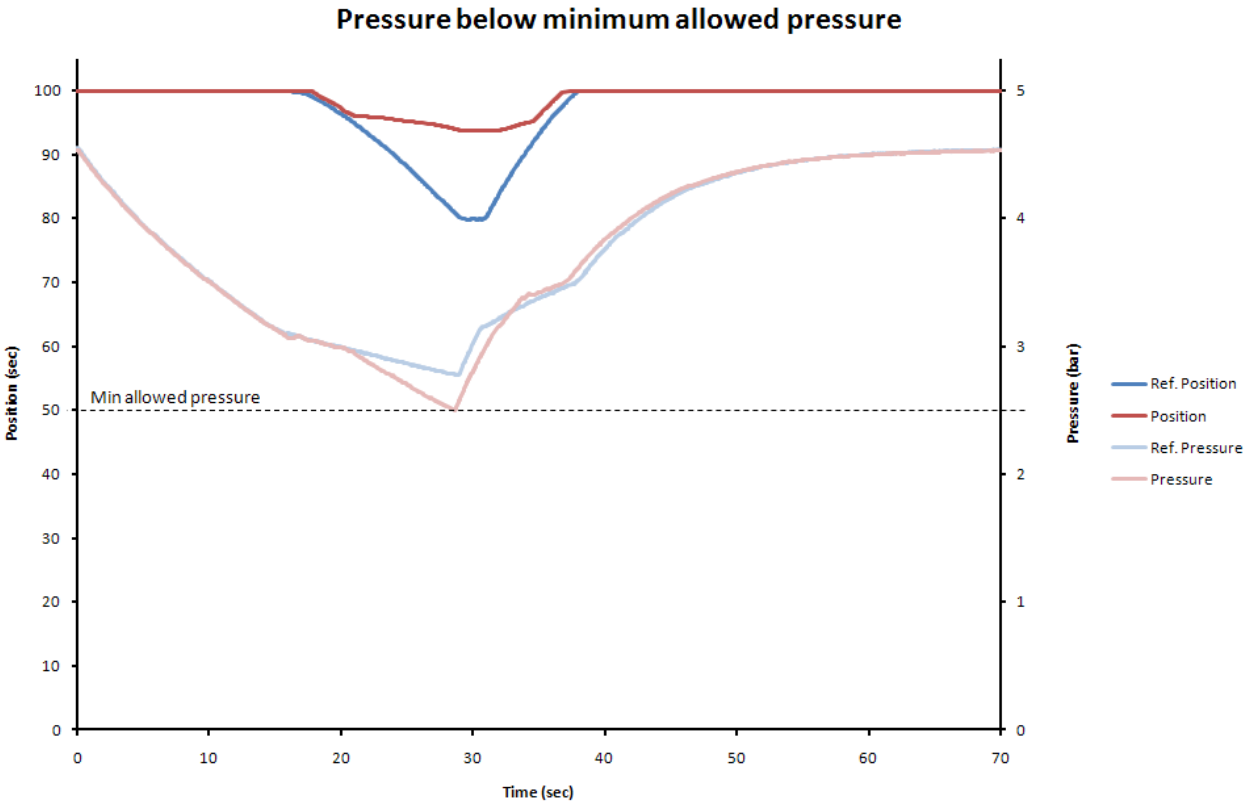
PST error: Pressure below minimum allowed (Error: 414)
This arises when then pressure goes below the minimum allowed pressure.

It can be caused by a broken spring or increased torque in the actuator, valve or stem.



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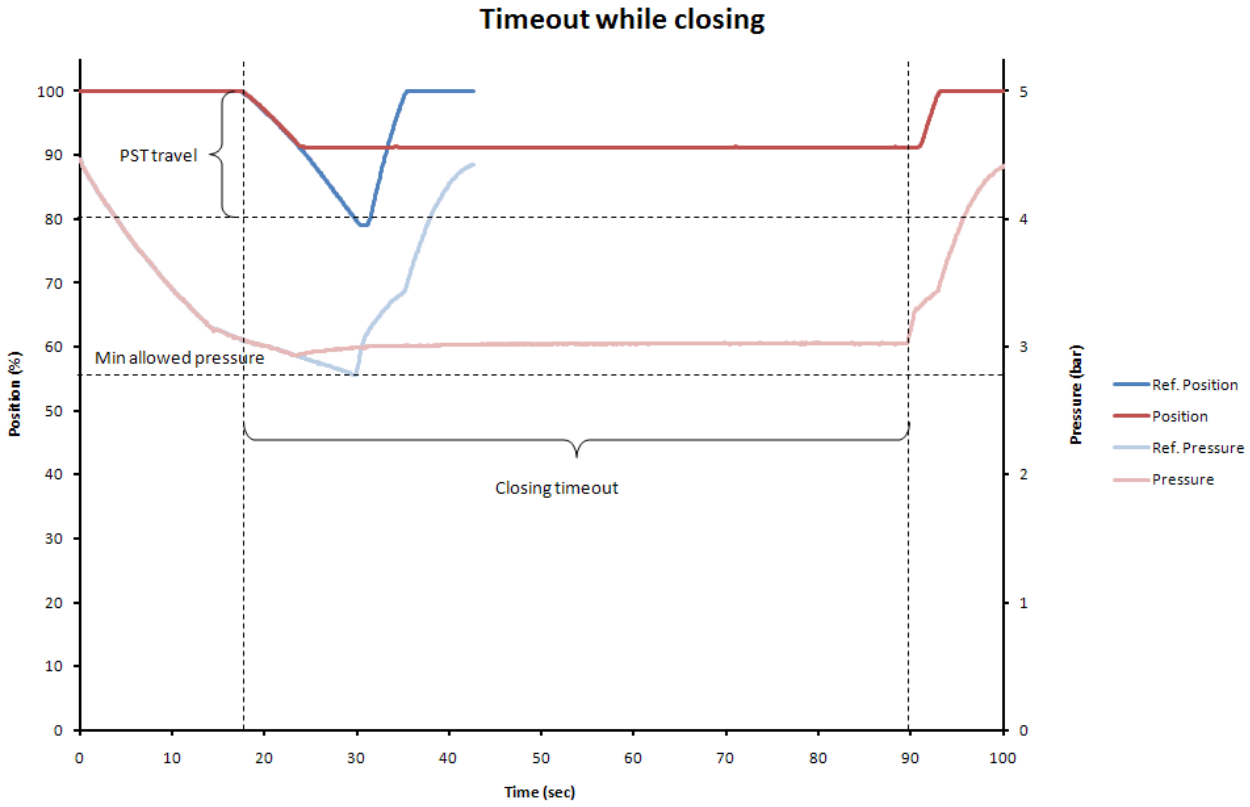
PST error: Timeout while closing (Error: 415)

This arises if the pressure is above the minimum allowed pressure and position has not moved the PST travel.



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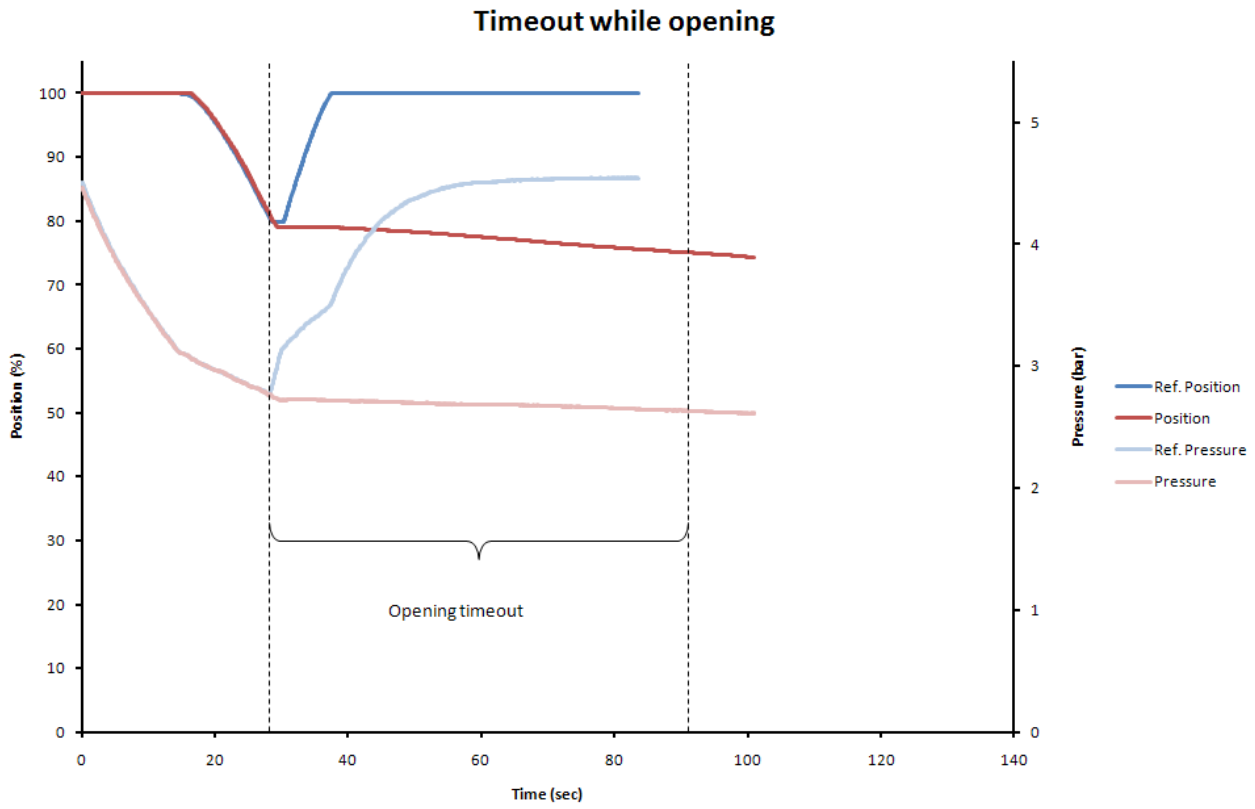
PST error: Timeout while opening. Position (Error: 416)
This arises if the valve is unable to open again.

The cause of this problem may be no supply pressure or that the solenoid valve cannot be energized.



PST error: Timeout while opening. Pressure (Error: 417)
This arises if the pressure does not reach the starting pressure after a stroke, but the valve is full open.

The cause of this problem may be low supply pressure.

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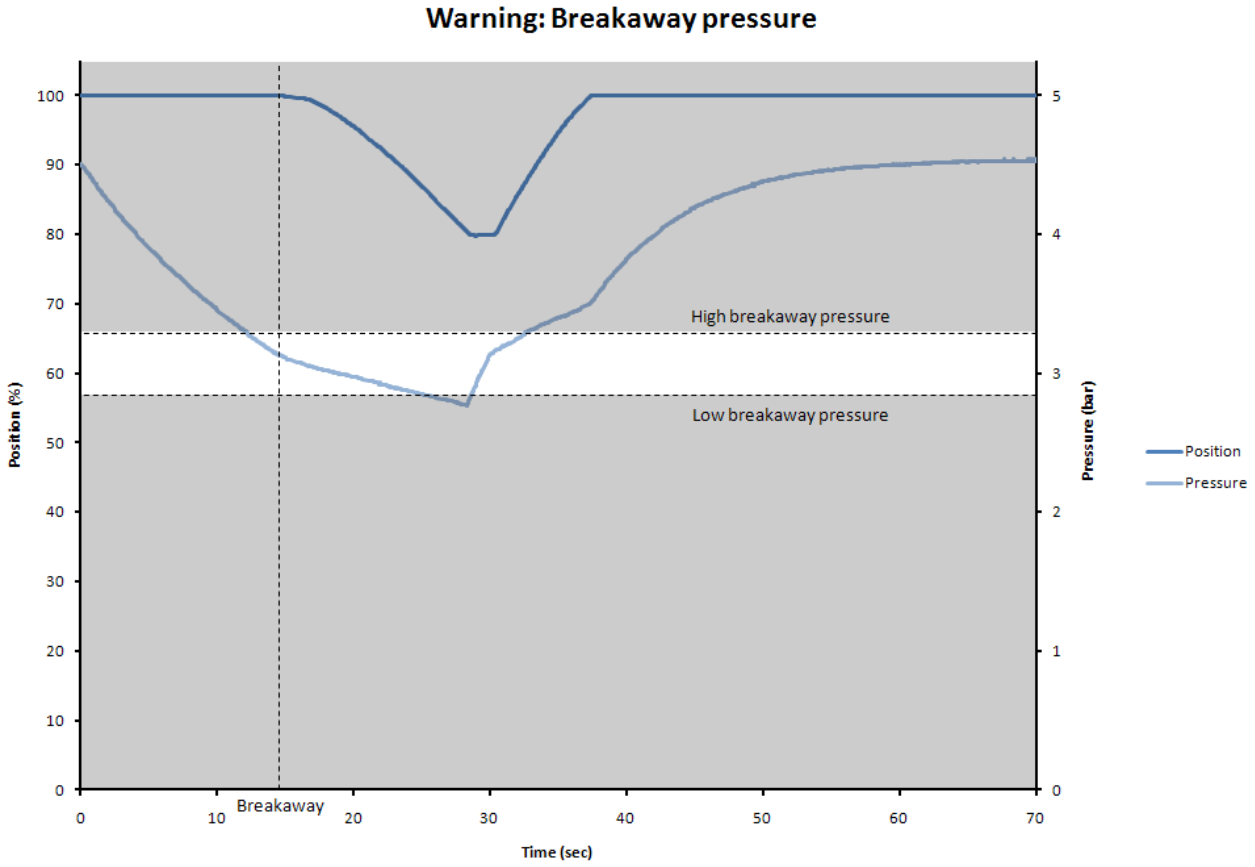
7.1.2 Partial stroke warnings

Warnings can be used to notify the operator that the actuator or valve has changed characteristics. For both breakaway time and travel time it is possible to set a high and low error level in the basic setup menu (2.3). It requires knowledge of the physical system to determine reasonable error and warning limits as they depends on several factors, e.g. variation in pressure in the hydraulic/pneumatic system. If the measured times exceed the alarm limits is an error raised. The error can only be removed by performing a successful partial stroke.

PST warning: Breakaway pressure (Error: 431 and 432)
The breakaway pressure is defined as the pressure the first time the position is more the position deadband away from 100%.

A Change in the breakaway pressure indicates that the system has changed.



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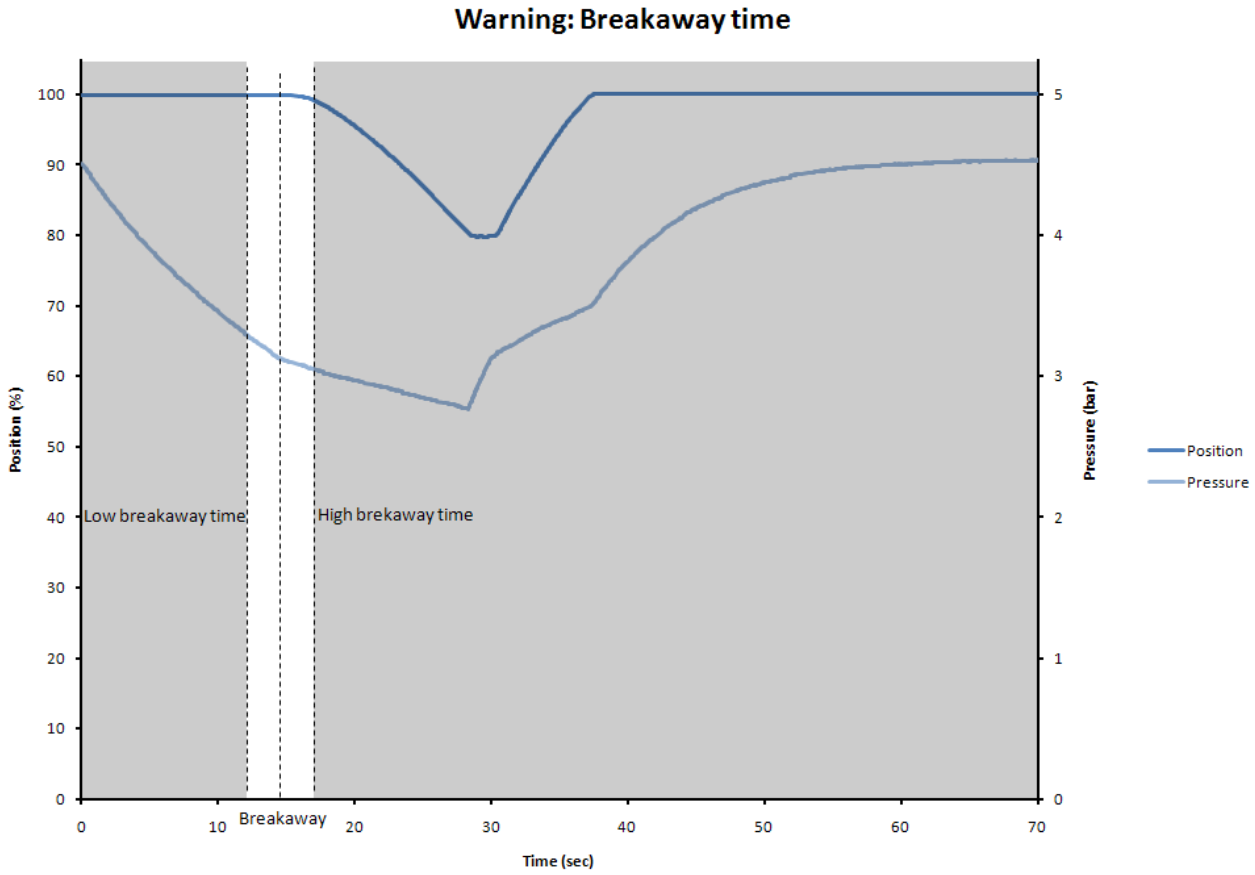
PST warning: Breakaway time (Error: 433 and 434)

The breakaway time is measured from the test is initiated to the valve position has moved the amount specified as deadband in the basic setup menu (2.1.2).

A long breakaway time may indicate that the valve is stuck in the operational position and then when it breaks away moves fast as there is build up pressure in the hydraulic/pneumatic system.



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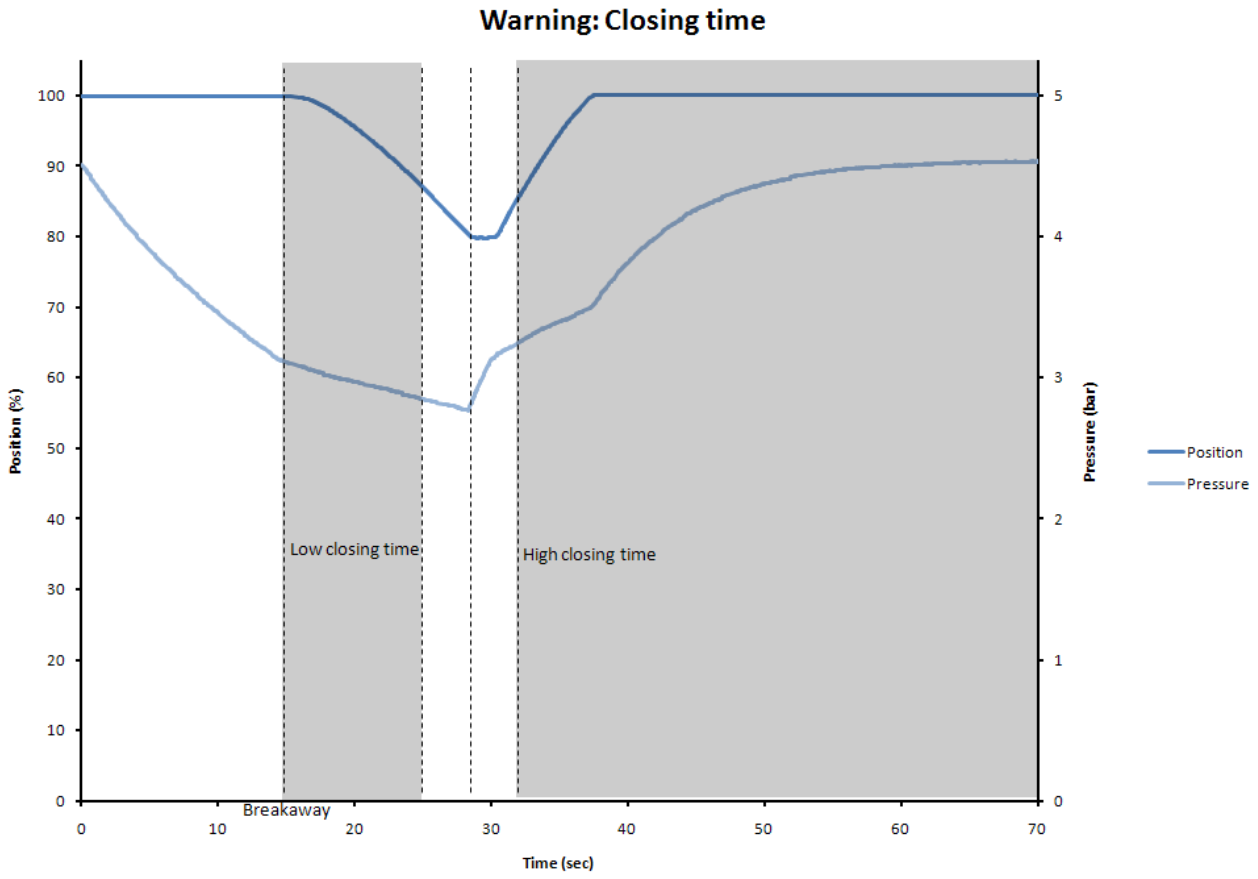
PST warning: Closing time (Error: 435 and 436)

The closing time is defined as the time it takes to move from full open to the PST set point.

If the partial stroke closing time has changed it indicates that the full stoke closing time may also have changed.



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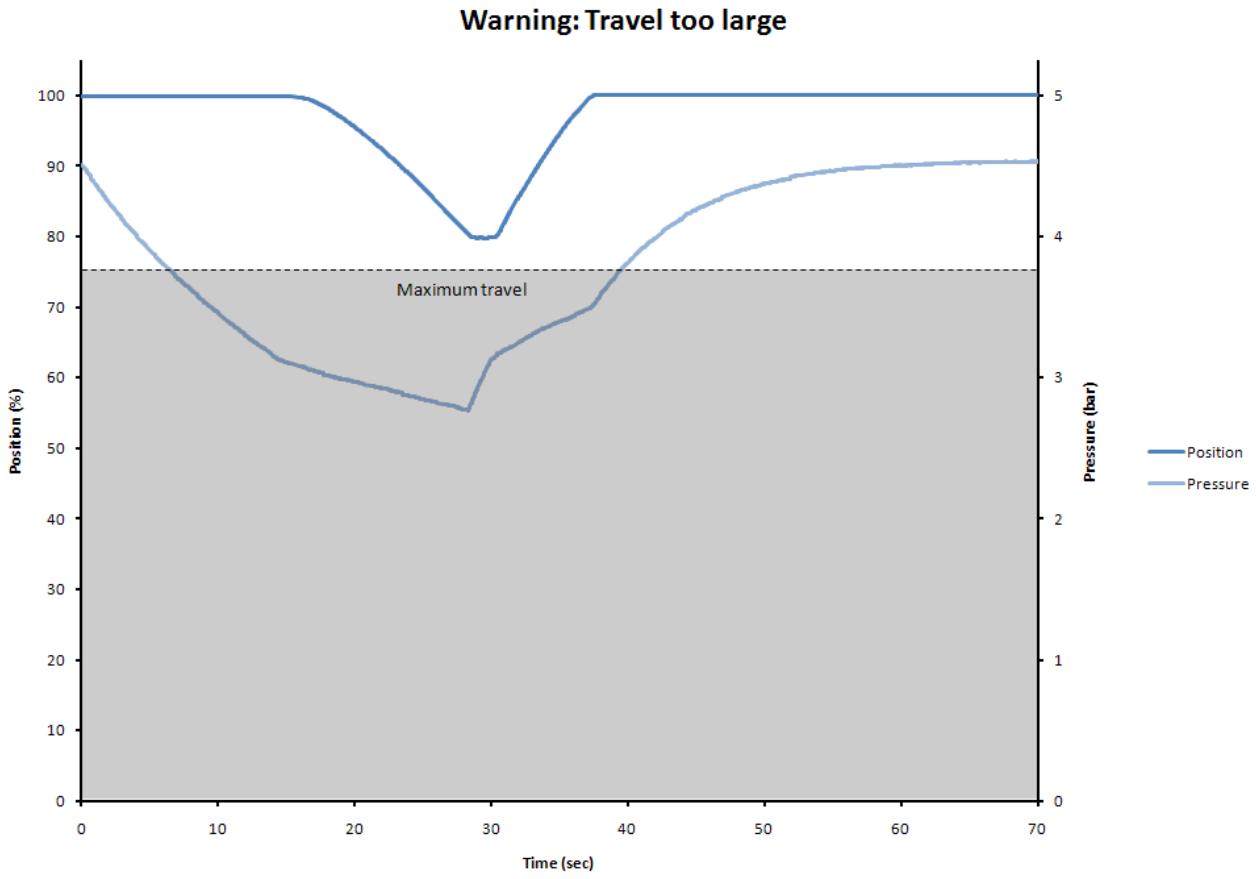
PST warning: Travel too large (Error: 437)

During the partial stroke the IDP monitors the maximum travel from full open. The alarm on the travel can be used to ensure that the partial stroke does not interrupt the production by moving the valve too much.



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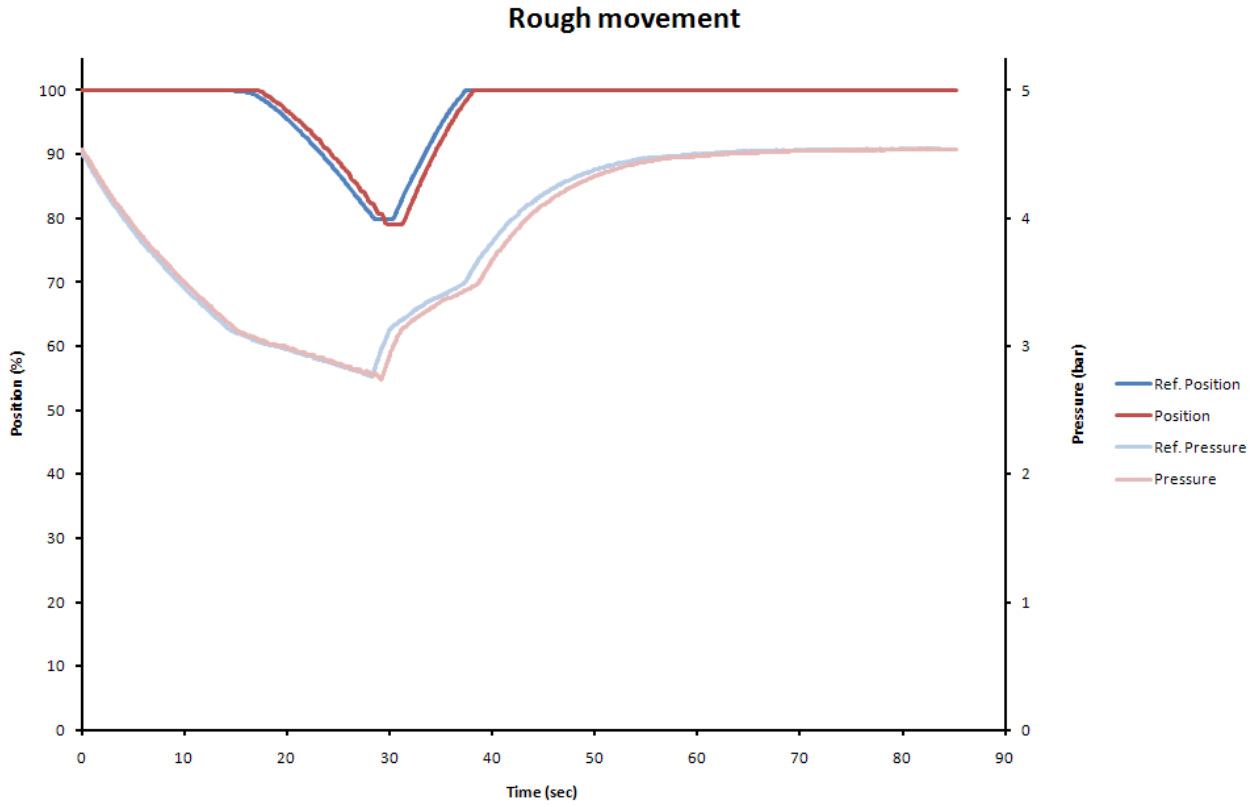
Rough movement



The IDP will not report errors if the deviations from the reference curve are small. In cases like this the signatures must be extracted and analysed visually.

The above example shows a curve from a valve with increased torque which leads to uneven movement. The measured times and pressures does not give an error but in time the performance will be so bad that it will give errors.

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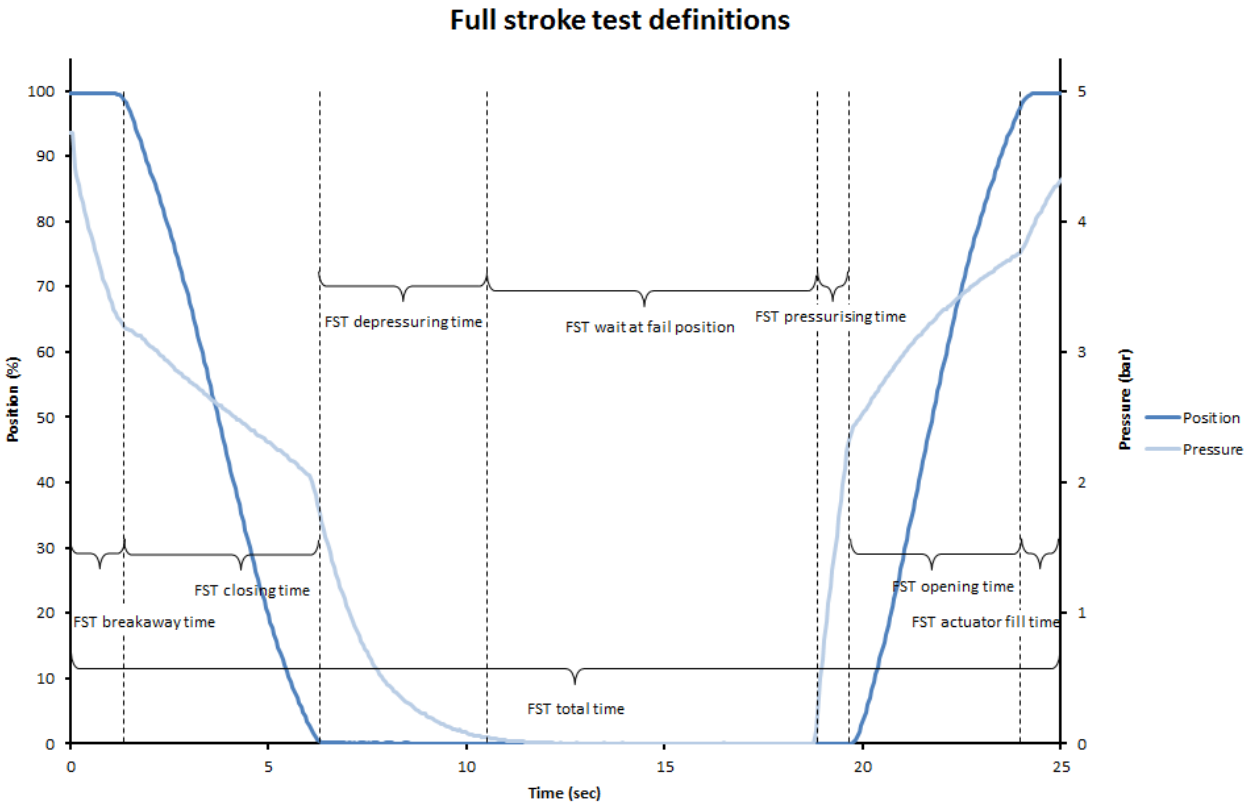
7.2 Full stroke test

The full stroke test will usually only be performed when the system is not in operation.

The full stroke test can be used to verify that the valve can be closed within a specified time. More over the full stroke test will also test for situations when it is desirable to abort the test like with the partial stroke test. The default limits are however more relaxed for the full stroke test compared to the partial stroke test.



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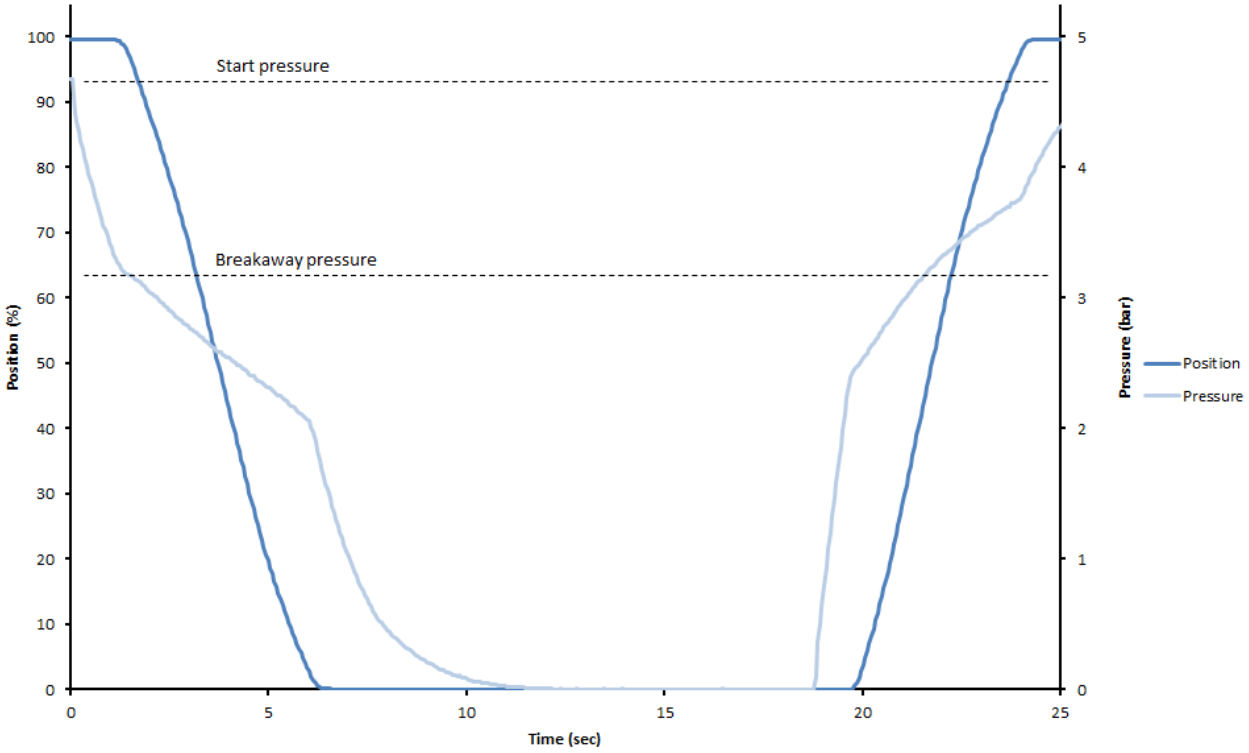
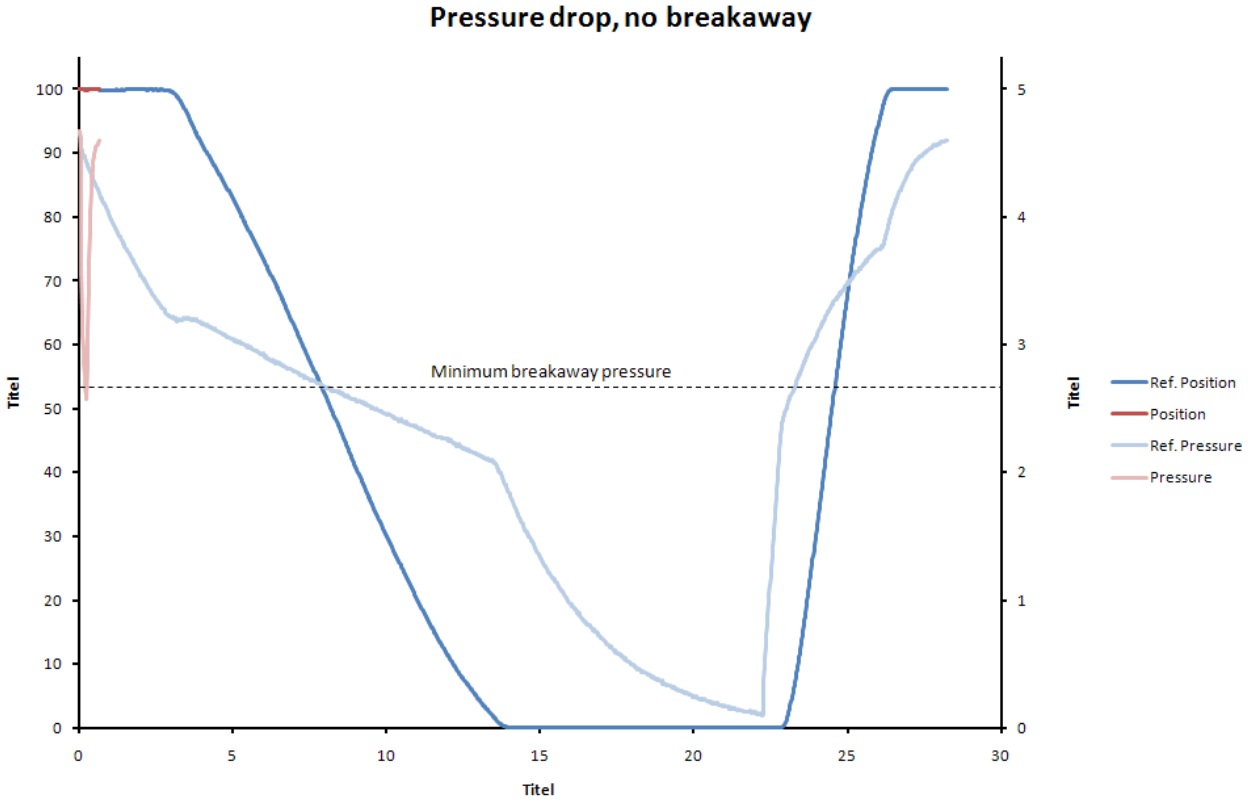
Full stroke test definitions



7.2.1 Full stroke errors

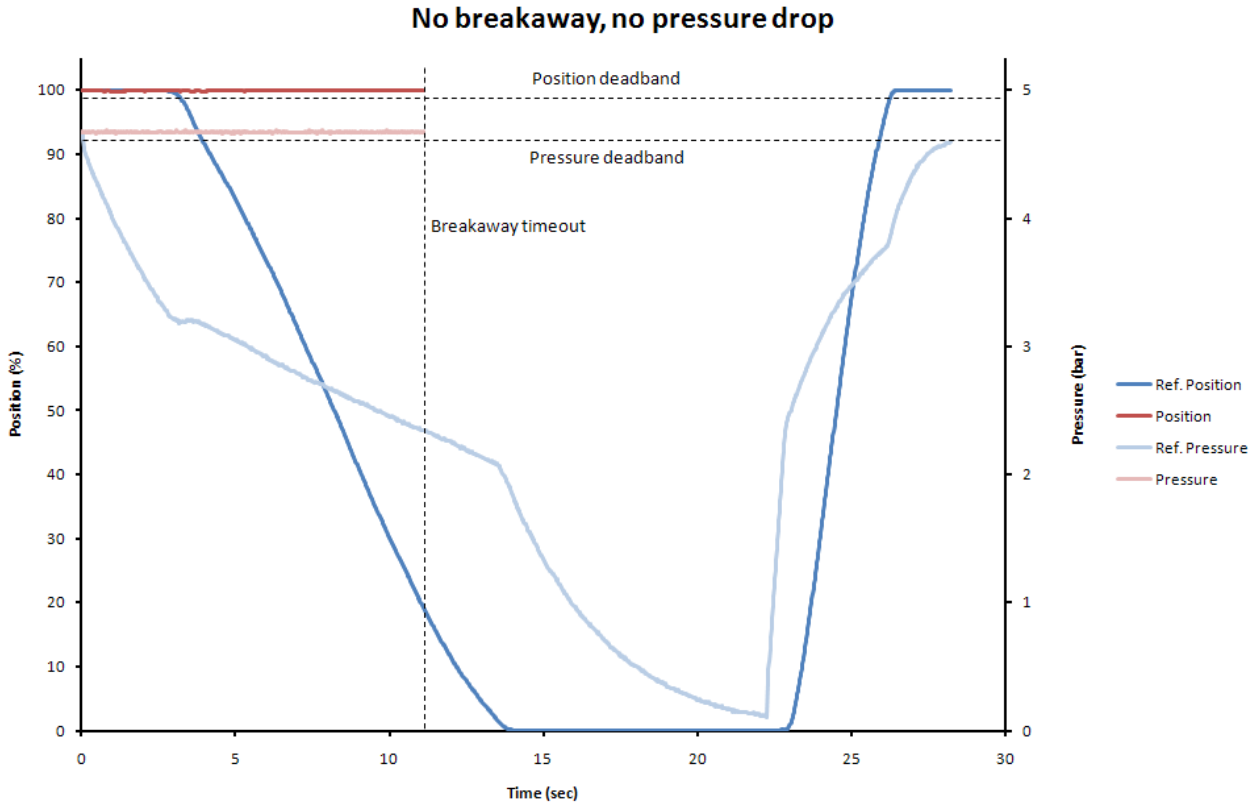
FST error: Pressure drop, no breakaway (Error: 461)
This arises when pressure goes below the minimum breakaway pressure before the breakaway is detected. It can happen if the valve is stuck.



FST error: No breakaway, No press. drop (Error: 462)

This arises if neither position signal nor pressure signal has changed within the breakaway timeout.

This can occur if the solenoid valve is not reacting or the output of the solenoid valve is blocked.



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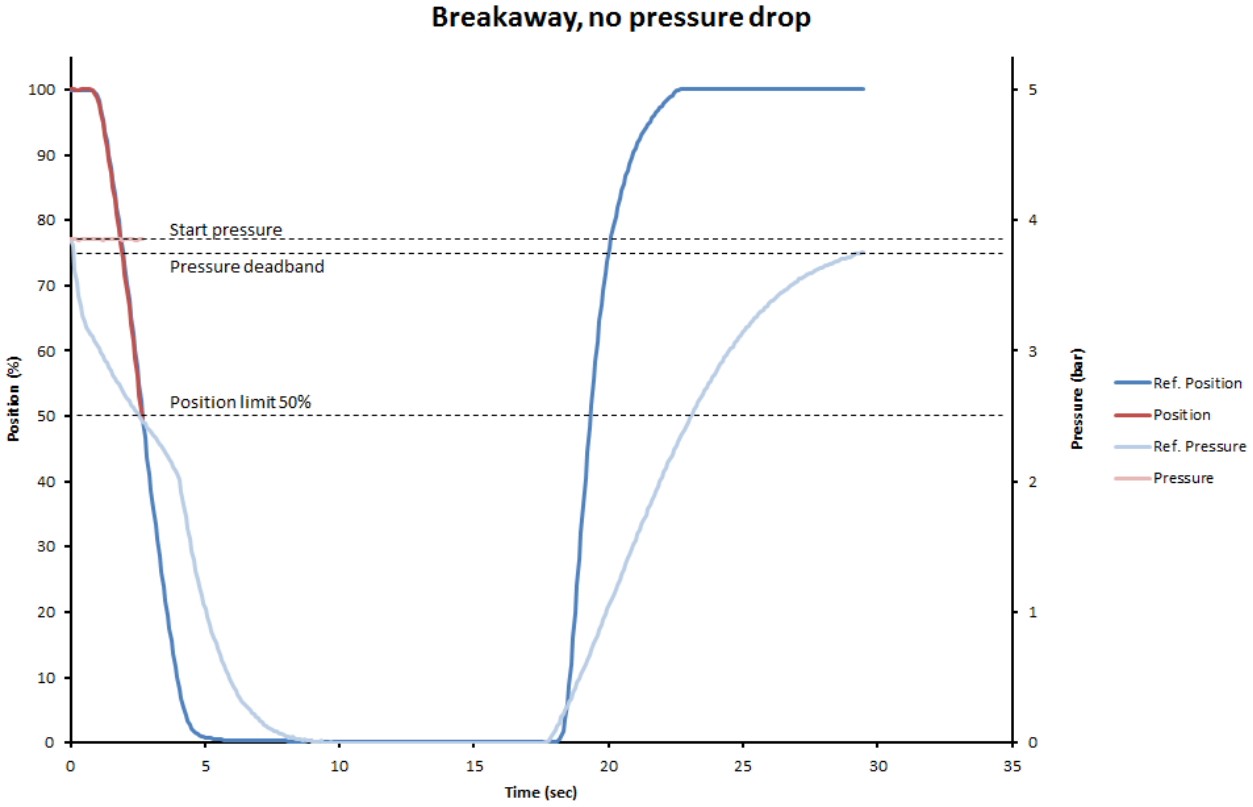
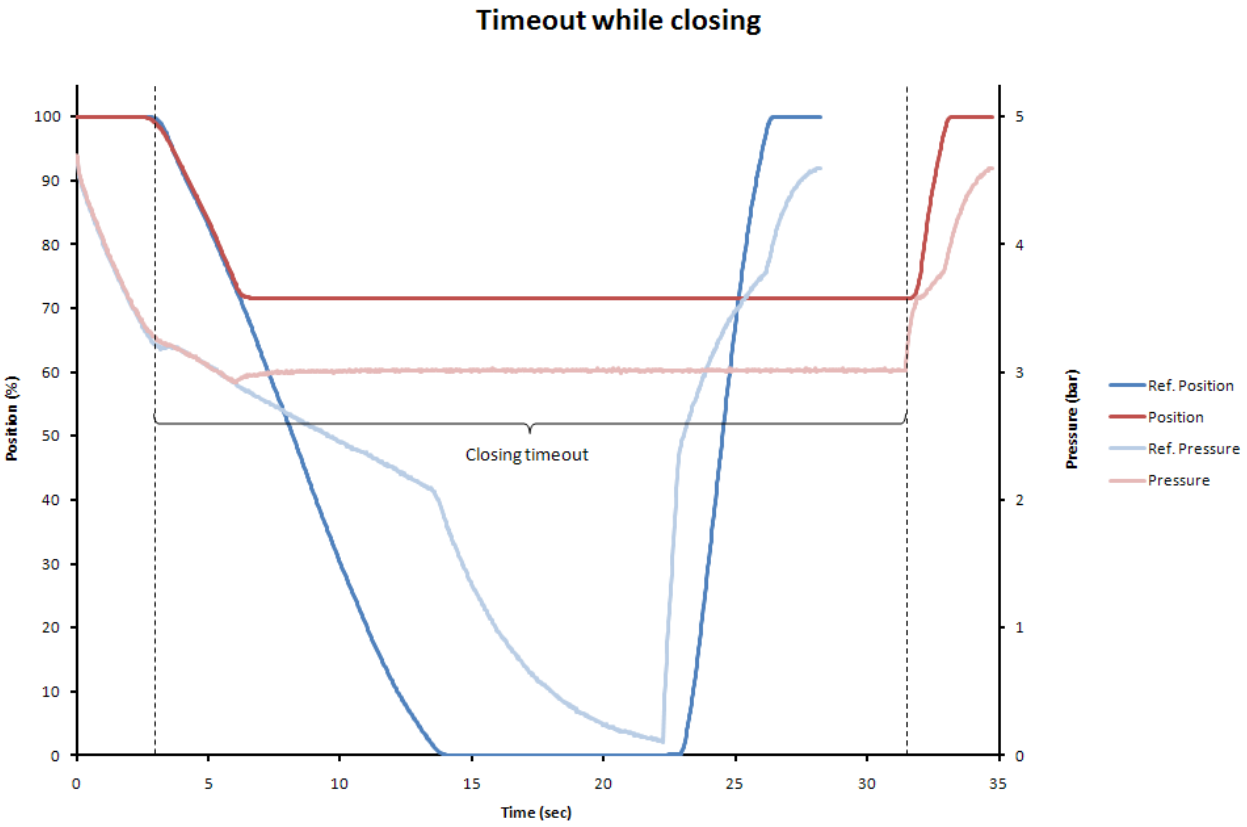
FST error: Breakaway, no pressure drop (Error: 463)
This arise if there is not detected any change on pressure signal before breakaway is detected.

The pressure transmitter is not detecting the pressure drop. The start conditions ensure that the pressure transmitter is connected and hence the problem must be a blocked pressure transmitter not a disconnected pressure transmitter.



FST error: Timeout while closing (Error: 464)

This arises if the valve is not fully closed within the closing timeout.



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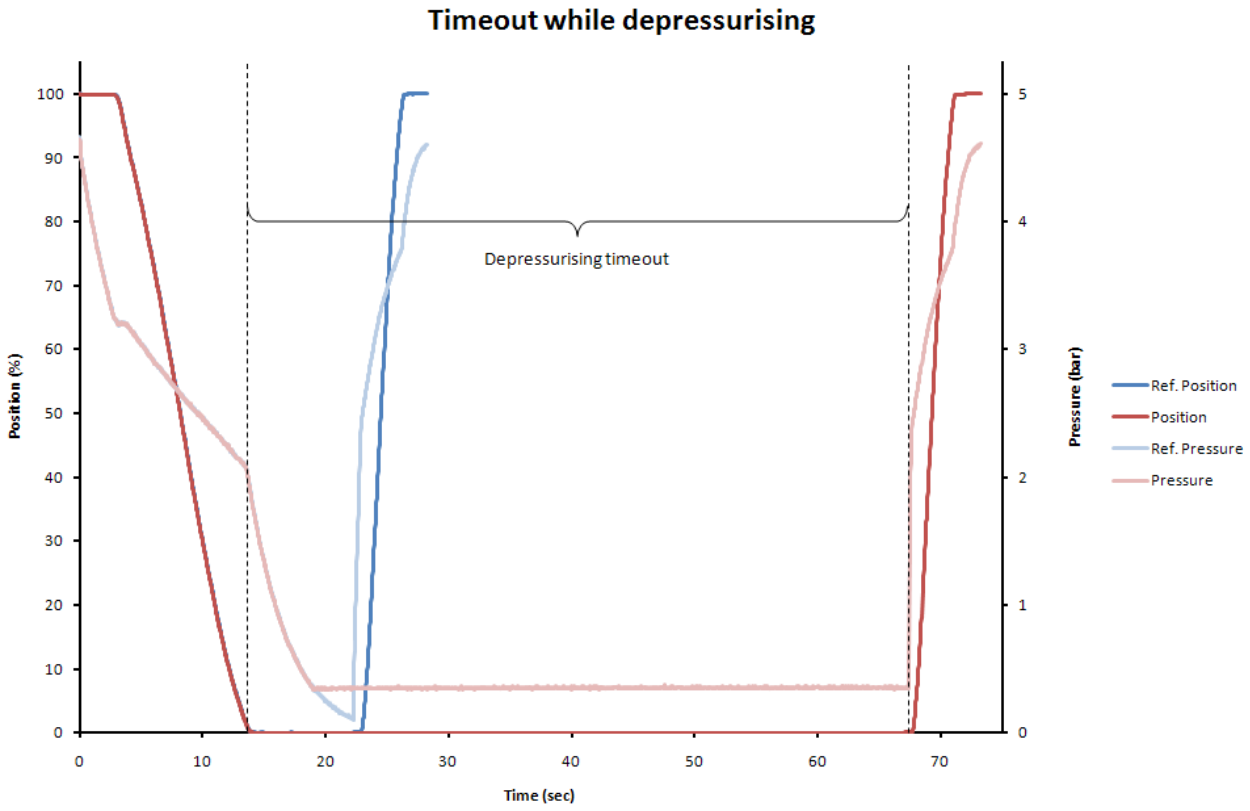
FST error: Timeout while depressurising (Error: 465)

This error arise when the valve is fully closed but the pressure does not reach 0 bar



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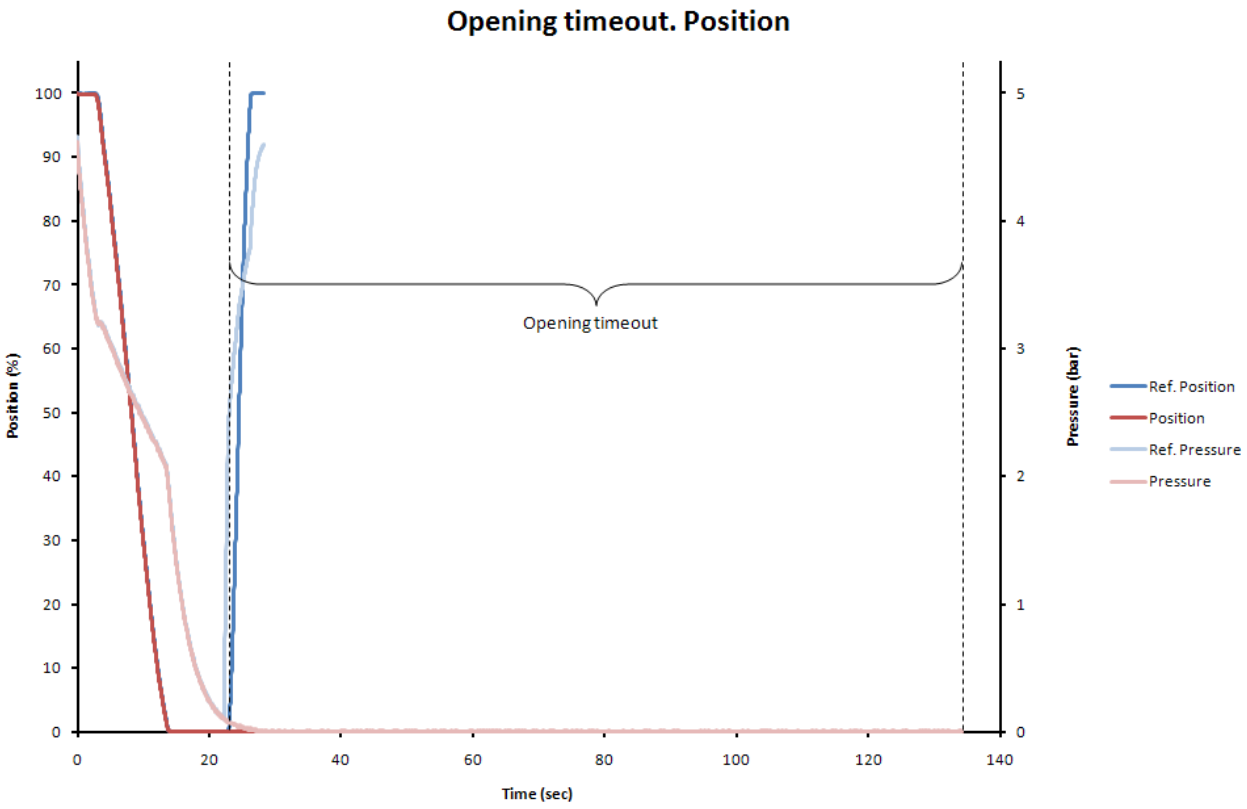
FST error: Timeout while opening. Position (Error: 466)
This arises if the valve is unable to open again.

The cause of this problem may be no supply pressure or that the solenoid valve cannot be energized.



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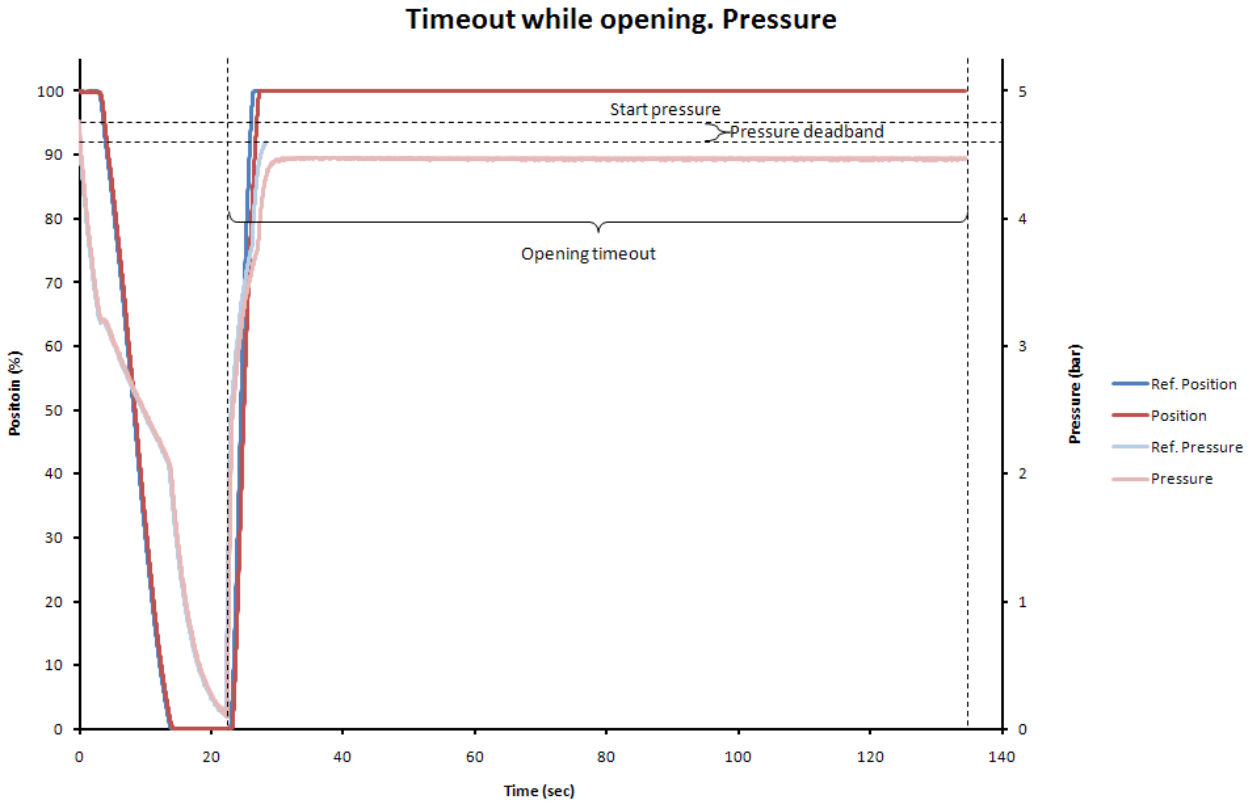
FST error: Timeout while opening. Pressure (Error: 467)

This error arises when the valve is fully opened after a full stroke but the pressure cannot reach the level as before the test started.



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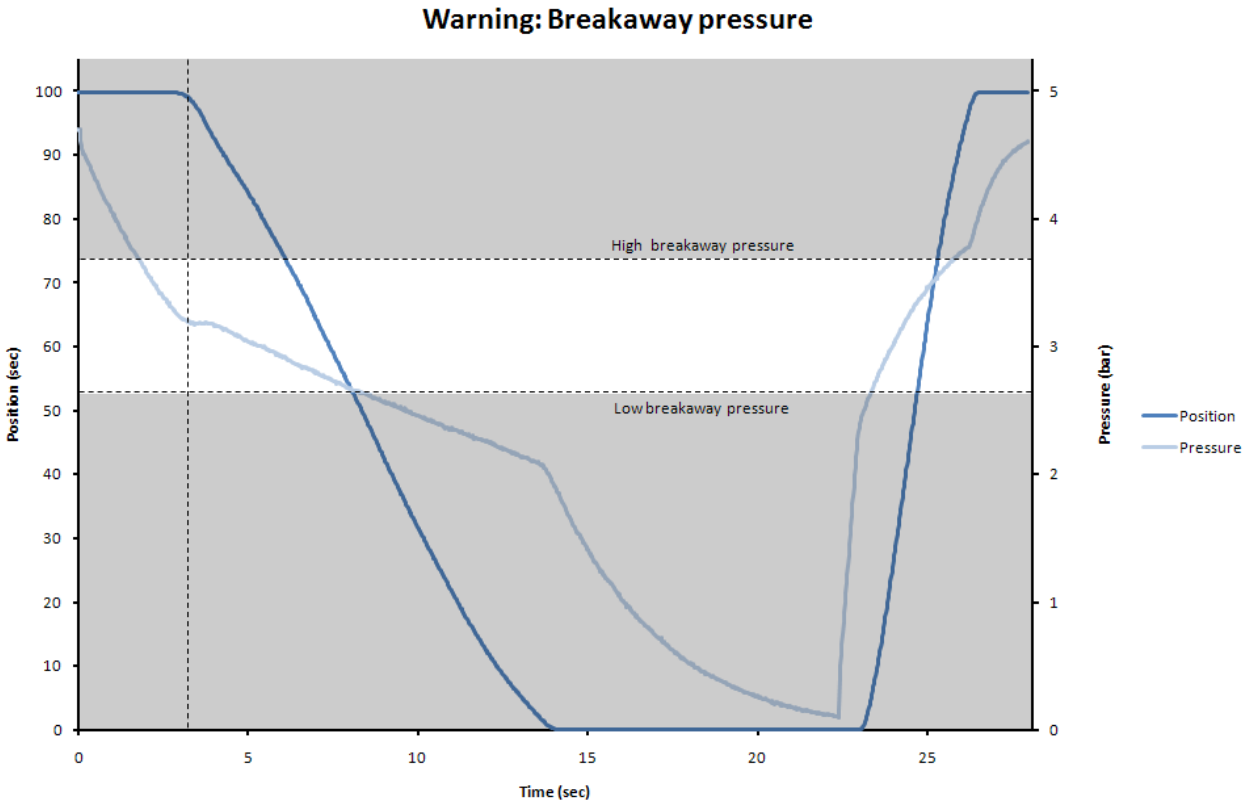
7.2.2 Full stroke warnings

FST warning: Breakaway pressure (Error: 481 and 482)
The breakaway pressure is defined as the pressure the first time the position is more the position deadband away from 100%.

A Change in the breakaway pressure indicates that the system has changed.



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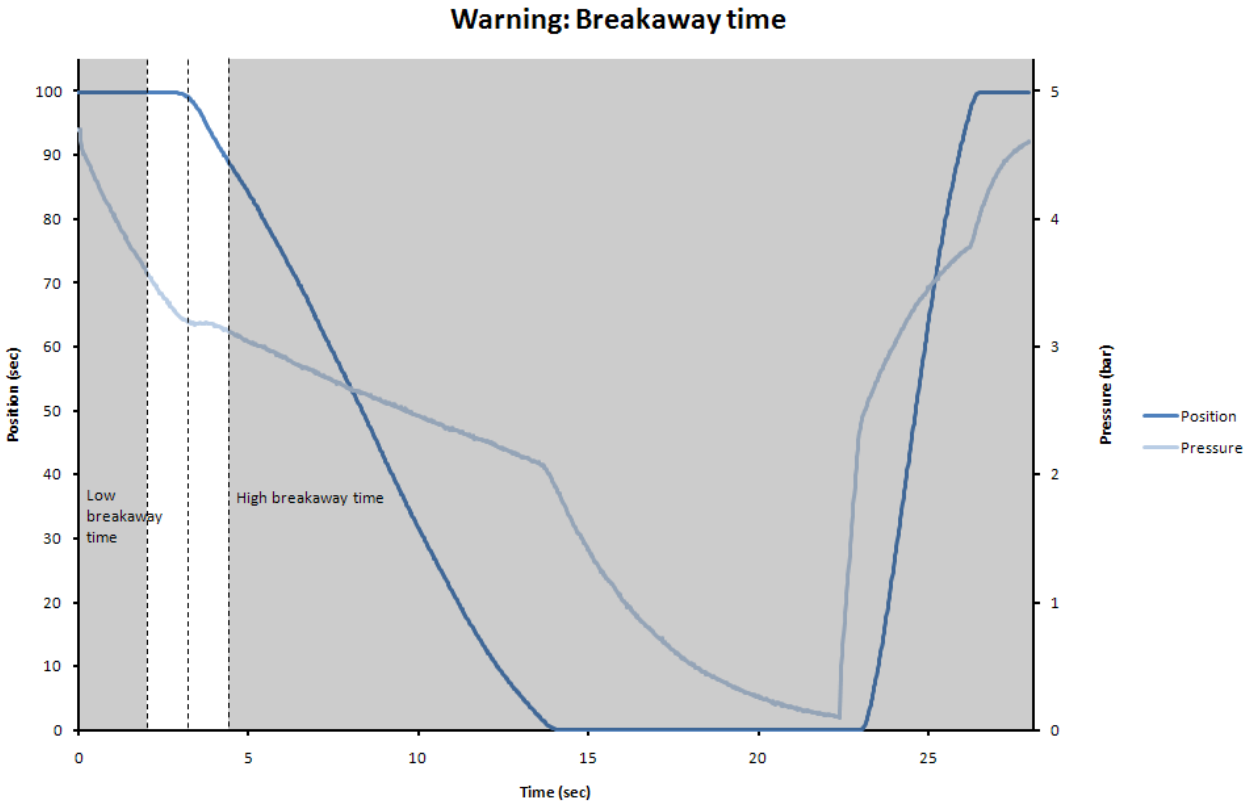
FST warning: Breakaway time (Error: 483 and 484)

The breakaway time is measured from the test is initiated to the valve position has moved the amount specified as deadband in the basic setup menu (3.1.2).

A long breakaway time may indicate that the valve is stuck in the operational position and then when it breaks away moves fast as there is build up pressure in the hydraulic/pneumatic system.



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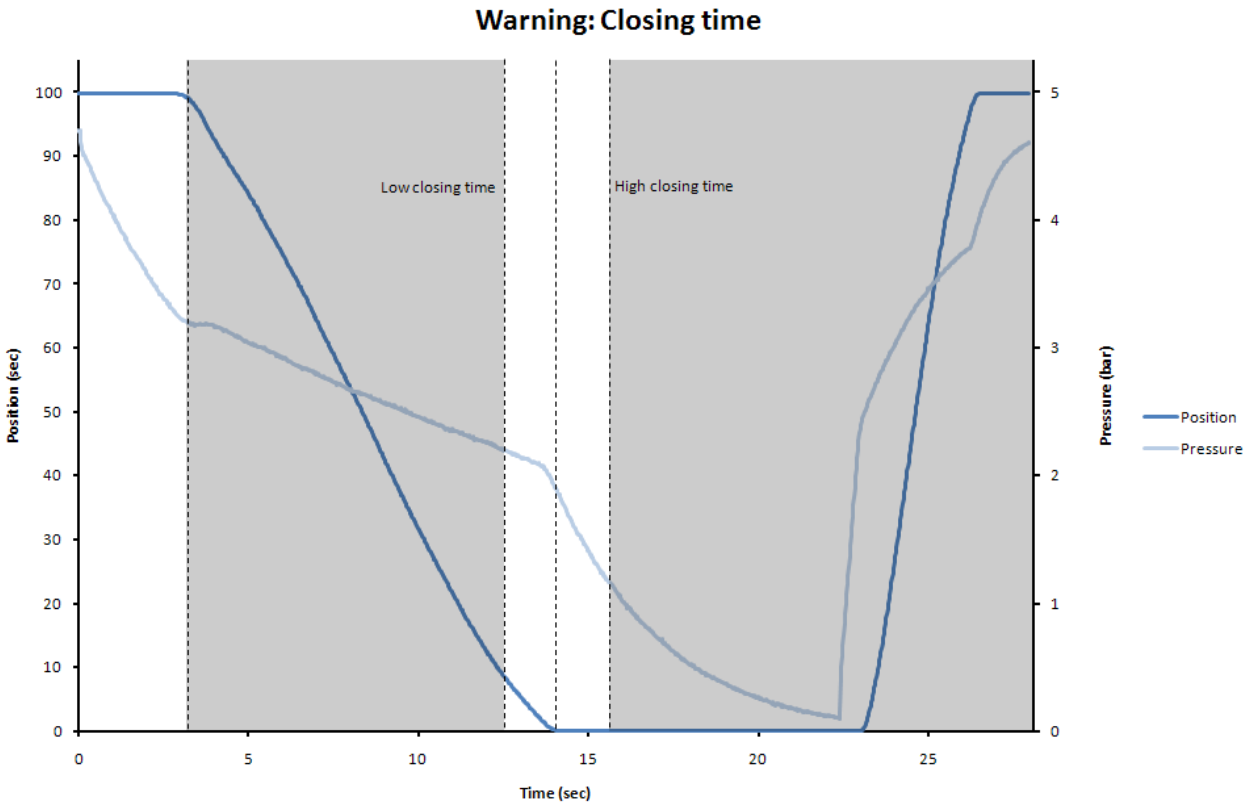
FST warning: Closing time (Error: 485 and 486)

The closing time is defined as the time it takes to move from full open to full close.



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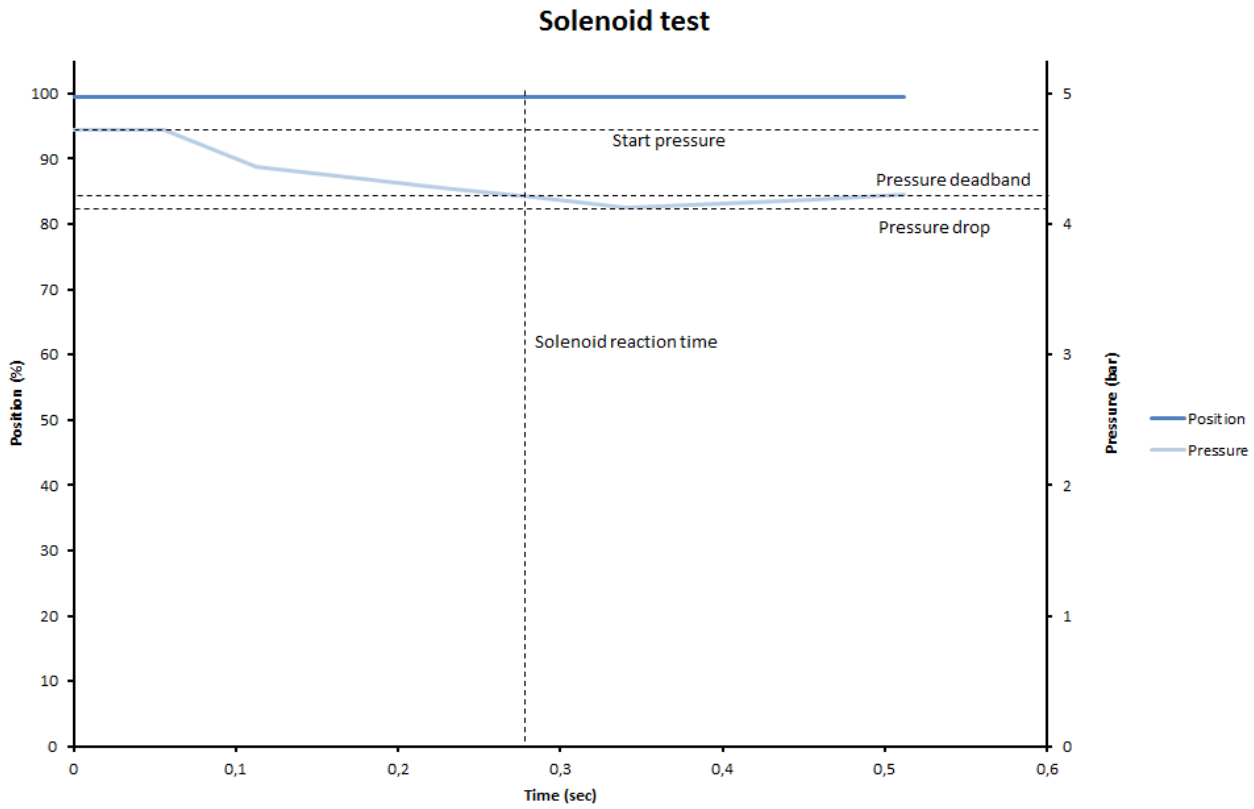
7.3 Solenoid test

The solenoid test can be used to verify that the solenoid valve reacts, without moving the valve as only the pressure is used.



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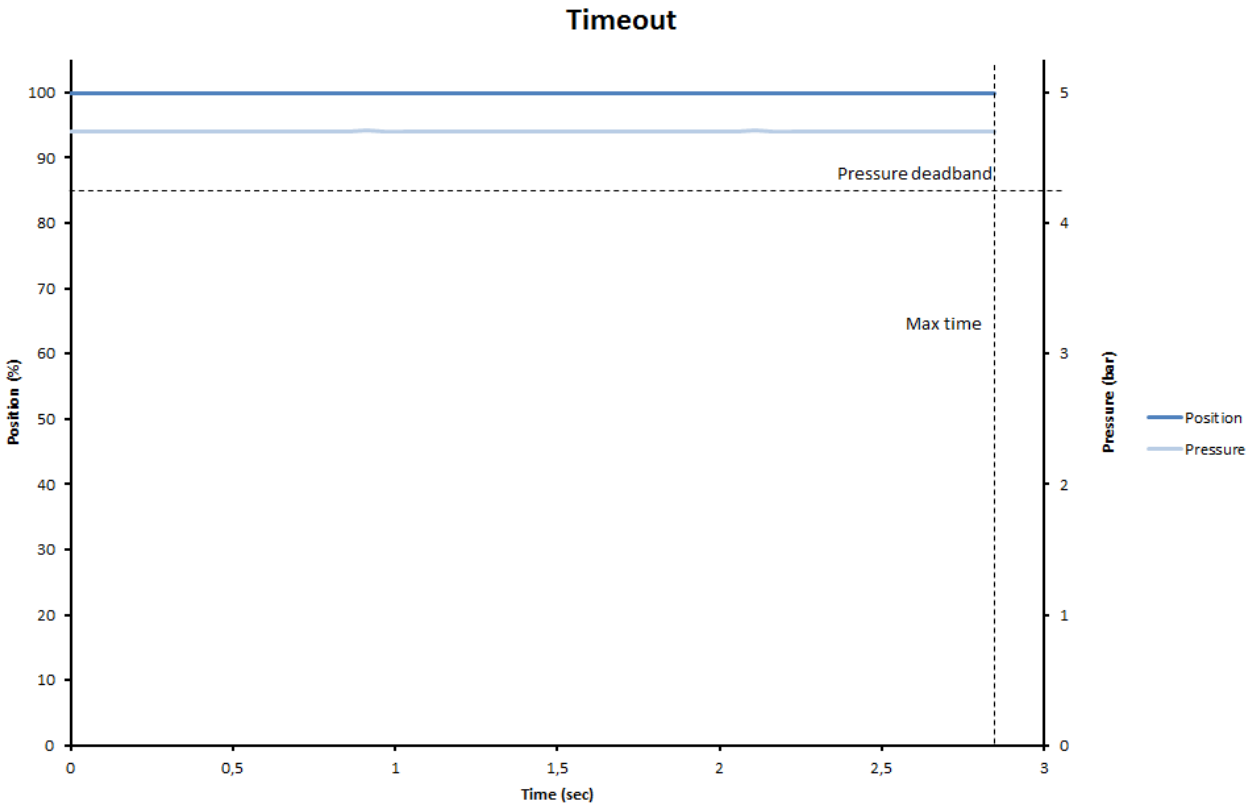
7.3.1 Solenoid Errors

SOT error: Timeout (Error: 511)
This arises when the pressure does not drop below the pressure deadband, within the max time.



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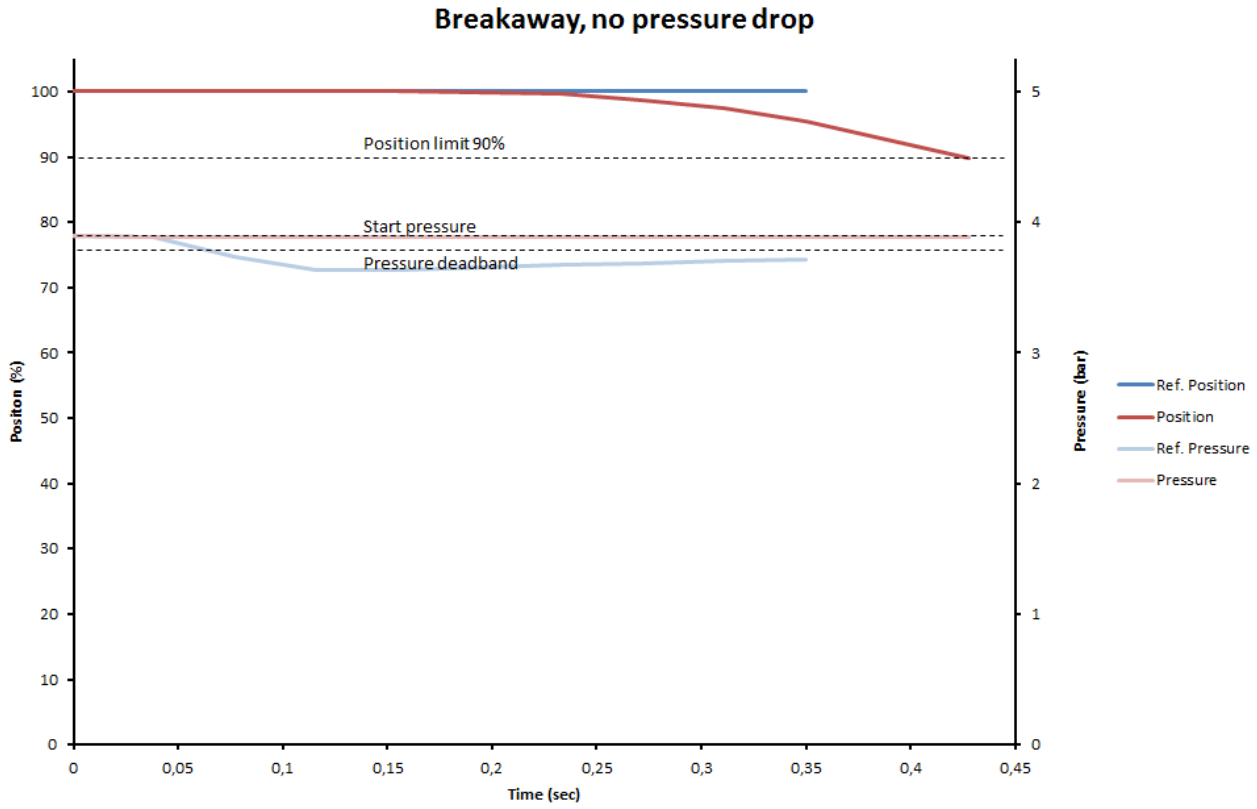
SOT error: Breakaway, no pressure drop (Error: 512)
This arises when the position is below the position deadband.



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8 System errors

System errors are related to mounting, calibration and the state of the IDP.

8.1 Mounting and settings

No. 102	**Potentiometer is not connected**
Description	The potentiometer has been selected as the position feedback signal, but there is not connected a potentiometer to the positioner.
Trouble shooting	Connect a potentiometer to the positioner Or Change the position feedback signal to position loop in the advanced menu (3.2)

No. 103	**Position loop is not connected**
Description	The position loop has been selected as the position feedback signal, but there is not connected a signal to the positioner.
Trouble shooting	Connect a loop signal to the positioner Or Change the position feedback signal to potentiometer in the advanced menu (3.2)

No. 106	**Transmitter loop is not calibrated**
Description	The transmitter loop is not calibrated
Trouble shooting	Calibrate the transmitter loop from the advanced menu (2.1)

No. 108	**Position loop is not calibrated**
Description	The position loop is not calibrated
Trouble shooting	Calibrate the position loop from the advanced menu (2.2)

No. 109	**Pressure loop is not calibrated**
Description	The pressure loop is not calibrated
Trouble shooting	Calibrate the pressure input loop from the advanced menu (2.3)

No. 115	No pressure loop connected
Description	The current into the Analogue input 1 port is below 3.5 mA.
Trouble shooting	Connect a pressure transmitter to the analogue input 1

8.2 Calibration

No. 201	Not Calibrated
Description	The IDP is not calibrated
Trouble shooting	This alarm can be solved by: • Perform an automatic calibration. Calibration menu (1) • Perform an endpoint calibration. Calibration menu (2)

No. 203	Too few ADC points
Description	The measured travel is not large enough
Trouble shooting	Increase the travel

No. 204	No movement or too large actuator
Description	The positioner has not detected any movement
Trouble shooting	Movement is confirmed visually: • The actuator is very slow moving. Use manual calibration without auto tuning • Check that the position feedback is connected correct No movement: • Check that the solenoids are configured correct • Check the hydraulic/pneumatic system

No. 205	Travel time too long
Description	The travel time is larger than 120 sec
Trouble shooting	Use manual end point calibration

No. 209	No pressure change
Description	The pressure has not changed
Trouble shooting	This alarm can be solved by: • Check pressure sensor

No. 221	No PST reference signature
Description	A reference signature has not been recorded. The Error and Warning parameters have not been set.
Trouble shooting	This alarm can be solved by: • Perform an automatic calibration. Calibration menu (1) • Perform a PST reference calibration. Calibration menu (3)

No. 222	No FST reference signature
Description	A reference signature has not been recorded. The Error and Warning parameters have not been set.
Trouble shooting	This alarm can be solved by: • Perform an automatic calibration. Calibration menu (1) • Perform a FST reference calibration. Calibration menu (4)

No. 223	No SOT reference signature
Description	A reference signature has not been recorded. The Error and Warning parameters have not been set.
Trouble shooting	This alarm can be solved by: • Perform an automatic calibration. Calibration menu (1) • Perform a SOT reference calibration. Calibration menu (5)

8.3 External connections

No. 350	No SD card found
Description	A SD card was not detected by the device.
Trouble shooting	Insert a Val Controls SD card into the IDP. Note that the SD card not must be moved between devices.

No. 354	SD card error
Description	There is a problem with the SD card
Trouble shooting	Insert a Val Controls SD card into the IDP. Note that the SD card not must be moved between devices.

8.4 Internal errors

No. 9xx	Internal Error contact support
Description	An internal error has occurred
Trouble shooting	Contact Val Controls A/S and give the following information: • Product type • Software version • Error number • How did the error occur

9 Test errors

The test errors relates to the result of the test performed on the valve system by the IDP.

No. 401	**PST start condition: Not full open**
Description	The valve is not fully open
Trouble shooting	This error can be solved by • Make sure the valve is fully open • Perform an endpoint calibration. Calibration menu (2) • Increase the partial stroke position deadband in the Basic menu (2.1.2) • See page 38 for more information

No. 402	**PST start condition: Low start pressure**
Description	The measured pressure is below the start pressure minus the pressure deadband.
Trouble shooting	This error can be solved by: • Increase the pressure to the partial stroke start pressure. • Decrease the Start pressure in the Basic menu (2.2.1) • Increase Pressure deadband in the Basic menu (2.1.1) • See page 38 for more information The pressure measured by the IDP can be read in the Live status menu. Note: Changing the start pressure will make it difficult to compare new signature to already recorded signatures.

No. 403	**PST start condition: High start pressure**
Description	The measured pressure is above the start pressure plus the pressure deadband.
Trouble shooting	This error can be solved by: • Decrease the pressure to the partial stroke start pressure. • Increase Start pressure in the Basic menu (2.2.1) • Increase Pressure deadband in the Basic menu (2.1.1) • See page 38 for more information The pressured measured by the IDP can be read in the Live status menu. Note: Changing the start pressure will make it difficult to compare new signature to already recorded signatures.

No. 404	PST start condition: In ESD mode
Description	The IDP is in ESD mode.
Trouble shooting	This error can be solved by: • Activate the operational input

No. 411	PST error: Pressure drop, no breakaway
Description	The pressure is below the minimum allowed breakaway pressure before breakaway
Trouble shooting	This error is generated when • The valve is stuck • Position signal is stuck or broken This error can be solved by: • Decrease the Minimum breakaway pressure in the Basic menu (2.2.2) • See page 39 for more information

No. 412	PST Error: No breakaway, No press. drop
Description	There is no pressure drop in the actuator. Breakaway is not detected and pressure is not below breakaway minimum before the breakaway timeout.
Trouble shooting	This error may be due to: • Blocked output of actuator • Solenoid valve is stuck This error can be solved by: • Clear the output of the actuator • Increase the PST breakaway timeout in the Basic menu (2.2.3) • See page 40 for more information

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No. 413	PST error: Breakaway, no pressure drop
Description	Breakaway is detected but there is no pressure drop
Trouble shooting	This error is generated when the pressure transmitter is not sensing the pressure drop. This error can be solved by: • Check pressure transmitter • See page 41 for more information

No. 414	PST Error: Pressure below min allowed
Description	Breakaway is detected but pressure is below the minimum allowed pressure during the travel.
Trouble shooting	This error may be due to: • Increased torque in the actuator or valve. • Broken spring The error can be solved by: • Resolve the mechanical problem • Decrease Min allowed pressure in the Basic menu (2.2.6) • See page 42 for more information

No. 415	PST error: Timeout while closing
Description	The valve did not move the desired PST travel before the closing timeout
Trouble shooting	This error can occur if: • The valve gets stuck during the test, due to an obstruction in the hydraulic/pneumatic system • The valve is moving slow It can be solved by: • Resolve the mechanical problem • Increasing the Closing timeout in the Basic menu (2.2.4) • See page 43 for more information

No. 416	PST error: Timeout while opening. Position
Description	The valve did not open within the opening timeout
Trouble shooting	This error can be caused by: • No supply pressure • The valve is stuck • The valve is moving slow • The solenoid valve cannot be activated It can be solved by: • Resolve the mechanical problem • Increase Total timeout in Basic menu (2.2.5) • See page 44 for more information

No. 417	PST error: Timeout while opening. Pressure
Description	The pressure did not reach the start pressure within the opening timeout
Trouble shooting	This error can be caused by: • Low supply pressure It can be solved by: • Increase pressure • Resolve the mechanical problem • Increase Total timeout in Basic menu (2.2.5) • See page 44 for more information

No. 431	PST warn: Breakaway pressure is too low
Description	The breakaway pressure is lower than the partial stroke breakaway pressure low warning
Trouble shooting	This alarm can be solved by: • Resolve the mechanical problem • Decrease the partial stroke breakaway pressure low warning in the Basic menu (2.3.1) • See page 45 for more information

No. 432	PST warn: Breakaway pressure is too high
Description	The breakaway pressure is higher than the breakaway pressure high warning
Trouble shooting	This alarm can be solved by: • Resolve the mechanical problem • Increase the partial stroke breakaway pressure high warning in the Basic menu (2.3.1) • See page 45 for more information

No. 433	PST warn: Breakaway time is too low
Description	The breakaway time is lower than the breakaway time low warning
Trouble shooting	This alarm can be solved by: • Resolve the mechanical problem • Decrease the partial stroke breakaway time low warning in the Basic menu (2.3.2) • See page 46 for more information

No. 434	PST warn: Breakaway time is too high
Description	The breakaway time is higher than the breakaway time high warning
Trouble shooting	This alarm can be solved by: • Resolve the mechanical problem • Increase the partial stroke breakaway time high warning in the Basic menu (2.3.2) • See page 46 for more information

No. 435	PST warn: Closing time is too low
Description	The travel time is lower than the Travel time low warning
Trouble shooting	This alarm can be solved by: • Resolve the mechanical problem • Increase the partial stroke closing time low warning in the Basic menu (2.3.4) • See page 47 for more information •

No. 436	PST warn: Closing time is too high
Description	The closing time is higher than the Travel time high warning
Trouble shooting	This alarm can be solved by: • Resolve the mechanical problem • Increase the partial stroke closing time high warning in the Basic menu (2.3.4) • See page 47 for more information

No. 437	PST warn: Travel too large
Description	During the partial stroke did the actuator move more than maximum travel alarm
Trouble shooting	To remove this alarm: • Perform service on the actuator and valve • Increase Max travel in the Basic alarm (2.3.5) • See page 48 for more information •

No. 451	FST start condition: Not full open
Description	The valve is not fully open
Trouble shooting	This error can be solved by • Make sure the valve is fully open • Perform an endpoint calibration. Calibration menu (2) • Increase the full stroke position deadband in the Basic menu (3.1.2) •

No. 452	FST start condition: Low start pressure
Description	The measured pressure is below the start pressure minus the pressure deadband.
Trouble shooting	This error can be solved by: • Increase the pressure in the system to the full stroke start pressure. • Decrease the full stroke start pressure in the Basic menu (3.2.1 • Increase full stroke pressure deadband in the Basic menu (3.1.1) The pressure measured by the IDP can be read in the Live status menu. Note: Changing the start pressure will make it difficult to compare new signature to already recorded signatures.

No. 453	FST start condition: High start pressure
Description	The measured pressure is above the start pressure plus the pressure deadband.
Trouble shooting	This error can be solved by: • Decrease the pressure in the system to the full stroke start pressure. • Increase full stroke start pressure in the Basic menu (3.2.1) • Increase full stroke pressure deadband in the Basic menu (3.1.1) The pressured measured by the IDP can be read in the Live status menu. Note: Changing the start pressure will make it difficult to compare new signature to already recorded signatures.

No. 454	FST start condition: In ESD mode
Description	The IDP is in ESD mode.
Trouble shooting	This error can be solved by: • Activate the operational input

No. 461	FST error: Pressure drop, no breakaway
Description	The pressure is below the minimum allowed breakaway pressure before breakaway
Trouble shooting	This error is generated when • The valve is stuck • Position signal is stuck or broken This error can be solved by: • Decrease the Minimum breakaway pressure in the Basic menu (3.2.2) • See page 52 for more information

No. 462	FST Error: No breakaway, No press. drop
Description	There is no pressure drop in the actuator. Breakaway is not detected and pressure is not below breakaway minimum before the breakaway timeout.
Trouble shooting	This error may be due to: • Blocked output of actuator • Solenoid valve is stuck This error can be solved by: • Clear the output of the actuator • Increase breakaway timeout in the Basic menu (3.2.3) • See page 53 for more information

No. 463	FST error: Breakaway, no pressure drop
Description	Breakaway is detected but there is no pressure drop
Trouble shooting	This error is generated when the pressure transmitter is not sensing the pressure drop. It can be solved by: • Check pressure transmitter, • See page 54 for more information

No. 464	FST error: Timeout while closing
Description	The valve did not close before the closing timeout
Trouble shooting	This error can occur if: • The valve gets stuck during the test, due to an obstruction in the hydraulic/pneumatic system • The valve is moving slow It can be solved by: • Resolve the mechanical problem • Increasing the Closing timeout in the Basic menu (3.2.4) • See page 55 for more information

No. 465	FST error: Timeout while depressurising
Description	The valve if fully closed, but the pressure did not reach 0 bar before the depressurising timeout
Trouble shooting	It can be solved by: • Resolve the mechanical problem • Increase the depressurising timeout in Basic menu (3.2.5) • See page 56 for more information

No. 466	FST error: Timeout while opening. Position
Description	The valve did not open within the opening timeout
Trouble shooting	This error can be caused by: • No supply pressure • The valve is stuck • The valve is moving slow • The solenoid valve cannot be activated It can be solved by: • Resolve the mechanical problem • Increase full stroke total timeout in Basic menu (3.2.6) • See page 57 for more information

No. 467	FST error: Timeout while opening. Pressure
Description	The pressure did not reach the start pressure within the opening timeout
Trouble shooting	This error can be caused by: • Low supply pressure It can be solved by: • Increase pressure • Resolve the mechanical problem • Increase full stroke total timeout in Basic menu (3.2.6) • See page 58 for more information .

No. 481	FST warn: Breakaway pressure is too low
Description	The breakaway pressure is lower than the breakaway pressure low warning
Trouble shooting	This error can be solved by: • Resolve the mechanical problem • Decrease the full stroke breakaway pressure low warning in the Basic menu (3.3.2) • See page 59 for more information

No. 482	FST warn: Breakaway pressure is too high
Description	The breakaway pressure is higher than the breakaway pressure high warning
Trouble shooting	This error can be solved by: • Resolve the mechanical problem • Increase the full stroke breakaway pressure high warning in the Basic menu (3.3.2) • See page 59 for more information

No. 483	FST warn: Breakaway time is too low
Description	The breakaway time is lower than the breakaway time low warning
Trouble shooting	This error can be solved by: • Resolve the mechanical problem • Decrease the full stroke breakaway time low warning in the Basic menu (3.3.2) • See page 60 for more information

No. 484	FST warn: Breakaway time is too high
Description	The breakaway time is higher than the breakaway time high warning
Trouble shooting	This error can be solved by: • Resolve the mechanical problem • Increase the full stroke breakaway time high warning in the Basic menu (3.3.3) • See page 60 for more information

No. 485	FST warn: Closing time is too low
Description	The closing time is lower than the closing time low warning
Trouble shooting	This error can be solved by: • Resolve the mechanical problem • Decrease the full stroke closing time low warning in the Basic menu (3.3.4) • See page 61 for more information

No. 486	FST warn: Closing time is too high
Description	The closing time is higher than the closing time high warning
Trouble shooting	This error can be solved by: • Resolve the mechanical problem • Increase the full stroke closing time high warning in the Basic menu (3.3.4) • See page 61 for more information

No. 501	SOT start condition: Not full open
Description	The valve is not fully open
Trouble shooting	This error can be solved by • Make sure the valve is fully open • Perform an endpoint calibration. Calibration menu (2) • Increase the solenoid position deadband in the Basic menu (4.1.2)

No. 502	SOT start condition: Low start pressure
Description	The measured pressure is below the start pressure minus the pressure deadband.
Trouble shooting	This error can be solved by: • Increase the pressure in the system • Decrease the Start pressure in the Basic menu (4.2.1) • Increase Pressure deadband in the Basic menu (4.1.1) The pressure measured by the IDP can be read in the Live status menu.

No. 503	SOT start condition: High start pressure
Description	The measured pressure is above the start pressure plus the pressure deadband.
Trouble shooting	This error can be solved by: • Decrease the pressure in the system • Increase Start pressure in the Basic menu (4.2.1) • Increase Pressure deadband in the Basic menu (4.1.1) The pressured measured by the IDP can be read in the Live status menu.

No. 504	SOT start condition: In ESD mode
Description	The IDP is in ESD mode.
Trouble shooting	This error can be solved by: • Activate the operational input

No. 511	SOT error: Timeout
Description	The pressure did not drop within max time
Trouble shooting	The solenoid valve did not react This error can be solved by: • Resolve the mechanical problem • Increase max time in the Basic menu (4.2.3) • Increase Pressure deadband in the Basic menu (4.1.1)

No. 512	SOT error: Breakaway, no pressure drop
Description	Breakaway is detected but there is no pressure drop
Trouble shooting	This error is generated when the pressure transmitter is not sensing the pressure drop. This error can be solved by: • Check pressure transmitter

10 Event log

No. 1	IDP power on
Description	The IDP is power on

No. 2	System error
Description	An error was logged in the system error log.

No. 3	System error removed
Description	An error was removed from the system error log

No. 11	ESD line was power off
Description	The ESD line was power off. This event is only applicable for IDPs with external power supply.

No. 12	ESD line was power on
Description	The ESD line was power on. This event is only applicable for IDPs with external power supply.

No. 21	PST start
Description	A PST was started.

No. 22	PST finished
Description	A PST was finished

No. 23	Reference PST start
Description	A reference PST was started.

No. 24	Reference PST finished
Description	A reference PST finished

No. 25	PST aborted by operator
Description	A PST was aborted by the operator

No. 26	Reference PST aborted by operator
Description	A reference PST was aborted by the operator

No. 31	FST start
Description	A FST was started.

No. 32	FST finished
Description	A FST finished

No. 33	Reference FST start
Description	A reference FST was started.

No. 34	Reference FST finished
Description	A reference FST finished

No. 35	FST aborted by operator
Description	A FST was aborted by the operator

No. 36	Reference FST aborted by operator
Description	A reference FST was aborted by the operator

No. 41	SOT start
Description	A SOT was started.

No. 42	SOT finished
Description	A SOT finished

No. 43	Reference SOT start
Description	A reference SOT was started.

No. 44	Reference SOT finished
Description	A reference SOT finished

No. 45	SOT aborted by operator
Description	A SOT was aborted by the operator

No. 46	Reference SOT aborted by operator
Description	A reference SOT was aborted by the operator

No. 51	Operational
Description	The IDP was set in operational mode

No. 52	Fail position
Description	The IDP was set in fail position mode

No. 61	Auto calibration was started
Description	An auto calibration was started

No. 62	Auto calibration finished
Description	An auto calibration finished

No. 63	Manual endpoint calibration was started
Description	A Manual endpoint calibration was started

No. 64	Manual endpoint calibration finished
Description	A Manual endpoint calibration finished