Exploration & Production

GENERAL SPECIFICATION

INSTRUMENTATION

GS INS 170

ON / OFF Process Valve
standard function
- XV -

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1. Scope

The purpose of this document is to define the Standard Function of ON/OFF Process Valve.

ON-OFF process valves, handled by the PCS, can be both operated by operator or automatic control function. These valves shall never be controlled by safety system.

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

This Standard Function is a fundamental building block. It may either be used standalone, or integrated with other standard functions to create a more complex function, e.g. with the Pumping Unit Standard Function.

It covers:

- the standard type: **XV** - ON-OFF process valve with 2 limit switches
- the optional case: **XV_2B** - ON-OFF process valve with 2 limit switches and 2 digital outputs

  This option is described in **chapter 8**.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
Not applicable	

Professional Documents

Reference	Title
Not applicable	

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

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Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS INS 150	Design Method for System Configuration Standard Functions

3. General description of functions

3.1 List of main functions

- Handling of field inputs and outputs with status and discrepancy detection
- Interfacing with higher level Standard Function (e.g. P.U.):

status and fault, open/close command, standalone/cascade mode

- Use of Operator commands: Open / Close, maintenance inhibit

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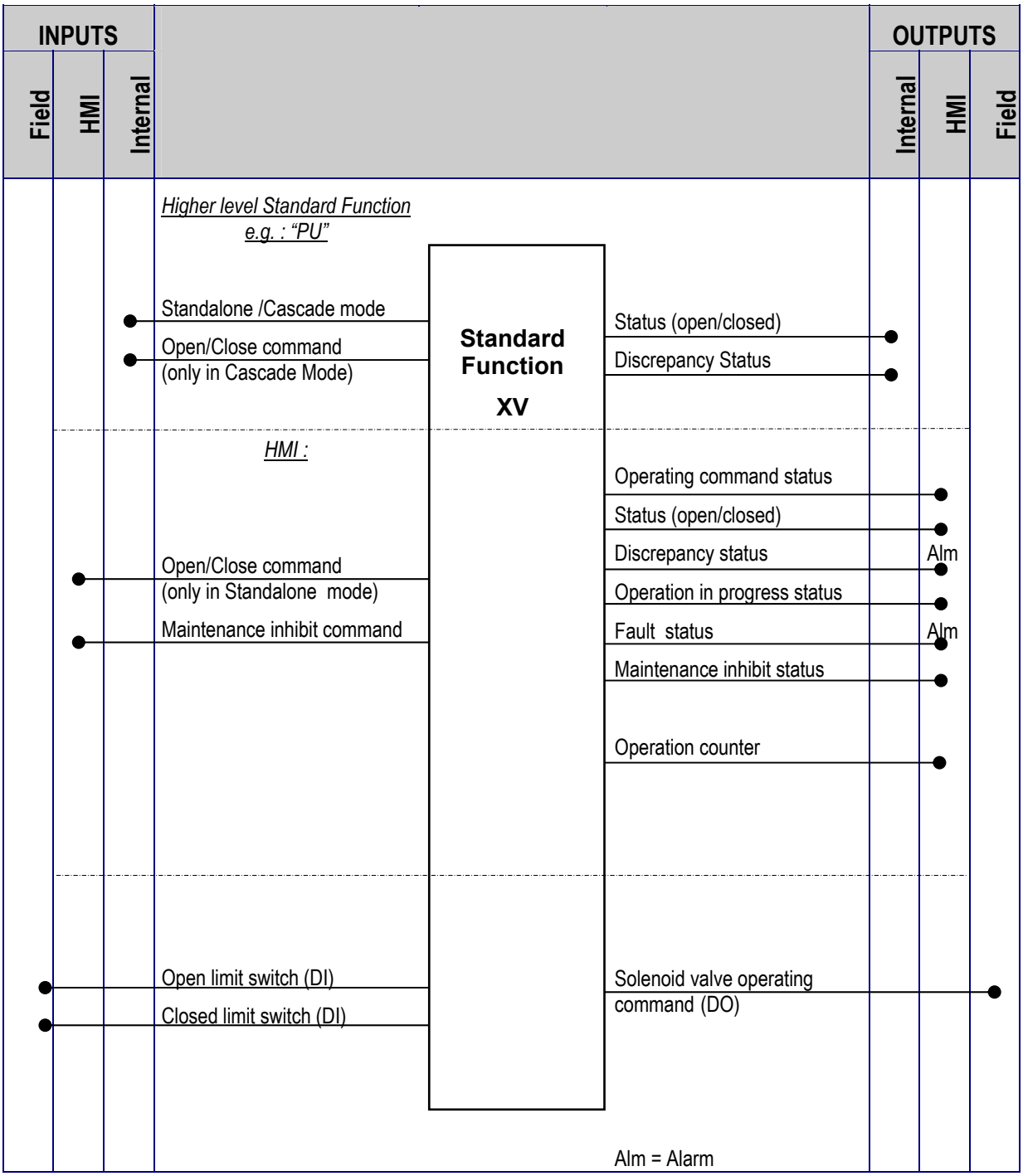
4. Interfaces description

4.1 General description



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4.2 Specific description of field interfaces

Corresponding field interfaces are:

- XY (1 DO): solenoid valve operating command:

  1 = Open – fail close type

  1 = Close – fail open type
- XZH (1 DI): open limit switch: **1 = Open**
- XZL (1 DI): closed limit switch : **1 = Closed**

5. Detailed description of functions

5.1 Modes and commands

5.1.1 Specific description

5.1.1.1 Standalone /Cascade mode

Standalone / Cascade mode is set by higher level automatic control (Pump Unit Standard Function, for example)

Standalone / Cascade mode is always set in Standalone mode when no higher level control is implemented.

5.1.1.2 Open/Close command

In Standalone mode, Open/Close command is available to operator only, from process control display.

In Cascade mode, Open/Close command is generated by the higher level Standard Function.

5.1.1.3 Maintenance inhibit

This command is available only when in maintenance level access.

When the maintenance inhibit is active:

- Limit switches are no more considered in internal Open/Closed status management
- HMI and Internal Discrepancies are no longer active
- Controlled part (valve body) is red steady when both open and closed limit switches are active; 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 set

5.2 Status definition

5.2.1 Operating command status:

It results from the Open/Close command.

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5.2.2 Open/Closed status

5.2.2.1 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

5.2.2.2 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

5.2.3 Discrepancy status

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

Discrepancy status is active when (Internal Open status) and (Internal Closed status) and (Operating in progress status) and (maintenance inhibit status) are not active

5.2.4 Operation in progress status

Active during "operation in progress timer" counts down

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

5.2.5 Solenoid valve command (DO) status

Same status as Operating command status for fail closed type and reverse status for fail open type.

5.2.6 Fault status:

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

5.3 Operation counter:

Reports the number of changes of the operating command status (from close to open).

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

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6. Tuning parameters and variables

PARAMETER	ACCESS LEVEL
Operation in progress timer pre-set value	Method

7. Representation and animation description (HMI)

7.1 Events and values to be recorded

7.1.1 Events

- Open/Close command (operator)
- Maintenance inhibit command
- Operating command status
- Discrepancy status
- Fault status

7.1.2 Values

- Open operating number.

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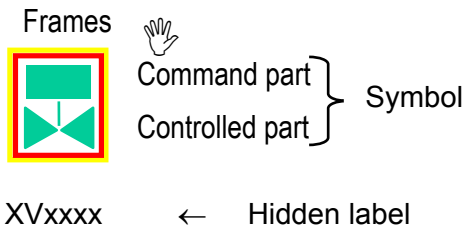
7.2 Alarm handling

Alarm Description	Priority
Discrepancy Status	Level 1
Fault Status	Level 1

7.3 Control display

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

7.3.1 XV (ON-OFF process valve) representation:



7.3.2 Miscellaneous

- XVxxxx instrument label appears on operator request (soft key)
- XVxxxx instrument label is used as target area for maintenance inhibit command
- A “hand” symbol (full yellow) appears near the valve when Open/Close operator command is allowed

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7.3.3 Animation of the symbol (command and controlled parts)

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

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

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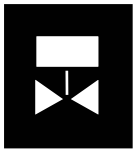
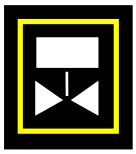
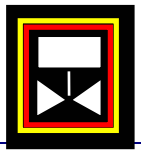
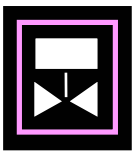
7.3.4 Animation of the Frames

Display description	Display	Frames
Normal status		
Maintenance inhibit		External frame : Yellow
Fault and maintenance inhibit		Internal frame : Red flashing before acknowledgement Red steady after acknowledgement
Communication or system fault		Internal 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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8. Option: XV_2B: XV with 2 digital outputs

8.1 General description of functions

XV_2B valves control requires 2 pulse outputs:

- one for open
- one for close

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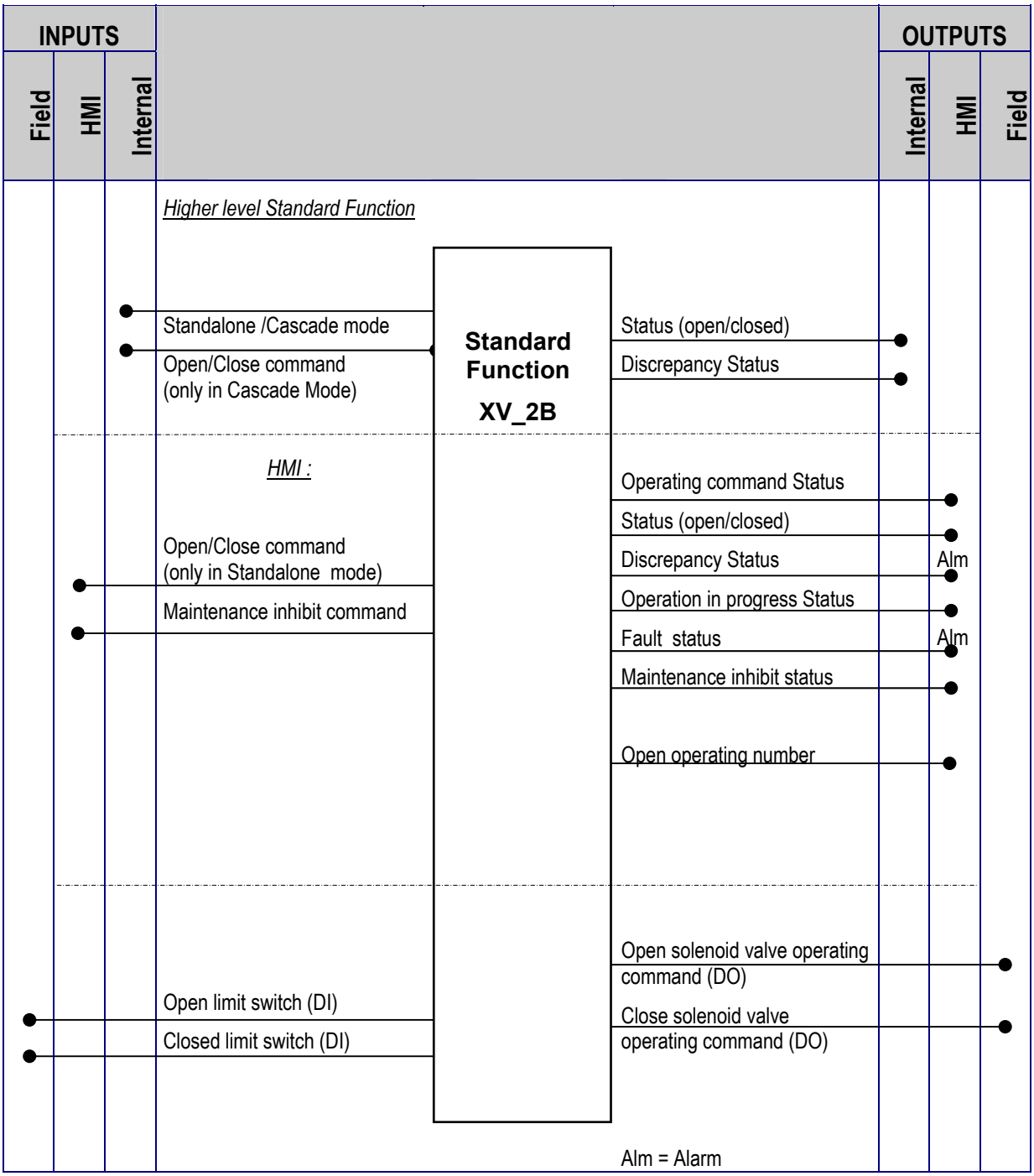
8.2 Description of interfaces

8.2.1 General description



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8.2.2 Specific description of field interfaces

Corresponding field interfaces are:

- XY_1 (1 DO): solenoid valve operating command: **pulse to 1 = Open**
- XY_2 (1 DO): solenoid valve operating command: **pulse to 1 = Close**
- XZH (1 DI): open limit switch: **1 = Open**
- XZL (1 DI): closed limit switch: **1 = Closed**

8.3 Differences with XV description of functions

- Fault status relative to 2 DO
- Solenoid valves commands (2 DO):

Open command (DO) is activated (calibrated pulse) upon Operating command status activation.

Close command (DO) is activated (calibrated pulse) upon Operating command status de-activation.

8.4 Tuning parameters and variables

PARAMETER	ACCESS LEVEL
Operation in progress timer pre-set value	Method

8.5 Representation and animation description (HMI)

Same as XV representation.

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