

EXAMPLE SYSTEM

# Cause and Effect Report

2026-04-15

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# Revision History

Revision	Date	Author	Checker	Approver	Version	Description
Rev A	2026-04-15	—	—	—	1.0	Initial issue

# Contents

Revision History	1
1. Introduction	3
1.1 Purpose and Development Basis	3
1.2 Relationship Coverage	3
1.3 Report Structure and Presentation	3
2. Effect Details	4
2.1 PT1-H-Alarm - High Pressure Alarm	4
2.2 PT1-HH-Alarm - High High Pressure Alarm	5
2.3 XV1 Closed - Valve 1 Closed	6
2.4 D1-Stopped - Pump 1 Stopped	7
2.5 TT1-H-Alarm - High Temperature Alarm	8
2.6 TT1-HH-Alarm - High High Temperature Alarm	9
3. Signal Register	10
Appendix A. Cause and Effect Matrix	11

# 1. Introduction

This Cause and Effect Report is a generic engineering deliverable used to document how defined plant or system conditions lead to defined responses. It provides a structured reference that helps engineers, operators, controls specialists, and reviewers understand what initiating conditions have been identified and what actions, alarms, shutdowns, or other effects are expected to result.

## 1.1 Purpose and Development Basis

To generate this report, the engineer defines the project causes and effects, then records the logical relationships between them. This process helps establish a clear functional scope, exposes missing or conflicting assumptions, and creates a repeatable basis for design review, controls implementation, testing, and future maintenance.

## 1.2 Relationship Coverage

The report describes generic cause-and-effect relationships such as alarm initiation, equipment trips, shutdown actions, valve movements, permissives, inhibitions, resets, latching behaviour, and time delays. The exact signals and actions vary by project, but the document structure remains the same.

## 1.3 Report Structure and Presentation

The report contains an Effect Details section and a Signal Register. Effect Details present each defined effect together with its Boolean statement, Boolean diagram, and system-level description, while the Signal Register provides a consolidated list of all defined causes and effects with tag, description, and traceability information. Together, these sections show the same design intent as summary logic, visual logic, descriptive narrative, and signal-reference data.

## 2. Effect Details

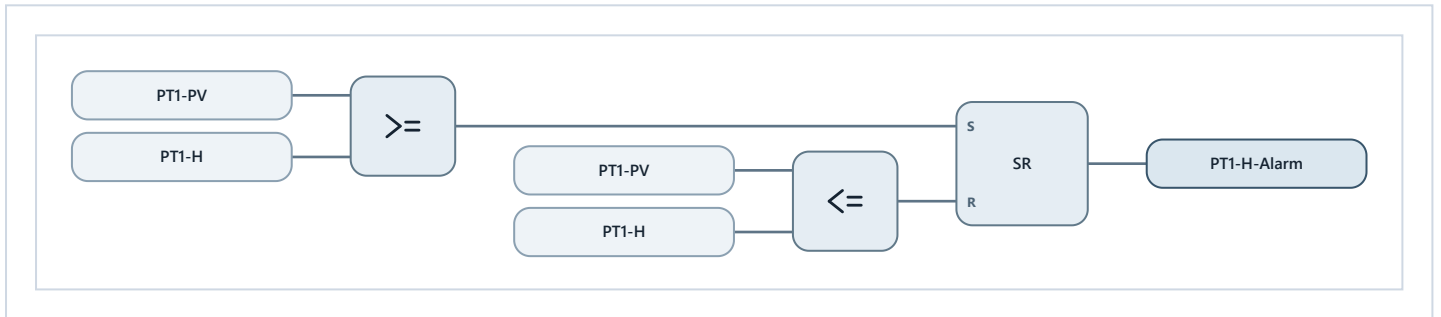
The following pages contain one self-contained effect detail sheet per effect, including Logic Summary, Boolean Diagram, and System Description.

### 2.1 PT1-H-Alarm - High Pressure Alarm

#### Logic Summary

Trigger:  $PT1-H-Alarm = (PT1-PV \geq PT1-H)$   
 Attributes: latched; reset when  $PT1-PV \leq PT1-H$

#### Boolean Diagram



#### System Description

PT1-H-Alarm - High Pressure Alarm is generated when PT1-PV is greater than or equal to PT1-H. Once generated, the effect remains latched until PT1-PV - Pressure Value is less than or equal to PT1-H - High Pressure.

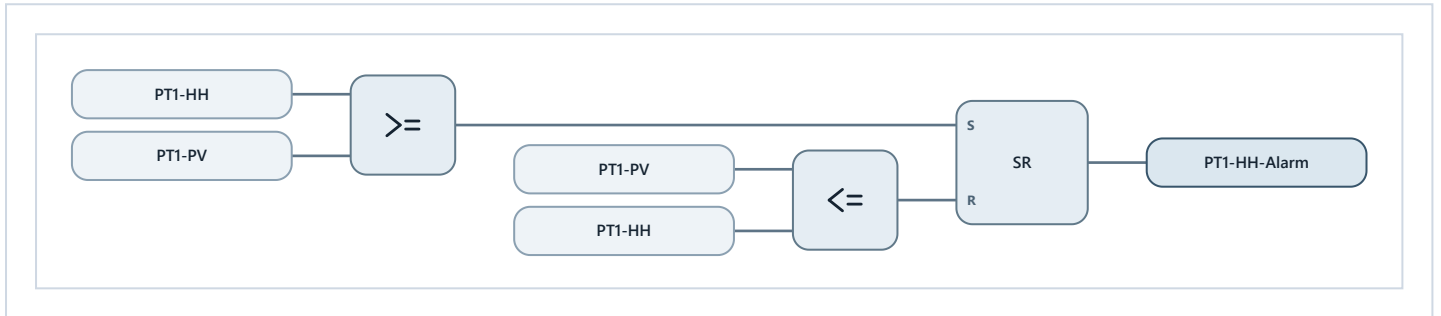
## 2.2 PT1-HH-Alarm - High High Pressure Alarm

### Logic Summary

Trigger:  $PT1-HH-Alarm = (PT1-HH \geq PT1-PV)$

Attributes: latched; reset when  $PT1-PV \leq PT1-HH$

### Boolean Diagram



### System Description

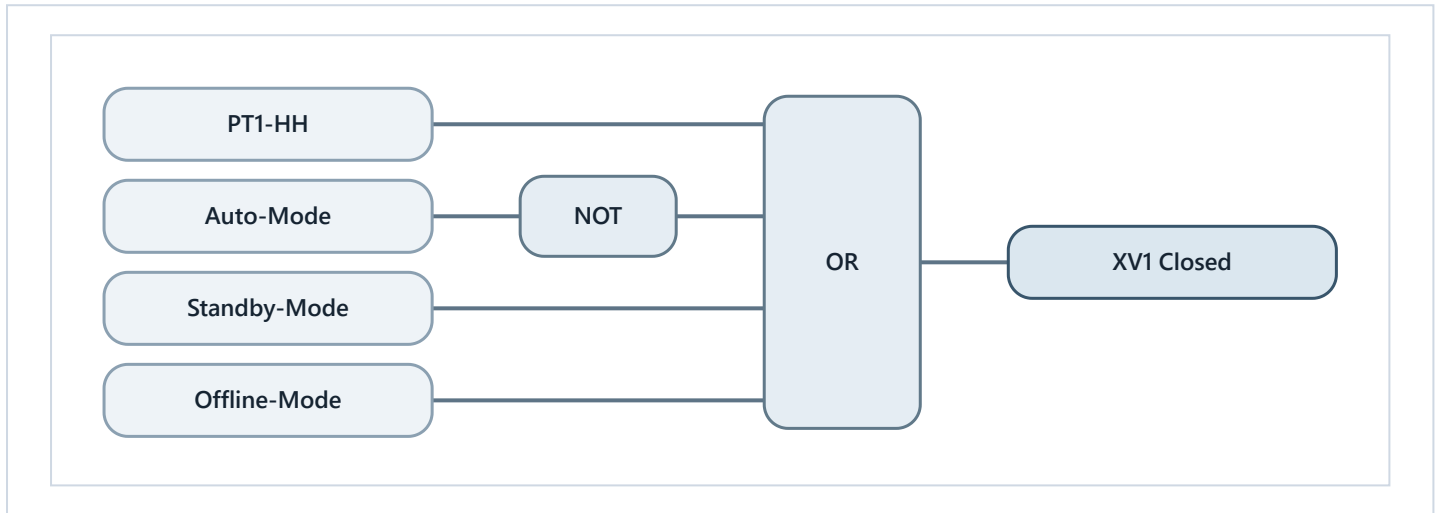
PT1-HH-Alarm - High High Pressure Alarm is generated when PT1-HH is greater than or equal to PT1-PV. Once generated, the effect remains latched until PT1-PV - Pressure Value is less than or equal to PT1-HH - High High Pressure.

## 2.3 XV1 Closed - Valve 1 Closed

### Logic Summary

Trigger: XV1 Closed = (PT1-HH OR NOT Auto-Mode OR Standby-Mode OR Offline-Mode)

### Boolean Diagram



### System Description

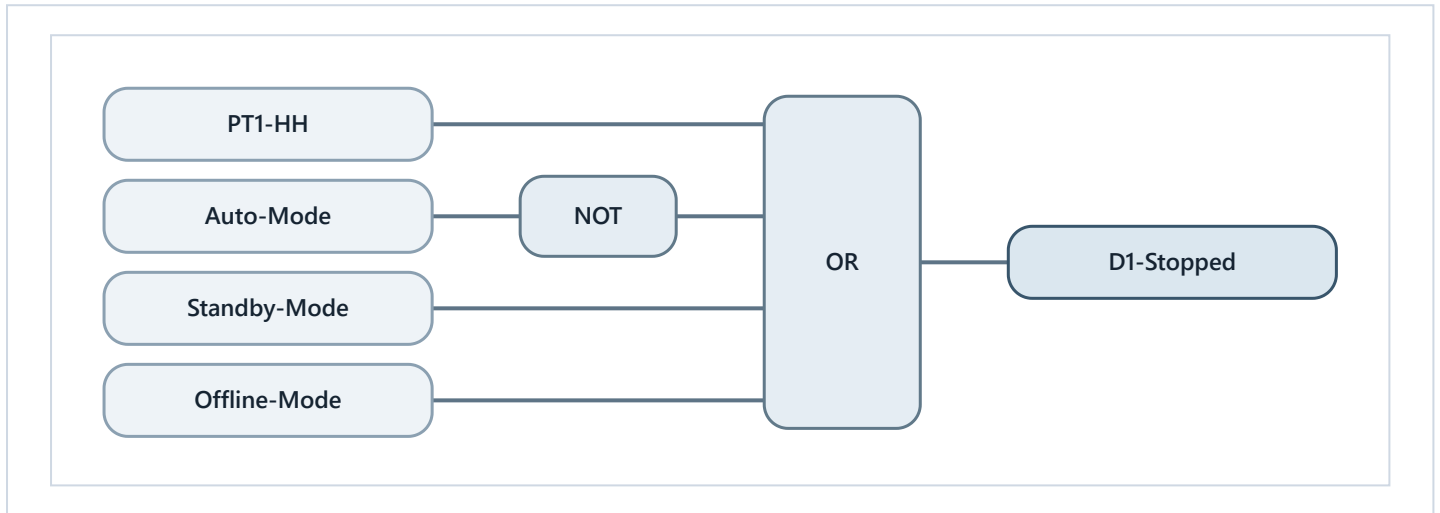
XV1 Closed - Valve 1 Closed is generated when any of the following conditions are active: PT1-HH; NOT Auto-Mode; Standby-Mode; and Offline-Mode.

## 2.4 D1-Stopped - Pump 1 Stopped

### Logic Summary

Trigger: D1-Stopped = (PT1-HH OR NOT Auto-Mode OR Standby-Mode OR Offline-Mode)

### Boolean Diagram



### System Description

D1-Stopped - Pump 1 Stopped is generated when any of the following conditions are active: PT1-HH; NOT Auto-Mode; Standby-Mode; and Offline-Mode.

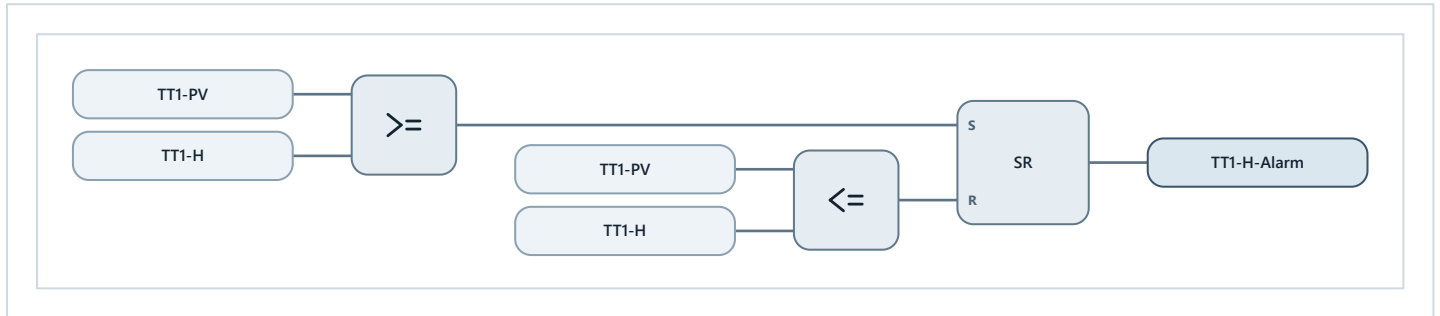
## 2.5 TT1-H-Alarm - High Temperature Alarm

### Logic Summary

Trigger:  $TT1-H-Alarm = (TT1-PV \geq TT1-H)$

Attributes: latched; reset when  $TT1-PV \leq TT1-H$

### Boolean Diagram



### System Description

TT1-H-Alarm - High Temperature Alarm is generated when TT1-PV is greater than or equal to TT1-H. Once generated, the effect remains latched until TT1-PV - Temperature Value is less than or equal to TT1-H - High Temperature.

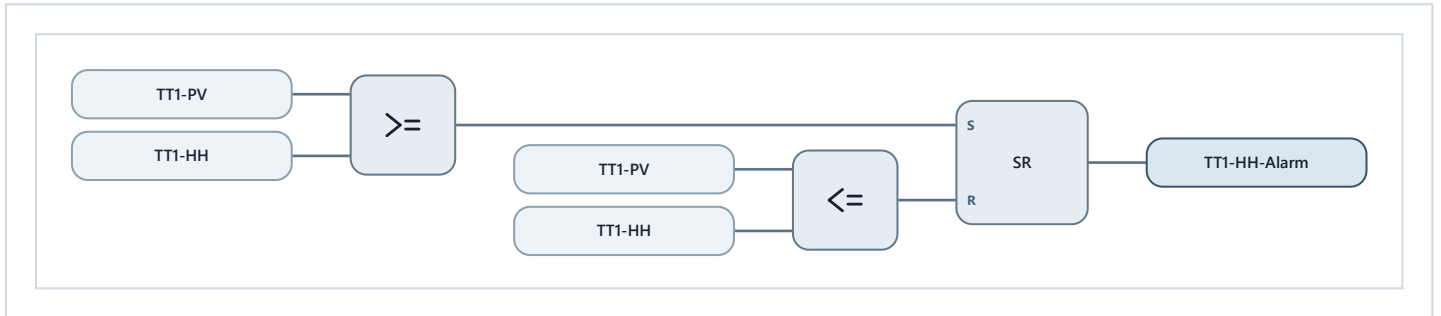
## 2.6 TT1-HH-Alarm - High High Temperature Alarm

### Logic Summary

Trigger:  $TT1-HH-Alarm = (TT1-PV \geq TT1-HH)$

Attributes: latched; reset when  $TT1-PV \leq TT1-HH$

### Boolean Diagram



### System Description

TT1-HH-Alarm - High High Temperature Alarm is generated when TT1-PV is greater than or equal to TT1-HH. Once generated, the effect remains latched until TT1-PV - Temperature Value is less than or equal to TT1-HH - High High Temperature.

### 3. Signal Register

Type	Tag	Description	Used In
Cause	Auto-Mode	Auto Mode	e3, e4
Cause	Offline-Mode	Offline Mode	e3, e4
Cause	PT1-H	High Pressure	e1
Cause	PT1-HH	High High Pressure	e2, e3, e4
Cause	PT1-PV	Pressure Value	e1, e2
Cause	Standby-Mode	Standby Mode	e3, e4
Cause	TT1-H	High Temperature	e5
Cause	TT1-HH	High High Temperature	e6
Cause	TT1-PV	Temperature Value	e5, e6
Effect	D1-Stopped	Pump 1 Stopped	NOT Auto-Mode, Offline-Mode, PT1-HH, Standby-Mode
Effect	PT1-H-Alarm	High Pressure Alarm	PT1-H, PT1-PV
Effect	PT1-HH-Alarm	High High Pressure Alarm	PT1-HH, PT1-PV
Effect	TT1-H-Alarm	High Temperature Alarm	TT1-H, TT1-PV
Effect	TT1-HH-Alarm	High High Temperature Alarm	TT1-HH, TT1-PV
Effect	XV1 Closed	Valve 1 Closed	NOT Auto-Mode, Offline-Mode, PT1-HH, Standby-Mode

Signals marked — are defined but not currently mapped to any effect. Review for completeness.

# Appendix A. Cause and Effect Matrix

Effects 1-6 of 6 | Causes 1-9 of 9

- A filled circle indicates that the cause drives the effect.

Cause Tag / Description	PT1-H-Alarm	PT1-HH-Alarm	XV1 Closed	D1-Stopped	TT1-H-Alarm	TT1-HH-Alarm
<b>PT1-H</b> High Pressure	H					
<b>PT1-HH</b> High High Pressure		H	H	H		
<b>TT1-H</b> High Temperature					H	
<b>TT1-HH</b> High High Temperature						H
<b>Auto-Mode</b> Auto Mode			L	L		
<b>Standby-Mode</b> Standby Mode			H	H		
<b>Offline-Mode</b> Offline Mode			H	H		
<b>PT1-PV</b> Pressure Value	H	H				
<b>TT1-PV</b> Temperature Value					H	H