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

Steven Mouser, P.E.
Grubb Engineering, Inc.
TBPE Firm No. 3904

APPENDIX A - APPLICATION SERVICES

SAWS HMI Software Configuration Standards

TESCO®
CONTROLS, INC.

HMI SOFTWARE CONFIGURATION STANDARDS

REVISION: OCTOBER 2021

DEVELOPED FOR: **SAN ANTONIO WATER SYSTEM (SAWS)**
DEVELOPED BY: **TESCO CONTROLS**

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

TABLE OF **CONTENTS**

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

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 HISTORY

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	AUTHOR(S)	REVISION NOTES	CM FORM
.			
.			
.			
.			

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

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.

System Applicability (Current Revision)

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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	

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

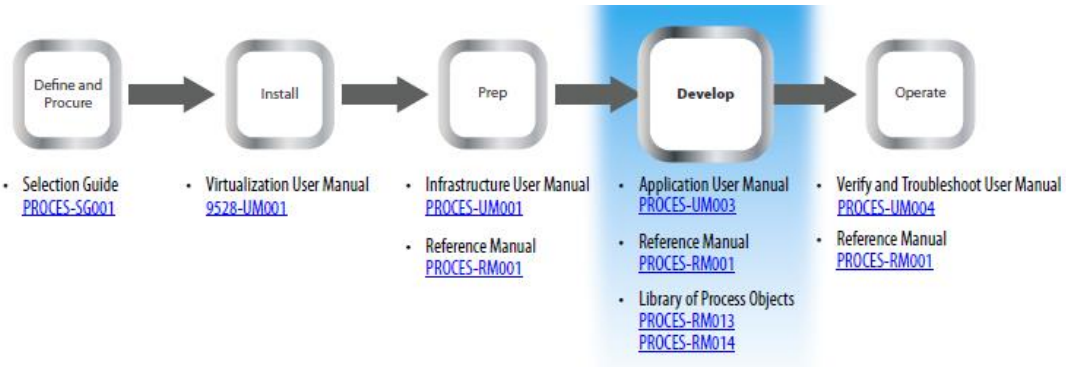
SCOPE

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.



[1]PlantPAx 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-UM001 PlantPAx Distributed Control System Infrastructure Configuration User Manual
- PROCES-UM003 PlantPAx Distributed Control System Application Configuration
- PROCES-UM004 PlantPAx 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.

TERM /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.

TERM /ACRONYM	DEFINITION /DESCRIPTION
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 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 (global objects), and faceplates that let you quickly assemble large applications with proven 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. 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)
- 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)

1.2.2 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*

- Not defined yet

1.2.2.6 *ASR, CWS, WWTPs Application*

- Not defined yet

1.2.2.7 *ASR, CWS, WWTPs HMI Server*

- 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
pH	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 Systems	Process Systems	Application/Scope	SAWS Std
☑	PCS	ALL	HMI Application Security Model for PCS System.	☑

1.9.2 SECURITY GROUPS, CODES, AND PERMISSIONS

- [1]An 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.
- [1]HMI_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.
- [2]Additional Codes were added, enabling access to these features for additional User Groups.

1.9.4 PLANTPAX SECURITY CODE MATRIX

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

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

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*

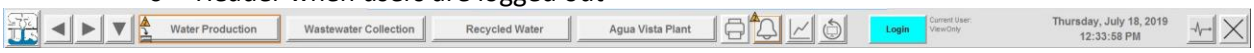
- An Application Header has been established for the SAWS HMI Standard that encompasses several Systems, as indicated below.

1.10.1.2 *System Applicability*

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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



- Header when a user is logged in

1.10.1.4 *Home Button (SAWS Logo)*

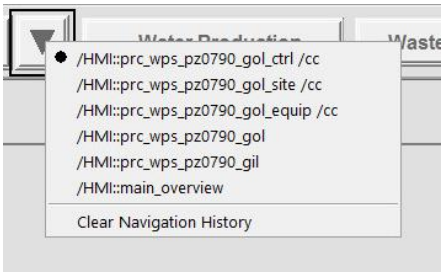
- The Home Button navigate to the Home Display [main_overview].
  - Size: 54 x 59 Pixels

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*

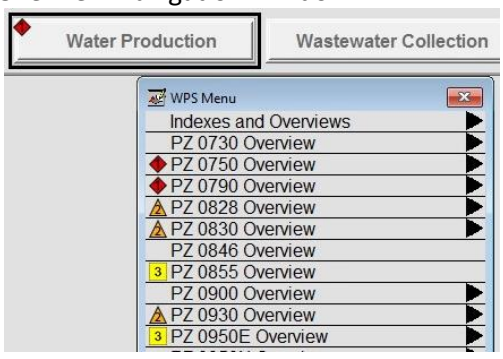
- The Navigation History Button opens a window with the navigation history displayed, allowing the user to select displays from the list.
  - Size: 45 x 45 Pixels



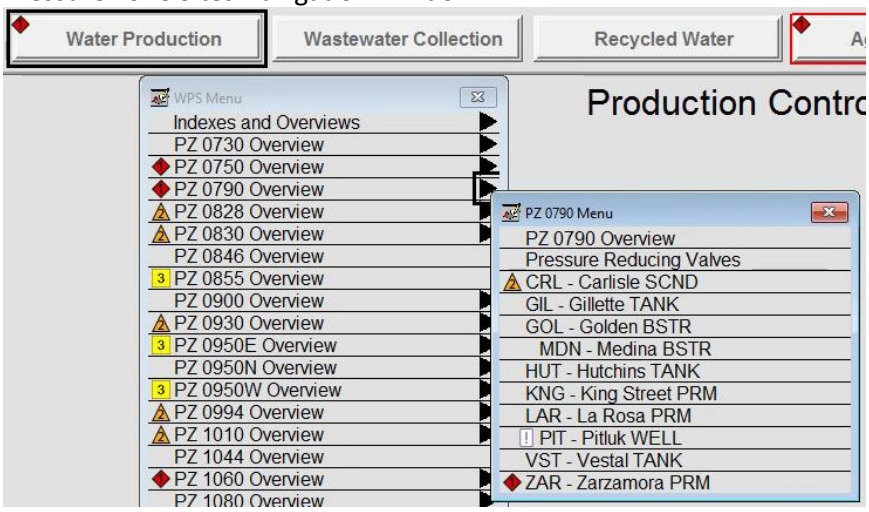
1.10.1.7 *Water Production Button*

- 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

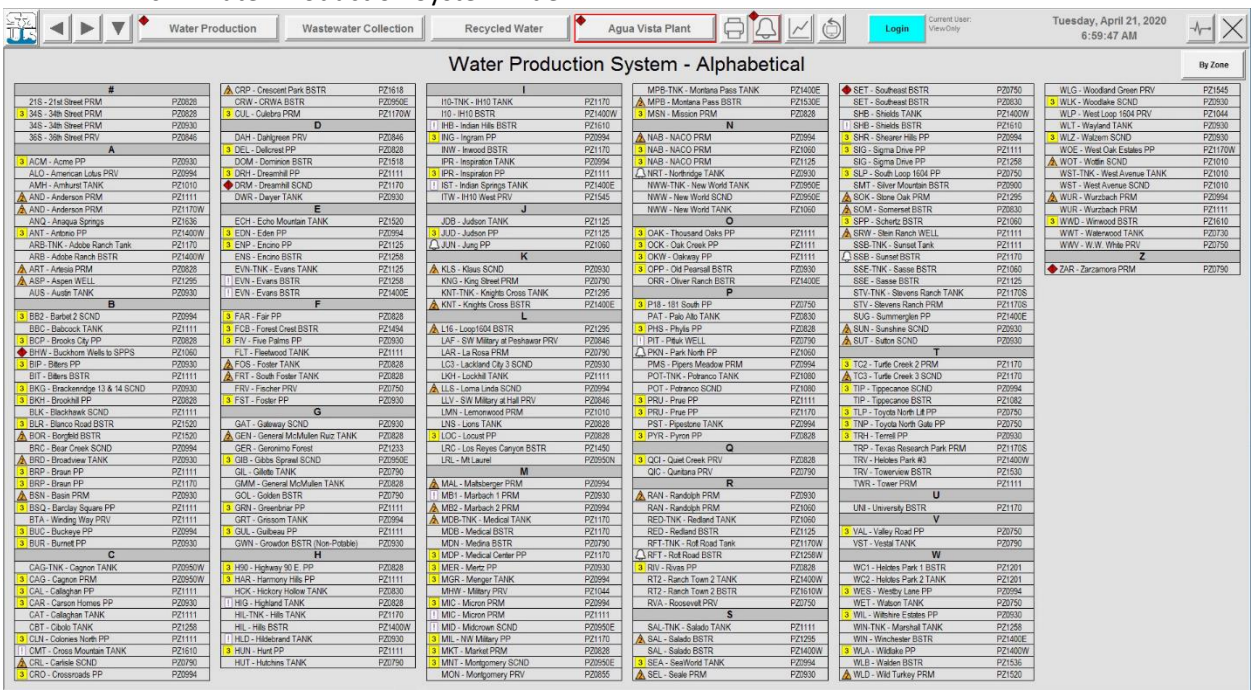
- Pressure Zone Overview Navigation Window



- Pressure Zone Sites Navigation Window

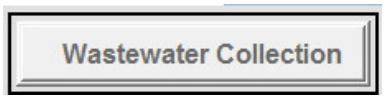


- Water Production System Index 1



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

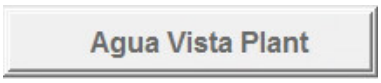


1.10.1.9 *Recycled Water Button*

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

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*

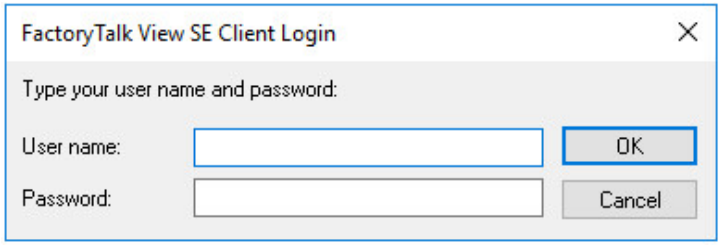
- The Trends Button navigates to the Trend Display.
  - Size: 45 x 45 Pixels

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.



- 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.

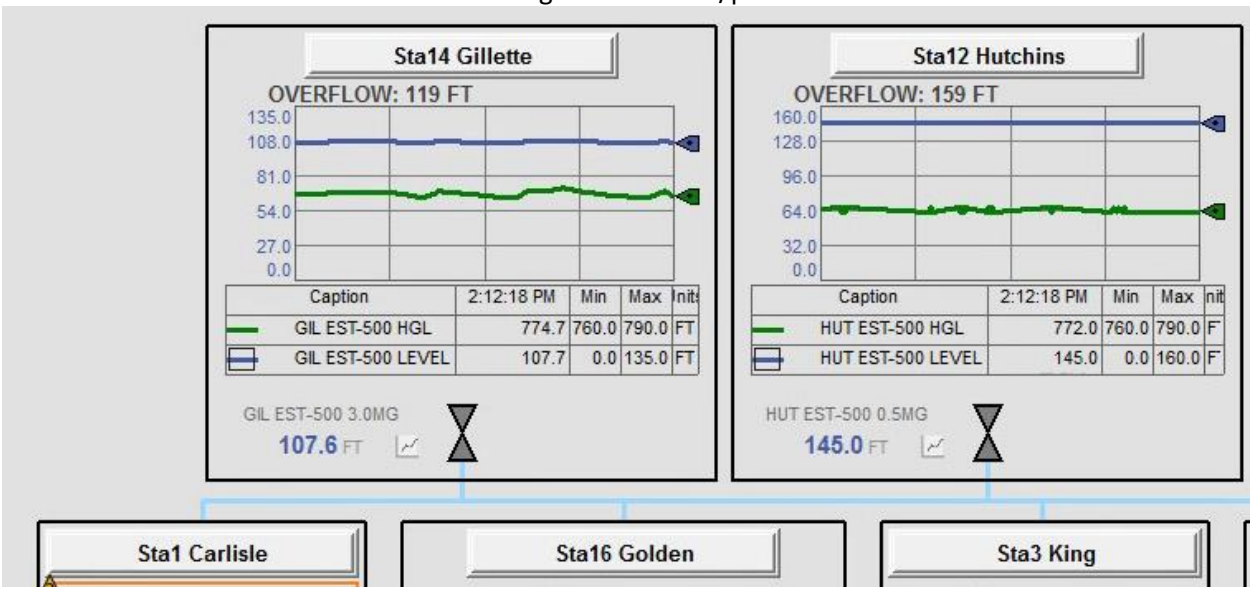
1.10.1.17 *Close Window Button*

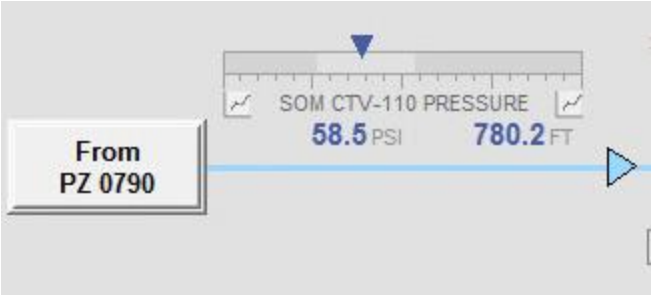
- The Close Window Button closes the HMI Client application.
  - Size: 45 x 45 Pixels

1.10.2 WITHIN DISPLAYS

1.10.2.1 *Site Navigation Buttons*

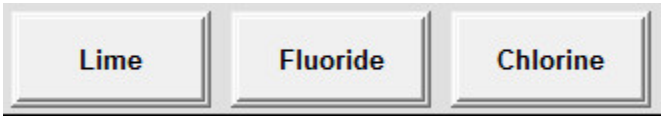
- Site navigation buttons are located throughout the HMI application displays [ex. Sta Gillette, Sta1 Carlisle, Sta16 Golden, From PZ 0790].
  - Size: Varies
  - The site buttons navigate to the site/process area indicated on the button.





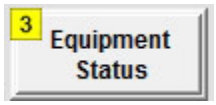
1.10.2.2 *Sub-process Area Buttons*

- 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.



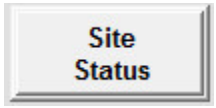
1.10.2.3 *Equipment Status Button*

- 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



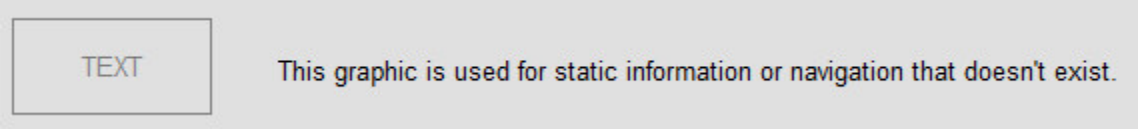
1.10.2.5 *Process Control Button*

- 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.



    - Example of future placeholder buttons (Lime, Fluoride, Chlorine, 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.

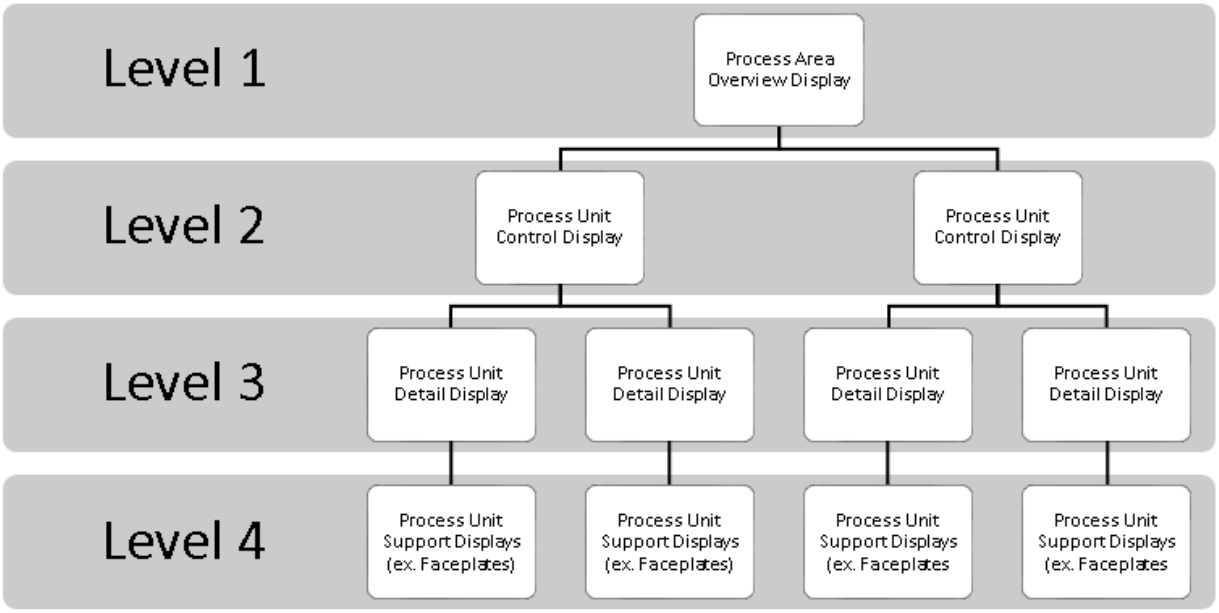
1.11.1.1 *System Applicability*

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

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.



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

Display Type	Example	L0	L1	L2	L3	L4
Main Overview	PCS (WPS, WCS, RWS, AVS) Overview	X				
Process System Overview	WPS System Overview		X			
Process Area/Zone	PZ#### Zone Overview			X		
Process Sub-Area/Site	PZ#### Site Display				X	
Equipment Status	PZ#### Equipment Status Display					X
Subsystem/Site Status	PZ#### Site Status Display					X
Process Control	PZ#### Process Control Display					X
Alarm Summary	Alarm Summary Display		X			
Alarm History	Alarm History Display		X			
Alarm Explorer	Alarm Explorer Display		X			
Trend (Display)	On-Demand Trend		X			
PlantPAx Faceplates	Any Faceplate Display					X

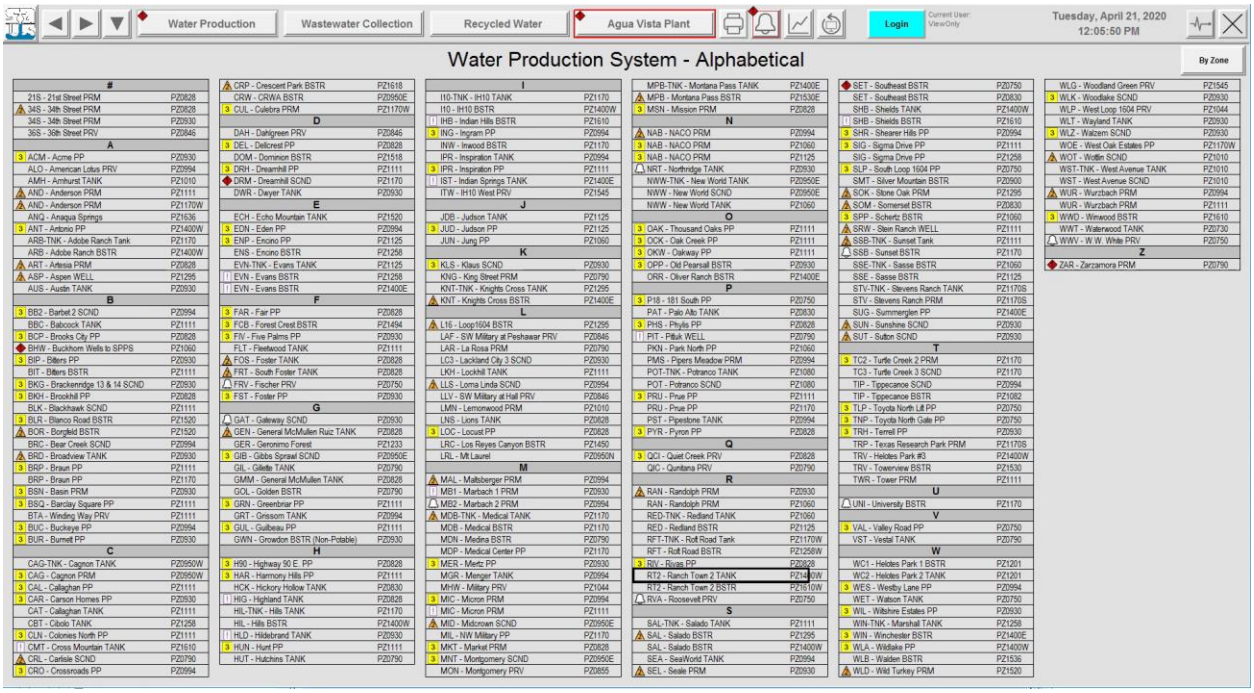
1.11.3 Main Overview Displays

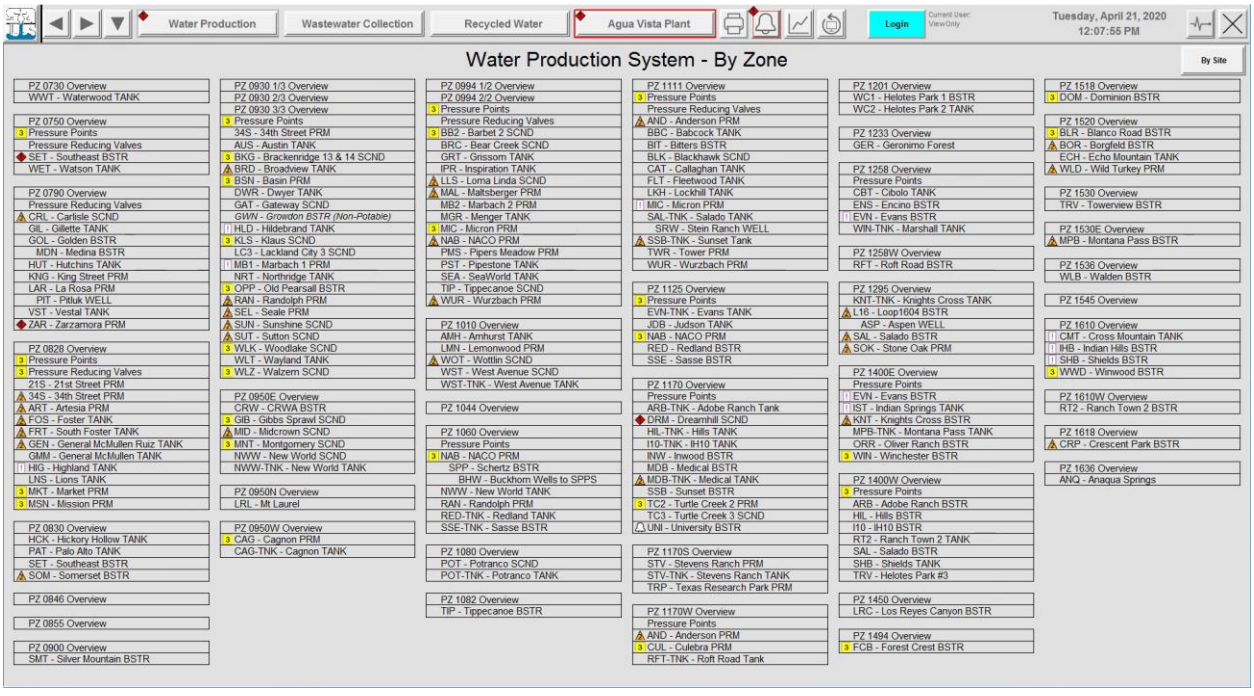
- Used to show a high-level view of multiple process systems within an HMI System.
    - Example showing the PCS Overview display.

PROVIDE IMAGE WHEN MAIN OVERVIEW EXAMPLE IS AVAILABLE

1.11.4 PROCESS SYSTEM OVERVIEW DISPLAYS

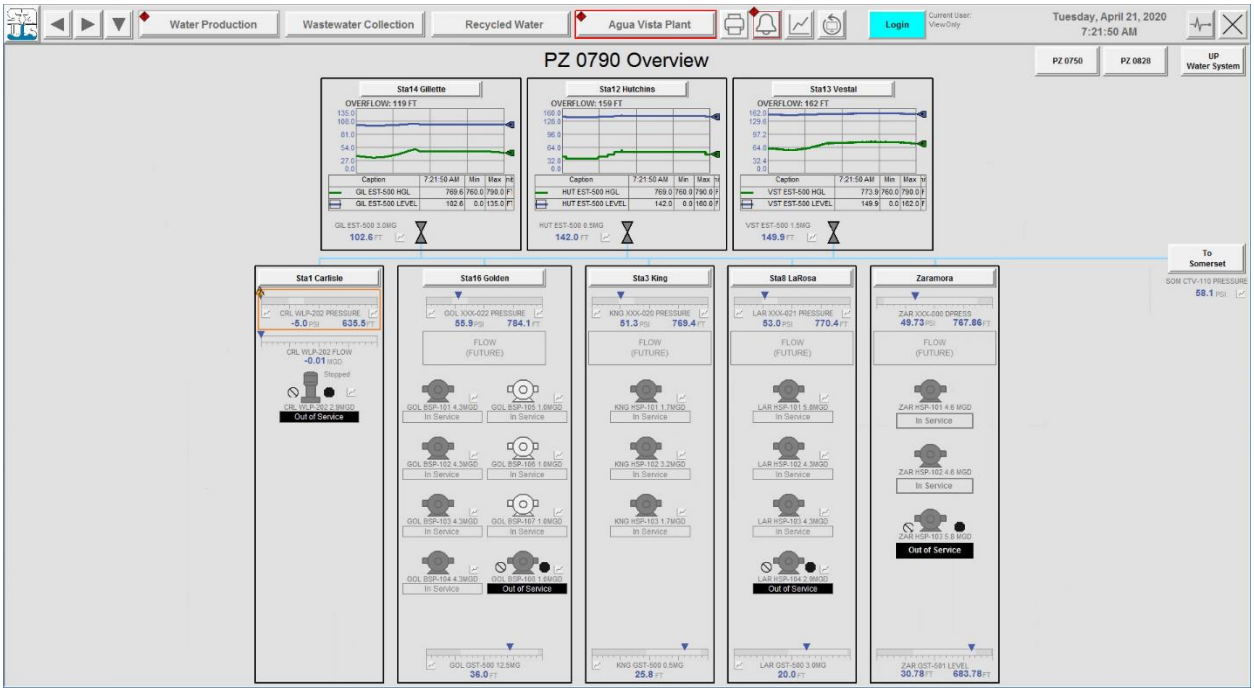
- Used to show a high-level view of a process system using index layout.
    - Example showing the WPS Overview display (Alphabetical Index followed by Zone Index examples).





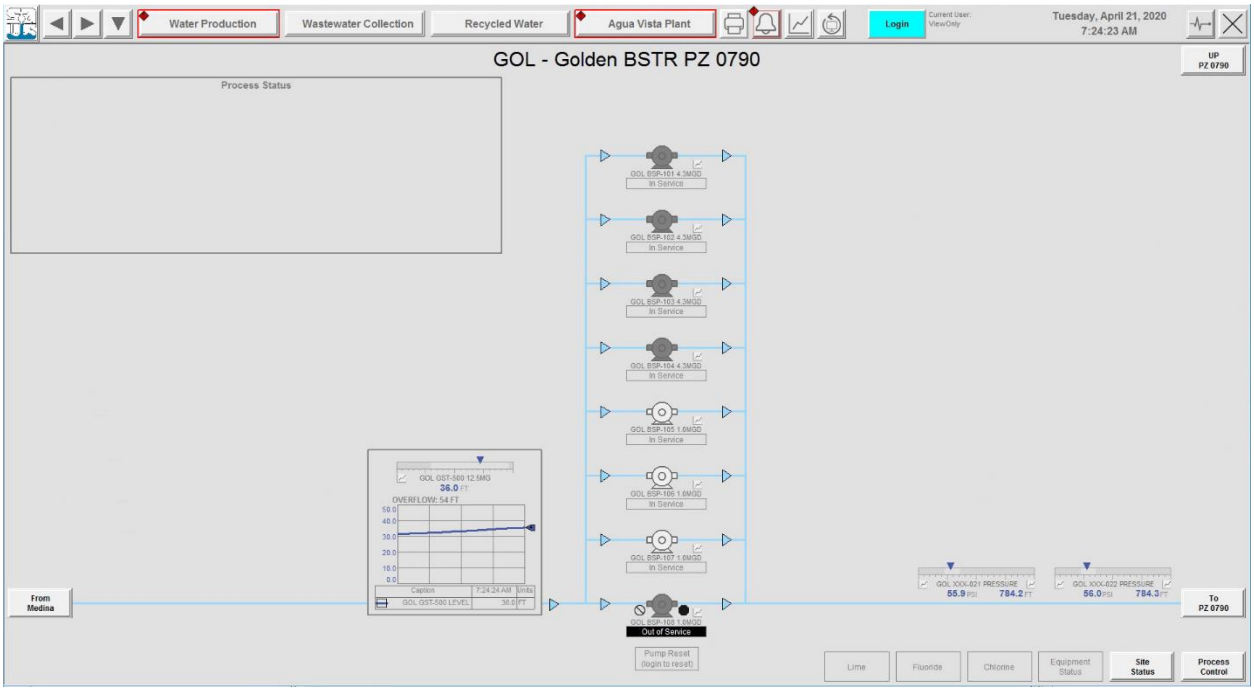
1.11.5 PROCESS AREA/ZONE DISPLAYS

- 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.



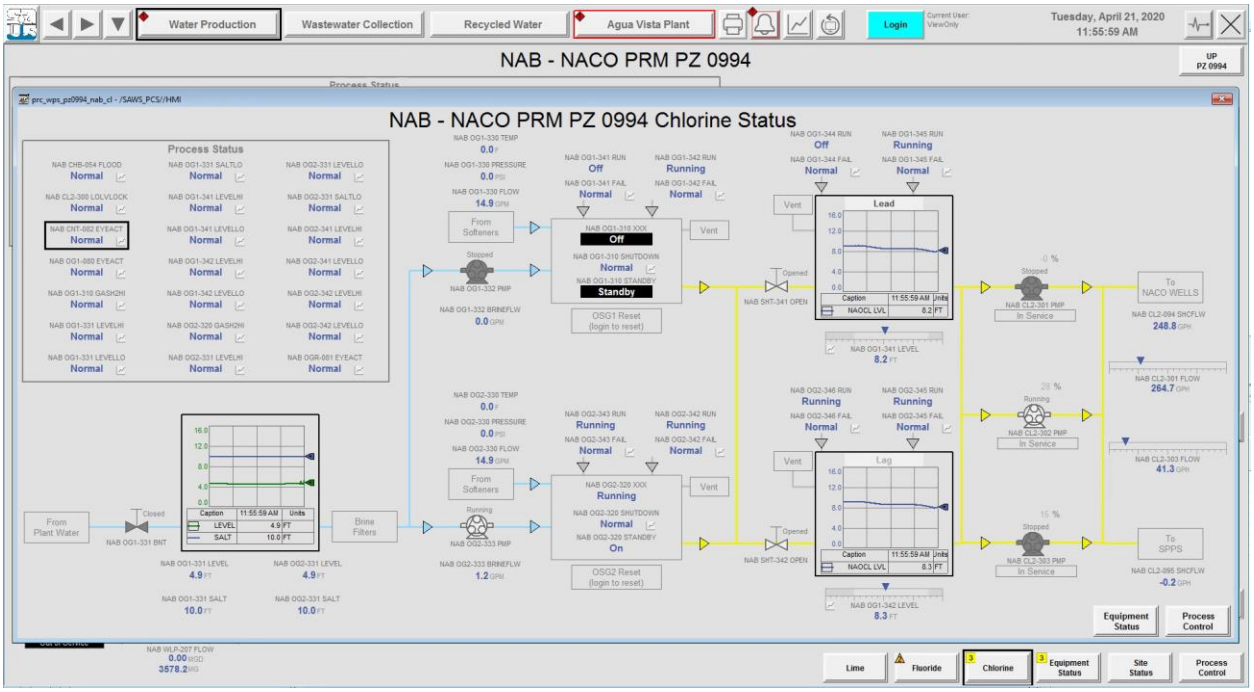
1.11.6 PROCESS SUB-AREA/SITE DISPLAYS

- 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.

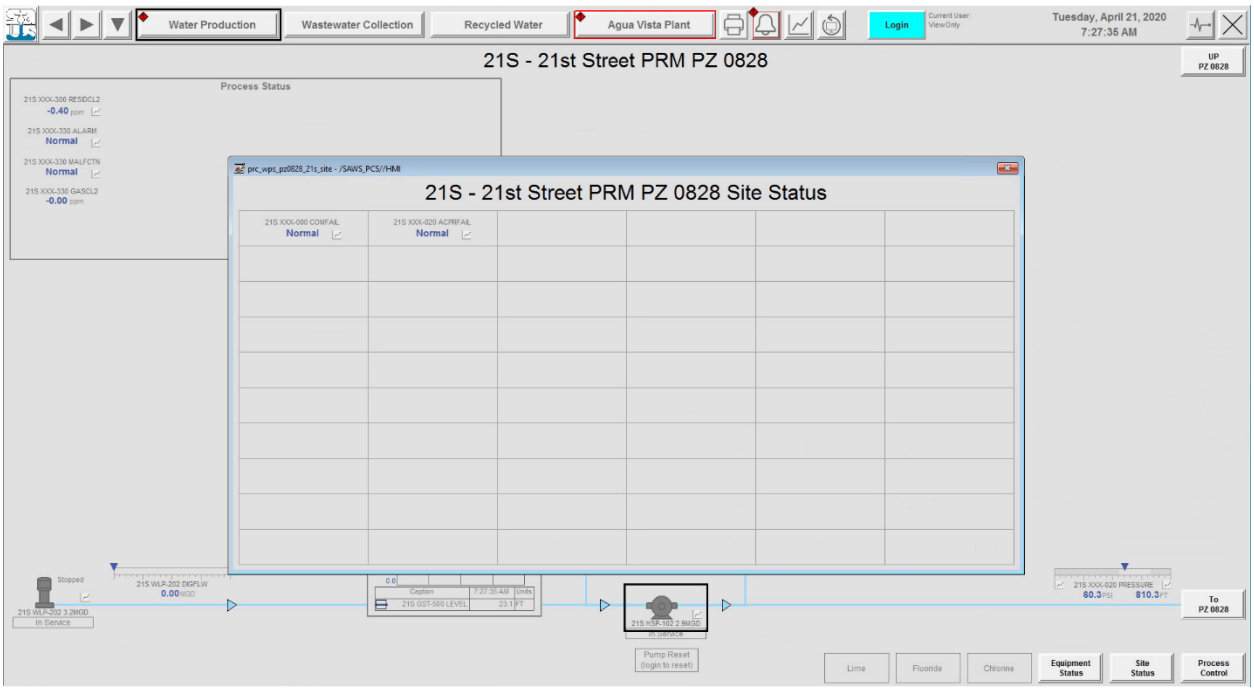


1.11.8 EQUIPMENT STATUS DISPLAYS

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

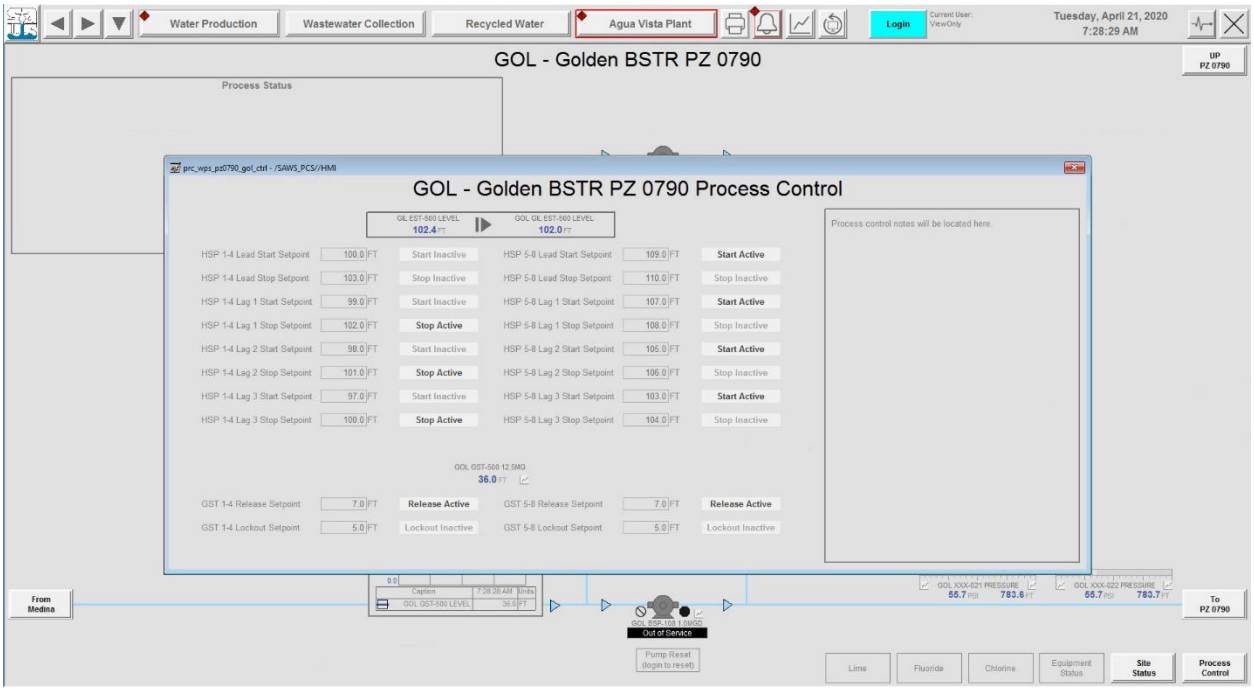
1.11.9 SITE STATUS DISPLAYS

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

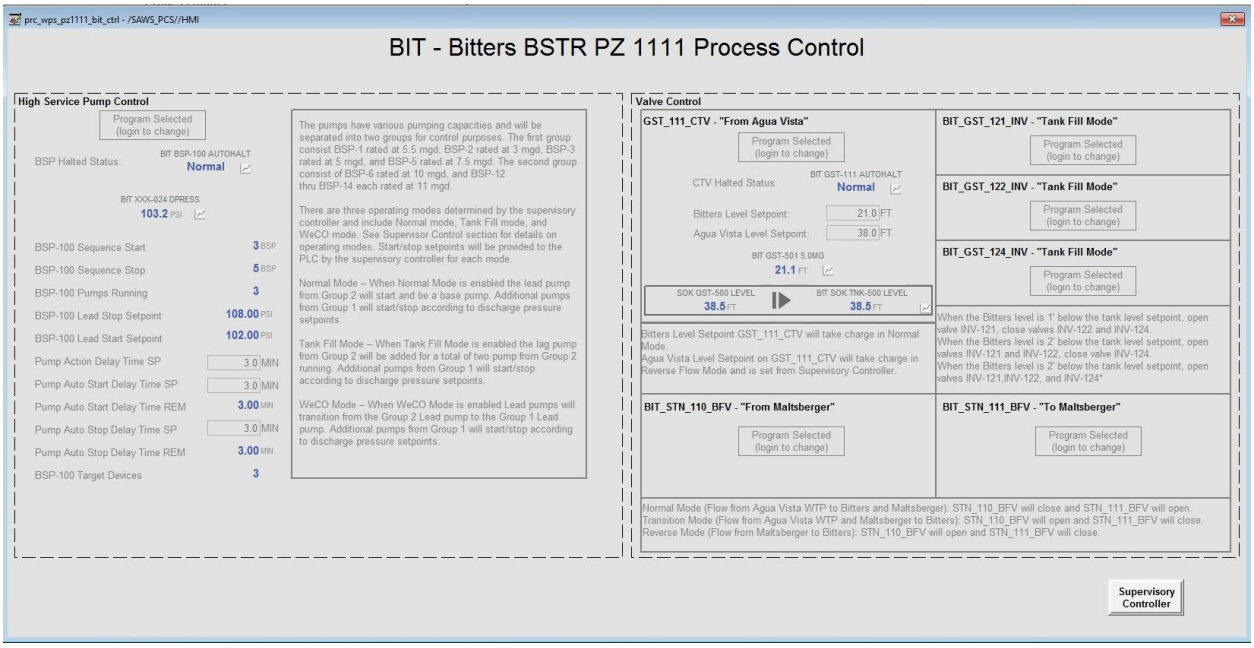


1.11.10 PROCESS CONTROL DISPLAYS

- 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.



- 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.



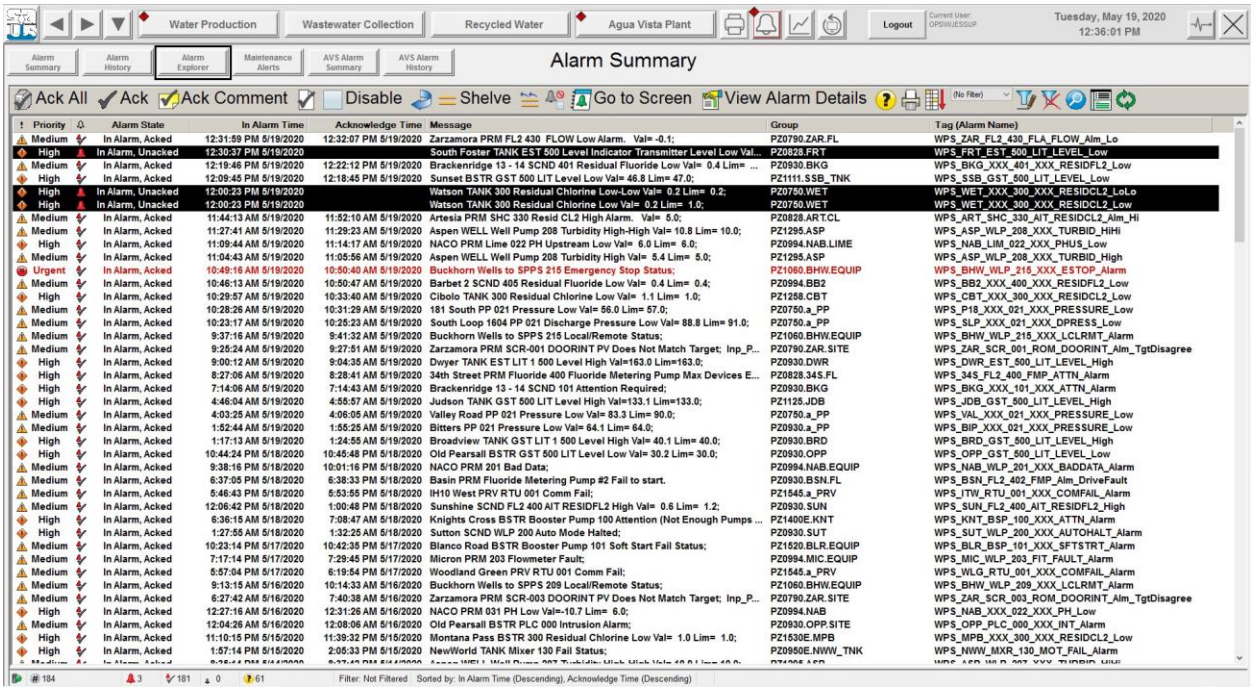
- Peer-to-Peer data transfer values are shown on Process Control displays for sites where they exist, as shown below.

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.

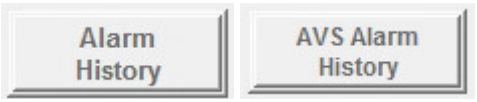
- The Alarm and Event Summary object is used to display A&E summary information.
  - Alarm Summary Display:



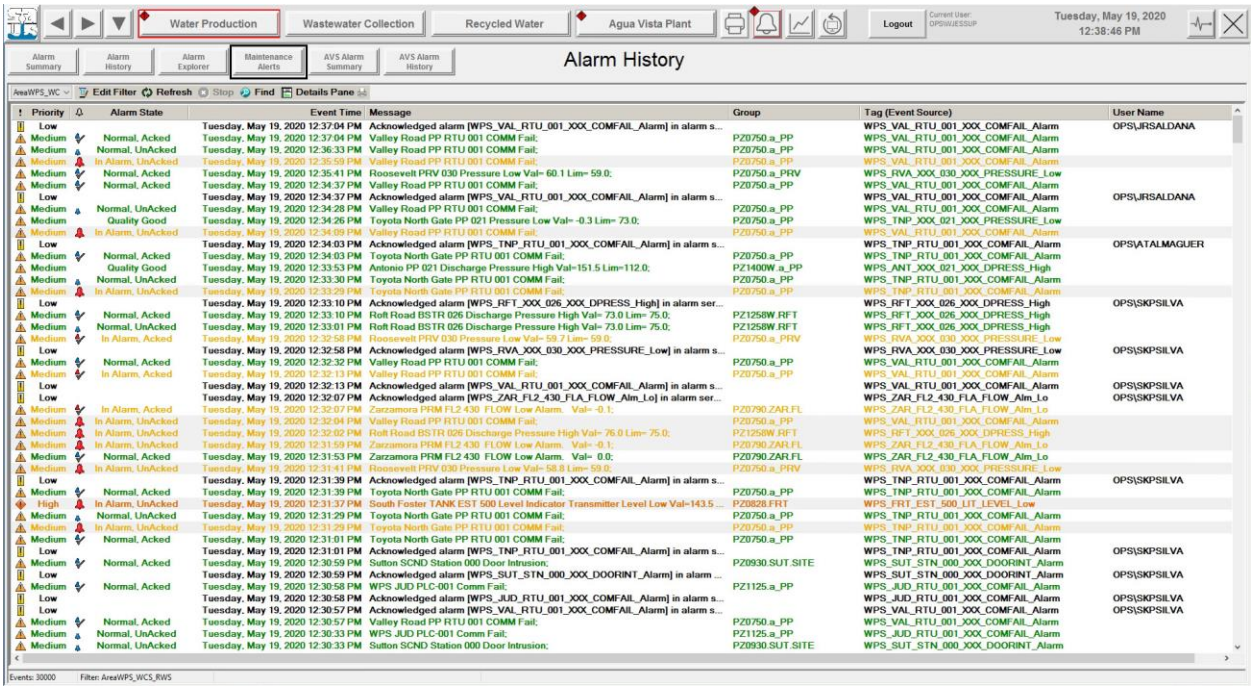
Priority	Alarm State	In Alarm Time	Acknowledge Time	Message	Group	Tag (Alarm Name)
Medium	In Alarm, Acked	12:31:59 PM 5/19/2020	12:32:07 PM 5/19/2020	Zarzamora PRM FL2 430 FLOW Low Alarm. Val= -0.1;	PZ0790.ZAR.FL	WPS_ZAR_FL2_430_FLA_FLOW_Alm_Lo
High	In Alarm, Unacked	12:30:37 PM 5/19/2020		South Foster 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	12:22:12 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	11:52:10 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	11:29:23 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	11:14:17 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	11:05:56 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	10:50:40 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	10:50:47 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	10:33:40 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	10:31:29 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	10:25:23 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	9:41:32 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	9:27:51 AM 5/19/2020	Zarzamora PRM SCR-001 DOORINT PV Does Not Match Target; Inp_P...	PZ0790.ZAR.SITE	WPS_ZAR_SCR_001_ROM_DOORINT_Alm_TgtDisagree
High	In Alarm, Acked	9:00:12 AM 5/19/2020	9:04:35 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	8:28:41 AM 5/19/2020	34th Street PRM Fluoride 400 Fluoride Metering Pump Max Devices E...	PZ0828.34S.FL	WPS_34S_FL2_400_FMP_ATTN_Alarm
High	In Alarm, Acked	7:14:06 AM 5/19/2020	7:14:43 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	4:55:57 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	4:06:05 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	1:55:25 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	1:24:55 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	10:45:48 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	10:01:16 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	6:38:33 PM 5/18/2020	Basin PRM Fluoride Metering Pump #2 Fail to start.	PZ0930.BSN.FL	WPS_BSN_FL2_402_FMP_Alm_DriveFault
Medium	In Alarm, Acked	5:46:43 PM 5/18/2020	5:53:55 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	1:00:48 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	7:08:47 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	1:32:25 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	10:42:35 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	7:29:45 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	6:19:54 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	Buckhorn Wells to SPPS 209 Local/Remote Status;	PZ1060.BHW.EQUIP	WPS_BHW_WLP_209_XXX_LCLRMT_Alarm
Medium	In Alarm, Acked	6:27:42 AM 5/16/2020	7:40:38 AM 5/16/2020	Zarzamora PRM SCR-003 DOORINT PV Does Not Match Target; Inp_P...	PZ0790.ZAR.SITE	WPS_ZAR_SCR_003_ROM_DOORINT_Alm_TgtDisagree
High	In Alarm, Acked	12:27:16 AM 5/16/2020	12:31:26 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	Old Pearsall BSTR PLC 000 Intrusion Alarm;	PZ0930.OPP.SITE	WPS_OPP_PLC_000_XXX_INT_Alarm
High	In Alarm, Acked	11:10:15 PM 5/15/2020	11:39:32 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	2:06:33 PM 5/15/2020	NewWorld TANK Mixer 130 Fail Status;	PZ0950E.NWW_TNK	WPS_NWW_MXR_130_MOT_FAIL_Alarm

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.



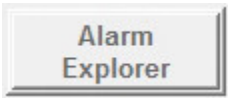
- The Alarm and Event Log Viewer object is used to display A&E historical information.
  - Alarm History Display:



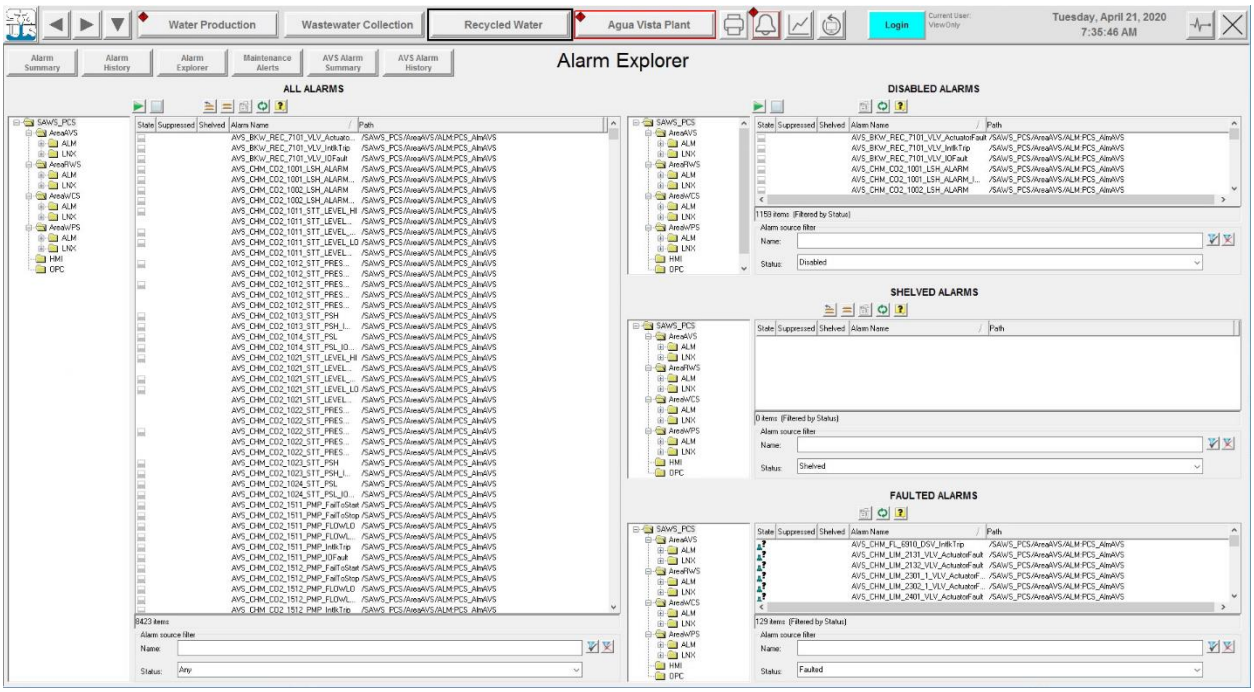
!	Priority	Alarm State	Event Time	Message	Group	Tag (Event Source)	User Name
	Low		Tuesday, May 19, 2020 12:37:04 PM	Acknowledged alarm [WPS_VAL_RTU_001_XXX_COMFAIL_Alarm] in alarm s...		WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	OPS\JRSALDANA
	Medium	Normal, Acked	Tuesday, May 19, 2020 12:37:04 PM	Valley Road PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	
	Medium	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	
	Medium	In Alarm, UnAcked	Tuesday, May 19, 2020 12:35:59 PM	Valley Road PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	
	Medium	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	
	Medium	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 alarm s...		WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	OPS\JRSALDANA
	Medium	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	
	Medium	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	
	Medium	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_XXX_COMFAIL_Alarm] in alarm s...		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	
	Medium	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	
	Medium	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	
	Medium	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	
	Low		Tuesday, May 19, 2020 12:33:10 PM	Acknowledged alarm [WPS_RFT_XXX_026_XXX_DPRESS_High] in alarm ser...		WPS_RFT_XXX_026_XXX_DPRESS_High	OPS\SKPSILVA
	Medium	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	
	Medium	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	
	Medium	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	
	Low		Tuesday, May 19, 2020 12:32:58 PM	Acknowledged alarm [WPS_RVA_XXX_030_XXX_PRESSURE_Low] in alarm s...		WPS_RVA_XXX_030_XXX_PRESSURE_Low	OPS\SKPSILVA
	Medium	Normal, Acked	Tuesday, May 19, 2020 12:32:32 PM	Valley Road PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	
	Medium	In Alarm, Acked	Tuesday, May 19, 2020 12:32:13 PM	Valley Road PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	
	Low		Tuesday, May 19, 2020 12:32:13 PM	Acknowledged alarm [WPS_VAL_RTU_001_XXX_COMFAIL_Alarm] in alarm s...		WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	OPS\SKPSILVA
	Low		Tuesday, May 19, 2020 12:32:07 PM	Acknowledged alarm [WPS_ZAR_FL2_430_FLA_FLOW_Alm_Lo] in alarm ser...		WPS_ZAR_FL2_430_FLA_FLOW_Alm_Lo	OPS\SKPSILVA
	Medium	In Alarm, Acked	Tuesday, May 19, 2020 12:32:07 PM	Zarzamora PRM FL2 430 FLOW Low Alarm. Val= -0.1;	PZ0790.ZAR.FL	WPS_ZAR_FL2_430_FLA_FLOW_Alm_Lo	
	Medium	In Alarm, UnAcked	Tuesday, May 19, 2020 12:32:04 PM	Valley Road PP RTU 001 COMM Fail;	PZ0750.a_PP	WPS_VAL_RTU_001_XXX_COMFAIL_Alarm	
	Medium	In Alarm, UnAcked	Tuesday, May 19, 2020 12:32:02 PM	Roft Road BSTR 026 Discharge Pressure High Val= 76.0 Lim= 75.0;	PZ1258W.RFT	WPS_RFT_XXX_026_XXX_DPRESS_High	
	Medium	In Alarm, UnAcked	Tuesday, May 19, 2020 12:31:59 PM	Zarzamora PRM FL2 430 FLOW Low Alarm. Val= -0.1;	PZ0790.ZAR.FL	WPS_ZAR_FL2_430_FLA_FLOW_Alm_Lo	
	Medium	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	
	Medium	In Alarm, UnAcked	Tuesday, May 19, 2020 12:31:41 PM	Roosevelt PRV 030 Pressure Low Val= 58.8 Lim= 59.0;	PZ0750.a_PRV	WPS_RVA_XXX_030_XXX_PRESSURE_Low	
	Low		Tuesday, May 19, 2020 12:31:39 PM	Acknowledged alarm [WPS_TNP_RTU_001_XXX_COMFAIL_Alarm] in alarm s...		WPS_TNP_RTU_001_XXX_COMFAIL_Alarm	OPS\SKPSILVA
	Medium	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	
	High	In Alarm, UnAcked	Tuesday, May 19, 2020 12:31:37 PM	South Foster TANK EST 500 Level Indicator Transmitter Level Low Val=143.5 ...	PZ0828.FRT	WPS_FRT_EST_500_LIT_LEVEL_Low	
	Medium	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	
	Medium	In Alarm, 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	
	Medium	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 alarm s...		WPS_TNP_RTU_001_XXX_COMFAIL_Alarm	OPS\SKPSILVA
	Medium	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 alarm ...		WPS_SUT_STN_000_XXX_DOORINT_Alarm	OPS\SKPSILVA
	Medium	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 alarm s...		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 alarm s...		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	
	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	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	

1.11.11.3 *Alarm Explorer Display*

- 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.

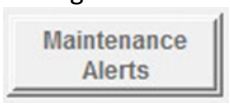


- The Alarm Status Explorer object is used to display A&E status information.
  - Alarm Explorer Display:

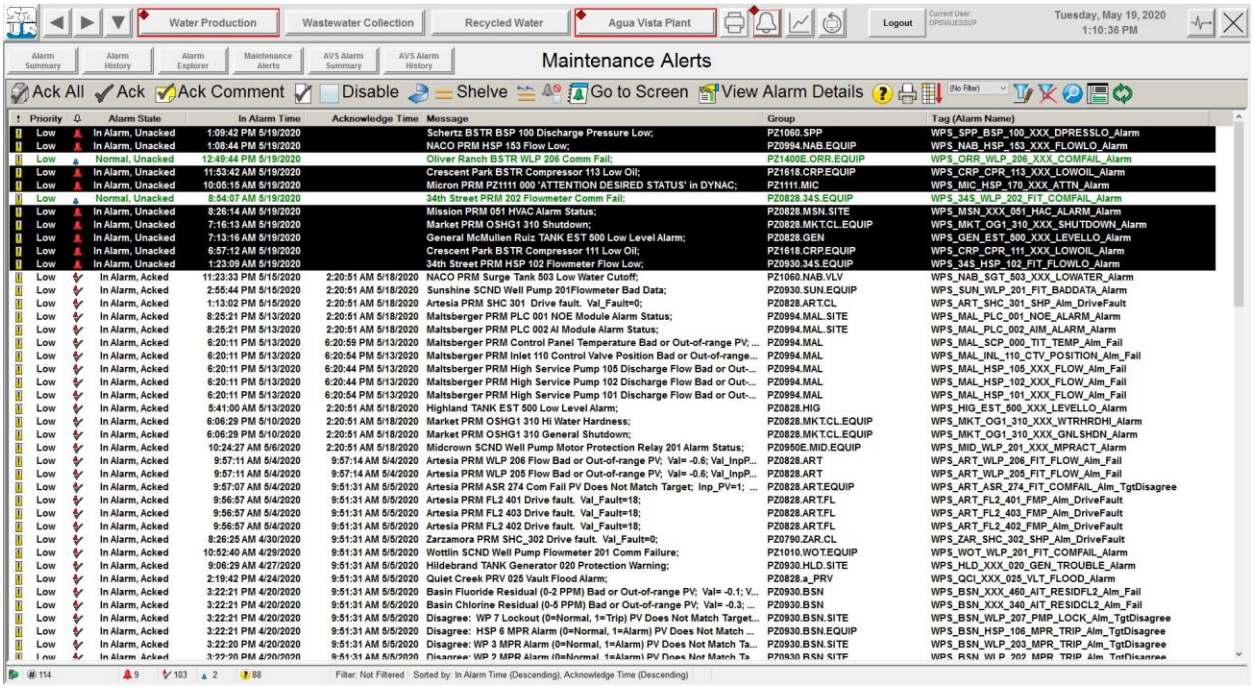


1.11.11.4 *Maintenance Alerts Display*

- 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.

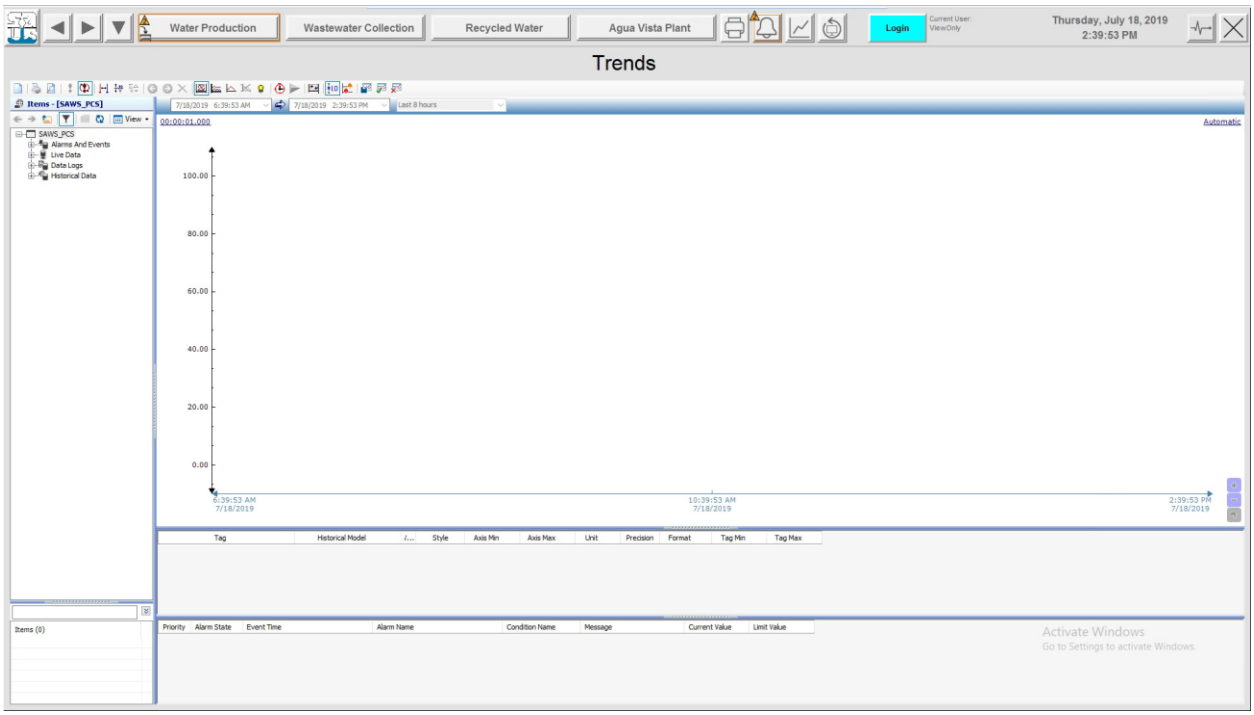


- The Alarm and Event Summary object is used and filtered to show only Low Priority Alarm information.
  - Alarm Summary Display (Filtered to show only Low Priority Alarms):



1.11.12 TREND DISPLAYS

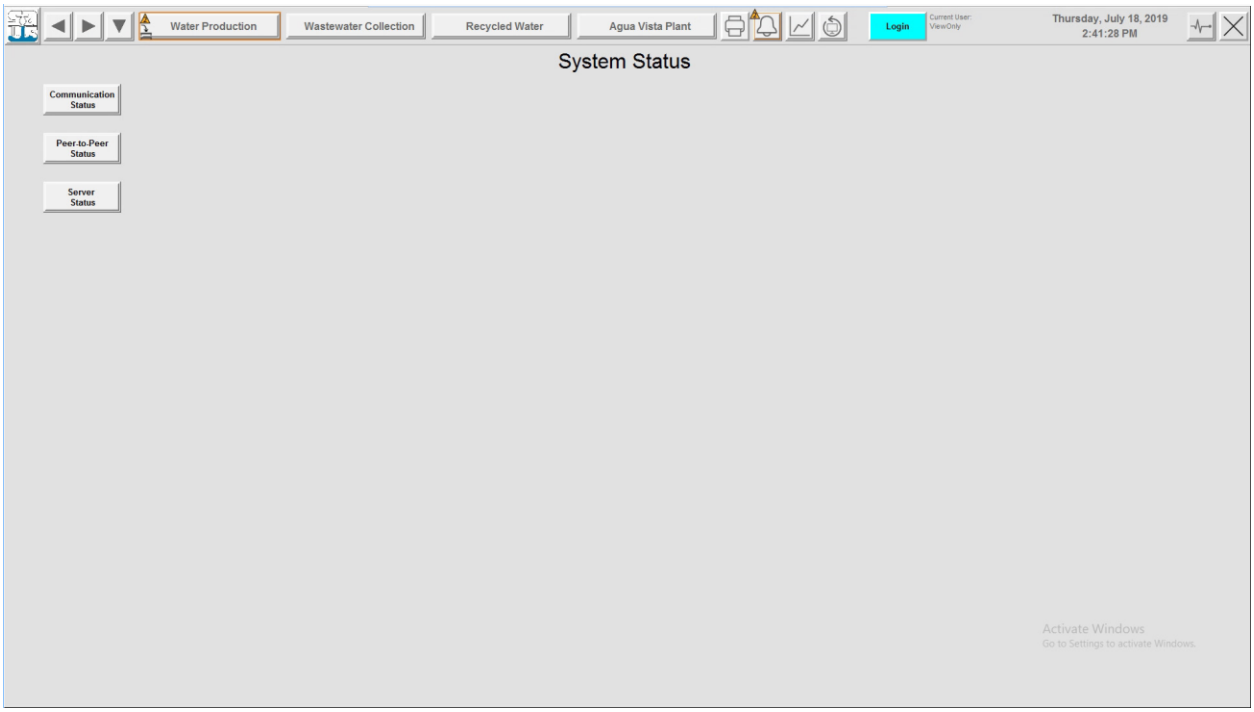
- Any value(s) being logged in Historian can be trended from this display on-demand.
- Other data sources, such as live data can be added to the trend on-demand.
- This display is accessed from the Trends Button in the Application Header.
    - Example Trend Display:



1.11.13 ADMIN DISPLAYS

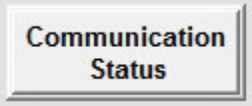
1.11.13.1 *System Status Display*

- 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:

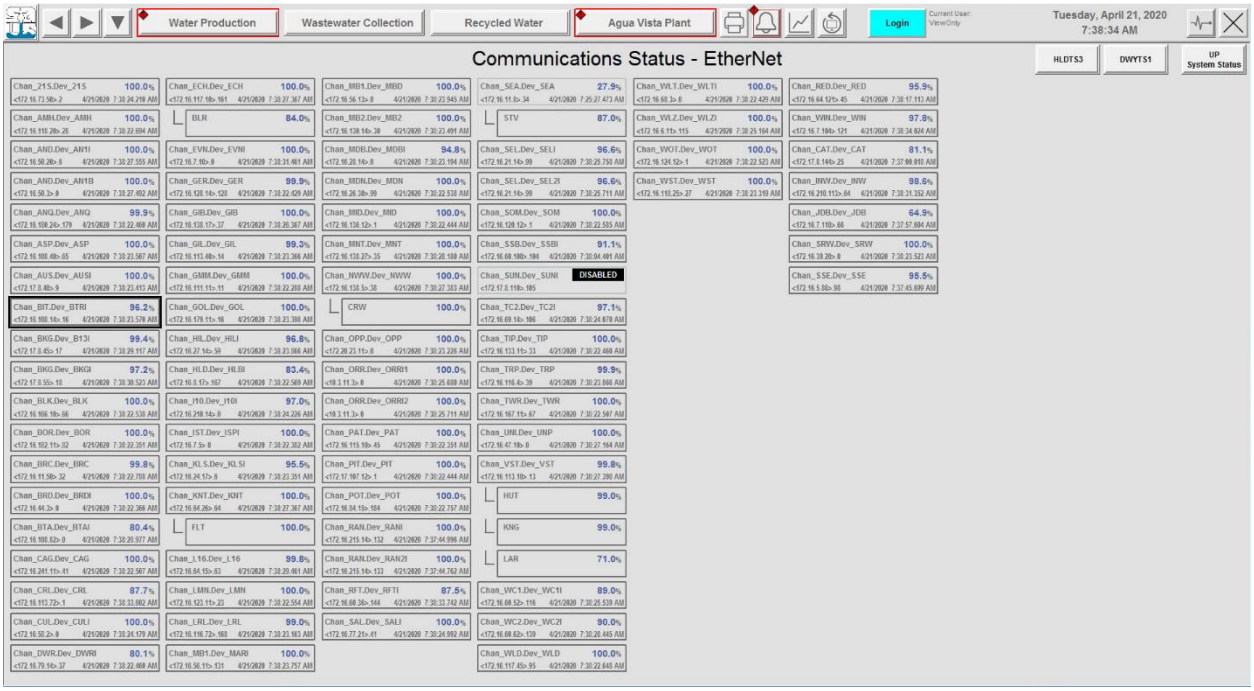


1.11.13.2 *Communication Status Display*

- 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.

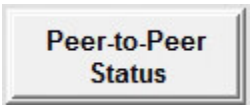


- Communication Status Display:

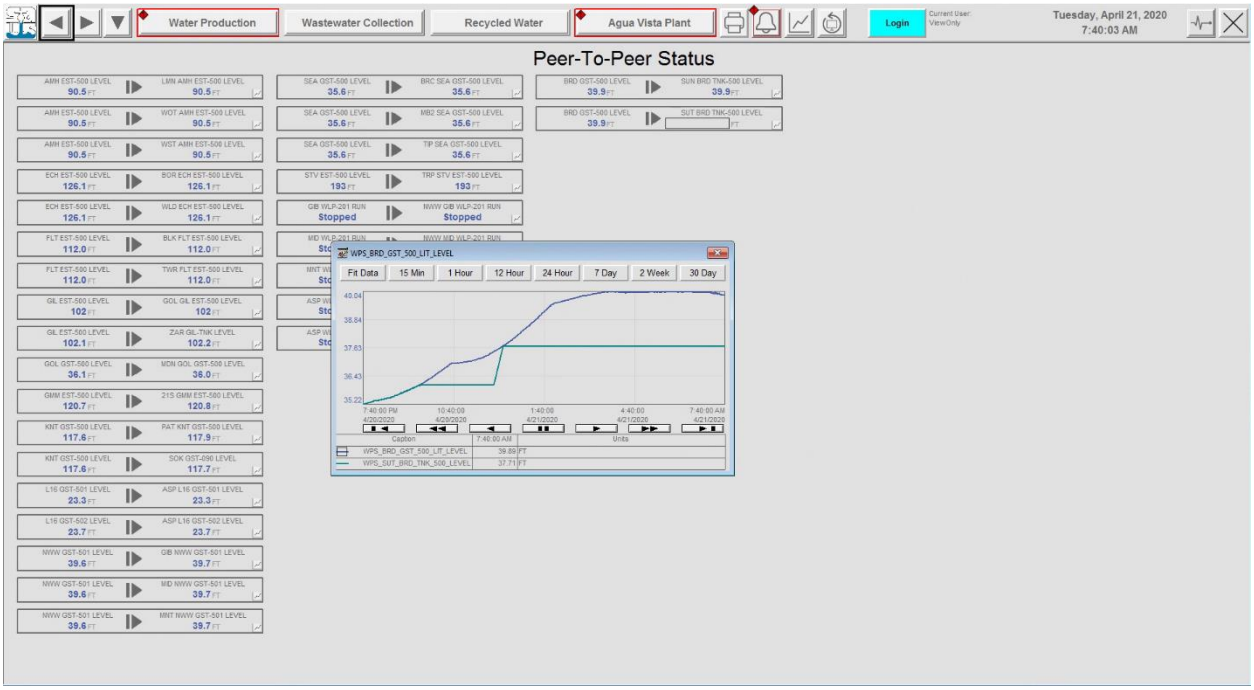


1.11.13.3 *Peer-to-Peer Status Display*

- 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.
- A trend popup is accessible for each peer-to-peer status.

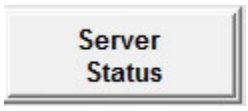


- Peer-to-Peer Status Display:

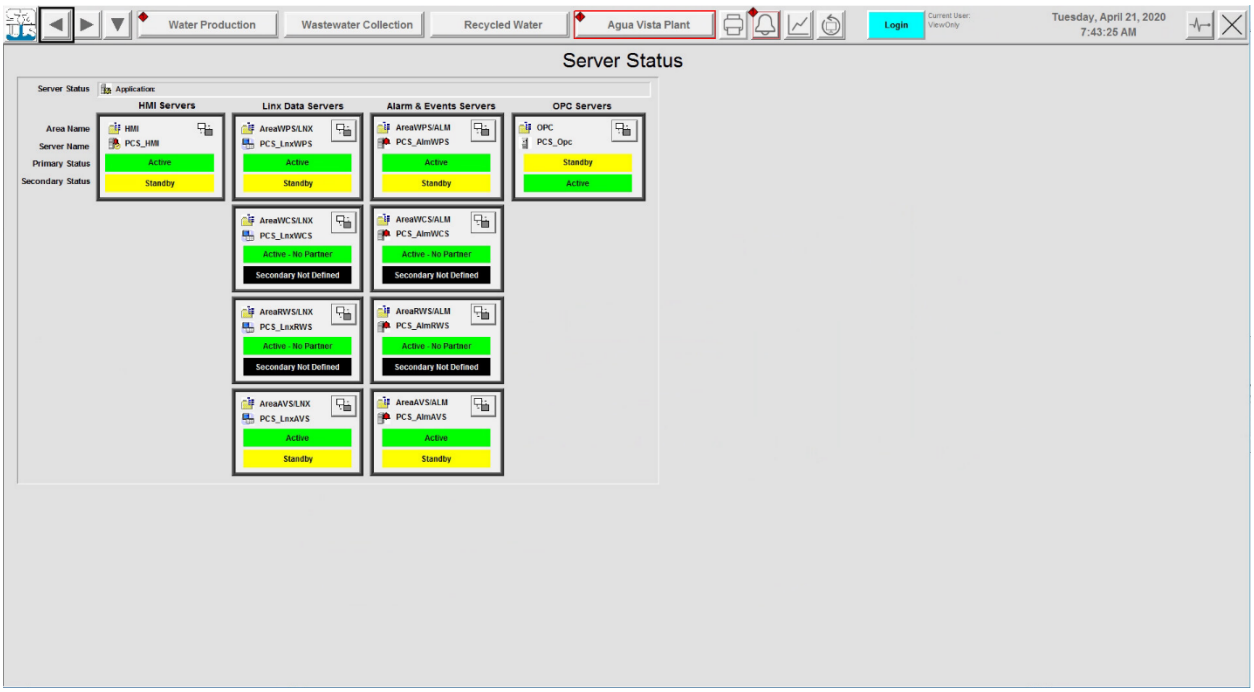


1.11.13.4 *Server Status Display*

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



- Server Status Display:



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

2.1.2 ALARM PHILOSOPHY MANUAL

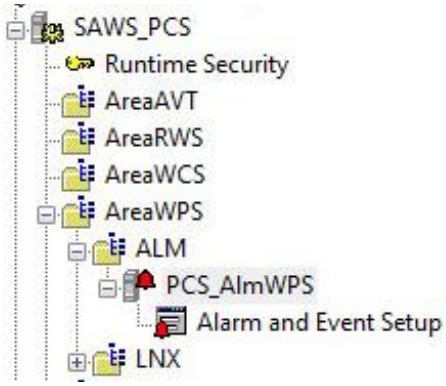
- See SAWS reference document: “SAWS Alarm Philosophy Manual”.

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_AlmWPS. The format for the name of the A&E Server is <HMI System>_Alm<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*

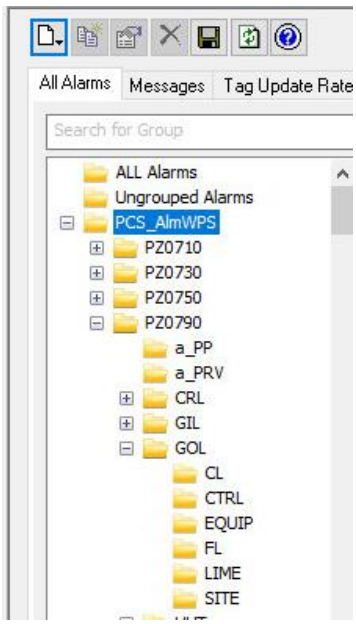
- The following A&E Alarm folder structure in Alarm and Event Setup illustrates the SAWS Standard Alarm Hierarchy:

  - *<HMI System>_Alm<Process System>*
    - *<Process Area or Zone>*
      - *<Process Sub-Area or Site>*
        - *<Subsystem Status> (ex. Chlorine, Fluoride, Lime)*
        - *<Equipment Status>*
        - *<Site Status>*
        - *<Process 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)*
        - *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)

Name	Type	Input Tag	Ack Req'd	Alarm as a Tag	Group	Alarm Class	FactoryTalk View Command
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*

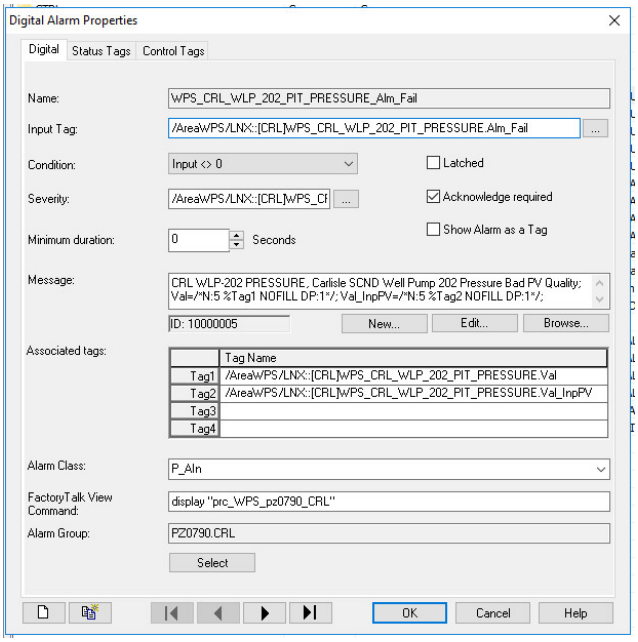
- The following example shows the formats to be used for SAWS Analog Alarms configuration within the individual Digital Alarm Properties Tabs (Digital, Status Tags, Control Tags) in the Alarm and Event Setup.

  - Analog Example:

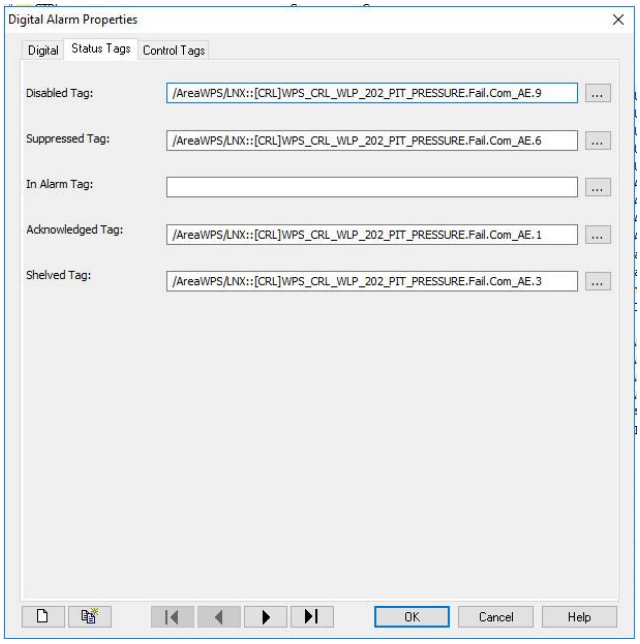
Carlisle (CRL) Pressure Fail Alarm for PIT-202 in Water Production System (WPS)

2.2.4.2.1 Digital Tab Configuration

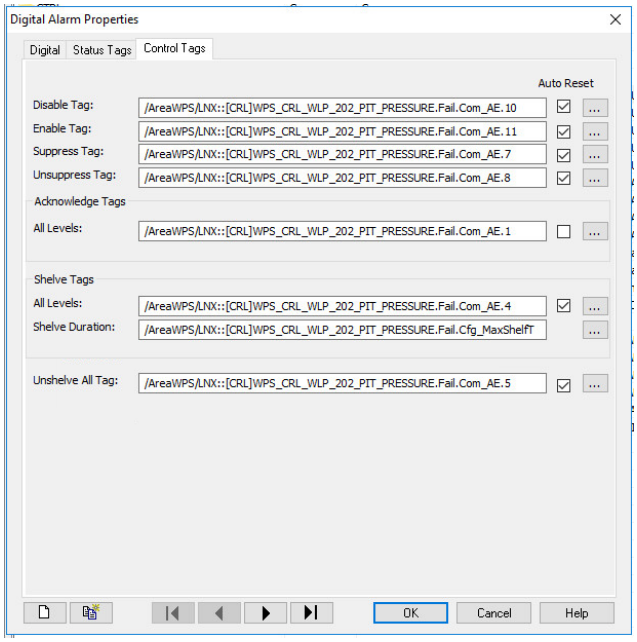
FactoryTalk View Command Examples
display “prc_[AAA]_[AREA]_AAA /cc
display “prc_[AAA]_[AREA]_AAA /cc;pause 1;display “prc_[AAA]_[AREA]_AAA_site /cc



2.2.4.2.2 Status Tags Tab Configuration



2.2.4.2.3 Control Tags Tab Configuration



2.2.4.3 *PlantPAx Digital Alarm Properties for Discrete Alarms*

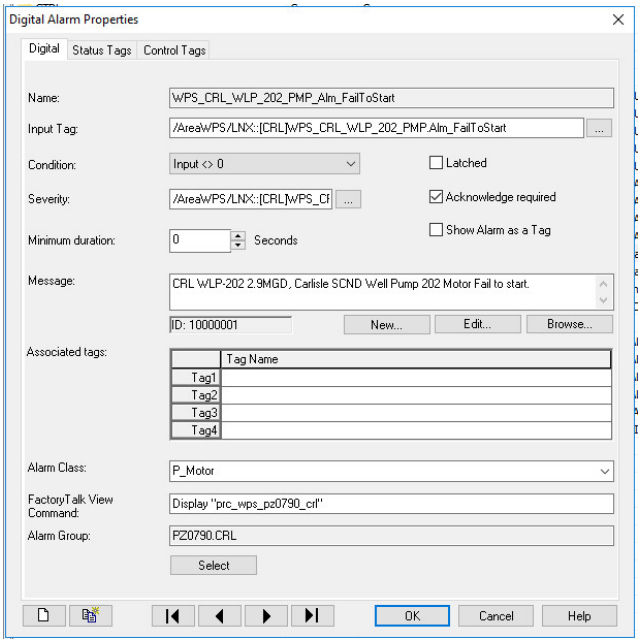
- The following example shows the formats to be used for SAWS Discrete Alarms configuration within the individual Digital Alarm Properties Tabs (Digital, Status Tags, Control Tags) in the Alarm and Event Setup.

  - Discrete Example:

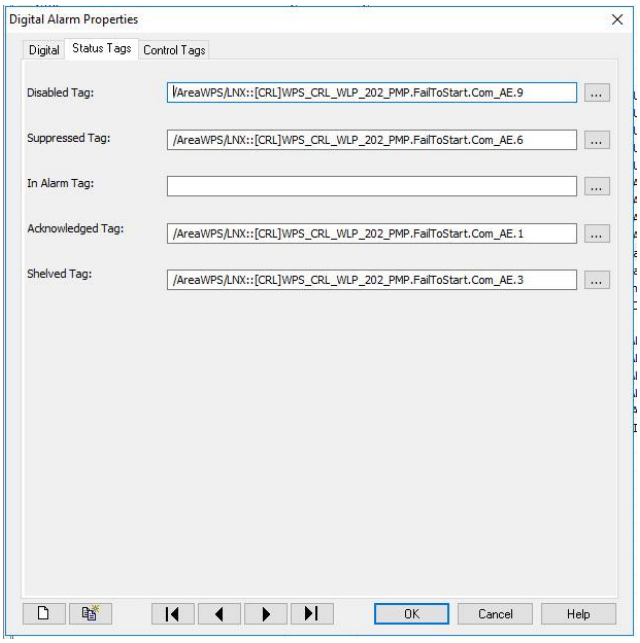
Carlisle (CRL) Pump-202 Fail to Start Alarm in Water Production System (WPS)

2.2.4.3.1 Digital Tab Configuration

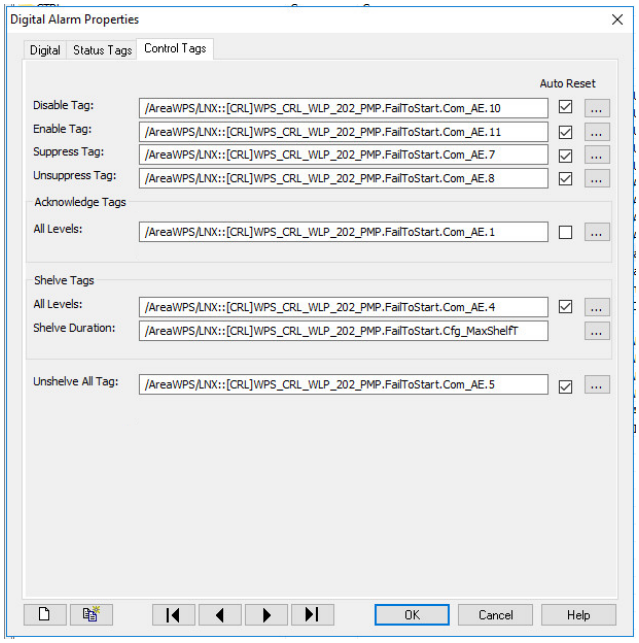
FactoryTalk View Command Examples
display “prc_[AAA]_[AREA]_AAA” /cc
display “prc_[AAA]_[AREA]_AAA” /cc;pause 1;display “prc_[AAA]_[AREA]_AAA_site” /cc



2.2.4.3.2 Status Tags Tab Configuration



2.2.4.3.3 Control Tags Tab Configuration



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.

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

3. NON-PLANTPAX GRAPHICS

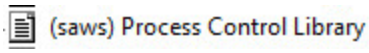
3.1 OVERVIEW

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.



3.2 TRENDS

3.2.1 TRENDS IN PROCESS GRAPHICS

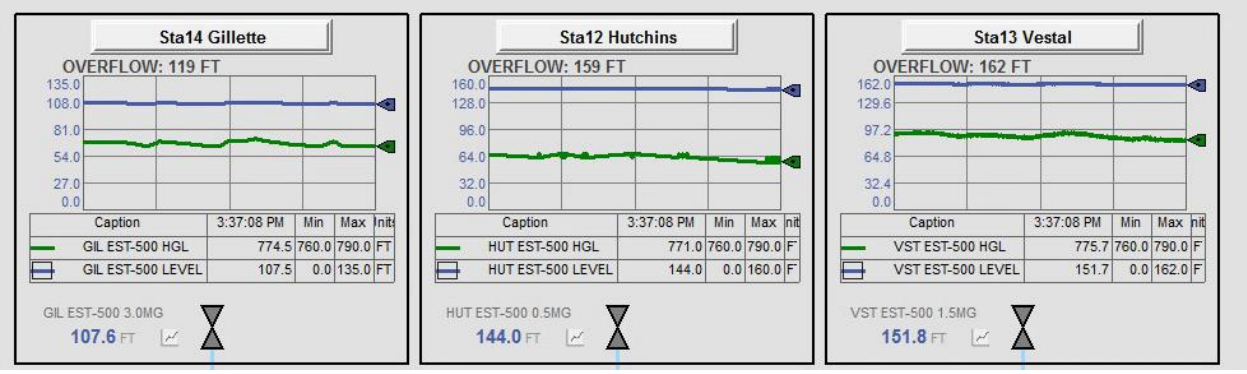
- Non-Plant PAx Trends are used throughout the application on displays, including Overview Displays, Site/Area Displays, and on Process Trend Displays.
    - These trends use the standard FTView 'Trend' object.

3.2.1.1 *System Applicability*

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

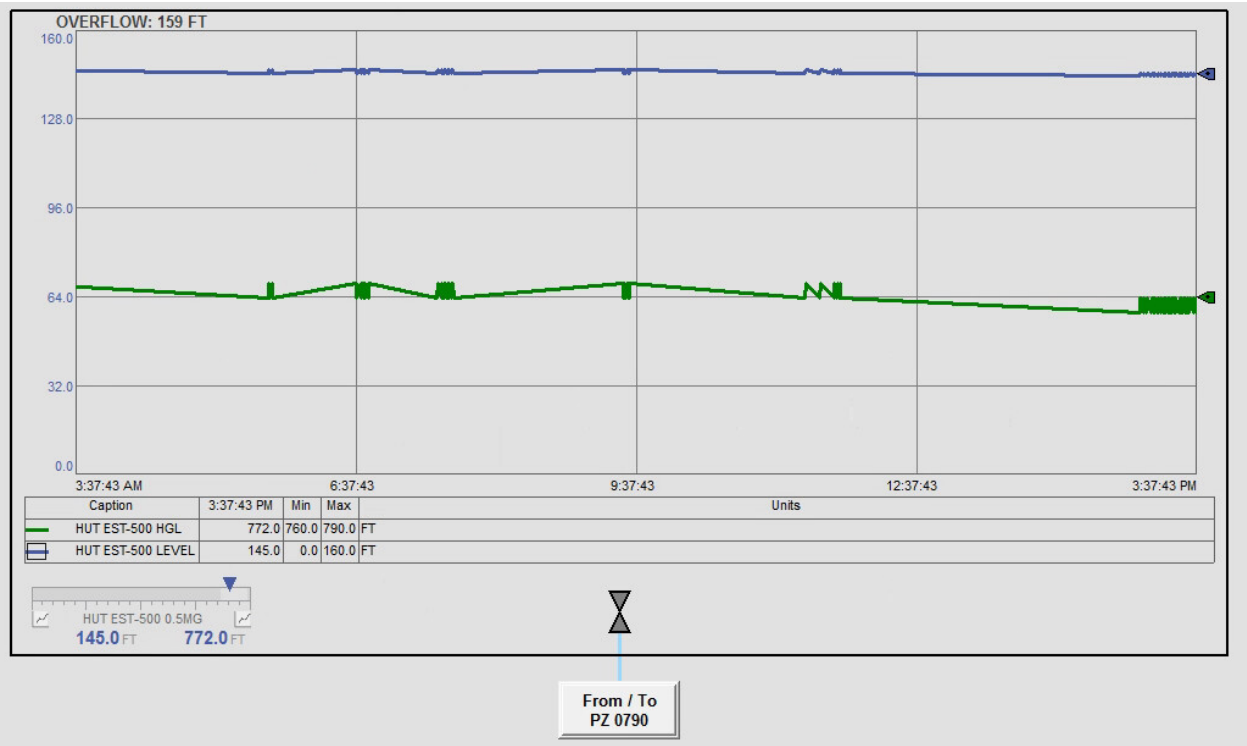
3.2.2 OVERVIEW DISPLAY TRENDS

- 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.



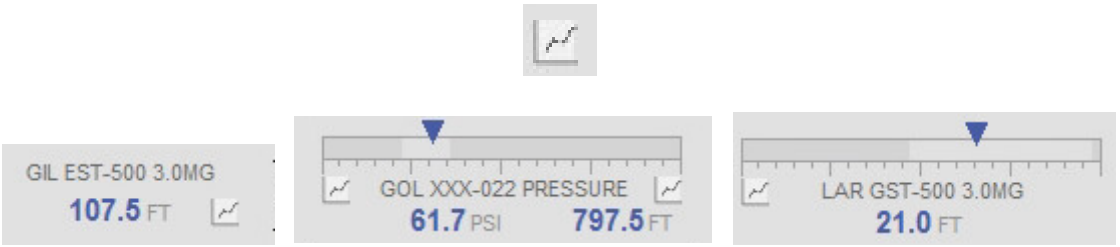
3.2.3 SITE/AREA DISPLAY TRENDS

- 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.

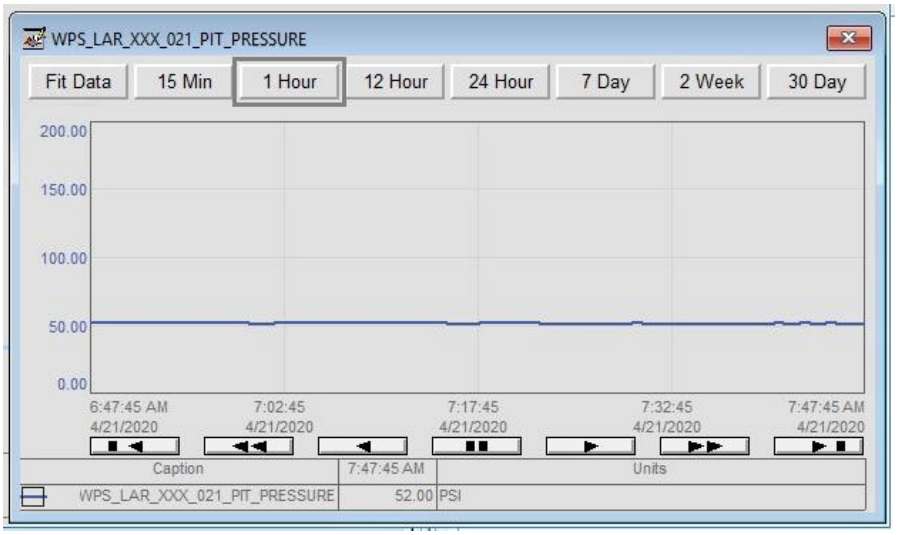


3.2.4 PROCESS VALUE TRENDS

- 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.



3.3 STATUS INDICATORS

3.3.1 SERVICE STATUS.

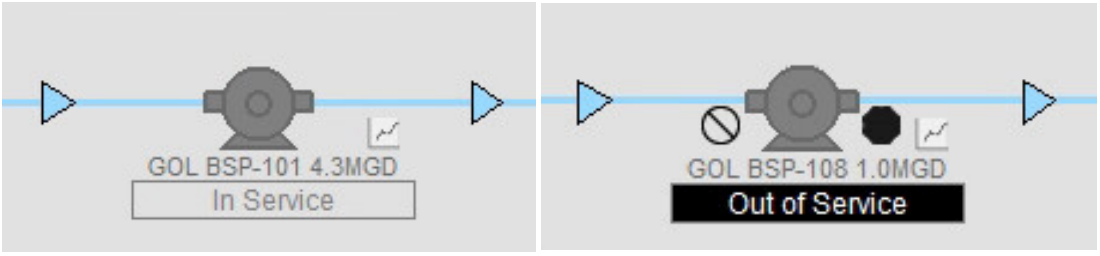
- A custom service status graphic object is added below each motor display element within the graphic area.
- This graphic can be found in the SAWS Out of Service Library in the SAWS Process Objects Library under Graphics\FTView SE\Global Objects.
    - (SAWS) Out of Service Library

3.3.1.1 *System Applicability*

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

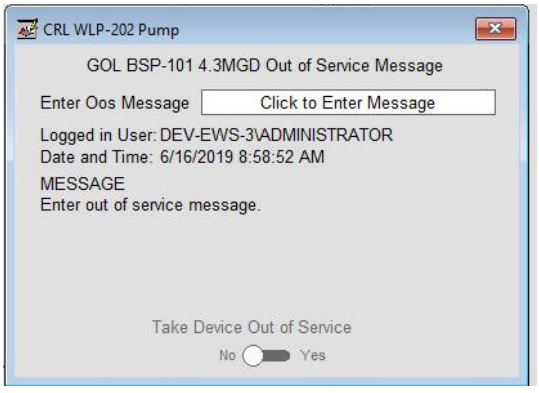
3.3.1.2 *Service Status Popup*

- 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.



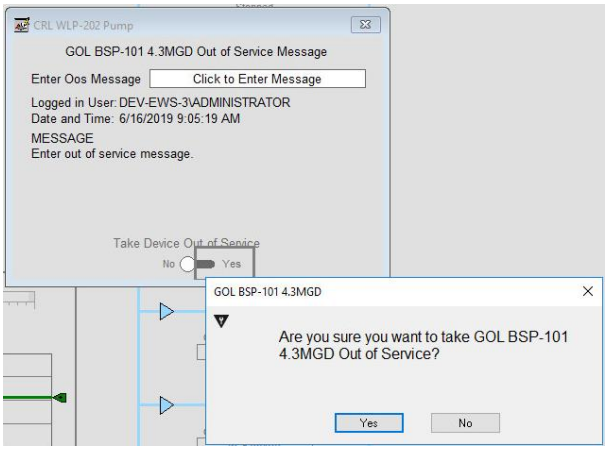
P_Motor Service Status showing In Service and Out of Service status

- 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.



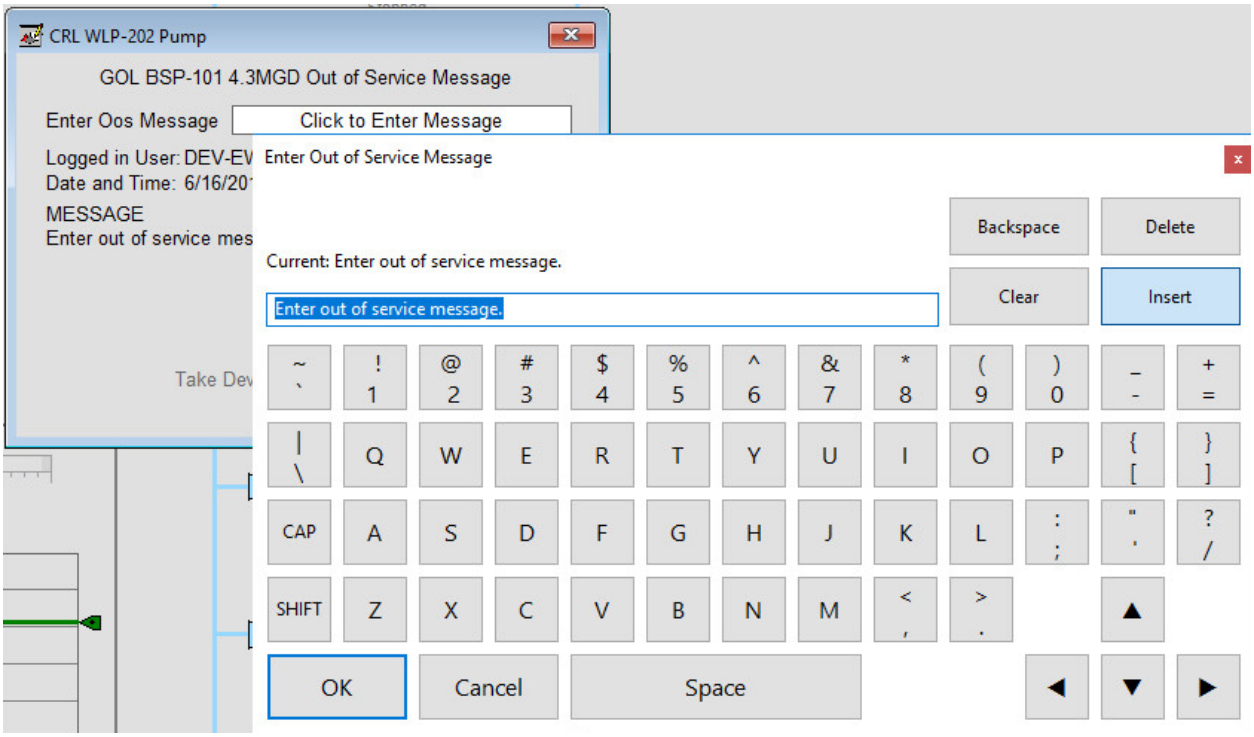
P_Motor Service Status selection switch

- 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.'



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

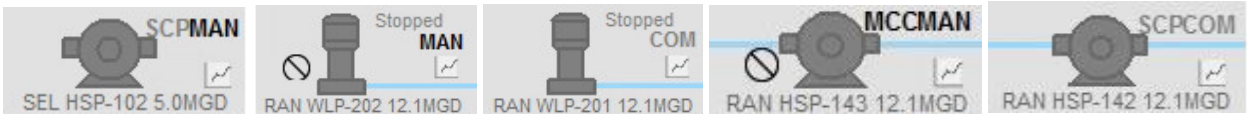
3.3.2.2 *Switch Positions*

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

'HOA' Field Switch Status

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



HOA Switch Position Status with Pump Graphic

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.

3.3.3.1 *System Applicability*

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

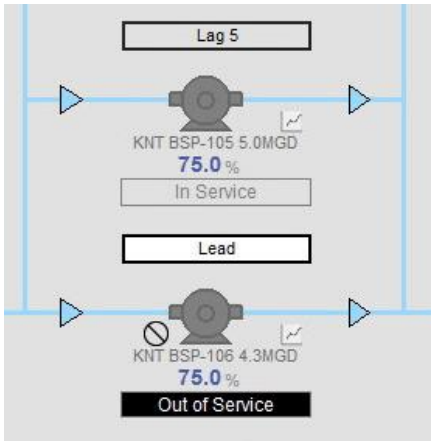
3.3.3.2 *Lead/Lag Status Graphic Elements*

- 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 Duty	Motor Element is in Lead or Duty
2 - 9	Lag # Standby 1	Motor Element is in Lag1-8 or Standby (where # Position)

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.

3.3.4.1 *System Applicability*

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

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

3.3.4.2.1 PLC Status and Communication Expressions

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

No.	Expression
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

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.

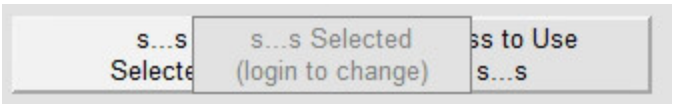
3.4 PROCESS CONTROL AND STATUS ELEMENTS

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

3.4.1.1 *System Applicability*

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

3.4.1.2 *Examples*

Graphic	Description
	Momentary reset command. Sets tag to 1, waits 5 seconds and then sets to 0.
	Momentary command. Sets tag to 1, waits 30 seconds and then sets to 0.
	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.
	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.
	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

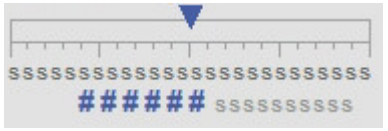
Generic elements are used in place of a PlantPAx element when a value requires displaying only.

3.5.1 GENERIC ELEMENTS

3.5.1.1 *System Applicability*

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

3.5.1.2 *Examples*

Graphic	Description
	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.
	Numeric Indicator and scale bar with Description. Displays a numeric value. Configuration options include number of decimals and engineering units up to 8 characters.
	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

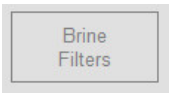
- Static items, including process and equipment-related items, are detailed in this section.

3.6.1.1 *System Applicability*

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

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

Static Process Area Indicators

3.6.1.3 *Process Equipment (No Process Feedback)*

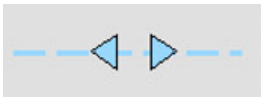
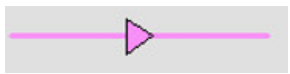
- These graphics are used for static process equipment indication.
  - The following example graphics have been developed:

Graphic	Description
	Static Free-flowing Well
	Static Booster Pump
	Static Well Pump
	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

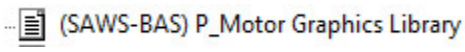
4.1 OVERVIEW

4.1.1 APPLICATION

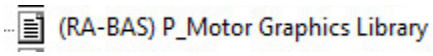
- These graphics are from the PlantPAx libraries. Any customizations that have been made to these graphics are indicated for each approved graphic element. Elements that are not yet approved or applicable to any SAWS Systems are provided as placeholders for future expansion of these standards (these 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.



    - 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 Systems	Process Systems	Application/Scope	SAWS Std
☑	PCS	ALL	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.

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.).
  - ➔ The following symbols were modified:

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

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 Systems	Process Systems	Application/Scope	SAWS 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*

- 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 Applicability*

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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 Applicability*

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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	/cc	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 Systems	Process Systems	Application/Scope	SAWS 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

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*

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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*

- 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 Systems	Process Systems	Application/Scope	SAWS 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*

- 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:
  - P_[AOI Name]-Advanced
  - P_CmdSrc
  - P_Alarm
  - P_Gate

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 *P_AIn*.

4.3.3.1 *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. **See Process Value Trends under the Non-PlantPAx Graphics section of this document for details on adding trends for selected value types.**	☑

4.3.3.2 *Display Elements*

- The standard display elements are listed in the table below.
- A custom horizontal graphic has been created for [1]Analog 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 Graphics Library	GO_P_AIn_Indicator_HOR_wTrend		[1]Analog Input Values (PCS) Option 1
(SAWS-BAS) P_AIn Graphics Library	GO_P_AIn_Indicator_H_wHGL_wTrend		[1]Analog Input Values (PCS) with HGL Option 2
(SAWS-BAS) P_AIn Graphics Library	GO_P_Ain_wTrend		[1]Analog Input Values (PCS) 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	/cc	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 *P_AIn*.

4.3.5.1 *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. **See Process Value Trends under the Non-PlantPAx Graphics section of this document for details on adding trends for selected value types.**	☑

4.3.5.2 *Display Elements*

- The standard display elements are listed in the table below.
- A custom horizontal graphic has been created for [1]Dual 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		[1]Dual Analog Input Values (PCS) Option 1
(SAWS-BAS) P_AIn Graphics Library	GO_P_AInDual_Indicator_H_wHGL_wTrend		[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
#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 *P_AIn*.

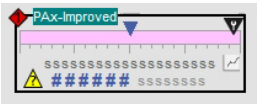
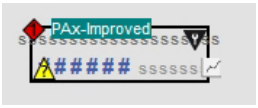
4.3.6.1 *System Applicability*

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. **See Process Value Trends under the Non-PlantPAx Graphics section of this document for details on adding trends for selected value types.**	☑

4.3.6.2 *Display Elements*

- The standard display elements are listed in the table below.
- A custom horizontal graphic has been created for [1]Analog 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 Graphics Library	GO_P_AIn_Indicator_HOR_wTrend		[1]Analog Input Values (PCS) Option 1
(SAWS-BAS) P_AIn Graphics Library	GO_P_AIn_Indicator_H_wHGL_wTrend		[1]Analog Input Values (PCS) with HGL Option 2
(RA-BAS) P_AIn Graphics Library	GO_P_Ain_wTrend		[1]Analog Input Values (PCS) 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	/cc	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*

- 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*

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.	☑

4.3.7.2 *Display Elements*

- The standard display elements are listed in the table below.
- 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		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 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.	☑

4.3.9.2 *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*

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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	/cc	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

4.4.8 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
  - P_CmdSrc
  - P_Alarm
- Optional Links:
  - P_Perm
  - P_Intlk

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:
  - P_Perm (not used for HO elements)
  - P_Intlk
  - P_Runtime
  - 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.

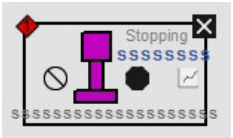
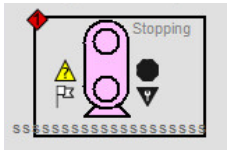
4.5.2.1 *System Applicability*

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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).	☑

4.5.2.2 *Display Elements*

- A custom motor graphic has been created for [1]Well 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		[1]Well Pumps (PCS)
(saws-legacy) P_Motor Graphics Library Currently Legacy Only	*GO_P_MOT3_Pump_VERT		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		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	/cc	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.

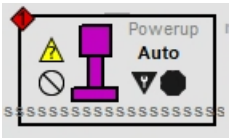
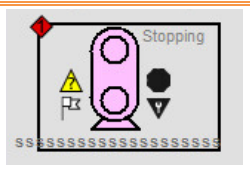
4.5.5.1 *System Applicability*

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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*

- A custom motor graphic has been created for [1]Well 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		High Service and Booster Pumps (PCS)
(SAWS-BAS) P_MotorHO Graphics Library	GO_P_MotorHO_Pump_WLP_MCCMAN		1Well Pumps (PCS)
(SAWS-BAS) P_MotorHO Graphics Library	GO_P_MotorHO_Pump_LS_Vertical		Lift Station Pumps Vertical (PCS)
(SAWS-BAS) P_MotorHO Graphics Library	GO_P_MotorHO_Pump_LS_Submersible		Lift Station Pumps Submersible (PCS)
(RA-BAS) P_MotorHO Graphics Library	GO_P_MotorHO_RPump_U		Air Compressors (PCS)
(SAWS-BAS) P_MotorHO Graphics Library	GO_P_MotorHO_Pump_CHEM_MCCMAN		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

Parameter	Required Value	Description
#120	/cc	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.

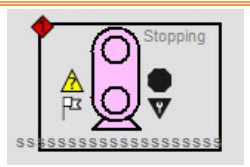
4.5.7.1 *System Applicability*

Applies	HMI Systems	Process Systems	Application/Scope	SAWS Std
☑	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.	☑
☑		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.	☑

4.5.7.2 *Display Elements*

- A custom motor graphic has been created for [1]Well 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		High Service and Booster Pumps (PCS)
(SAWS-BAS) P_VSD Graphics Library	GO_P_VSD_Pump_WLP_MCCMAN		1Well Pumps (PCS)
(RA-BAS) P_VSD Graphics Library	GO_P_VSD_RPump_U		Air Compressors (PCS)
(SAWS-BAS) P_VSD Graphics Library	GO_P_VSD_Pump_CHEM_MCCMAN		Chemical Pumps (PCS)

4.5.7.3 *Global Object Parameters*

- 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 Systems	Process Systems	Application/Scope	SAWS Std
☑	PCS	WPS	All AB PowerFlex 755 VFD drives (coordinate with SAWS for use of PowerFlex 523/525 and 753 drives).	☑
☑		WCS	All AB PowerFlex 755 VFD drives (coordinate with SAWS for 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	/cc	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_E300OVLD)~~

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.

4.5.16.1 *System Applicability*

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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

Parameter	Required Value	Description
#120	/cc	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

4.5.17.1 *System Applicability*

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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

Parameter	Required Value	Description
#120	/cc	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:
  - P_Perm (not used for Valve C or HO elements)
  - P_Intlk (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.

4.6.2.1 *System Applicability*

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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 Systems	Process Systems	Application/Scope	SAWS 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	/cc	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.

4.6.4.1 *System Applicability*

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

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	/cc	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.

4.6.6.1 *System Applicability*

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

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.

4.6.7.1 *System Applicability*

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

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	/cc	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

4.7.1 Proportional + Integral + Derivative Enhanced (PIDE) Autotune

4.7.2 Coordinated Control (CC)

4.7.3 Internal Model Control (IMC)

4.7.4 Modular Multivariable Control (MMC)

4.7.5 Proportional + Integral + Derivative Enhanced (PIDE)

4.7.6 Ramp/Soak (RMPS)

4.7.7 Totalizer (TOT)

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

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-UM003 PlantPAx 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

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

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

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

innovation | solutions | support

Corporate Headquarters
8440 Florin Road
Sacramento, CA 95828
Ph: 916.395.8800
Fax: 916.429.2817

Regional Offices
Central CA
1315-B Dayton St.
Salinas, CA 93901
831.754.6838

Southern CA
42015 Remington Ave.
Suite 102
Temecula, CA 92590
951.308.6450

Northwest
5250 High Banks Rd.
Suite 440
Springfield, OR 97477
800.94.TESCO

Nevada
213 Sage St.
Carson City, NV 89706
800.94.TESCO

Southeast
10699 Airline Hwy.
Suite B
Baton Rouge, LA 70816
800.94.TESCO

APPENDIX B - APPLICATION SERVICES

SAWS PLC Software Configuration Standards

TESCO®
CONTROLS, INC.

PLC SOFTWARE CONFIGURATION STANDARDS

REVISION: JANUARY 2023

DEVELOPED FOR: **SAN ANTONIO WATER SYSTEM (SAWS)**
DEVELOPED BY: **TESCO CONTROLS**

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

TABLE OF **CONTENTS**

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

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 HISTORY

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 1.6.6.3 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	AUTHOR(S)	REVISION NOTES	CM FORM
.			

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

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 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.

System Applicability (Current Revision)

Applies	HMI Systems	Process Systems	Application/Scope	SAWS 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	

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

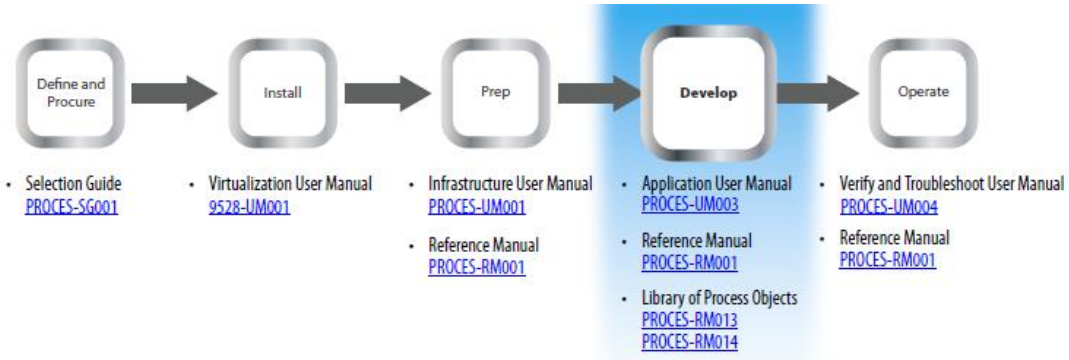
SCOPE

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.



[1]PlantPAx 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-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.

TERM /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.

TERM /ACRONYM	DEFINITION /DESCRIPTION
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 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 (global objects), and faceplates that let you quickly assemble large applications with proven 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)
- 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)
- 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 Systems	Process Systems	Application/Scope	SAWS 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
  - 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*

- 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.
- 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)

- The Tag Name is determined using the convention detailed below.
- 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

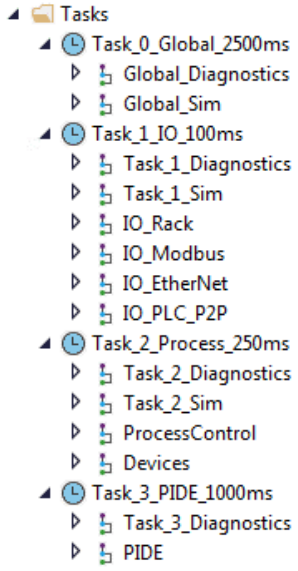
1.3.6 Program, Task, Routine, and Sheet Naming

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

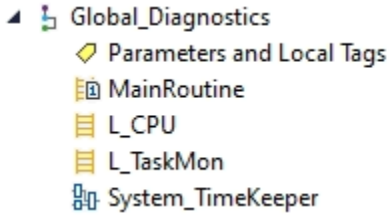
1.3.6.2 *Program Name*

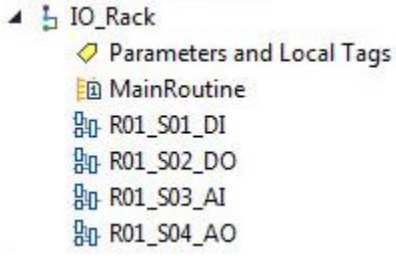
- Use the following naming conventions for Programs:
  - Program names should be concise yet indicative of the type of AOI object routines contained within each.
  - Some examples are shown below and organized by Task (note that this is not inclusive of each Program needed and should be used a guideline):

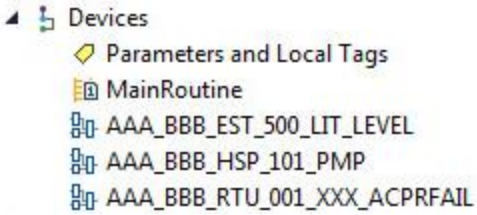


1.3.6.3 *Routine Name (LLD & FBD)*

- 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):







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 Systems	Process Systems	Application/Scope	SAWS 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 Systems	Process Systems	Application/Scope	SAWS 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
  - 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 Systems	Process Systems	Application/Scope	SAWS 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):

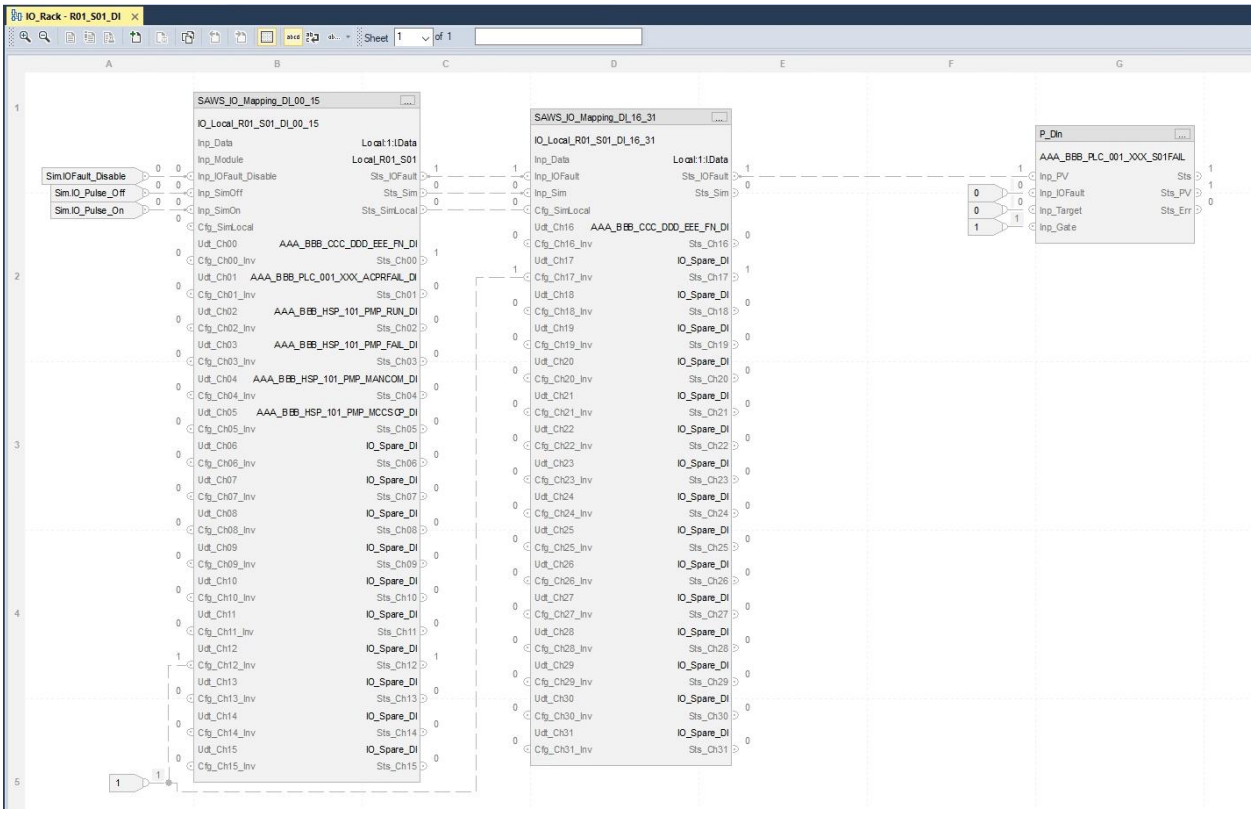
Task	Priority	Program Type(s)
Task_0_GlobalDiagnostics_2500ms	4	Global Diagnostics
Task_1_IO_100ms	2	IO_Mapping (Rack, Modbus, EtherNet, PLC-P2P)
Task_2_Process_250ms	1	Device Objects (AOIs ex. P_Motor, P_AIn, Etc.)
		Process Control
Task_3_PIDE_1000ms	3	PIDE Logic

1.6.5 IO MAPPING

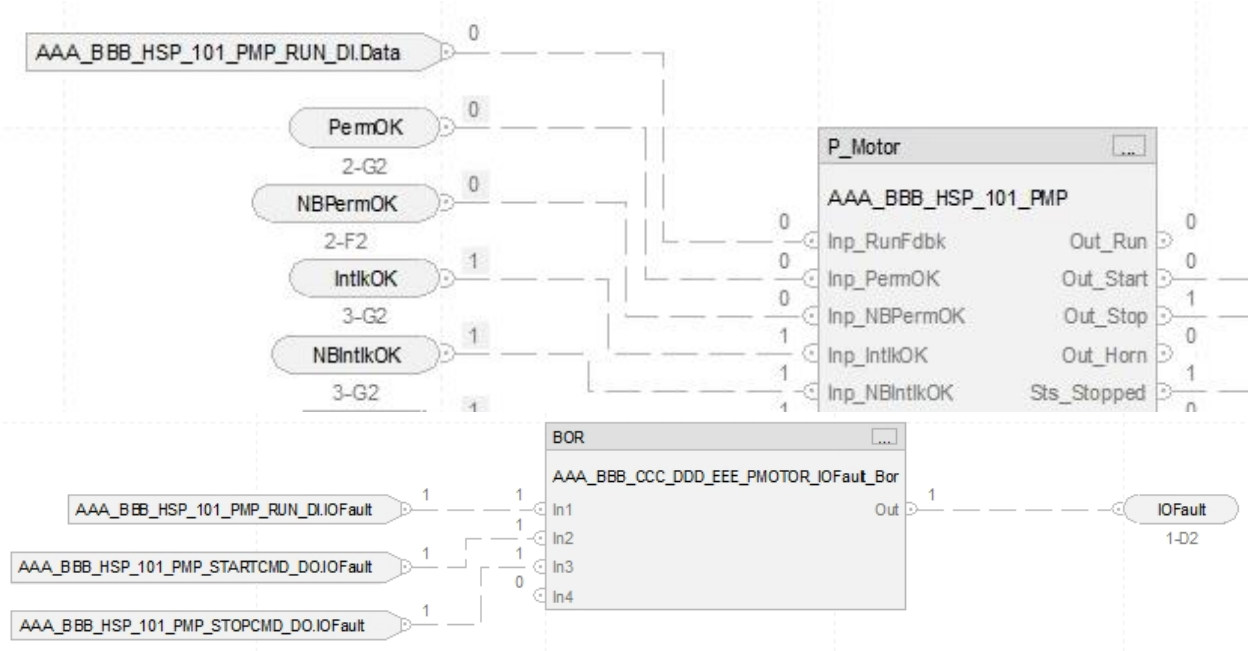
- The IO Mapping routine is used to map the physical IO to the AOI parameters within the Objects.
- Rack IO Mapping is accomplished with AOI's and corresponding IO UDT's.
- The AOI's are specific to analog card types and generic for digital cards. The following AOI's are supplied by SAWS:
    - SAWS_IO_Mapping_AI_1769_IF8
        - (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
    - 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.

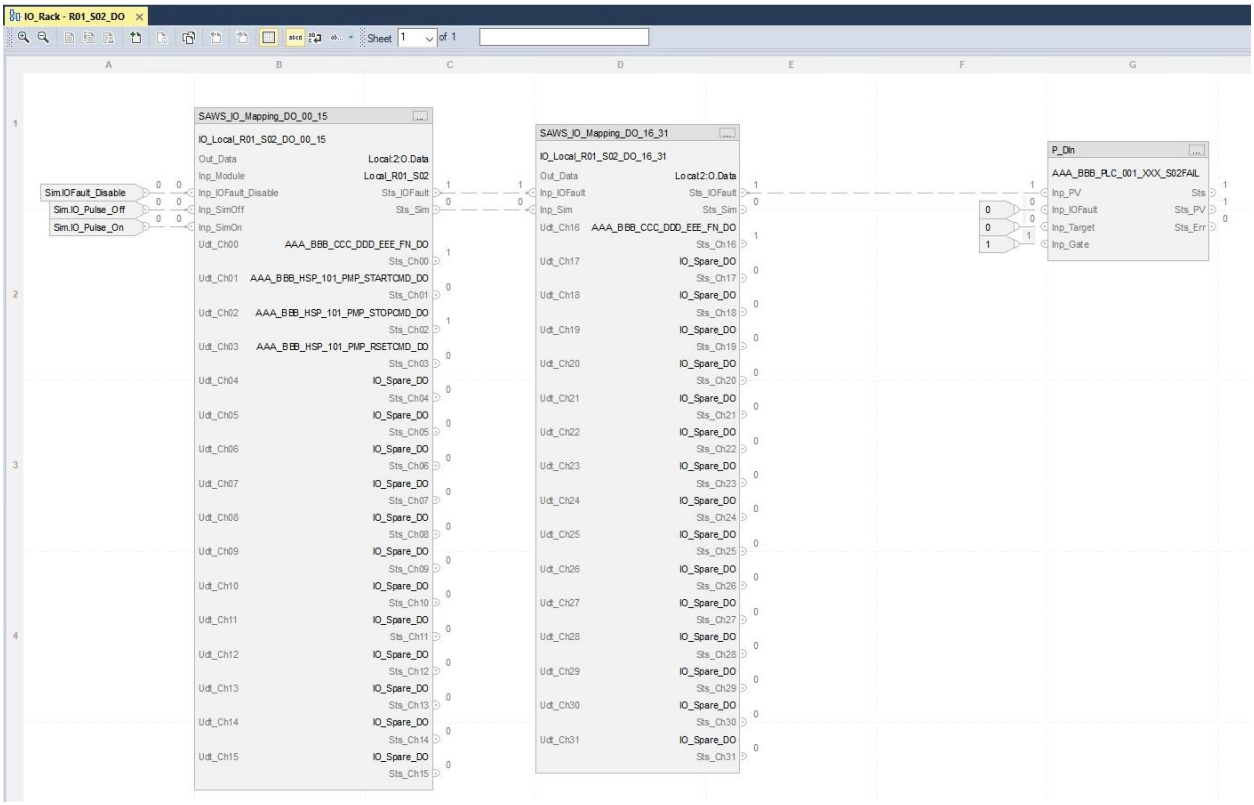
1.6.5.1 *Digital Inputs Example Mapping:*



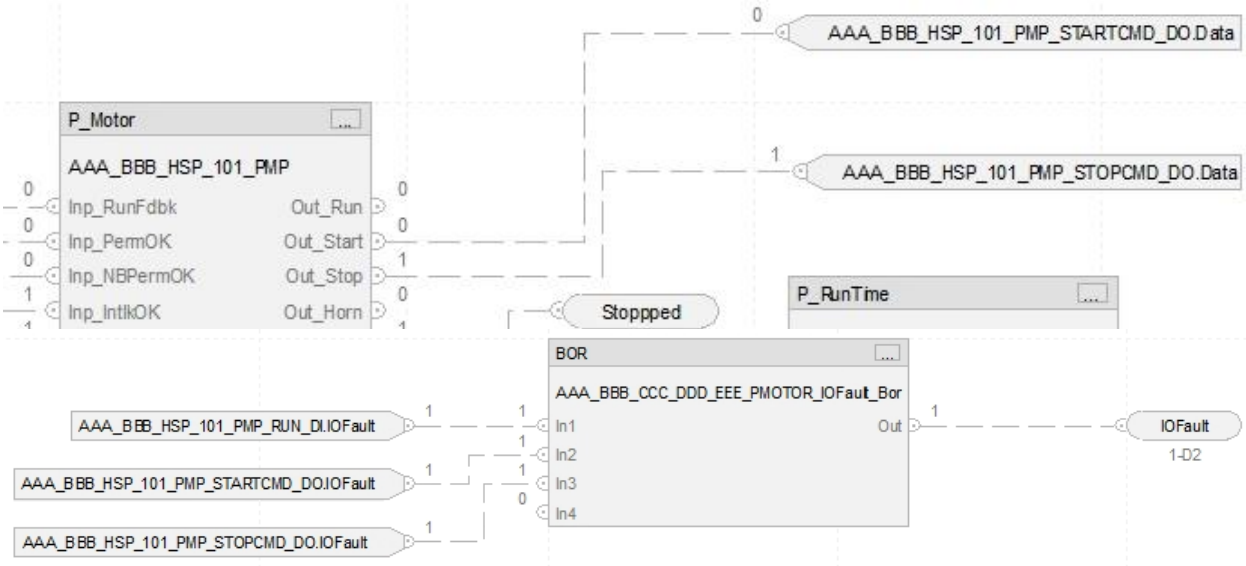
1.6.5.2 *Digital Input Example Usage:*



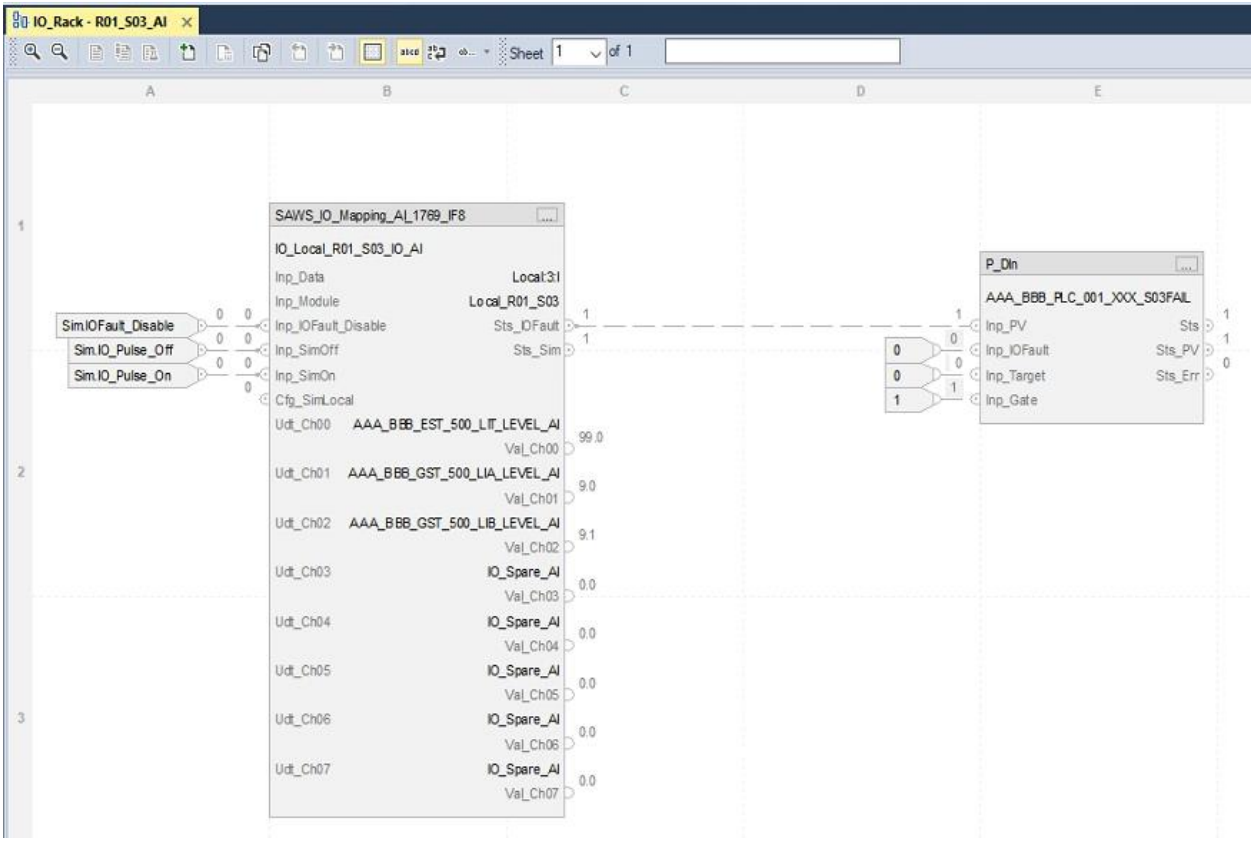
1.6.5.3 *Digital Outputs Example Mapping:*



1.6.5.4 *Digital Output Example Usage:*

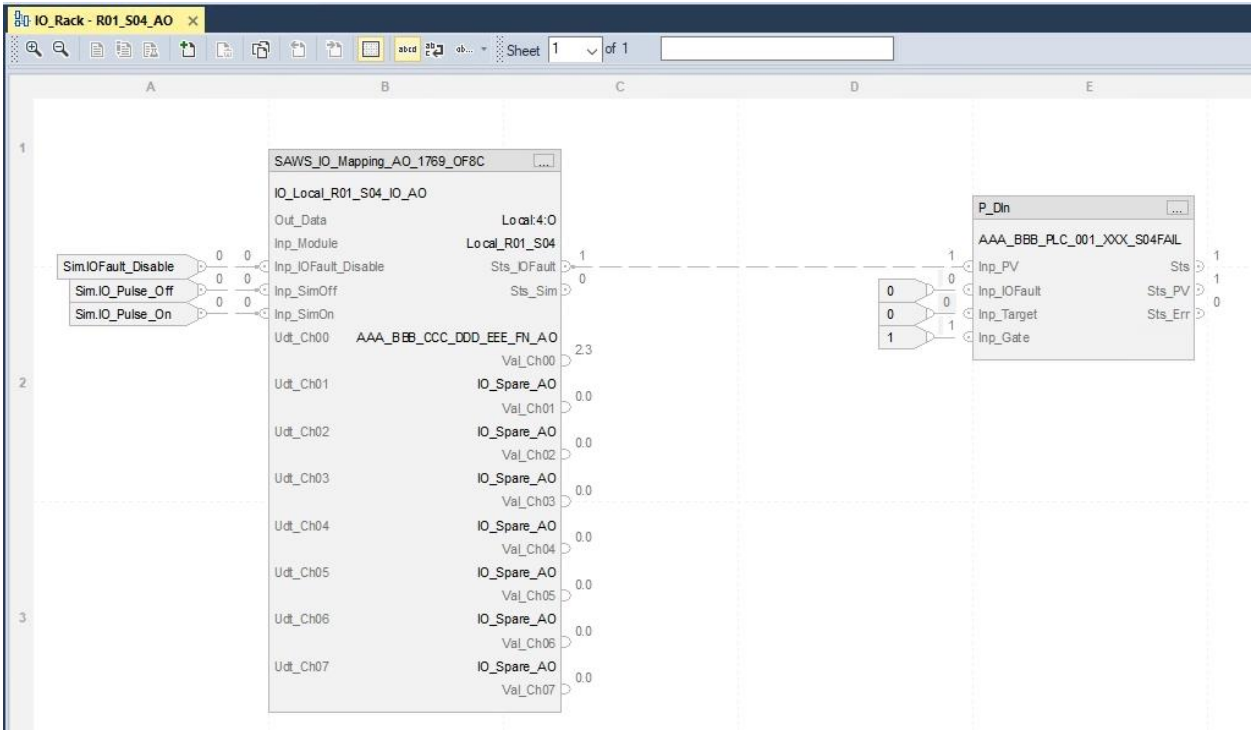


1.6.5.5 *Analog Inputs Example Mapping:*

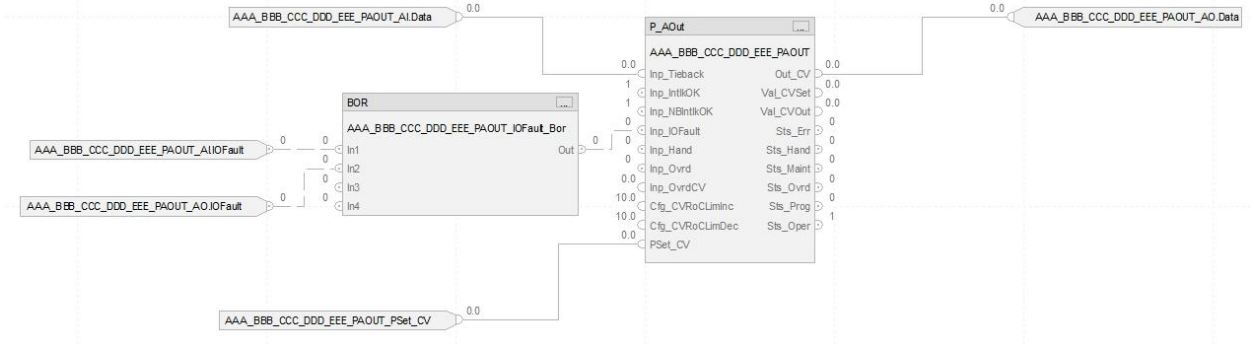


1.6.5.6 *Analog Input Example Usage:*

1.6.5.7 *Analog Outputs Example:*



1.6.5.8 *Analog Output Example Usage:*

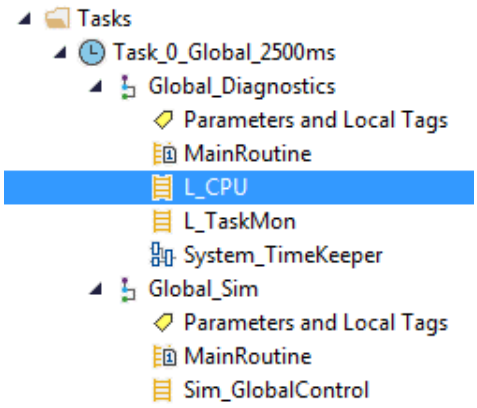


1.6.6 GLOBAL DIAGNOSTICS

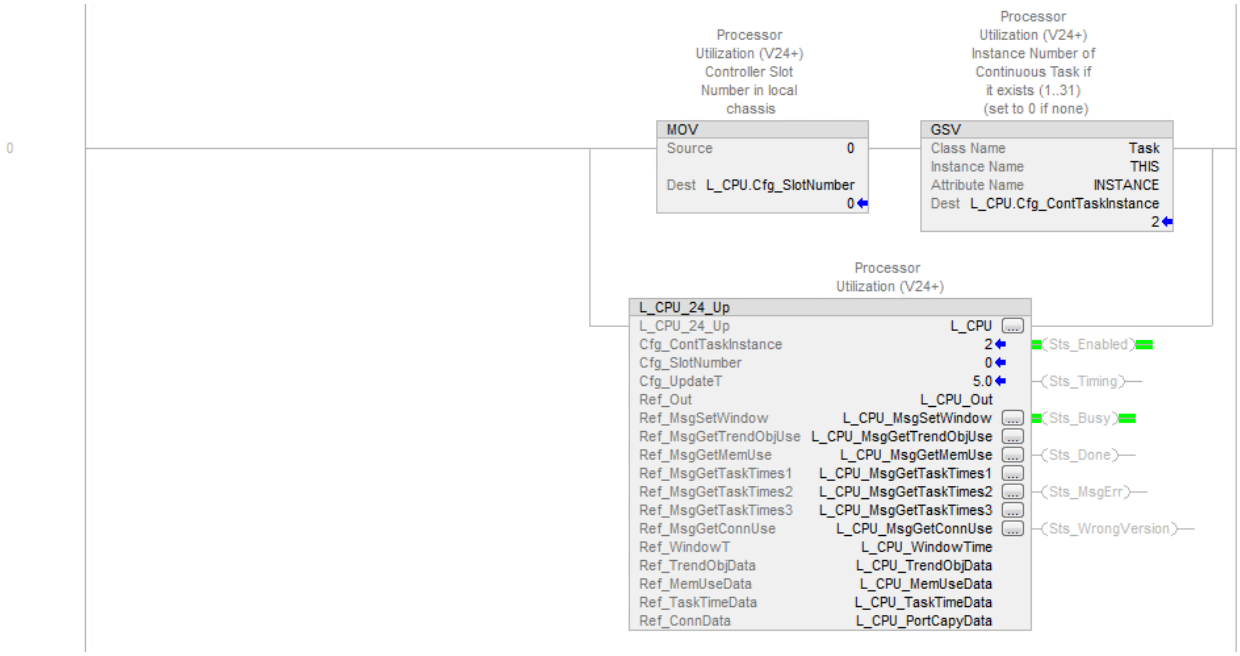
- The following Global Diagnostic routines need to be included in each PLC program (in addition to the MainRoutine).

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:



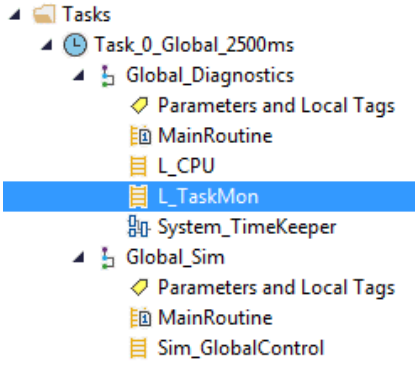
  - The L_CPU logic is shown below:

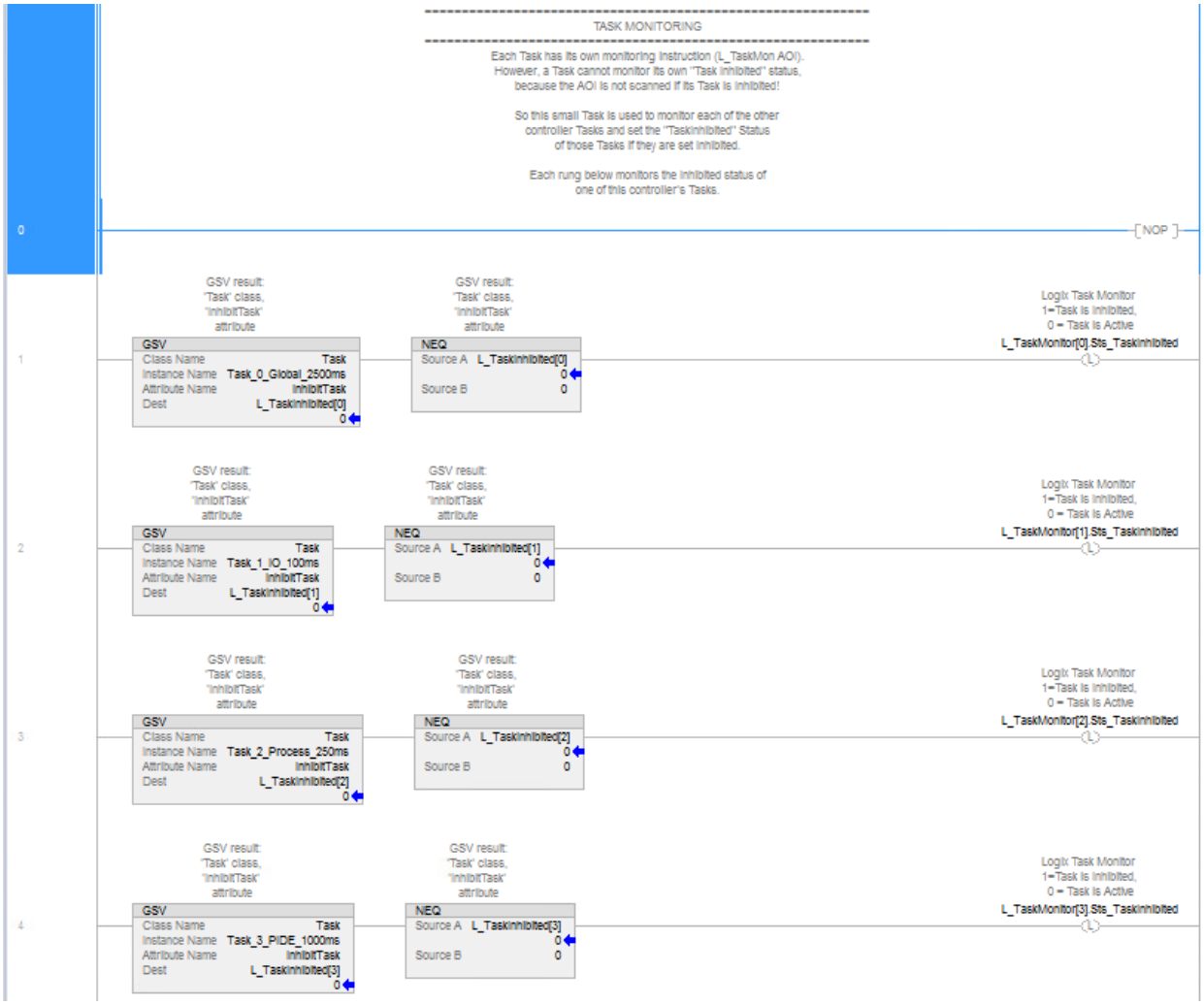


1.6.6.2 *L_TaskMon Routine*

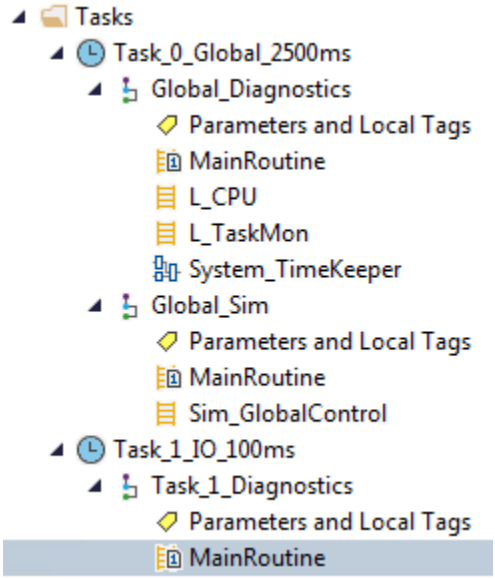
- The L_TaskMon routine from Rockwell is used to monitor tasks.
- There are 2 types of routines for L_TaskMon:
  - A global routine that monitors each of the individual task routines' inhibited status is in a routine labeled 'L_TaskMon' under Task_Diagnostics, as shown below:

:



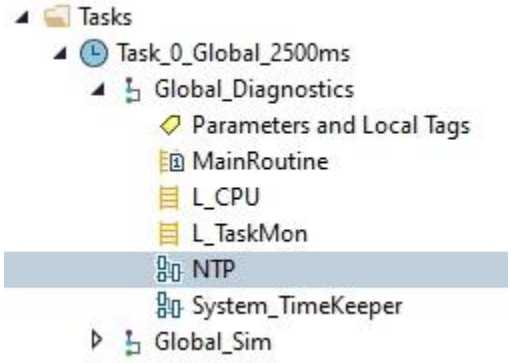


- And an individual routine included in each of the 3 tasks (Task_100ms, Task_250ms, Task_1s) and labeled 'MainRoutine'. These contains the L_TaskMon AOI and is shown in the example below:

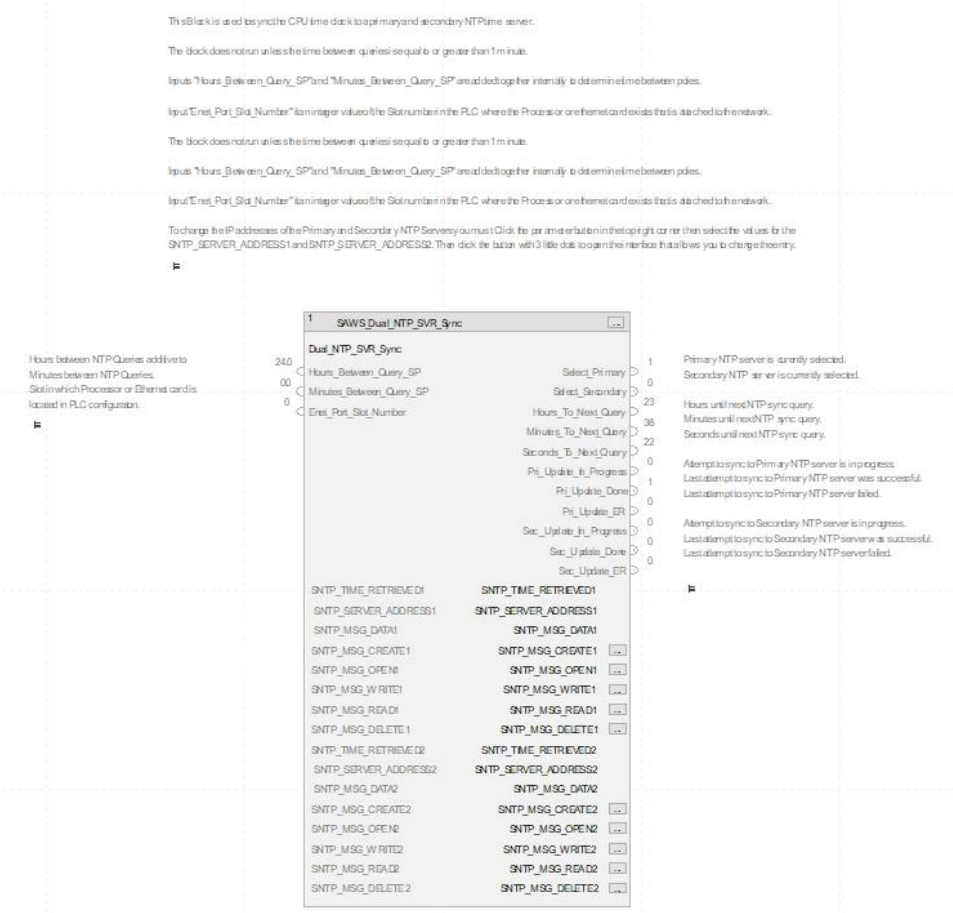


1.6.6.3 *NTP Routine*

- 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.

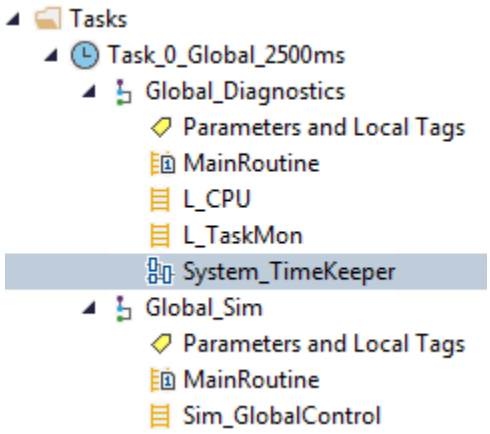


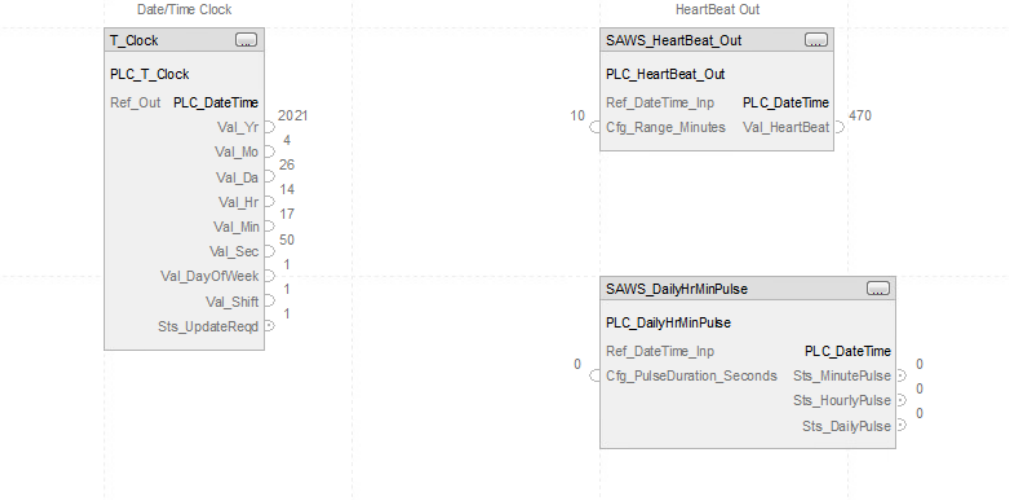
- The addition of a JSR in the MainRoutine will be required for it to function.
- The function block logic for the NTP routine is shown in the example below:
- The Block should be configured to run an update once every 24 hours.
- The Enet_Port_Slot_Number is the slot number for the card containing the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



1.6.6.4 *System_TimeKeeper Routine*

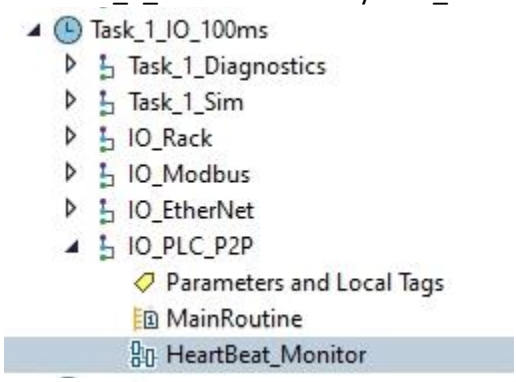
- The System_TimeKeeper routine contains the following:
  - PLC_T_Clock
    - This is a standard Rockwell AOI used to provide current date/time in separate tags for each time/date element (day, week, minute, etc.)
  - Heartbeat_Out
    - Generates a heartbeat for the local PLC for use by other PLC's 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:

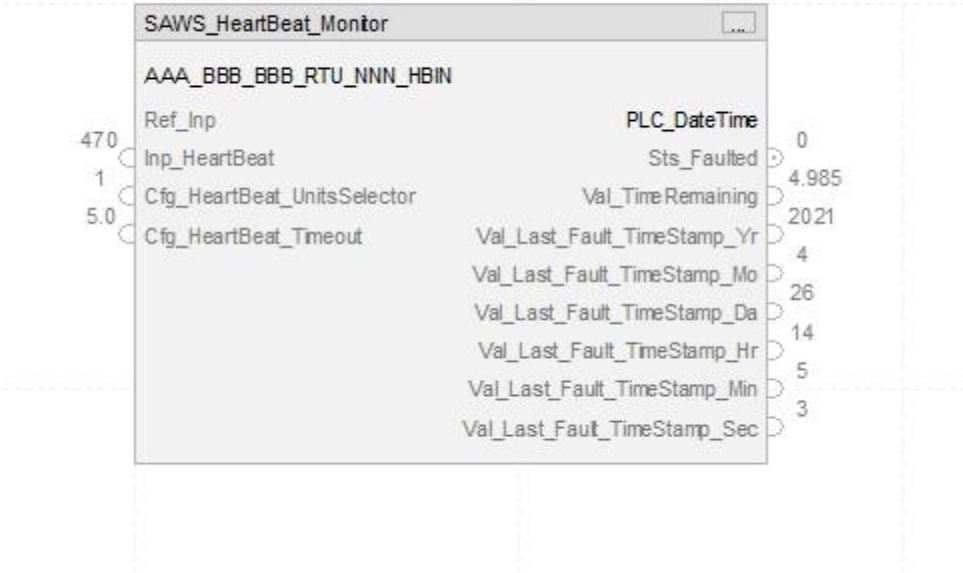




1.6.7 HEARTBEAT_MONITOR ROUTINE

- 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).



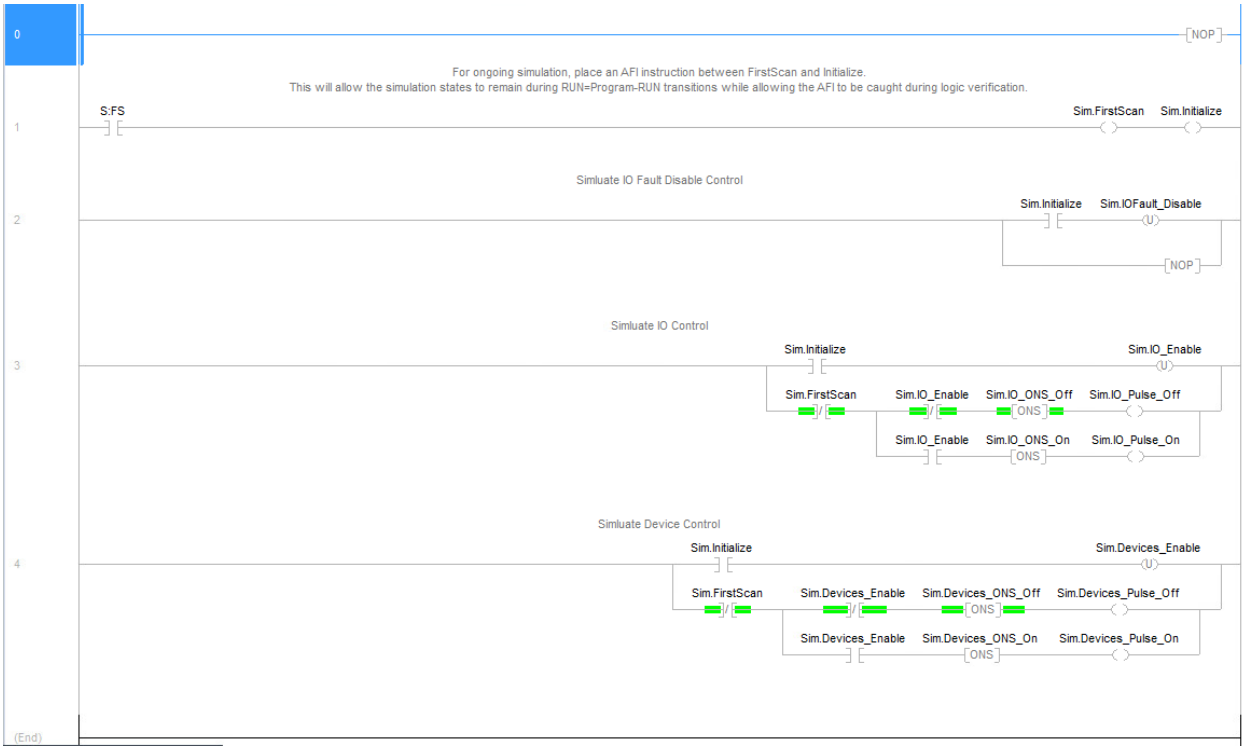


1.6.8 GLOBAL SIM

- The following Global SIM routine needs to be included in each PLC program (in addition to the MainRoutine).

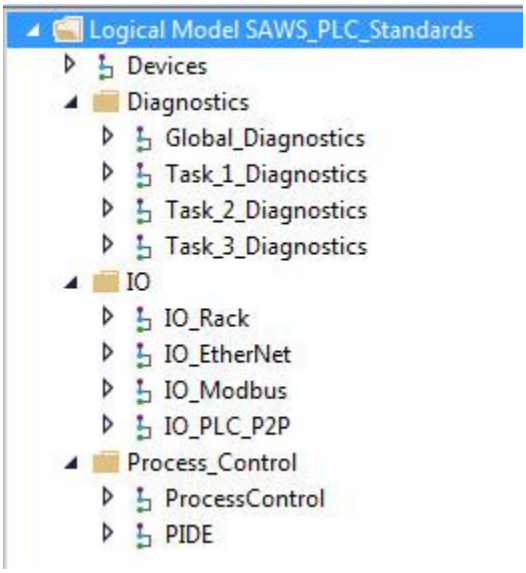
1.6.8.1 *Sim_GlobalControl*

- 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:



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

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

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

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

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 Systems	Process Systems	Application/Scope	SAWS Std
☑	PCS	ALL	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*

- 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.

3.3.2.1 *System Applicability*

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

3.3.2.2 *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.
  - **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*

- 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 Systems	Process Systems	Application/Scope	SAWS 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]
1	AAA_BBB_HSP_101_PMP_PriMsg[1]
2	AAA_BBB_HSP_101_PMP_PriMsg[2]
…	…
9	AAA_BBB_HSP_101_PMP_PriMsg[9]

Tag	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*

- See HMI Standards for details on Display Elements

3.3.4 Local Analog Output Scaling (Non-HMI Related Local Analog Outputs)

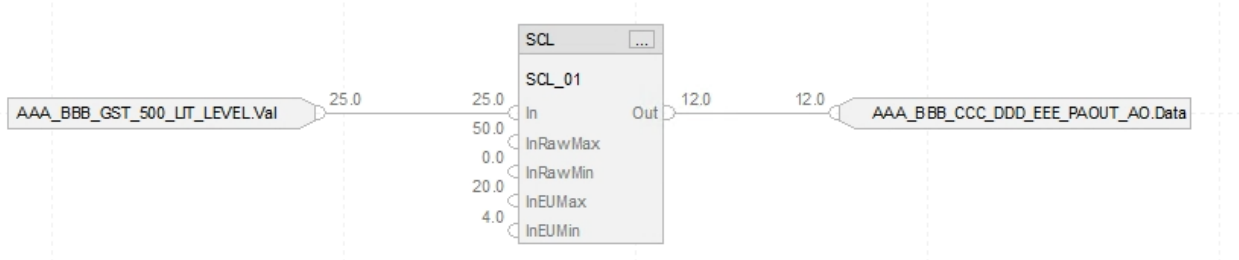
- There are instances where a local display needs to be driven from a PLC analog output, either from another analog input or from another derived source in the PLC.
- These instances should be identified by whether the HMI will need a PlantPAx object connection and limited to those outputs that are not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

3.3.4.1.1 System Applicability

Applies	Control Systems	Process Systems	Application/Scope	SAWS Std
☑	PCS	ALL	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.	☑

3.3.4.2 *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*

- None by design

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.
  - 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 Systems	Process Systems	Application/Scope	SAWS Std
☑	PCS	ALL	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 Systems	Process Systems	Application/Scope	SAWS 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).

4.1.5.1 *System Applicability*

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

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).

4.1.6.1 *System Applicability*

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

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*

Applies	Control Systems	Process Systems	Application/Scope	SAWS Std
☑	PCS	ALL	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
- 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*

- 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*

Applies	Control Systems	Process Systems	Application/Scope	SAWS 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.

4.1.9.1 *System Applicability*

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

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.

4.2.2.1 *System Applicability*

Applies	Control Systems	Process 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.

4.2.8.1 *System Applicability*

Applies	Control 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 required lead-lag control strategy and applicable PLC code on a project-by-project basis.	

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

4.3.2.2 *Required Files*

- 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 Systems	Process Systems	Application/Scope	SAWS 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)~~

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/IP Interface
        - 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 Systems	Process Systems	Application/Scope	SAWS Std
☑	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*

- 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.

4.3.11.1 *System Applicability*

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 ~~E1 PLUS™ 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_E300OVLD)~~

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*

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

4.3.16.2 *Required Files*

- 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.

4.4.2.1 *System Applicability*

Applies	Control Systems	Process 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 *System Applicability*

Applies	Control Systems	Process Systems	Application/Scope	SAWS 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.

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*

Applies	Control Systems	Process Systems	Application/Scope	SAWS 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 *System Applicability*

Applies	Control Systems	Process Systems	Application/Scope	SAWS 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 *System Applicability*

Applies	Control Systems	Process Systems	Application/Scope	SAWS 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)~~

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 Systems	Process Systems	Application/Scope	SAWS Std
☑	PCS	ALL	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.

4.5.3.1 *System Applicability*

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.	☑

4.5.3.2 *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).

4.5.4.1 *System Applicability*

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.	☑

4.5.4.2 *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*

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

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

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*

Applies	Control Systems	Process Systems	Application/Scope	SAWS 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*

- 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.

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*

Applies	Control Systems	Process Systems	Application/Scope	SAWS 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*

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

4.5.8.2 *Required Files*

- 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)~~

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

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

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

[THIS PAGE IS INTENTIONALLY LEFT BLANK]

innovation | solutions | support

Corporate Headquarters
8440 Florin Road
Sacramento, CA 95828
Ph: 916.395.8800
Fax: 916.429.2817

Regional Offices
Central CA
1315-B Dayton St.
Salinas, CA 93901
831.754.6838

Southern CA
42015 Remington Ave.
Suite 102
Temecula, CA 92590
951.308.6450

Northwest
5250 High Banks Rd.
Suite 440
Springfield, OR 97477
800.94.TESCO

Nevada
213 Sage St.
Carson City, NV 89706
800.94.TESCO

Southeast
10699 Airline Hwy.
Suite B
Baton Rouge, LA 70816
800.94.TESCO