

GENERAL SPECIFICATION

INSTRUMENTATION

GS EP INS 198

Safety and Fire & Gas Standard Functions

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1. Scope

The purpose of this document is to define a set of Standard Functions for most common inputs and outputs.

It includes the following functions with some options:

- SDV
- ESDV
- BDV
- Safety Bar
- Point gas detector
- Beam gas detector
- Flame detector
- Heat/smoke detector
- Deluge
- Fire extinguishing
- Voting logic
- Fire damper.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
Not applicable	

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Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS EP INS 137	On/off valve control panels and actuators functional and construction requirements
GS EP INS 150	Design method for system configuration - Standard functions
GS EP INS 196	Input and Output Standard Functions
GS EP SAF 312	Fire and Gas detection systems

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Chapter 1 Safety Shut-Down Valve Standard function - SDV -

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1. Scope

The purpose of this document is to define the Standard Function for a Shut-Down Valve, operated by the PSS.

When safety and control logic charts require PCS to operate SDV, PCS digital output will be provided to operate a second solenoid valve.

In order to assist in understanding, this document should be read in conjunction with **GS EP INS 150**, Design Method for System Configuration Standard Functions.

This Standard Function is a fundamental building block, generally linked to the Safety Bar Standard Function.

This Standard Function proposes solenoid valve test facility, as per project requirements.

Partial stroking facility, if required by project specifications, does not affect this Standard Function, contrary to the solenoid valve test, when achieved by means of additional devices mounted inside the control panels.

Another solution, based on smart devices with enhanced diagnostic capabilities, is not described here since depending on the selected devices; however test status and result will be transmitted to PCS for monitoring and recording purposes.

2. General description of functions

2.1 SDV operating description

As per project specifications and **GS EP INS 137**, when safety trip is no longer active, the Control Room operator may initiate either an Open command or an Open Authorisation command when a local action is still necessary to open the valve.

Likewise Close operator command may also be requested as per project specifications.

2.2 List of main functions

- Handling of field inputs/outputs with status and discrepancy detection
- Interfacing with higher level Standard Function (e.g. Safety Bar)
- Operator's commands
 - Open authorisation or open command (as per project requirements)
 - Inhibit
 - Close command (as per project requirements)
 - Close command when in solenoid valve test mode (as per project requirements).

3. Interfaces description

3.1 General description

INPUTS				OUTPUTS			
Field	HMI	Internal		Internal	HMI	Field	
			<u>Safety Bar Standard Function</u>				
			Standard function SDV				
		● Safety trip		Status (open/closed)	●		
				Discrepancy Status		●	●
	●	Open authorisation command OR Open command		Operating command Status		●	
				Status (open/closed)		●	
				Discrepancy Status		Alm	
	●	Close command (if required)		Operation in progress Status		●	
				Fault status		Alm	
				Maintenance inhibit status		●	
	●	Close command (in test mode) (opt)		Solenoid valve test mode status (opt)		●	
	●	Completed test command (opt)		Solenoid valve Test completed status (opt)		●	
	●	Maintenance inhibit command		Operation counter (opt)		●	
●		Solenoid valve local by-pass (opt)		Solenoid valve operating command (DO)			●
●		Open limit switch (DI)					
●		Closed limit switch (DI)					
				Opt = Option Alm = Alarm			

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3.2 Specific description of field interfaces

Corresponding field interfaces are:

- SY (DO): solenoid valve operating command: **0 = Close**
- SZH (DI): open limit switch: **1 = Open**
- SZL (DI): closed limit switch: **1 = Closed**

Option:

- SPSL (DI): solenoid valve local bypass: **0 = Active**

Special attention has to be paid when the SDV control panel is fitted with two solenoid valves, one operated by the PSS and the other by the PCS. Preference is given to handle discrepancy function within the PCS, which requires the hardwiring of the limit switches to the PCS and to transmit the PSS command status to the PCS (communication time will be taken into consideration).

4. Detailed description of functions

4.1 Operator's Commands and mode

4.1.1 Specific description

4.1.1.1 Open Authorisation or Open Command

Open Authorisation or Open command, as per project specifications, will be available to the operator from process control display when:

- Concerned safety trip is not active (relevant safety bar not tripped)
- and
- Operating command status = "Closed".

4.1.1.2 Close command

Likewise, Close command may be required. It will be available to the operator from process control display when Operating command status = "Open".

4.1.1.3 Maintenance inhibit

Available when in maintenance access level.

When the maintenance inhibit is active:

- Limit switches are no longer considered in internal Open/Closed status handling
- Discrepancy is no longer active
- Controlled part (valve body) is red steady if open and closed limit switches have the same status; else the open or closed or operating in progress status will be displayed as defined below.

Maintenance inhibit status is active when maintenance inhibit command is active.

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4.1.1.4 Solenoid valve test

This test is designed to be used when the valve is in the open position. The local bypass of the solenoid valve will maintain the valve to its open position, no matter the status of the PSS solenoid command.

The safety function will always override the test function and trip the output to the closed position when necessary.

Specific display will indicate the test has been stopped for safety reasons, and the local operator shall switch back the by-pass to its normal operating mode, in order to allow the valve to move to its safety position.

When the local bypass of the solenoid valve (SPSL) is detected then the test mode is activated. The Close command is available to the operator when the test mode is active and the safety trip is not active.

Upon activation of the Close command by the operator, an adjustable timer (a few seconds) is launched; when elapsed, the Open command is restored and the test completed.

The local operator will then switch back the bypass to its normal position.

The Control Room operator will enter the completed test status for logging purpose as successful if the local operator has observed the solenoid valve being de-energised, else it will be logged as a failed test.

4.2 Status definition

4.2.1 Operating command status

Operating command status is set to:

- Open when
 - the concerned safety bar not tripped
 - and
 - open Authorisation or Open command or (Open test command and test mode) are active
- Close upon activation of
 - the associated safety trip
 - or
 - the Close test command and test mode
 - or
 - the Close operator command (as per project specifications).

4.2.2 Solenoid valve Operating command (DO)

Same as Operating command status.

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4.2.3 Open/Closed status

4.2.3.1 Open status

HMI open status is active if Open limit switch is active and Closed limit switch is not active.

Open status (internal data) is active if:

- (Operating command status = "Open") and (Open limit switch active and Closed limit switch not active)
- or
- (Operating command status = "Open") and maintenance inhibit status is active.

4.2.3.2 Closed status

HMI closed status is active if Open limit switch is not active and Closed limit switch is active.

Closed status (internal) is active if:

- (Operating command status = "Close") and (Open limit switch not active and Closed limit switch active)
- or
- (Operating command status = "Close") and maintenance inhibit status is active.

4.2.4 Discrepancy status

It indicates a discrepancy between the operating command and the limit switches status, after a delay time (operation in progress timer).

Discrepancy status is not active when:

- Internal Closed status is active
- or
- Operating command status = "Open" and Closed limit switch is active, as long as Closed limit switch has not moved (only when Open Authorisation command applies)
- or
- Internal Open status is active (only when Open command applies)
- or
- Operation in progress status is active
- or
- Maintenance inhibit status is active.

When in test mode and after an operator Close command, discrepancy will no longer be active.

4.2.5 Operation in progress Status

Active during "operation in progress" timer counts down.

"Operation in progress" timer is activated:

- Upon a status change of the Operating command status from open to close

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or

- Upon a change of the closed limit switch from active to inactive when operating command status = open authorisation, (only when Open Authorisation command applies)

or

- Upon a status change of the Operating command status from close to open, (only when Open command applies).

4.2.6 Fault status

Reports a hardware fault relating to an associated I/O cards (field inputs/output).

4.2.7 Operation counter

Reports the number of changes of the operating command status (from close to open) when not due to solenoid valve test.

The counter reset command will be issued manually by the operator from the HMI (a dedicated pop-up window at maintenance access level).

Note this monitoring function may be implemented into the Process Data Server by means of a supervisory tool, as per the project specifications.

5. Tuning parameters and variables

Parameter	Access level
Test timer	Maintenance
"Operation in progress" timer pre-set value	Maintenance

6. Representation and animation description (HMI)

6.1 Events and values to be recorded

6.1.1 Events

- Maintenance inhibit command
- Test mode
- Completed test result
- Operating command Status
- Discrepancy Status
- Fault status.

6.1.2 Values

- Operation counter.

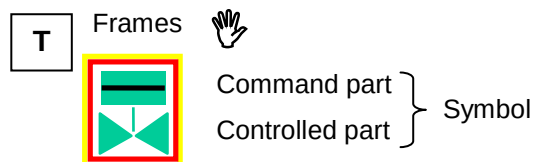
6.2 Alarm handling

Alarm Description	Priority
Discrepancy Status	Level 2
Fault Status	Level 2

6.3 Control display

The hereafter description gives examples of representation. However, they may be amended dependant on the DCS features.

6.3.1 SDV (Shutdown Valve) representation



SDV xxxx ← Hidden label

Symbol  is hidden

6.3.1.1 Miscellaneous

SDV xxxx instrument label and Blue Symbol  appears on operator request (soft key).

SDV xxxx instrument label is used as target area for maintenance inhibit command.

A “hand” symbol (full yellow) appears near valve when Open Authorisation (or open or Close) commands are available to the operator.

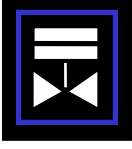
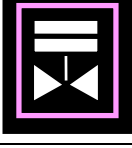
Blue Symbol  is used as target area for test commands and test status keyboard entry.

6.3.2 Animation of the symbol (command and controlled parts)

Display description	Display	Symbol	Tagname on safety bar display
Valve closed or Communication or system fault		White White	White
Open command but Valve closed		Fluid White	White
Valve opening in progress		Fluid Fluid flashing	White
Valve open		Fluid Fluid	Blue
Close command but Valve open		White Fluid	Blue
Valve closing in progress		White Fluid flashing	Blue
Valve discrepancy when closing before acknowledgement (*)		White Red flashing	Red flashing
Valve discrepancy when closing after acknowledgement Or open and closed limit switches active and maintenance inhibit status active (*)		White Red	Red
Valve discrepancy when opening before acknowledgement (*)		Fluid Red flashing	Red flashing
Valve discrepancy when opening after acknowledgement Or open and closed limit switches active and maintenance inhibit status active (*)		Fluid Red	Red

(*) Valve in an undetermined position after a time delay

6.3.3 Animation of the frames

Display description	Display	Frames
Normal status		
Safety trip		External frame: White
Maintenance inhibit		External frame: Yellow
Solenoid valve test mode		External frame: Blue
Fault (and maintenance inhibition)		Internal frame: Red flashing before acknowledgement Red steady after acknowledgement
Communication or system fault		External frame: Magenta

The events which drive these frame displays may not be mutually exclusive. Therefore, the precedence on the display, from most to least important, shall be: magenta, white, blue, yellow.

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Chapter 2 Emergency Shut-Down Valve Standard function - ESDV -

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1. Scope

The purpose of this document is to define the Standard Function for Emergency Shut-Down Valve.

ESDV's are automatically closed by emergency safety logic and remotely opened in conjunction with local action. These valves shall never be controlled by the PCS.

This Standard Function is part of the ESD system configuration. However when the safety logic chart requires the PSS to operate an ESDV, then a PSS digital output will be provided to operate a second solenoid valve.

In order to assist in understanding, this document should be read in conjunction with **GS EP INS 150**, Design Method for System Configuration Standard Functions.

This Standard Function is a fundamental building block, linked to the Standard Function of the Safety Bar.

This Standard Function proposes different functional facilities, which may be combined as per project requirements for ESDV functions:

- Electrical local reset
- Solenoid valve test.

Partial stroking facility does not affect this Standard Function, contrary to the solenoid valve test, when achieved by means of additional devices mounted inside the control panels.

Another solution, based on smart devices with enhanced diagnostic capabilities, is not described here since depending on the selected devices; however test status and result will be transmitted to PCS for monitoring and recording purposes.

2. General description of functions

2.1 ESDV operating description

Activation of a local reset is requested so as to allow ESDV to be re-opened, provided safety condition is not tripped.

As per project specifications and **GS EP INS 137**, when safety trip is no longer active the Control Room operator initiates either an Open command or an Open Authorisation command when a local action is still necessary to open the valve.

Likewise a Close operator command may also be requested, as per project specifications.

2.2 List of main functions

- Handling of field inputs/outputs with status and discrepancy detection
- Interfacing with higher level Standard Functions (e.g. Safety Bar)
- Operator commands
 - Open authorisation or open command (as per project requirements)
 - Inhibit

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Chapter 2

- Close command (as per project requirements)
- Close command in test mode (as per project requirements).

3. Interfaces description

3.1 General description

[illegible]

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3.2 Specific description of field interfaces

Corresponding field interfaces are:

- ESY (DO): solenoid valve operating command: **0 = Close**
- ESZH (DI): open limit switch: **1 = Open**
- ESZL (DI): closed limit switch: **1 = Closed**
- ESHS2 (DI): local reset: **1 = Active (pulse)**

Option:

- ESPSL (DI): solenoid valve local bypass: **0 = Active**

Special attention has to be paid when the ESDV control panel is fitted with two solenoid valves, one operated by the ESD system and the other by the PSS. Preference is given to handle discrepancy function within the PSS, which requires the hardwiring of the limit switches to the PSS and to transmit the ESD system command status to the PSS (communication time will be taken into consideration).

4. Detailed description of functions

4.1 Operator's Commands and mode

4.1.1 Specific description

4.1.1.1 Open Authorisation or Open Command

Open Authorisation or Open command, as per project specifications, will be available to the operator on the process control display when:

- Concerned safety trip is not active (relevant safety bar not tripped)
- and
- Operating command status = "Closed".

4.1.1.2 Close command

Likewise, a Close command may be required. It will be available to the operator on the process control display when Operating command status = "Open".

4.1.1.3 Maintenance inhibit

Available when in maintenance access level

When the maintenance inhibit is active:

- Limit switches are no longer considered with the internal Open/Closed status handling
- Discrepancy is no longer active
- Controlled part (valve body) is red steady if open and closed limit switches have the same status; else the open or closed or operating in progress status will be displayed as defined below.

The maintenance inhibit status is active when the maintenance inhibit command is active.

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4.1.1.4 Solenoid valve test

This test is designed to be used when the valve is in the open position. The local bypass of the solenoid valve will maintain the valve to its open position, no matter the status of the ESD system solenoid command.

The safety function will always override the test function and trip the output to the closed position when necessary.

Specific display will indicate the test has been stopped for safety reasons, and the local operator shall switch back the by-pass to its normal operating mode, in order to allow the valve to move to its safety position.

When the local bypass of the solenoid valve (ESPSL) is detected then the test mode is activated. The Close command is available to the operator when the test mode is active and the safety trip is not active.

Upon activation of the Close command by the operator, an adjustable timer (a few seconds) is launched; when elapsed, the Open command is restored and the test completed.

The local operator will then switch back the bypass to its normal position.

The Control Room operator will enter the completed test status for logging purpose as successful if the local operator has observed the solenoid valve being de-energised, else it will be logged as a failed test.

4.2 Status definition

4.2.1 Local reset status

This status will be set upon detection of the pulse from local reset push-button and reset upon activation of the Close command when not in test mode.

4.2.2 Operating command status

Operating command status is set to:

- Open when
 - the concerned safety bar has not been tripped
 - and
 - local reset is active
 - and
 - open Authorisation or Open command or (Open test command and test mode) are active.
- Close upon activation of
 - the associated safety trip has been tripped
 - or
 - the Close test command and test mode
 - or
 - the Close operator command (as per project specifications).

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4.2.3 Solenoid valve Operating command (DO)

Same as Operating command status.

4.2.4 Open/Closed Status

4.2.4.1 Open status

HMI open status is active if the Open limit switch is active and the Closed limit switch is not active.

Open status (internal data) is active if:

- (Operating command status = "Open") and (Open limit switch active and Closed limit switch not active)
- or
- (Operating command status = "Open") and maintenance inhibit status is active.

4.2.4.2 Closed status

HMI closed status is active if the Open limit switch is not active and the Closed limit switch is active.

Closed status (internal) is active if:

- (Operating command status = "Close") and (Open limit switch not active and Closed limit switch active)
- or
- (Operating command status = "Close") and maintenance inhibit status is active.

4.2.5 Discrepancy status

It indicates a discrepancy between the operating command and the limit switches status, after a time delay (operation in progress timer).

Discrepancy status is not active when:

- Internal Closed status is active
- or
- ((Operating command status = "Open" and Closed limit switch is active, as long as Closed limit switch has not moved (only when Open Authorisation command applies)
- or
- Internal Open status is active (when Opening command applies))
- or
- Operating in progress status is active
- or
- Maintenance inhibit status is active.

When in test mode and after a Close operator command, then the discrepancy will no longer be active.

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4.2.6 Operation in progress Status

Active during "operation in progress" timer counts down.

"Operation in progress" timer is activated:

- Upon a status change of the Operating command status from open to close
or
- (Upon a change of the closed limit switch from active to inactive when operating command status = open (when Open authorisation command applies)
or
- Upon a status change of the *Operating command status* from close to open (when Opening command applies)).

4.2.7 Fault status

It reports a hardware fault relating to an associated I/O card (field inputs/output).

4.2.8 Operation counter

It reports the number of changes of the operating command status (from close to open) when not due to solenoid valve test.

The counter reset command will be issued manually by the operator from the HMI (a dedicated pop-up window at maintenance access level).

Note this monitoring function may be implemented into the Process Data Server by means of a supervisory tool, as per the project specifications.

5. Tuning parameters and variables

Parameter	Access level
Test timer	Maintenance
"Operation in progress" timer pre-set value	Maintenance

6. Representation and animation description (HMI)

6.1 Events and values to be recorded

6.1.1 Events

- Maintenance inhibit command
- Local reset
- Test mode
- Completed test result
- Operating command Status

- Discrepancy Status
- Fault status.

6.1.2 Values

- Operation counter.

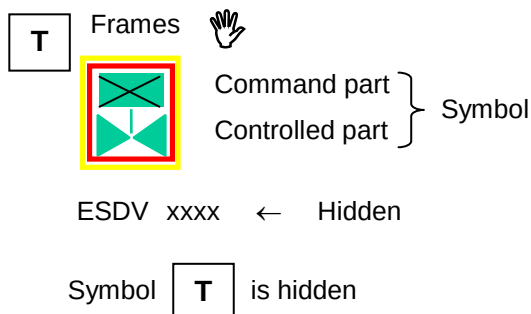
6.2 Alarm handling

Alarm Description	Priority
Discrepancy Status	Level 1
Fault Status	Level 3

6.3 Control display

The descriptions below give examples of valve representation animations. However, they may be amended dependant on the DCS features.

6.3.1 ESDV (Emergency Shut Down Valve) representation



6.3.2 Miscellaneous

- ESDV xxxx instrument label and Blue Symbol  appears on operator request (soft key)
- ESDV xxxx instrument label is used as target area for the maintenance inhibit command
- A “hand” symbol (full yellow) appears near the valve when Open authorisation or Open or Close commands are available to the operator
- Blue Symbol  is used as a target area for the test command and test status entry.

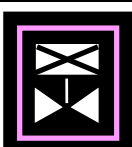
6.3.3 Animation of the symbol (command and controlled parts)

Display description	Display	Symbol	Tagname on safety bar display
Valve closed or Communication or system fault		White White	White
Open command but Valve closed		Fluid White	White
Valve opening in progress		Fluid Fluid flashing	White
Valve open		Fluid Fluid	Blue
Close command but Valve open		White Fluid	Blue
Valve closing in progress		White Fluid flashing	Blue
Valve discrepancy when closing before acknowledgement *		White Red flashing	Red flashing
Valve discrepancy when closing after acknowledgement *		White Red	Red
Valve discrepancy when opening before acknowledgement *		Fluid Red flashing	Red flashing
Valve discrepancy when opening after acknowledgement *		Fluid Red	Red



Valve in an undetermined position after a time delay

6.3.4 Animation of the frames

Display description	Display	Frames
Normal status		NA
Safety trip		External frame: White
Maintenance inhibit		External frame: Yellow
Solenoid valve Test mode		External frame: Blue
Fault (and maintenance inhibit)		Internal frame: Red flashing before acknowledgement Red steady after acknowledgement
Communication or system fault		External frame: Magenta

The events which drive these frame displays may not be mutually exclusive. Therefore, the precedence on the display, from most to least important, shall be: magenta, white, blue, yellow.

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1. Scope

The purpose of this document is to define the Standard Function for a Blow Down Valve (BDV).

In order to assist in understanding, this document should be read in conjunction with **GS EP INS 150**, Design Method for System Configuration Standard Functions.

This Standard Function is a fundamental building block, linked to the Safety Bar Standard Function, part of the ESD system configuration.

This Standard Function proposes different functional facilities, which may be combined as per project requirements for BDV functions:

- Electrical local reset
- Solenoid valve test

achieved through additional devices mounted inside the control panel.

Another solution, based on smart devices with enhanced diagnostic capabilities, is not described here since depending on the selected devices; however test status and result will be transmitted to PCS for monitoring and recording.

2. General description of functions

2.1 BDV operating description

As per the project safety concept, emergency depressurisation will be provided upon automatic or manual initiation interlocked with "permissive to blowdown" signal, which means in both cases the BDV open command will be activated from internal ESD system variable (safety trip). Individual open command is not available to the operator.

Reset function will also be provided and initiated either automatically upon reset of the corresponding safety bar, either manually from the control room or from the BDV control panel.

Likewise, emergency depressurisation interrupt may be implemented as per project safety concept. This interrupt may be achieved either automatically through the reset of the associated safety bar or manually by means of a push-button located in Control room.

2.2 List of main functions

- Handling of field inputs/outputs with status and discrepancy detection
- Interfacing with higher level Standard Function (e.g. Safety Bar)
- Operator's commands
 - Inhibit
 - Solenoid valve test (as per project requirements).

2.3 Interfaces description

2.3.1 General description

INPUTS				OUTPUTS		
Field	HMI	Internal		Internal	HMI	Field
			<i>e.g. Safety Bar Standard Function</i> Safety trip Interrupt push-button in CCR DI_LM (opt) Open command (in test mode) (opt) Completed test command (opt) Maintenance inhibit command Solenoid valve local by-pass (test mode) (opt) Local reset (opt) Open limit switch (DI) Closed limit switch (DI)	Status (open/closed) Discrepancy Status Reset status (opt) Interrupt status Operating command Status Status (open/closed) Discrepancy Status Operating in progress Status Fault status Maintenance inhibit status Solenoid valve test mode status (opt) Solenoid valve Test completed status (opt) Operation counter (opt) Solenoid valve operating command (DO)		
			Standard function BDV			
			Opt = Option Alm = Alarm			

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2.3.2 Specific description of field interfaces

Corresponding field interfaces are:

- BY (DO): solenoid valve operating command: **1 = Close**
- BZH (DI): open limit switch: **1 = Open**
- BZL (DI): closed limit switch: **1 = Closed**

Options:

- BPSL (DI): solenoid valve local bypass: **0 = Active**
- BHS2 (DI): reset (from local panel or Control room): **1 = Active (pulse)**
- BHS3 (DI): interrupt push-button in Control Room: **1 = Active (pulse)**

This interrupt push-button will be line monitored and its status issued from the DI_LM Standard Function.

When project specifications require facility to remove the depressurisation interrupt, after its activation, switch will be used instead of push-button to prevent confusion.

3. Detailed description of functions

3.1 Operator's Commands and mode

3.1.1 Specific description

3.1.1.1 Maintenance inhibit

Available when in maintenance access level

When the maintenance inhibit is active:

- Limit switches are no longer considered with the internal Open/Closed status handling
- Discrepancy is no longer active
- Controlled part (valve body) is red steady if open and closed limit switches have the same status; else the open or closed or operating in progress status will be displayed as defined below.

Maintenance inhibit status is active when maintenance inhibit command is active.

3.1.1.2 Solenoid valve test

This test is designed to be used when the valve is in the closed position. The local bypass of the solenoid valve will maintain the valve to its close position, no matter the status of the ESD system solenoid command.

The safety function will always override the test function and trip the output to the open position when necessary.

Specific display will indicate the test has been stopped for safety reasons, and the local operator shall switch back the by-pass to its normal operating mode, in order to allow the valve to move to its safety position.

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When the local bypass of the solenoid valve (BPSL) is detected then the test mode is activated. The Open command is available to the operator when the test mode is active and the safety trip is not active.

Upon activation of the Open command by the operator, an adjustable timer (a few seconds) is launched; when elapsed, the Closed command is restored and the test completed.

The local operator will then switch back the bypass to its normal position.

The Control Room operator will enter the completed test status for logging purpose as successful if the local operator has observed the solenoid valve being de-energised, else it will be logged as a failed test.

3.2 Status definition

3.2.1 Reset status

This status will be set upon detection of the pulse from reset push-button and reset upon activation of the Open command when not in Test mode.

3.2.2 Interrupt status

This status will be set upon pulse detection of the line monitored push-button, through DI_LM Standard Function, and reset upon de-activation of the safety trip.

3.2.3 Operating command status

Operating command status is set to:

- Close when
interrupt status is active
or
de-activation of the safety trip and reset status (if applicable) are active
or
close test command and test mode are active.
- Open upon activation of the safety trip or the open test command when in test mode.

3.2.4 Solenoid valve Operating command (DO)

Same as Operating command status.

3.2.5 Open/Closed Status

3.2.5.1 Open status

HMI open status is active if Open limit switch is active and Closed limit switch is not active.

Open status (internal data) is active if:

- (Operating command status = "Open") and (Open limit switch active and Closed limit switch not active)

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or

- (Operating command status = "Open") and maintenance inhibit status is active.

3.2.5.2 Closed status

HMI closed status is active if Open limit switch is not active and Closed limit switch is active

Closed status (internal) is active if:

- (Operating command status = "Close") and (Open limit switch not active and Closed limit switch active)

or

- (Operating command status = "Close") and maintenance inhibit status is active.

3.2.6 Discrepancy status

It indicates a discrepancy between the command status and the limit switches status, after a time delay (operation in progress timer).

Discrepancy status is not active when:

- Internal Closed/Open status are active

or

- Operating in progress status is active

or

- Maintenance inhibit status is active.

When in test mode and after an operator Open command, discrepancy will no longer be active.

3.2.7 Operation in progress status

Active during "operation in progress" timer counts down.

"Operation in progress timer" is activated upon change of the operating command status.

3.2.8 Fault status

Reports a hardware fault related to an associated I/O cards (field inputs/output).

3.2.9 Operation counter

Reports the number of changes of the operating command status changes (from close to open) when not due to solenoid valve test.

The counter reset command will be issued manually by the operator from the HMI (a dedicated pop-up window at maintenance access level).

Note this monitoring function may be implemented into the Process Data Server by means of a supervisory tool, as per the project specifications.

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4. Tuning parameters and variables

Parameters	Access level
Test timer	Maintenance
"Operation in progress" timer pre-set value	Maintenance

5. Representation and animation description (HMI)

5.1 Events and values to be recorded

5.1.1 Events

- Maintenance inhibit command
- Test mode
- Completed test result
- Operating command Status
- Interrupt push-button switch
- Reset status
- Discrepancy Status
- Fault status.

5.1.2 Values

- Operation counter.

5.2 Alarm handling

Alarm Description	Priority
Discrepancy Status	Level 1
Fault Status	Level 3

5.3 Control display

The descriptions below give examples of valve representation animations. However, they may be amended dependant on the DCS features.

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5.3.1 BDV (Blow Down Valve) representation



BDV xxxx ← Hidden label

Symbol  is hidden

5.3.2 Miscellaneous

BDVxxxx instrument label and Blue Symbol  appear on operator request (soft key).

BDVxxxx instrument label is used as target area for maintenance inhibit command.

A “hand” symbol (full yellow) appears near valve when Open or Close commands are available to the operator (commands as per project specifications).

Blue Symbol  is used as target area for Test command and test status entry.

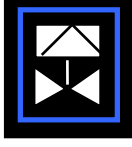
5.3.3 Animation of the symbol (command and controlled parts)

Display description	Display	Symbol	Tagname on safety bar display
Valve closed or Communication or system fault		White White	White
Open command but Valve closed		Fluid White	White
Valve opening in progress		Fluid Fluid flashing	White
Valve open		Fluid Fluid	Blue
Close command but Valve open		White Fluid	Blue
Valve closing in progress		White Fluid flashing	Blue
Valve discrepancy when closing before acknowledgement *		White Red flashing	Red flashing
Valve discrepancy when closing after acknowledgement Or open and closed limit switches active and maintenance inhibit status active *		White Red	Red
Valve discrepancy when opening before acknowledgement *		Fluid Red flashing	Red flashing
Valve discrepancy when opening after acknowledgement Or open and closed limit switches active and maintenance inhibit status active *		Fluid Red	Red



Valve in an undetermined position after a time delay

5.3.4 Animation of the frames

Display description	Display	Frames
Normal state		
Safety trip		External frame: White
Maintenance inhibit		External frame: Yellow
Solenoid valve Test mode		External frame: Blue
Fault (and maintenance inhibit)		Internal frame: Red flashing before acknowledgement Red steady after acknowledgement
Communication or system fault		External frame: Magenta

The events which drive these frame displays may not be mutually exclusive. Therefore, the precedence on the display, from most to least important, shall be: magenta, white, blue, yellow.