

WATER PRODUCTION FACILITIES ELECTRICAL UPGRADES PROJECT Solicitation Number: CO-00523 Job No.: 21-6007

ADDENDUM No. 5 February 3, 2023

To Bidder of Record:

This addendum, applicable to work referenced above, is an amendment to the bid proposal, plans and specifications and as such will be a part of and included in the Contract Documents. Acknowledge receipt of this addendum by entering the Addendum number and issue date on the space provided in submitted copies of the bid proposal.

CHANGES TO THE SPECIFICATIONS

- 1. Specification section 17305 Application Services:
 - A. 17305-1 1.01 E. REMOVE and REPLACE the entire sentence with the following: "The currently available SAWS HMI and PLC programming standards are attached in Appendix A and Appendix B for bidding purposes.
 - B. ADD Appendix A SAWS HMI Software Configuration Standards. Revision: October 2021 (Attached to this addendum.)
 - C. ADD Appendix B SAWS PLC Software Configuration Standards. Revision: January 2023 (Attached to this addendum.)
- 2. Specification Section 01500 Construction Facilities and Temporary Control 01500-7.
 - A. REMOVE page in entirety.

END OF ADDENDUM

This Addendum is two hundred thirty-three (233) page(s) in its entirety.

Attachments:

- 1) Section 17305 Appendix A SAWS HMI Software Configuration Standards
- 2) Section 17305 Appendix A SAWS PLC Software Configuration Standards



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APPENDIX A - APPLICATION SERVICES

SAWS HMI Software Configuration Standards





HMI SOFTWARE CONFIGURATION STANDARDS

REVISION: OCTOBER 2021

DEVELOPED FOR: SAN ANTONIO WATER SYSTEM (SAWS) DEVELOPED BY: TESCO CONTROLS [THIS PAGE IS INTENTIONALLY LEFT BLANK]

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FORWARD

This document was developed by Tesco Controls on behalf of and in collaboration with San Antonio Water System (SAWS). The latest revision replaces all previous revisions. Any revisions to this document must be approved by SAWS, at a minimum. A completed and approved Change Management Request Form is required to accompany any revisions to this document. The CM Form(s) should be identified in the Revision History table by their number to provide a historical record of changes made to this document. Refer to the Change Management (CM) Procedure on the next page for details on the CM Process.

Any feedback or questions on this document should be directed to SAWS. The revision history for this document is detailed below.

REVISION	AUTHOR(S)	REVISION NOTES	CM FORM
MONTH DAY, YYYY	Author Names	Name of Project revisions were made on & Brief description of changes	CM Form Number
September 12, 2019	WEBSTER JESSUP STEPHEN GOLDSWORTH	BASE PROJECT INITIAL DRAFT DEVELOPED FROM DECISIONS MADE IN WORKSHOPS WITH OWNER	CM-0000
April 21, 2020	WEBSTER JESSUP STEPHEN GOLDSWORTH	BASE PROJECT SECOND DRAFT DEVELOPED FROM DECISIONS MADE IN WORKSHOPS WITH OWNER	CM-0000
June 19, 2020	WEBSTER JESSUP STEPHEN GOLDSWORTH ALEX MCCULLOCH	BASE PROJECT THIRD DRAFT DEVELOPED WITH UPDATES ENCOMPASSING PROJECT CHANGES OVER TIME	CM-0000
August 28, 2020	WEBSTER JESSUP	Section 2.2.5.2.2 ADDED WCS Alarm message ID assignments. Section 4.5.2.2.1 Added Lift Station motor graphics.	CM-0000
December 17, 2020	WEBSTER JESSUP	Section Added additional decimal place items	CM-0000
August 2, 2021	STEPHEN GOLDSWORTH	Added section 3.3.4 PLC Status and Communication Updated section 4.3.5.2.1 with dual analog graphics Added section 4.5.10 PowerFlex 755 Drive (P_PF755) Updated section 1.2.1.4 Introduction (System Info) Updated section 3.3.2 (HOA embedded in Motor Graphics) Updated sections 4.5.2/5/7 with updated Motor Graphics Added section 3.3.4.3 System Time Keeper Object	CM-0000
October 26, 2021	JESUS MARTINEZ	Updated Section 1.11.10 – added Supervisory Control display example Updated Section 4.5.2/5/7 – added Lift Station Pumps & corrected display and object naming	CM-0000
January 30, 2023	JESUS MARTINEZ	Updated Section 1.3 – added wording for tag name generator Updated Section 1.12.2.2 – Renamed Dos Rios to Steven M Clouse Updated Section 3.3.4.2 – removed derived tags for "not in run" and "fault" Updated Section 3.3.4.3.2 – updated recommended global object Updated Section 4.3.7 – updated recommended global object	CM-0000

REVISION HISTORY

REVISION	AUTHOR(S)	REVISION NOTES	CM FORM

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CHANGE MANAGEMENT (CM) PROCEDURE

It is rare for a Control System Software Standard to execute as planned throughout its lifecycle without the need for some sort of change. These changes often come from new process additions or new Systems or Sites that require additional or unique elements to integrate the process changes properly. The well-managed change increases the likelihood of project success and significantly improves adherence to defined standards.

The Change Control process consists of five distinct steps:

- **1.** Change Request Initiation A change request CM-Form is prepared, formally submitted to decision-makers (as selected or specified by SAWS at the time or project context of the request).
- 2. Change Request Analysis The change request is analyzed to determine if it has merit and is appropriate, and what impact the changes have on the existing standards. Additional information may be needed that might aid decision-makers in granting or denying approval of the request.
- **3.** Change Request Resolution/Approval Decision-makers consider the results of the analysis and determine if the request should be approved, denied, or if more analysis is needed.
- 4. Change Request Implementation Approved changes are planned, scheduled, resourced, and implemented.
- 5. Change Request Verification and Closing Implementation of the change is verified.

Change Request Procedure:

- 1. The Change Control Process is triggered by the completion and submittal of a change request form, which is used to record events, decisions, and activities that occur as the change progresses through the defined steps of the change control process.
- 2. Once submitted, the change request is analyzed through whatever means chosen (Workshop, RFI, Submittal, etc.), and the change request form is updated accordingly with information regarding the status of the approval.
- **3.** Once the change is approved, the CM-Form is signed by authorized individuals chosen by SAWS.
- **4.** Standards Document(s) are modified in accordance with the approved changes detailed in the approved CM-Form(s).
- **5.** Standards Document changes are reviewed for accuracy in adherence to the changes detailed in the approved CM-Form(s).
- **6.** The Revision History Table on the previous page is updated with the Revision (Date), Authors, Revision Notes, and the applicable CM-Form references.

The Change Request Form Template (CM-Form) is included as Appendix E. Completed and Approved CM-Forms are to be added to this document under Appendix F for proper historical tracking of the changes to the standards document. [THIS PAGE IS INTENTIONALLY LEFT BLANK]

INTRODUCTION

This document is developed as part of the Production Control System Upgrade project to implement a single, consolidated software platform. This platform provides monitoring and control of the entire Water Production System, Water Collection System, and Recycled Water System utilizing the Rockwell FactoryTalk HMI and the PlantPAx platform. Additional Systems that this standard applies to are to be added to this document as part of the evolution of the SAWS software configuration standard.

A key part of the design process is the development of the Human Machine Interface (HMI) standards, which are to be applied to bring consistency to the HMI. The decisions documented as part of the baseline HMI standards workshops were used to create these SAWS HMI standards and are be incorporated into the technical specifications for system implementation on SAWS projects.

- The specific application of these standards to each SAWS Control System is indicated in the table below by a '☑' in the 'Applies' column when the item is approved or applicable and blank when not approved or applicable. This table exists throughout the document.
- The scope applies to either ALL or individual Process Systems; additional information is indicated for each Process System as necessary under the Application/Scope.
- Any customizations or SAWS-specific standards are also indicated with a '☑' in the 'SAWS Std' column of the table to indicate deviations from the native PlantPAx standard or other standards that are specific to SAWS.
- If there is no SAWS Std indicated, refer to PlantPAx documentation references for configuration details as indicated in sections where the default PlantPAx approach is acceptable.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Additional PCS Application/Scope details go here	
		WPS	Additional WPS Application/Scope details go here	
		WCS	Additional WCS Application/Scope details go here	
		RWS	Additional RWS Application/Scope details go here	
	AVS Additional AVS Application/Scope details go here			
	ASR	ALL	Additional ASR Application/Scope details go here	
	ASR Add		Additional ASR Application/Scope details go here	
		DSL	Additional DSL Application/Scope details go here	
	CWS	CWS	Additional CWS Application/Scope details go here	
	WWTP	ALL	Additional WWTP Application/Scope details go here	
		SMC	Additional SMC Application/Scope details go here	
		LCK	Additional LCK Application/Scope details go here	
		МСК	Additional MCK Application/Scope details go here	

System Applicability (Current Revision)

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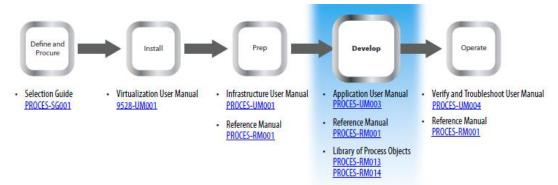
SCOPE

The purpose of HMI Standards is to define and document specific software configuration standards for developing the elements of the HMI to keep the system uniform and accurate to the HMI philosophy adopted by SAWS throughout the initial implementation phase of the project and for future modifications to the system. This document is intended to evolve with the SAWS Production Control System. It should be modified over time as needed to reflect the current HMI standards philosophy and ensure that modifications made to the system align with the documented standards.

The core software standard for the SAWS Production Control System is the Rockwell Automation Library of Process Objects model, also referred to as PlantPAx, built within the framework of the Rockwell FactoryTalk View SE SCADA Platform. The standards identified within this document are intended to focus attention on the items that establish the specific SAWS standard:

- Objects of the base PlantPAx standard that have been customized
- Standard PlantPAx elements that have been selected and approved for use
- Customized PlantPAx elements that have been selected and approved for use
- Integration of non-PlantPAx elements that have been developed
- Change Management Procedure

This approach of tailoring the PlantPAx standard to fit the SAWS Production Control System is in alignment with the Rockwell best-practices approach of the documented PlantPAx System Implementation and Documentation Strategy shown in the figure below. Execution is accomplished by documentation that captures the deviations and provides a clear and narrow scope. This document provides guideline requirements for the Develop stage of the strategy specific to the SAWS Production Control System.



¹PlantPAx System Implementation and Documentation Strategy

Implementation of specific configurations, objects, instructions, or methodologies that are not outlined in this document shall be executed in strict accordance with the guidelines detailed in the applicable PlantPAx documentation listed under the Normative References section of this document.

The intended audience for this document is those who are responsible for control system analysis, engineers or integrators who may be adding to the system or interfacing to the system through a different application in future capital projects, or those who are responsible for making ongoing changes and maintaining or troubleshooting the system.

¹ From PROCES-RM014, Rockwell Automation Library of Process Objects: HMI Instructions (Page 13)

NORMATIVE REFERENCES

The following document references are the established PlantPAx standards used as a baseline for the development and application of this document. This document is complementary to the baseline PlantPAx standard established by Rockwell Automation, and as such, the documents referenced below are essential for the appropriate application of this document.

For information on PlantPAx HMI Standards not explicitly outlined in this document, reference the following for additional requirements:

PlantPAx Library Documentation for Version 4.0

- PROCES-RM002 Rockwell Automation Library of Process Objects
- PROCES-RM003 Rockwell Automation Library of Logix Diagnostic Objects
- PROCES-RM004 Rockwell Automation Library of Steam Table Instructions
- PROCES-RM005 Foundation Fieldbus Design Considerations
- PROCES-RM006 Rockwell Automation Sequencer Object
- PROCES-RM007 PlantPAx Logix Batch and Sequence Manager
- PROCES-RM008 PlantPAx Batch Design Considerations
- PROCES-RM010 Rockwell Automation Library of Process Objects: HART Modules
- PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions
- PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions

PlantPAx System Documentation for Version 4.5

- PROCES-RM001 PlantPAx Distributed Control System Reference Manual
- PROCES-SG001 PlantPAx Distributed Control System Selection Guide
- PROCES-UM001PlantPAx Distributed Control System Infrastructure Configuration User Manual
- PROCES-UM003PlantPAx Distributed Control System Application Configuration
- PROCES-UM004PlantPAx Distributed Control System Verification and Troubleshooting User Manual
- PROCES-SR027 PlantPAx System Hardware Specifications
- 9258-UM001 PlantPAx Virtualization User Manual

Additional Rockwell Documentation

 Knowledgebase Article 1076498: PlantPAx Process Library 4.x security group setup for FactoryTalk View SE & ME

TERMS AND DEFINITIONS

For this document, the following terms and definitions apply.

ERM /ACRONYM	DEFINITION /DESCRIPTION
Alarm	An audible or visible means of indicating to the operator an equipment malfunction process deviation, or abnormal condition requiring a timely response.
Alarm Event	Push notification from the alarm object to the alarm subscriber that indicates a change in alarm state.
Alarm Management	The processes and practices for determining, documenting, designing, operating, monitoring, and maintaining alarm systems.
Alarm Object	The alarm system element that owns the alarm; it is responsible for identifying an alarm, managing the state, and generating an alarm event.
Alarm Priority	An attribute of In-Alarm even that informs you of the salience of the event.
Alarm System	The collection of hardware and software that detects alarms, communicates the indication of that state to the operator, and records changes in the alarm state.
AOI	Add-on Instruction
Application Server	The application server (AppServ) is a server on the Process Automation System Server (PASS), which is typically a FactoryTalk Directory client of the PASS.
Architecture	Architecture is a representation of a control and software system, as well as the process and discipline for effectively implementing the designs for such a system.
Characterization	Characterization is the operation and collection of performance data for a representative process system to determine the scalability, stability, and usability or a specific system configuration.
Client	A client is a hardware and software that provides an interface with a link into a system server application.
Control Strategy	System footprint to show the complexity of the data servers, information storage, operator interface, control code, and I/O.
Control System	A system that responds to input signals from the equipment under control or from an operator and generates output signals that cause the equipment under control to operate in the desired manner.
Controllers	Logix Controllers
Decision-makers	Parties identified by SAWS at the current time or based on the project context under which the changes were proposed.
Display (Graphic, Window)	A visual representation of the process and related information used by the operator for monitoring and control.
Display Object	A display object is a functional group of display elements with animations.
Drill-down	A method of navigation in which successive displays show increasing detail for smaller subsets of the system scope.
EWS	Engineering Workstation
Faceplate	A display, part of a display, or pop-up used for monitoring or direct operation of a single control loop, device, sequence, or other entity.
FactoryTalk	FactoryTalk Services Platform is a suite of services including Live Data, Directory, Audit, Security, Activation, and Alarm & Events.
FTD	FactoryTalk Directory software defines where system data is stored for access, and also provides a shared address book of factory resources that are shared among FactoryTalk-enabled products.
Global Object	A collection of display objects that are linked to the Add-On Instructions with a dra and drop wizard. Global objects allow the rapid development of main plant display graphics. An object that can be created once and can be referenced multiple times on multiple displays in an application.
Global Object Parameter	Placeholder used in place of a tag in display objects for dynamic assignment of tags through the use of a parameter file that provides the link between parameters and tags.

Graphic Symbol	A visual representation of a process component, instrument, or condition in a display composed of a combination of simple graphic elements.
Historian	Application to Collect, Manage, and Analyze Data
Historical Data	Data that is used for the long-term analysis of past operations.
HMI	Human Machine Interface, a collection of hardware and software used by the operator and other users to monitor and interact with the control system and wit the process via the control system.
Navigation	A function which supports users in locating desired information in an HMI-based information system, and also in guiding the selection of displays; or the act of selecting a display.
OIT	Operational Interface Terminal
Operator	The primary user of the HMI; the person who monitors and makes changes to the process.
OWS	Operator Workstation
PASS	PlantPAx Automation System Server
PCS	Production Control System
Platform	A particular family of HMI products capable of using a standard toolkit.
PLC	Programmable Logic Controller
Pop-up (Pop-up Display, Overlay)	A display that appears (pops up) in the foreground of the screen, possibly obscuri part or all of the display in the background.
Process Object Library	Predefined library of controller code (Add-On Instructions), display elements (glob objects), and faceplates that let you quickly assemble large applications with prov strategies, rich functionality, and qualified performance.
RSLinx Software	Communication driver (data server) for computer-based programs to access information in Rockwell Automation controllers.
SAWS	San Antonio Water System
SCADA	Supervisory Control and Data Acquisition is a system for monitoring and control or geographically widespread processes. SCADA includes all equipment and function for acquiring, processing, transmitting, and displaying the necessary process information.
Screen	The part of the HMI client that shows an image.
Script	A code module which performs tasks executed on the HMI platform and usually invoked by some operator action or other control system event.
Scripting	A feature provided by some HMI platforms to allow the execution of scripts.
SE	Site Edition, a specific version of FactoryTalk View software
Server	A software component that serves data to an application (for example, data serve
Tag (Point)	The unique identifier assigned to the process measurement, state, calculation, device, or other entity within the HMI or controller.
Toolkit	A collection of custom or pre-defined HMI configuration items that reduces time and effort to produce a control system.
Trending	A feature for displaying real-time or historical data in various chart formats, usual with respect to time.
UDT	User-defined data type, a tag type that you create once and reuse in multiple tag templates, multiple times.
VantagePoint	Analytical Reporting Software
Workstation	A computer running development, configuration, or client software.

1. HMI APPLICATION CONFIGURATION

1.1 OVERVIEW

1.1.1 APPLICATION

 This section references information from multiple Chapters of PROCES-UM003 PlantPAx Distributed Control System Application Configuration. Basic HMI configuration details not included in this section can be found in the reference documentation. Specific application configuration details, including security, navigation, fonts, colors, formats, and other specific non-PlantPAx methodologies selected for the SAWS standard, are detailed in this section.

1.1.2 REQUIREMENTS FOR DEVIATIONS FROM STANDARD

• Any intended deviation from these standard guidelines shall be discussed with SAWS personnel and approved on a project-by-project basis to ensure methodologies are in alignment with the SAWS vision. This also provides an opportunity for SAWS personnel to consider if updates to the standards document are appropriate based on any approved deviations.

1.1.3 MODIFICATIONS TO LEGACY HMI COMPONENTS

The existing PCS and ASR Systems were initially developed using a legacy approach to HMI development. Subsequent additions to these systems are intended to be developed using the SAWS PlantPAx standards detailed in this document. This evolution has produced a hybrid PlantPAx HMI application for the PCS and ASR Systems that have some additional considerations for those making modifications within either of these systems. One of the most important considerations is to address the legacy components in the appropriate way depending on what the scope of the modifications are as defined below (select the appropriate method based on the scope of the project is either a modification or a replacement – replacement defined by the implementation of PlantPAx programming of the site PLC thereby requiring HMI PlantPAx method vs. a modification to a site that would leave non-PlantPAx programming in the site PLC):

1.1.3.1 Modification to Existing Legacy Site(s)

• The legacy approach should be utilized in the development of new components to be added to the existing legacy site components and provide consistency in the site that remains following the modifications. Refer to an existing application for legacy methods.

1.1.3.2 Replacement of Existing Legacy Site(s)

• The standards detailed within this document should be utilized in the development of the replacement site components, and the existing legacy components for the site should be removed entirely following the modifications.

1.2 APPLICATION ENVIRONMENTS

- 1.2.1 HMI Systems and Associated Process Systems
 - The following Control Systems (HMI Systems) are subject to SAWS software standards. The Process Systems associated with each Control System are indicated.
 - 1.2.1.1 PCS Process Control System
 - Water Production System (WPS)
 - Wastewater Collection System (WCS)
 - Recycled Water System (RWS)
 - Agua Vista Station (AVS)
 - 1.2.1.2 ASR Aquifer Storage and Recovery System
 - Aquifer Storage and Recovery Water Treatment Plant (ASR)
 - o Desal Brackish Groundwater Desalinization (DSL)
 - 1.2.1.3 CWS Chilled Water System
 - Chilled Water System (CWS)
 - 1.2.1.4 WWTPs (FUTURE) Wastewater Treatment Plants
 - Steven M. Clouse WRC (SMC)
 - \circ $\,$ Leon Creek WRC (LCK) $\,$
 - Medio Creek WRC (MCK)

- 1.2.2 SERVER, APPLICATION, DIRECTORY, AREA, AND HOSTING DETAILS
 - The following information includes details about the overall application as well as individual components within each area, including hosting details.

1.2.2.1 PCS FactoryTalk Network Directory

- 1.2.2.1.1 Name: HQS-PCS-FTD-PN
- 1.2.2.2 PCS Application
 - 1.2.2.2.1 Name: SAWS_PCS
- 1.2.2.3 PCS HMI Server
 - 1.2.2.3.1 Name: PCS_HMI
 - Historian Interface Location: 10

1.2.2.4 PCS Areas and Servers

- 1.2.2.4.1 Name: AreaWPS Water Production System
 - Sub Area: ALM (FT A&E Server)
 - Name: PCS_AlmWPS
 - Host Servers: HQS-PCS-ALM1-P1(Pri) and BCS-PCS-ALM1-P1(Sec)
 - Sub Area: LNX (FT Linx Server)
 - Name: PCS_LnxWPS
 - Host Servers: HQS-PCS-DAS1-P1(Pri) and BCS-PCS-DAS1-P1(Sec)
 - Historian Interface Location: 11
- 1.2.2.4.2 Name: AreaWCS Wastewater Collection System
 - Sub Area: ALM (FT A&E Server)
 - Name: PCS_AlmWCS
 - Host Servers: HQS-PCS-ALM2-P1(Pri) and BCS-PCS-ALM2-P1(Sec)
 - Sub Area: LNX (FT Linx Server)
 - Name: PCS_LnxWCS
 - Host Servers: Hosted on HQS-PCS-DAS2-P1(Pri) and BCS-PCS-DAS2-P1(Sec)
 - Historian Interface Location: 12
- 1.2.2.4.3 Name: AreaRWS Recycled Water System
 - Sub Area: ALM (FT A&E Server)
 - Name: PCS_AlmRWS
 - Host Servers: HQS-PCS-ALM3-P1(Pri) and BCS-PCS-ALM3-P1(Sec)
 - Sub Area: LNX (FT Linx Server)
 - Name: PCS_LnxRWS
 - Host Servers: HQS-PCS-DAS3-P1(Pri) and BCS-PCS-DAS3-P1(Sec)
 - Historian Interface Location: 13

- 1.2.2.4.4 Name: AreaAVS Agua Vista Station
 - Sub Area: ALM (FT A&E Server)
 - Name: PCS_AlmAVS
 - Host Servers: HQS-PCS-ALM4-P1(Pri) and BCS-PCS-ALM4-P1(Sec)
 - Sub Area: LNX (FT Linx Server)
 - Name: PCS_LnxAVS
 - Host Servers: HQS-PCS-DAS4-P1(Pri) and BCS-PCS-DAS4-P1(Sec)
 - Historian Interface Location: 14
- 1.2.2.5 ASR, CWS, WWTPs FactoryTalk Network Directory
 - $\circ \quad \text{Not defined yet} \\$
- 1.2.2.6 ASR, CWS, WWTPs Application
 - $\circ \quad \text{Not defined yet} \\$
- 1.2.2.7 ASR, CWS, WWTPs HMI Server
 - $\circ \quad \text{Not defined yet} \\$
- 1.2.2.8 ASR, CWS, WWTPs Areas and Servers
 - Not defined yet

1.3 TAG NAMING CONVENTIONS

See PLC Programming Standards for Naming Standards related to PLC Objects (AOI) and HMI display elements. Similarly, verify all I/O and Tag naming with the Tag Name Generator document.

1.4 IO SERVER NAMING CONVENTIONS

The IO Server shortcut name matches the 'PLC Controller Name' as specified in the PLC Programming Standards.

1.5 COLORS

- 1.5.1 GRAPHIC ELEMENTS
 - Unless otherwise noted for specific elements, the PlantPAx default color scheme is used for the SAWS standard.
- 1.5.2 DISPLAY BACKGROUND
 - The display background for all displays other than the alarm summary shall be Light Gray (224,224,224). This color reduces eye strain and allows color-coded text and symbols to be easily seen by the user.

1.6 FONTS

- 1.6.1 NON-PLANTPAX FONTS
 - Arial shall be used for all non-PlantPAx fonts.
- 1.6.2 PLANTPAX FONTS
 - All PlantPAx element fonts shall be the default.

1.7 VALUE FORMATS

Configure the number of decimal places to be displayed for each type of process variable, as shown in the table below.

Process Value Type	Decimal Places
Residual	2
Flow Rate, GPM (Max < 1000)	1
Flow Rate, GPM (Max > 1000)	0
Flow Rate, MGD	2
Level/HGL	1
Conductivity	2
Pressure/HGL	1
Runtime, hours	1
Runtime, minutes	1
Runtime, seconds	0
Temperature	1
рН	1

1.8 APPLICATION RESOLUTION

HMI Applications use 1920 x 1080 resolution unless otherwise directed.

1.9 HMI SECURITY

1.9.1 SECURITY OVERVIEW

- The security defined for the SAWS HMI standard follow the guidelines provided by Rockwell Automation for PlantPAx Process Library 4.x; these guidelines can be found in Knowledgebase Article 1076498 titled "PlantPAx Process Library 4.x security setup for FactoryTalk View SE & ME" which has an access level of 'Everyone' and is available within the Rockwell Knowledgebase at https://rockwellautomation.custhelp.com/. Any deviations from the Rockwell standard are detailed in this section.
- A modified version of the Knowledgebase article containing the customization markups is included in Appendix D.

1.9.1.1 *System Applicability*

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	HMI Application Security Model for PCS System.	

1.9.2 SECURITY GROUPS, CODES, AND PERMISSIONS

- ¹An additional User Security Group has been created as part of the SAWS Standard. This Security is HMI_ViewOnly, and is used to allow view-only access to the HMI application when there is no valid user logged in (default user); this allows the FTView SE Client to display the application and allow navigation only instead of the Client displaying a dialog box that would normally appear when there are no valid users logged in.
 - All HMI Users are Windows Linked Users
 - SAWS personnel must create new users within the OPS domain before new HMI Windows Linked users can be added to FactoryTalk and the appropriate FactoryTalk Security User Groups shown below.
- 1.9.3 FACTORYTALK SECURITY USER GROUPS (USER GROUPS ARE NOT WINDOWS LINKED)
 - HMI_Operators (Only Code A)
 - HMI_Operating Supervisor (Only Code B)
 - HMI_Maintenance (Only Code C)
 - HMI_Maintenance Supervisor (Only Code D)
 - HMI_Engineering (Only Code E)
 - HMI_Manager (Only Code F)
 - HMI_Admin (Only Code G) Note Code G only allow the user to view the project.
 - ¹HMI_ViewOnly (Only Code H) Note Code H only allow the user to view the project. This code was created to ensure a view-only code remained and allows for modifications to Code G that may allow additional administrative functions as needed.
 - ²Additional Codes were added, enabling access to these features for additional User Groups.

FactoryTalk View Tag	Description	А	В	С	D	Е	F	G	1 <mark>1</mark> H	
Security\AlarmAck	Acknowledge/Reset Alarms	Х	Х	Х	Х	Х	Х			
Security\AlarmConfig	Alarm Configuration					Х				
Security\AlarmDisable	Disable Alarms		Х	Х	Х	Х	Х			
Security\AlarmShelve	Shelve Alarms	Х	Х	Х	Х	Х	Х			
Security\BypassFeedback	Can Bypass Feedback			Х	Х	Х				
Security\BypassInterlocks	Bypass Permissives and Interlocks		Х	Х	Х	Х	Х			
Security\CmdSrcMaint	Acquire/Release Equipment Maintenance Command Source			х	х	х				
Security\CmdSrcOperProg	Acquire/Lock and Release Equipment Operator Command Source		х	х	х	х	х			
² Security\CmdSrcOutOfService	Can put device in/out of service	Х	Х	Х	Х	Х				
Security\ConfigSecurity	Change Security for the device					Х				
Security\DeviceConfigBehavior	Change the setup of the device (Advanced)					х				
Security\DeviceConfigDiagnostics	Configure device diagnostics			Х	Х	Х				
² Security\DeviceConfigFailTimers	Modify Alarm Delay Times		Х		Х	Х				
Security\DeviceConfigHMI	Change the configuration of the HMI interface for the device					х				
Security\DeviceConfigLimits	Configure device limits				Х	Х				
Security\DeviceConfigThresholds	Modify Limits and Deadbands		Х	Х	Х	Х	Х			
Security\DeviceConfigTimers	Configure device timers				Х	Х				
Security\DeviceConfigTuning	Change Tuning; Inflights; and Preacts				х	х				
Security\EnableSimulation	Put Device in Simulation					Х				
Security\EnterOperSettings	Enter Setpoints and Control Variables	х	х	х	х	х	х			
Security\OperateEquipment	Command Equipment in Operator Command Source	х	х	х	х	х	х			
Security\OverrideInputs	Override Inputs			Х	Х	Х				
Security\OverrideOutputs	Override Outputs			Х	Х	Х				
Security\ProcedureAdvancedExceptio ns	Exception Processing (Step Change; Parameter Change; Acquire; Reorder; Activate)		х	х	х	x	x			
Security\ProcedureChangeParameters	Override Downloaded Phase Parameters		х	х	х	х	х			
Security\ProcedureChangeSetpoints	Override Downloaded Setpoints		Х	Х	Х	Х	Х			
Security\ProcedureControl	Select; run; hold; and restart Procedures; Sequences; and Batches	х	х	х	х	х	х			
Security\ProcedureEquipmentControl	Manual Supervisory EP/EM Control		Х	Х	Х	Х	Х	Ī		
Security\ProcedureExceptions	Exception Processing (Resume; manual; Auto; Semi-Auto; Pause; Disconnect; Release)	х	х	х	х	х	х			

Security\ProcedureForceSequence	Force Steps/States		Х	Х	Х	Х	Х		
Security\ProcedureManualControl	Manual Procedure; Sequence; and Batch Processing (Stop; Abort; Reset)	x	х	х	х	х	х		
Security\ResetAccumulators	Reset Run Time Accumulators		Х	Х	Х	Х			
Security\RespondToPrompts	Respond to Prompts	Х	Х	Х	Х	Х	Х		
Security\ShowFaceplate	Navigate to full faceplate			Х	Х	Х			

1.10 NAVIGATION

Navigation buttons use the /cc suffix in the SAWS standard to center the display being called on the screen.

• For example, the action for navigating to a fluoride sub-process screen would be as follows: Display prc_wps_pz0790_mdn_fl /cc

1.10.1.1 Application Header

 $\circ~$ An Application Header has been established for the SAWS HMI Standard that encompasses several Systems, as indicated below.

1.10.1.2 System Applicability

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Navigation Model for PCS System.	

1.10.1.3 Header Overview

- There are multiple components that make up the Application Header. The individual components are described in this section. The header display within the application is titled '_navbar.'
- Header when users are logged out

Water Production	Wastewater Collection	Recycled Water	Agua Vista Plant	Login	Corrent User: ViewOnly	Thursday, July 18, 2019 12:33:58 PM	\rightarrow

• Header when a user is logged in

Water Production	Wastewater Collection	Recycled Water	Agua Vista Plant	Logout OPSISGOLDSWORTH	Thursday, July 18, 2019 12:35:32 PM	X

1.10.1.4 Home Button (SAWS Logo)

- The Home Button navigate to the Home Display [main_overview].
 - Size: 54 x 59 Pixels



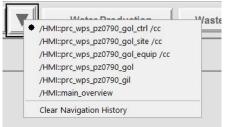
1.10.1.5 *Previous and Next Buttons*

- Previous and Next Buttons are used to jump back and forth through the navigation history.
 - Size: 45 x 45 Pixels



1.10.1.6 Navigation History Button

- The Navigation History Button opens a window with the navigation history displayed, allowing the user to select displays from the list.
 - Size: 45 x 45 Pixels



1.10.1.7 Water Production Button

- The Water Production Button opens a navigation window [mnu_wps] that allows multiple methods of navigation to the pressure zones and sites within the PCS System. Clicking on the Pressure Zone Overview text [ex. PZ 0790 Overview] navigate to the pressure zone overview display. Clicking on the Black Arrow on the right side of the Pressure Zone Overview text brings up another navigation window [ex. mnu_wps_pz0790] that lists the sites within the pressure zone. Clicking on the individual Site text [ex. CRL Carlisle SCND]text navigate directly to the site screen [ex. Prc_wps_pz0790_crl]. Clicking on either of the WPS Index 1, 2, 3, or 4 texts open a Water Production System Index display with multiple site navigation menus.
 - Size: 44 x 219 Pixels



• Pressure Zone Overview Navigation Window



• Pressure Zone Sites Navigation Window

Water Production	Wastewater Collection	n Recycled Water A
WPS Menu Indexes ar PZ 0730 C ◆ PZ 0750 C ◆ PZ 0790 C)verview	Production Contro
▲ PZ 0828 (▲ PZ 0828 (▲ PZ 0830 (■ PZ 0850 (■ PZ 0850 (■ PZ 0900 (▲ PZ 0900 (■ PZ 0950 (■ PZ	Dverview Dverview Dverview Dverview Dverview Dverview Overview Overview Verview Dverview Dver	

Water Production System Index 1

▙◀▶▼੯	Water Pro	Oduction Wastewater	Collection	Recycled Water	Ag	ua Vista Plant		Login Current User: ViewOnly		Tuesday, April 21, 2020 6:59:47 AM	-1
				Water Produ	ction S	ystem - Alphabe	tical				By Zon
#		CRP - Crescent Park BSTR	PZ1618	1		MPB-TNK - Montana Pass TANK	PZ1400E	SET - Southeast BSTR	PZ0750	WLG - Woodland Green PRV	PZ154
218 - 21st Street PRM	P20828	CRW - CRWA BSTR	PZ0950E	H0-TNK - IH10 TANK	PZ1170	A MPB - Montana Pass BSTR	PZ1530E	SET - Southeast BSTR	P20830	3 WLK - Woodlake SCND	PZ093
34S - 34th Street PRM	PZ0828	3 CUL - Culebra PRM	PZ1170W	110 - IH10 BSTR	PZ1400W	3 MSN - Mission PRM	PZ0828	SHB - Shields TANK	PZ1400W	WLP - West Loop 1604 PRV	PZ104
34S - 34th Street PRM	PZ0930	D		III IHB - Indian Hills BSTR	PZ1610	N		SHB - Shields BSTR	PZ1610	WLT - Wayland TANK	PZ093
36S - 36th Street PRV	PZ0846	DAH - Dahloreen PRV	PZ0846	3 ING - Ingram PP	PZ0994	A NAB - NACO PRM	PZ0994	3 SHR - Shearer Hills PP	PZ0994	3 WLZ - Walzern SCND	PZ09
A		3 DEL - Delicrest PP	PZ0828	INW - Inwood BSTR	PZ1170	3 NAB - NACO PRM	PZ1060	3 SIG - Sigma Drive PP	PZ1111	WOE - West Oak Estates PP	PZ11
ACM - Acme PP	PZ0930	DOM - Dominion BSTR	PZ1518	IPR - Inspiration TANK	P20994	3 NAB - NACO PRM	PZ1125	SIG - Sigma Drive PP	PZ1258	A WOT - Wottin SCND	PZ10
ALO - American Lotus PRV	PZ0994	3 DRH - Dreamhil PP	PZ1111	3 IPR - Inspiration PP	PZ1111	NRT - Northridge TANK	PZ0930	3 SLP - South Loop 1604 PP	P20750	WST-TNK - West Avenue TANK	PZto
AMH - Amhurst TANK	PZ1010	DRM - Dreamhill SCND	PZ1170	IST - Indian Springs TANK	PZ1400E	NWW-TNK - New World TANK	PZ0950E	SMT - Silver Mountain BSTR	P20900	WST - West Avenue SCND	PZ10
AND - Anderson PRM	PZ1111	DWR - Daver TANK	P20930	ITW - IH10 West PRV	PZ1545	NWW - New World SCND	P20950E	SOK - Stone Oak PRM	PZ1295	WUR - Wurzbach PRM	P209
AND - Anderson PRM	PZ1170W	E	1 20000	- In the second second	121040	NWW - New World TANK	PZ1060	A SOM - Somerset BSTR	PZ0830	WUR - Wurzbach PRM	PZ11
ANQ - Anagua Springs	PZ1636	ECH - Echo Mourtain TANK	PZ1520	JDB - Judson TANK	PZ1125	0	12.1000	3 SPP - Schertz BSTR	PZ1060	3 WWD - Wirwood BSTR	PZ16
ANT - Antonio PP	PZ1030	3 EDN - Eden PP	PZ0994	3 JUD - Judson PP	PZ1125	3 OAK - Thousand Daks PP	PZ1111	SRW - Stein Ranch WELL	PZ1000	WWT - Waterwood TANK	PZ07
ARB-TNK - Adobe Ranch Tank	PZ1400W PZ1170	3 ENP - Engino PP	PZ0394 PZ1125	JUN - Jung PP	PZ1125 PZ1060	3 OCK - Oak Creek PP	PZ1111 PZ1111	SSB-TNK - Sunset Tank	PZ1111	WWV - W.W. White PRV	P207
ARB-TNK - Adobe Ranch Tank ARB - Adobe Ranch BSTR	P211/0 P21400W		PZ1125 PZ1258	K	PZ1060		PZ1111 PZ1111		PZ1111 PZ1170	WINY - W.W. White PRV	PZU
		ENS - Encino BSTR				3 OKW - Oakway PP		C SSB - Sunset BSTR		2	0.001
ART - Artesia PRM	PZ0828	EVN-TNK - Evans TANK	PZ1125	A KLS - Klaus SCND	PZ0930	3 OPP - Old Pearsall BSTR	PZ0930	SSE-TNK - Sasse BSTR	PZ1060	ZAR - Zarzamora PRM	PZ0
ASP - Aspen WELL	PZ1295	EVN - Evans BSTR	PZ1258	KNG - King Street PRM	PZ0790	ORR - Oliver Ranch BSTR	PZ1400E	SSE - Sasse BSTR	PZ1125		
AUS - Austin TANK	PZ0930	EVN - Evans BSTR	PZ1400E	KNT-TNK - Knights Cross TANK	PZ1295	P		STV-TNK - Stevens Ranch TANK	PZ1170S		
B		F		KNT - Knights Cross BSTR	PZ1400E	3 P18 - 181 South PP	PZ0750	STV - Stevens Ranch PRM	PZ1170S		
BB2 - Barbet 2 SCND	PZ0994	3 FAR - Fair PP	PZ0828	L		PAT - Palo Alto TANK	PZ0830	SUG - Summerglen PP	PZ1400E		
BBC - Babcock TANK	PZ1111	3 FCB - Forest Crest BSTR	PZ1494	A L16 - Loop1604 BSTR	PZ1295	3 PHS - Phylis PP	PZ0828	A SUN - Sunshine SCND	P20930		
BCP - Brooks City PP	PZ0828	3 FIV - Five Palms PP	PZ0930	LAF - SW Military at Peshawar PRV	PZ0846	PIT - Pituk WELL	PZ0790	A SUT - Sutton SCND	PZ0930		
BHW - Buckhorn Wells to SPPS	PZ1060	FLT - Fleetwood TANK	PZ1111	LAR - La Rosa PRM	P20790	PKN - Park North PP	PZ1060	Т			
BIP - Biters PP	PZ0930	A FOS - Foster TANK	PZ0828	LC3 - Lackland City 3 SCND	PZ0930	PMS - Pipers Meadow PRM	PZ0994	3 TC2 - Turtle Creek 2 PRM	PZ1170		
BIT - Bitters BSTR	PZ1111	FRT - South Foster TANK	PZ0828	LKH - Lockhill TANK	PZ1111	POT-TNK - Potranco TANK	PZ1080	A TC3 - Turtle Creek 3 SCND	PZ1170		
3 BKG - Brackennidge 13 & 14 SCND	PZ0930	FRV - Fischer PRV	PZ0750	A LLS - Loma Linda SCND	PZ0994	POT - Potranco SCND	PZ1080	3 TIP - Tippecanoe SCND	PZ0994		
3 BKH - Brookhill PP	PZ0828	3 FST - Foster PP	PZ0930	LLV - SW Military at Hall PRV	PZ0846	3 PRU - Prue PP	PZ1111	TIP - Tippecanoe BSTR	PZ1082		
BLK - Blackhawk SCND	PZ1111	G		LMN - Lemonwood PRM	PZ1010	3 PRU - Prue PP	PZ1170	3 TLP - Toyota North Lit PP	P20750		
BLR - Blanco Road BSTR	PZ1520	GAT - Gateway SCND	PZ0930	LNS - Lions TANK	PZ0628	PST - Pipestone TANK	PZ0994	3 TNP - Toyota North Gate PP	PZ0750		
BOR - Borgfeld BSTR	PZ1520	GEN - General McMulen Ruz TANK	PZ0828	3 LOC - Locust PP	PZ0828	3 PYR - Pyron PP	PZ0828	3 TRH - Terrell PP	P20930		
BRC - Bear Creek SCND	PZ0994	GER - Geronimo Forest	PZ1233	LRC - Los Reves Canvon BSTR	PZ1450	0		TRP - Texas Research Park PRM	PZ1170S		
BRD - Broadview TANK	PZ0930	3 GIB - Gibbs Sprawl SCND	PZ0950E	LRL - Mt Laurel	P20950N	3 QCI - Quiet Creek PRV	PZ0828	TRV - Helples Park #3	PZ1400W		
BRP - Braun PP	PZ1111	GIL - Gilete TANK	PZ0790	M		QIC - Qunitana PRV	PZ0790	TRV - Towerview BSTR	PZ1530		
BRP - Braun PP	PZ1170	GMM - General McMullen TANK	PZ0828	A MAL - Matsberger PRM	PZ0994	R	1 601 50	TWR - Tower PRM	PZ1111		
BSN - Basin PRM	PZ0930	GOL - Golden BSTR	PZ0790	MB1 - Marbach 1 PRM	P20930	A RAN - Randolph PRM	PZ0930	U	1.6.7111		
BSQ - Barclay Square PP	PZ1111	3 GRN - Greenbriar PP	PZ1111	A MB2 - Marbach 2 PRM	PZ0994	RAN - Randolph PRM	PZ1060	UNI - University BSTR	PZ1170		
BTA - Winding Way PRV	PZ1111 PZ1111	GRT - Grissom TANK	PZ1111 PZ0994	MDB-TNK - Medical TANK	PZ034 PZ1170	RED-TNK - Redland TANK	PZ1050	V	-21110		
BUC - Buckeye PP	PZ0994	3 GUL - Guibeau PP	PZ0394 PZ1111	MDB - Medical BSTR	PZ1170	RED - Rediand BSTR	PZ1000 PZ1125	3 VAL - Valley Road PP	P20750		
BUR - Burnet PP	PZ0994 PZ0930	GWN - Growdon BSTR (Non-Potable)	PZ1111 PZ0930	MDD - Medical DSTR MDN - Medical BSTR	PZ1170 PZ0790	RED - Rediand DSTR RFT-TNK - Rot Road Tank	PZ1125 PZ1170W	VST - Vestal TANK	PZ0750 PZ0790		
S BUR - Burnet PP	P20330	GWIN - Growdon BSTR (Non-Potable)	PZ0300		PZ0790 PZ1170		PZ1170W PZ1258W	VST - Vestal TANK	P20/90		
	03001011		070000	3 MDP - Medical Center PP		AFT - Rot Road BSTR			071001		
CAG-TNK - Cagnon TANK	PZ0950W	3 H90 - Highway 90 E. PP	PZ0828	3 MER - Mertz PP	PZ0930	3 RIV - Rivas PP	PZ0828	WC1 - Heldtes Park 1 BSTR	PZ1201		
CAG - Cagnon PRM	P20950W	3 HAR - Harmony Hills PP	PZ1111	3 MGR - Menger TANK	PZ0994	RT2 - Ranch Town 2 TANK	PZ1400W	WC2 - Helotes Park 2 TANK	PZ1201		
CAL - Callaghan PP	PZ1111	HCK - Hickory Hollow TANK	PZ0830	MHW - Miltary PRV	PZ1044	RT2 - Ranch Town 2 BSTR	PZ1610W	3 WES - Westby Lane PP	PZ0994		
CAR - Carson Homes PP	PZ0930	HIG - Highland TANK	PZ0828	3 MIC - Micron PRM	P20994	RVA - Roosevelt PRV	P20750	WET - Watson TANK	P20750		
CAT - Callaghan TANK	PZ1111	HIL-TNK - Hills TANK	PZ1170	MIC - Micron PRM	PZ1111	S		3 WIL - Witshire Estates PP	PZ0930		
CBT - Cibolo TANK	PZ1258	HIL - HIIS BSTR	PZ1400W	MID - Midcrown SCND	PZ0950E	SAL-TNK - Salado TANK	PZ1111	WIN-TNK - Marshall TANK	PZ1258		
CLN - Colonies North PP	PZ1111	HLD - Hildebrand TANK	PZ0930	3 MIL - NW Miltary PP	PZ1170	A SAL - Salado BSTR	PZ1295	WIN - Winchester BSTR	PZ1400E		
CMT - Cross Mountain TANK	PZ1610	3 HUN - Hunt PP	PZ1111	3 MKT - Market PRM	PZ0828	SAL - Salado BSTR	PZ1400W	3 WLA - Wildlake PP	PZ1400W		
CRL - Carlisle SCND	PZ0790	HUT - Hutchins TANK	PZ0790	3 MNT - Montpomery SCND	PZ0950E	3 SEA - SeaWorld TANK	PZ0994	WLB - Walden BSTR	PZ1536		
CRO - Crossroads PP	PZ0994			MON - Montgomery PRV	PZ0855	A SEL - Seale PRM	PZ0930	WLD - Wild Turkey PRM	PZ1520		

1.10.1.8 Wastewater Collection Button

- The Wastewater Collection Button opens a navigation window that allows navigation to the Wastewater Collection sites in the PCS System by clicking on site text.
 - Size: 44 x 219 Pixels



1.10.1.9 Recycled Water Button

- o The Recycled Water Button navigates to the Recycled Water System.
 - Size: 44 x 219 Pixels

Recycled Water

1.10.1.10 Agua Vista Plant Button

- The Agua Vista Button navigates to the Agua Vista System.
 - Size: 44 x 219 Pixels



1.10.1.11 Print Button

- The Print Button prints the current display to the PDF printer (Prints to PDF file).
 - Size: 45 x 45 Pixels



1.10.1.12 Alarms Button

- The Alarms Button navigates to the Alarm Display.
 - Size: 45 x 45 Pixels



1.10.1.13 Trends Button

- The Trends Button navigates to the Trend Display.
 - Size: 45 x 45 Pixels



1.10.1.14 Repaint Display Button

- The Trends Button navigates to the Trend Display.
 - Size: 45 x 45 Pixels



1.10.1.15 Login/Logout Buttons

- The Login/Logout Buttons allow the user to login and logout of the HMI Client.
 - Size: 45 x 90 Pixels
 - The Login button brings up the FactoryTalk View SE Client Login Dialog Box.

	Login	Current User: ViewOnly	
FactoryTalk View S	E Client Login		×
Type your user name	e and password:		
User name:			OK
Password:			Cancel

• The Logout Button logs out the current user and logs in the default user (ViewOnly).



1.10.1.16 Admin Button

- The Admin Button navigates to the Admin Display.
 - Size: 45 x 45 Pixels
 - Note that the Admin button is only visible when the logged in user is a member of the HMI_Admins security group.



1.10.1.17 Close Window Button

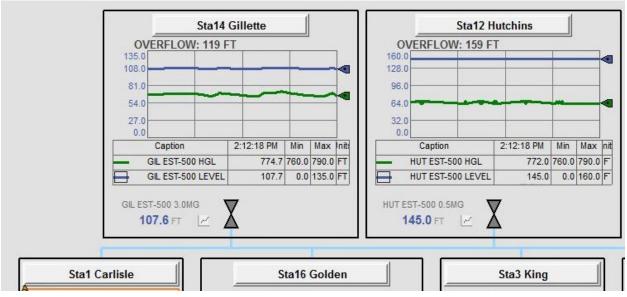
- \circ $\;$ The Close Window Button closes the HMI Client application.
 - Size: 45 x 45 Pixels

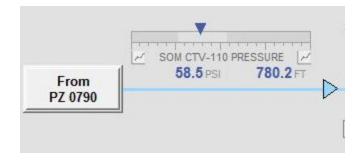


1.10.2 WITHIN DISPLAYS

1.10.2.1 Site Navigation Buttons

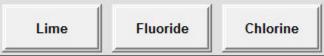
- Site navigation buttons are located throughout the HMI application displays [ex. Sta Gillette, Sta1 Carlisle, Sta16 Golden, From PZ 0790].
 - Size: Varies
 - The site buttons navigate to the site/process area indicated on the button.





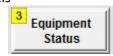
1.10.2.2 Sub-process Area Buttons

- Sub-process areas can be navigated to from site/process area displays. These vary between the systems [ex. Lime, Fluoride, Chlorine].
 - Size: 48 x 100 Pixels
 - Lime, Fluoride, and Chlorine sub-process area buttons in a PCS System Water Production site.



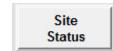
1.10.2.3 Equipment Status Button

- The Equipment Status button is located on the site displays and navigates to the Equipment Status display.
 - Size: 48 x 100 Pixels



1.10.2.4 Site Status Button

- The Site Status Button is located on the site displays and navigates to the Site Status display.
 - Size: 48 x 100 Pixels



1.10.2.5 Process Control Button

- The Process Control Button is located on the site displays and navigates to the Process Control display.
 - Size: 48 x 100 Pixels



1.10.2.6 Future Status/Control & Sub-Process Area Placeholders

• The size of this graphic used for the purpose of future navigation shall be 48 x 100 pixels to match the size of existing navigation buttons and simplify future modifications.

- This graphic is placed behind the navigation buttons within a process display and is visible if this the navigation button is not visible (in the case of a future site, for example, where the navigation button is currently disabled and provided as a placeholder only).
 - Note that this graphic is also used for an indication of static processes that are not monitored but exist as a reference indication within a graphic display. The usage instructions for that purpose are detailed under the Non-PlantPAx section of this document.

TEXT	This graphic is used for static information or navigation that doesn't exist.
•	Example of future placeholder buttons (Lime, Fluoride, Chlorine, Process Control)

Lime	Fluoride	Chlorine	Equipment Status	Site Status	Process Control
------	----------	----------	---------------------	----------------	--------------------

1.11 DISPLAY TYPES & CONFIGURATION DETAILS

Specific display layouts and organization is dependent on various factors, including the system that the display is being incorporated into, process type, workshop decisions, submittal process, and the specific project requirements detailed in the project plans and specification documents.

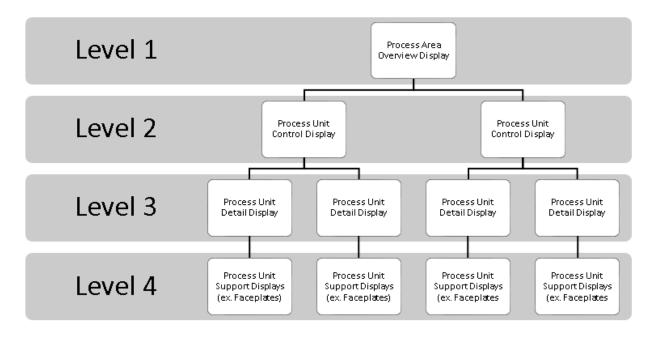
• Refer to the existing application for details on display settings for each display type.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All display types.	

1.11.1.1 System Applicability

1.11.2 DISPLAY TYPE LEVELS

- 1.11.2.1 Default PlantPAx Display Level Hierarchy
 - The HMI template requires that displays and alarms are organized in a specific hierarchy.
 By default, there are four levels that are used in the display and alarm hierarchy, each level providing more detail than the previous level.
 - Level 1 displays are high-level overviews. These displays provide an overview that can be assimilated quickly, provides a clear indication of current performance, and immediately highlights anything that needs the attention of a viewer.
 - **Level 2** displays are the main displays for users to perform their tasks. They contain information and control required to perform user tasks.
 - Level 3 displays contain more detail and controls. These displays show details of subunits, individual equipment items, components, and related controls and indications. The displays are used for detailed investigations and interventions, and for troubleshooting or manipulating items not accessible from Level 2 displays.
 - **Level 4** displays provide the most detail of subsystems, individual sensors, or components. A faceplate is a type of level 4 display.
 - The following is the default example for the HMI Template Hierarchy from the PROCES-UM003 PlantPAx Distributed Control System Application Configuration document (page 72). This was used as the baseline in developing the SAWS standard hierarchy.



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1.11.2.2 SAWS Standard PlantPAx Display Level Hierarchy Matrix

• In the SAWS Standard, a Level 0 display category has been included for main overview screens that encompass multiple process systems.

Display Type	Example	LO	L1	L2	L3	L4
Main Overview	PCS (WPS, WCS, RWS, AVS) Overview	Х				
Process System Overview	WPS System Overview		Х			
Process Area/Zone	PZ#### Zone Overview			Х		
Process Sub-Area/Site	PZ#### Site Display				Х	
Equipment Status	PZ#### Equipment Status Display					Х
Subsystem/Site Status	PZ#### Site Status Display					Х
Process Control	PZ#### Process Control Display					Х
Alarm Summary	Alarm Summary Display		Х			
Alarm History	Alarm History Display		Х			
Alarm Explorer	Alarm Explorer Display		Х			
Trend (Display)	On-Demand Trend		Х			
PlantPAx Faceplates	Any Faceplate Display					Х

• The following matrix provides detail on the SAWS Standard display levels:

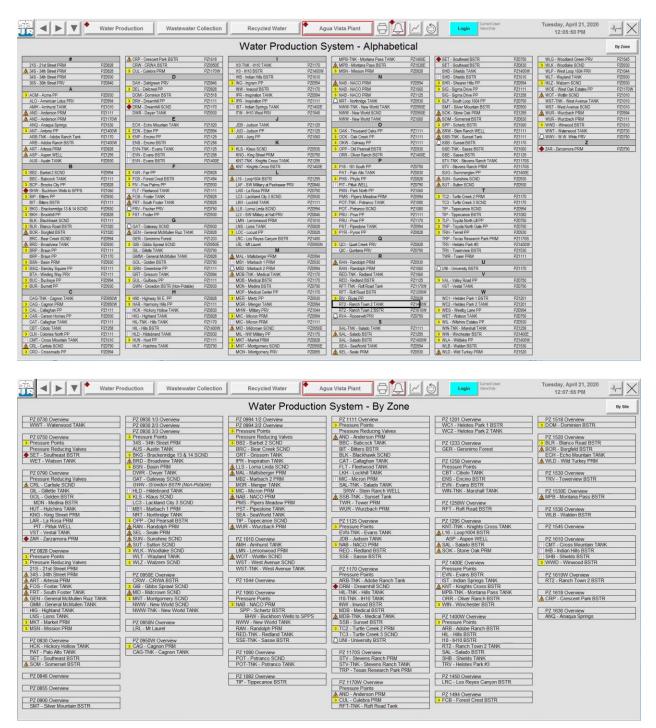
1.11.3 MAIN OVERVIEW DISPLAYS

- Used to show a high-level view of multiple process systems within an HMI System.
 - Example showing the PCS Overview display.

PROVIDE IMAGE WHEN MAIN OVERVIEW EXAMPLE IS AVAILABLE

1.11.4 PROCESS SYSTEM OVERVIEW DISPLAYS

- Used to show a high-level view of a process system using index layout.
 - Example showing the WPS Overview display (Alphabetical Index followed by Zone Index examples).



1.11.5 PROCESS AREA/ZONE DISPLAYS

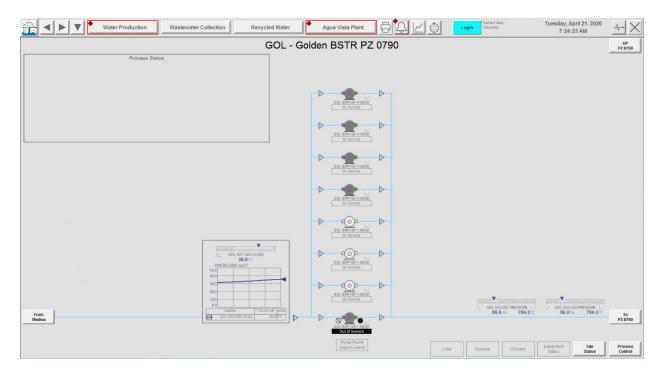
 Used to show a high-level view of a major process area like a pressure zone that contains other sites/areas.



• Example showing a pressure zone Overview display.

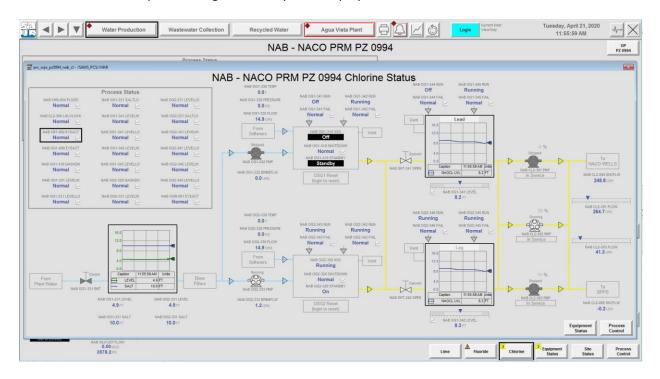
1.11.6 PROCESS SUB-AREA/SITE DISPLAYS

- Used to show process graphics related to a site or process sub-area.
 - Example showing a Site display from a pressure zone site.



1.11.7 SITE SUBSYSTEM DISPLAYS

• Used to show other processes related to a site or area. An example would be a chemical system associated with a water production site.



• Example showing Chlorine System display.

1.11.8 EQUIPMENT STATUS DISPLAYS

- Used to show various equipment status information.
 - Example showing an Equipment Status display from a pressure zone site.

		Canada Canada a		NG - King Stre					PZ 079
3 XXX-300 RESIDCL2	P	rocess Status							
1.44 ppm 🛛 🗠									
IG XXXC-301 ALARIM Normal									
Normal		😿 prc_wps_pz0790_kng_equip - /SAW	/S_PCS//HMI						
G XOX-301 GASCL2 0.00 ppm			KNG - King	Street PRM F	PZ 0790 Equi	oment Statu	5		
		KNG WLP-203 BADDATA Normal	KNG WLP-204 BADDATA	KNG WLP-205 BADDATA					
		KNG WLP-203 COMFAIL	KNG WLP-204 COMFAIL	KNG WLP-205 COMFAIL					
		KING WLP-203 DIGFLW 0.00 MGD	KNG WLP-204 DIGFLW 0.00 MGD	KNG WLP-205 DIGFLW 0.00 MgD					
		KNG WLP-203 DIGFLWTL 1185.6 MG	KNG WLP-204 DIGFLWTL 139.9 MG	KNG WLP-205 DIGFLWTL 461.8 MG					
		KNG WLP-203 FLTCODE 0 Fit Code	KNG WLP-204 FLTCODE O FE Code	KNG WLP-205 FLTCODE O Fit Code				-	
Stopped	KNG WLP-203 DIGFLW							-	
WLP-203 3 0MGD In Service	0.00 MGD							-	
Stopped	KNG WLP-204 DIGFLW 0.00 MGD							_	
Stopped Stopped	KING WLP-205 DIGFLW 0.00 MOD		0.0 Capten 7252 KNG GST-500 LEVEL	0 AM Jints 25.8 FT	KNG HSP-163 1.7NGO			✓ KNG XXX, 220 PRESSURE ↓ ✓ 51.2 PSI 769.3 PT FLOW	

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1.11.9 SITE STATUS DISPLAYS

- Used to show various site status information.
 - Example showing a Site Status display from a pressure zone site.

	Production Wastewater			et PRM PZ 082	28	Login ViewOnly	7:27:35 AM	UP PZ 0828
15 X004-300 RESIDCL2 -0.40 ppm	Process Status							PZ 0828
Normal								
IS XXX-330 MALFCTN Normal	prc_wps_pz0828_21s_site - /SAWS	PCS//HMI	1					
15 XXX-330 GASCL2 -0.00 ppm		21S - 2	1st Street PR	M PZ 0828 Sit	e Status			
	215 XXX-000 COMFAL Normal	21S XXX-020 ACRRFAIL Normal						
*							v	
215 WUE-202 DIAP 215 WUE-202 DIAP 0.00 MOD WUE-202 3 2MGD In Service			AM Units 23.1 FT	215 HSP-102 2.9MGD			215 XXXX 020 PRESSURE 2 60.3PSI 810.3PT	To PZ 082
				Pump Reset (login to reset)			Equipment Site	Proces

1.11.10 PROCESS CONTROL DISPLAYS

- Used to show process control setpoints and other control strategy-related information.
 - Local control example showing control in a Process Control display from a pressure zone site.

Process Sta	tus						
					N		
مَلَةُ prc_wps_pz0790_gol_ctrl - /	SAWS_PCS//HMI			7 0700	D		
		GOL - C	Golden BSTR P	2 0790	Process Co	ontrol	
		GL EST-500 LEVEL	GOL GELEST-500 LEVEL			Process control notes will be located here.	
HSP 1-4 Lead Start	Setpoint 100.0	FT Start Inactive	HSP 5-8 Lead Start Setpoint	109.0 FT	Start Active		
HSP 1-4 Lead Stop	Setpoint 103.0	FT Stop Inactive	HSP 5-8 Lead Stop Setpoint	110.0 FT	Stop Inactive		
HSP 1-4 Lag 1 Star	Setpoint 99.0	FT Start Inactive	HSP 5-8 Lag 1 Start Setpoint	107.0 FT	Start Active		
HSP 1-4 Lag 1 Stop	Setpoint 102.0	FT Stop Active	HSP 5-8 Lag 1 Stop Setpoint	108.0 FT	Stop Inactive		
HSP 1-4 Lag 2 Star	Setpoint 98.0	FT Start Inactive	HSP 5-8 Lag 2 Start Setpoint	105.0 FT	Start Active		
HSP 1-4 Lag 2 Stop	Setpoint 101.0	FT Stop Active	HSP 5-8 Lag 2 Stop Setpoint	106.0 FT	Stop Inactive		
HSP 1-4 Lag 3 Star	Setpoint 97.0	FT Start Inactive	HSP 5-8 Lag 3 Start Setpoint	103.0 FT	Start Active		
HSP 1-4 Lag 3 Stop	Setpoint 100.0	FT Stop Active	HSP 5-8 Lag 3 Stop Setpoint	104.0 FT	Stop Inactive		
			T-500 12.5MG 36.0 FT ∠				
GST 1-4 Release Se	tpoint 7.0	FT Release Active	GST 5-8 Release Setpoint	7.0 FT	Release Active		
GST 1-4 Lockout Se	tpoint 5.0	FT Lockout Inactive	GST 5-8 Lockout Setpoint	5.0 FT	Lockout Inactive		
		0.0				GOL XXX-021 PRESSURE	C GOL XXX-022 PRESSURE
		Caption 7 GOL QST-500 LEVEL	28 28 AM Units 36.0 FT			55.7 PSI 783.6 FT	T 65.7 PSI 783.1

 Supervisory control example showing in a Process Control display from a pressure zone site. Notice how the dotted lines are used to show control that does not reside in the local PLC, in this case it resides in the supervisory controller.

Service Pump Control Program Selected			Valve Control	
BSP Halted Status: BIT BSP-100 AUTOHALT Normal		The pumps have various pumping capacities and will be separated into two groups for control purposes. The first group consist BSP-1 rated at 5.5 mgd, BSP-2 rated at 3 mgd, BSP-3 rated at 5 mgd, and BSP-5 rated at 7.5 mgd. The second group consist of BSP-6 rated at 10 mgd, and BSP-12	Program Selected (login to change)	BIT_GST_121_NV - "Tank Fill Mode" Program Selected (login to change)
		thru BSP-14 each rated at 11 mgd. There are three operating modes determined by the supervisory	CTV Halted Status: Normal 2 Bitters Level Setpoint: 21.0 FT	BIT_GST_122_INV - "Tank Fill Mode" Program Selected
SP-100 Sequence Start	3 BSP	controller and include Normal mode, Tank Fill mode, and WeCO mode. See Supervisor Control section for details on operating modes. Start/stop setpoints will be provided to the	Agua Vista Level Setpoint: 38.0 FT BIT QST-501 5.0MG	(login to change) BIT GST 124 INV - "Tank Fill Mode"
SP-100 Sequence Stop	5 85P	PLC by the supervisory controller for each mode. Normal Mode – When Normal Mode is enabled the lead pump	21.1 FT 🗠	Program Selected (login to change)
SP-100 Pumps Running SP-100 Lead Stop Setpoint	3 108.00 PSI 102.00 PSI	from Group 2 will start and be a base pump. Additional pumps from Group 1 will start/stop according to discharge pressure setpoints.	SOK GST-500 LEVEL BIT SOK TWK-500 LEVEL 38.5 FT 38.5 FT Bitters Level Setooint GST 111 CTV will take charae in Norm	When the Bitters level is 1' below the tank level setpoint, op
P-100 Lead Start Setpoint mp Action Delay Time SP	3.0 MIN	Tank Fill Mode – When Tank Fill Mode is enabled the lag pump from Group 2 will be added for a total of two pump from Group 2 running. Additional pumps from Group 1 will start/stop	Mode. Agua Vista Level Setpoint on GST_111_CTV will take charge in Reverse Flow Mode and is set from Supervisory Controller.	When the Bitters level is 2' below the tank level setpoint, op valves INV-121 and INV-122, close valve INV-124. When the Bitters level is 2' below the tank level setpoint, op
mp Auto Start Delay Time SP mp Auto Start Delay Time REM	3.0 MIN 3.00 MIN	according to discharge pressure setpoints. WeCO Mode – When WeCO Mode is enabled Lead pumps will		valves INV-121,INV-122, and INV-124* BIT_STN_111_BFV - "To Maltsberger"
mp Auto Stop Delay Time SP	3.0 MIN 3.00 MIN	transition from the Group 2 Lead pump to the Group 1 Lead pump. Additional pumps from Group 1 will start/stop according to discharge pressure setpoints.	Program Selected (login to change)	Program Selected (login to change)
imp Auto Stop Delay Time REM SP-100 Target Devices	3			
				sberger): STN_110_BFV will close and STN_111_BFV will open. to Bitters): STN_110_BFV will open and STN_111_BFV will close FV will open and STN_111_BFV will close.

 Peer-to-Peer data transfer values are shown on Process Control displays for sites where they exist, as shown below.



1.11.11 ALARM DISPLAYS

1.11.11.1 Alarm Summary

- Provides access to current alarm status information and is titled 'main_alarm_summary' within the application.
- This is the default display when the Alarm Display is accessed from the Alarms Button in the Application Header.
- This display can also be accessed by clicking the Alarm Summary Button from the Alarm Display.

Alarm	AVS Alarm
Summary	Summary

- The Alarm and Event Summary object is used to display A&E summary information.
 - Alarm Summary Display:

∄⊿⊾	Wate	r Production W	astewater Collection	Recycled Water Agua Vista Plant	<u>JMQ</u>	Logout Current User: Tuesday, May 19, 2020
Alarm Summary	Alarm Alar History Explo		AVS Alarm Semmary AVS Al			
Ack All	Ack Ack	ck Comment 🦉	Disable 🪽	🕽 📥 Shelve 🚞 🐣 🚺 Go to Screen View	Alarm Details	🕐 🖶 📕 (No Filer) 学 🍞 🏋 🥥 🔚 🗘
! Priority &	Alarm State	In Alarm Time	Acknowledge Time	Message	Group	Tag (Alarm Name)
🛕 Medium 🐓	In Alarm, Acked	12:31:59 PM 5/19/2020	12:32:07 PM 5/19/2020	Zarzamora PRM FL2 430 FLOW Low Alarm. Val= -0.1;	PZ0790.ZAR.FL	WPS_ZAR_FL2_430_FLA_FLOW_Alm_Lo
🚸 High 🔔	In Alarm, Unacked	12:30:37 PM 5/19/2020		South Foster TANK EST 500 Level Indicator Transmitter Level Low Val	PZ0828.FRT	WPS_FRT_EST_500_LIT_LEVEL_Low
🛕 Medium 🐓	In Alarm, Acked	12:19:46 PM 5/19/2020		Brackenridge 13 - 14 SCND 401 Residual Fluoride Low Val= 0.4 Lim=	PZ0930.BKG	WPS_BKG_XXX_401_XXX_RESIDFL2_Low
🚸 High 🐓	In Alarm, Acked	12:09:45 PM 5/19/2020	12:18:45 PM 5/19/2020	Sunset BSTR GST 500 LIT Level Low Val= 46.8 Lim= 47.0;	PZ1111.SSB_TNK	WPS_SSB_GST_500_LIT_LEVEL_Low
🚸 High 🔔	In Alarm, Unacked	12:00:23 PM 5/19/2020		Watson TANK 300 Residual Chlorine Low-Low Val= 0.2 Lim= 0.2;	PZ0750.WET	WPS_WET_XXX_300_XXX_RESIDCL2_LoLo
🚸 High 🔔	In Alarm, Unacked	12:00:23 PM 5/19/2020		Watson TANK 300 Residual Chlorine Low Val= 0.2 Lim= 1.0;	PZ0750.WET	WPS_WET_XXX_300_XXX_RESIDCL2_Low
🛕 Medium 🐓	In Alarm, Acked	11:44:13 AM 5/19/2020		Artesia PRM SHC 330 Resid CL2 High Alarm. Val= 5.0;	PZ0828.ART.CL	WPS_ART_SHC_330_AIT_RESIDCL2_Alm_Hi
🛕 Medium 🐓	In Alarm, Acked	11:27:41 AM 5/19/2020		Aspen WELL Well Pump 208 Turbidity High-High Val= 10.8 Lim= 10.0;	PZ1295.ASP	WPS_ASP_WLP_208_XXX_TURBID_HiHi
🚸 High 🐓	In Alarm, Acked	11:09:44 AM 5/19/2020		NACO PRM Lime 022 PH Upstream Low Val= 6.0 Lim= 6.0;	PZ0994.NAB.LIME	WPS_NAB_LIM_022_XXX_PHUS_Low
🛕 Medium 🐓	In Alarm, Acked	11:04:43 AM 5/19/2020		Aspen WELL Well Pump 208 Turbidity High Val= 5.4 Lim= 5.0;	PZ1295.ASP	WPS_ASP_WLP_208_XXX_TURBID_High
🗑 Urgent 🐓	In Alarm, Acked	10:49:16 AM 5/19/2020		Buckhorn Wells to SPPS 215 Emergency Stop Status;	PZ1060.BHW.EQUIP	WPS_BHW_WLP_215_XXX_ESTOP_Alarm
🛕 Medium 🐓	In Alarm, Acked	10:46:13 AM 5/19/2020		Barbet 2 SCND 405 Residual Fluoride Low Val= 0.4 Lim= 0.4;	PZ0994.BB2	WPS_BB2_XXX_400_XXX_RESIDFL2_Low
🚸 High 🐓	In Alarm, Acked	10:29:57 AM 5/19/2020		Cibolo TANK 300 Residual Chlorine Low Val= 1.1 Lim= 1.0;	PZ1258.CBT	WPS_CBT_XXX_300_XXX_RESIDCL2_Low
🛕 Medium 🐓	In Alarm, Acked	10:28:26 AM 5/19/2020		181 South PP 021 Pressure Low Val= 56.0 Lim= 57.0;	PZ0750.a_PP	WPS_P18_XXX_021_XXX_PRESSURE_Low
🛕 Medium 🐓	In Alarm, Acked	10:23:17 AM 5/19/2020		South Loop 1604 PP 021 Discharge Pressure Low Val= 88.8 Lim= 91.0;	PZ0750.a_PP	WPS_SLP_XXX_021_XXX_DPRESS_Low
🛕 Medium 🐓	In Alarm, Acked	9:37:16 AM 5/19/2020		Buckhorn Wells to SPPS 215 Local/Remote Status;	PZ1060.BHW.EQUIP	WPS_BHW_WLP_215_XXX_LCLRMT_Alarm
🛕 Medium 🐓	In Alarm, Acked	9:25:24 AM 5/19/2020		Zarzamora PRM SCR-001 DOORINT PV Does Not Match Target; Inp_P		WPS_ZAR_SCR_001_ROM_DOORINT_Alm_TgtDisagree
🚸 High 🐓	In Alarm, Acked	9:00:12 AM 5/19/2020		Dwyer TANK EST LIT 1 500 Level High Val=163.0 Lim=163.0;	PZ0930.DWR	WPS_DWR_EST_500_LIT_LEVEL_High
🚸 High 🐓	In Alarm, Acked	8:27:06 AM 5/19/2020		34th Street PRM Fluoride 400 Fluoride Metering Pump Max Devices E	PZ0828.345.FL	WPS_34S_FL2_400_FMP_ATTN_Alarm
🚸 High 🐓	In Alarm, Acked	7:14:06 AM 5/19/2020		Brackenridge 13 - 14 SCND 101 Attention Required;	PZ0930.BKG	WPS_BKG_XXX_101_XXX_ATTN_Alarm
🚸 High 🐓	In Alarm, Acked	4:46:04 AM 5/19/2020		Judson TANK GST 500 LIT Level High Val=133.1 Lim=133.0;	PZ1125.JDB	WPS_JDB_GST_500_LIT_LEVEL_High
🛕 Medium 🐓	In Alarm, Acked	4:03:25 AM 5/19/2020		Valley Road PP 021 Pressure Low Val= 83.3 Lim= 90.0;	PZ0750.a_PP	WPS_VAL_XXX_021_XXX_PRESSURE_Low
🛦 Medium 🐓	In Alarm, Acked	1:52:44 AM 5/19/2020		Bitters PP 021 Pressure Low Val= 64.1 Lim= 64.0;	PZ0930.a_PP	WPS_BIP_XXX_021_XXX_PRESSURE_Low
🔶 High 🐓	In Alarm, Acked	1:17:13 AM 5/19/2020		Broadview TANK GST LIT 1 500 Level High Val= 40.1 Lim= 40.0;	PZ0930.BRD	WPS_BRD_GST_500_LIT_LEVEL_High
🚸 High 🐓	In Alarm, Acked	10:44:24 PM 5/18/2020		Old Pearsall BSTR GST 500 LIT Level Low Val= 30.2 Lim= 30.0;	PZ0930.OPP	WPS_OPP_GST_500_LIT_LEVEL_Low
🛕 Medium 🐓	In Alarm, Acked	9:38:16 PM 5/18/2020		NACO PRM 201 Bad Data;	PZ0994.NAB.EQUIP	WPS_NAB_WLP_201_XXX_BADDATA_Alarm
🛕 Medium 🐓	In Alarm, Acked	6:37:05 PM 5/18/2020		Basin PRM Fluoride Metering Pump #2 Fail to start.	P20930.BSN.FL	WPS_BSN_FL2_402_FMP_Alm_DriveFault
🛕 Medium 🐓	In Alarm, Acked	5:46:43 PM 5/18/2020		IH10 West PRV RTU 001 Comm Fail;	PZ1545.a_PRV	WPS_ITW_RTU_001_XXX_COMFAIL_Alarm
🛕 Medium 🐓	In Alarm, Acked	12:06:42 PM 5/18/2020		Sunshine SCND FL2 400 AIT RESIDFL2 High Val= 0.6 Lim= 1.2;	PZ0930.SUN	WPS_SUN_FL2_400_AIT_RESIDFL2_High
🔶 High 🐓	In Alarm, Acked	6:36:15 AM 5/18/2020		Knights Cross BSTR Booster Pump 100 Attention (Not Enough Pumps	PZ1400E.KNT	WPS_KNT_BSP_100_XXX_ATTN_Alarm
🚸 High 🐓	In Alarm, Acked	1:27:55 AM 5/18/2020		Sutton SCND WLP 200 Auto Mode Halted;	PZ0930.SUT	WPS_SUT_WLP_200_XXX_AUTOHALT_Alarm
🗥 Medium 🐓	In Alarm, Acked	10:23:14 PM 5/17/2020		Blanco Road BSTR Booster Pump 101 Soft Start Fail Status;	PZ1520.BLR.EQUIP	WPS_BLR_BSP_101_XXX_SFTSTRT_Alarm
🛕 Medium 🐓	In Alarm, Acked	7:17:14 PM 5/17/2020		Micron PRM 203 Flowmeter Fault;	PZ0994.MIC.EQUIP	WPS_MIC_WLP_203_FIT_FAULT_Alarm
🛕 Medium 🐓	In Alarm, Acked	5:57:04 PM 5/17/2020		Woodland Green PRV RTU 001 Comm Fail;	PZ1545.a_PRV	WPS_WLG_RTU_001_XXX_COMFAIL_Alarm
🛕 Medium 🐓	In Alarm, Acked	9:13:15 AM 5/16/2020	10:14:33 AM 5/16/2020		PZ1060.BHW.EQUIP	WPS_BHW_WLP_209_XXX_LCLRMT_Alarm
🛕 Medium 🐓	In Alarm, Acked	6:27:42 AM 5/16/2020		Zarzamora PRM SCR-003 DOORINT PV Does Not Match Target; Inp_P		WPS_ZAR_SCR_003_ROM_DOORINT_Alm_TgtDisagree
🚸 High 🐓	In Alarm, Acked	12:27:16 AM 5/16/2020		NACO PRM 031 PH Low Val=-10.7 Lim= 6.0;	PZ0994.NAB	WPS_NAB_XXX_022_XXX_PH_Low
🛕 Medium 🐓	In Alarm, Acked	12:04:26 AM 5/16/2020	12:08:06 AM 5/16/2020		PZ0930.OPP.SITE	WPS_OPP_PLC_000_XXX_INT_Alarm
🔶 High 🐓	In Alarm, Acked	11:10:15 PM 5/15/2020		Montana Pass BSTR 300 Residual Chlorine Low Val= 1.0 Lim= 1.0;	PZ1530E.MPB	WPS_MPB_XXX_300_XXX_RESIDCL2_Low
🔶 High 🐓	In Alarm, Acked	1:57:14 PM 5/15/2020	2:05:33 PM 5/15/2020	NewWorld TANK Mixer 130 Fail Status;	PZ0950E.NWW_TNK	WPS_NWW_MXR_130_MOT_FAIL_Alarm
# 184	A 3 🐓 181	± 0 7 61	Filter: Not Filtered Se	orted by: In Alarm Time (Descending), Acknowledge Time (Descending)		

1.11.11.2 Alarm History Display

- Provides access to historical alarm data and is titled 'main_alarm_history' within the application.
- This display is accessed by clicking the Alarm History Button from the Alarm Display.



The Alarm and Event Log Viewer object is used to display A&E historical information.
 Alarm History Display:

Alarm ammary	Alarm Ala History Exp	Irrm Maintenance AVS Alarm AVS Alarm History Alarm History			
WPS_WC ~ 🕎	Edit Filter (2) Refresh	🕼 Stop 🤌 Find 🔚 Details Pane 😹			
Priority D	Alarm State	Event Time Message	Group	Tag (Event Source)	User Name
Low		Tuesday, May 19, 2020 12:37:04 PM Acknowledged alarm [WPS_VAL_RTU_001_XXX_COMFAIL_Alarm] in al	arm s	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	OPS\JRSALDANA
Medium 🐓	Normal, Acked	Tuesday, May 19, 2020 12:37:04 PM Valley Road PP RTU 001 COMM Fail:	PZ0750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	
Aedium A	Normal, UnAcked	Tuesday, May 19, 2020 12:36:33 PM Valley Road PP RTU 001 COMM Fail:	PZ0750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	
Aedium 🤱	In Alarm, UnAcked	Tuesday, May 19, 2020 12:35:59 PM Valley Road PP RTU 001 COMM Fail:	P20750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	
ledium 🐓	Normal, Acked	Tuesday, May 19, 2020 12:35:41 PM Roosevelt PRV 030 Pressure Low Val= 60.1 Lim= 59.0;	PZ0750.a_PRV	WPS_RVA_XXX_030_XXX_PRESSURE_Low	
Aedium 🐓	Normal, Acked	Tuesday, May 19, 2020 12:34:37 PM Valley Road PP RTU 001 COMM Fail:	PZ0750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	
Low		Tuesday, May 19, 2020 12:34:37 PM Acknowledged alarm [WPS_VAL_RTU_001_XXX_COMFAIL_Alarm] in al		WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	OPS\JRSALDANA
Aedium 🔥	Normal, UnAcked	Tuesday, May 19, 2020 12:34:28 PM Valley Road PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	
ledium	Quality Good	Tuesday, May 19, 2020 12:34:26 PM Toyota North Gate PP 021 Pressure Low Val= -0.3 Lim= 73.0;	PZ0750.a_PP	WPS_TNP_XXX_021_XXX_PRESSURE_Low	
ledium 🐥	In Alarm, UnAcked	Tuesday, May 19, 2020 12:34:09 PM Valley Road PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	
Low		Tuesday, May 19, 2020 12:34:03 PM Acknowledged alarm [WPS_TNP_RTU_001_XX_COMFAIL_Alarm] in a		WPS_TNP_RTU_001_XXX_COMFAIL_Alarm	OPS\ATALMAGUER
Medium 🐓	Normal, Acked	Tuesday, May 19, 2020 12:34:03 PM Toyota North Gate PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_TNP_RTU_001_XXX_COMFAIL_Alarm	
Aedium	Quality Good	Tuesday, May 19, 2020 12:33:53 PM Antonio PP 021 Discharge Pressure High Val=151.5 Lim=112.0;	PZ1400W.a_PP	WPS_ANT_XXX_021_XXX_DPRESS_High	
ledium 🛔	Normal, UnAcked	Tuesday, May 19, 2020 12:33:30 PM Toyota North Gate PP RTU 001 COMM Fail:	PZ0750.a_PP	WPS_TNP_RTU_001_XXX_COMFAIL_Alarm	
ledium	In Alarm, UnAcked	Tuesday, May 19, 2020 12:33:29 PM Toyota North Gate PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_TNP_RTU_001_XXX_COMFAIL_Alarm	000000000000000000000000000000000000000
Low		Tuesday, May 19, 2020 12:33:10 PM Acknowledged alarm [WPS_RFT_XXX_026_XXX_DPRESS_High] in alar		WPS_RFT_XXX_026_XXX_DPRESS_High	OPS\SKPSILVA
ledium 🐓	Normal, Acked	Tuesday, May 19, 2020 12:33:10 PM Roft Road BSTR 026 Discharge Pressure High Val= 73.0 Lim= 75.0;	PZ1258W_RFT	WPS_RFT_XXX_026_XXX_DPRESS_High	
ledium 🔺	Normal, UnAcked	Tuesday, May 19, 2020 12:33:01 PM Roft Road BSTR 026 Discharge Pressure High Val= 73.0 Lim= 75.0;	PZ1258W_RFT	WPS_RFT_XXX_026_XXX_DPRESS_High	
Aedium 🐓	In Alarm, Acked	Tuesday, May 19, 2020 12:32:58 PM Roosevelt PRV 030 Pressure Low Val- 59.7 Lim- 59.0;	PZ0750.a_PRV	WPS_RVA_XXX_030_XXX_PRESSURE_Low	00010000000000
Low	Married Married	Tuesday, May 19, 2020 12:32:58 PM Acknowledged alarm [WPS_RVA_XX_030_XXX_PRESSURE_Low] in a		WPS_RVA_XXX_030_XXX_PRESSURE_Low	OPS\SKPSILVA
Medium Y	Normal, Acked	Tuesday, May 19, 2020 12:32:32 PM Valley Road PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_VAL_RTU_001_X0X_COMFAIL_Alarm	
Low	In Alarm, Acked	Tuesday, May 19, 2020 12:32:13 PM Valley Road PP RTU 001 COMM Fail; Tuesday, May 10, 2020 12:32:13 PM Asternational Joint 0010 COMM Fail;	P20750.a_PP	WPS VAL RTU 001 XXX COMFAIL Alarm WPS VAL RTU 001 XXX COMFAIL Alarm	OPS\SKPSILVA
Low		Tuesday, May 19, 2020 12:32:13 PM Acknowledged alarm [WPS_VAL_RTU_001_XXX_COMFAIL_Alarm] in al Tuesday, May 19, 2020 12:32:07 PM Acknowledged alarm [WPS_ZAR_FL2_430_FLA_FL0W Alm Lo] in alar		WPS_VAL_RTO_00T_AAA_COMPAIL_Alarm WPS_ZAR_FL2_430_FLA_FLOW_Alm_Lo	OPS\SKPSILVA
Aedium 4	In Alarm, Acked	Tuesday, May 19, 2020 12:32:07 PM Acknowledged alarm [WPS_2X4_FL2_430_FDC_FL0W_dum_toj in alar Tuesday, May 19, 2020 12:32:07 PM Zarzamora PRM FL2 430 FL0W Low Alarm, Val=-0.1;	PZ0790.ZAR FL	WPS ZAR FL2 430 FLA FLOW AIm Lo	OPSISKPSILVA
	In Alarm, UnAcked	Tuesday, May 19, 2020 12:32:07 PM Catzaniora PPM PL2 4:30 PLCW Low Adams. Val- 10.1. Tuesday, May 19, 2020 12:32:04 PM Valley Road PP RTU 001 COMM Fail;	P20750.a.PP	WPS_VAL_RTU_001_XXX COMFAIL_Alarm	
	In Alarm, UnAcked	Tuesday, May 19, 2020 12:32:02 PM Rolt Road BSTR 026 Discharge Pressure High Val- 76:0 Lim- 75:0;	PZ1258W_RFT	WPS RFT XXX 026 XXX DPRESS High	
	in Alarm, UnAcked	Tuesday, May 19, 2020 12:31:59 PM Zazamora PRM FL2 430 FLOW Low Alarm. Val= -0.1;	P20790 ZAR FL	WPS ZAR FL2 430 FLA FLOW AIm Lo	
ledium 🐓	Normal, Acked	Tuesday, May 19, 2020 12:31:53 PM Zarzamora PRM FL2 430 FLOW Low Alarm. Val= 0.0;	PZ0790.ZAR.FL	WPS_ZAR_FL2_430_FLA_FLOW_Alm_Lo	
ledium A	In Alarm, UnAcked	Tuesday, May 19, 2020 12:31:41 PM. Roosevelt PRV 030 Pressure Low Val- 58.8 Lim- 59.0.	P20750.a PRV	WPS RVA XXX 030 XXX PRESSURE Low	
Low	In the second se	Tuesday, May 19, 2020 12:31:39 PM Acknowledged alarm [WPS_TNP_RTU_001_XXX_COMFAIL_Alarm] in a		WPS_TNP_RTU_001_XXX_COMFAIL_Alarm	OPS\SKPSILVA
Aedium 🐓	Normal, Acked	Tuesday, May 19, 2020 12:31:39 PM Toyota North Gate PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_TNP_RTU_001_XXX_COMFAIL_Alarm	or offere picture
High A	In Alarm, UnAcked	Tuesday, May 19, 2020 12:31:37 PM South Foster TANK EST 500 Level Indicator Transmitter Level Low Val-		WPS_FRT_EST_500_LIT_LEVEL_Low	
Aedium A	Normal, UnAcked	Tuesday, May 19, 2020 12:31:29 PM Toyota North Gate PP RTU 001 COMM Fail:	PZ0750 a PP	WPS_TNP_RTU_001_XXX_COMFAIL_Alarm	
ledium A	In Alarm, UnAcked	Tuesday, May 19, 2020 12:31 29 PM Toyota North Gate PP RTU 001 COMM Fail:	P20750 a PP	WPS TNP RTU 001 XXX COMFAIL Alarm	
ledium 🐓	Normal Acked	Tuesday, May 19, 2020 12:31:01 PM Toyota North Gate PP RTU 001 COMM Fail;	PZ0750.a PP	WPS TNP RTU 001 XXX COMFAIL Alarm	
Low		Tuesday, May 19, 2020 12:31:01 PM Acknowledged alarm [WPS_TNP_RTU_001_XXX_COMFAIL_Alarm] in a		WPS_TNP_RTU_001_XXX_COMFAIL_Alarm	OPS\SKPSILVA
ledium 🐓	Normal, Acked	Tuesday, May 19, 2020 12:30:59 PM Sutton SCND Station 000 Door Intrusion;	PZ0930 SUT SITE	WPS SUT STN 000 XXX DOORINT Alarm	
Low		Tuesday, May 19, 2020 12:30:59 PM Acknowledged alarm [WPS_SUT_STN_000_XXX_DOORINT_Alarm] in a		WPS_SUT_STN_000_XXX_DOORINT_Alarm	OPS\SKPSILVA
Aedium 4	Normal, Acked	Tuesday, May 19, 2020 12:30:58 PM WPS JUD PLC-001 Comm Fail:	PZ1125.a PP	WPS JUD RTU 001 XXX COMFAIL Alarm	
Low		Tuesday, May 19, 2020 12:30:58 PM Acknowledged alarm [WPS_JUD_RTU_001_XXX_COMFAIL_Alarm] in a		WPS_JUD_RTU_001_XXX_COMFAIL_Alarm	OPS\SKPSILVA
Low		Tuesday, May 19, 2020 12:30:57 PM Acknowledged alarm [WPS VAL RTU 001 XXX COMFAIL Alarm] in al		WPS VAL RTU 001 XXX COMFAIL Alarm	OPS\SKPSILVA
Medium 🐓	Normal, Acked	Tuesday, May 19, 2020 12:30:57 PM Valley Road PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	and the second second second
Medium 🔥	Normal, UnAcked	Tuesday, May 19, 2020 12:30:33 PM WPS JUD PLC-001 Comm Fail;	PZ1125.a_PP	WPS_JUD_RTU_001_XXX_COMFAIL_Alarm	
Medium A	Normal UnAcked	Tuesday, May 19, 2020 12:30:33 PM Sutton SCND Station 000 Door Intrusion:	PZ0930 SUT SITE	WPS_SUT_STN_000_XXX_DOORINT_Alarm	

Events: 30000 Filter: AreaWPS_WCS_RWS

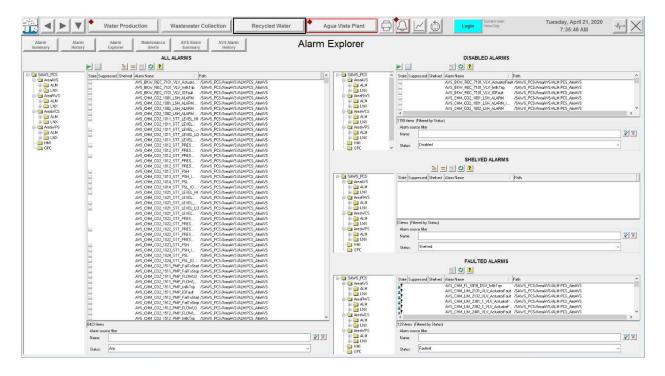
1.11.11.3 Alarm Explorer Display

- 0 Provides access to historical alarm data and is titled 'main_alarm_explorer' within the application.
- This display is accessed by clicking the Alarm Explorer Button from the Alarm Display. 0



The Alarm Status Explorer object is used to display A&E status information. 0

Alarm Explorer Display:



1.11.11.4 *Maintenance Alerts Display*

- Provides access to current alarm data (Low Priority Alarms Only) and is titled 'main_alarm_summary_maint' within the application.
- This display is accessed by clicking the Maintenance Alerts Button from the Alarm Display.



- The Alarm and Event Summary object is used and filtered to show only Low Priority Alarm information.
 - Alarm Summary Display (Filtered to show only Low Priority Alarms):

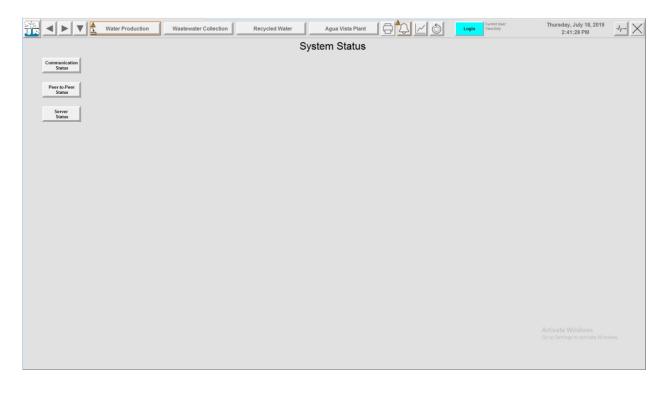
		Vati	er Production W	astewater Collection	Recycled Water Agua Vista Plant	84 <u>~</u> 0 <u>-</u>	out Current User Tuesday, May 19, 20 OPSWJESSUP 1:10:36 PM	20
Alarm ummary			arm Maintenance Alerts	AVS Alarm Summary History	Maintenance Alerts			
Ack	All	🖌 Ack 🏹 A	ck Comment 🎤	Disable 🌏 😑 S	ihelve 🚞 4 🚺 Go to Screen 😭	View Alarm Details 🕐	🕂 🛄 (No Filter) 💛 ゾ 🏹 🤗 🔚 🗘	
Priority	4	Alarm State	In Alarm Time	Acknowledge Time Message	3	Group	Tag (Alarm Name)	
Low		In Alarm, Unacked	1:09:42 PM 5/19/2020		BSTR BSP 100 Discharge Pressure Low;	PZ1060.SPP	WPS_SPP_BSP_100_XXX_DPRESSLO_Alarm	
Low	1	In Alarm, Unacked	1:08:44 PM 5/19/2020		RM HSP 153 Flow Low;	PZ0994.NAB.EQUIP	WPS_NAB_HSP_153_XXX_FLOWLO_Alarm	
Low	4	Normal, Unacked	12:49:44 PM 5/19/2020		anch BSTR WLP 206 Comm Fail;	PZ1400E.ORR.EQUIP	WPS_ORR_WLP_206_XXX_COMFAIL_Alarm	
Low		In Alarm, Unacked	11:53:42 AM 5/19/2020		t Park BSTR Compressor 113 Low Oil;	PZ1618.CRP.EQUIP	WPS_CRP_CPR_113_XXX_LOWOIL_Alarm	
Low	1	In Alarm, Unacked	10:05:15 AM 5/19/2020		PRM PZ1111 000 'ATTENTION DESIRED STATUS' in DYN/		WPS_MIC_HSP_170_XXX_ATTN_Alarm	
Low	4	Normal, Unacked	8:54:07 AM 5/19/2020		eet PRM 202 Flowmeter Comm Fail;	PZ0828.34S.EQUIP	WPS_34S_WLP_202_FIT_COMFAIL_Alarm	
Low		In Alarm, Unacked	8:26:14 AM 5/19/2020		PRM 051 HVAC Alarm Status;	PZ0828.MSN.SITE	WPS_MSN_XXX_051_HAC_ALARM_Alarm	
Low		In Alarm, Unacked	7:16:13 AM 5/19/2020		RM OSHG1 310 Shutdown;	PZ0828.MKT.CL.EQUIP	WPS_MKT_OG1_310_XXX_SHUTDOWN_Alarm	
Low	+	In Alarm, Unacked	7:13:16 AM 5/19/2020		McMullen Ruiz TANK EST 500 Low Level Alarm;	PZ0828.GEN	WPS_GEN_EST_500_XXX_LEVELLO_Alarm	
Low		In Alarm, Unacked	6:57:12 AM 5/19/2020		t Park BSTR Compressor 111 Low Oil;	PZ1618.CRP.EQUIP	WPS_CRP_CPR_111_XXX_LOWOIL_Alarm	
Low		In Alarm, Unacked	1:23:09 AM 5/19/2020		eet PRM HSP 102 Flowmeter Flow Low;	PZ0930.34S.EQUIP	WPS_34S_HSP_102_FIT_FLOWLO_Alarm	
Low	*	In Alarm, Acked In Alarm, Acked	11:23:33 PM 5/15/2020		RM Surge Tank 503 Low Water Cutoff;	PZ1060.NAB.VLV PZ0930.SUN.EQUIP	WPS_NAB_SGT_503_XXX_LOWATER_Alarm	
Low	2	In Alarm, Acked	2:55:44 PM 5/15/2020		e SCND Well Pump 201Flowmeter Bad Data;		WPS_SUN_WLP_201_FIT_BADDATA_Alarm	
Low	Y.		1:13:02 PM 5/15/2020		PRM SHC 301 Drive fault. Val_Fault=0; rger PRM PLC 001 NOE Module Alarm Status;	PZ0828.ART.CL	WPS_ART_SHC_301_SHP_Alm_DriveFault	
Low	2	In Alarm, Acked In Alarm, Acked	8:25:21 PM 5/13/2020 8:25:21 PM 5/13/2020		rger PRM PLC 001 NOE Module Alarm Status;	PZ0994.MAL.SITE PZ0994.MAL.SITE	WPS_MAL_PLC_001_NOE_ALARM_Alarm WPS_MAL_PLC_002_AIM_ALARM_Alarm	
		In Alarm, Acked	6:20:11 PM 5/13/2020		rger PRM PLC 002 Al Module Alarm Status; rger PRM Control Panel Temperature Bad or Out-of-rang			
Low	*	In Alarm, Acked	6:20:11 PM 5/13/2020 6:20:11 PM 5/13/2020		ger PRM Control Panel Temperature Bad or Out-of-rang		WPS_MAL_SCP_000_TIT_TEMP_AIm_Fail WPS_MAL_INL_110_CTV_POSITION_AIm_Fail	
Low	2	In Alarm, Acked	6:20:11 PM 5/13/2020		ger PRM High Service Pump 105 Discharge Flow Bad or		WPS_MAL_HSP_105_XXX_FLOW_AIm_Fail	
Low	1	In Alarm, Acked	6:20:11 PM 5/13/2020		ger PRM High Service Pump 100 Discharge Flow Bad of		WPS_MAL_HSP_102_XXX_FLOW_AIM_Fail	
Low	1	In Alarm, Acked	6:20:11 PM 5/13/2020		rger PRM High Service Pump 102 Discharge Flow Bad of		WPS_MAL_HSP_101_XXX_FLOW_AIM_Fail	
Low	1	In Alarm, Acked	5:41:00 AM 5/13/2020		I TANK EST 500 Low Level Alarm;	PZ0828.HIG	WPS HIG EST 500 XXX LEVELLO Alarm	
Low	4	In Alarm, Acked	6:06:29 PM 5/10/2020		PRM OSHG1 310 Hi Water Hardness:	PZ0828.MKT.CL.EQUIP	WPS_MKT_OG1_310_XXX_WTRHRDHI_Alarm	
Low	1	In Alarm, Acked	6:06:29 PM 5/10/2020		RM OSHG1 310 General Shutdown:	PZ0828.MKT.CL.EQUIP	WPS MKT OG1 310 XXX GNLSHDN Alarm	
Low	~	In Alarm, Acked	10:24:27 AM 5/6/2020		n SCND Well Pump Motor Protection Relay 201 Alarm Sta		WPS_MID_WLP_201_XXX_MPRACT_Alarm	
Low	ě,	In Alarm, Acked	9:57:11 AM 5/4/2020		PRM WLP 206 Flow Bad or Out-of-range PV: Val= -0.6: Val		WPS_ART_WLP_206_FIT_FLOW_Alm_Fail	
Low	*	In Alarm, Acked	9:57:11 AM 5/4/2020		RM WLP 205 Flow Bad or Out-of-range PV: Val= -0.6; Val		WPS_ART_WLP_205_FIT_FLOW_Alm_Fail	
Low	ž	In Alarm, Acked	9:57:07 AM 5/4/2020		RM ASR 274 Com Fail PV Does Not Match Target; Inp. P		WPS ART ASR 274 FIT COMFAIL Alm TgtDisa	aree
Low	*	In Alarm, Acked	9:56:57 AM 5/4/2020		RM FL2 401 Drive fault. Val Fault=18:	PZ0828.ART.FL	WPS ART FL2 401 FMP Alm DriveFault	
Low	i.	In Alarm, Acked	9:56:57 AM 5/4/2020		RM FL2 403 Drive fault. Val Fault=18:	PZ0828.ART.FL	WPS ART FL2 403 FMP Alm DriveFault	
Low	ž	In Alarm, Acked	9:56:57 AM 5/4/2020		RM FL2 402 Drive fault. Val Fault=18:	PZ0828.ART.FL	WPS_ART_FL2_402_FMP_Alm_DriveFault	
Low	4	In Alarm, Acked	8:26:25 AM 4/30/2020		ra PRM SHC_302 Drive fault. Val_Fault=0;	PZ0790.ZAR.CL	WPS_ZAR_SHC_302_SHP_Alm_DriveFault	
Low	*	In Alarm, Acked	10:52:40 AM 4/29/2020		CND Well Pump Flowmeter 201 Comm Failure;	PZ1010.WOT.EQUIP	WPS_WOT_WLP_201_FIT_COMFAIL_Alarm	
Low	÷.	In Alarm, Acked	9:06:29 AM 4/27/2020	9:51:31 AM 5/5/2020 Hildebra	nd TANK Generator 020 Protection Warning;	PZ0930.HLD.SITE	WPS_HLD_XXX_020_GEN_TROUBLE_Alarm	
Low	*	In Alarm, Acked	2:19:42 PM 4/24/2020	9:51:31 AM 5/5/2020 Quiet Cr	eek PRV 025 Vault Flood Alarm;	PZ0828.a_PRV	WPS_QCI_XXX_025_VLT_FLOOD_Alarm	
Low	V	In Alarm, Acked	3:22:21 PM 4/20/2020	9:51:31 AM 5/5/2020 Basin Flu	uoride Residual (0-2 PPM) Bad or Out-of-range PV; Val=	-0.1; V PZ0930.BSN	WPS_BSN_XXX_460_AIT_RESIDFL2_Alm_Fail	
Low	Y	In Alarm, Acked	3:22:21 PM 4/20/2020	9:51:31 AM 5/5/2020 Basin Ch	nlorine Residual (0-5 PPM) Bad or Out-of-range PV; Val=	-0.3; PZ0930.BSN	WPS_BSN_XXX_340_AIT_RESIDCL2_AIm_Fail	
Low	*	In Alarm, Acked	3:22:21 PM 4/20/2020	9:51:31 AM 5/5/2020 Disagree	: WP 7 Lockout (0=Normal, 1=Trip) PV Does Not Match	Target PZ0930.BSN.SITE	WPS_BSN_WLP_207_PMP_LOCK_Alm_TgtDisag	ree
Low	*	In Alarm, Acked	3:22:21 PM 4/20/2020	9:51:31 AM 5/5/2020 Disagree	e: HSP 6 MPR Alarm (0=Normal, 1=Alarm) PV Does Not M	atch PZ0930.BSN.EQUIP	WPS_BSN_HSP_106_MPR_TRIP_Alm_TgtDisagn	ee
Low	¥	In Alarm, Acked	3:22:20 PM 4/20/2020		: WP 3 MPR Alarm (0=Normal, 1=Alarm) PV Does Not Mat		WPS_BSN_WLP_203_MPR_TRIP_Alm_TgtDisagr	
I ow	41	In Alarm Acked	3-22-20 PM 4/20/2020	9-51-31 AM 5/5/2020 Disagree	WP 2 MPR Alarm (0=Normal 1=Alarm) PV Does Not Mat	tch Ta P70930 BSN SITE	WPS BSN WI P 202 MPR TRIP Alm TotDisage	88

- Any value(s) being logged in Historian can be trended from this display on-demand.
- Other data sources, such as live data can be added to the trend on-demand.
- This display is accessed from the Trends Button in the Application Header.
 - Example Trend Display:

	Water Production	Wastewater Collection	Recycled Water	Agua Vista Plant		Login Current User: ViewOnly	Thursday, July 18, 2019 2:39:53 PM	\sim
				Trends				
🗎 🗟 🖉 🕴 🔁 💾 🖶 😂 🕻								
# Items - [SAWS_PCS]		7/18/2019 2:39:53 PM V Last 8 hours	× .					_
← → 🛄 🝸 🗐 🔯 🛄 View •	00:00:01.000							Automatic
SAWS_PCS								
Alarms And Events Live Data	1 1							
Data Logs Historical Data	100.00 -							
	80.00 -							
	60.00 -							
	40.00 -							
	40.00							
	20.00 -							
	· ·							
	0.00 -							
								+
	6:39:53 AM			10:3	19:53 AM		2:3	19:53 PM
	7/18/2019			//1	8/2019		1.	18/2019
	Tag	Historical Model / Style	Axis Min Axis Max	Unit Precision Format	Tag Min Tag Max			
X								
Items (0)	Priority Alarm State Event Time	Alarm Name	Condition Name	Message Curre	ent Value Limit Value		Activate Windows	
							Go to Settings to activate Windo	2W5.
	1							

1.11.13.1 System Status Display

- Refer to the existing application for the details associated with this display, titled 'main_admin' in the application and 'System Status' for the runtime title.
- Provides access buttons to additional Admin Status displays, including Communication Status, Peer-to-Peer Status, and Server Status.
- This display is accessed from the Admin Button in the Application Header.
 - System Status Display:



1.11.13.2 Communication Status Display

- Provides access to communication status information, titled 'adm_communication' in the application.
- This display is accessed by clicking the Communication Status Button from the System Status display.



• Communication Status Display:

	Water Production Wa	stewater Collection	ecycled Water Agu	a Vista Plant	Login Current User: ViewOnly	Tuesday, April 21, 2020 7:38:34 AM
			Communications	Status - EtherNet		HLDTS3 DWYTS1 UP System Status
Chan_215.Dev_215 100.0% c172.H1736b.2 47/2028 73824248.AM Chan_AMRLDev_AMH 100.0% c172.H112b.2 47/2028 73822248.AM Chan_AMRLDev_AMH 100.0% Chan_AMRLDev_AMH 100.0% c172.H112b.2 47/2028 73822248.AM Chan_BAND.Dev_AMH1 100.0% c172.H32b.2 47/2028 73822548.AM	Enan_ECH.Dev_ECH 100.0% <172.15.177.9b-191	Chan_MB1.Dev_MBD 100.0%	Chan_SEA.Dev_SEA 27.9%	Chan_WLT.Dev_WLT1 100.0% <172.% 68.15.0	Chan_RED.Dev_RED 95.9% <172 164 42D-36	
Chan_AND.Dev_AM1B 100.0% 472.16.50.3>.0 4/21/2020 7.38.27.492.4MI Chan_ANOLDev_ANQ 99.9% 4/21/2020 7.38.22.4MI	Chan_GER.Dev_GER 99.9% <172.16.128.145.128	Chan_MDN.Dev_MDN 100.0% <172.16.26.306.39	Chan_SEL.Dov_SEL21 96.6% <172.16.21.36-39	Chan_WST.Dev_WST 100.0% <f72.%1%25>27 420/2020 7:821319 AM</f72.%1%25>	Chan_INW.Dev_INW 98.6% <172.16.210.115.64	
Chan_ASP.Dev_ASP 100.0% <t212.16.108.465.65< td=""> 4/21/2620 7.38.23.507.4M Chan_AUS.Dev_AUSI 100.0% <t12.17.8.46.9< td=""> 4/22/2620 7.38.23.415.4M</t12.17.8.46.9<></t212.16.108.465.65<>	Chan_Gil_Dov_Gil 99.3% <t12.16.153.4b.14< td=""> 421/2028 7.38.23.364.All Chan_GMM.Dov_GMM 100.0% <t12.16.111.15.11< td=""> 421/2028 7.38.22.384.All</t12.16.111.15.11<></t12.16.153.4b.14<>	Chun_MNT.Dov_MNT 100.0% <t72.66.138.27>.35 4.21/2826 7.38.26.188 AM Chan_NVVV.Dov_NVVV 100.0% <t72.66.138.5>.36 4.21/2826 7.33.27.383 AM</t72.66.138.5></t72.66.138.27>	Chun_SSB.Dev_SSBI 91.1% <172.96.09.1905-194 4/22/2020 7.35.04.491 AM Chan_SUN.Dev_SUNI DISABLED <172.17.8.196-195		Chan_SRW.Dov_SRW 100.0% <172.16.39.20-0	
Chan_BIT.Dov_BTRI 96.2% <172.16.101.16.16 421/020 7.38.23.50 AM Chan_BKG.Dov_B131 99.4% <172.17.8.45.17 422/020 7.38.29.117 AM	Chan_GOLDev_GOL 100.0% c12.16.179.11s.16 4/21/2029 7.38.2.338.ABI Chan_HILDev_HILI 96.8% c12.16.29 4/21/2029 7.38.2.386.ABI	CRW 100.0% Chan_OPP.Dev_OPP 100.0% <172.20.23 15:6 4241288 7.3822.226 AM	Chan_TC2.Dev_TC21 97.1% <172.46.09.16106			
Chan_BKG.Dev_BKGI 97.2%	Chan_HLD.Dev_HLBI 83.4% c172.16.8.175.187 4/21/2020 7.38.22.509.ABI Chan_H10.Dev_H101 97.0% c172.162.026.ADI c172.162.0154.0 4/21/2020 7.38.22.26.ABI	Chan_ORR.Dev_ORRI1 100.0% ct8.111.3s.0 421/2820 7.38.25 680 AM Chan_ORR.Dev_ORRI2 100.0% ct8.111.3s.0 421/2820 7.38.25 /11 AM	Chan_TRP.Dev_TRP 99.9% <t72.16.116.45.39< td=""> 4/21/2020 7.38.23.566.AM Chan_TWR.Dev_TWR 100.0% <t12.16.117.115.71< td=""> 4/21/2020 7.38.22.597.AM</t12.16.117.115.71<></t72.16.116.45.39<>			
Chan_BOR.Dev_BOR 100.0% <172.16.192.115.92	Chan_IST.Dev_ISP! 100.0% <t72.16.7.5> 0 421/2820 7.38.22.382 All Chan_KL.S.Dev_KL.SI 95.5% <t121.16.24.17> 6 421/2820 7.38.23.351 All</t121.16.24.17></t72.16.7.5>	Chan_PAT.Dev_PAT 100.0% <t72.%15.1b.45< td=""> 421/280 7.35.22.351.MII Chan_PIT.Dev_PIT 100.0% <t72.1%101.1b.1< td=""> 421/280 7.33.22.444.MII</t72.1%101.1b.1<></t72.%15.1b.45<>	Chan_UNLDev_UNP 100.0% <172.16.47.19-5			
Chan_BRO.Dev_BRDI 100.0% Chan_BRO.Dev_BRDI 102.0% <	Chan_KNT.Dev_KNT 100.0% c172.16.54.24x.54 4/21/2828 7.38.27.387.ABI	Chan_POT.Dev_POT 100.0% <t72.16.34.155.154< td=""> 421/262 7.33:22.157 AM Chan_RAN.Dev_RANI 100.0% <t72.16.215.16-112< td=""> 421/262 7.37:44.996 AM</t72.16.215.16-112<></t72.16.34.155.154<>	HUT 99.0%			
Chan_CAG.Dev_CAG 100.0%	Chan_L16.Dev_L16 99.8% <172.16.64.15>.83 4/21/2020 7:38:28.441 AM	Chan_RAN.Dev_RAN2I 100.0% <172.16.215.16-113 4/21/2020 7-37:44.762.AM	L LAR 71.0%			
Chan_CRL.Dev_CRL 87.7% <172.16.113.72-1 4/21/2620 7.38.33.602.AM Chan_CUL.Dev_CULI 100.0% <172.16.58.25-0 4/21/2620 7.38.24.179.AM	Chan_LMM.Dev_LMN 100.0% <172.16.123.115.23	Chan_RFT.Dev_RFTI 87.5% <t72.15.80.30s.544< td=""> 421/2020 7.38.33.742 AM Chan_SAL:Dev_SALJ 100.0% <t72.16.77.21s.41< td=""> 421/2020 7.38.24 AM</t72.16.77.21s.41<></t72.15.80.30s.544<>	Chan_WC1.Dev_WC11 89.0% <172.16.04.52×.116			
Chan_DWR.Dev_DWRI 80.1% <172 16.79.16-37 4/21/2020 7.38 22.468 AM	Chan_MB1.Dev_MARI 100.0% <172.16.56.11>.131 4/21/2028 7.38/23.757 All		Chan_WLD.Dev_WLD 100.0% <172.16.117.45>.95 4/21/2020 7.38.22.648 AM			

1.11.13.3 Peer-to-Peer Status Display

- Provides access to peer-to-peer status information, titled 'adm_peer_to_peer' in the application.
- This display is accessed by clicking the Peer-to-Peer Status Button from the System Status display.
- $\circ~$ A trend popup is accessible for each peer-to-peer status.



Peer-to-Peer Status Display:

Water Production	Wastewater Collection Recycled Water Agua Vista Plant C Collection Correct User Vendow	Tuesday, April 21, 2020 7:40:03 AM	\sim
	Peer-To-Peer Status		
AWH EST-500 LEVEL IN AMH EST-500 LEVEL 90.5 FT 90.5 FT	SEA OST-ADD LEVEL BRC SEA OST-ADD LEVEL SEN BRC TRA-OST-ADD LEVEL 36.6 FT 36.6 FT 139.9 FT 39.9 FT		
AMH EST-500 LEVEL 90.5 FT WOT AMH EST-500 LEVEL 90.5 FT 200	SIA 05T-560 LEVEL M82 SEA 05T-560 LEVEL SIG 867 SIG 567 SIG 867 SIG 867 SIG 867 SIG 86		
AMM EST-500 LEVEL IN WST AMM EST-500 LEVEL 90.5 FT 90.5 FT 20	SEA 057-500 LEVEL 36.6 FT P SEA 057-500 LEVEL 36.6 FT -		
ECH EST-500 LEVEL BOR ECH EST-500 LEVEL 126.1 /T III 126.1 /T //	STIVEST-600 LEVEL TRP STIVEST-600 LEVEL 1303 rr 1/2		
ECH EST-500 LEVEL WLD ECH EST-500 LEVEL 126.1 FT 126.1 FT 26.1	Stopped NWW OB VILP301 RUN Stopped L		
FLT EST-500 LEVEL BLK FLT EST-500 LEVEL 112.0 FT 112.0 FT	ND W. P. 201 BIN ■ MANY MD M L 201 BIN Str		
FLT EST-500 LEVEL TWR FLT EST-500 LEVEL 112.0 FT 112.0 FT	INT IV Sto Sto		
GL:EST-500 LEVEL GOL:GL:EST-500 LEVEL 102 FT 102 FT //	ASP W 4004 Std 33.64		
GL EST-500 LEVEL IN ZAR GL-THK LEVEL 102.1 FT IN 102.2 FT ///	A59 W Std 3785		
GOL GST-500 LEVEL 36.1 FT IN MDN GOL GST-500 LEVEL 36.0 FT [2]	3.4		
GMM.EST-560 LEVEL 120.7 FT 120.8 FT 200	35 22 740 00 PM 10 40 00 1 140 00 4 40 00 7 40 00 AM		
KNIT GST-500 LEVEL PAT KNIT GST-500 LEVEL 117.6 FT 117.9 FT	4/20203 4/2/2020 4/2/2020 4/2/2020 Captor 7 40 00 All Units		
KHT GST-500 LEVEL 117.8 FT IN SOK GST-690 LEVEL 117.7 FT [22]			
L16 GST-501 LEVEL ASP L16 GST-501 LEVEL 23.3 FT 23.3 FT //			
L16 GST-502 LEVEL ASP L16 GST-502 LEVEL 23.7 FT 23.7 FT 2			
MWW GST-501 LEVEL DB NWW GST-601 LEVEL 39.6 FT 39.7 FT			
NWW GST-501 LEVEL MD NWW GST-501 LEVEL 39.6 FT 39.7 FT			
MWW GST-501 LEVEL IN MIT NWW GST-501 LEVEL 39.6 FT 39.7 FT			

1.11.13.4 Server Status Display

- $\circ\,$ Provides access to server status information, titled 'adm_server_status' in the application.
- $\circ~$ This display is accessed by clicking the Server Status Button from the System Status display.



Server Status Display:

Water Produ	uction Wastewater Collection Re	cycled Water Agua Vista I	Plant	Login Current User: ViewOnly	Tuesday, April 21, 2020 7:43:25 AM	\rightarrow
Server Status		Server State	S			
Hill Servers Arrea Name Primary Status Sacondary Status	Allow Allow Address Address Standby Address Standby Address Address Addres <th>Image: Single state Image: Single state Image: Single state Image: Single state Image: Single state</th> <th></th> <th></th> <th></th> <th></th>	Image: Single state Image: Single state Image: Single state Image: Single state Image: Single state				

1.11.14 FACEPLATES

• Refer to the details provided under each HMI Element in the PlantPAx Graphics section of this document. Additional details can be found in PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions documentation.

1.12 DISPLAY NAMING

1.12.1 DISPLAY NAMING STANDARD

- The structure of the display name is composed of several individual element types that are concatenated to form the full display name.
 - Note that some of this information is in Appendix documents as indicated.

1.12.1.1 System Applicability

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Overview, Menu, and Process Displays.	

1.12.1.2 Full Display Name

- The Display Name is determined using the convention detailed below.
 - AAA_BBB_CCC_DDD_EEE
 - AAA Display Type Code
 - BBB Process System Identifier
 - CCC Zone/Process Area Identifier
 - DDD Site/Sub-Area Identifier
 - EEE Status/Control/Subsystem (Optional)
 - The Southeast Booster (part of Pressure Zone 750 in the Water Production System) Equipment Status display name would be:

prc_wps_pz0750_set_equip

AAA	BBB	CCC	DDD	EEE
prc	wps	pz0750	set	equip

1.12.2 DISPLAY NAME ELEMENTS

1.12.2.1 Display Type Code (AAA)

Element	Description	System
MNU	Menu Display	ALL
OVR	Overview Display	ALL
PRC	Process Graphic Display (includes status, control, and sub-process screens)	ALL

1.12.2.2 Process System Identifier (BBB)

Element	Description	System
WPS	Water Production System	PCS
WCS	Wastewater Collection System	PCS
RWS	Recycled Water System	PCS
AVS	Agua Vista Plant	PCS
ASR	Aquifer Storage & Recovery	ASR
DSL	Desalinated Water System	ASR
CWS	Chilled Water System	CWS

SMC	Steven M. Clouse WRC	SMC
LCK	Leon Creek WRC (FUTURE)	LCK
MDC	Medio Creek WRC (FUTURE)	MDC

- 1.12.2.3 Zone/Process Area Identifier (CCC)
 - See Appendices for a detailed list of this information.
- 1.12.2.4 Site/Sub Area Identifier (DDD)
 - See Appendices for a detailed list of this information.
- 1.12.2.5 Status/Control/Subsystem (EEE) (Optional)

Element	Description	System
EQUIP	Equipment Status	ALL
SITE	Site Status	ALL
CTRL	Process Control (Setpoints)	ALL
CL	Chlorine System	ALL
FL	Fluoride System	ALL
LIME	Lime System	ALL

2. ALARM AND EVENTS

2.1 OVERVIEW

- 2.1.1 APPLICATION
 - Specific Alarm & Event (A&E) configuration details are included in this section.

2.1.1.1 System Applicability

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Alarms and Events configuration and component details.	

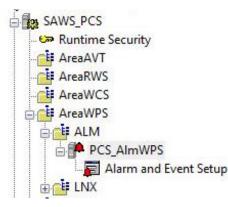
2.1.2 ALARM PHILOSOPHY MANUAL

• See SAWS reference document: "SAWS Alarm Philosophy Manual".

2.2 ALARM CONFIGURATION

This section describes requirements for configuring PlantPAx A&E Alarms and Alarm components for SAWS HMI Systems. Specific alarms selected for configuration with the HMI System(s) are dependent on various factors, including the system that the alarm is being incorporated into, process type, workshop decisions, submittal process, and the specific project requirements detailed in the project plans and specification documents.

- 2.2.1 ALARM & EVENT SERVER
 - An A&E Alarm Server is configured for each Area that has been defined related to a Process System. This server is held in a default 'ALM' folder under the area definition.
 - For example, 'AreaWPS' has been defined for the Water Production System in the SAWS_PCS HMI System and contains an A&E Server in the ALM folder named PCS_AImWPS. The format for the name of the A&E Server is <HMI System>_AIm<Process System>.
 - The PCS_AlmWPS A&E Server is shown in the structure below.



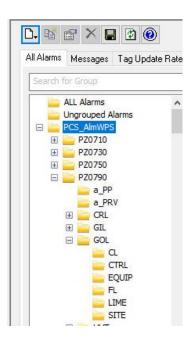
2.2.2 A&E ALARM HIERARCHY

- 2.2.2.1 Alarm Folder Structure
 - The following A&E Alarm folder structure in Alarm and Event Setup illustrates the SAWS Standard Alarm Hierarchy:
 - C <HMI System>_Alm<Process System>
 - C <Process Area or Zone>
 - C <Process Sub-Area or Site>
 - C <Subsystem Status> (ex. Chlorine, Fluoride, Lime)
 - 🗁 <Equipment Status>
 - 🗁 <Site Status>
 - Control
 - The following example structure is a Water Production System site (GOL Golden BSTR) that is part of Pressure Zone 0790.
 - PCS_AlmWPS

🗁 PZ0790

🗁 GOL

- CL (Chlorine System)
- CTRL (Process Control)
- EQUIP (Equipment Status)
- ⇐ FL (Fluoride System)
- Difference LIME (Lime System)
- SITE (Site Status)
- The example above shown in the Alarm and Event Setup is shown below in the Alarm and Even Setup.



2.2.3 A&E ALARM DEFINITIONS

- 2.2.3.1 Alarm Types
 - Two types of alarms are used in the SAWS Standard, Deviation Alarms, and Digital Alarms.
 - Deviation Alarms are used for the generation of analog alarms for the legacy sites where an analog tag is used to generate alarms locally at the HMI versus PlantPAx sites where the PLC objects produce individual digital alarms for corresponding analog level alarming.
 - 2.2.3.1.1 Deviation Alarms (Legacy HMI sites only).
 - Used for analog tag alarming. Individual analog alarm states for Legacy sites are:
 - HiHi
 - High
 - Low
 - LoLo
 - 2.2.3.1.2 Digital Alarms (Legacy HMI sites)
 - Used for all discrete tag alarming in legacy sites. Digital alarm state for discrete alarms can be either when the tag input value is on or off depending on the appropriate alarm state as defined per alarm.
 - 2.2.3.1.3 PlantPAx Alarms (Digital definitions for discrete and analog alarms)
 - Digital alarm state for discrete alarms can be either when the tag input value is on or off depending on the appropriate alarm state as defined per alarm.
 - Individual analog alarm states (digital states) are:
 - Fail
 - HiHi
 - Hi
 - Lo
 - LoLo

2.2.4 A&E ALARM PROPERTIES

- 2.2.4.1 PlantPAx Digital Alarm Naming
 - The following examples show the format to be used for SAWS Alarms. Note the Name format, Input Tag, and FactoryTalk View Command for both the analog and discrete examples that are highlighted. The name format matches the Input Tag (PLC Tag Name is the full path of direct PLC tag reference) format except that the dot ('.') that separates the Function Element from the other tag elements is replaced with an underscore ('_') to match the syntax requirements of FT View A&E Alarm Names.
 - The non-highlighted rows are legacy site alarms that utilize an HMI Tag for the Input Tag instead of a direct PLC tag reference used for the Plant PAx Alarms.
 - Analog Example:

Carlisle (CRL) Pressure Alarms for PIT-202 in Water Production System (WPS)

Discrete Example:

Carlisle (CRL) Pump-202 Alarms in Water Production System (WPS)

ame	Туре	Input Tag	Ack Reg'd	Alarm as a Tag	Group	Alarm Class	FactoryTalk View Command
CL CL	Group	Group	Group	Group	Group	Group	Group
CTRL	Group	Group	Group	Group	Group	Group	Group
EQUIP	Group	Group	Group	Group	Group	Group	Group
FL	Group	Group	Group	Group	Group	Group	Group
LIME	Group	Group	Group	Group	Group	Group	Group
SITE	Group	Group	Group	Group	Group	Group	Group
WPS_CRL_WLP_202_PIT_PRESSURE_Alm_Fail	Digital	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Alm_Fail	true	false	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_WLP_202_PIT_PRESSURE_Alm_Hi	Digital	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Alm_Hi	true	false	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_WLP_202_PIT_PRESSURE_Alm_HiHi	Digital	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Alm_HiHi	true	false	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_WLP_202_PIT_PRESSURE_Alm_Lo	Digital	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Alm_Lo	true	false	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_WLP_202_PIT_PRESSURE_Alm_LoLo	Digital	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Alm_LoLo	true	false	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_WLP_202_PIT_PRESSURE_High	Deviation	/HMI::WPS\CRL\WLP_202_PIT_PRESSURE\IO_Inp_ANALOG	true	true	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_WLP_202_PIT_PRESSURE_HiHi	Deviation	/HMI::WPS\CRL\WLP_202_PIT_PRESSURE\IO_Inp_ANALOG	true	true	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_WLP_202_PIT_PRESSURE_LoLo	Deviation	/HMI::WPS\CRL\WLP_202_PIT_PRESSURE\IO_Inp_ANALOG	true	true	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_WLP_202_PIT_PRESSURE_Low	Deviation	/HMI::WPS\CRL\WLP_202_PIT_PRESSURE\IO_Inp_ANALOG	true	true	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_WLP_202_PMP_Alm_FailToStart	Digital	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.Alm_FailToStart	true	false	CRL	P_Motor	Display "prc_wps_pz0790_crl"
WPS_CRL_WLP_202_PMP_Alm_FailToStop	Digital	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.Alm_FailToStop	true	false	CRL	P_Motor	Display "prc_wps_pz0790_crl"
WPS_CRL_WLP_202_PMP_Alm_IntlkTrip	Digital	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.Alm_IntlkTrip	true	false	CRL	P_Motor	Display "prc_wps_pz0790_crl"
WPS_CRL_WLP_202_PMP_Alm_IOFault	Digital	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.Alm_IOFault	true	false	CRL	P_Motor	Display "prc_wps_pz0790_crl"
WPS_CRL_WLP_202_PMP_FAIL	Digital	/HMI::WPS\CRL\WLP_202_PMP\IO_Inp_FAIL	true	true	CRL	P_MOT1	display "prc_WPS_pz0790_CRL"
WPS_CRL_XXX_300_XXX_RESIDCL2_High	Deviation	/HMI::WPS\CRL\XXX_300_XXX_RESIDCL2\IO_Inp_ANALOG	true	true	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_XXX_300_XXX_RESIDCL2_HiHi	Deviation	/HMI::WPS\CRL\XXX_300_XXX_RESIDCL2\IO_Inp_ANALOG	true	true	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_XXX_300_XXX_RESIDCL2_LoLo	Deviation	/HMI::WPS\CRL\XXX_300_XXX_RESIDCL2\IO_Inp_ANALOG	true	true	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_XXX_300_XXX_RESIDCL2_Low	Deviation	/HMI::WPS\CRL\XXX_300_XXX_RESIDCL2\IO_Inp_ANALOG	true	true	CRL	P_AIn	display "prc_WPS_pz0790_CRL"
WPS_CRL_XXX_301_CGD_ALARM_Alarm	Digital	/HMI::WPS\CRL\XXX_301_CGD_ALARM\IO_Inp_DIGITAL	true	true	CRL	P_Din0	display "prc_WPS_pz0790_CRL"
WPS_CRL_XXX_301_CGD_MALFCTN_Alarm	Digital	/HMI::WPS\CRL\XXX_301_CGD_MALFCTN\IO_Inp_DIGITAL	true	true	CRL	P_Din0	display "prc_WPS_pz0790_CRL"

2.2.4.2 PlantPAx Digital Alarm Properties for Analog Alarms

- The following example shows the formats to be used for SAWS Analog Alarms configuration within the individual Digital Alarm Properties Tabs (Digital, Status Tags, Control Tags) in the Alarm and Event Setup.
 - Analog Example:

Carlisle (CRL) Pressure Fail Alarm for PIT-202 in Water Production System (WPS)

2.2.4.2.1 Digital Tab Configuration

FactoryTalk View Command Examples
display "prc_[AAA]_[AREA]_AAA /cc
display "prc_[AAA]_[AREA]_AAA /cc;pause 1;display "prc_[AAA]_[AREA]_AAA_site /cc

Digital Status Tags	Control Tags	
Name:	WPS_CRL_WLP_202_PIT_PRESSURE_Alm_F	ail
Input Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_P	IT_PRESSURE.Alm_Fail
Condition:	Input <> 0 v	Latched
Severity:	/AreaWPS/LNX::[CRL]WPS_CF	Acknowledge required
Minimum duration:	0 Seconds	Show Alarm as a Tag
Message:	CRL WLP-202 PRESSURE, Carlisle SCND Well Val=/*N:5 %Tag1 N0FILL DP:1*/; Val_InpPV=/*1	Pump 202 Pressure Bad PV Quality; N:5 %Tag2 NOFILL DP:1*/;
	ID: 10000005 New	Edit Browse
Associated tags:	Tag Name Tag1 /AreaWPS/LNC:[CRL]wPS_CRL_W Tag2 /AreaWPS/LNC:[CRL]wPS_CRL_W Tag3 Tag4	
Alarm Class:	P_AIn	×
FactoryTalk View Command:	display "prc_WPS_pz0790_CRL"	
Alarm Group:	PZ0790.CRL	
	Select	

2.2.4.2.2 Status Tags Tab Configuration

Digital Status Tags (Control Tags	
Disabled Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.Com_AE.9	
Suppressed Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.Com_AE.6	
In <mark>Alarm Tag:</mark>		
Acknowledged Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.Com_AE.1	
Shelved Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.Com_AE.3	

2.2.4.2.3 Control Tags Tab Configuration

Digital	Status Tags	Control Tags				
			Auto Re	set		
Disable	e Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.C	Com_AE. 10			
Enable	Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.Com_AE.11				
Suppre	ess Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.C	Com_AE.7			
Unsup	press Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.C	Com_AE.8			
Ackno	wledge Tags					
All Lev	els:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.C	Com_AE.1			
Shelve	Tags					
All Lev	els:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.Com_AE.4				
Shelve	Duration:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.C	fg_MaxShelfT			
Unshel	ve All Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PIT_PRESSURE.Fail.C	Com_AE.5			

2.2.4.3 PlantPAx Digital Alarm Properties for Discrete Alarms

- The following example shows the formats to be used for SAWS Discrete Alarms configuration within the individual Digital Alarm Properties Tabs (Digital, Status Tags, Control Tags) in the Alarm and Event Setup.
 - Discrete Example:

Carlisle (CRL) Pump-202 Fail to Start Alarm in Water Production System (WPS)

2.2.4.3.1 Digital Tab Configuration

FactoryTalk View Command Examples
display "prc_[AAA]_[AREA]_AAA" /cc
display "prc_[AAA]_[AREA]_AAA" /cc;pause 1;display "prc_[AAA]_[AREA]_AAA_site" /cc

Name:	WPS_CRL_WLP_202_PMP_Alm_FailToStart				
Input Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_P	MP.Alm_FailToStart			
Condition:	Input \Leftrightarrow 0 \checkmark	Latched			
Severity:	/AreaWPS/LNX::[CRL]WPS_CF	Acknowledge required			
Minimum duration:	0 Seconds	Show Alarm as a Tag			
Message:	CRL WLP-202 2.9MGD, Carlisle SCND Well Pump 202 Motor Fail to start.				
	ID: 10000001 New	Edit Browse			
Associated tags:	Tag Name Tag1 Tag2 Tag3 Tag3				
Alarm Class:	P_Motor				
FactoryTalk View Command:	Display "prc_wps_pz0790_crl"				
Alarm Group:	PZ0790.CRL				
	Select				

2.2.4.3.2 Status Tags Tab Configuration

	C1.1.7		
Digital	Status Tags	Control Tags	
Disable	d Tag:	VareaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Com_AE.9	
Suppre	ssed Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Com_AE.6	
In <mark>Ala</mark> rr	n Tag:		
Acknow	vledged Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Com_AE.1	
Shelved	d Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Com_AE.3	

2.2.4.3.3 Control Tags Tab Configuration

	arm Properties			
Digital	Status Tags	Control Tags		
			Auto Re	set
Disable	e Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Com_AB	E. 10	
Enable	e Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Com_AB	.11	
Suppre	ess Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Com_AB	.7	
Unsup	press Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Com_AB	E.8	
Ackno	wledge Tags			
All Lev	els:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Com_AE	5.1	
All Lev Shelve	els: Duration:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Com_A& /AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Cfg_Ma		••
Unshei	lve All Tag:	/AreaWPS/LNX::[CRL]WPS_CRL_WLP_202_PMP.FailToStart.Com_AE	E.5	

2.2.5 MESSAGE ID ASSIGNMENTS

- 2.2.5.1 Message ID Definition
 - FactoryTalk Alarm & Events use message IDs to associate with each individual alarm defined in the A&E Server. This number is simply an index. Valid PlantPAx message IDs are from 1000 to 999,999. In order to provide the meaningful organization of alarms defined in the A&E Server as well as allow for a scalable alarm strategy, the message IDs are predefined in ranges associated with the sites that are developed within the individual HMI and Process Systems.

2.2.5.2 Message ID Range Assignments

- 2.2.5.2.1 Assignment Methodology
 - The PCS System, more specifically, the Water Production System within the PCS System, was used as the baseline for developing the message ID assignments, thereby establishing the methodology that serves as the SAWS Standard for subsequent development of new sites within SAWS HMI and Process Systems.
 - Each Process Area or Zone that has sites associated should be the level at which a range is defined. HMI Systems are separate, and the Area definitions are based around the Process System, for example, the Water Production System; therefore, the range for the Process Area or Zone along with a range for each site within the Process Area or Zone is the basis for the range definitions.
- 2.2.5.2.2 Existing Assignments
 - Message ID 1-999 should be reserved in each Process System Area for other alarms that Transcend process area or site.
 - Refer to the existing HMI System Applications for existing assignments to be considered before making new assignments to avoid overlap or duplication of message IDs, which would be problematic.
 - Note that block assignments for legacy sites are in ranges of +1,000,000 to keep them separate from PlantPAx block assignments, which are from 1,000 – 999,999.
 - WCS Lift Station alarm message ID ranges will be LS# x 1,000 in blocks of 1,000.
 Ex LS201 alarm messade ID range would be 255 x 1,000 = 255,000 starting ID.
 Range would be 255,000 thru 255,999.
 - Any ranges defined should be large enough to accommodate all future integration work without overlap or duplication of message IDs, which would be problematic.
 - Block Range assignments for *3 sites* within the Water Production System (PCS HMI System) is shown below for an example of the assignment methodology. The message IDs are assigned with a 1000 range block for each site being developed within a Process Area or Zone of a Process System. This allows for 1000 unique alarms per site and allow for more than enough sites (room for 1000 sites).

Process System	Process Area / Zone	Site ID	Starting Message ID	Ending Message ID
WPS	PZ0790	CRL	10000	10999
WPS	PZ0790	GIL	11000	11999
WPS	PZ0790	GOL	12000	12999

EXAMPLE ONLY, not actual assignment configured in application

2.2.6 ALARM MESSAGE FORMAT

- 2.2.6.1 *Alarm Descriptions*
 - Reference the latest revision (provided by SAWS) of the "SAWS Tag Name Tables" for alarm descriptions.
 - Note that the description is created by the Tag Name Generator sheet of the "SAWS Tag Name Tables" document in addition to the Tag Name.

2.2.6.2 Alarm Messages

- Utilize the description generated from the "SAWS Tag Name Tables" as the alarm prefix. The suffix matches the PlantPAx Alarm Builder format.
- Include all alarms, even if those alarms are not enabled. This allows SAWS the flexibility of enabling alarms later without having to modify Alarm and Events.
 - Example Alarm Messages:

Tagname:	WPS_SEL_HSP_101_PMP
Messages:	Seale PRM HSP 101 Fail to start
	Seale PRM HSP 101 Fail to stop
	Seale PRM HSP 101 Interlock tripped
	Seale PRM HSP 101 IO fault

2.3 ALARM SUMMARY CONFIGURATION

Refer to existing PCS HMI application for configuration details on the A&E Alarm Summary Object.

2.4 ALARM HISTORY CONFIGURATION

Refer to existing PCS HMI application for configuration details on the A&E Alarm History Object.

2.5 ALARM EXPLORER CONFIGURATION

Refer to existing PCS HMI application for configuration details A&E Alarm Explorer Object.

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3. NON-PLANTPAX GRAPHICS

3.1 OVERVIEW

- 3.1.1 APPLICATION
 - These graphics provide additional status and functionality required by SAWS in addition to what was available in the PlantPAx libraries.
- 3.1.2 REQUIRED FILES
 - All custom and standard graphic library files detailed in this standards document for use in the development of the SAWS system can be found within the SAWS Process Objects Library under Graphics\FTView SE\Global Objects. The non-PlantPAx graphics are indicated with a preface of (SAWS).
 - Example showing (SAWS) Process Control Library.

(saws) Process Control Library

3.2 TRENDS

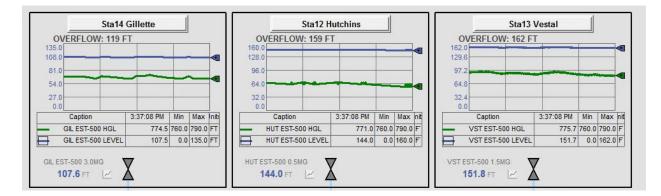
- 3.2.1 TRENDS IN PROCESS GRAPHICS
 - Non-Plant PAx Trends are used throughout the application on displays, including Overview Displays, Site/Area Displays, and on Process Trend Displays.
 - These trends use the standard FTView 'Trend' object.

3.2.1.1	System Applicability

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Process Trends within process graphic displays.	V
			See Process Value Trends under the Non-PlantPAx Graphics section of this document for details on adding trends for selected value types.	

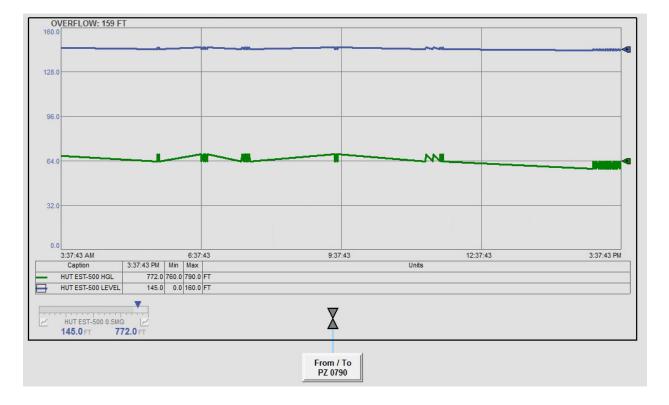
3.2.2 OVERVIEW DISPLAY TRENDS

- Trends are used on Overview Displays to monitor critical process data that is related to zones or major process areas and the sites and areas within them.
 - The example below shows site trends from a pressure zone overview screen.



3.2.3 SITE/AREA DISPLAY TRENDS

• Trends are used on Site/Area Displays to monitor critical process data that is related to the Site or Area, and data from related Sites and Areas.



• The example below shows a site trend from a pressure zone site.

3.2.4 PROCESS VALUE TRENDS

- Process Value Trends are used for Levels, Pressures, and HGL Process Values.
- Trend Icon/Button Global Object is placed over graphic elements within displays where the Process Value Trend access is desired.
- Clicking the Trend Icon will bring up a Process Value Trend popup display.
- Parameter #102 is used to define the Historical Tag Value that is to be shown on the Process Value Trend popup display.
 - The examples below show the Trend Icon Global Object (GO_Nav_Trend1 located in the (saws) Generic Graphics Library) and placement over analog graphic elements.



• The Process Value Trend popup display is shown below.

Fit Data	15 Min	1 Hour	12 Hour	24 Hour	7 Day	2 Week	30 Day
200.00							
150.00							
100.00							
50.00		_					
0.00							
6:47:45 Al 4/21/2020		7:02:45 4/21/2020		7:17:45 4/21/2020		2:45 /2020	7:47:45 Al 4/21/202
		and the second se					

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3.3 STATUS INDICATORS

3.3.1 SERVICE STATUS.

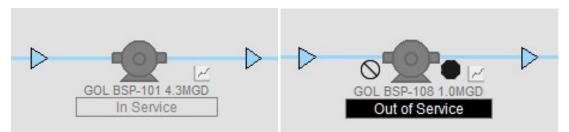
- A custom service status graphic object is added below each motor display element within the graphic area.
- This graphic can be found in the SAWS Out of Service Library in the SAWS Process Objects Library under Graphics\FTView SE\Global Objects.
 - o (SAWS) Out of Service Library

3.3.1.1 System Applicability

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All Motor Display Elements.	

3.3.1.2 Service Status Popup

- The service status of the motor display element is displayed as text below the element (shown in the figures below).
 - The operator can click on the service status text and view the Service Status popup display.



P_Motor Service Status showing In Service and Out of Service status

- The Out of Service Status can also be managed from this popup by clicking the selection switch and selecting either 'No' or 'Yes.'
- The Logged-in User, as well as the current Date and Time, are shown on this popup as well.

CRL WLP-202 Pump	
GOL BSP-101 4.3	MGD Out of Service Message
Enter Oos Message	Click to Enter Message
Logged in User: DEV-EW Date and Time: 6/16/201	
MESSAGE Enter out of service mes	sage.
Take Devi	ice Out of Service
1	No 💭 Yes

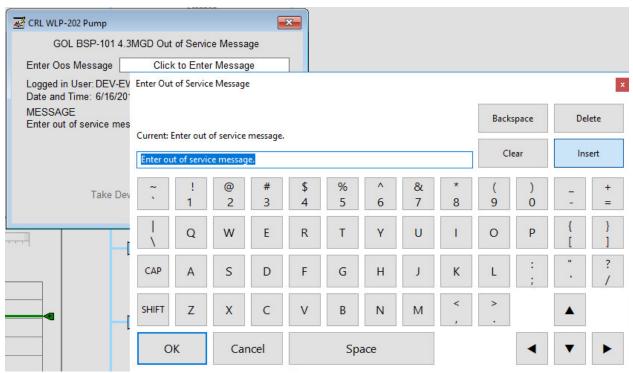
P_Motor Service Status selection switch

 A dialog box prompt will require confirmation for a service status change to 'Out of Service.' No confirmation is required for a service status change to 'In Service.'

V AV	Vienned	1
CRL WLP-202 Pump	8	
GOL BSP-101 4.3	MGD Out of Service Message	
Enter Oos Message	Click to Enter Message	
Logged in User: DEV-EV Date and Time: 6/16/201 MESSAGE		
Enter out of service mes	sage.	
Take Dev	ice Out of Senice	
	No Ome Yes	
7	GOL BSP-101 4.3MGD	X
	Are you sure you 4.3MGD Out of S	want to take GOL BSP-101 Service?
	Yes	No

P_Motor Service Status changed to 'Out of Service' confirmation dialog box

- The out of service message can be entered by clicking on the 'Click to Enter Message' text.
- This is the message that will be displayed on the Service Status popup display under the MESSAGE text.



The out of service message can be entered

3.3.1.3 PLC Objects

• References the out-of-service string tag created in the PLC for motors.

3.3.2 FIELD HOA SWITCH INDICATOR

- A custom field switch indicator graphic object is embedded in each PlantPAx display element within the graphic area (applicable when field switch status tags are available, not all motors have these 'HOA' controls, but all have this built into the PlantPAx motor elements found in section 4 of this document).
 - Note that these are not native PlantPAx objects, but they are now included in the SAWS standard PlantPAx global objects. This section is for reference only to provide details on the purpose and function of this portion of the display element as well as indicating the link between the PLC tags that need to be created to support this functionality when motors have HOA controls.
- This graphic can be found in the SAWS Process Objects Library under Graphics\FTView SE\Global Objects in the following location:
 - (SAWS) Generic Graphics Library

3.3.2.1	System Applicability
---------	----------------------

Applies	HMI	Process	Application/Scope	
	Systems	Systems		Std
	PCS	WPS	All Motor Display Elements that have the associated Field HOA feedback.	V
		RWS	All Motor Display Elements that have the associated Field HOA feedback.	V

3.3.2.2 *Switch Positions*

- There are 2 identified field switches that provide status, MCC/SCP, and MAN/COM.
 - The status of these field switches will be represented by 4 status objects, as indicated by the following table:

Name	Normal	Abnormal	Background Color (R, G, B)	Font
	Status	Status		
MCC / SCP	SCP	мсс	SCP / MCP Control Source	Arial Bold, Size 10, Right Aligned
MAN / COM	СОМ	MAN	COM / MAN Control Source	Arial Bold, Size 10, Left Aligned

'HOA' Field Switch Status

 \circ The status of these field switches is shown next to the applicable motor element:



3.3.2.3 PLC Objects

• References the MCC/MAN tags created in the PLC for motors that have these statuses.

3.3.3 LEAD/LAG STATUS INDICATOR

• A custom Lead/Lag Status Indicator is added above each motor display element that is part of a set of pumps with a lead/lag control sequence.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All Motor Display Elements part of Lead/Lag control	
			sequence	

3.3.3.1 *System Applicability*

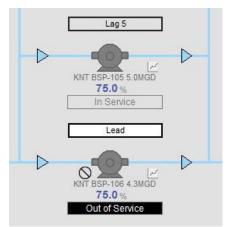
3.3.3.2 Lead/Lag Status Graphic Elements

- There are several valid states for the lead/lag status multistate indicator. The number of states will depend on how many motors are part of the sequence.
 - Some potential state descriptions are detailed in the table below.
 - Note that the description is derived from the referenced string tag in the PLC based on the tag state value, but the state indication color scheme is fixed for the tag state values as shown:

Tag State	State Indication (Examples)		Description
0		Unavailable	Motor Element is Unavailable
1		Lead	Motor Element is in Lead or Duty
		Duty	
2 - 9		Lag #	Motor Element is in Lag1-8 or Standby (where # Position)
		Standby 1	

Status Indicators

 The Lead/Lag Status Indicator is located with the selected motor element, as shown in the example below:



Lead and Lag2 Status Indicators

3.3.3.3 PLC Objects

 References the Lead/Lag tags created in the PLC for motors that are in a lead/lag control strategy.

3.3.4 PLC STATUS AND COMMUNICATION

These tags and objects are used to monitor the status and communication of each PLC. •

	,			
Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All PLCs	

3.3.4.1 System Applicability

3.3.4.2 PLC Status and Communication Derived Tags

- These tags are used to provide the state of each PLC and the current communication status.
- These tags are sourced from status tags in the data driver and conditioned as derived tags based on consideration for specific PLC states.
- The four (2) derived tags in the following table are added for each PLC to provide status and communication state in the existing 'DT_LNX_PLC_Statuses' derived tag file.
 - As an example, the following tags would be configured for Southton Meadows (SML) Lift Station PLC (WCS) (typical for sites with 1 PLC):

Comm Fail Status: LNX\WCS_SML_1_COMFAIL

PLC CPU Not in Remote Run Mode Status: LNX\WCS_SML_1_NOTREMRN

No.	Derived Tag Name	Description				
1	LNX\AAA_BBB_PLC#_COMFAIL	Comm Fail Status				
2	LNX\AAA_BBB_ PLC#_NOTREMRN	PLC CPU Not in Remote Run Mode Status				
PLC Status and Communication Derived Tags						

PLC Status and Communication Derived Tags

3.3.4.2.1 PLC Status and Communication Expressions

• The following expressions are used for each derived tag name.

No.	Expression					
1	1 Comm_err({/AreaAAA/LNX::[AAA_BBB_PLC#]@Mode})					
2	IF NOT comm_err({/AreaAAA/LNX::[AAA-BBB_PLC#]@Mode}) THEN ({/AreaAAA/LNX::[AAA_BBB_PLC#]@Mode} <> "Remote Run") AND (NOT LNX\AAA_BBB_PLC#_NOTINRUN})) ELSE 0					

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3.3.4.3 System Time Keeper Object

- This is a global object that is used to monitor the AOI's and tags in the System_TimeKeeper Routine of each the PLC.
- 3.3.4.3.1 HMI Placement
 - The object is to be located on the Site Status screen and on the communication status.

3.3.4.3.2 Global Object

• The 'GO_Logix_LNX_with_NoRemRn' display element is used for status can be found (SAWS-BAS) Logix Graphics Library and is shown in the example below.



3.4 PROCESS CONTROL AND STATUS ELEMENTS

Process control and status elements are used for setpoint entry, commands, and feedback.

		••	-	
Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Use as needed to provide setpoint entry, controls, and feedback.	

3.4.1.1 System Applicability

3.4.1.2 Examples

Graphic	Description
5	Momentary reset command. Sets tag to 1, waits 5 seconds and then sets to 0.
Press to ss	Momentary command. Sets tag to 1, waits 30 seconds and then sets to 0.
ss ss Selected ss to Use Selecte (login to change) ss	Various versions available. 1 command tag 0 status tag 1 command tag, 1 status tag 2 command tags 1 status tag 2 command tags 2 status tags Configuration options include text states and security tag.
######## ss	Numeric Input. Configuration options include number of decimals, min/max tag or min/max values, keypad input title, security tag, and engineering units up to 8 characters.
######## ss	Numeric Indicator. Displays a numeric value. Configuration options include number of decimals and engineering units up to 8 characters.

Process Control and Status Graphics

3.5 GENERIC ELEMENTS

Generic elements are used in place of a PlantPAx element when a value requires displaying only.

3.5.1 GENERIC ELEMENTS

3.5.1.1	System Applicability
---------	----------------------

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Use as needed to display a value not tied to a PlantPAx AOI.	

3.5.1.2 Examples

Graphic	Description
\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ 5 \$ 5 \$ 5	Digital State with Description
\$\$\$\$\$\$\$\$\$\$\$	Digital State
\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$ ########## \$\$\$\$\$\$\$\$	Numeric Indicator with Description. Displays a numeric value. Configuration options include number of decimals and engineering units up to 8 characters.
ssssssssssssssssss ###### sssssssss	Numeric Indicator and scale bar with Description. Displays a numeric value. Configuration options include number of decimals and engineering units up to 8 characters.
######### sssssss	Numeric Indicator. Displays a numeric value. Configuration options include number of decimals and engineering units up to 8 characters.

Generic Graphics

3.6 STATIC ELEMENTS

Static elements are used for informational and clarity purposes within the process graphics.

- 3.6.1 PROCESS INDICATION FOR STATIC OR NON-MONITORED PROCESS AREAS, EQUIPMENT, AND COMPONENTS
 - Static items, including process and equipment-related items, are detailed in this section.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Use as needed to provide clarity on the process and equipment details.	

3.6.1.1 System Applicability

3.6.1.2 Process Areas (No Process Feedback)

- This graphic is identical to the graphic used for the purpose of future navigation without the restriction to size (make smaller as necessary). The use of this graphic, in this case, is for the indication of other processes that are not monitored but exist within a graphic display.
 - The following are example process area graphics:

Graphic	Description
Brine Filters	This is representative of a process that is static or provides no feedback but is useful for operations to know that it exists.
VENT	Shown smaller, adjust size as necessary

Static Process Area Indicators

3.6.1.3 Process Equipment (No Process Feedback)

- These graphics are used for static process equipment indication.
 - The following example graphics have been developed:

Graphic	Description
Free Flowing	Static Free-flowing Well
No Status Static Only	Static Booster Pump
No Status Static Only WLP-201	Static Well Pump
VALVE No Status Static Only	Static Valve

Static Process Equipment Graphics

3.6.1.4 Process Piping and Other Components (No Process Feedback)

- These graphics are used for static piping and other components for process detail.
 - The following graphics have been developed:

Graphic	Description
	Bi-directional flow Indicated by dashed' lines and opposing arrows. FactoryTalk View does not allow line thickness for dashed lines greater than 1, so 2 lines must be stacked.
	Water
	ASR, Recharge Flow
	All Chemical
	Wastewater
	Air, Ventilation, Etc
	Recycle

Static Process Piping Graphics

4. PLANTPAX GRAPHICS

4.1 OVERVIEW

4.1.1 APPLICATION

These graphics are from the PlantPAx libraries. Any customizations that have been made to these
graphics are indicated for each approved graphic element. Elements that are not yet approved
or applicable to any SAWS Systems are provided as placeholders for future expansion of these
standards (these are indicated by strikethrough light gray text to provide clarity; the TOC also
indicates these topics in strikethrough text for additional ease of identification).

4.1.2 REQUIRED FILES

- Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 18) for details on the standard locations of PlantPAx graphic library files (.ggfx).
- All custom and standard graphic library files detailed in this standards document for use in the development of the SAWS system can be found within the SAWS Process Objects Library under Graphics\FTView SE\Global Objects. The customized graphics available for the development of the SAWS HMI are prefaced with (SAWS-BAS) versus the standard graphics libraries which have a preface of (RA-BAS).
- Both standard and custom libraries are utilized in the development of SAWS systems. Any customizations are indicated.
 - Example showing (SAWS-BAS) P_Motor Graphics Library containing custom graphic elements.

.... (SAWS-BAS) P_Motor Graphics Library

• Example showing (RA-BAS) P_Motor Graphics Library containing standard graphic elements.

4.1.3 BASIC ATTRIBUTES AND INDICATORS

• This section shows examples of visual tools that are common for global objects in the Rockwell Automation Library of Process Objects.

4.1.3.1	System Applicability
---------	----------------------

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS		All Graphic Display Elements that use the Status/Quality Indicator Symbols (Global Change).	

4.1.3.2 *State Indicators*

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 23) for details on State Indicators.

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4.1.3.3 Status/Quality Indicators

- The following symbols were modified within the original elements to produce the SAWS graphic elements (Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 23) for details on original State/Quality Indicators).
- This change applies to multiple display element families that use these symbols within the display element graphics (Motors Family, Valves Family, etc.).

Image Name	Description	Original	SAWS
	Data Quality degraded: uncertain, test, simulation, substitution, or out of specification	0	
Status_CommFail	Data quality bad/failure	٢	?

➔ The following symbols were modified:

4.1.3.4 Threshold Indicators

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 23) for details on Threshold Indicators.

4.1.3.5 Deviation Indicators

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 24) for details on Deviation Indicators.

4.1.3.6 Command Source Indicators

- Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 24) for details on Command Source Indicators.
- 4.1.3.7 Maintenance Bypass Indicator
 - Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 26) for details on Maintenance Bypass Indicator.

4.1.4 BASIC FACEPLATE ATTRIBUTES

- 4.1.4.1 Operator Tab
 - Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 27) for details on Operator Tab Description.

4.1.4.2 Maintenance Tab

- Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 28) for details on Maintenance Tab Description.
- 4.1.4.3 Advanced Properties Display
 - Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 29) for details on Advanced Properties Display Description.

4.1.4.4 Diagnostics Tab

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 30) for details on the Diagnostics Tab Description.

4.1.4.5 Faults Tab

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 30) for details on Faults Tab Description.

4.1.4.6 Trends Tab

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 31) for details on Trends Tab Description.

4.1.4.7 Alarms Tab

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 32) for details on Alarms Tab Description.

4.1.4.8 Help Button

- Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 32) for details on Help Button.
- 4.1.5 Quick Display Interaction

• Quick displays are not to be utilized in the SAWS standard.

- 4.1.6 USING A DISPLAY ELEMENT (GLOBAL OBJECT)
 - Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 34) for details on Using a Display Element (Global Object).
 - Parameter #120 needs to be set to /cc for all display elements.

4.2 CROSS-FUNCTIONAL FAMILY

- 4.2.1 CONDITION GATE DELAY (P_GATE)
 - The P_Gate (Condition Gate Delay) Add-On Instruction provides a 'gate' for a discrete signal and provides on-delay and off-delay timing for the gated signal.
 - P_Gate is used within P_DIn, all Analog inputs, and P_PIDE for threshold and target disagree status processing.

4.2.1.1 *System Applicability*

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used in conjunction with other elements where applicable.	

4.2.1.2 Display Elements

- There are no dedicated display elements for this instruction. The faceplate is called from the containing instruction faceplate.
- 4.2.1.3 Global Object Parameters
 - o N/A
- 4.2.1.4 Faceplate
 - Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 38) for faceplate details.
- 4.2.1.5 *PLC Objects*
 - AOI: P_Gate

4.2.2 INTERLOCKS WITH FIRST OUT AND BYPASS (P_INTLK)

- The P_Intlk (Interlocks with First Out and Bypass) Add-On Instruction is used to collect (sum up) the interlock conditions that stop or de-energize a running or energized piece of equipment.
- For permissive conditions that must be made to start the equipment, but are ignored once the equipment is running, use the Permissives (P_Perm) Add-On Instruction.

4.2.2.1 System Applicabilit

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used in conjunction with other elements where applicable.	

4.2.2.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 39) for display element details.

4.2.2.3 Global Object Parameters

• The following display element global object parameters have required values.

4.2.2.3.1 Parameter Values

Parameter	Required Value	Description
#120	/cc	Opens the faceplate in the center of the screen.

4.2.2.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 41) for faceplate details.

4.2.2.5 PLC Objects

• AOI: P_Intlk

4.2.3 PERMISSIVES WITH BYPASS (P_PERM)

• The P_Perm (Permissives with bypass) Add-On Instruction is used to collect (sum up) the permissive conditions that allow a piece of equipment to start (run, energize, open, and so forth).

4.2.3.1	System Applicabilit	y
	0,000	/

Applies	HMI	Process	Application/Scope	
	Systems	Systems		Std
	PCS	ALL	Used in conjunction with other elements where applicable.	

4.2.3.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 46) for display element details.

4.2.3.3 Global Object Parameters

• The following display element global object parameters have required values.

4.2.3.3.1 Parameter Values

Parameter	Required Value	Description
#120	/сс	Opens the faceplate in the center of the screen.

4.2.3.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 48) for faceplate details.

4.2.3.5 *PLC Objects*

• AOI: P_Perm

4.2.4 CENTRAL RESET (P_RESET)

• The P_Reset (Central Reset) Add-On Instruction provides a central point to reset equipment faults. Latched alarms can be reset for a control strategy.

4.2.4.1 System Applicability

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used as an alarm reset from the HMI.	

4.2.4.2 Graphic Symbols

- Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 52) for graphic symbol details.
- 4.2.4.3 PLC Objects
 - AOI: P_Reset

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4.2.5 COMMON ALARM BLOCK (P_ALARM)

• The P_Alarm (Common Alarm Block) Add-On Instruction is used to provide notification to operators of abnormal conditions or events. This instruction handles alarm acknowledgment, alarm reset, alarm shelving/disabling, and alarm suppression (for FactoryTalk[®] Alarms and Events).

4.2.5.1	System	Applicability
4.2.3.1	System	Аррисионну

Applies	HMI	Process	Application/Scope	
	Systems	Systems		Std
	PCS	ALL	Used in conjunction with other elements where applicable.	

4.2.5.2 Display Elements

- This instruction excludes display elements.
- 4.2.5.3 Global Object Parameters
 - o N/A

4.2.5.4 Faceplate

- Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 54) for faceplate details.
- 4.2.5.5 PLC Objects
- AOI: P_Alarm

4.2.6 COMMAND SOURCE (P_CMDSRC)

• The P_CmdSrc (Command Source) Add-On Instruction is used to provide selection of the command source (owner) of an instruction or control strategy. This instruction excludes display elements.

4.2.6.1 *System Applicability*

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used in conjunction with other elements where applicable.	

4.2.6.2 *Display Elements*

- This instruction excludes display elements.
- 4.2.6.3 Global Object Parameters

o N/A

- 4.2.6.4 Faceplate
 - Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 58) for faceplate details.
 - Indicators on the HMI faceplate show the current states of selections for Operator, Program, External, Override, Maintenance, Hand, and Out of Service

4.2.6.5 PLC Objects

• AOI: P_CmdSrc

4.2.7 OPERATOR PROMPT (P_PROMPT)

4.2.8 BOOLEAN LOGIC WITH SNAPSHOT (P_LOGIC)

4.3 I/O PROCESSING FAMILY

- 4.3.1 I/O PROCESSING FAMILY (COMMON)
 - From these faceplates, there are links to other faceplates. These include links that are standard and those that are optional (navigation must be enabled for these links).
 - Standard Links:
 - o P_[AOI Name]-Advanced
 - o <u>P_CmdSrc</u>
 - o <u>P_Alarm</u>
 - o <u>P_Gate</u>
 - 4.3.1.1 Display Elements
 - Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 77) for details on display elements.
 - 4.3.1.2 Trends Tab
 - The Trends tab shows trend charts of key device data over time. These faceplate trends provide a quick view of current device performance to supplement, but not replace, dedicated historical or live trend displays. The trend displays are common across all I/O Processing Add-On Instructions.
 - Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 29 and Page 79) for details on the trend displays.

4.3.2 Basic Analog Input (P_AIn)

4.3.3 ADVANCED ANALOG INPUT (P_AINADV)

• The P_AInAdv Add-On Instruction monitors one analog value, typically from an Analog Input I/O module. The Add-On Instruction has the same basic features as <u>P_AIn</u>.

Applies	HMI Systems	Process Systems	Application/Scope	SAWS Std
	PCS	ALL	Used for applicable IO. Select the appropriate display element from the table below for use in process graphic screens. See Process Value Trends under the Non-PlantPAx Graphics section of this document for details on adding trends for selected value types.	Ø

4.3.3.1 System Applicability

4.3.3.2 *Display Elements*

- \circ The standard display elements are listed in the table below.
- A custom horizontal graphic has been created for ¹Analog Values. This orientation was preferred by SAWS for the PCS System.

4.3.3.2.1 Approved Graphic Display Elements

GGFX Name	Display Element Name	Display Element	Description
(SAWS-BAS) P_AIn	GO_P_AIn_Indicator_HOR_wTrend	PAx-Improved	¹ Analog Input Values (PCS)
Graphics Library		SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS	Option 1
(SAWS-BAS) P_AIn Graphics Library	GO_P_AIn_Indicator_H_wHGL_wTrend	PAx-Improved sssssssssssssss /###### ss Horizontal with HGL Display PLC Tag: #102_HGL	¹ Analog Input Values (PCS) with HGL Option 2
(SAWS-BAS) P_AIn	GO_P_Ain_wTrend	S <mark>PAx-Improved</mark>	¹ Analog Input Values (PCS)
Graphics Library		SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS	Option 3

4.3.3.3 Global Object Parameters

• The following display element global object parameters have required values.

4.3.3.3.1 Parameter Values

Parameter	Required Value	Description
#120	/сс	Opens the faceplate in the center of the screen.

4.3.3.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 87) for faceplate details.

4.3.3.5 PLC Objects

• AOI: P_AInAdv

4.3.4 ANALOG INPUT CHANNEL (P_AICHAN)

4.3.5 DUAL SENSOR ANALOG INPUT (P_AINDUAL)

• The P_AInDual (Dual Analog Input) Add-On Instruction monitors one analog Process Variable by using two analog input signals (dual sensors, dual transmitters, and dual-input channels). The Add-On Instruction has the same basic features as <u>P_AIn</u>.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable IO. Select the appropriate display element from the table below for use in process graphic screens. See Process Value Trends under the Non-PlantPAx Graphics section of this document for details on adding trends for selected value types.	

4.3.5.1 System Applicability

4.3.5.2 Display Elements

- The standard display elements are listed in the table below.
- A custom horizontal graphic has been created for ¹Dual Analog Values. This orientation was preferred by SAWS for the PCS System.

4.3.5.2.1 Approved Graphic Display Elements

GGFX Name	Display Element Name	Display Element	Description
(SAWS-BAS) P_AIn Graphics Library	GO_P_AInDual_Indicator_HOR_wTrend	PAx-Improved ▼ ssssssssssssssss × ###### sssssss A###### sssssss B:###### sssssss	¹ Dual Analog Input Values (PCS) Option 1
(SAWS-BAS) P_AIn Graphics Library	GO_P_AInDual_Indicator_H_wHGL_wTrend	Ax-improved ssssssssssssss /##### ss/s#### as A##### sssssss B##### sssssss B##### sssssss B##### sssssss B###### sssssss B###### sssssss B###### sssssss B###### sssssss B###### sssssss B####### sssssss B####### sssssss B####### sssssss B############### B############	¹ Dual Analog Input Values with HGL (PCS) Option 2

4.3.5.3 *Global Object Parameters*

• The following display element global object parameters have required values.

4.3.5.3.1 Parameter Values

	Parameter	Required Value	Description
Ľ	#120	/cc	Opens the faceplate in the center of the screen.

4.3.5.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 101) for faceplate details.

4.3.5.5 PLC Objects

• AOI: P_AInDual

4.3.6 MULTIPLE ANALOG INPUT (P_AINMULTI)

 The P_AInMulti (Multiple Analog Input) Add-On Instruction monitors one analog process variable (Process Variable) by using up to eight analog input signals (sensors, transmitters, input channels). The Add-On Instruction has the same basic features as <u>P AIn</u>.

4.5.0.1	L System	Арріїсарії	lý	
Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable IO. Select the appropriate display element from the table below for use in process graphic screens. See Process Value Trends under the Non-PlantPAx Graphics section of this document for details on adding trends for selected value types.	

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4.3.6.2 Display Elements

- The standard display elements are listed in the table below.
- A custom horizontal graphic has been created for ¹Analog Values. This orientation was preferred by SAWS for the PCS System.

4.3.6.2.1 Approved Graphic Display Elements

GGFX Name	Display Element Name	Display Element	Description
(SAWS-BAS) P_AIn	GO_P_AIn_Indicator_HOR_wTrend	PAx-Improved	¹ Analog Input Values (PCS)
Graphics Library		SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS	Option 1
(SAWS-BAS) P_AIn Graphics Library	GO_P_AIn_Indicator_H_wHGL_wTrend	PAx-Improved sssssssssssssss /######ss Horizontal with HGL Display PLC Tag: #102_HGL	¹ Analog Input Values (PCS) with HGL Option 2
(RA-BAS) P_AIn	GO_P_Ain_wTrend	PAx-Improved	¹ Analog Input Values (PCS)
Graphics Library		ssssssssssssssssssssssssssssssssssss	Option 3

4.3.6.3 Global Object Parameters

- The following display element global object parameters have required values.
- 4.3.6.3.1 Parameter Values

Parameter	Required Value	Description
#120	/сс	Opens the faceplate in the center of the screen.

4.3.6.4 Faceplate

 Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 109) for faceplate details.

4.3.6.5 PLC Objects

o AOI: P_AInMulti

4.3.7 DISCRETE INPUT (P_DIN)

• The P_DIn (Discrete Input) Add-On Instruction is used to receive and process one discrete condition (the Process Variable or Process Variable), typically for a channel of a discrete input card. It can be used with any discrete (BOOL) signal.

4.3.7.1	System Applicability
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Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable IO. Select the appropriate display element from the table below for use in process graphic screens.	

4.3.7.2 Display Elements

- The standard display elements are listed in the table below.
- $\circ~$ A custom graphic was created with the trend icon incorporated into the regular P_DIn object.
- 4.3.7.2.1 Approved Graphic Display Elements

GGFX Name	Display Element Name	Display Element	Description
(saws-BAS) Process Graphics Library	GO_P_Din_wTrend	5 5 5 5 5 5 5 5 5	Digital Input Values (PCS)

4.3.7.3 *Global Object Parameters*

• The following display element global object parameters have required values.

4.3.7.3.1 Parameter Values

Parameter	Required Value	Description
#120	/cc	Opens the faceplate in the center of the screen.

4.3.7.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 119) for faceplate details.

4.3.7.5 PLC Objects

• AOI: P_Din

4.3.8 DISCRETE OUTPUT (P_DOUT)

 The Discrete Output (P_DOut) Add-On Instruction controls a device by one discrete output signal and optionally monitors feedback from the device to check for device failures. The P_DOut instruction operates in various command sources and can provide steady, single pulsed, or continually pulsed output.

4.3.8.1 System Applicability

Applies	HMI Systems	Process Systems	Application/Scope	SAWS Std
	PCS	ALL	Used for applicable IO. Select the appropriate display element from the table below for use in process graphic screens.	

4.3.8.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 124) for display element details.

4.3.8.3 Global Object Parameters

• The following display element global object parameters have required values.

4.3.8.3.1 Parameter Values

Parameter	Required Value	Description
#120	/cc	Opens the faceplate in the center of the screen.

4.3.8.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 125) for faceplate details.

4.3.8.5 PLC Objects

• AOI: P_DOut

4.3.9 ANALOG OUTPUT (P_AOUT)

• The P_AOut (Analog Output) Add-On Instruction is used to manipulate an analog output to control a field device, such as a control valve or a motorized gate positioner. The output responds to an Operator (manual) or Program setting of the Controlled Variable (CV) signal.

4.3.9.1 *System Applicability*

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable IO. Select the appropriate display element from the table below for use in process graphic screens.	

4.3.9.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 132) for display element details.

4.3.9.3 Global Object Parameters

• The following display element global object parameters have required values.

4.3.9.3.1 Parameter Values

Parameter	Required Value	Description
#120	/cc	Opens the faceplate in the center of the screen.

4.3.9.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 133) for faceplate details.

4.3.9.5 PLC Objects

• AOI: P_AOut

4.3.10 PRESSURE/TEMPERATURE COMPENSATED FLOW (P_PTComp)

4.3.11 TANK STRAPPING TABLE (P_STRAPTBL)

4.4 REGULATORY AND PROCEDURAL CONTROL FAMILY

- 4.4.1 REGULATORY AND PROCEDURAL
 - 4.4.1.1 Library objects in this section comprise two groups of Advanced Process Control: regulatory and procedural.
 - Regulatory control focuses on the process variables (levels, flows, temperatures, pressures, and so on). The control is designed to improve loops that perform poorly and automate loops that are typically run in manual mode by the operator. These loops include techniques such as ratio, feed-forward, cascade, and decoupling control. Regulatory control variables include:
 - Proportional + Integral + Derivative Enhanced (P_PIDE)
 - Analog Fanout (P_Fanout)
 - High or Low Selector (P_HiLoSel)
 - Deadband Controller (P_DBC)
 - Procedural control focuses on the product being manufactured (cement, polyethylene, ethanol. paper, and so on). The objects control the various product specifications and parameters via a series of discrete sequential actions. Procedural control variables include:
 - Sequencer Object (P_Seq)
 - Flowmeter Dosing / Weigh Scale Dosing (P_Dose)
 - Lead/Lag/Standby Motor Group (P_LLS)

4.4.2 PROPORTIONAL + INTEGRAL + DERIVATIVE ENHANCED (P_PIDE)

• The P_PIDE (Proportional + Integral + Derivative Enhanced) Add-On Instruction provides the functionality of the Studio 5000 Logix Designer PIDE function block.

4.4.2.1	System Applicability
4.4.2.1	System Applicubility

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable control strategies.	

4.4.2.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 142) for display element details.

4.4.2.3 Global Object Parameters

• The following display element global object parameters have required values.

4.4.2.3.1 Parameter Values

Parameter	Required Value	Description
#120	/сс	Opens the faceplate in the center of the screen.

4.4.2.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 145) for faceplate details.

4.4.2.5 PLC Objects

• AOI: P_PIDE

- 4.4.3 ANALOG FANOUT (P_FANOUT)
- 4.4.4 HIGH OR LOW SELECTOR (P_HILOSEL)
- 4.4.5 DEADBAND CONTROLLER (P_DBC)
- 4.4.6 Rockwell Automation Sequencer Object (P_Seq)
- 4.4.7 DOSING (P_DOSE)

4.4.8 LEAD/LAG/STANDBY MOTOR GROUP (P_LLS)

- The P_LLS (Lead/Lag/Standby motor group) Add-On Instruction provides control of a parallel group of motors. Such groups are commonly used for a group of pumps that maintain pressure on a header despite wide changes in demand, such as in municipal-scale or plant-scale water distribution.
- From this faceplate, there are links to other faceplates. These include links that are standard and those that are optional (navigation must be enabled for these links).
- Standard Links:
 - P_[AOI Name]-Advanced
 - P_[AOI Name]-Config
 - o <u>P_CmdSrc</u>
 - o <u>P_Alarm</u>
 - Optional Links:
 - o <u>P_Perm</u>
 - o <u>P_Intlk</u>

4.4.8.1 System Applicability

Applies	HMI Systems	Process Systems	Application/Scope	SAWS Std
	PCS	ALL	May be selected for motors in a lead-lag control strategy after approval by SAWS for specific project applications. Review project control requirements with SAWS for direction on the use of this specific element as it may not be applicable if custom SAWS lead-lag control strategy is required. Refer to SAWS for details on the required lead-lag control strategy and applicable PLC code on a project-by- project basis.	

4.4.8.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 209) for display element details.

4.4.8.3 Global Object Parameters

• The following display element global object parameters have required values.

4.4.8.3.1 Parameter Values

Parameter	Required Value	Description
#120	/cc	Opens the faceplate in the center of the screen.

4.4.8.4 Faceplate

- Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 210) for faceplate details.
- 4.4.8.5 PLC Objects
 - AOI: P_LLS

4.5 MOTORS FAMILY

4.5.1 COMMON MOTORS FACEPLATES

- 4.5.1.1 Faceplate Attributes
 - Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 219) for details on Common Motor Faceplate Attributes.
 - From these faceplates, there are links to other faceplates. These include links that are standard and those that are optional (navigation must be enabled for these links).
 - Standard Links:
 - P_[AOI Name]-Advanced
 - P_CmdSrc
 - P Alarm
 - Optional Links:
 - <u>P_Perm</u> (not used for HO elements)
 - P_Intlk
 - <u>P_Runtime</u>
 - P_ResInh
 - P_@_Ovld

4.5.2 SINGLE-SPEED MOTOR (P_MOTOR)

• The P_Motor (Single-speed Motor) Add-On Instruction controls a non-reversing, single-speed motor in various command sources and monitors for fault conditions.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	WPS	All Single Speed Motors (Select display element from the table shown: High Service and Booster Pumps, Well Pumps, Air Compressors, Chemical Pumps).	
		WCS	All Single Speed Motors (Select display element from the table shown: Lift Station Pumps, Air Compressors).	

4.5.2.1 System Applicability

4.5.2.2 Display Elements

\circ A custom motor graphic has been created for ¹Well Pumps.

4.5.2.2.1 Approved Graphic Display Elements

GGFX Name	Display Element Name	Display Element	Description
(SAWS-BAS) P_Motor Graphics Library	GO_P_Motor_Pump_HP_MCCMAN		High Service and Booster Pumps (PCS)
(SAWS-BAS) P_Motor Graphics Library	GO_P_Motor_Pump_WLP_MCCMAN	Stopping SSSSSSS SSSSSSS SSSSSSSSSSSSSSSSSSSS	¹ Well Pumps (PCS)
(saws-legacy) P_Motor Graphics Library Currently Legacy Only	*GO_P_MOT3_Pump_VERT	SESSESSESSESSESSESSESSESSESSESSESSESSES	Lift Station Pumps Vertical (PCS)
(saws-legacy) P_Motor Graphics Library Currently Legacy Only	*GO_P_MOT3_Pump_SUB		Lift Station Pumps Submersible (PCS)
(RA-BAS) P_Motor Graphics Library	GO_P_Motor_RPump_U	SS SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS	Air Compressors (PCS)
(SAWS-BAS) P_Motor Graphics Library	GO_P_Motor_Pump_CHEM_MCCMAN		Chemical Pumps (PCS)

4.5.2.3 Global Object Parameters

• The following display element global object parameters have required values.

4.5.2.3.1 Parameter Values

Parameter	Required Value	Description
#120	/сс	Opens the faceplate in the center of the screen.

4.5.2.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 222) for faceplate details.

4.5.2.5 PLC Objects

- AOI: P_Motor
- 4.5.3 Two-speed Motor (P_Motor2Spd)
- 4.5.4 Reversing Motor (P_MotorRev)

4.5.5 HAND-OPERATED MOTOR (P_MOTORHO)

• The P_MotorHO (Hand-operated Motor) Add-On Instruction monitors a locally controlled (hand-operated) motor.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	WPS	All Hand-Operated Motors (Select display element from the table shown: High Service and Booster Pumps, Well Pumps, Air Compressors, Chemical Pumps).	
		WCS	All Hand-Operated Motors (Select display element from the table shown: Lift Station Pumps, Air Compressors).	

4.5.5.2 Display Elements

 \circ A custom motor graphic has been created for ¹Well Pumps.

4.5.5.2.1 Approved Graphic Display Elements

GGFX Name	Display Element Name	Display Element	Description
(SAWS-BAS) P_MotorHO Graphics Library	GO_P_MotorHO_Pump_HP_MCCMAN	Powerup SSSSSSSSS SSSSSSSSSSSSSSSSSSSSSSSSSS	High Service and Booster Pumps (PCS)
(SAWS-BAS) P_MotorHO Graphics Library	GO_P_MotorHO_Pump_WLP_MCCMAN	Powerup SSSSSSSS SSSSSSSSSSSSSSSSSSSSSSSSSSS	1Well Pumps (PCS)
(SAWS-BAS) P_MotorHO Graphics Library	GO_P_MotorHO_Pump_LS_Vertical	Powerup Auto SESSSESSESSESSESSESSESSESSESSESSESSESSE	Lift Station Pumps Vertical (PCS)
(SAWS-BAS) P_MotorHO Graphics Library	GO_P_MotorHO_Pump_LS_Submersible	Powerup Auto	Lift Station Pumps Submersible (PCS)
(RA-BAS) P_MotorHO Graphics Library	GO_P_MotorHO_RPump_U	SSESSESSESSESSESSESSESSESSESSESSESSESSE	Air Compressors (PCS)
(SAWS-BAS) P_MotorHO Graphics Library	GO_P_MotorHO_Pump_CHEM_MCCMAN	Powerup SSSSSSSS SESSSSSSSSSSSSSSSSSSSSSSSSSS	Chemical Pumps (PCS)

4.5.5.3 Global Object Parameters

• The following display element global object parameters have required values.

4.5.5.3.1 Parameter Values

Para	ameter	Required Value	Description
#	120	/сс	Opens the faceplate in the center of the screen.

4.5.5.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 247) for faceplate details.

4.5.5.5 PLC Objects

- AOI: P_MotorHO
- 4.5.6 DISCRETE 2-, 3-, 4-STATE DEVICE (P_D4SD)

4.5.7 VARIABLE SPEED DRIVE (P_VSD)

• The P_VSD (Variable Speed Drive) Add-On Instruction is used to operate one variable speed motor by using a drive (AC variable frequency or DC) in various command sources, monitoring for fault conditions.

Applies	HMI Systems	Process Systems	Application/Scope	SAWS Std
V	PCS	WPS	All Variable Speed Drive Motors EXCEPT AB PowerFlex 755 VFD drives (Use P_PF755 AOI for this exception). Select display element from the table shown: High Service and Booster Pumps, Well Pumps, Air Compressors, Chemical Pumps.	V
		WCS	All Variable Speed Drive Motors EXCEPT AB PowerFlex 755 VFD drives (Use P_PF755 AOI for this exception). Select display element from the table shown: Lift Station Pumps, Air Compressors.	

4.5.7.1 System Applicability

4.5.7.2 Display Elements

- \circ A custom motor graphic has been created for ¹Well Pumps.
- 4.5.7.2.1 Approved Graphic Display Elements

GGFX Name	Display Element Name	Display Element	Description
(SAWS-BAS) P_VSD Graphics Library	GO_P_VSD_Pump_HP_MCCMAN	sissessesses ###### sssssss	High Service and Booster Pumps (PCS)
(SAWS-BAS) P_VSD Graphics Library	GO_P_VSD_Pump_WLP_MCCMAN	Running s. s ssssssss sssssssss ###### sssssss	1Well Pumps (PCS)
(RA-BAS) P_VSD Graphics Library	GO_P_VSD_RPump_U	SSESSESSESSESSESSESSESSESSESSESSESSESSE	Air Compressors (PCS)
(SAWS-BAS) P_VSD Graphics Library	GO_P_VSD_Pump_CHEM_MCCMAN	Jogging ss SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS	Chemical Pumps (PCS)

4.5.7.3 Global Object Parameters

 \circ $\;$ The following display element global object parameters have required values.

4.5.7.3.1 Parameter Values

Parameter	Required Value	Description
#120	/cc	Opens the faceplate in the center of the screen.

4.5.7.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 267) for faceplate details.

4.5.7.5 PLC Objects

- AOI: P_VSD
- 4.5.8 POWERFLEX[®] 523/525 VARIABLE FREQUENCY DRIVES (P_PF52x)
- 4.5.9 POWERFLEX 753 DRIVE (P_PF753)

4.5.10 POWERFLEX 755 DRIVE (P_PF755)

• The P_PF755 (PowerFlex 755 drive) object is used to operate one variable-speed motor by using a PowerFlex 755 AC variable frequency drive in various command sources and monitoring for fault conditions.

4.5.10.1	System Applicability	
----------	----------------------	--

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
\checkmark	PCS	WPS	All AB PowerFlex 755 VFD drives (coordinate with SAWS for	V
			use of PowerFlex 523/525 and 753 drives).	
\checkmark		WCS	All AB PowerFlex 755 VFD drives (coordinate with SAWS for	\checkmark
			use of PowerFlex 523/525 and 753 drives).	

4.5.10.2 Display Elements

- The P_PF755 instruction uses the same HMI display elements that are used for the VariableSpeed Drive (P_VSD) instruction.
- 4.5.10.2.1 Approved Graphic Display Elements
 - The P_PF755 instruction uses the same HMI display elements that are used for the VariableSpeed Drive (P_VSD) instruction.

4.5.10.3 Global Object Parameters

• The following display element global object parameters have required values.

4.5.10.3.1 Parameter Values

Parameter	Required Value	Description		
#120	/сс	Opens the faceplate in the center of the screen.		

4.5.10.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 302) for faceplate details.

4.5.10.5 PLC Objects

- AOI: P_PF755
- 4.5.11 SMC[™]-50 Smart Motor Controller (P_SMC50)
- 4.5.12 SMC FLex Smart Motor Controller (P_SMCFLex)
- 4.5.13 E1 PLUS[™] ELECTRONIC OVERLOAD RELAY (ETHERNET/IP) (P_E1PLUSE)
- 4.5.14 E3/E3 PLUS OVERLOAD RELAY (P_E3OVLD)
- 4.5.15 E300[™] Electronic Overload Relay (EtherNet/IP) (P_E3000vLd)

4.5.16 RUN TIME AND START COUNTER (P_RUNTIME)

• The P_RunTime (Run Time and Start Counter) Add-On Instruction is used to accumulate the total run time and count of starts for a motor or other equipment.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for all motors with running feedback.	

4.5.16.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 367) for display element details.

4.5.16.3 Global Object Parameters

• The following display element global object parameters have required values.

4.5.16.3.1 Parameter Values

Paramete	r Required Value	Description
#120	/сс	Opens the faceplate in the center of the screen.

4.5.16.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 368) for faceplate details.

4.5.16.5 PLC Objects

• AOI: P_Runtime

4.5.17 RESTART INHIBIT FOR LARGE MOTOR (P_RESINH)

• The P_ResInh (Restart Inhibit for Large Motor) Add-On Instruction is used to help prevent damage to a large motor through repeated starts. The high starting current for a large motor causes considerable heating

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for all motors where this function is applicable.	

4.5.17.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 369) for display element details.

4.5.17.3 Global Object Parameters

• The following display element global object parameters have required values.

4.5.17.3.1 Parameter Values

Paramet	r Required Value	Description
#120	/сс	Opens the faceplate in the center of the screen.

4.5.17.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 370) for faceplate details.

4.5.17.5 PLC Objects

• AOI: P_ResInh

4.6 VALVES FAMILY

4.6.1 COMMON VALVES FACEPLATES

- 4.6.1.1 *Faceplate Attributes*
 - Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 373) for details on Common Valves Faceplate Attributes.
 - From these faceplates, there are links to other faceplates. These include links that are standard and those that are optional (navigation must be enabled for these links).
 - Standard Links:
 - P_[AOI Name]-Advanced
 - P_CmdSrc
 - P Alarm
 - Optional Links:
 - <u>P_Perm</u> (not used for Valve C or HO elements)
 - <u>P_Intlk</u> (not used for ValveMO)
 - P_ValveStats

4.6.2 ANALOG/PULSED CONTROL VALVE (P_VALVEC)

• The P_ValveC (Analog/Pulsed Control Valve) Add-On Instruction manipulates a control valve by using an analog signal or discrete signals and monitors the valve by using analog position feedback.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable valves. Select the appropriate display	
			element for use in process graphic screens.	

4.6.2.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 375) for display element details.

4.6.2.3 Global Object Parameters

• The following display element global object parameters have required values.

4.6.2.3.1 Parameter Values

Parameter	Required Value	Description
#120	/cc	Opens the faceplate in the center of the screen.

4.6.2.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 376) for faceplate details.

4.6.2.5 PLC Objects

• AOI: P_ValveC

4.6.3 HAND-OPERATED VALVE (P_VALVEHO)

 The P_ValveHO (Hand-operated Valve) Add-On Instruction monitors a hand (locally) operated valve and displays its current state. The valve can have any type of actuator – handwheel, lever, motor, solenoid, pneumatic, hydraulic – but it is normally operated at the valve. The control system only monitors the valve via open and closed limit switches.

4.6.3.1	System	Applicability
---------	--------	---------------

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable valves. Select the appropriate display element for use in process graphic screens.	

4.6.3.2 *Display Elements*

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 386) for display element details.

4.6.3.3 Global Object Parameters

• The following display element global object parameters have required values.

4.6.3.3.1 Parameter Values

Parameter	Required Value	Description
#120	/сс	Opens the faceplate in the center of the screen.

4.6.3.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 387) for faceplate details.

4.6.3.5 PLC Objects

• AOI: P_ValveHO

4.6.4 MOTOR-OPERATED VALVE (P_VALVEMO)

• The P_ValveMO (Motor-operated Valve) Add-On Instruction is used to operate (open and close) a motor-operated valve in various command sources, monitoring for fault conditions.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable valves. Select the appropriate display element for use in process graphic screens.	

4.6.4.1 *System Applicability*

4.6.4.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 394) for display element details.

4.6.4.3 Global Object Parameter

• The following display element global object parameters have required values.

4.6.4.3.1 Parameter Values

Parameter	Required Value	Description
#120	/сс	Opens the faceplate in the center of the screen.

4.6.4.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 3395) for faceplate details.

4.6.4.5 PLC Objects

• AOI: P_ValveMO

4.6.5 MIX-PROOF VALVE (P_VALVEMP)

4.6.6 SOLENOID-OPERATED VALVE (P_VALVESO)

• The P_ValveSO (Solenoid-operated Valve) Add-On Instruction is used to operate (open and close) a solenoid-operated valve in various command sources, monitoring for fault conditions.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable valves. Select the appropriate display	
			element for use in process graphic screens.	

4.6.6.1 *System Applicability*

4.6.6.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 410) for display element details.

4.6.6.3 Global Object Parameters

• The following display element global object parameters have required values.

4.6.6.3.1 Parameter Values

Parameter	Required Value	Description
#120	/cc	Opens the faceplate in the center of the screen.

4.6.6.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 411) for faceplate details.

4.6.6.5 PLC Objects

• AOI: P_ValveSO

4.6.7 2-STATE VALVE STATISTICS (P_VALVESTATS)

• The P_ValveStats (2-state Valve Statistics) Add-On Instruction monitors a 2-state (open and close) valve and records various statistics that are related to stroke times and stroke counts.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
\checkmark	PCS	ALL	Used for applicable valves. Select the appropriate display	
			element for use in process graphic screens.	

4.6.7.1 *System Applicability*

4.6.7.2 Display Elements

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 418) for display element details.

4.6.7.3 Global Object Parameters

• The following display element global object parameters have required values.

4.6.7.3.1 Parameter Values

Parameter	Required Value	Description
#120	/сс	Opens the faceplate in the center of the screen.

4.6.7.4 Faceplate

• Refer to PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (Page 419) for faceplate details.

4.6.7.5 PLC Objects

- AOI: P_ValveStats
- 4.6.8 N-POSITION DEVICE (P_NPOS)
- 4.6.9 DISCRETE 2-, 3-, 4-STATE DEVICE (P_D4SD)

4.7 Built-in Instructions Family

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- 4.7.6 RAMP/SOAK (RMPS)
- 4.7.7 TOTALIZER (TOT)

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BIBLIOGRAPHY

Standards outlined in this document should take into account the following documentation:

Library Documentation for Version 4.0

- PROCES-RM014 Rockwell Automation Library of Process Objects: HMI Instructions (November 2018)
- PROCES-RM002 Rockwell Automation Library of Process Objects (July 2018)

PlantPAx System Documentation for Version 4.5

• PROCES-UM003PlantPAx Distributed Control System Application Configuration (July 2018)

Additional Rockwell Documentation

• Knowledgebase Article 1076498: PlantPAx Process Library 4.x security group setup for FactoryTalk View SE & ME

SAWS Documentation

- SAWS Tag Naming Convention Memo
- SAWS Tag Name Tables
- SAWS Alarm Philosophy Manual

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APPENDICES

A. PROCES-RM014 ROCKWELL AUTOMATION LIBRARY OF PROCESS OBJECTS: HMI INSTRUCTIONS

B. PROCES-RM002 ROCKWELL AUTOMATION LIBRARY OF PROCESS OBJECTS

C. PROCES-UM003 PLANTPAX DISTRIBUTED CONTROL SYSTEM APPLICATION CONFIGURATION

D. PLANTPAX PROCESS LIBRARY 4.X SECURITY SETUP FOR FACTORYTALK VIEW SE & ME

E. CHANGE REQUEST FORM TEMPLATE (CM-FORM)

F. APPROVED CM-FORMS

G. PCS System ZONE/PROCESS AREA IDENTIFIERS

H. ASR System Zone/Process Area Identifiers

I. PCS System Site/Sub-Area Identifiers

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APPENDIX B - APPLICATION SERVICES

SAWS PLC Software Configuration Standards





PLC SOFTWARE CONFIGURATION STANDARDS

REVISION: JANUARY 2023

DEVELOPED FOR: SAN ANTONIO WATER SYSTEM (SAWS) DEVELOPED BY: TESCO CONTROLS [THIS PAGE IS INTENTIONALLY LEFT BLANK]

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FORWARD

This document was developed by Tesco Controls on behalf of and in collaboration with San Antonio Water System (SAWS). The latest revision replaces all previous revisions. Any revisions to this document must be approved by SAWS, at a minimum. A completed and approved Change Management Request Form is required to accompany any revisions to this document. The CM Form(s) should be identified in the Revision History table by their number to provide a historical record of changes made to this document. Refer to the Change Management (CM) Procedure on the next page for details on the CM Process.

Any feedback or questions on this document should be directed to SAWS. The revision history for this document is detailed below.

REVISION	AUTHOR(S)	REVISION NOTES	CM FORM	
MONTH DAY, YYYY	Author Names	Name of Project revisions were made on & Brief description of changes	CM Form Number	
September 12, 2019	WEBSTER JESSUP STEPHEN GOLDSWORTH	BASE PROJECT INITIAL DRAFT DEVELOPED FROM DECISIONS MADE IN WORKSHOPS WITH OWNER	CM-0000	
April 21, 2020	WEBSTER JESSUP STEPHEN GOLDSWORTH	BASE PROJECT SECOND DRAFT DEVELOPED FROM DECISIONS MADE IN WORKSHOPS WITH OWNER	CM-0000	
June 19, 2020	WEBSTER JESSUP STEPHEN GOLDSWORTH ALEX MCCULLOCH	BASE PROJECT THIRD DRAFT DEVELOPED WITH UPDATES ENCOMPASSING PROJECT CHANGES OVER TIME	CM-0000	
August 13, 2019	WEBSTER JESSUP	BASE PROJECT All non-predefined tags require descriptions (Section 1.3.2.4) Task Configuration Update (Section 1.6.3) File, Controller, and Shortcut naming update AAA_BBB_# (Sections 1.3.3, 1.3.4) Uncheck connection fault for IO modules (Section 1.6.7)	CM-0000	
December 18, 2020	WEBSTER JESSUP	FBD sheet naming correction (Section 1.3.6.4)	CM-0000	
August 2, 2021	STEPHEN GOLDSWORTH	Added section 3.3.4 Local Analog Output Scaling Added section 4.3.8 PowerFlex 755 Drive (P_PF755) Added section 1.6.3 PLC Time Updated section 1.2.1.4 Introduction (System Info) Added section 1.6.3 System Time Keeper Object Added section 1.6.7 Global SIM Updated the Task Tree screenshot in section 1.3.6.2 Updated the Application/Scope for 4.5.3 and 4.5.4	CM-0000	
August 13, 2021	Alfredo DeLaGarza Jr	Added section HeartBeat Monitor Updated screen shots for DI, DO, AI and AO Removed LLD as an option for IO Mapping Updated Routine Name screen shots		
October 29, 2021	Alfredo DeLaGarza Jr	Added section 1.6.12 for Lift Station HOA Field Switch Indication		
January 19, 2023	Alfredo DeLaGarza Jr	Added wording in section 1.3.6.4 Sheet Name to account for times when importing from Rockwell Process Strategies		
January 19, 2023	Alfredo DeLaGarza Jr	Added parameter values in section 4.1.7.4.1 on when Camel Case and all Caps should be used in P_Din's		
January 23, 2023	Mark Girton	Added Section for NTP routine 1.6.6.3		

REVISION HISTORY

REVISION	AUTHOR(S)	REVISION NOTES	CM FORM

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CHANGE MANAGEMENT (CM) PROCEDURE

It is rare for a Control System Software Standard to execute as planned throughout its lifecycle without the need for some sort of change. These changes often come from new process additions or new Systems or Sites that require additional or unique elements to integrate the process changes properly. The well-managed change increases the likelihood of project success and significantly improves adherence to defined standards.

The Change Control process consists of five distinct steps:

- 1. Change Request Initiation A change request CM-Form is prepared, formally submitted to decision-makers (as selected or specified by SAWS at the time or project context of the request).
- 2. Change Request Analysis The change request is analyzed to determine if it has merit and is appropriate, and what impact the changes have on the existing standards. Additional information may be needed that might aid decision-makers in granting or denying approval of the request.
- **3.** Change Request Resolution/Approval Decision-makers consider the results of the analysis and determine if the request should be approved, denied, or if more analysis is needed.
- 4. Change Request Implementation Approved changes are planned, scheduled, resourced, and implemented.
- 5. Change Request Verification and Closing Implementation of the change is verified.

Change Request Procedure:

- 1. The Change Control Process is triggered by the completion and submittal of a change request form, which is used to record events, decisions, and activities that occur as the change progresses through the defined steps of the change control process.
- 2. Once submitted, the change request is analyzed through whatever means chosen (Workshop, RFI, Submittal, etc.), and the change request form is updated accordingly with information regarding the status of the approval.
- 3. Once the change is approved, the CM-Form is signed by authorized individuals chosen by SAWS.
- **4.** Standards Document(s) are modified in accordance with the approved changes detailed in the approved CM-Form(s).
- 5. Standards Document changes are reviewed for accuracy in adherence to the changes detailed in the approved CM-Form(s).
- 6. The Revision History Table on the previous page is updated with the Revision (Date), Authors, Revision Notes, and the applicable CM-Form references.

The Change Request Form Template (CM-Form) is included as Appendix E. Completed and Approved CM-Forms are to be added to this document under Appendix F for proper historical tracking of the changes to the standards document.

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INTRODUCTION

This document is developed as part of the Production Control System Upgrade project to implement a single, consolidated software platform. This platform provides monitoring and control of the entire Water Production System, Water Collection System, and Recycled Water System utilizing the Rockwell FactoryTalk PLC and the PlantPAx platform. Additional Systems that this standard applies to are be added to this document as part of the evolution of the SAWS software configuration standard.

A crucial part of the design process is the development of the Programmable Logic Controller (PLC) standards, which are to be applied to bring consistency to the PLCs. The decisions documented as part of the baseline PLC standards workshop were used to create these SAWS PLC standards and will be incorporated into the technical specifications for system implementation on SAWS projects.

- The specific application of these standards to each SAWS Control System is indicated in the table below by a '☑' in the 'Applies' column when the item is approved or applicable and blank when not approved or applicable. This table exists throughout the document.
- The scope applies to either ALL or individual Process Systems; additional information is indicated for each Process System as necessary under the Application/Scope.
- Any customizations or SAWS-specific standards are also indicated with a '☑' in the 'SAWS Std' column of the table to indicate deviations from the native PlantPAx standard or other standards that are specific to SAWS.
- If there is no SAWS Std indicated, refer to PlantPAx documentation references for configuration details as indicated in sections where the default PlantPAx approach is acceptable.

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Additional PCS Application/Scope details go here	
		WPS	Additional WPS Application/Scope details go here	
		WCS	Additional WCS Application/Scope details go here	
		RWS	Additional RWS Application/Scope details go here	
		AVS	Additional AVS Application/Scope details go here	
	ASR	ALL	Additional ASR Application/Scope details go here	
		ASR	Additional ASR Application/Scope details go here	
		DSL	Additional DSL Application/Scope details go here	
	CWS	CWS	Additional CWS Application/Scope details go here	
	WWTP	ALL	Additional WWTP Application/Scope details go here	
		SMC	Additional SMC Application/Scope details go here	
		LCK	Additional LCK Application/Scope details go here	
		MCK	Additional MCK Application/Scope details go here	

System Applicability (Current Revision)

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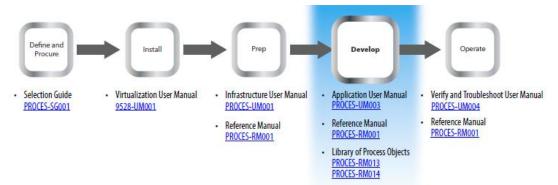
SCOPE

The purpose of PLC Standards is to define and document specific software configuration standards for developing the elements of the PLC Logic to keep the system uniform and accurate to the PLC philosophy adopted by SAWS throughout the initial implementation phase of the project and for future modifications to the system. This document is intended to evolve with the SAWS Production Control System. It should be modified over time as needed to reflect the current PLC standards philosophy and ensure that modifications made to the system align with the documented standards.

The core software standard for the SAWS Production Control System is the Rockwell Automation Library of Process Objects model, also referred to as PlantPAx, built within the framework of the Rockwell Logix Controller Platform. The standards identified within this document are intended to focus attention on the items that establish the specific SAWS standard:

- Objects of the base PlantPAx standard that have been customized
- Standard PlantPAx elements that have been selected and approved for use
- Customized PlantPAx elements that have been selected and approved for use
- Integration of non-PlantPAx elements that have been developed
- Change Management Procedure

This approach of tailoring the PlantPAx standard to fit the SAWS Production Control System is in alignment with the Rockwell best-practices approach of the documented PlantPAx System Implementation and Documentation Strategy shown in the figure below. Execution is accomplished by documentation that captures the deviations and provides a clear and narrow scope. This document provides guideline requirements for the Develop stage of the strategy specific to the SAWS Production Control System.



¹PlantPAxSystem Implementation and Documentation Strategy

Implementation of specific configurations, objects, instructions, or methodologies that are not outlined in this document shall be executed in strict accordance with the guidelines detailed in the applicable PlantPAx documentation listed under the Normative References section of this document.

The intended audience for this document is those who are responsible for control system analysis, engineers or integrators who may be adding to the system or interfacing to the system through a different application in future capital projects, or those who are responsible for making ongoing changes and maintaining or troubleshooting the system.

¹ From PROCES-RM014, Rockwell Automation Library of Process Objects: HMI Instructions (Page 13)

NORMATIVE REFERENCES

The following document references are the established PlantPAx standards used as a baseline for the development and application of this document. This document is complementary to the baseline PlantPAx standard established by Rockwell Automation, and as such, the documents referenced below are essential for the appropriate application of this document.

For information on PlantPAx HMI Standards not explicitly outlined in this document, reference the following for additional requirements:

PlantPAx Library Documentation for Version 4.0

- PROCES-RM002Rockwell Automation Library of Process Objects
- PROCES-RM003Rockwell Automation Library of Logix Diagnostic Objects
- PROCES-RM004Rockwell Automation Library of Steam Table Instructions
- PROCES-RM005Foundation Fieldbus Design Considerations
- PROCES-RM006Rockwell Automation Sequencer Object
- PROCES-RM007PlantPAx Logix Batch and Sequence Manager
- PROCES-RM008PlantPAx Batch Design Considerations
- PROCES-RM010Rockwell Automation Library of Process Objects: HART Modules
- PROCES-RM013Rockwell Automation Library of Process Objects: Logic Instructions
- PROCES-RM014Rockwell Automation Library of Process Objects: HMI Instructions

PlantPAx System Documentation for Version 4.5

- PROCES-RM001PlantPAx Distributed Control System Reference Manual
- PROCES-SG001 PlantPAx Distributed Control System Selection Guide
- PROCES-UM001PlantPAx Distributed Control System Infrastructure Configuration User Manual
- PROCES-UM003PlantPAx Distributed Control System Application Configuration
- PROCES-UM004PlantPAx Distributed Control System Verification and Troubleshooting User Manual
- PROCES-SR027 PlantPAx System Hardware Specifications
- 9258-UM001 PlantPAx Virtualization User Manual

Additional Rockwell Documentation

 Knowledgebase Article 1076498: PlantPAx Process Library 4.x security group setup for FactoryTalk View SE & ME

TERMS AND DEFINITIONS

For this document, the following terms and definitions apply.

ERM /ACRONYM	DEFINITION /DESCRIPTION
Alarm	An audible or visible means of indicating to the operator an equipment malfunction, process deviation, or abnormal condition requiring a timely response.
Alarm Event	Push notification from the alarm object to the alarm subscriber that indicates a change in alarm state.
Alarm Management	The processes and practices for determining, documenting, designing, operating, monitoring, and maintaining alarm systems.
Alarm Object	The alarm system element that owns the alarm; it is responsible for identifying an alarm, managing the state, and generating an alarm event.
Alarm Priority	An attribute of In-Alarm even that informs you of the salience of the event.
Alarm System	The collection of hardware and software that detects alarms, communicates the indication of that state to the operator, and records changes in the alarm state.
AOI	Add-on Instruction
Application Server	The application server (AppServ) is a server on the Process Automation System Server (PASS), which is typically a FactoryTalk Directory client of the PASS.
Architecture	Architecture is a representation of a control and software system, as well as the process and discipline for effectively implementing the designs for such a system.
Characterization	Characterization is the operation and collection of performance data for a representative process system to determine the scalability, stability, and usability of a specific system configuration.
Client	A client is a hardware and software that provides an interface with a link into a system server application.
Control Strategy	System footprint to show the complexity of the data servers, information storage, operator interface, control code, and I/O.
Control System	A system that responds to input signals from the equipment under control or from an operator and generates output signals that cause the equipment under control to operate in the desired manner.
Controllers	Logix Controllers
Decision-makers	Parties identified by SAWS at the current time or based on the project context under which the changes were proposed.
Display (Graphic, Window)	A visual representation of the process and related information used by the operator for monitoring and control.
Display Object	A display object is a functional group of display elements with animations.
Drill-down	A method of navigation in which successive displays show increasing detail for smaller subsets of the system scope.
EWS	Engineering Workstation
Faceplate	A display, part of a display, or pop-up used for monitoring or direct operation of a single control loop, device, sequence, or other entity.
FactoryTalk	FactoryTalk Services Platform is a suite of services including Live Data, Directory, Audit, Security, Activation, and Alarm & Events.
FTD	FactoryTalk Directory software defines where system data is stored for access, and also provides a shared address book of factory resources that are shared among FactoryTalk-enabled products.
Global Object	A collection of display objects that are linked to the Add-On Instructions with a drag and drop wizard. Global objects allow the rapid development of main plant display graphics. An object that can be created once and can be referenced multiple times on multiple displays in an application.
Global Object Parameter	Placeholder used in place of a tag in display objects for dynamic assignment of tags through the use of a parameter file that provides the link between parameters and tags.

Graphic Symbol	A visual representation of a process component, instrument, or condition in a display composed of a combination of simple graphic elements.
Historian	Application to Collect, Manage, and Analyze Data
Historical Data	Data that is used for the long-term analysis of past operations.
НМІ	Human Machine Interface, a collection of hardware and software used by the operator and other users to monitor and interact with the control system and with the process via the control system.
Navigation	A function which supports users in locating desired information in an HMI-based information system, and also in guiding the selection of displays; or the act of selecting a display.
OIT	Operational Interface Terminal
Operator	The primary user of the HMI; the person who monitors and makes changes to the process.
OWS	Operator Workstation
PASS	PlantPAx Automation System Server
PCS	Production Control System
Platform	A particular family of HMI products capable of using a standard toolkit.
PLC	Programmable Logic Controller
Pop-up (Pop-up Display, Overlay)	A display that appears (pops up) in the foreground of the screen, possibly obscuring part or all of the display in the background.
Process Object Library	Predefined library of controller code (Add-On Instructions), display elements (globa objects), and faceplates that let you quickly assemble large applications with prove strategies, rich functionality, and qualified performance.
RSLinx Software	Communication driver (data server) for computer-based programs to access information in Rockwell Automation controllers.
SAWS	San Antonio Water System
SCADA	Supervisory Control and Data Acquisition is a system for monitoring and control of geographically widespread processes. SCADA includes all equipment and functions for acquiring, processing, transmitting, and displaying the necessary process information.
Screen	The part of the HMI client that shows an image.
Script	A code module which performs tasks executed on the HMI platform and usually invoked by some operator action or other control system event.
Scripting	A feature provided by some HMI platforms to allow the execution of scripts.
SE	Site Edition, a specific version of FactoryTalk View software
Server	A software component that serves data to an application (for example, data server
Tag (Point)	The unique identifier assigned to the process measurement, state, calculation, device, or other entity within the HMI or controller.
Toolkit	A collection of custom or pre-defined HMI configuration items that reduces time and effort to produce a control system.
Trending	A feature for displaying real-time or historical data in various chart formats, usually with respect to time.
UDT	User-defined data type, a tag type that you create once and reuse in multiple tag templates, multiple times.
VantagePoint	Analytical Reporting Software
Workstation	A computer running development, configuration, or client software.

1. PLC APPLICATION PROGRAMMING

OVERVIEW

1.1 **APPLICATION**

• This section includes configuration details and programming guidelines that combine to form the SAWS PLC software standard. Specific application programming details, including naming conventions, controller organization, annotation details, programming strategies, and other specific non-PlantPAx methodologies selected for the SAWS standard, are detailed in this section.

1.1.1 REQUIREMENTS FOR DEVIATIONS FROM STANDARD

• Any intended deviation from these standard guidelines shall be discussed with SAWS personnel and approved on a project-by-project basis to ensure methodologies are in alignment with the SAWS vision. This also provides an opportunity for SAWS personnel to consider if updates to the standards document are appropriate based on any approved deviations.

1.1.2 MODIFICATIONS TO LEGACY PLC CODE

The existing PCS and ASR Systems were initially developed using various legacy programming approaches to PLC development. Subsequent additions to these systems are intended to be developed using the SAWS PlantPAx standards detailed in this document. This evolution has produced a hybrid of PlantPAx and legacy PLC applications for the PCS and ASR Systems that have some additional considerations for those making modifications within either of these systems. One of the most important considerations is to address the legacy components appropriately depending on what the scope of the modifications are as defined below (select the appropriate method based on the scope of the project is either a modification or a replacement – replacement defined by the implementation of PlantPAx programming of the site PLC vs. a modification to a site that would leave non-PlantPAx programming in the site PLC):

1.1.2.1 Modification to Existing Legacy Site(s)

• The legacy approach found should be utilized in the development of new components to be added to the existing legacy site components and provide consistency in the site that remains following the modifications. Refer to existing PLC applications for legacy methods utilized in each case.

1.1.2.2 Replacement of Existing Legacy Site(s)

• The standards detailed within this document should be utilized in the development of the replacement site components, and the existing legacy components for the site should be removed entirely following the modifications.

1.2 **APPLICATION ENVIRONMENTS**

- 1.2.1 CONTROL SYSTEMS AND ASSOCIATED PROCESS SYSTEMS
 - The following Control Systems (HMI Systems) are subject to SAWS software standards. The Process Systems associated with each Control System are indicated.
 - 1.2.1.1 PCS Process Control System
 - Water Production System (WPS)
 - Wastewater Collection System (WCS)
 - o Recycled Water System (RWS)
 - Agua Vista Station (AVS)
 - 1.2.1.2 ASR Aquifer Storage and Recovery System
 - o Aquifer Storage and Recovery Water Treatment Plant (ASR)
 - o Desal Brackish Groundwater Desalinization (DSL)
 - 1.2.1.3 CWS Chilled Water System
 - Chilled Water System (CWS)
 - 1.2.1.4 WWTPs (FUTURE) Wastewater Treatment Plants
 - Steven M. Clouse WRC (SMC)
 - Leon Creek WRC (LCK)
 - Medio Creek WRC (MCK)

1.3 NAMING CONVENTIONS

1.3.1 APPLICATION

• Specific naming conventions are detailed in this section.

1.3.1.1 System Applicability

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All Rockwell PLC PlantPAx PLC Programming.	

1.3.2 TAG NAMING (AOI NAMING)

- Use the following tag-name conventions for AOI naming and other required tag naming within the controller, including labels and descriptions.
- The Rockwell Guideline for Tag Names is considered as part of the SAWS Tag Name standard. Tag Name Guidelines from Rockwell are as follows:
 - Only (A-Z or a-z) (0-9) and underscores (_) No other characters are allowed.
 - Connecting underscores are not allowed
- Character-count limitations from Rockwell are as follows:
 - AOI.Cfg_Desc: Description: 40 characters
 - o AOI.Cfg_Label: Label: 20 characters
 - AOI.Cfg_Tag:Tag Name: 40 characters
- 1.3.2.1 General Tag Practices
 - For all IO Mapping Tags, AOI Tags and any Tags with a connection to HMI should all be Uppercase.
 - For internal to the plc tags, it is good practice to mix cases for readability. It is much easier to read Line1_Start than LINE1START or line1start.
 - In addition, the tag database list sorts alphabetically. Therefore, it is best to use similar prefixes when you want tags to reside together in the list.

1.3.2.2 Tag Name Tables and Tag Name Generator

- Reference the latest revision (provided by SAWS) of the SAWS Tag Name Tables and Tag-Name Generator Tool for further details on the element lists and creating tag names.
 - Note that the description is created by the Tag Name Generator in addition to the Tag Name.

1.3.2.3 Tag Name Elements

- The following element types are used to create SAWS Tag Names:
 - AAA_BBB_CCC_DDD_EEE_FN
 - AAA Process System Identifier
 - BBB Site / Process Area Identifier
 - CCC Subsystem Identifier
 - DDD Sequence Number
 - EEE Equipment Identifier
 - FN Function (for single I/O Point AOI types only)

- 1.3.2.4 IO Mapping Tag Name Elements
 - The following element types are used to create SAWS IO Mapping Tag Names:
 - AAA_BBB_CCC_DDD_EEE_FN_GG
 - AAA Process System Identifier
 - BBB Site / Process Area Identifier
 - CCC Subsystem Identifier
 - DDD Sequence Number
 - EEE Edupment Identifier
 - FN Function (for single I/O Point AOI types only)
 - GG I/O Type DI, DO, AI or AO (only used for SAWS IO Mapping AOI's)

1.3.2.5 Tag Descriptions

- o All tags require a description except the following
 - Module-Defined Data Types

1.3.2.6 Tag Name Examples

- 1.3.2.6.1 Single I/O Point AOI Naming (Ex. IO Processing Family AOI)
 - The Tag Name is determined using the convention detailed below.
 - \circ The function element is included for further description of the variable.
 - AAA_BBB_CCC_DDD_EEE_FN
 - The Zarzamora PRM Ground Storage Tank 500 Level AOI name would be:

Tagname: WPS_ZAR_GST_500_LIT_LEVEL AOI.Cfg_Desc: Zarzamora PRM GST 500 Level AOI.Cfg_Label: ZAR GST-500 LEVEL AOI.Cfg_Tag: WPS-ZAR-GST-500-LIT

1.3.2.6.2 Multiple I/O Point AOI Naming (Ex. Motor Family AOI)

- \circ $\;$ The Tag Name is determined using the convention detailed below.
- \circ $\;$ The function is left off, and the parameters within the AOI provide the function detail.
 - AAA_BBB_CCC_DDD_EEE
 - The Zarzamora PRM High Service Pump 101 Motor AOI name would be:

Tagname: WPS_ZAR_HSP_101_PMP AOI.Cfg_Desc: Zarzamora PRM HSP 101 AOI.Cfg_Label: ZAR HSP-101 4.6MGD AOI.Cfg_Tag: WPS-ZAR-HSP-101-PMP

1.3.2.6.3 I/O Point Tags

- The Tag Name is determined using the convention detailed below.
- The function element is included for further description of the variable.
 - AAA_BBB_CCC_DDD_EEE_FN_DI,DO,AI or AO
 - The Zarzamora PRM High Service Pump 101 Motor Run Status:

Tagname: WPS_ZAR_HSP_101_PMP_RUN_DI.Data

1.3.3 FILE NAMING

- Use the following file name conventions for PLC program application files:
 - Main site PLC: [System_SiteID_#]_[Date revision in YYYY_MM_DD_HHMM (CST) format]
 - Vendor PLC: [System_SiteID_PkgSys_FUNCTION#]_[Date revision in YYYY_MM_DD_HHMM (CST) format]
 - The file name examples for the Seale station site and vendor PLC programs saved on Jan 1, 2019, 2:00 pm CST would be:

Main site PLC format: AAA_BBB_#_YYYY_MM_DD_HHMM Main site PLC 1: WPS_SEL_1_2019_01_01_1400 Main site PLC 2: WPS_SEL_2_2019_01_01_1400

Vendor PLC format: AAA_BBB_PkgSys_FUNCTION#_YYYY_MM_DD_HHMM Vendor PLC A: WPS_SEL_PkgSys_OSG1_2019_01_01_1400 Vendor PLC B: WPS_SEL_PkgSys_ODOR1_2019_01_01_1400

- 1.3.4 CONTROLLER NAMING AND DESCRIPTION
 - 1.3.4.1 Controller Name
 - Use the following controller name conventions for PLC CPU:
 - Main site PLC: [System_SiteID_#]
 - Vendor PLC: [System_SiteID_PkgSys_FUNCTION#]
 - The controller names for the Seale station site and vendor PLCs would be:

Main site PLC format: AAA_BBB_# Main site PLC 1: WPS_SEL_1 Main site PLC 2: WPS_SEL_2 Main site PLC for Chemical: WPS_SEL_CHEM

Vendor PLC format: AAA_BBB__PkgSys_FUNCTION# Vendor PLC A: WPS_SEL_PkgSys_OSG1 Vendor PLC B: WPS_SEL_PkgSys_ODOR1

1.3.4.2 Controller Description

- Use the following controller description convention:
 - [IP: www.xxx.yyy.zzz]
 - The controller description for Seale station with IP of 10.11.12.13 would be:

IP: 10.11.12.13

1.3.5 MODULE NAMING

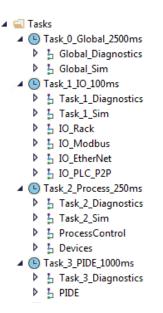
- Use the following module name convention for each PLC module:
 - [Local Panel OR Remote Panel #]_R[Rack Number]_S[Slot Number]
 - The analog input module name in rack 1 slot 2 of the Seale station LCP would be the first example below:

Local_R01_S02 Local_R02_S02 Remote1_R01_S02 Remote1_R02_S02 Remote2_R01_S02

- 1.3.6 PROGRAM, TASK, ROUTINE, AND SHEET NAMING
 - 1.3.6.1 Task Name
 - See Task Configuration section under Program Configuration Guidelines for the type of programs that are appropriate for each task execution speed):
 - Use the following naming conventions for Tasks:
 - Task__0_Global_2500ms
 - Task_1_IO_100ms
 - Task_2_Process_250ms
 - Task_3_PIDE_1000ms

1.3.6.2 Program Name

- Use the following naming conventions for Programs:
 - Program names should be concise yet indicative of the type of AOI object routines contained within each.
 - Some examples are shown below and organized by Task (note that this is not inclusive of each Program needed and should be used a guideline):



1.3.6.3 Routine Name (LLD & FBD)

- Use the following naming conventions for Routines:
 - Routine names should be concise yet indicative of the AOI object contained within each routine.
 - Some examples are shown below organized by Program (note this is not inclusive of every Routine needed and should be used a guideline):
 - Global_Diagnostics
 - Parameters and Local Tags
 - a MainRoutine
 - 📙 L_CPU
 - 📙 L_TaskMon
 - System_TimeKeeper
 - A L IO_Rack
 - Parameters and Local Tags
 - A MainRoutine
 - 80 R01_S01_DI
 - 801_S02_DO
 - 1 R01_S03_AI
 - R01_S04_AO
 - 🔺 🔓 Devices
 - Parameters and Local Tags
 - A MainRoutine
 - AAA_BBB_EST_500_LIT_LEVEL
 - BO AAA_BBB_HSP_101_PMP
 - AAA_BBB_RTU_001_XXX_ACPRFAIL

1.3.6.4 Sheet Name (FBD)

- Use the following naming conventions for Sheets:
 - Sheet Names should be standardized based on the primary type of AOI object in the routine.
 - Only if importing from Process Strategies then sheet names will have default values. And no need to modify sheet names is necessary.
 - Some examples are shown below organized by Routine (note this is not inclusive of every Sheet needed and should be used a guideline):

AAA_BBB_RTU_001_XXX_ACPRFAIL Sheet 1: P_DIn AAA_BBB_HSP_101_PMP Sheet 1: PS_Motor Sheet 2: Permissives Sheet 3: Interlocks Sheet 4: IO Fault

1.4 **ANNOTATION REQUIREMENTS**

1.4.1 APPLICATION

• Specific annotation requirements are detailed in this section.

1.4.1.1 System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All Rockwell PLC PlantPAx PLC Programming.	

1.4.2 ROUTINE LOGIC ANNOTATION

• Comments should be reserved for Process Control or Complex PLC code. They should identify the purpose of the code in detail so that others who need to troubleshoot or modify the PLC program logic can interpret the code's function easily.

1.5 **PROGRAMMING LANGUAGES**

1.5.1 APPLICATION

• The following lists the Rockwell Software programming languages and their applicability to the SAWS PLC software standard.

1.5.1.1 System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All Rockwell PLC PlantPAx PLC Programming.	

1.5.2 PRE-APPROVED AND PREFERRED

- Function Block Diagram (FBD)
 - FBD is the preferred PLC programming language by SAWS and is approved for use
- Ladder Logic Diagram (LLD)
 - LLD is approved for the following routines:
 - Main Routines (JSRs)
 - Diagnostics
 - o Any other use of LLD requires specific approval (see below)

1.5.3 REQUIRE SPECIFIC APPROVAL

- Ladder Logic Diagram (LLD)
 - It is acknowledged that certain types of PLC programming tasks can be accomplished more effectively with LLD vs. FDB. Any requests for using LLD over FDB, for this reason, must be presented to and approved by SAWS on a case-by-case basis, except for Routines listed under Ladder Logic Diagram (LLD) above.

1.5.4 NOT PRE-APPROVED FOR USE

- Sequential Function Chart (SFC)
- Structured Text (ST)
- Instruction List (IL)
 - Use requires acceptance based on individual specific usage or process control strategy. Provide submittal to SAWS for approval on a case-by-case basis.

1.6 **PROGRAMMING CONFIGURATION GUIDELINES**

1.6.1 APPLICATION

• Various program configuration guidelines are detailed in this section, including examples of specific routines.

1.6.1.1 System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All Rockwell PLC Programming.	

1.6.2 SOFTWARE VERSIONS

All PLC Programming created for SAWS utilizing the PlantPAx standard shall be developed using:

 Rockwell Studio 5000 Logix Designer (request version from SAWS).

1.6.3 PLC TIME

• The time in the PLC should be set to central standard time (CST) and uncheck the time sync setting.

1.6.4 TASK CONFIGURATION

- Task execution speed should be set to match the task name indication for each of the 4 tasks configured, as shown in the table below.
- The Global_Diagnostics task should have a 2s execution time.
- The table shows the types of programs for each task type based on the appropriate execution speed along with the Priority (note that multiple tasks should not be configured with the same priority value):

Task	Priority	Program Type(s)
Task_0_GlobalDiagnostics_2500ms	4	Global Diagnostics
Task_1_IO_100ms	2	IO_Mapping (Rack, Modbus, EtherNet, PLC-P2P)
Task_2_Process_250ms	1	Device Objects (AOIs ex. P_Motor, P_AIn, Etc.)
		Process Control
Task_3_PIDE_1000ms	3	PIDE Logic

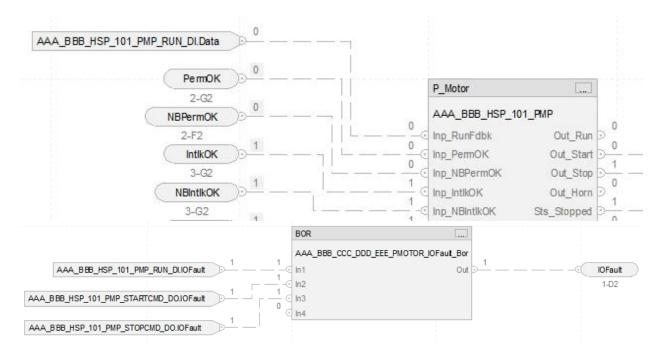
1.6.5 IO MAPPING

- The IO Mapping routine is used to map the physical IO to the AOI parameters within the Objects.
- Rack IO Mapping is accomplished with AOI's and corresponding IO UDT's.
- The AOI's are specific to analog card types and generic for digital cards. The following AOI's are supplied by SAWS:
 - SAWS_IO_Mapping_AI_1769_IF8
 - (AOI scales the inputs 0-20000 to 0.0-20.0)
 - SAWS_IO_Mapping_AO_1769_OF8C
 - (AOI scales the outputs 0.0-20.0 to 0-20000)
 - SAWS_IO_Mapping_DI_00_15
 - SAWS_IO_Mapping_DI_16_31
 - SAWS_IO_Mapping_DO_00_15
 - $\circ \quad SAWS_IO_Mapping_DO_16_31$
- All IO datatype are UDT's. These UDT's contain a "data" member and an "IOFault" member. The AOI maps the card Data and IOFault to or from each UDT. The following AOI's are supplied by SAWS:
 - SAWS_IO_Point_Analog (Inputs and Outputs)
 - MEMBER: Data (REAL)
 - MEMBER: IOFault (BOOL)
 - SAWS_IO_Point_Digital (Inputs and Outputs)
 - MEMBER: Data (BOOL)
 - MEMBER: IOFault (BOOL)
- All IO Mapping routines must contain a P_DIn for card failures or comm failures.
- All module IO points, including spares, should be included in the mapping routines for ease of modification and interpretation of spare IO.
- Alias tags shall not be used.
- The routines should be separated by rack/slot, MCC bucket, Modbus device, etc.
 - The examples on the following pages show Rack IO Mapping routines for both Analog and Digital IO.

1.6.5.1 Digital Inputs Example Mapping:

A	В	С	D		E	F	G
	SAWS IO Mapping DI 00 15						
			SAWS_IO_Mapping_DI	16_31			
	IO_Local_R01_S01_DI_00_15						P_Din
	Inp_Data Local 1		IO_Local_R01_S01_DI_	2017)			AAA_BBB_PLC_001_XXX_S01FAIL
0	Inp_Module Local_R0	- 1	Inp_Data	Lo cal:1:I.Data		1	
IOFault_Disable	0	OFault 0	Inp_IOFault	Sts_IOFault		0	Inp_PV Sts
m.IO_Pulse_Off	0	s_Sim 0		Sts_Sim 🦻			Inp_IOFault Sts_PV
m.IO_Pulse_On	0	nLocal D	Cfg_SimLocal	000 000 FFF FN DI		1	Inp_Target Sts_Err
	C fg_SimLocal Udt Ch00 AAA BBB CCC DDD EEE		0	Sts Ch16 D			⊙ Inp_Gate
		Ch00 D	Cfg_Ch16_Inv Udt_Ch17	IO_Spare_DI			
	Ud_Ch01 AAA_BBB_PLC_001_XXX_ACPRF			Sts_Ch17 D			
		Ch01 D 0	Udt Ch18	IO Spare DI			
	Udt Ch02 AAA BEB HSP 101 PMP E		0 ⊂ Cfg_Ch18_Inv	Sts_Ch18 >			
		Ch02 D	Udt Ch19	IO Spare DI			
	Lidt Ch03 AAA BEB HSP 101 PMP E		0 ⊙ Cfg Ch19 Inv	Sts Ch19			
		Ch03 🖸	Udt_Ch20	IO_Spare_DI			
	Udt_ch04 AAA_BBB_HSP_101_PMP_MANC		0 Cfg Ch20 Inv	Sts Ch20 D			
		Ch04 D	Udt_Ch21	IO_Spare_DI			
	Udt Ch05 AAA BBB HSP 101 PMP MCCS		0 ⊙ Cfg Ch21 Inv	Sts Ch21 D			
		Ch05 D 0	Udt Ch22	IO Spare DI			
	Udt Ch06 IO So	are DI	0 Cfg Ch22 Inv	Sts Ch22 D			
		Ch06 D	Udt Ch23	IO_Spare_DI			
	11dt Ch07 ID So	are DI	0 ⊂ Cfg Ch23 Inv	Sts Ch23 D			
		Ch07 D	Udt Ch24	IO Spare DI			
	Udt Ch08 IO Sp	are DI	0 Cfg_Ch24_Inv	Sts_Ch24 D			
		Ch08 0	Udt Ch25	IO Spare DI			
	Udt_Ch09 IO_Sp	are DI	Cfg_Ch25_Inv	Sts_Ch25 D			
	0 Cfg_Ch09_Inv Sts	Ch09 D	Udt_Ch26	IO_Spare_DI			
	Udt Ch10 IO Sp	are DI	0 ⊂ Cfg_Ch26_Inv	Sts_Ch26 D			
		Ch10 0	Udt_Ch27	IO_Spare_DI			
	Udt_Ch11 IO_Sp	are_DI	0 Cfg_Ch27_Inv	Sts_Ch27 D			
	Cfg_Ch11_Inv Sts	_Ch11 D 0	0 Udt_Ch28	IO_Spare_DI			
	Udt_Ch12 IO_Sp	are_DI	Cfg_Ch28_Inv	Sts_Ch28 D			
	Ctg_Ch12_Inv Sts	_Ch12 D	0 Udt_Ch29	IO_Spare_DI			
	0 Udt_Ch13 IO_Sp	are_DI	Cfg_Ch29_Inv	Sts_Ch29 3			
	© Cfg_Ch13_Inv Sts	_Ch13 🖸 👘 🔤	0 Udt_Ch30	IO_Spare_DI			
	0 Udt_Ch14 I0_Sp	are_DI	Cfg_Ch30_Inv	Sts_Ch30 D			
	Cfg_Ch14_Inv Sts	_Ch14 D	0 Udt_Ch31	IO_Spare_DI			
		ch15 D	€ Cfg_Ch31_Inv	Sts_Ch31 ≥			

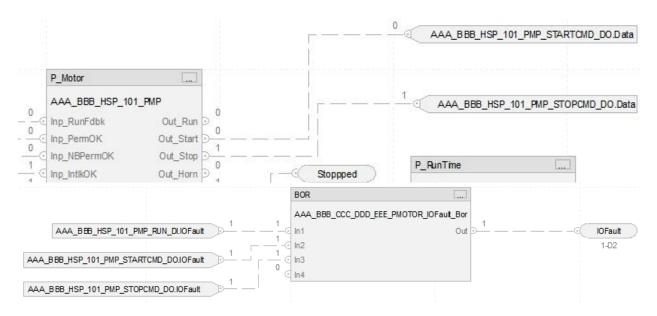
1.6.5.2 Digital Input Example Usage:



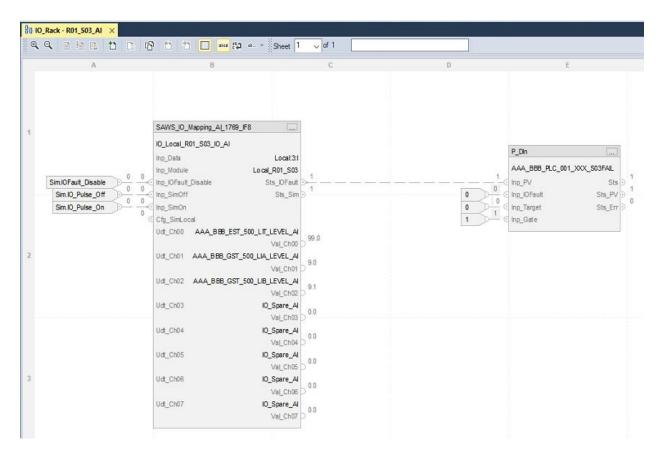
1.6.5.3 Digital Outputs Example Mapping:

A	В	C		D	E	F	G
	SAWS_IO_Mapping_DO	0_00_15					
	IO_Local_R01_S02_DC		SAWS_IO_Mapping	g_DO_16_31			
	Out Data	Local 2:0.Data	IO_Local_R01_S02	2_D0_16_31			P_Din
	Inp_Module	Lo cal_R01_S02	Out_Data	Lo cat 2:0.Da ta			AAA_BBB_PLC_001_XXX_S02FA
IOFault_Disable	Inp_IOFault_Disable	Sts_IOFault		Sts_IOFault			Inp_PV
m.IO_Pulse_Off	O Inp_SimOff	Sts_Sim D		Sts_Sim 🕤		0	Inp_IOFault Sts_
m.IO_Pulse_On	Inp_SimOn		Udt_Ch16 AAA_	BBB_CCC_DDD_EEE_FN_DO		0 1	Inp_Target Sts_
	Udt_Ch00 A	AA_BBB_CCC_DDD_EEE_FN_DO		Sts_Ch16 D		1	Inp_Gate
		Sts_Ch00 D	Udt_Ch17	IO_Spare_DO)		
	Udt_Ch01 AAA_BBB	LHSP_101_PMP_STARTCMD_D0		Sts_Ch17 D			
		Sts_Ch01 🖸	Udt_Ch18	IO_Spare_DO)		
	Udt_Ch02 AAA_BE	B_HSP_101_PMP_STOPCMD_DO	11.8.0140	Sts_Ch18 D			
	Udt Ch03 AAA BE	Sts_Ch02 D	Udt_Ch19	IO_Spare_DO Sts Ch19 >)		
	UU_CIUS AAAA_DE	Sts_Ch03 D	Udt Ch20	IO_Spare_DO			
	Udt_Ch04	IO_Spare_DO	our_oneo	Sts_Ch20 D)		
	ou_oner	Sts_Ch04 D	Udt_Ch21	IO Spare DO			
	Udt_Ch05	IO Spare DO		Sts_Ch21 D)		
		Sts_Ch05 D	Udt_Ch22	IO_Spare_DO			
	Udt_Ch06	IO_Spare_DO		Sts_Ch22 3)		
		Sts_Ch06 D	Udt_Ch23	IO_Spare_DO			
	Udt_Ch07	IO_Spare_DO		Sts_Ch23)		
		Sts_Ch07 D	Udt_Ch24	IO_Spare_DO	1		
	Udt_Ch08	IO_Spare_DO		Sts_Ch24 D			
		Sts_Ch08	Udt_Ch25	IO_Spare_DO)		
	Udt_Ch09	IO_Spare_DO		Sts_Ch25 🕤			
		Sts_Ch09 D	Udt_Ch26	IO_Spare_DO)		
	Udt_Ch10	IO_Spare_DO		Sts_Ch26 D			
	Udt_Ch11	Sts_Ch10 D	Udt_Ch27	IO_Spare_DO Sts_Ch27 >)		
	ou_cm	Sts_Ch11 D	Udt Ch28	IO_Spare_DO			
	Udt_Ch12	ID Spare DO	our_circo	Sts_Ch28 D)		
	ou_onz	5_0pti10_00 0 Sts_Ch12 ⊃	Udt_Ch29	IO Spare DO			
	Udt_Ch13	IO Spare DO		Sts_Ch29 D)		
		Sts_Ch 13 D	Udt_Ch30	IO Spare DO			
	Udt_Ch14	IO_Spare_DO		Sts_Ch30 3)		
		Sts_Ch14 D	Udt_Ch31	IO_Spare_DO			
	Udt_Ch15	IO_Spare_DO		Sts_Ch31 D			

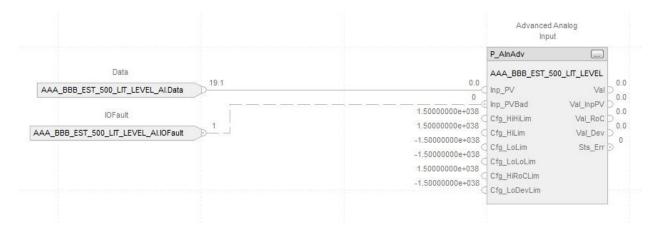
1.6.5.4 Digital Output Example Usage:



1.6.5.5 Analog Inputs Example Mapping:



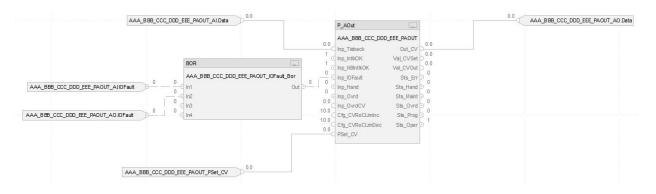
1.6.5.6 Analog Input Example Usage:



1.6.5.7 Analog Outputs Example:

80 K	0_Rack - R01_S04_A0 ×							
Ð,	Q D D R D R 6	1 🔁 🞦 🛄 👪 🔁	•b * Sheet 1	√ of 1				
	A	В		С	D	E		
1		SAWS_IO_Mapping_AO_1769_	OF8C					
		IO_Local_R01_S04_IO_AO				P_Din		
		Out_Data	Local:4:0					
		Inp_Module	Lo cal_R01_S04	1	4	AAA_BBB_PLC_001_)	OCX_S04FAIL	
	SimIOFault_Disable	Inp_IOFault_Disable	Sts_IOFault 3	>- <u>'</u>		E Inp_PV	Sts 🖯	
	Sim.IO_Pulse_Off	Inp_SimOff	Sts_Sim	>	0 0	Inp_IOFault	Sts_PV ∋ 0	
	Sim.IO_Pulse_On	Inp_SimOn			0	C Inp_Target	Sts_Err D	
		Udt_Ch00 AAA_BBB_CCC	DDD_EEE_FN_AO	2.3	1	E Inp_Gate		
			Val_Ch00	23				
2		Udt_Ch01	IO_Spare_AO	0.0				
			Val_Ch01	0.0				
		Udt_Ch02	IO_Spare_AO	0.0				
			Val_Ch02	> 0.0				
		Udt_Ch03	IO_Spare_A0					
			Val_Ch03	0.0				
		Udt_Ch04	IO_Spare_AO					
			Val_Ch04	0.0				
		Udt_Ch05	IO_Spare_A0					
			Val_Ch05	0.0				
3		Udt_Ch06	IO_Spare_AO					
			Val_Ch06	0.0				
		Udt_Ch07	IO_Spare_AO					
			Val_Ch07	0.0				

1.6.5.8 Analog Output Example Usage:

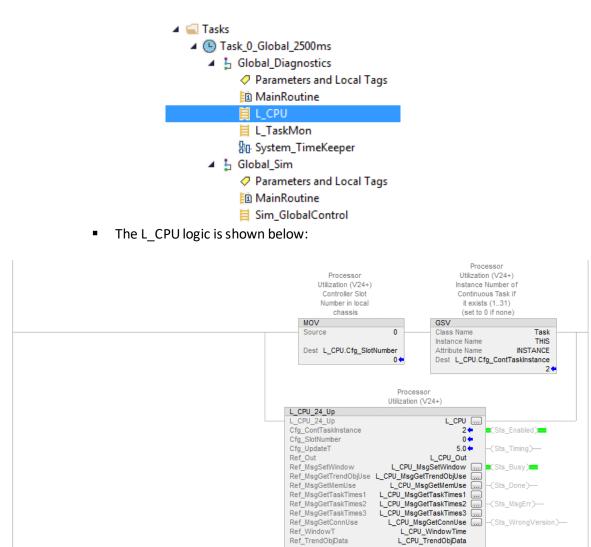


1.6.6 GLOBAL DIAGNOSTICS

• The following Global Diagnostic routines need to be included in each PLC program (in addition to the MainRoutine).

1.6.6.1 *L_CPU Routine*

- The L_CPU routine from Rockwell is used to monitor the PLC.
- This routine can be retrieved from the PlantPAx library.
 - The L_CPU routine is in the Global_Diagnostics task, as shown below and contains the L_CPU AOI:



Ref_MemUseData Ref_TaskTimeData

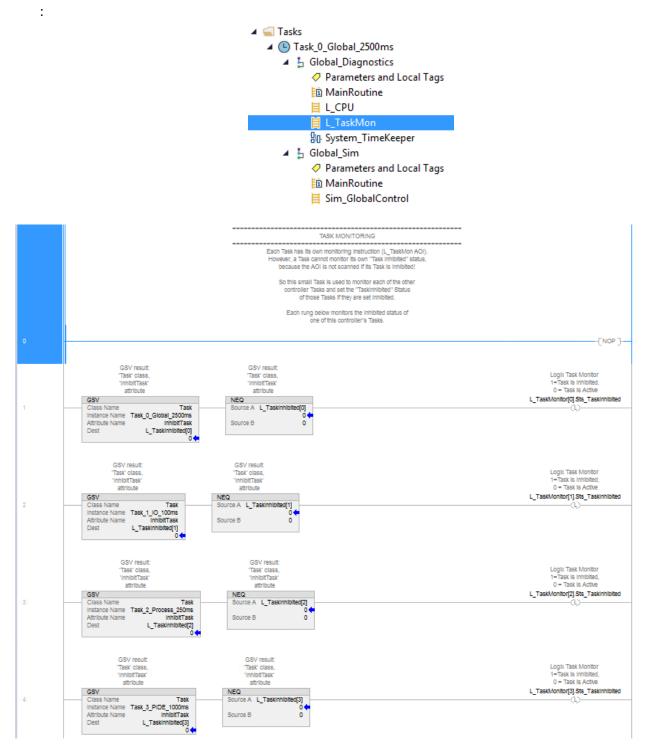
Ref_ConnData

L_CPU_MemUseData L_CPU_TaskTimeData

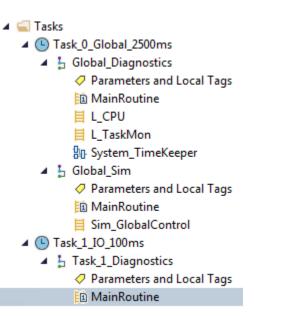
L_CPU_PortCapyData

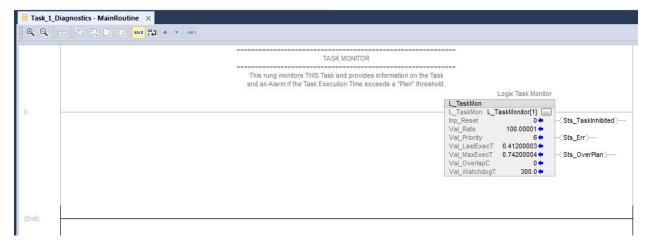
1.6.6.2 *L_TaskMon Routine*

- The L_TaskMon routine from Rockwell is used to monitor tasks.
- There are 2 types of routines for L_TaskMon:
 - A global routine that monitors each of the individual task routines' inhibited status is in a routine labeled 'L_TaskMon' under Task_Diagnostics, as shown below:



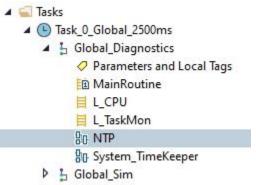
 And an individual routine included in each of the 3 tasks (Task_100ms, Task_250ms, Task_1s) and labeled 'MainRoutine'. These contains the L_TaskMon AOI and is shown in the example below:





1.6.6.3 NTP Routine

- The NTP Routine should be imported at a preconfigured routine, not just the AOI.
- The NTP routine contains the following:
 - SAWS_Dual_NTP_SVR_Sync AOI
 - This is a custom SAWS AOI designed to periodically synchronize the processor clock with one of two the SAWS OPS domain time servers.
- This routine should be imported into the Global_Diagnostics Program in the Task_0_Global_2500ms Task.

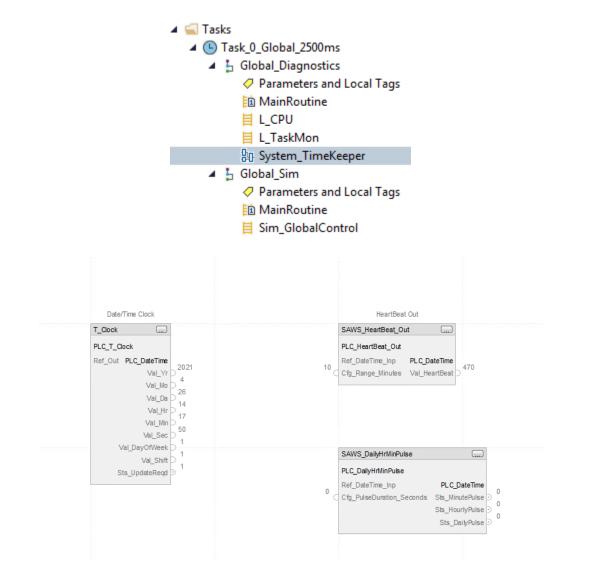


- o The addition of a JSR in the MainRoutine will be required for it to function.
- The function block logic for the NTP routine is shown in the example below:
- o The Block should be configured to run an update once every 24 hours.
- The Enet_Port_Slot_Number is the slot number for the card containing the appropriate Ethernet port. Typically, the processor in Slot 0.



1.6.6.4 System_TimeKeeper Routine

- The System_TimeKeeper routine contains the following:
 - PLC_T_Clock
 - This is a standard Rockwell AOI used to provide current date/time in separate tags for each time/date element (day, week, minute, etc.)
 - Heartbeat_Out
 - Generates a heartbeat for the local PLC for use by other PLC's and to monitor from SCADA (the reference input is from PLC_T_Clock).
 - DailyHrMinPulse
 - Used for totalizing or other logic depending on this type of pulse (the reference input is from PLC_T_Clock).
- The function block logic for the System_TimeKeeper is shown in the example below:



1.6.7 HEARTBEAT_MONITOR ROUTINE

- The HeartBeat_Monitor routine contains the following:
 - HeartBeat_Monitor
 - Monitors heartbeat from another plc through SCADA (the reference input is from PLC_T_Clock therefore System_TimeKeeper must also be utilitized).
 - Task_1_IO_100ms
 - Task_1_Diagnostics
 - Task_1_Sim
 - IO_Rack
 - IO_Modbus
 - IO_EtherNet
 - A 10_PLC_P2P
 - Parameters and Local Tags
 - MainRoutine
 - BD HeartBeat_Monitor

AAA_BBB_BBB_RTU_NNN_HB	IN	
Ref_Inp	PLC_DateTime	
Inp_HeartBeat	Sts_Faulted 🕞	0
Cfg_HeartBeat_UnitsSelector	Val Time Remaining D	4.985
Cfg_HeartBeat_Timeout	Val_Last_Fault_TimeStamp_Yr	2021
	Val_Last_Fault_TimeStamp_Mo D	26
	Val_Last_Fault_TimeStamp_Da	14
	Val_Last_Fault_TimeStamp_Hr	5
	Val_Last_Fault_TimeStamp_Min	3
	Val_Last_Faut_TimeStamp_Sec	2

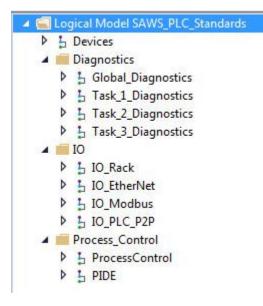
1.6.8 GLOBAL SIM

- The following Global SIM routine needs to be included in each PLC program (in addition to the MainRoutine).
- 1.6.8.1 Sim_GlobalControl
 - This routine is used for global simulation control(s). The outputs from this routine can be used in IO and for enabling and disabling simulation in PlantPAx AOI's.
 - These outputs can also be used for custom process-specific simulation logic.
 - The logic in this routine is shown in the example below:

0	
Č.	For ongoing simulation, place an AFI instruction between FirstScan and Initialize. This will allow the simulation states to remain during RUN=Program-RUN transitions while allowing the AFI to be caught during logic verification.
1	S:FS Sim.FirstScan Sim.htialize
2	Simiuate IO Fault Disable Control Sim.Initialize Sim.IOFault_Disable
2	
	Simluate IO Control
3	Sim Initialize Sim D_Enable
	Sim.FirstScan Sim.IO_Enable Sim.IO_ONS_Off Sim.IO_Pulse_Off
	Sim.I0_Enable Sim.I0_ONS_On Sim.I0_Pulse_On
	Simluate Device Control
4	Sim.htialize Sim.Devices_Enable
	Sim FirstScan Sim.Devices_Enable Sim.Devices_ONS_Off Sim.Devices_Pulse_Off
	Sim.Devices_Enable Sim.Devices_ONS_On Sim.Devices_Pulse_On
(End)	

1.6.10 LOGICAL ORGANIZER LAYOUT

- The Logical Organizer layout should be organized per the example below. As shown, the Programs have been categorized under each of the 4 folders (Devices, Diagnostics, IO, and Process_Control) that make up the Logical Organizer.
 - Example showing Logical Organizer from Standards PLC Program:



1.6.11 I/O CONFIGURATION

All Modules shall have "Major Fault On Controller if Connection Fails While in Run Mode" UNCHECKED.

1.6.12 LIFT STATION HOA FIELD SWITCH INDICATOR

- The field switch indicator object provides the current position details of two field switches found in the WCS stations related to the control source of the motors.
- The two switch positions are LAUTO and LHAND and are used to select the control source for the motor.

1.6.12.1	System	Applicability
----------	--------	---------------

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	WCS	All Motor Objects that have the associated Field HOA	
			feedback.	

1.6.12.2 PLC Tags

- Two tags need to be created in the PLC to hold the status of the switch positions that are displayed on the HMI. Each goes to separate P_Din's for separate Alarming.
 - Tag names (Example): WCS_HTR_LSP_101_PMP_LAUTO

WCS_HTR_LSP_101_PMP_LHAND

Data Type: P_Din

1.6.12.3 HMI Elements

• See HMI Standards for details on Display Elements

1.7 PLC SECURITY

1.7.1 APPLICATION

- The integrator shall not configure or utilize any PLC security features.
- SAWS personnel handle all PLC security configuration.
- Any questions or requests related to PLC security should be directed to SAWS personnel.

1.7.1.1 System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All Rockwell PLC PlantPAx PLC Programming.	

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2. ALARMS

2.1 **Overview**

- 2.1.1 APPLICATION
 - Refer to HMI Software Standards for information on Alarm & Event configuration requirements and other alarming details.

2.1.1.1 System Applicability

Applies	HMI	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All Rockwell PLC PlantPAx PLC Programming.	

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3. NON-PLANTPAX PLC OBJECTS

3.1 **Overview**

3.2 APPLICATION

• These objects provide additional status and functionality required by SAWS in addition to what was available in the PlantPAx libraries.

3.3 STATUS INDICATORS

- 3.3.1 SERVICE STATUS.
 - The service status object holds the current service status of each motor with either an 'In Service' or 'Out of Service' state displayed on the HMI.

3.3.1.1 *System Applicability*

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS		A PlantPAx Object that contains out of service functionality. Only Objects that have control contain out of service functionality, and the functionality is the same for all of them.	

3.3.1.2 PLC Tags

- A tag needs to be created in the PLC to hold the Out-of-Service message displayed on the HMI as well as the out of service status. This status is independent from the PlantPAx Out of Server status.
 - Tag names (Example): WPS_SEL_HSP_101_PMP_OOSMSG WPS_SEL_HSP_101_DSV_OOSMSG
 - Data Type: STRING
 - Tag names (Example): WPS_SEL_HSP_101_PMP_OOSCMD WPS_SEL_HSP_101_DSV_OOSCMD
 - Data Type: BOOL

3.3.1.3 HMI Elements

o See HMI Standards for details on Display Elements

3.3.2 FIELD HOA SWITCH INDICATOR

- The field switch indicator object provides the current position details of two field switches found in the WPS and RWS stations related to the control source of the motors.
- The two switches are SCP / MCC and COM / MAN and are used to select the control source for the motor.

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	WPS	All Motor Objects that have the associated Field HOA feedback.	
		RWS	All Motor Objects that have the associated Field HOA feedback.	

3.3.2.1 System Applicability

3.3.2.2 PLC Tags

- $\circ~$ Two tags need to be created in the PLC to hold the status of the switch positions that are displayed on the HMI.
 - Tag names (Example): WPS_SEL_HSP_101_PMP_MANCOM

WPS_SEL_HSP_101_PMP_MCCSCP

Data Type: SAWS_IO_Point_Digital

3.3.2.3 HMI Elements

o See HMI Standards for details on Display Elements

3.3.3 LEAD/LAG STATUS INDICATOR

• The lead/lag status object indicates the current position of motors in a lead-lag control strategy, which is shown on the HMI for each motor.

3.3.3.1 System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All Motor Objects part of Lead/Lag control sequence.	

3.3.3.2 PLC Tags

- A tag needs to be created for each pump in the sequence to hold the pumps' current priority for display on the HMI as well as a string array to hold the state text.
 - Tagname (Example): AAA_BBB_HSP_101_PMP_PRIORITY
 - Data Type: DINT
 - Tagname (Example): AAA_BBB_HSP_101_PMP_PriMsg[10]
 - Data Type: STRING[10]
 - NOTE: The value of zero (0) for the DINT tag is reserved for the "Unavailable" status. The HMI graphics have a black background and yellow text for this state.
 - The mapping example below shows the tag value with the corresponding priority status to be displayed on the HMI:

Value of DINT	Status Text
0 (This state reserved for "Unavailable" state)	AAA_BBB_HSP_101_PMP_PriMsg[0]
	AAA_BBB_HSP_101_PMP_PriMsg[1]
2	AAA_BBB_HSP_101_PMP_PriMsg[2]
9	AAA_BBB_HSP_101_PMP_PriMsg[9]

Тад	Example Values	Example Values	Example Values
AAA_BBB_HSP_101_PMP_PriMsg[0]	Unavailable	Unavailable	Unavailable
AAA_BBB_HSP_101_PMP_PriMsg[1]	Lead	Lead	Duty
AAA_BBB_HSP_101_PMP_PriMsg[2]	Lag1	Lag1	Standby
AAA_BBB_HSP_101_PMP_PriMsg[3]	Lag2	Standby	
AAA_BBB_HSP_101_PMP_PriMsg[4]	Standby		
AAA_BBB_HSP_101_PMP_PriMsg[9]	Lag8		

3.3.3.3 HMI Elements

o See HMI Standards for details on Display Elements

3.3.4 LOCAL ANALOG OUTPUT SCALING (NON-HMI RELATED LOCAL ANALOG OUTPUTS)

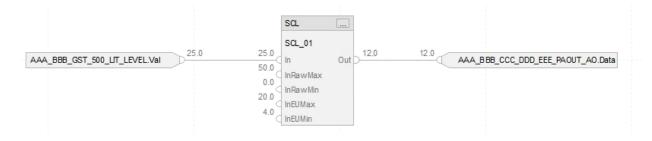
- There are instances where a local display needs to be driven from a PLC analog output, either from another analog input or from another derived source in the PLC.
- These instances should be identified by whether the HMI will need a PlantPAx object connection and limited to those outputs that are not related to an HMI need.

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS		A PlantPAx Object that contains out of service functionality. Only Objects that have control contain out of service functionality, and the functionality is the same for all of them.	V

3.3.4.1.1 System Applicability

3.3.4.2 *PLC Instruction*

• Utilize the SCL instruction to scale analog output values from the designated source analog as shown in the example below.



- 3.3.4.3 HMI Elements
 - o None by design

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4. PLANTPAX PROCESS OBJECTS

4.0 **Overview**

4.0.1 APPLICATION

- These objects are from the PlantPAx libraries. Any customizations that have been made to these objects are indicated for each approved PLC object. Objects that are not yet approved or applicable to any SAWS Systems are provided as placeholders for future expansion of these standards (these are indicated by strikethrough light gray text to provide clarity; the TOC also indicates these topics in strikethrough text for additional ease of identification).
- Cfg_*AckReqd is required to be 1 for every alarm.

4.0.2 REQUIRED FILES

• See individual Process Object sections below for required Controller Files (.L5X).

4.1 I/O PROCESSING FAMILY

4.1.1 PURPOSE

- The Process Objects in this group provide analog and discrete input/output signal processing. Pressure/temperature compensated flow calculations, and cylindrical tank level interpolations are also provided.
- 4.1.2 BASIC ANALOG INPUT (P_AIN)

4.1.3 ADVANCED ANALOG INPUT (P_AICHAN)

- The P_AIChan Add-On Instruction monitors one analog input channel for various conditions.
 - This instruction is usually associated with other instructions, with one instance being used for each analog input of the associated instruction.
 - \circ $\;$ This instruction can be integrated with the following instructions:
 - Basic Analog Input (P_AIn)
 - Advanced Analog Input (P_AInAdv)
 - Dual Sensor Analog Input (P_AInDual)
 - Multiple Analog Input (P_AInMulti)
 - Dosing (P_Dose)

4.1.3.1 System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
V	PCS		Used for applicable IO. If scaling the analog value is the basis for selecting this AOI, use the SCP instruction in the IO_Mapping routine instead for analog inputs that do not come as milliamp REALS from the IO Module.	

4.1.3.2 *Required Files*

- Controller File: P_AInChan_4.00.00_AOI.L5X
- 4.1.3.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.3.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.3.5 Operations, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 26) for additional details.

4.1.3.6 *Programming Example*

- Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 27) for additional details.
- 4.1.3.7 *HMI Elements*
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.1.4 ADVANCED ANALOG INPUT (P_AINADV)

• The P_AInAdv (Advanced Analog Input) Add-On Instruction monitors one analog value, typically from an Analog Input I/O module.

4.1.4.1 System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Standard used for applicable IO.	

4.1.4.2 Required Files

- Controller File: P_AInAdv_4.00.00_AOI.L5X
- 4.1.4.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.4.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.4.5 Operations, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 31) for additional details.

4.1.4.6 *Programming Example*

- Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 32) for additional details.
- 4.1.4.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.1.5 DUAL SENSOR ANALOG INPUT (P_AINDUAL)

• The P_AInDual (Dual Analog Input) Add-On Instruction monitors one analog Process Variable (PV) by using two analog input signals (dual sensors, dual transmitters, and dual-input channels).

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used when needed for applicable IO. Follow P_AinAdv requirements.	

4.1.5.1 System Applicability

4.1.5.2 *Required Files*

- Controller File: P_AInDual_4.00.00_AOI.L5X
- 4.1.5.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.5.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.5.5 Operations, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 35) for additional details.
- 4.1.5.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 36) for additional details.
- 4.1.5.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.1.6 MULTIPLE ANALOG INPUT (P_AINMULTI)

• The P_AInMulti (Multiple Analog Input) Add-On Instruction monitors one analog process variable (PV) by using up to eight analog input signals (sensors, transmitters, input channels).

Applies	Control Systems		Application/Scope	SAWS Std
	PCS	ALL	Used when needed for applicable IO. Follow P_AinAdv requirements.	

4.1.6.1 *System Applicability*

4.1.6.2 *Required Files*

- Controller File: P_AInMulti_4.00.00_AOI.L5X
- 4.1.6.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.6.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.6.5 Operations, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 39) for additional details.
- 4.1.6.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 40) for additional details.
- 4.1.6.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.1.7 DISCRETE INPUT (P_DIN)

• The P_DIn (Discrete Input) Add-On Instruction is used to receive and process a single discrete condition (the Process Variable or PV), typically for a channel of a discrete input card. It can be used with any discrete (BOOL) signal.

4.1.7.1 System Applicability

 Control Systems	Application/Scope	SAWS Std
PCS	Only used for discrete inputs that are alarmed. Do not use it for status only.	

4.1.7.2 Required Files

- Controller File: P_DIn_4.00.00_AOI.L5X
- 4.1.7.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.7.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - \circ ~ See the table below for AOI Input Parameters that have required values indicated.
 - Refer to specific AOI documentation for configuration requirements.

4.1.7.4.1 Parameter Values

Parameter	Default Value	Req Value	Description
Inp_Target	1	0	Inp_Target is required to be set to "0" so that the Alarm state is "1".
Cfg_0StText	Off		Text to Display in Camel Case
Cfg_1StText	On		Text to Display in all Caps

4.1.7.5 Operations, Execution, and Usage Instructions

• Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 46) for additional details.

4.1.7.6 Programming Example

- Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 47) for additional details.
- 4.1.7.7 HMI Elements
 - \circ $\:$ See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.1.8 DISCRETE OUTPUT (P_DOUT)

• The Discrete Output (P_DOut) Add-On Instruction controls a device by a single discrete output signal and optionally monitors feedback from the device to check for device failures.

4.1.8.1	System Applicability
1. 1.0. 1	System ripplicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable IO.	

4.1.8.2 Required Files

- Controller File: P_DOut_4.00.00_AOI.L5X
- 4.1.8.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.8.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.8.5 Operations, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 51) for additional details.
- 4.1.8.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 53) for additional details.
- 4.1.8.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.1.9 ANALOG OUTPUT (P_AOUT)

• The P_AOut (Analog Output) Add-On Instruction is used to manipulate an analog output to control a field device, such as a control valve or a motorized gate positioner.

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable IO when an analog output is needed that	
			is not part of another AOI.	

4.1.9.1 *System Applicability*

4.1.9.2 *Required Files*

- Controller File: P_AOut_4.00.00_AOI.L5X
- 4.1.9.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.9.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.1.9.5 Operations, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 58) for additional details.
- 4.1.9.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 59) for additional details.
- 4.1.9.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.
- 4.1.10 PRESSURE/TEMPERATURE COMPENSATED FLOW (P_PTComp)
- 4.1.11 TANK STRAPPING TABLE (P_STRAPTBL)
- 4.1.12 HART ANALOG INPUT (P_AINHART)
- 4.1.13 HART ANALOG OUTPUT (P_AOUT HART)

4.2 **REGULATORY AND PROCEDURAL CONTROL FAMILY**

4.2.1 PURPOSE

- Library objects in this section comprise two groups of Advanced Process Control: regulatory and procedural.
 - Regulatory control focuses on the process variables (levels, flows, temperatures, pressures, etc.). The control is designed to improve loops that perform poorly and automate loops that are typically run in manual by the operator. These loops include techniques such as ratio, feedforward, cascade, and split-range control.
 - Procedural control focuses on the product being manufactured (cement, polyethylene, ethanol. paper, etc.). The objects control the various product specifications and parameters via a series of discrete sequential actions.

- 4.2.2 PROPORTIONAL + INTEGRAL + DERIVATIVE ENHANCED (P_PIDE)
 - The P_PIDE (Proportional + Integral + Derivative Enhanced) Add-On Instruction provides the functionality of the Studio 5000 Logix Designer[®] PIDE function block with a user experience consistent with the rest of the Rockwell Automation Library of Process Objects.

 Control Systems		Application/Scope	SAWS Std
PCS	ALL	Used for applicable control strategies as the standard PID control object. Always place in the Task_1s.	

4.2.2.2 Required Files

- Controller File: P_PIDE_4.00.00_AOI.L5X
- 4.2.2.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.2.2.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.2.2.5 Operations, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 78) for additional details.

4.2.2.6 Programming Example

• Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 80) for additional details.

4.2.2.7 HMI Elements

- See HMI Standards for details on Display Elements and Faceplates for this AOI.
- 4.2.3 ANALOG FANOUT (P_FANOUT)
- 4.2.4 HIGH OR LOW SELECTOR (P_HILOSEL)
- 4.2.5 DEADBAND CONTROLLER (P_DBC)
- 4.2.6 ROCKWELL AUTOMATION SEQUENCER OBJECT (P_SEQ)
- 4.2.7 DOSING (P_DOSE)

4.2.8 LEAD/LAG/STANDBY MOTOR GROUP (P_LLS)

• The P_LLS (Lead-Lag Standby motor group) Add-On Instruction provides control of a parallel group of motors. Such groups are commonly used for a group of pumps that maintain pressure or flow on a header despite broad changes in demand, such as in municipal-scale or plant-scale water distribution.

Applies		Process Systems	Application/Scope	SAWS Std
	PCS	ALL	May be selected for motors in a lead-lag control strategy after approval by SAWS for specific project applications. Review project control requirements with SAWS for direction on the use of this specific element as it may not be applicable if custom SAWS lead-lag control strategy is required. Refer to SAWS for details on required lead-lag control strategy and applicable PLC code on a project-by- project basis.	

4.2.8.1 System Applicability

4.2.8.2 Required Files

- Controller File: P_LLS_4.00.00_AOI.L5X
- Controller File: (See SAWS for custom files)
- 4.2.8.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.2.8.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.2.8.5 Operations, Execution, and Usage Instructions
- Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 111) for additional details.
- 4.2.8.6 *Programming Example*
- Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 109) for additional details.

4.2.8.7 HMI Elements

• See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.3 MOTORS FAMILY

4.3.1 PURPOSE

• The Process Objects in this group provide control and monitoring for smart motor controllers, drives, and overload relays.

4.3.2 SINGLE-SPEED MOTOR (P_MOTOR)

• The P_Motor (Single-speed Motor) Add-On Instruction controls a non-reversing, single-speed motor in various modes and monitors for fault conditions.

4.3.2.1 *System Applicability*

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All Single Speed Motors.	

4.3.2.2 Required Files

o P_Motor_4.00.00_AOI.L5X

4.3.2.3 Local Tag Configuration

- No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.

4.3.2.4 Input Parameter Configuration

- Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.3.2.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 122) for additional details.

4.3.2.6 *Programming Example*

• Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 123) for additional details.

4.3.2.7 HMI Elements

- See HMI Standards for details on Display Elements and Faceplates for this AOI.
- 4.3.3 Two-speed Motor (P_Motor2Spd)
- 4.3.4 REVERSING MOTOR (P_MOTORREV)

4.3.5 HAND-OPERATED MOTOR (P_MOTORHO)

• The P_MotorHO (Hand-operated Motor) Add-On Instruction monitors a locally-controlled (hand-operated) motor.

4.3.5.1 System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	All Hand-Operated Motors.	

- 4.3.5.2 Required Files
 - P_MotorHO_4.00.00_AOI.L5X
- 4.3.5.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.3.5.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.3.5.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 134) for additional details.

4.3.5.6 Programming Example

- Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 135) for additional details.
- 4.3.5.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.
- 4.3.6 POWERFLEX[®] 523/525 VARIABLE FREQUENCY DRIVES (P PF52x)
- 4.3.7 PowerFlex 753 Drive (P_PF753)

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4.3.8 POWERFLEX 755 DRIVE (P_PF755)

- The P_PF755 (PowerFlex 755 drive) object is used to operate one variable-speed motor by using a PowerFlex 755 AC variable frequency drive in a variety of modes and monitoring for fault conditions.
 - **IMPORTANT**: If you use a drive other than a PowerFlex 755 TL/TR drive or PowerFlex 753 drive with a 20-750-ENETR adapter, use these Add-On Instructions instead:
 - P_PF753 for the PowerFlex 753 Drive with 20-COMM-E EtherNet/IPInterface
 - P_PF52x for the PowerFlex 523 or PowerFlex 525 Drive on an EtherNet/IP network
 - P_VSD for third-party drives, drives on other networks, or via hardwired I/O

4.3.8.1 System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
V	PCS	ALL	All AB PowerFlex 755 VFD drives (coordinate with SAWS for use of PowerFlex 523/525 and 753 drives).	

- 4.3.8.2 Required Files
 - P_PF755_4.00.00_RUNG.L5X
- 4.3.8.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.3.8.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.3.8.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 170) for additional details.
- 4.3.8.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 172) for additional details.
- 4.3.8.7 HMI Elements
 - \circ $\:$ See HMI Standards for details on Display Elements and Faceplates for this AOI.
- 4.3.9 SMC[™]-50 SMART MOTOR CONTROLLER (P_SMC50)
- 4.3.10 SMC FLex SMART MOTOR CONTROLLER (P_SMCFLex)

4.3.11 VARIABLE SPEED DRIVE (P_VSD)

• The P_VSD (Variable Speed Drive) Add-On Instruction is used to operate one variable speed motor by using a drive (AC variable frequency or DC) in a variety of modes, monitoring for fault conditions.

Applies	Control Systems	Process Systems	Application/Scope	SAWS Std
	PCS	ALL	All Variable Speed Drive Motors EXCEPT AB PowerFlex 755 VFD drives (Use P_PF755 AOI for this exception). Note that if there is a non-AB VFD AOI from the VFD manufacturer then proceed to map the necessary IO from this manufacturer AOI to the appropriate inputs of a corresponding P_VSD AOI to ensure proper function of the associated PlantPAx global object element and faceplate.	

4.3.11.2 Required Files

- P_VSD_4.00.00_AOI.L5X
- 4.3.11.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.3.11.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.3.11.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 231) for additional details.
- 4.3.11.6 Programming Example
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 233) for additional details.
- 4.3.11.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.
- 4.3.12 E1PLus[™] Electronic Overload Relay (EtherNet/IP) (P_E1PLusE)
- 4.3.13 E3/E3 PLUS OVERLOAD RELAY (P_E3OVLD)
- 4.3.14 E300[™] Electronic Overload Relay (EtherNet/IP) (P_E3000vLd)

4.3.15 RUN TIME AND START COUNTER (P_RUNTIME)

• The P_RunTime (Run Time and Start Counter) Add-On Instruction is used to accumulate the total runtime and count of starts for a motor or other equipment.

4.3.15.1	System	Applicability
4.5.15.1	System	ripplicubility

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for all motors with running feedback.	

- 4.3.15.2 Required Files
 - P_RunTime_4.00.00_AOI.L5X
- 4.3.15.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.3.15.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.3.15.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 259) for additional details.
- 4.3.15.6 Programming Example
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 260) for additional details.
- 4.3.15.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.3.16 RESTART INHIBIT FOR LARGE MOTOR (P_RESINH)

• The P_ResInh (Restart Inhibit for Large Motor) Add-On Instruction is used to prevent damage to a large motor through repeated starts.

4.3.16.1 System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for all motors where this function is applicable.	

- 4.3.16.2 Required Files
 - o P_ResInh_4.00.00_AOI.L5X
- 4.3.16.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.3.16.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.3.16.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 262) for additional details.
- 4.3.16.6 Programming Example
- Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 263) for additional details.
- 4.3.16.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.4 VALVES FAMILY

4.4.1 PURPOSE

• The Process Objects in this group provide an interface to a wide range of process valve types and statistical valve calculations.

4.4.2 ANALOG/PULSED CONTROL VALVE (P_VALVEC)

• The P_ValveC (Analog/Pulsed Control Valve) Add-On Instruction manipulates a control valve by using an analog signal or discrete signals and monitors the valve by using analog position feedback.

Applies	Control Systems		Application/Scope	SAWS Std
	PCS	ALL	Used for applicable valves.	

4.4.2.2 Required Files

- P_ValveC_4.00.00_AOI.L5X
- 4.4.2.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.4.2.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.4.2.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 271) for additional details.
- 4.4.2.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 272) for additional details.
- 4.4.2.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.4.3 HAND-OPERATED VALVE (P_VALVEHO)

• The P_ValveHO (Hand-operated Valve) Add-On Instruction monitors a hand (locally) operated valve and displays its current state. The valve may have any type of actuator, but it is typically operated at the valve and only monitored by the control system via open and closed limit switches.

4.4.3.1	Svstem	Applicability
1. 1. 5. 1	System	, ipplicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable valves.	

4.4.3.2 Required Files

- P_ValveHO_4.00.00_AOI.L5X
- 4.4.3.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.4.3.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.4.3.5 *Operations, Alarms, Execution, and Usage Instructions*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 277) for additional details.

4.4.3.6 Programming Example

• Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 279) for additional details.

4.4.3.7 HMI Elements

• See HMI Standards for details on Display Elements and Faceplates for this AOI.

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4.4.4 MOTOR-OPERATED VALVE (P_VALVEMO)

• The P_ValveMO (motor-operated valve) Add-On Instruction is used to operate (open and close) a motor-operated valve in various modes, monitoring for fault conditions.

4.4.4.1	System Applicability
7.7.7.1	System Applicubility

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable valves.	

- 4.4.4.2 Required Files
 - P_ValveMO_4.00.00_AOI.L5X
- 4.4.4.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.4.4.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.4.4.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 285) for additional details.
- 4.4.4.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 287) for additional details.
- 4.4.4.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.
- 4.4.5 MIX-PROOF VALVE (P_VALVEMP)

4.4.6 SOLENOID-OPERATED VALVE (P_VALVESO)

• The P_ValveSO (solenoid-operated valve) Add-On Instruction is used to operate (open and close) a single solenoid-operated valve in various modes, monitoring for fault conditions.

4.4.6.1	Svstem	Applicability
1. 1.0.1	System	, ipplicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable valves.	

- 4.4.6.2 Required Files
 - P_ValveSO_4.00.00_AOI.L5X
- 4.4.6.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.4.6.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.4.6.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 291) for additional details.
- 4.4.6.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 293) for additional details.
- 4.4.6.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.4.7 2-STATE VALVE STATISTICS (P_VALVESTATS)

• The P_ValveStats (2-state Valve Statistics) Add-On Instruction monitors a 2-state (open and close) valve and records various statistics related to stroke times and stroke counts.

4.4.7.1	Svstem	Applicability
1. 1. / . ±	<i>System</i>	, ipplicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used for applicable valves (all discrete open/close valves).	

4.4.7.2 Required Files

- P_ValveStats_4.00.00_AOI.L5X
- 4.4.7.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.4.7.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.4.7.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 295) for additional details.

4.4.7.6 *Programming Example*

- Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 296) for additional details.
- 4.4.7.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.
- 4.4.8 N-POSITION DEVICE (P_NPOS)
- 4.4.9 DISCRETE 2-, 3-, 4-STATE DEVICE (P_D4SD)

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4.5 CROSS-FUNCTIONAL FAMILY

4.5.1 PURPOSE

• The Process Objects in this group provide analog and discrete input/output signal processing. Pressure/temperature compensated flow calculations and cylindrical tank level interpolations are also provided.

4.5.2 CONDITION GATE DELAY (P_GATE)

- The P_Gate (Condition Gate Delay) Add-On Instruction provides a 'gate' for a discrete signal and provides on-delay and off-delay timing for the gated signal.
- This instruction is integrated with the following Rockwell Automation Library
 - Basic Analog Input (P_AIn)
 - Advanced Analog Input (P_AInAdv)
 - Dual Sensor Analog Input (P_AInDual)
 - Multiple Analog Input (P_AInMulti)
 - Discrete Input Object (P_DIn)
 - Enhanced PID (P_PIDE)

4.5.2.1 System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS		Used in conjunction with other objects where applicable. Should never be used standalone.	

- 4.5.2.2 Required Files
 - P_Gate_4.00.00_AOI.L5X
- 4.5.2.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.2.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.2.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 309) for additional details.
- 4.5.2.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 310) for additional details.
- 4.5.2.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.5.3 INTERLOCKS WITH FIRST OUT AND BYPASS (P_INTLK)

• The P_Intlk (Interlocks with First Out and Bypass) Add-On Instruction is used to collect (sum up) the interlock conditions that stop or de-energize a running or energized piece of equipment and prevent it from starting or being energized.

Applies	Control Systems	Process Systems	Application/Scope	SAWS Std
	PCS	ALL	 Include with all devices with AOI Interlock inputs, even if they don't have any actual interlocks. All interlocks need to be configured with the proper data entered for each (description, navigation (if the interlock is another PlantPAx AOI), etc.) to ensure they will function correctly and will display properly on the associated HMI faceplate. Do not enable navigation for unused interlocks. 	

4.5.3.1 System Applicability

4.5.3.2 Required Files

- P_Intlk_4.00.00_AOI.L5X
- 4.5.3.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.3.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.3.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 314) for additional details.
- 4.5.3.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 315) for additional details.
- 4.5.3.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.5.4 PERMISSIVES WITH BYPASS (P_PERM)

• The P_Perm (Permissives with Bypass) Add-On Instruction is used to collect (sum up) the permissive conditions that allow a piece of equipment to start (run, energize, open, and so forth).

Applies	Control Systems	Process Systems	Application/Scope	SAWS Std
	PCS	ALL	 Include with all devices with AOI Permissive inputs, even if they don't have permissives. All permissives need to be configured with the proper data entered for each (description, navigation (if the permissive is another PlantPAx AOI), etc.) to ensure they will function correctly and will display properly on the associated HMI faceplate. Do not enable navigation for unused permissives. 	

4.5.4.1 System Applicability

4.5.4.2 Required Files

- P_Perm_4.00.00_AOI.L5X
- 4.5.4.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.4.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.4.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 319) for additional details.
- 4.5.4.6 Programming Example
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 320) for additional details.
- 4.5.4.7 HMI Elements
 - \circ $\:$ See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.5.5 DISCRETE 2-, 3-, 4-STATE DEVICE (P_D4SD)

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4.5.6 CENTRAL RESET (P_RESET)

• The P_Reset (Central Reset) Add-On Instruction provides a central point for resetting equipment faults. Latched alarms can be reset for a control strategy.

4.5.6.1	System Applicability
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Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used as an alarm reset for the PLC (typically from HMI). It should be used for all devices.	

4.5.6.2 *Required Files*

- o P_Reset_4.00.00_AOI.L5X
- 4.5.6.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.6.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.6.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 331) for additional details.
- 4.5.6.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 332) for additional details.
- 4.5.6.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

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4.5.7 COMMON ALARM BLOCK (P_ALARM)

- The P_Alarm (Common Alarm Block) Add-On Instruction is used to provide notification to operators of abnormal conditions or events. This instruction handles Alarm Acknowledgment, Alarm Reset, Alarm Shelving/Disabling, and Alarm Suppression (for FactoryTalk Alarm and Events).
- This instruction can be used standalone, with the abnormal condition simply written or wired to the Input (Inp) pin, or it can be embedded within another Add-On Instruction to provide Alarming for some condition. For example, a Motor instruction can have P_Alarm Add-On Instructions for Failure to Start, Failure to Stop, and other conditions.

4.5.7.1	System Applicability
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Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used in conjunction with other objects where applicable. Should never be used standalone.	

- 4.5.7.2 Required Files
 - P_Alarm_4.00.00_AOI.L5X
- 4.5.7.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.7.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.7.5 *Operations, Alarms, Execution, and Usage Instructions*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 337) for additional details.
- 4.5.7.6 Programming Example
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 338) for additional details.
- 4.5.7.7 HMI Elements
 - \circ $\:$ See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.5.8 COMMAND SOURCE (P_CMDSRC)

• The P_CmdSrc (Command Source) Add-On Instruction is used to provide selection of the command source (owner) of an instruction or control strategy.

4.5.8.1	System Applicability

Applies	Control	Process	Application/Scope	SAWS
	Systems	Systems		Std
	PCS	ALL	Used in conjunction with other objects where applicable. Should never be used standalone.	

4.5.8.2 *Required Files*

- o P_CmdSrc_4.00.00_AOI.L5X
- 4.5.8.3 Local Tag Configuration
 - No specific requirements.
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.8.4 Input Parameter Configuration
 - Cfg_*AckReqd is required to be 1 for every alarm
 - Refer to specific AOI documentation for configuration requirements.
- 4.5.8.5 Operations, Alarms, Execution, and Usage Instructions
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 341) for additional details.
- 4.5.8.6 *Programming Example*
 - Refer to PROCES-RM013 Rockwell Automation Library of Process Objects: Logic Instructions (Page 346) for additional details.
- 4.5.8.7 HMI Elements
 - See HMI Standards for details on Display Elements and Faceplates for this AOI.

4.5.9 OPERATOR PROMPT (P_PROMPT)

4.5.10 BOOLEAN LOGIC WITH SNAPSHOT (P_LOGIC)

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BIBLIOGRAPHY

Standards outlined in this document should take into account the following documentation:

Library Documentation for Version 4.0

• PROCES-RM013Rockwell Automation Library of Process Objects: Logic Instructions (January 2019)

PlantPAx System Documentation for Version 4.5

• N/A

Additional Rockwell Documentation

• N/A

SAWS Documentation

- SAWS Tag Naming Convention Memo
- SAWS Tag Name Tables
- SAWS Alarm Philosophy Manual

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APPENDICES

A. PROCES-RM013 ROCKWELL AUTOMATION LIBRARY OF PROCESS OBJECTS: LOGIC INSTRUCTIONS

B. PROCES-RM002 ROCKWELL AUTOMATION LIBRARY OF PROCESS OBJECTS

C. RESERVED FOR FUTURE APPENDIX

D. RESERVED FOR FUTURE APPENDIX

E. CHANGE REQUEST FORM TEMPLATE (CM-FORM)

F. APPROVED CM-FORMS

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