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07-Instrumentation
L2 SCADA & L1 HMI CONFIG STANDARDS

Doc. no.: NA-07-STS011

This standard technical description is subject to change without prior notice. The most current issue will at all times be located on the Nordural web site, www.nordural.is.

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1 RESPONSIBILITY

This Standard Technical Specification (STS) is of responsibility of the owner. The revision and date of issue are on the front page.

All deviations from the specifications must be approved in writing by the Owner.

2 INTRODUCTION

This document objective is to show the standard design, screen layout and operation for both HMI and SCADA systems on the Norðurál Site.

All specific graphic and object symbols shown in this document are taken from the PlantPax library from Rockwell Automation and the version used for the development of this document is 2.0. The version of the used PlantPax library for Norðurál Site will be reviewed when they are released, and the standard release level used might change accordingly (Table 2).

Important: It is in responsibility of the contractors to ensure that they are using the latest version of the PlantPax standard and get it verified, prior to start of work, by Norðurál.

This specification should be used with the following project files:

The standard name	PlantPax object	Subject
SYSLIB-RM001	P_AIn	Basic Analog Input
SYSLIB-RM002	P_Alarm	Standard Alarm Sub-Block
SYSLIB-RM003	P_Din	Discrete Input
SYSLIB-RM004	P_Intlk	Interlocks with First-Out and Bypass
SYSLIB-RM005	P_Mode	Standard Modes
SYSLIB-RM006	P_Motor	Single-Speed Motor
SYSLIB-RM007	P_Perm	Permissive with Bypass
SYSLIB-RM008	P_Reset	Shared Reset
SYSLIB-RM009	P_ResInh	Restart Inhibit for Large Motor
SYSLIB-RM010	P_RunTime	Runtime and Starts
SYSLIB-RM011	P_AOut	Analog Output
SYSLIB-RM012	P_Motor2Spd	Two-Speed Motor
SYSLIB-RM013	P_MotorRev	Reversing Motor
SYSLIB-RM014	P_ValveMO	Motor Operated Valve
SYSLIB-RM015	P_ValveSO	Solenoid Valve
SYSLIB-RM016	P_VSD	Variable Speed Drive
SYSLIB-RM017	L_CPU	Controller CPU Utilization
SYSLIB-RM018	P_AInAdv	Advanced Analog Input
SYSLIB-RM019	P_AInDual	Dual Analog Input
SYSLIB-RM020	P_DoseFM	Flow meter Dosing
SYSLIB-RM021	P_DoseWS	Weigh Scale Dosing
SYSLIB-RM022	P_MotorHO	Hand-Operated Motor Monitor
SYSLIB-RM025	P_ValveHO	Hand-Operated 2-Position Valve
SYSLIB-RM026	P_AinMulti	Multiple Analog Outputs
SYSLIB-RM027	P_Logic	Boolean Logic with Snapshot
SYSLIB-RM028	P_D4SD	Discrete 2-,3-,or 4-state Device
SYSLIB-RM029	P_DOut	Discrete Output
SYSLIB-RM030	P_Fanout	Analog Fanout
SYSLIB-RM031	P_nPos	n-Position Device
SYSLIB-RM032	P_PTComp	Pressure/Temp. Compensated Flow
SYSLIB-RM033	P_StrapTbl	Tank Strapping Table
SYSLIB-RM034	P_ValveC	Analog Control Valve
SYSLIB-RM035	P_ValveMP	Mix Proof Valve
SYSLIB-RM036	P_ValveStats	2-State Valve Statistics
	P_PF755	PowerFlex 755 Object

Table 1 – PlantPax documents

2.1 Document Purpose

The objectives of this document are to:

- Define the user interface for the HMI and SCADA system
- Define the standards for graphic displays including templates, screen navigation, graphical objects and coding standard for the Rockwell SCADA system.
- Provide naming conventions for all pre-mentioned points.

2.2 Revision

Applicable revisions	01.11.2011	28.08.2013	07.01.2021	TBC
SCADA Standard	1.0	2.09	3.0	
PlantPax	2.0	2.0	2.0	

Table 2 – Application revisions

2.3 Review

A review of this standard will be carried out at least each January and the standard will be updated accordingly.

2.4 Abbreviations and Definitions

Abbreviations	Definitions
ADS	Active Directory Service
AOI	Add-on Instructions
ASN	Alarm, Status and Navigation
CIP	Control and Information Protocol
CLX	ControlLogix processor/system
CV	Control Variable
DATA	RSLinx Enterprise I/O Server
DHCP	Dynamic Host Configuration Policy
DNS	Domain Naming Service
ERP	Enterprise Resource Planning
EVRSI	EV – EverLock RSI - Rockwell Software Incorporated
FT	Factory Talk
FTAP	Factory Talk automation Platform
FTD	Factory Talk Directory
FTHistorian	The Rockwell Historian server
FTView	The FTView servers manage the process screen for the SCADA Client
GRT	Norðurál Grundartangi
HMI	Human Machine Interface HMI refers to plant operator stations installed locally nearby a machine on the process floor and consists of PanelView Plus units (level 1)
ISC	Initial Starting Conditions
MES	Manufacturing Execution System
ME	Machine Edition HMI System
OPC	Object Linking and Embedding for Process control – Administered by OPC foundation
PID	Proportional Integral and Derivative control
PIDE	Proportional Integral and Derivative control Enhanced
P&ID	Process and Instrumentation Diagram
PLC	Programmable Logic Controller
PV	Process Variable
PV+	PanelView Plus, MMI
RNA	Rockwell Network Architecture
SCADA	Supervisory Control and Data Acquisition SCADA refers to the Control Rooms computer systems running FTView applications (Level 2)
SAP	ERP software applications used by Norðurál (SAP: Business Software Solutions Applications and Services)
SE	Supervisory Edition SCADA System
SFC	Sequential Function Chart
SOP	Standard Operating Procedure
SP	Set point
UDT	User–Defined Data Type
VBA	Visual Basic for Applications
VLAN	Virtual Area Network
VTP	VLAN Trunk Protocol

Table 3 – Abbreviations and Definitions

2.5 Plant System Architecture

The plant system architecture is divided into five (5) levels:

Level	Designation	Hardware/Software	Objectives
5	Enterprise Management	SAP-ERP-SOP Platforms	Commercial business systems
3 & 4	Production Execution Management	FTHISTORIAN Software Platforms Metrics Vantage Point MES Applications	Area, line, and cell business management and optimization
2	Process Supervisory	FTView SE Platforms (server, workstation, thin clients) Printers	Real time supervisory execution control / SCADA
1	Direct Execution Level	PLC/CLXs Embedded platforms - HMI Control and I/O Networks I/O Adapters	The Direct Execution level represents the controlling and monitoring functions of the process that are typically implemented by the Programmable Logic Controllers (PLCs) and direct machine level Operator interfaces.
0	Field I/O	Field I/O, VFDs, Instrumentation, Instrumentation (sensors, actuators and transmitters)	Physical, I/O, and instrumentation interaction with the plant

Table 4 – Plant System Architecture Levels

Figure 1 shows these levels in more detail (see 9.1 Appendix A – Plant System Architecture Levels for larger figure):

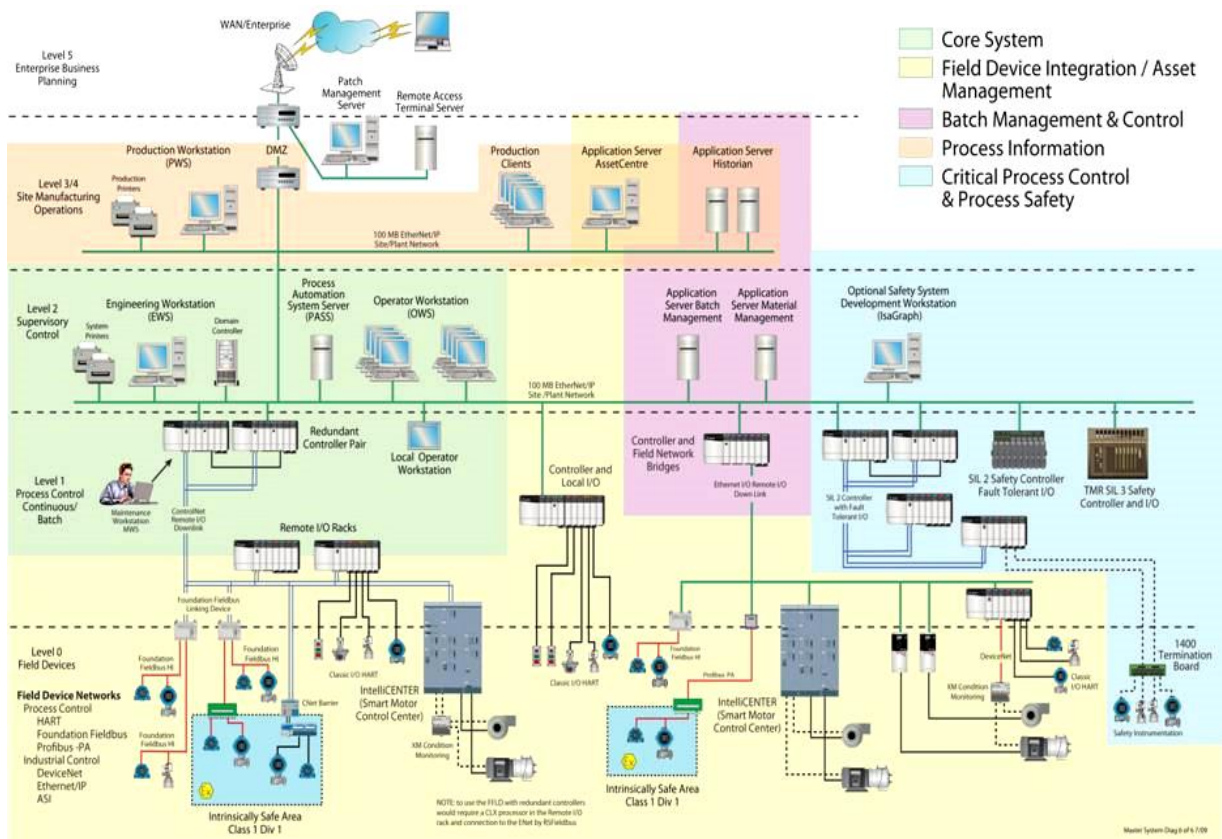


Figure 1 – Plant System Architecture Levels

2.6 System Objectives

The SCADA system consists of a Supervisory Control and Data Acquisition system based on a client/server architecture using Rockwell FTView SE software on a Microsoft Windows 7 operating system. Operator stations shall be linked to the servers to provide supervisory and process operation functions using process display diagrams. The user interface shall also enable the data entry and regulation commands.

The infrastructure and SCADA topology shall be designed and deployed to:

- Facilitate information flow throughout the system (devices on different networks and levels can communicate with each other)
- Share the information (I/O monitored by multiple devices)

From a single workstation over heterogeneous networks, the infrastructure and SCADA topology shall enable users to:

- Collect Information from any device
- Monitor status of any device
- Identify and configure all devices
- Program all control devices

2.7 Design Considerations

Homogeneity of the various installed systems is very important. This concerns both form (screen layout, function key assignment, etc.) and content (philosophy, schematics, action sequencing, etc.).

All user interfaces are designed to be as user friendly as possible. System ease of use includes visual system status, simplified decision making, and intuitive system training.

The default language shall be in English but all text shall also be translated to Icelandic and the language switching feature of the FTView SE utilized.

Operator ergonomics must be a priority. The user interface must be as user friendly as possible but the main focus will be user functionalities and ergonomics.

Process screens must remain as simple as possible in order to:

- Minimize future maintenance,
- Reduce risks of deficiencies hence delays at start-up,
- Facilitate reaching homogeneity between the systems,
- Facilitate screen design by the Vendors.

Recommended actions to reach these objectives:

- When necessary, 3-D drawings might be used for static objects to increase process understanding and facilitate process operations. However, the drawings must not impact SCADA performance excessively.
- VBA code use must be kept to a minimum. Before any use of VBA code the Vendor needs permission from the owner.
- Picture files are to be kept to a minimum to not impact performance excessively.
- Standard objects shall be used as the norm.
- Vendor's logo is not allowed in the SCADA system except on the help page where vendor's company contact information is obligatory.

At the end of delivery of the SCADA system the owner of the system will be Norðurál. The full SCADA application backup with all associated files shall be supplied to Norðurál.

2.8 System requirements

The availability of the SCADA system is crucial for the operation, maintenance and monitoring of the Norðurál Site. It shall have a high availability and a very quick restart time in case of failures. The SCADA system will be distributed on multiple servers to minimize the risk of a whole plant failure.

Startup of the whole SCADA system after a shutdown should not take longer than 10 min.

The refresh rate of a display shall not be greater than 2 sec.

Each graphic display in an application can contain up to 1000 references to expressions or tags (HMI tags and data server tags). This limit includes the tags contained in embedded variables. This level should be avoided at all cost.

The limit also includes duplicate references. For example, one display can contain only 1000 numeric inputs that refer to tags, even if all 1000 objects refer to the same tag.

- Number of alarms per FactoryTalk application should not be greater than 20.000
- Number of alarms per Rockwell Automation Device Server (RSLinx Enterprise) should not be greater than 10.000
- Number of alarms per Tag Alarm and Event Server should not be greater than 10.000
- Alarm burst (number of alarms occurring at once) the maximum is 2.000
- Number of alarms the alarm summary can display at once is 2.000
- 20 clients can simultaneously connect to the application

2.9 Data Access Policies

To ensure a maximum level of information sharing, users with the appropriate privileges can access all process pages for a specific area.

Write access is restricted to user groups having operative authority with the following types of data:

- Set point modifications
- Commands, starts and stops for the equipment and line (group)
- Operation mode modifications
- Alarm acknowledgments and control
- Other specific cases according to area requirements
- Equipment configuration (includes naming, labeling etc.) through popups

2.10 Assumptions

This document takes into account the following assumptions:

- SCADA user interface screens are designed for use with a resolution of 1920 x 1080 pixels
- Control layer (PLCs) for the Norðurál Site shall be according to the Norðurál standard

2.11 System Limit

SCADA systems do NOT:

- Perform control functions, control algorithms, or become involved in the PLC calculations
- Perform calculations or data transformation for the ControlLogix or for other systems
- Provide long-term data storage. Use historians.
- Produce reports
- The SCADA system doesn't store equipment labeling, description or tag names, only the connection to the equipment (tag) in the specific PLC. The PLC stores this information where they are configured from the SCADA system.

2.12 Symbol and standard library

VERY IMPORTANT: Vendors are not allowed to modify the standard library elements along with screen and popup standards. These screens and objects are used in all areas of the plant. If Vendors have a specific requirement, they can copy and rename the object, and send this object to the owner for validation.

3 SOFTWARE COMPONENTS

3.1 Configuration and Programming Development Software

As standard, all configuration and programming shall be done utilizing the basic development software levels (0 thru 2). The software shall form the basic configuration and application development core for level 0 thru 2 configuration and programming. A list of the applicable software is provided in Table 5.

3.2 Software List

The following software shall be used for the application development:

Software	Vendor	Version
FactoryTalk View Studio Enterprise	Rockwell Automation	(CPR 9 SR 10) 10.00.00
FactoryTalk View Site Edition Server	Rockwell Automation	(CPR 9 SR 10) 10.00.00
FactoryTalk View Site Edition Client	Rockwell Automation	(CPR 9 SR 10) 10.00.00
FactoryTalk Service Platform	Rockwell Automation	(CPR 9 SR 10) 3.00.00
RSNetworkx for Ethernet/IP	Rockwell Automation	(CPR 9 SR 10) 27.00.00
RSNetworkx for ControlNet	Rockwell Automation	(CPR 9 SR 10) 27.00.00
RSNetworkx for DeviceNet	Rockwell Automation	(CPR 9 SR 10) 27.00.00
RSLogix 5000	Rockwell Automation	(CPR 9 SR 5) 20.01.00
Studio 5000 Logix Designer	Rockwell Automation	(CPR 9 SR 7.4) 24.01.00
Studio 5000 Logix Designer	Rockwell Automation	(CPR 9 SR 10) 30.00.00
Patch Install 04.Feb.2019 Patch Rollup	Rockwell Automation	-

Table 5 – Software list

3.3 SCADA Vendor Mandates

The SCADA vendors must provide the following documentation in English.

Title	Document Number	Type
Functional Description		Document
Simulation procedure		Document
Factory Acceptance Test (FAT)		Document
Site Acceptance Test (SAT)		Document
Fault and Alarm List		Excel
All other documents included in the contract		

Table 6 – SCADA Vendor Mandates

The Functional Description shall include following information;

- Description for new elements. If Vendors create a new element (modification of the PlantPax object is not allowed).
- Documentation of new HMI tags and their function and use.
- Description of non-standard buttons and their function (see Table 7 – Example of associated screen table for the functional description for an example).

- Description of associated pages; navigation buttons and buttons which call non-standard pages or popups, for each page the vendor provides with the system (see Table 7 – Example of associated screen table for the functional description for an example).

Button label or Description	Function	Associated Screens
Navigation arrow 1	Displays Blower Room page	GRT40_S002
Navigation arrow 2	Displays Silo control page	GRT40_S010
PID Button	Displays PID popup	GRT40_P100
Control Button 1	Displays Silo control popup for Silo 1	GRT40_P102
Control Button 2	Displays Silo control popup for Silo 2	GRT40_P103
Pump 1 out button	Takes pump out of control	-

Table 7 – Example of associated screen table for the functional description

The Vendor must also provide the following services:

- Programming to support the MES command, set point, and requirement (if required)
- Support for the MES configuration
- Support for the PLC configuration when needed
- All other activities included in the contract

4 NAMING CONVENTIONS

This section covers the naming conventions for the data acquisition and the database process variables. Also included are the FTView SE application graphic screens and other component naming conventions.

Here are some general rules:

- Equipment identification tags shall be as defined in the P&ID drawings and project standards
- All names in the FTView SE development environment i.e. Screen Names, Server names etc. shall be in English US
- All text in a graphic display, alarms, tags and static text shall be in English and in Icelandic.
- No special characters (#, \$, etc.) may be entered other than “_” (this is the only character allowed as a text separator)

4.1 Area Naming Convention

An FTView SE application may be divided into several sub areas. Within a process area, there will therefore be at least one FTView server pair and/or one or more DATA server pairs. Sub area names are very important because FTView SE uses the name of each sub area to resolve the component references. With the sub area name, FTView SE is allowed to find the source of each element on the screen.

The Area FTView server shall adhere to the following structure:

GRT – Grundartangi

VLI - Vlissigen

Where

- **GRTxx**: “GRT” is always present for Grundartangi site and “xx” refers to the specific area number

4.1.1 Area code

Following table shows the area code for Norðurál Site

Area code	Area
00	General
10	Utilities
20	Administration
30	Material handling
40	Power
50	Reduction
60	Anode production
70	Casting
80	Environmental
90	SCADA library objects

Table 8 – Area codes definition

4.2 FactoryTalk System Naming Conventions

The following FTView FactoryTalk System naming conventions shall be used for each system identified for a specific area.

GRTxx_yyy..yyy_zzzzz

Where:

- **GRTxx**: “GRT” is always present and “xx” refers to the specific area number
- **yyy..yyy**: refers to the area or sub area name (Short title with a maximum 22 characters and no spaces)
- **zzzzz**: refers to the server type ID

The following server type ID’s shall be used in FTView applications

- **DATA** I/O Server
- **HIST** Historian Acquisition Node (OPC)
- **HMI** FTView Server, SCADA Graphics
- **ALARM** for alarm server

4.3 FactoryTalk Naming Convention Structure Example

Each data server (OPC or RSLinx Enterprise) must be placed in its own area separated from the FTView Server. A typical example of FTView structure is shown below:

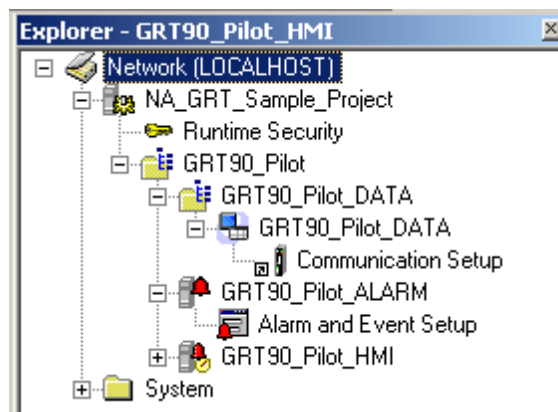


Figure 2 – FactoryTalk Naming Structure

FactoryTalk project shall be grouped into areas but it can contain different sub areas.

Each area in a plant may contain one or more Data Access servers and at least 1 FTView server.

4.4 FTView Studio Applications Structure

FTView application formats shall be developed by FTView Studio and distributed in each FactoryTalk area. A system is initially developed separate from the final area based deployment. In addition, the overall FactoryTalk Directory and naming must be maintained. Each separate development must use the same FactoryTalk naming conventions for both area and sub area naming contexts.

Vendors must obtain confirmation of its FTView application structure from owner before programming starts to ensure that all structure elements (Application name, sub-areas, FTView and Data access server names) are in conformity with project specification and standards. These elements must be included in the functional description. This is required since often different vendors will supply systems that need to be integrated into the same FTD. By not complying with this rule, the vendor may have to change the structure and be responsible to modify all parameter files and dynamic objects configuration of its application.

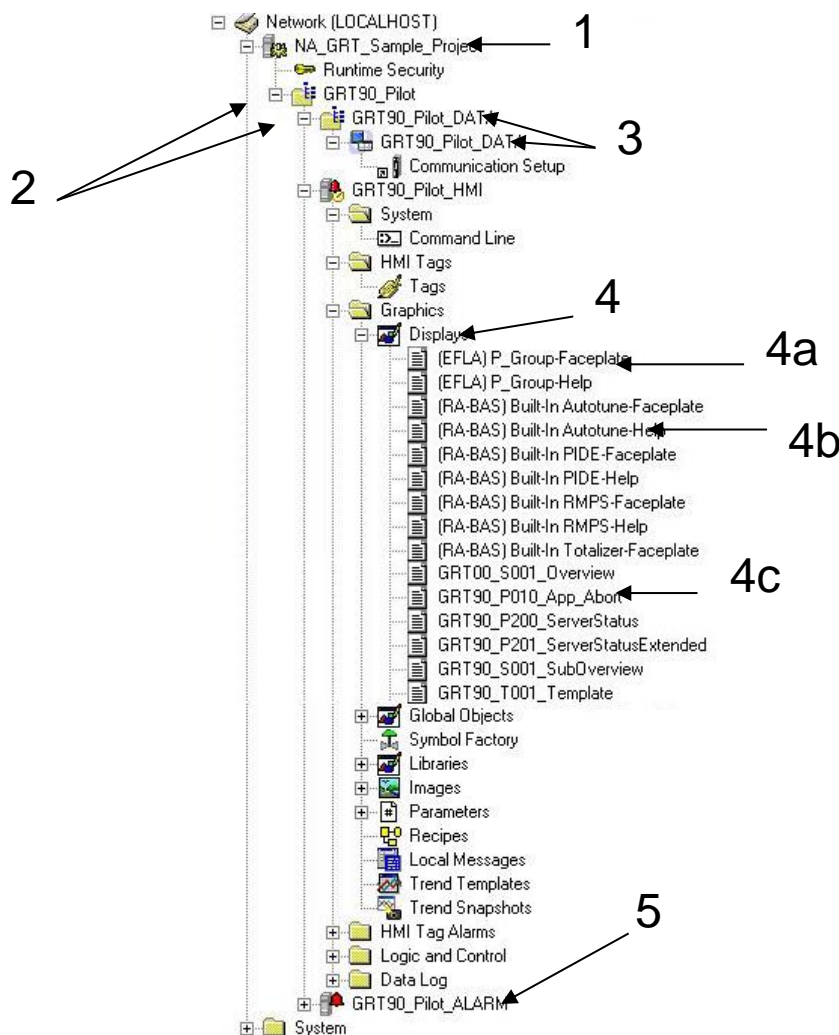


Figure 3 – FTView Studio Applications Structure

The example shown above is a typical SCADA project outline where:

- (1) Is FTView Application Name
- (2) Are the Areas and Sub-areas
- (3) Are the FTView Server and Data Access Server
- (4) Are the Process Displays (Line or Unit)

(4a) Included special popups (marked EFLA the vendor), (4b) Included PlantPax popups and screens (marked RA) and (4c) Process displays, popups and etc.

(5) Is the FTView Alarm Server

4.5 FTView Studio Graphic Screen Naming Convention

Graphic screens must be named using a short descriptive name. The screen name must be prefixed with the area or sub area abbreviation.

The graphic screen naming convention structure is defined as follows:

GRTxx_Zxxx_AAAAAAAAAAAAAAAAAA

Where:

- **GRTxx:** “GRT” is always present and “xx” refers to the specific area number
- **Zxxx:** **Z** is the type of view (see list below) and **xxx** refers to the screen number (always 3 numbers and each screen number is unique)
 - O: Overview
 - P: Popup
 - S: Process display screen
 - T: Template
 - X: General full page: Tools, Background, Alarm History, Trend, Network Diagnostics
 - G: Global Object
- **xxxxxxxxxxxxxxx** Refers to the short title with a maximum 30 characters and no spaces. This section shall be logical and meaningful. Standard keywords, prefixes, suffixes should be used to help grouping.

Popups and overview pages can bare the GRTxx name of the main area as they are called from various sub areas.

FTView SE uses the “gfx” file extension; these screens must be saved with this native format as standard.

If the images, macros, and the VBA are relative to a specific screen the “FTView Studio General Naming Convention” must be used (see chapter 4.7).

Vendors are not allowed to modify the elements in the PlantPax library. Vendors can copy the common elements (popup and template) to a project and save them under a different name for a specific requirement. This has to be informed to Norðurál and a change description should be included.

Vendors are advised to use predefined global objects such as buttons and indicators as building blocks for their user developed popups as much as they can, as this will help to update the system in the future.

4.6 FTView Studio Parameter Naming Convention

Parameter files are normally not used in the SCADA system as global object usage is the norm. But if needed they are allowed, please see chapter 4.7 for naming conventions.

4.7 FTView Studio General Naming Convention

To facilitate the application integration, the following elements in FTView studio must respect the same general naming convention:

- Images (general)

- Macros (general)
- Global Objects (ASN Control)
- Parameter files

The General naming convention structure is defined as follows:

GRTxx_Yyyy_XXXXXXXXXXXXXXXXXXXX

Where:

- **GRTxx** : “GRT” is always present and “xx” refers to the specific area number
- **Yyyy**: **Y** is always present. **yyy** is a number (always 3 numbers and each number is unique)
 - I: Images
 - M: Macro
 - G: Global object
 - F: Parameter File
- **XXXXXXXXXXXX**: refers to the short title with a maximum of 30 characters and no spaces. This section shall be logical and meaningful. Standard keywords, prefixes, suffixes should be used to enhance grouping.

Example:

GRT90_G800_”short description”

5 SCADA INTERFACE

This section includes detailed information about SCADA graphical interfaces (screens).

5.1 FTView SE Language and Windows Regional Settings

5.1.1 Language

The standard language for Norðurál Site is “**English (United States), en US**” since that is the default language of the PlantPax library.

Language used to configure an FTView application must be the same for all FTView Studio applications developed for Norðurál Site to avoid problems with text displaying.

In FTView SE Studio “English (United States), en-US” must be selected when a new application is created. See Figure 4:

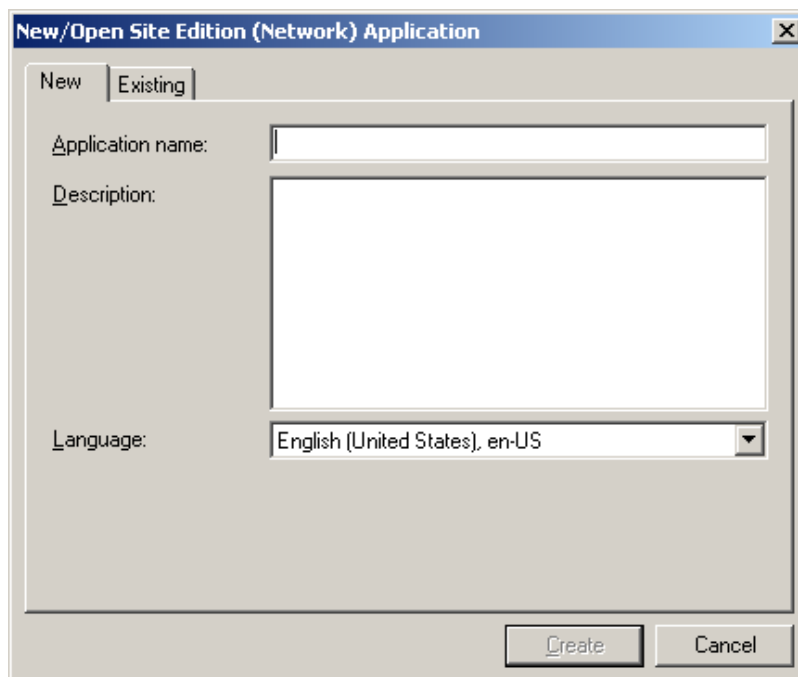


Figure 4 – Language settings with English (United States), en-US as a standard

5.1.2 Windows Regional Settings

During development or at run time, FactoryTalk View uses the Windows regional settings for the current application language to enter, modify, or display text in an application.

For Norðurál Site Windows regional settings must be configured as follows:

- For Time:
 - Short time HH:mm
 - Long time HH:mm:ss
- For date:
 - Short date d.M.yyyy
 - Long date dd.MM.yyyy

5.2 SCADA Navigation Philosophy

The SCADA Navigation philosophy includes the following important points:

- General process overviews shall always be available.
- The main button bar is located at the bottom of all pages except the Overview. This button bar has the same functionality for all sub areas. The bar presents a predefined setup of buttons, an alarm button a trend button, a print screen button and an info details button.
- The ASN Control is located below the header of each page and provides statuses and overall alarms for all units of a specific line (group). All lines and units are shown simultaneously with the ASN Control.
- Clicking on the ASN Control prompts the display of a specific line process main page or a specific unit detail.
- A line (group) can be operated from a process display screen. A line control standard display shall have an interlock popup a permissive popup (both

accessible inside the line control popup) and a fault/alarm symbol. In addition, it shall provide the line (group) status.

- Equipment symbols display the equipment status with a symbol color. Other related information such as modes, faults/alarms, permissive and interlocks are shown around the equipment symbol as a series of smaller icons.
- Popup window layout and content are consistent for any specific type of equipment in all plant areas.
- Analog value trends are accessed by clicking on the analog value within any process display screen.

Accomplishment of these points ensures that the resulting product is both user friendly and a key provider of essential operational information. All relevant and important details are immediately accessible during the use of the SCADA application in all areas of the plant.

5.3 User Interface Design Standards

The main function of the SCADA system is the process representation. The objective is to group information required by the plant facility users into graphic screens for optimal plant facility operation.

Graphic screens shall be written in simple English and Icelandic (User can choose language) to provide operators with the options available within the specific graphic user interface.

Graphic screens shall be as simple as possible with access to essential information in a pyramid approach.

Graphic screens shall be designed using one or more of the following configurations:

- Overview to assist the operator in understanding area control
- Standard navigation button bar
- Standard status bar (Alarm, Status and Navigation - ASN)
- Simplified block diagram to illustrate sequences, interactions, and selected options
- Diagrammatic representation of the process using predetermined symbols to represent the process or various equipment (process display screen)
- Faults and alarms shall always be disassociated from state representation (running, stopped etc.) to simplify the understanding of equipment functioning. Faults/alarms shall be represented by fault/alarm icons or buttons. Equipment states shall be represented by changing color symbols.
- Command buttons shall be invisible to indicate when the command is not available from the SCADA or HMI.
- Diagnostic process screens will assist Maintenance/Operations with troubleshooting problems such as:
 - ControlLogix (CLX) Network Diagnostics
 - Emergency Stops (localization)

5.4 Graphic Screen Standard Colors

The following section defines the color palette that shall be used for all types of graphic screens or objects found in the Norðurál project.

The color palette shall be standard for all areas of the plant. FTView by default has a standard color palette.

Colors for the Norðurál project (standard) are defined by index codes. These codes represent the line and column number of the FTView SE color palette.



Figure 5 – FactoryTalk View SE standard color pallet

Standard colors for the Norðurál project are defined in Table 9:

Index	Name	Code	Index	Name	Code	Index	Name	Code
1	Dark red	L3C3	11	Yellow	L2C1	21	Cyan	L2C5
2	Red	L1C9	12	Orange	L3C8	22	Aqua marine	L2C6
3	Grey	L1C6	13	Violet	L2C9	23	Dark Olive Green	L2C4
4	Background Light Grey	L1C3	14	Blue	L5C4	24	Electrical Green	L4C9
5	Grey	L1C4	15	Midnight Blue	L2C8	25	Deep Purple	L5C9
6	Dark Grey	L1C5	16	Light Blue	L2C7	26	Dark Grey	L1C7
7	Off White	L1C2	17	Mid Blue	L5C3	27	Wheat	L3C6
8	White	L1C1	18	Light Orange	L3C7	28	Thistle	L5C6
9	Dark Green	L4C8	19	Dark Brown	L3C9	29	Black	L1C8
10	Light Green	L2C2	20	Gold	L3C8			

Table 9 – Graphic screen standard colors

Important: The color pallet for the graphic screens and animation do not match with the color pallet in the Alarms and events, therefore are the Alarms and events color pallet is custom made. The pallet has 6 custom made colors see Figure 21 and those colors are the only one that is used in the Alarm and events color pallet. RGB parameters for the custom made colors are in Table 13.

5.5 Graphic Screen Format

The SCADA process shall be supervised at the basic device level in the process display screen during operation. Equipment or line (group) control shall be possible from the process display screen. Static and dynamic objects shall be organized according to the various guidelines provided below.

The standard graphic screen is split up in 5 zones. Zones 1, 2, 4 and 5 are always visible but zone 3 is a process display. The popup shall be displayed over the process display (zone 3).

Equipment control, interlock or equipment fault/alarm popup shall be used to supplement full size screens by offering the operator quick access to related information or commands.

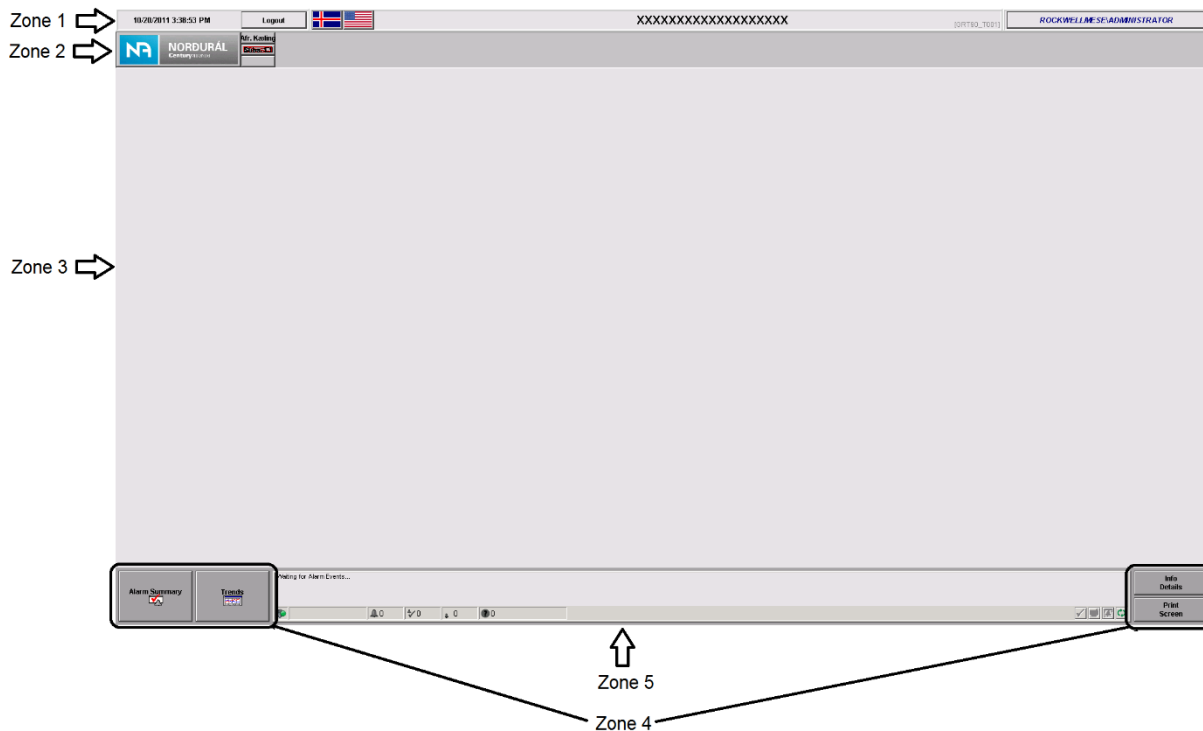


Figure 6 – Graphic screen zone definition

The basic graphic screen zones are:

- Zone 1: Title Bar and General Information
- Zone 2: Alarm, Status and Navigation (ASN)
- Zone 3: Process Display
- Zone 4: Function Buttons
- Zone 5: Alarms Banner

5.5.1 Zone 1: Title Bar



Figure 7 – Zone 1 Title bar

Zone 1 is always visible at the top of each graphic screen and it shows following general information

1. **Time and date** shall be programmed with a “Time Date Display Properties” object and indicated as following.
 - DD/MM/YYYY HH:MM:SS TT
 - DD** = day of the month (2 characters),
 - MM** = month number (2 characters),
 - YYYY** = year (4 characters),
 - HH** = hour of the day (2 characters),
 - MM** = minutes of the hour (2 characters),
 - SS** = seconds of the minutes (2 characters).
 - TT** = AM/PM Only visible when English language is selected.
2. Logout button:

Makes following actions:

- a. Logs out the current SE Client
- b. Aborts the current process screen
- c. Displays the current process screen again

This is done to secure that the current user rights show only the corresponding objects connected to that user.

3. Languages buttons give users a choice between two languages Icelandic and English. Default languages settings shall be English US and the chosen language shall effects all text on all screens.
4. Graphic Screen shall identify the plant facility or the functional section (follow the project specification for naming conventions). The corresponding FTView display number shall also be displayed to the right side of the Graphic Screen title as follows:

Example: Fresh and Reacted Alumina

5. The corresponding FTView display number shall be displayed.

Example: [GRT90_S100]

6. User Name/Login Button: indicates the user currently logged in. This field is dynamically linked to the "CurrentUserName()" FTView system functions. A click on the button will call the following function:
 - a. Calls a login macro which calls the login popup
 - b. Aborts the current process screen
 - c. Displays the current process screen again

This is done to secure that the current user rights show only the corresponding objects connected to that user.

Background panels and Time and Date indicators are allowed to be global objects, other objects in Zone 1 should not be a part of global object as they are current process page depended.

5.5.2 Zone 2: Alarm, Status and Navigation - ASN



Figure 8 – Zone 2 ASN bar

The ASN zone is composed of all lines (groups) included in a sub area. The ASN zone shall always be visible except in the Overview screen. The ASN zone appears at the top of each graphic screen in a zone located under the title bar. Line name and unit number must be defined by the Vendor in the functional analysis.

The vendor is not allowed to include his logo in the ASN.

The ASN should be a global object and should have the corresponding area number and name. Example;

GRT90_X001_ASN_Template

The following numbers refers to Figure 8

1. Norðurál logo shall be used as a touch field to access the Overview process display by calling a macro.
2. The ASN Control is a Global Object (FTView Studio). It shall be included in each page and it is used to represent the line status (fault/alarm) and states (running, stopped etc.). The ASN control corresponds to a line (group). Some ASN controls shall be grouped according to the workshop or logical groups. All graphic screens shall contain an Alarm status and Navigation zone (ASN) consisting of a series of buttons. The ASN control shall respect general naming convention.

The ASN Control shall consist of three lines as shown in the following figure:

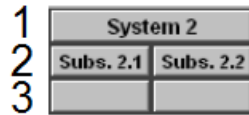


Figure 9 – Zone 2 ASN buttons

Where the following numbers refers to Figure 9:

1. Line 1: identifies the logical sub area section and allows the operator to view the corresponding graphic screen (process main page or process overview). The line button width could vary according to the number of units (subsystems) in a line.
2. Line 2: Subs. 2.1 and subs. 2.2: dynamically represents the unit section status of operation for a specific line. Each button allows the operator to call the corresponding process display screen. The size of the buttons should be kept homogenous for each area to keep the ASN bar as neat as possible. The buttons can be resized as long as all buttons in an area are of the same size, but should be minimum 40 pixels and maximum 150 pixels. Each button displays the line (group) status corresponding according to color code. Status and corresponding colors for the ASN are defined in Table 10.

Value	State	Border/Back Color		Caption Color	
0	Unknown	Purple	L1C8	Black	L1C8
1	Stopped	Gray	L1C4	Black	L1C8
2	Stopping	Blue	L1C7	White	L1C1
3	Starting	Blue	L1C7	White	L1C1
4	Running	Green	L4C8	White	L1C1
5	Comm. Failure	Light Blue	L5C3	White	L1C1
6	Tripped Non Recoverable		L3C2	White	L1C1
7	Tripped Recoverable		L3C3	White	L1C1
8	Homing		L2C3	White	L1C1
9	Hold	Yellow	L2C1	Black	L1C8

Table 10 – Zone 2 ASN button states

These buttons should represent 1 group. If there are more than 1 group present on a specific process page buttons should be added, even if they call the same process page.

3. Line3: Alarm Indicator/button: dynamically represents the fault/alarm status for the associated unit (subsystem) section. Clicking the button [1] displays an Alarm Summary screen with the current fault/alarm for the corresponding unit.

[1] Alarm Indicator/button shall call two different alarm summary screens:

- Read-only: used to display fault and alarm for user with restricted access, this screen doesn't include acknowledgement buttons.

- With acknowledge buttons: used to display fault and alarm for user with operation access (operator, supervisor, and maintenance), this screen includes acknowledgement buttons.

If the specific process page doesn't include group control, a group AOI should even though be present in the PLC where the equipment on that process page is connected indicates all statuses (alarm, starting, stopping, etc.) of the process page. For the alarm summary screens to view only the alarms subjected to the specific process page an alarm filter has to be activated. In the alarm and event setup the alarms have to be setup with alarm class. The filter is activated by writing the corresponding alarm class name in a tag. This is described in chapter 5.7.1 Alarm Class filtering.

These buttons should represent 1 group. If there is more than 1 group present on the specific process page an alarm indicator/button should be added and the filtering should than be dependent on the group not the process page.

For details on the Group control animation see Appendix B – Group Object.

5.5.2.1 ASN naming convention

The ASN naming convention structure is defined as follows:

GRTxx_Yyyy_XXXXXXXXXXXXXXXXXXXX

Where:

- **GRTxx** : “GRT” is always present and “xx” refers to the specific area number
- **Yyyy**: Since the ASN will be a Global Object the it should be labeled with a **G**. yyy is a number (always 3 numbers and each number is unique)
- **XXXXXXXXXXXX**: refers to the short title with a maximum of 30 characters and no spaces. This section shall be logical and meaningful. Standard keywords, prefixes, suffixes should be used to enhance grouping. Usually this should be ASN_Areadescription

Example: GRT90_G001_ASN_Template

5.5.3 Zone 3: Process Display

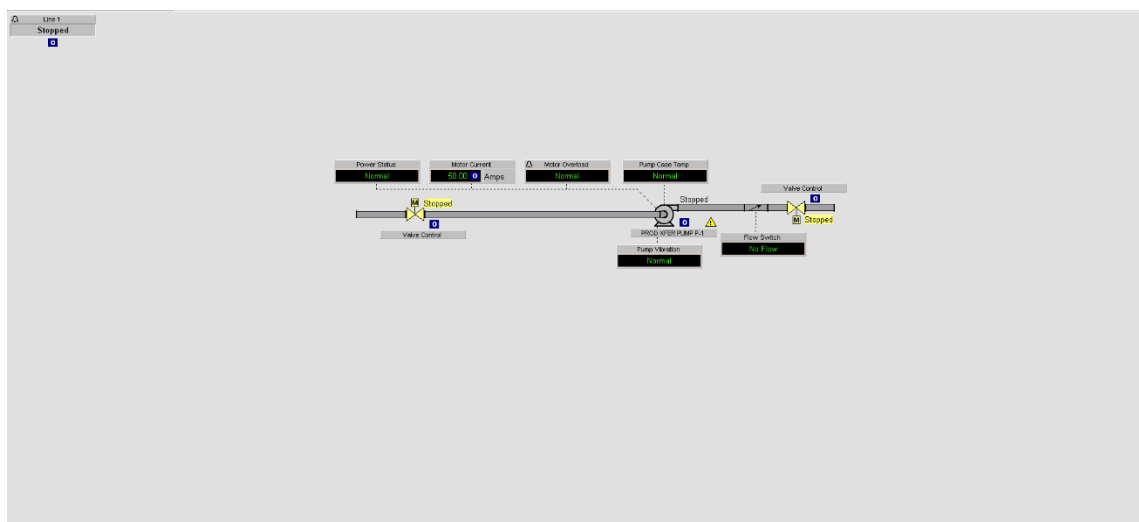


Figure 10 – Zone 3 process display example

The process display screen represents the monitored process status or Operation Support screen. A process display screen may include menus, sub-menus, detailed application views, trend views, graphs, and any other graphics that represent the monitored process. The zone may contain control device symbols (i.e. group control button and statuses display) graphs, blocks of text, and other graphic objects.

The group control display shall always be located in the top left section of Zone 3, when applicable. If there is more than 1 group present on the process page a group control displays should be added, forming a row at the top. It is allowed to locate the Group control button close to a specific group if there is more than one group in a process display and it improves process readability and understanding see chapter 5.11 for more details.

5.5.3.1 Process Display FTView SE Display Settings

For proper operation, the settings shown in Figure 11 and Figure 12 shall be used for the Process Display Settings in the FTView SE:

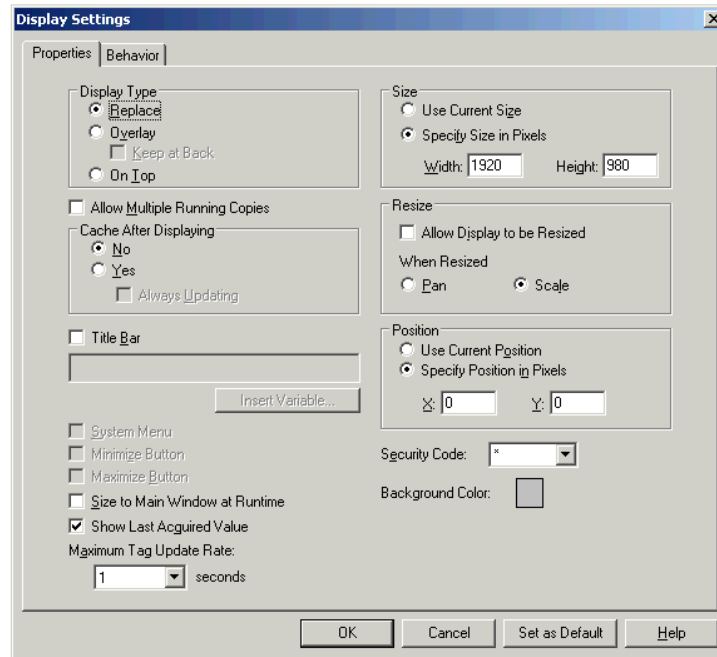


Figure 11 – Zone 3 Display settings, properties tab settings

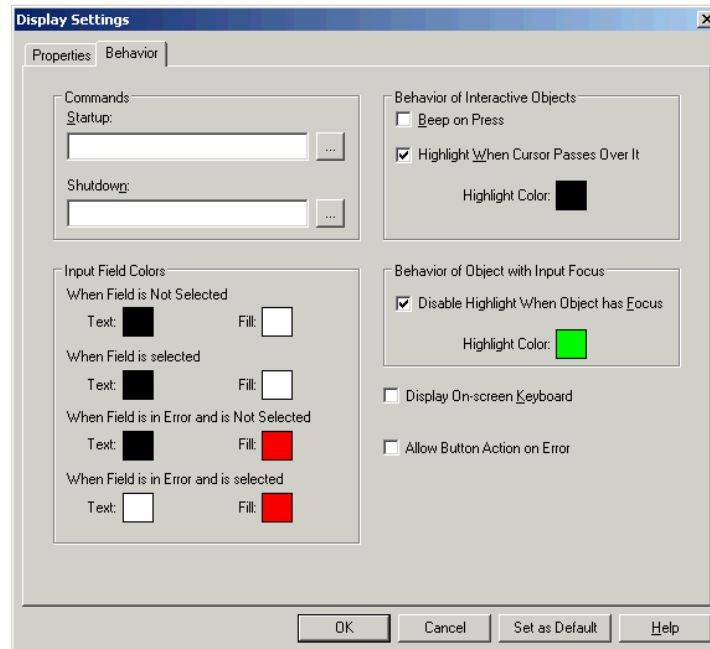


Figure 12 – Zone 3 Display settings, behavior tab settings

Background color should be gray L1C3 refer to Table 9.

5.5.4 Zone 4: Function Bottom Bar

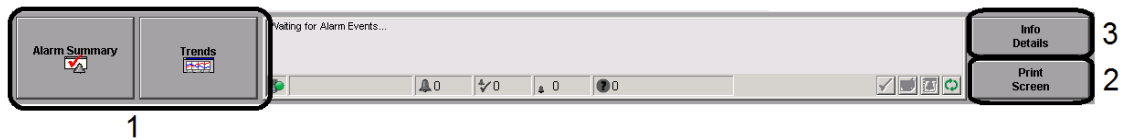


Figure 13 – Zone 4 function bottom bar

This zone shall always be visible for each specific sub area’s graphic screen except in the Overview screen.

1. These two buttons give a popup for alarm and trends. The alarm popup will display the current alarm list which is active for the sub area and the trend popup will display historian tag trends.

Alarm button shall call two different alarm summary screens:

- Read-only: used to display fault and alarm for user with restricted access, this screen doesn’t include acknowledgement buttons.
- With acknowledge buttons: used to display fault and alarm for user with operation access (operator, supervisor, and maintenance), this screen includes acknowledgement buttons.

No filtering other than area connection should be activated by calling these alarm summary screens.

2. Print screen button calls the print dialogue to print the current visible screen.
3. The Info Details button shall call a popup list as the following figure shows:

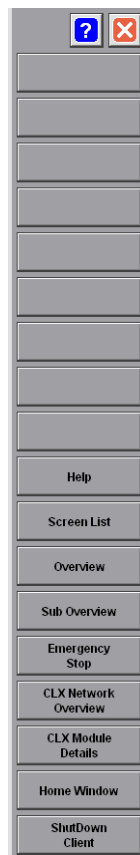


Figure 14 – Zone 4 Side bar

The Function button in the popup list shall contain buttons used to perform common operator functions.

Action commands associated with the function buttons shall have the same application definition for all plant sub areas.

The Function bottom bar shall respect the following rules:

- Button positions and size is fixed
- Standard button names are static
- Vendor can use the spare unmarked buttons bars (with the approval of the owner).
- If the spare unmarked buttons are not used they must be deleted and the drop up list sized corrected accordingly. It is not allowed to add more buttons than are apparent in the template.

The following table lists the function buttons that are usually present on the drop up list:

Button label	Function
Unused buttons	Free use
Help	Support Screen for all beneficial information for the operator or maintenance person.
Screen List	Displays a button page with all graphic screens contained in the sub area
Overview	Displays the area overview
Sub Overview	Displays the sub area overview
Emergency stop	Displays the localization of the emergency stop
CLX Network Overview	Displays area network and equipment statuses
CLX module Details	Displays the modules communicating with the area CLX (local and remote racks, including IO's and communication modules)
Home Windows	Displays the overview
Shutdown Client	Open a popup to select shutdown client or abort.

Table 11 – Zone 4 Side bar button description

5.5.4.1 Bottom Bar FTView SE Display Settings

The following figure shows the configuration required for the FTView SE bottom bar.

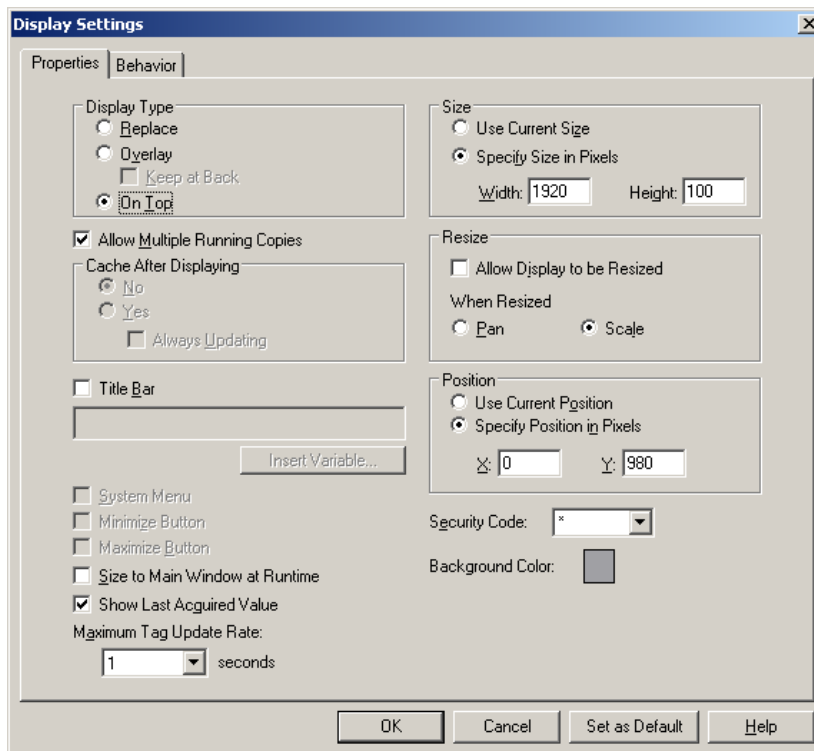


Figure 15 – Zone 4 Bottom bar display settings, properties tab settings

Background color should be gray L1C5 refer to Table 9.

5.5.5 Zone 5: Alarm Display Banner



Figure 16 – Zone 5 alarm display banner

This zone shall be the same for all the graphic screens in a specific sub area and shall always be visible except in the Overview screen.

The alarm banner should be large enough to display three (3) lines for fault/alarm indications. Acknowledgement of alarms is not available from the alarm banner.

5.5.5.1 The general tab

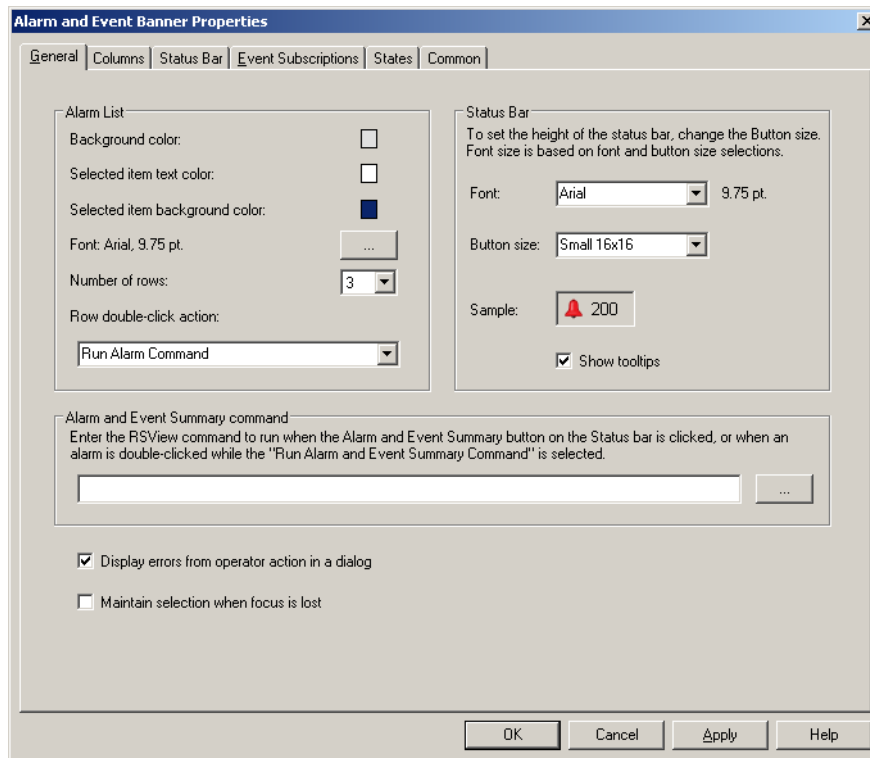


Figure 17 – Zone 5 Alarm panel properties settings in general tab

Alarm and Event Summary Command should be left unfilled as there are 2 alarm summaries due to user depended restrictions.

Background color should be same gray as the background color in process pages L1C3 (red: 224, green: 224 and blue:224).

Row double click should be set to Run Alarm Command. This is configured for individual alarm in the alarm and event setup, where it opens the corresponding equipment process page.

The text in the alarm summary banner should be set to Arial Bold 10 (see Table 16). The banner indicates this as 9.75 pt. as it connected to the height of the banner.

5.5.5.2 Columns tab

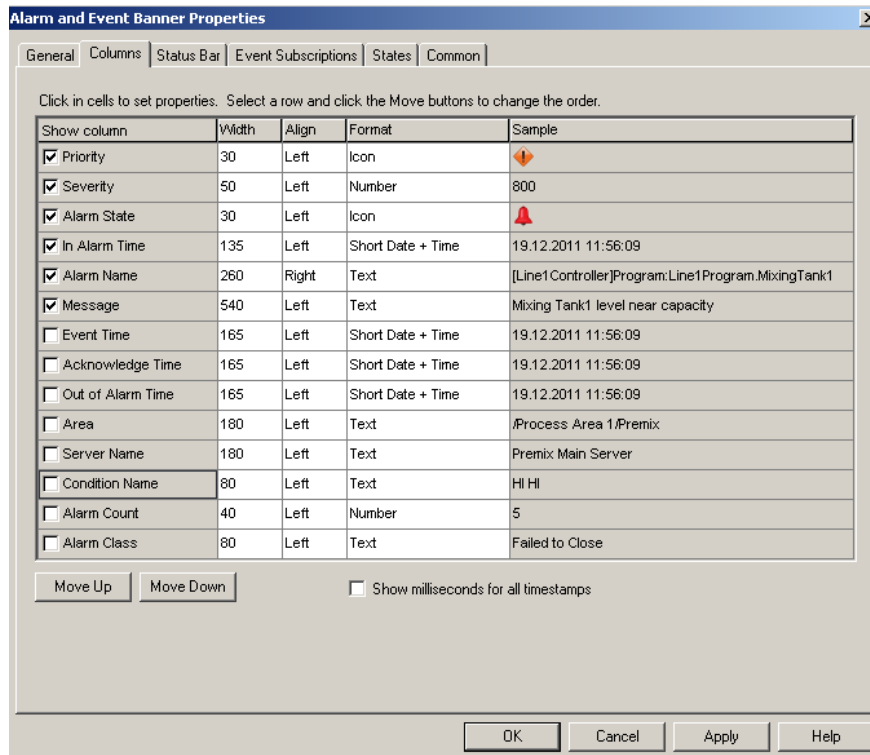


Figure 18 – Zone 5 Alarm panel properties settings in columns tab

The following table indicates which columns should be visible and the correct settings for these columns. The banner cannot be configured in the same way as the main alarm summary as the banner has not the same pixel width.

Column	Width	Align	Format
Priority	30	Left	Icon
Severity	50	Left	Number
Alarm State	30	Left	Icon
In alarm Time	135	Left	Short Date + Time
Alarm Name	260	Left	Text
Message	540	Left	Text

Table 12 – Zone 5 Alarm panel properties settings in columns tab

5.5.5.3 Status bar

All objects should be checked except Silence All Alarms and Audible Sound Enabled.

5.5.5.4 Event Subscriptions tab

Should be configured for the subarea;

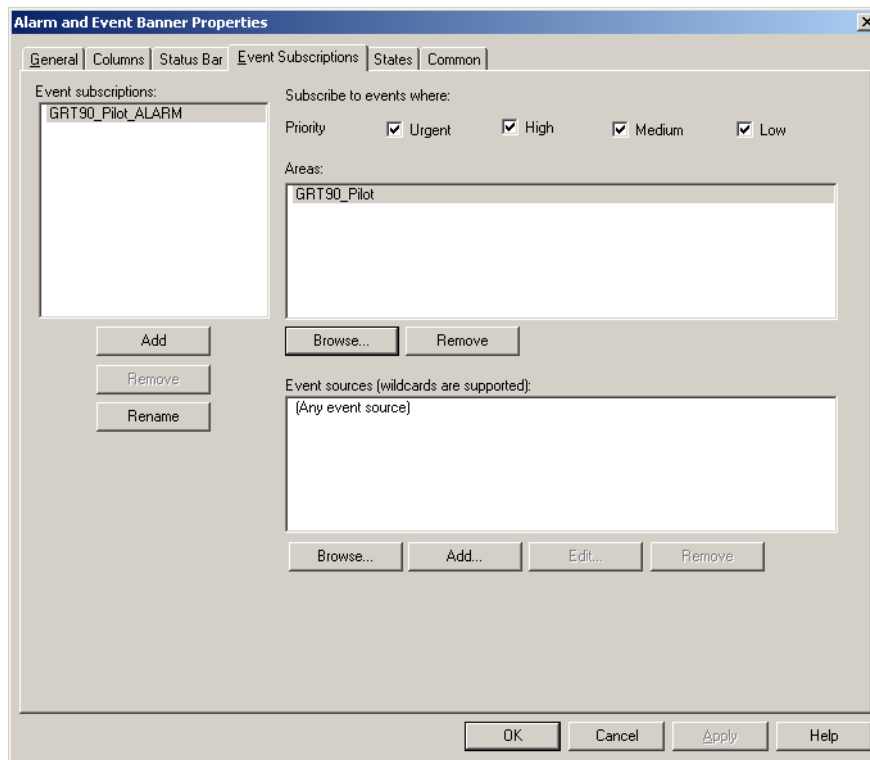


Figure 19 – Zone 5 Alarm panel properties settings in event subscription tab

5.5.5.5 States Tab

For proper operation, the Alarm Banner Color Configuration shall be as shown below for FTView SE.

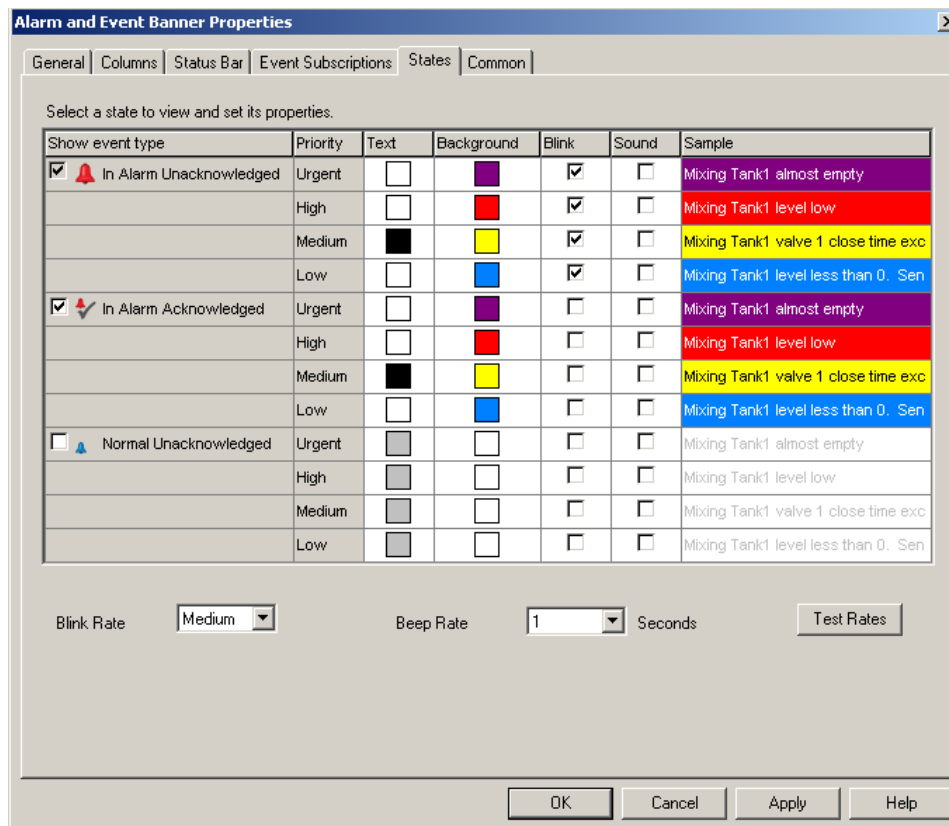


Figure 20 – Zone 5 Alarm panel properties settings in states tab

As the Figure 20 shows there are four types of alarm urgent, high, medium and low and the table and figure below shows the color code for each alarm see chapter 6 for alarm classifications.

Important: The color pallet for the graphic screens and animation do not match with the color pallet in the Alarms and events, therefore are the Alarms and events color pallet in the pilot project custom made. The pallet has 6 custom made colors (see Figure 21) and those colors are the only one which is used in the Alarm and events color pallet. RGB parameters for the custom made colors are in Table 13



Figure 21 – Alarm and events color pallet.

Color	Red	Green	Blue
Blue	0	136	200
Yellow	255	255	0
Red	255	0	0
Purple	192	0	192
Black	0	0	0
Gray	224	224	224

Table 13– Zone 5 RGB parameters for Alarm and events color pallet.

Table 14 shows severity configuration for alarms.

In alarm unacknowledged	Color text	Color background	Blink
Urgent (severity 4)	5	4	Yes
High (severity 3)	5	3	Yes
Medium (severity 2)	5	2	Yes
Low (severity 1)	5	1	Yes
In alarm acknowledged	Color text	Color background	Blink
Urgent	5	4	No
High	5	3	No
Medium	5	2	No
Low	5	1	No
Normal Unacknowledged	Color text	Color background	Blink
Urgent	4	6	No
High	3	6	No
Medium	2	6	No
Low	1	6	No

Table 14 - Zone 5 severity configuration, colors refer to colors in Figure 21

5.5.5.6 Common Tab

Common tab should be configured as following.

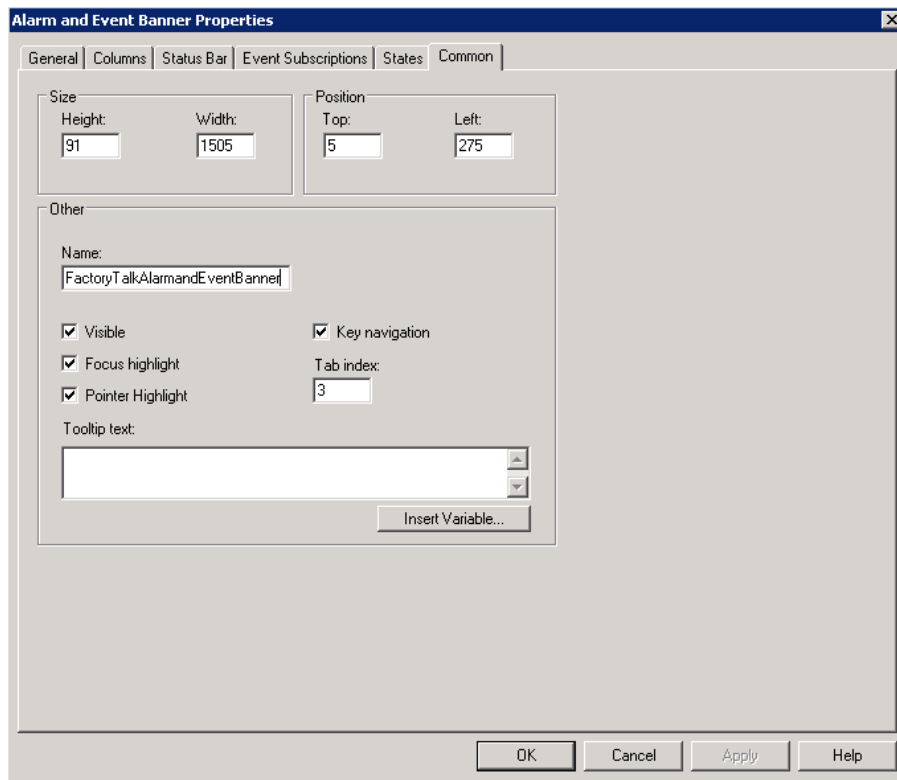


Figure 22 – Zone 5 Alarm panel properties settings in common tab

5.6 Main Alarm Summary Screen

The Main Alarm Summary screen displays current fault/alarm conditions and shall be configured as shown in pilot project. The Main Alarm Summary screen shall be accessed by the alarm button located on the bottom bar (sub area filtered fault/alarm).

Two screens are provided in this standard; one for user with acknowledges rights and one for read only access. The read only alarm summary doesn't display acknowledge buttons and alarms therefore cannot be acknowledged.

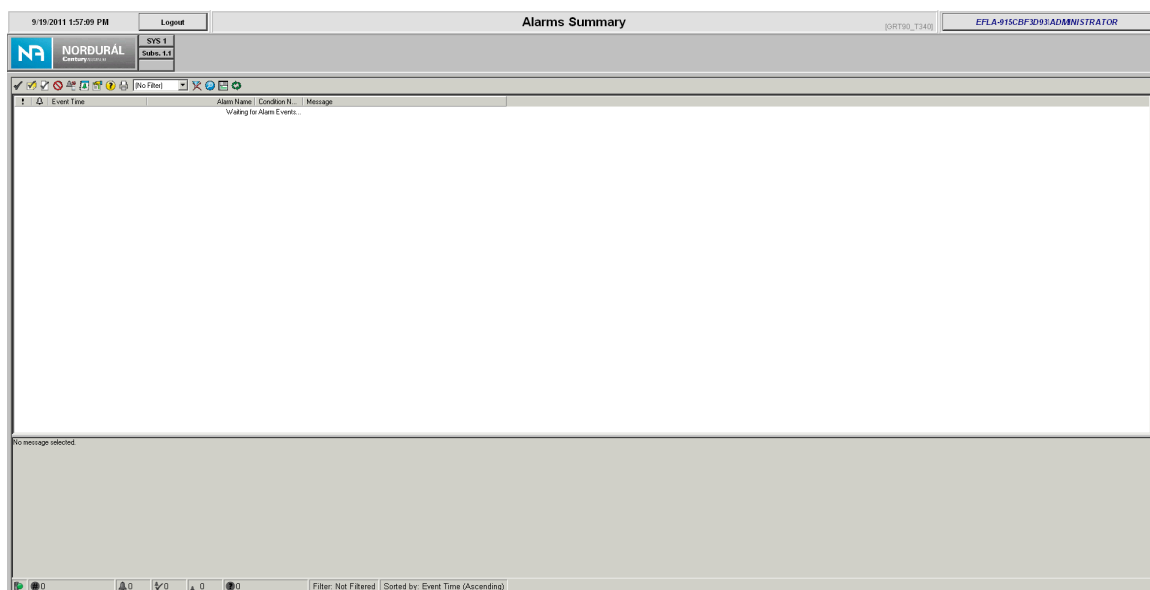


Figure 23 – Alarm summary page

From this screen, the Historical Alarm, Fault, Message and Event Viewing Utility can be used to complete the following actions:

- Retrieve data by selecting the start date/time and end date/time

- View the alarm history
- View the event history
- Sort data according to its description, tag name
- Filter specific group alarms
- Print the data with a standard windows printer

The color configuration for the Alarm Summary screen shall be the same as defined for the alarm Table 14.

By double-clicking on an alarm in the alarm summary the specific equipment process display should be called see chapter 6.3.6

5.6.1 Configuration of the alarm summary

5.6.1.1 Appearance tab

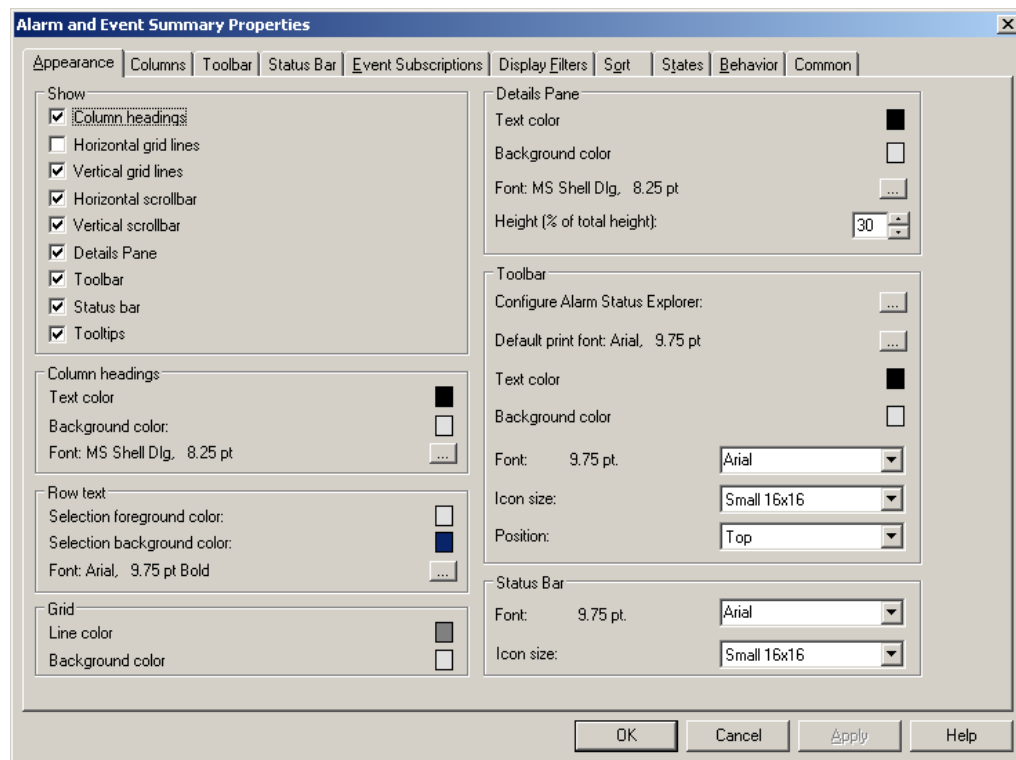


Figure 24 – Alarm summary properties settings in appearance tab

Background color should be same gray as the background color in process pages L1C3 (red: 224, green: 224 and blue: 224). Text color is Black

The text in alarm summary banner should be set to Arial Bold 10 (see Table 16). The banner indicates this as 9.75 pt. as it connected to the height of the banner.

5.6.1.2 Columns tab

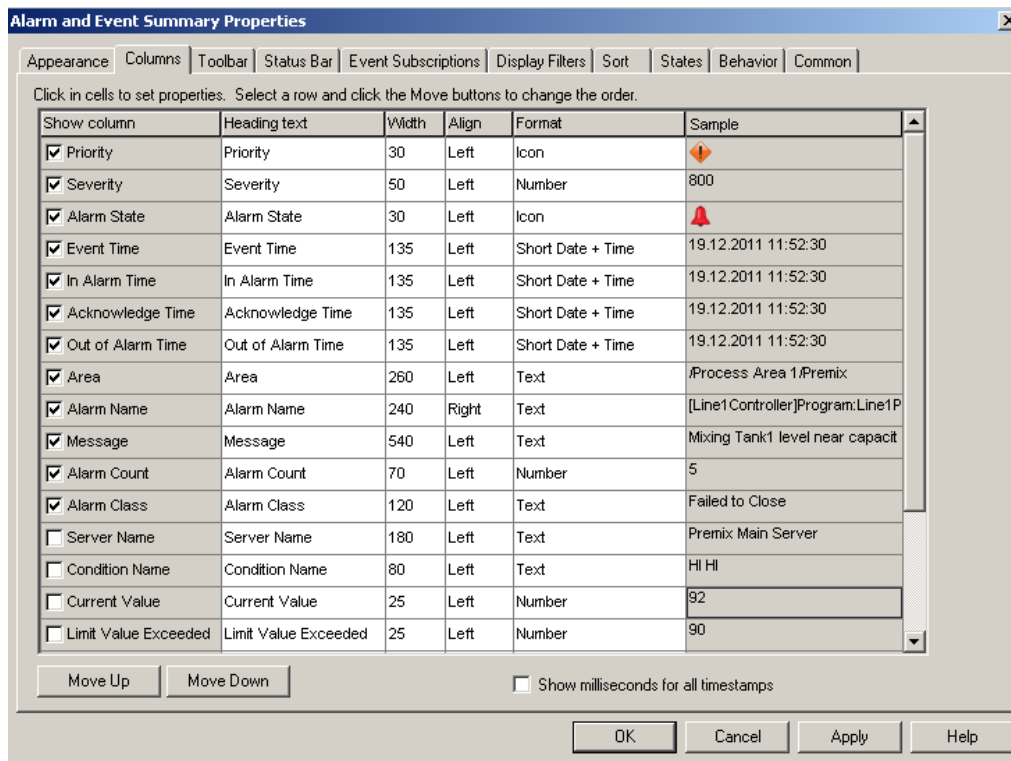


Figure 25 – Alarm summary properties settings in columns tab

The following table indicates which columns should be visible and the correct settings for these columns.

Column	Width	Align	Format
Priority	30	Left	Icon
Severity	50	Left	Number
Alarm State	30	Left	Icon
Event Time	135	Left	Short Date + Time
In Alarm Time	135	Left	Short Date + Time
Acknowledge Time	135	Left	Short Date + Time
Out of Alarm Time	135	Left	Short Date + Time
Area	260	Left	Text
Alarm Name	240	Left	Text
Message	540	Left	Text
Alarm Count	70	Left	Text
Alarm Class	120	Left	Text

Table 15 – Alarm summary properties settings in columns tab

5.6.1.3 Toolbar tab

In the alarm summary which is called for user with acknowledge rights all buttons are checked. For the alarm summary with only read only access the Acknowledge, Suppress, Disable and Reset buttons are not visible as the following figure shows;

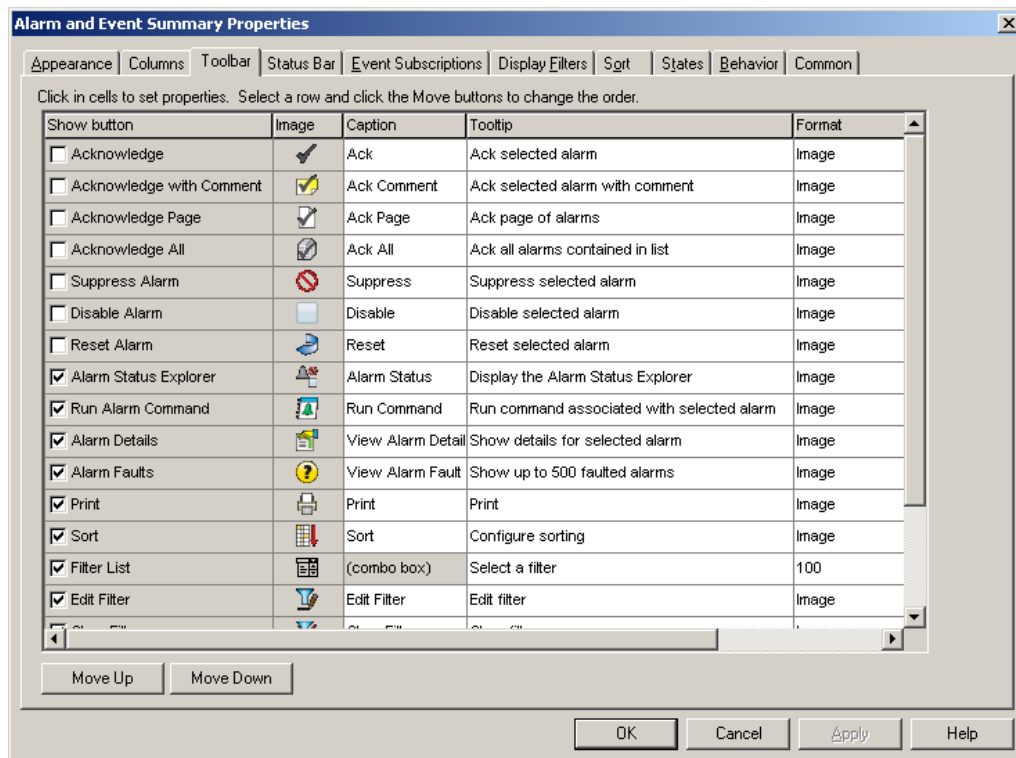


Figure 26 – Alarm summary properties settings in toolbar tab

Row double click should be set to Run Alarm Command. This is configured for individual alarm in the alarm and event setup, where it should open the corresponding equipment process page.

5.6.1.4 Status bar tab

All panels are checked

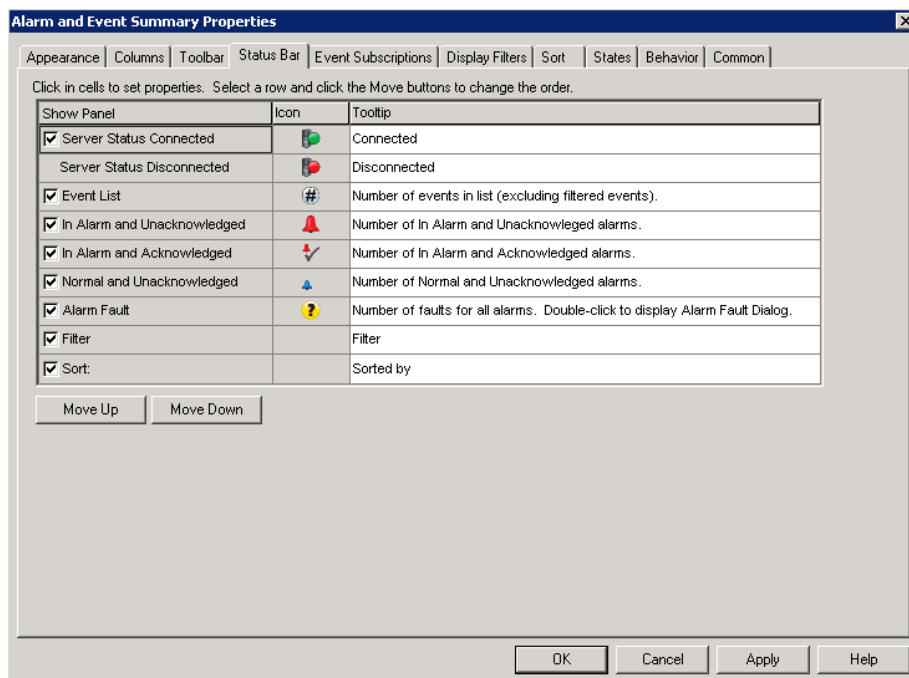


Figure 27 – Alarm summary properties settings in status bar tab

5.6.1.5 Event Subscriptions tab

Subscriptions are for the specific sub area.

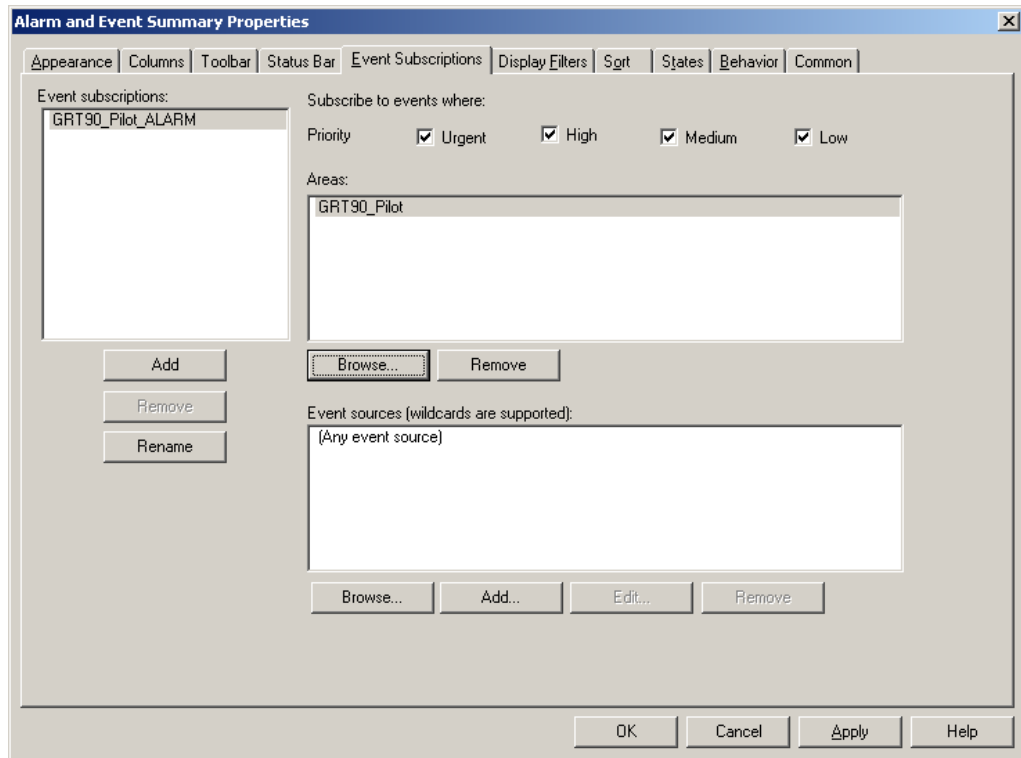


Figure 28 – Alarm summary properties settings in event subscriptions tab

5.6.1.6 Sort tab

First is sort by Severity – Descending and then by Event Time – Descending.

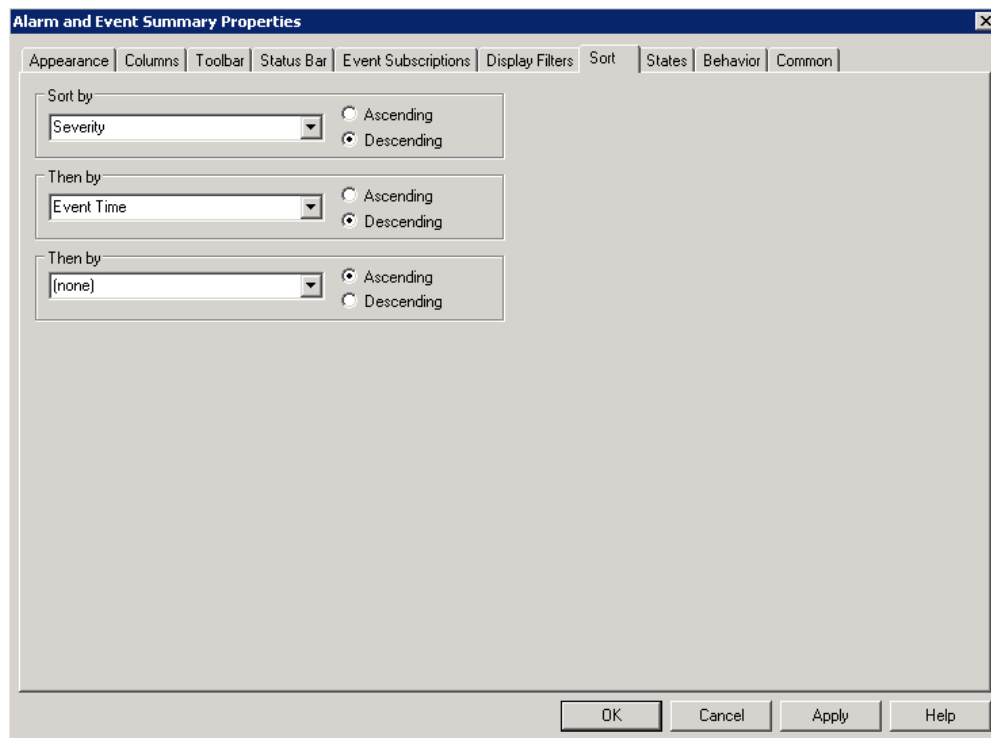


Figure 29 – Alarm summary properties settings in sort tab

5.6.1.7 States Tab

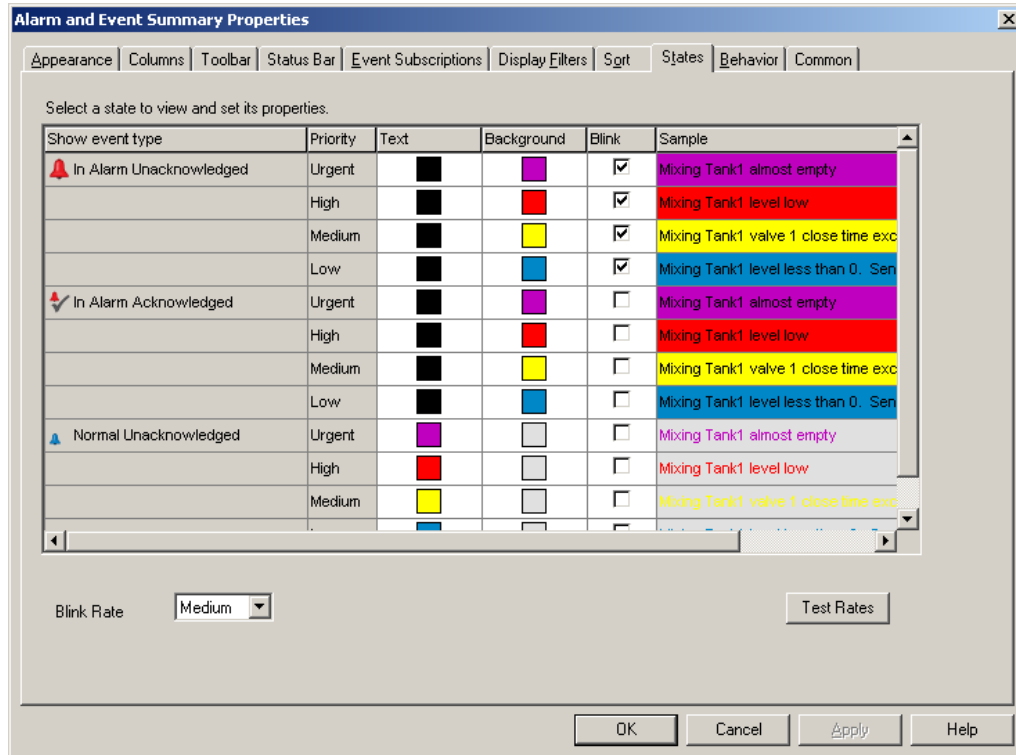


Figure 30 – Alarm summary properties settings in states tab

5.6.1.8 Behavior tab

Behavior tab should be checked as the following figure shows;

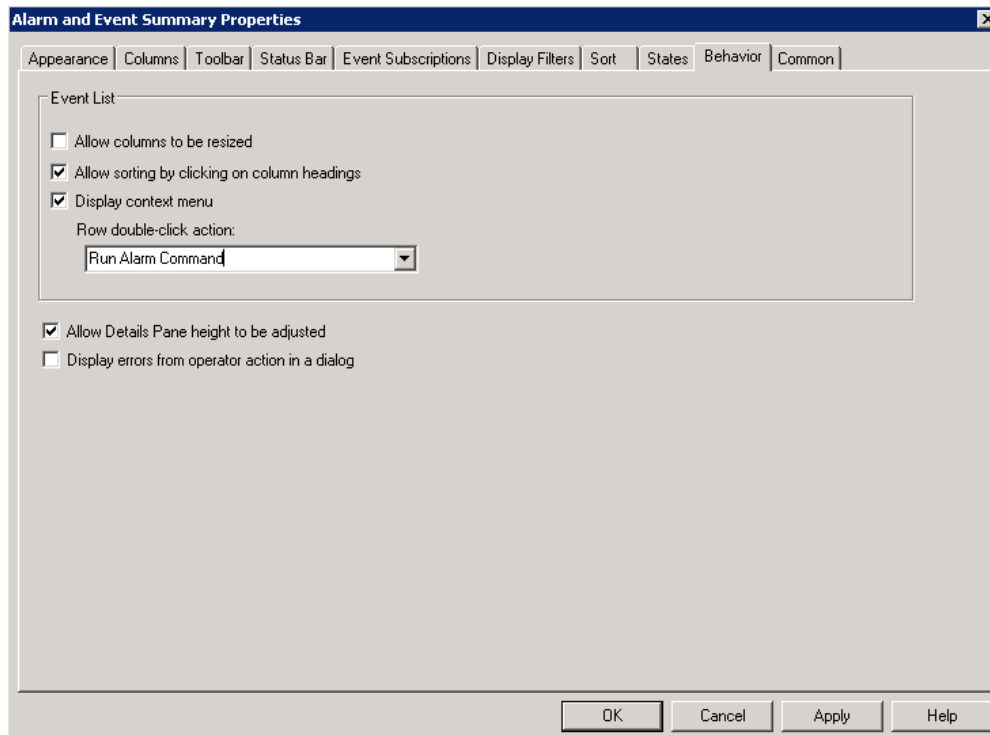


Figure 31 – Alarm summary properties settings in behavior tab

Row double click should be set to Run Alarm Command. This is configured for individual alarm in the alarm and event setup, where it should open the corresponding equipment process display see chapter 6.3.6.

5.7 Alarm Summary popup

The Alarm Summary popup displays current fault/alarm conditions (filtered by Alarm Class) and shall be configured as shown in pilot project. The Alarm Summary popup shall be accessed by a button in the ASN.

The Alarm summary popup should be configured the same way as the Main Alarm Summary.

Two screens are provided in this standard; one for user with acknowledges rights and one for read only access. The read only alarm summary doesn't display acknowledge buttons and alarms cannot be acknowledged.

The Height of the popup is 280 pixel and width 1910 pixel.

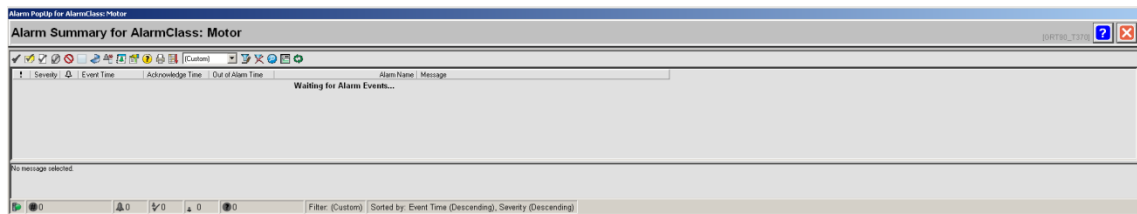


Figure 32 – Alarm summary popup

5.7.1 Alarm Class filtering

Alarm Class filtering is done by combination of HMI tag and VBA code. A HMI string memory Tag is created in the Tag Database for Alarm Filtering (in the pilot project is named AlarmFilters\AlarmClass. Alarms are created and have been categorized using Alarm Class where the Class is defined as the name of the process page where the equipment is visible on.

The Alarm Summary popup call button in the ASN writes the corresponding string (the name of the process page) in the mentioned HMI tag.

Example;

```
AlarmFilters\AlarmClass = "Motor";  
Display GRT90_T370_Alarm_Summary_PopUp_Protected
```

A VBA code is called upon Animation Start for the Alarm Summary popup which reads the Alarm Filtering tag and constructs Filter definition string sent to the Alarm Event Summary object in the popup. No changes to this popup are allowed.

Changes on the Alarm Summary popup, HMI string and tag name are not allowed, this includes the VBA code.

5.8 Graphic Screen – View Types

Many types of views can be displayed in Zone 3.

- Overview
- Sub Overview
- Process Display screen (process display) equipment detail
- Popup (motor, valve, analog value trend etc.)

With the exception of the Overview level, the ASN zone shall always be present. Within the ASN zone, the ASN Control represents a specific sub area. Clicking the large button (line) at the top of each ASN Control displays a process display screen for the related Line/Process Overview level. Clicking each small button in the ASN Control shall display the related Unit Detail level.

5.8.1 Screen Navigation Hierarchy

The screen hierarchy can include several levels the following figure is an overview of the Screen Navigation hierarchy.

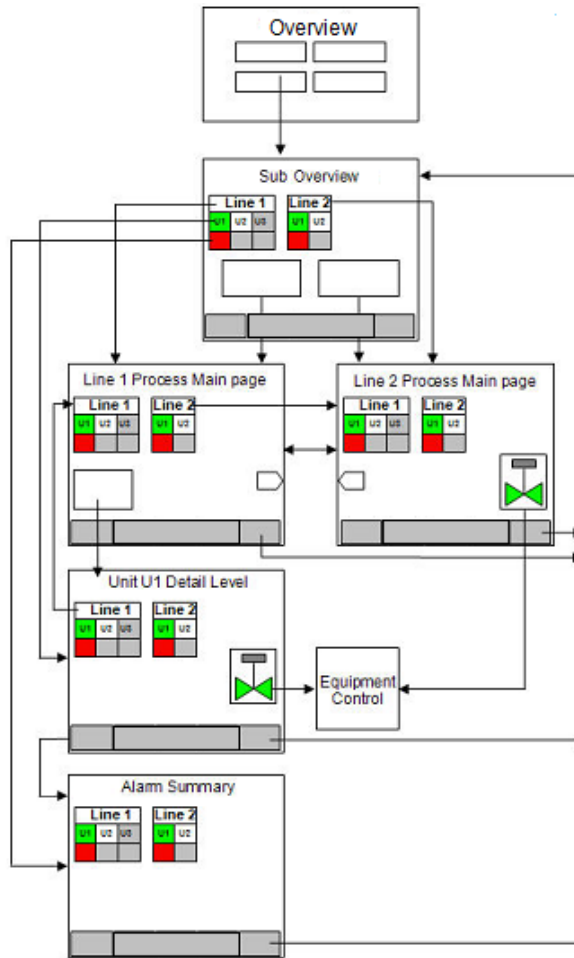


Figure 33 – Screen navigation hierarchy

5.8.2 Overview

This view provides a view over entire area and all sub areas are accessible form this level. This level has buttons that can display a specific Sub Overview screen but they have no control or animation. It is allowed to implement a simple static descriptive image on these buttons.

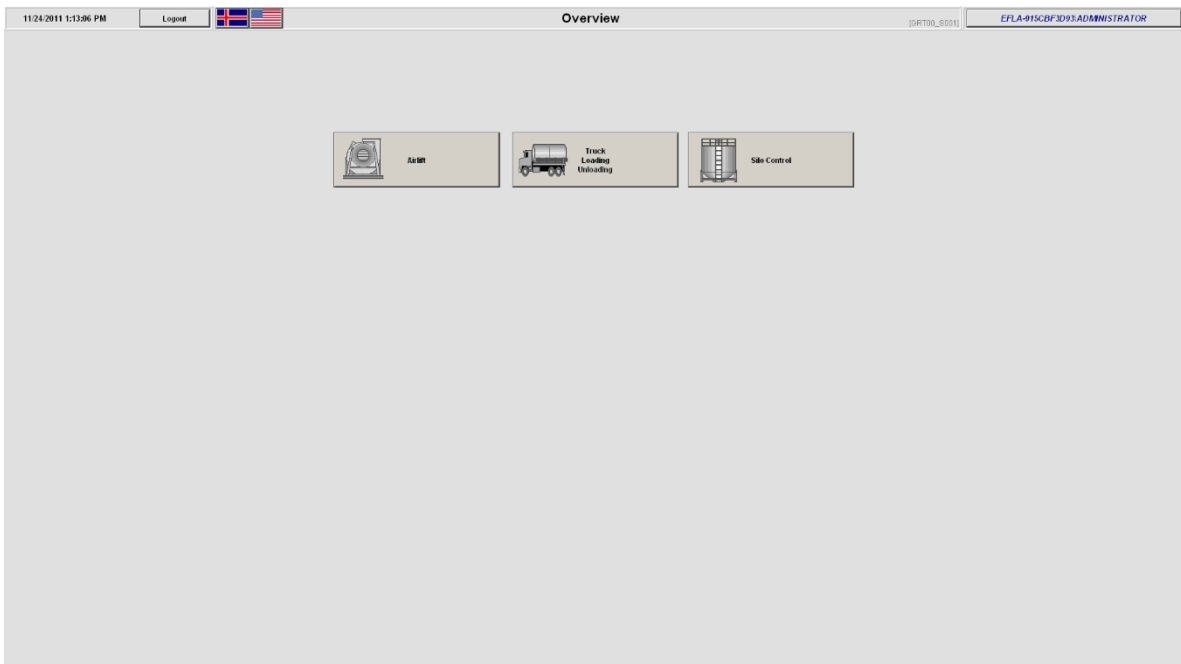


Figure 34 – Overview page

5.8.3 Sub Overview

This view provides access to all lines/processes for the sub system. In this level ASN controls are available and also a buttons that provide access to the Line/Process Overview. Each button shall be linked to a specific Line/Process and the background of the button shall have a schematic view of the Line/Process. Buttons shall also display the status icons for faults or alarms that are present in the Line/Process. It is allowed to implement a simple static descriptive image on these buttons. This view does not allow equipment control.

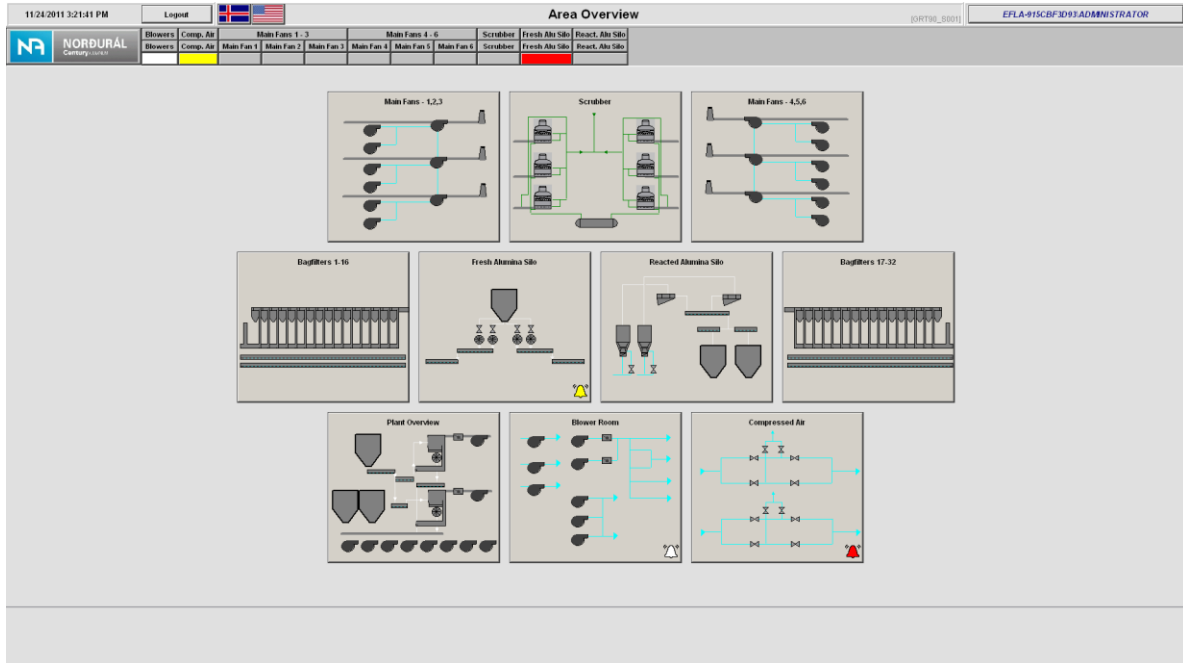


Figure 35 – Sub overview page

Each button on this page corresponds to 1 process page and should call it upon release. A simple and none animated drawing should be present on each button for easier navigation. This drawing is usually the layout of the process page.

Alarm bell indicates the alarm state on each button for the group present on the process page. If there is more than 1 group present then alarm bell needs to be added accordingly.

Important: Only one sub overview display is allowed.

5.8.4 Process Display

This view displays the Line/Process main page and/or Unit Detail level according to the use of the application. The process display screen contains static and dynamic objects, alarm information, and SFC statuses. The content of the process display screen may change but the shape, position, and size will not.

- Line/Process Level provides access to functionally related equipment groups. This level displays schematic views of the Line/Process in units with flow directions, Unit/Equipment states, and status. Single clicking on buttons provides more details along with access to the Unit Detail level.
 - Unit Detail Level provides access to the Equipment Control level via a single click on an equipment object. A unit could be equipment or a group of equipment included in a line. In some cases, a Line/Process Flow button enables access to another Line/Process Overview screen within the same sub area. This level shall show equipment details, states, and statuses. Multiple Unit Detail levels may be necessary to fully represent a unit in a clear and precise manner.

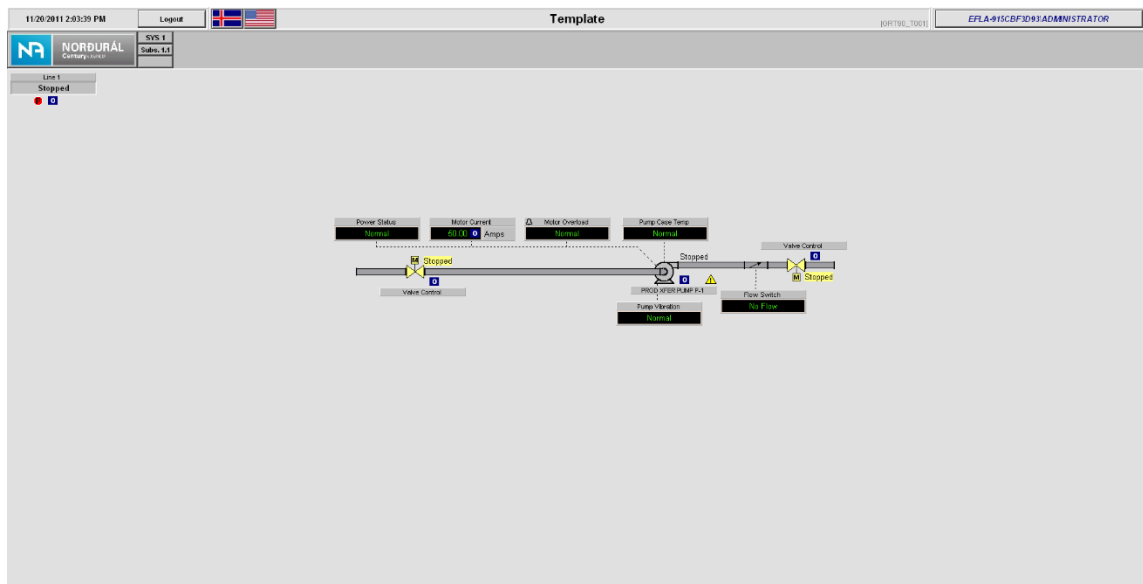


Figure 36 – Process display page

5.8.5 Popup Display

Equipment Control Level provides all the statuses, states, and operating modes for the equipment. This level also enables actions on the equipment. From the process display screen, clicking on the equipment object displays a specific popup for each equipment type.

Popup displays the possible action of a pump, motor, valve, analog input, line (group) etc. It also contains information about, equipment states, operation modes, fault/alarm statuses etc. Actions are possible from a popup display: operation-, maintenance-, engineering-, and alarm configuration-, alarms- and trends mode selection.

A great variety of popups is available in the PlantPax standard library and must not be modified. If vendor application requires special control function from its popups that is not included in the PlantPax library the vendor can copy the original popup to its project and save them under a different name and edit for specific requirements. The size of the popup display may be different according to application requirements.

A popup is called after a single click on the equipment. At the top of the popup is a faceplate and that shows a various options for the chosen equipment. Also at the top are help and exit button. Following figure shows the popup button bar

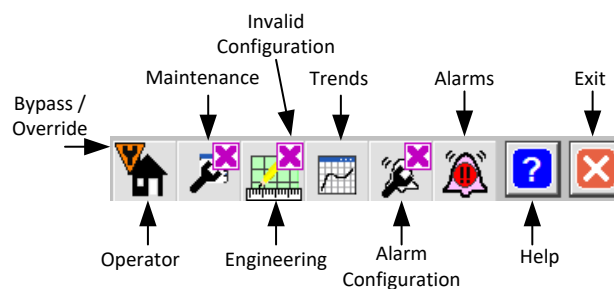


Figure 37 – Popup display button bar

All components of the PlantPax popups such as buttons, symbols, indicators etc. are available in the library as global objects. These components should be used as building blocks when designing a vendor specific popup.

Important: each user defined popup should have full graphic name in the bottom right corner of the help popup.

5.8.5.1 Faceplate Operator button

The operator button will show day-to-day status of the chosen equipment. For example the operators view for an analog input (Figure 38) and motor (Figure 39) is:

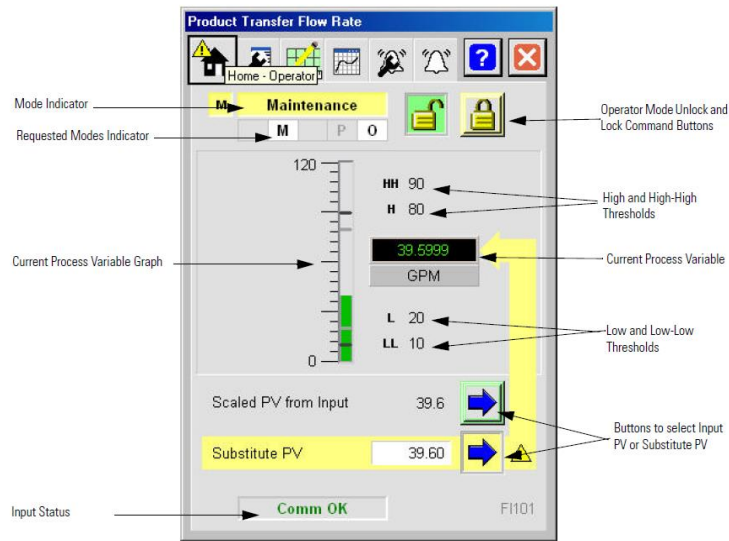


Figure 38 – Popup display operator tab for an analog indicator

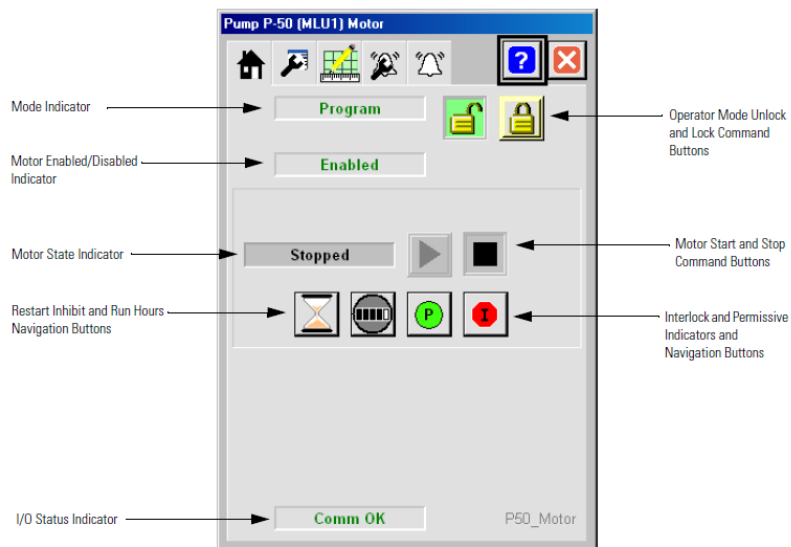


Figure 39 – Popup display operator tab for a motor

5.8.5.2 Faceplate Maintenance button

This button is used by the maintenance group. This button shall be used to call a page that enables parameters adjustment and control interrupt for the equipment. In following examples are shown maintenance options for analog input (Figure 40) and motor (Figure 41):

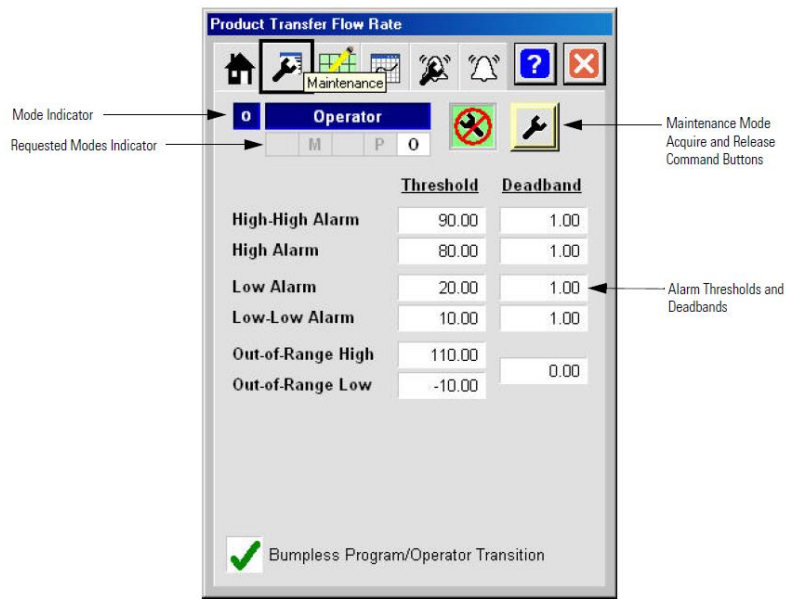


Figure 40 – Popup display maintenance tab for an analog indicator

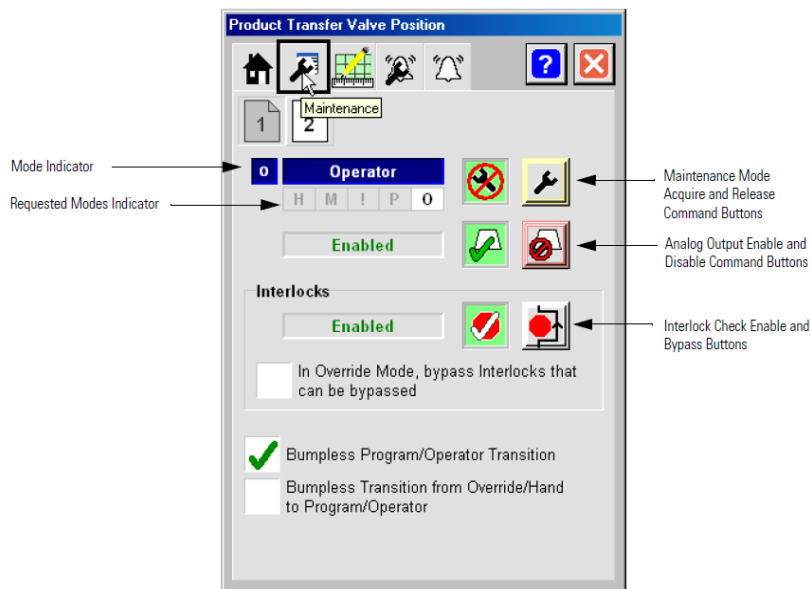


Figure 41 – Popup display maintenance tab for a valve

5.8.5.3 Faceplate engineering button

This button is for changing more detail control for the equipment and that control are variable between equipment. See the PlantPax standard (Table)

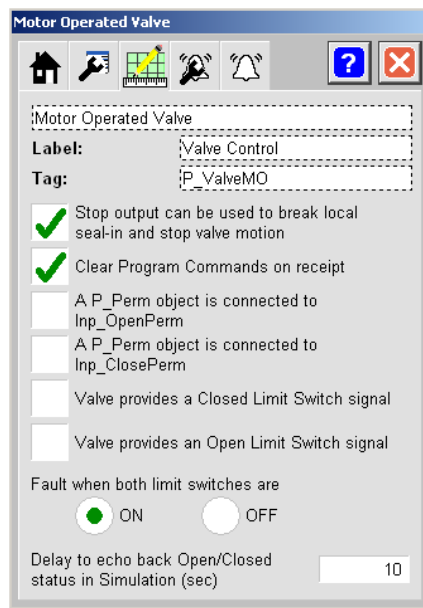


Figure 42 – Popup display engineering tab for a valve

5.8.5.4 Faceplate Trends button

Some equipment have trends button. Trends show different information depending on which device is being handled. For example in Figure 43 is shown a trend window for analog input and the trend shows have the input change in time.

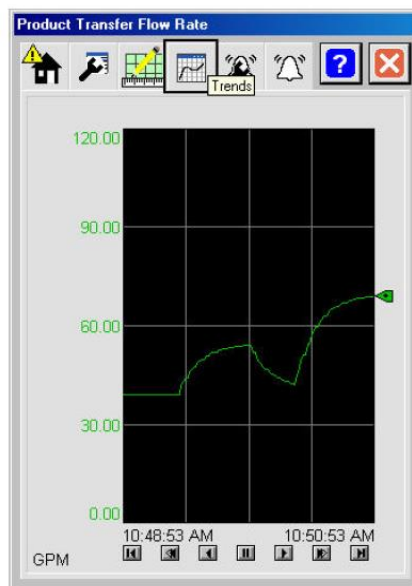


Figure 43 – Popup display trends tab for an analog indicator

5.8.5.5 Faceplate Alarm Configuration button

In the Alarm Configuration button allows user to change severity, acknowledge requirements, restart requirements etc.

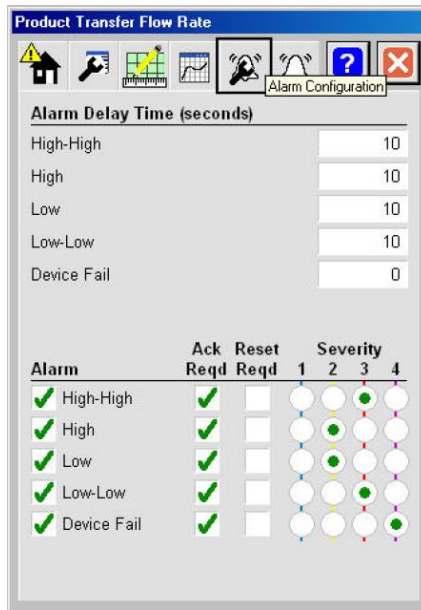


Figure 44 – Popup display alarm configuration tab for an analog indicator

Changing severity of the alarms will only affect the way this alarm is presented in the object and/or how these alarms will affect the control of the equipment. These changes will not affect the alarm message in the alarm summary as those severity levels are fixed.

5.8.5.6 Faceplate Alarms button

The Alarms button displays each alarm for the equipment which is being handled. See the PlantPax standard Table 1.

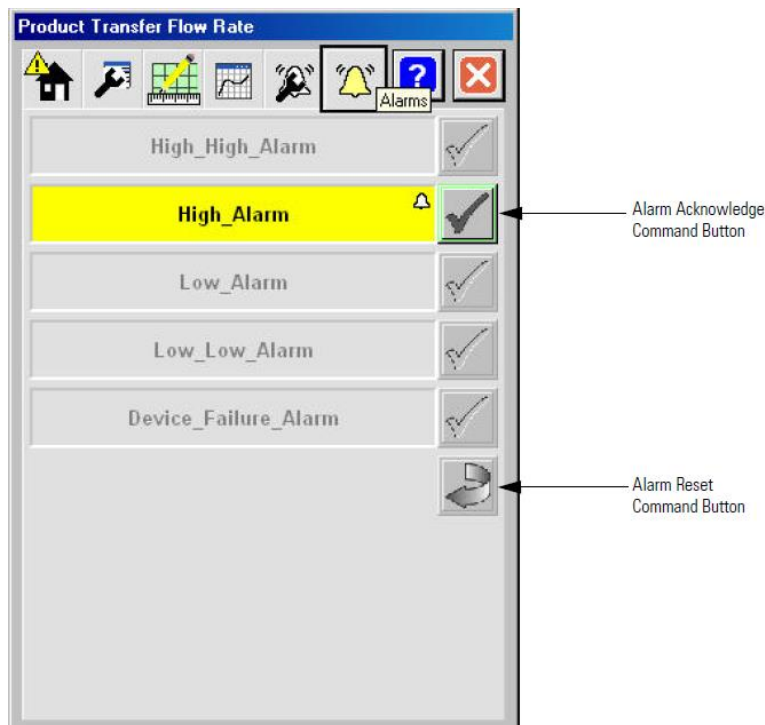


Figure 45 – Popup display alarm tab for an analog indicator

5.8.5.7 Permissive

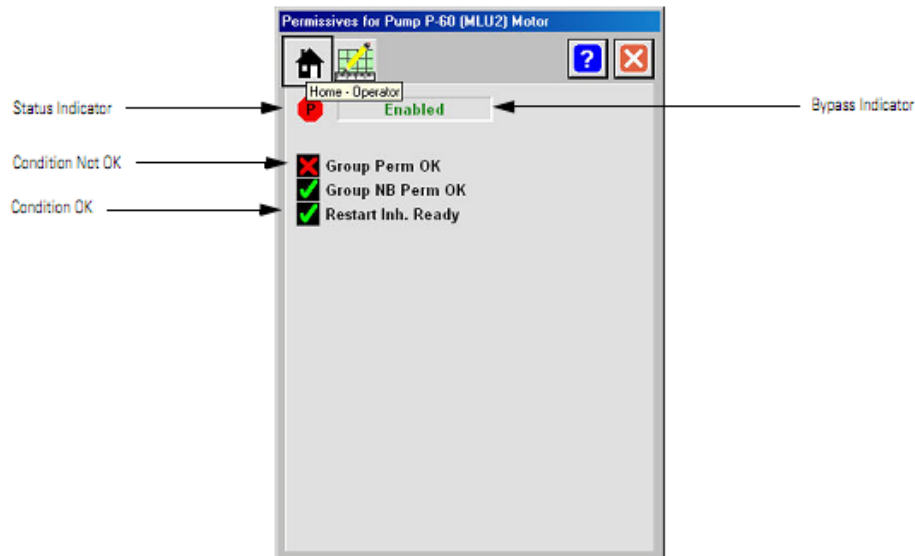


Figure 46 – Example of a permissive popup

Permissive are condition that allow specific equipment to be controlled started, run, opened etc. Permissive can be described as initial starting condition.

Permissive popups are usually called from the equipment popup page. If it is necessary to call the permissive popup directly from the process page the button should indicate if the equipment doesn't have control permission.

The permissive popup shall display all relevant initial starting conditions that must be fulfilled prior to starting a functional line (group), unit or equipment.

The level of detail must be sufficient to minimize the use of the ControlLogix Diagnostic tool.

If needed, mainly for detailed indication of permission, it is allowed to make a separate screen or popup which displays the permissive statuses.

5.8.5.8 Interlock

An interlock is designed to stop equipment that is running.

Interlock popups are usually called from the equipment popup page. If it is necessary to call the interlock popup directly from the process page the button should indicate if the equipment has an interlock condition.

The interlock popup shall display all interlocks for the equipment and their state; if the interlock is a fault state the alarm should be available from the alarm summary.

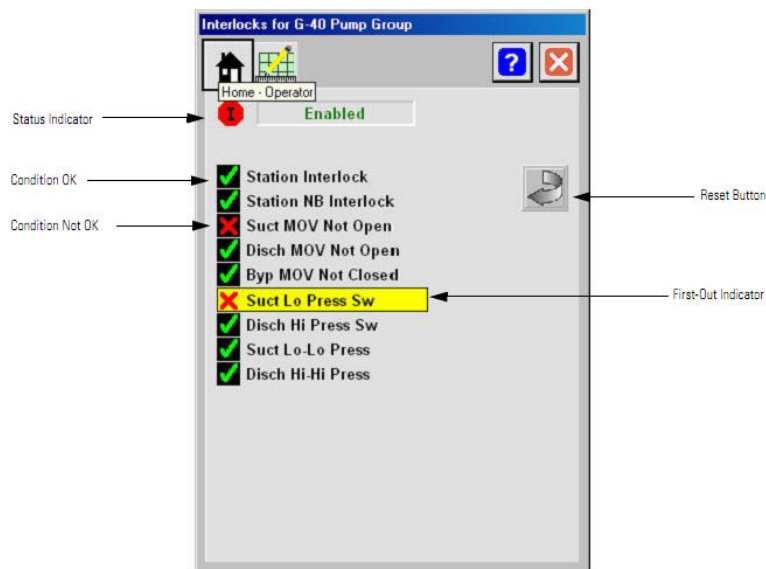


Figure 47 – Example of an interlock popup

5.9 Graphic Screen – Static Object

Static objects are objects that do not change in response to input data (i.e. the object retains the same shape and color during run-time). In the process display screen, all critical equipment should resemble the actual shapes and sizes in proportion to each other as represented on the P&ID. The flow path of the material should be clearly visible.

In a multi-area and multi-programmer context, a unique pre-defined library of commonly encountered static objects shall be used to ensure uniformity and standardization of the operation for all areas. A project static object library shall be provided for use by all vendors. The objects dimensions can be modified only if the initial proportions are respected. These objects shall be described and listed in the vendors functional design specification. All user defined static objects will be verified in the FAT.

The following figure is an example of static objects in a process display screen:

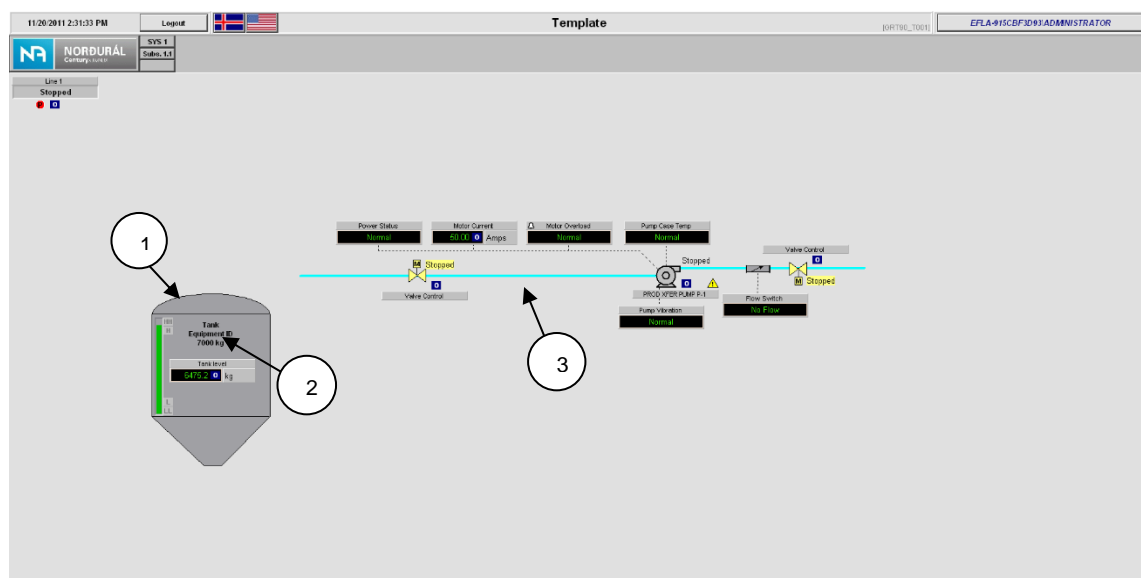


Figure 48 – Process page static objects

The static objects are listed below:

- (1) Static Element
- (2) Static Text
- (3) Process, Instrumentation and other Lines

5.9.1 Static Element

Static elements provide a realistic representation of the process. The static object library (screen GRT90_T101_Static_Library) has most of the elements and they shall be followed. If static objects are made by the vendor they should be provided in a separate screen, they should not be put on the provided static library screen.

All static objects should use grayscale with line width 1 and lines should be black L1C8.

5.9.2 Static Text

Static text identifies the Graphic Screen title and static objects. When identifying equipment number all text must appear in uppercase. All other static text must begin with a capital letter followed by lowercase letters.

Units shall be metric and conform to SI. All text shall appear in English or Icelandic depending on which language was chosen.

The equipment shall be identified by their tag numbers as they appear in the P&ID. The area identifier number shall appear only if it has more than one area identifier number on the same process display screen.

Static elements shall use the following style and color:

Text	Font	Style	Size	Alignment	Color
Graphic screen title	Arial	Bold	16	Centered	L1C8
Arrow identification	Arial	Bold	10	With the screen side	L1C8
Equipment identification	PlantPax				
Static element identification	Arial	Regular	10	Centered - Middle	L1C8
Unit	Use PlantPax standard format				
Process display	Arial	Regular	9	Right corner	L1C6
Alarm banner	Arial	Regular	10	Banner	L1C8
Button Text	Arial	Regular	9	Centered	L1C8

Table 16 – Static elements text sizes and color

5.9.3 Process, Instrumentation and other Lines

Static lines shall be used for detailed representation of the process. The lines shall have different styles, color and line weights depending on the process. Following figure and table shows width and color specifications: For easy segregation of screen process it is recommended to use different type of lines for main lines and supporting lines.

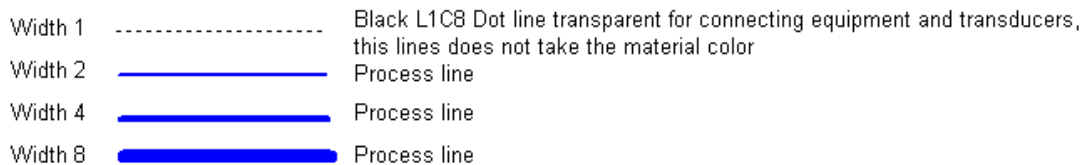


Figure 49 – Recommended process line sizes

Depending on the process application the color will change depending on the material represented on the display.

No	Material / Item	Color (Standard)	Color (Standard)	Standard Palette
1	Compressed Air	Gray		L1C6
2	Fluidizing Air	Cyan		L2C5
3	Air Slide	Blue-Green		L2C6
4	Potable Water	Blue		L2C7
5	Process / Cooling Water	Green		L2C2
6	Diesel Fuel	Orange		L3C8
7	LPG Fuel	Yellow		L2C1
8	Hydrolic	Brown		L3C4
9	Virgin (Fresh) Alumina	White		L1C1
10	Reacted Alumina	Violet (Magenta)		L2C10
11	Alumina Fluoride	Light Blue		L5C3
12	Chrushed Bath	Pink		L3C6
13	Carbon Dust	Black		L1C8
14	Carbon Classified	Purple		L5C9
15	Fire Hydrants and Equipment	Red		L3C2
16	Main Window Background	Light Gray		L1C3

Table 17 – Material color pallet

If process lines go from one process screen to another then there shall be a navigation button at the end of the line. This button shall provide navigation to the appropriate process screen where the line continues. Following figure shows the navigation button:



Figure 50 – Process line navigation arrows

Navigation button and the line shall always be in the same color. Navigation buttons are available in the pilot project.

5.10 Graphic Screen- Dynamic Object

A dynamic object is defined as an object associated with a specific data source. This object could be a button, touch area, or dynamic standard object.

A dynamic object library (screen GRT90_T100_Dynamic_Library) is provided with the pilot project.

For some specific conditions, the continuous animation could be used only to increase process understanding but the number of continuous animations must be minimized.

The Vendor can develop objects, the specific objects and the continuous animation must be defined in each sub area's functional analysis. These objects are suspects for approval by Norðurál. If dynamic objects are made by the vendor they should be provided in a separate screen, they should not be put on the proved dynamic library screen.

Dynamic objects shall follow these rules:

- All analog values call a popup with the corresponding real-time trend (visual display of the time).
- When applicable objects shall be capable of changing their shape and position in response to changing bit point values. For example, a gate symbol will change

according to the position of the gate. As point values change, the gate symbol moves to indicate the new position.

5.10.1 Equipment Dynamic Symbol

The dynamic object symbol allow operators to see status of the equipment, with a single click get the corresponding popup and get a control over selected equipment. When a popup is used to control a dynamic object, a touch field must be placed under it.

All dynamic symbols which are provided in the PlantPax standard (see Table 1) have similar design.

Figure 51 shows the dynamic symbol for single speed motor:

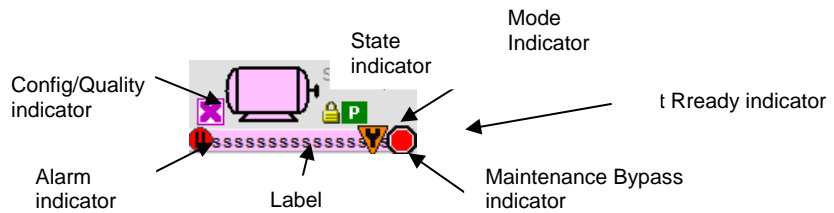


Figure 51 – Example of an equipment dynamic symbol

As shown in Figure 51 there are six symbols indications and they represents following:

- Config/Quality indicator:

Graphic Symbol	Description
	Invalid Configuration
	I/O Fault (status is "stale" or communication loss)
No symbol displayed	I/O quality good and Configuration valid

Table 18 – Process page indication for status/quality

- Alarm indicator: If alarm occurs this indicator will appear (see Table 27)
- Label: Device name
- Mode indicator: The motor have seven modes as following

Graphic Symbol	Description
	The motor is in Hand (local) Mode
	The motor is in Maintenance Mode
	The motor is in Override Mode
	The motor is locked in Program mode
	The motor is in Program mode
	The motor is locked in Operator Mode
	The motor is locked in Operator Mode
	No Mode: the instruction is scanned false and is out of service The outputs are held OFF and Alarms are not updated
	The motor has been disabled
No symbol displayed	The motor is in Program Mode

Table 19 – Process page indication for mode

- Maintenance Bypass indicator:

Graphic Symbol	Description
	A Maintenance Bypass is active
	The motor is disabled
No symbol displayed	No Maintenance Bypass active

Table 20 – Process page indication for maintenance bypass

- State indicator: The state indicator text changes and the graphic symbol color changes depending on the state of the motor.

Color	State text
Blue	Stopping
Gray	Stopped
Blue	Starting
Dark Green	Running

Table 21 – Process page indication for state

5.10.2 Tank/Vessel Level Representation

Tank and vessel objects shall not be dynamically filled. The bar graph object shall represent a tank/vessel level (PV value). The analog value must be represented in appropriate units for the Tank/Vessel etc. m³, ton, meter etc. and shall be located centered in the space between the vessel and the bar graph. If the mouse is moved over the object must appear a tooltip and when the user click on the PV value (level) a popup window will display.

Tooltip shall indicate the percentage (%) of fill when mouse pointer is over the level indicator.

The PV value must represent the appropriate unit for each tank/vessel, percentage (%), volume (m³), weight (kg or tons) etc.

The maximum volume (kg, m³ etc.) of the tank/vessel should be represented as a static text on the object as well as a description of the material the tank is used for. This should be the same as the PV unit.

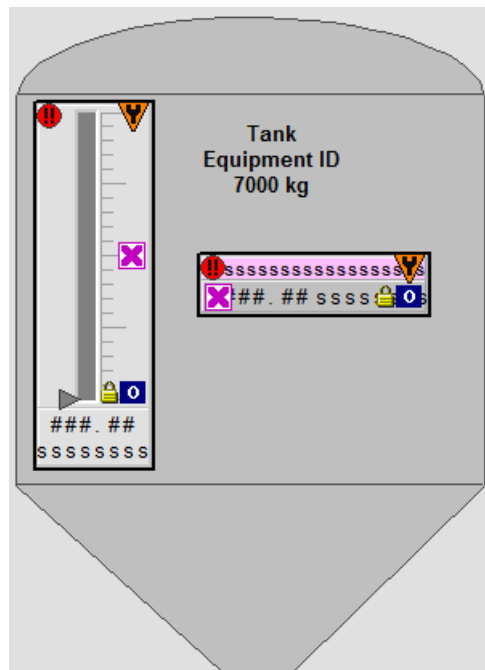


Figure 52 – Tank/Vessel representation

5.10.3 Fault/Alarm Representation

For equipment (motor, valve etc.) fault and alarm were dissociated from states representation (running, stopped etc.) to simplify the understanding of equipment functioning.

The fault/alarm icons shall be used to show equipment or line (group) fault/alarm conditions. The icons shall be superposed and visible only when a fault/alarm condition occurs. If a fault/alarm occurs it shall be possible to push the equipment and navigate to the alarm popup.- Following figure shows fault/alarm for motor:

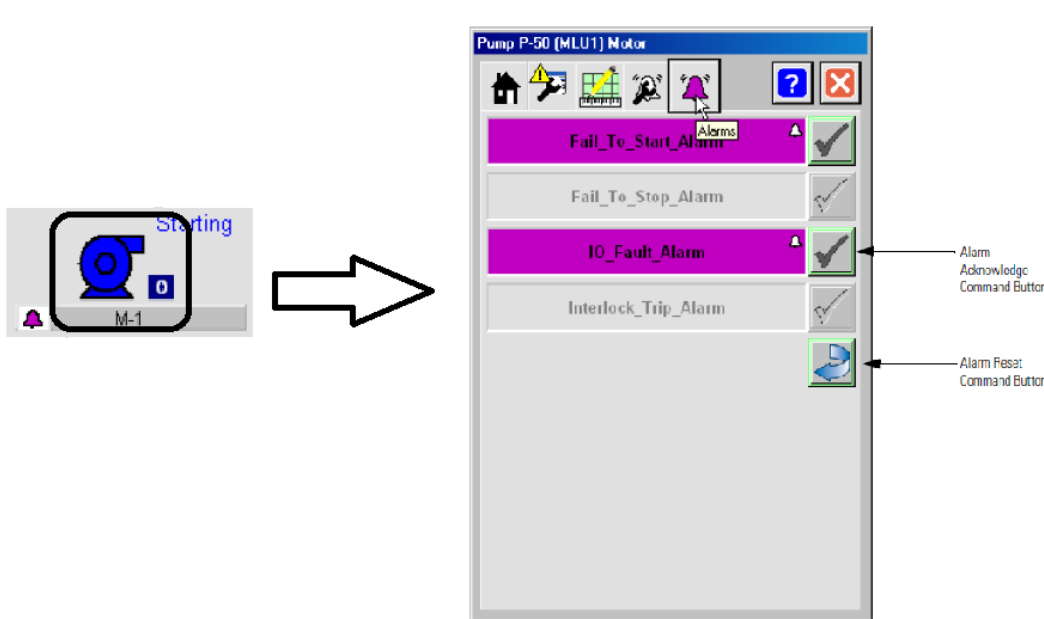


Figure 53 – Alarm representation in object and in equipment popup

All fault/alarm expressions can be found in the PlantPax standard (Table 1) or pilot project and they shall be followed.

5.10.4 Multi-State Indicator

This dynamic display field shall be used to indicate the status of the represented equipment or object.

The vendor is allowed to modify the multi-state indicators as he sees fit (dimension, text and color). These indicators should look like PlantPax indicators. Texts should be descriptive for the state and should be kept to minimum. A multi-state indicator is provided in the pilot project as a reference.

The below example is of Ready/Not Ready multi-state indicator;



Figure 54 – Example of multi-state indicators

5.10.5 Digital input Indicator

The digital input indicator is a standard objects provided with FTVIEW SE. The digital input indicator is a string display object that enables displaying an input state, etc.

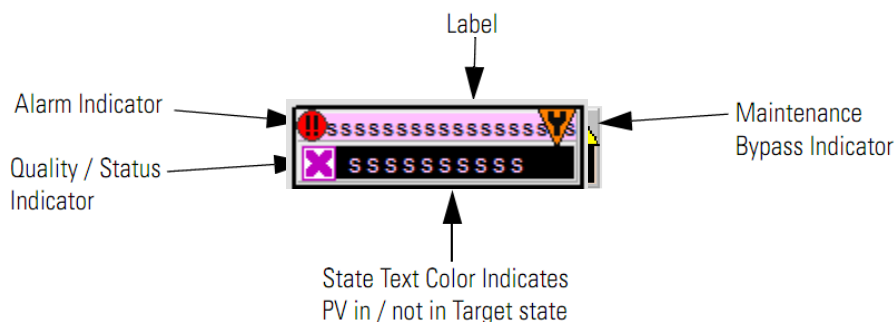


Figure 55 – Digital input indicator

Further information about multi-state indicator can be found in the pilot project.

5.10.6 Analog Value Indicator and Data Entry

The analog value indicator and data entry are standard objects provided with FTView SE. The analog value indicator is a numeric display object that enables displaying a tank level, equipment speed, etc.

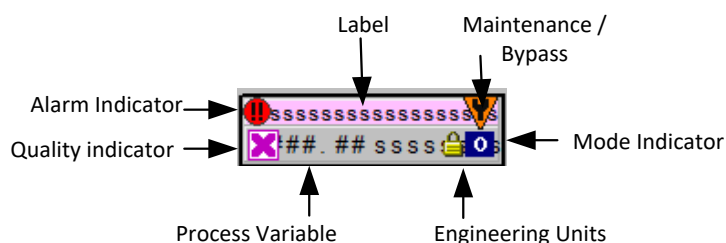


Figure 56 – Analog value indicator

5.10.7 Position Indicator

The position indicator represents the active position of equipment such as an elevator. The equipment current position shall be represented with the color green but grey for other inactive position. See the following example:

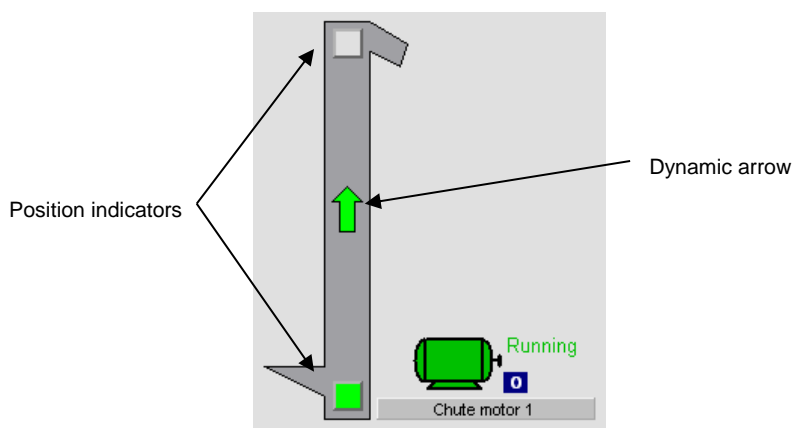


Figure 57 – Position indicator

State	Color	Code
Normal	Green	L2C2
Inactive position	Grey	L1C4

Table 22 – Position indicator color pallet

5.10.8 Level indicator

The level indicator represents the status of equipment such as a tank, etc. The indicator can show 2 states and they are following:

State	Color	Code
High High & Low Low	Red	L1C9
High & Low	Yellow	L2C1
Inactive position	Grey	L1C4

Table 23 – Level indication color pallet

Following figure shows example for a level indicator:

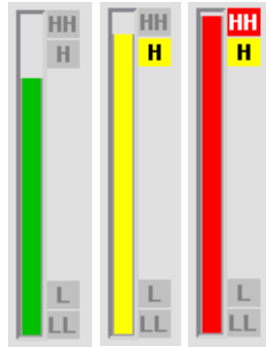


Figure 58 – Level indicator with limit alarms

5.11 Group control

Group control interfaces are located in upper left corner on process screen when applicable. This interface is used to control group of equipment, units or sequences. It is not allowed to resize the group control object.

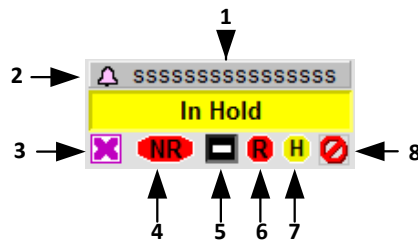


Figure 59 – Group control faceplate

1. Label: descriptive name of the group and/or subarea,
2. Alarm indicator.(See Table 27)

3. Invalid configuration. (See Table 18)
4. Non-Recoverable Fault active
5. Group mode: Group can be in following mode:









Symbol	Mode
	Device in Maintenance mode
	Device in Operator mode
	Hand (Local)
	Override
	NO mode (out of service)
	Alarm Inhibit (Suppressed or Disabled)
	Communication failure (Stale)
	A maintenance bypass is active

Table 24 – Group control modes

6. Recovable fault active
7. At Home Indicator – Green when machine is at Home – Else yellow
8. Bypass active
9. Status indicator: shows the status of the group.

Value	State	Border/Back Color		Caption Color	
0	Unknown	Purple	L1C8	Black	L1C8
1	Stopped	Gray	L1C4	Black	L1C8
2	Stopping	Blue	L1C7	White	L1C1
3	Starting	Blue	L1C7	White	L1C1
4	Running	Green	L4C8	White	L1C1
5	Comm. Failure	Light blue	L5C3	White	L1C1
6	Tripped Non Recoverable		L3C2	White	L1C1
7	Tripped Recoverable		L3C3	White	L1C1
8	Homing		L2C3	White	L1C1
9	Hold	Yellow	L2C1	Black	L1C8

Table 25 – Group control states

See Appendix B – Group Object for detailed description of the group indications.

Touch field is under the object which calls a group popup. From the popup the operator will be able to get information about the group and also control it. In the popup faceplate there are five tabs; Operator, Maintenance, Engineering, Alarm configuration and Alarm. Information about these tabs is available in chapter 4.6.4

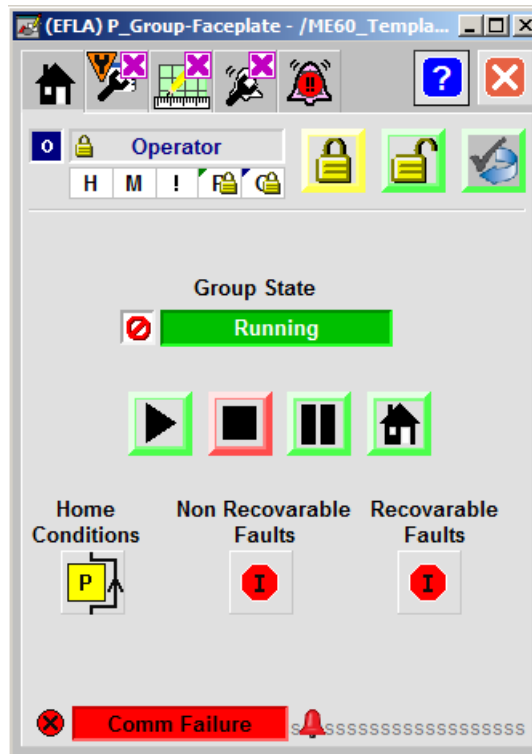


Figure 60 – Group control popup faceplate

The group is operated in the same manner as any equipment, and the faceplate has been constructed similar to the regular PlantPax faceplate. The group control faceplate has two additional buttons the home- and hold buttons.

Symbol	Description
	Home
	Hold

Table 26 – Group control extra buttons

Home button is used to get all the equipment in the group to the initial positions and pause button puts all equipment in the group in standby mode.

The home and hold buttons are only visible if the group has been configured for home and hold capability on the configuration tab.

The group control interface is available in pilot project and must not be changed.

5.12 Dynamic Object Configuration

There are two ways available to present objects in the SCADA system; use global objects or use object which use tag placeholders. The usage of global object is preferred.

5.12.1 Global objects

The vendor should use the global objects provided in the pilot project as much as possible. Most of dynamic objects included in the standard library are global objects.

Global objects made by the vendor should be constructed in their own global objects page. These global objects are not allowed to be constructed in provided global object pages. Naming conventions can be seen in chapter 4.7 FTView Studio General Naming Convention

Global object parameters definitions have to be filled in with description.

It is desirable that PlantPax objects are used as building blocks to construct new global objects.

5.13 Tooltips

If the computer mouse is moved over an object a tooltip shall be visible with a short description of the functionality of the object. All PlantPax objects have a tooltip window and they shall not be changed. Following figure shows example of a tooltip:

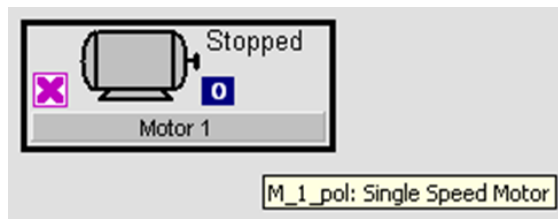


Figure 61 – Example of tooltips

5.14 Standard Buttons

The standard buttons are present on the graphic screens. They are used to open new pages or popup windows. In some cases, buttons have a color status. The standard button shall be used to call an equipment detail.

Sometimes a user does not have the option of clicking on a button for the following reasons:

- The user does not have the appropriate privileges
- The commands are not acceptable for the PLC sequence

When the user doesn't have privileges to use a button the button needs to be disabled and have a gray tone to it. The button should always be visible.

5.15 PID Button

The single loop PID button shall be displayed on process display screens. Multiple types of PID controllers are available in the RSLogix 5000 instruction library but not all have PlantPax faceplates. The PIDE has a PlantPax faceplate shown in this section.

It is preferred that the PlantPax PID is used. If the vendor, by approval of Norðurál, wishes to design their own PID control (using other RSLogix 5000 function) they are allowed to do so. These controls are required to have the same look and design as the PlantPax PID control and described in the functional design specifications.

Clicking the PID button, displays a popup that includes the following items:

- Control loop identification (name and description)
- Trend button (SP, PV and CV)
- Actual value of SP, PV and CV with engineering unit
- In manual mode, the controller output (CV) may be set by adjusting the set point (SP)
- Limits representation next to the set point (SP) bar graph
- Ability to change the SP and CV value

Following image shows the setup in more details:

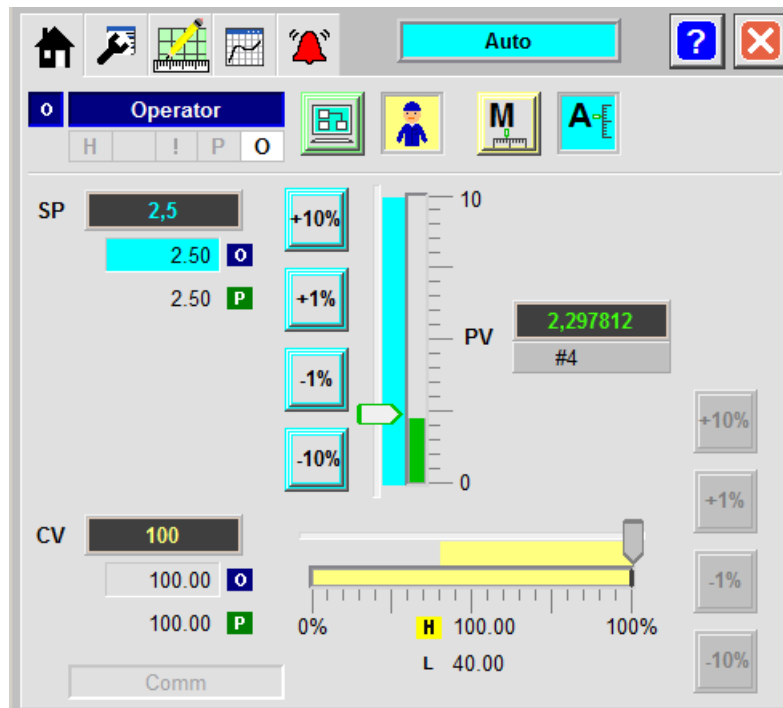


Figure 62 – PID popup home tab

Clicking on the maintenance button provides a popup for the PID Parameters.

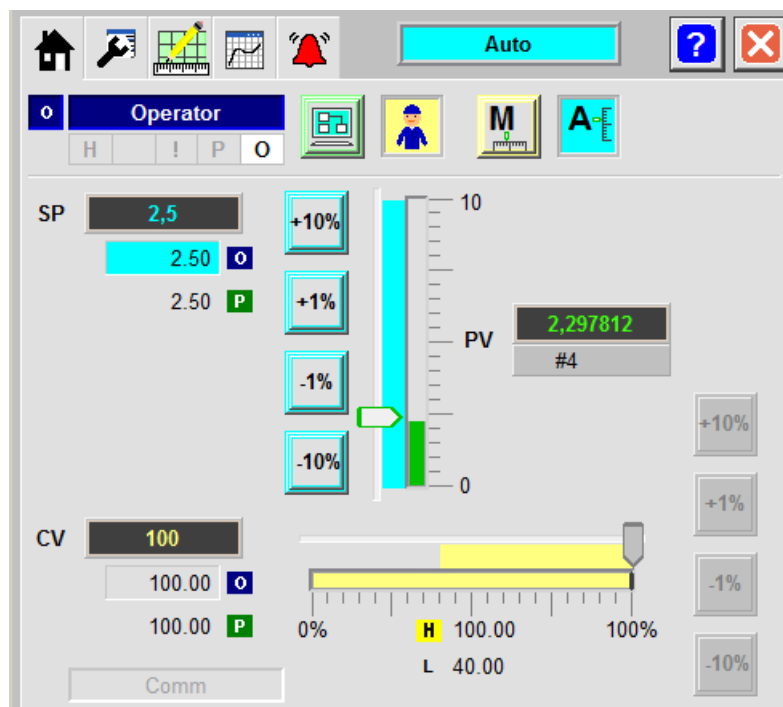


Figure 63 – PID popup maintenance tab

5.16 Trends

Template for SCADA trends are available in the pilot project and all trends in Norðurál project shall respected the template.

Default settings for trends are following:

- Data sever is real-time data server
- Pen source should be set to historian server.
- Trend refresh Rate is 2 seconds

- Maximum numbers of pens is eight
- Chart time range is 2 hours
- Display grid lines for X- and Y-axis is 4 for major and 0 for minor grid
- Following figure shows the runtime settings

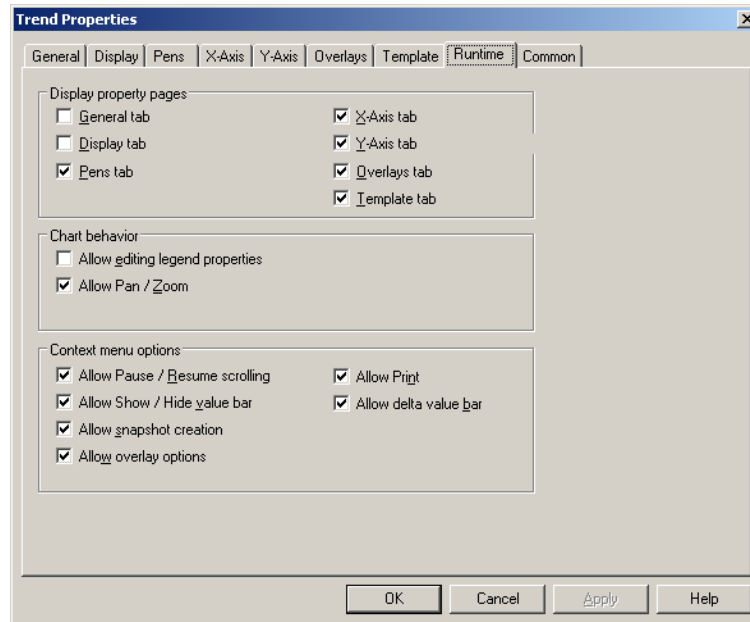


Figure 64 – Trend configuration runtime tab settings

All other setting can Vendor change but with approval from owner.

All analog values or values shall be logged.

5.16.1.1 Trend features

Trends features shall include the ability to move backward and forward within a selected time range, read the exact value of any variable by moving a sliding scale pointer on the graph or chart, and change the time scales by zooming in and out. A legend of the displayed tags is displayed at the bottom of the graph along with the values at the positions of the left and right sliding scale pointers.

5.17 Help page

The vendor has free design of this page. The page shall include vendors contact information. Vendor's logo is allowed to be placed on this page. Links to plant documentation is required (for an example panel schematics and P&ID). These documents are shall be in PDF format.

Vendor should not integrate documents into the SCADA system, where document navigation is done within the SCADA system. Only links (or path) to these documents should be provided.

Documents should be stored locally or on Norðuráls network. Following is an example of directory path

C:\Documents\VendorsName\DocumentType

Where;

Documents This is always the first folder

VendorsName Name of the vendor who provides the system

DocumentType Should be short descriptive text (schematics, P&ID etc.)

Following figure is an example of help page layout;

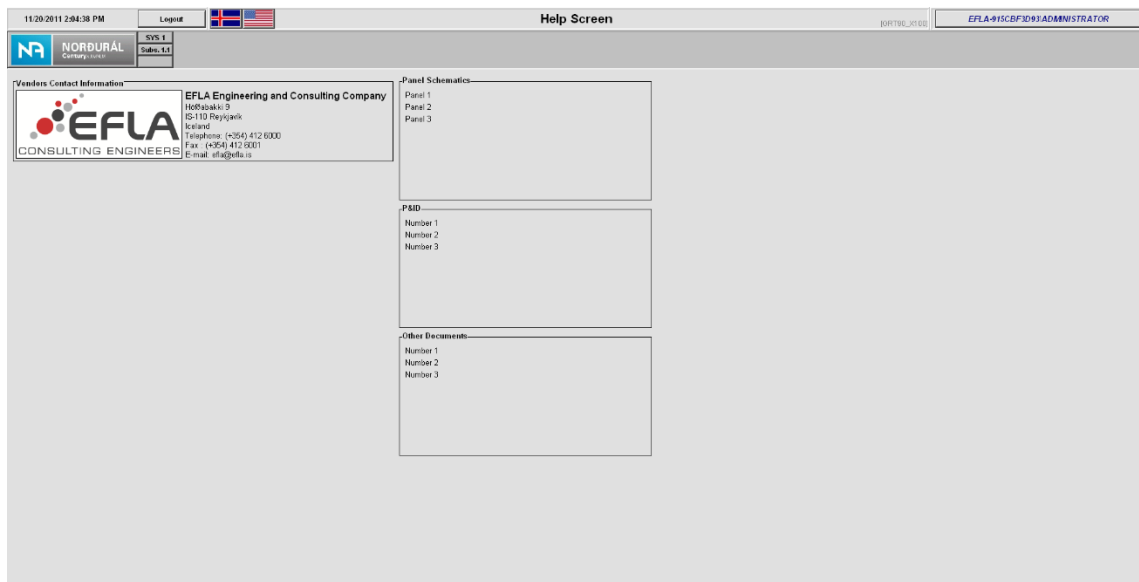


Figure 65 – Help page example

5.18 Sequence page

For each sequence there shall be a sequence screen implemented in the SCADA system. The sequence shall be visualized with sequence indicators included in the pilot project. Vendors are allowed to include step timers if they are descriptive for the sequence process flow. A legend shall be visible on this screen describing the functions of the sequence diagram.

Following figure is an example of a sequence screen layout with legend information;



Figure 66 – Sequence Screen Example

5.19 Screen List

This display provides access to the entire graphic screen included in a sub area. Only overviews, process and general full pages need to be listed. It is not necessary to list popups that are equipment depended.



Figure 67 – Screen list

5.20 CLX Network Overview

This screen shall display the network including all ControlLogix controller statuses, Stratix switch statuses, FactoryTalk Directory Server status, and Data Server and FTView Server status (server statuses are available by popup call) for a specific sub area. It shall be accessible with the Network button located on the Function bottom bar.

The remote rack shall not be represented on this screen. But, the Ethernet communication network switches must be represented.

The following information shall be represented for each ControlLogix controller:

- IP Address (AOI connected)
- Heartbeat (failure or normal condition)
- ControlLogix Controller date and time
- CPU status
- The CPU task statuses (running or inhibited)

Stratix switch information should be displayed and should the object call a detailed information popup.

Server statuses are available in a popup call from this page. These popup calls are conditional to how many servers are connected to the subarea. For sub area with 1-3 servers the popup GRT90_P200_ServerStatus should be used and for subareas with 4-6 servers the popup GRT90_P201_ServerStatusExtended should be used. These popup include VBA code which needs to be configured for the popup to work properly.

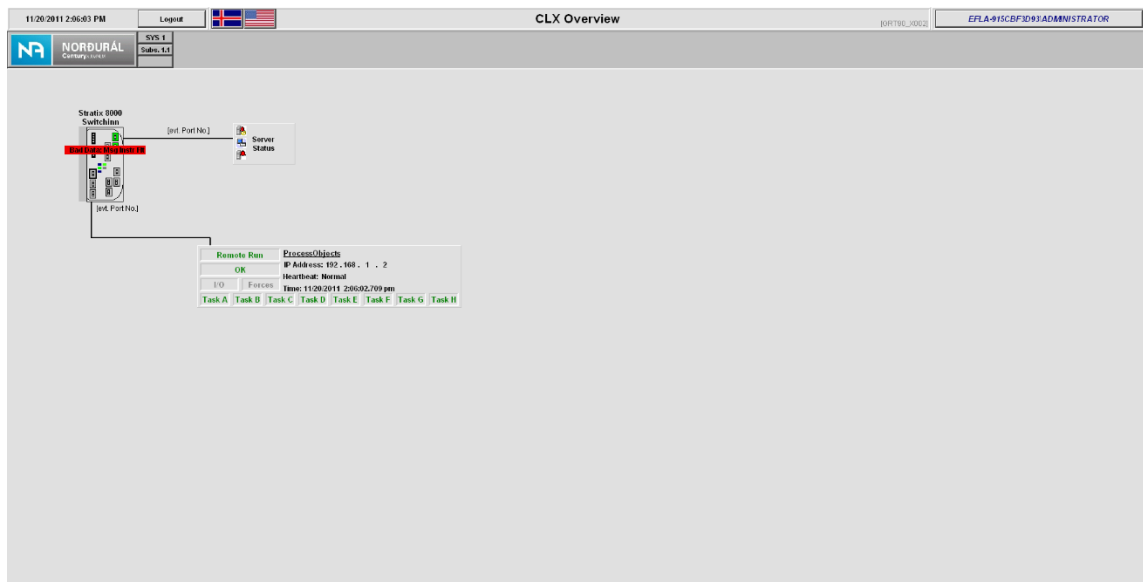


Figure 68 – CLX overview

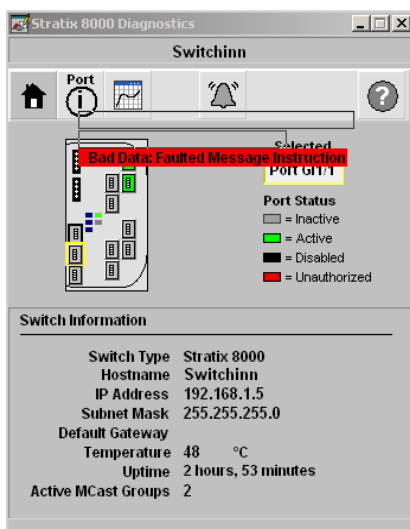


Figure 69 – Stratix switch Popup

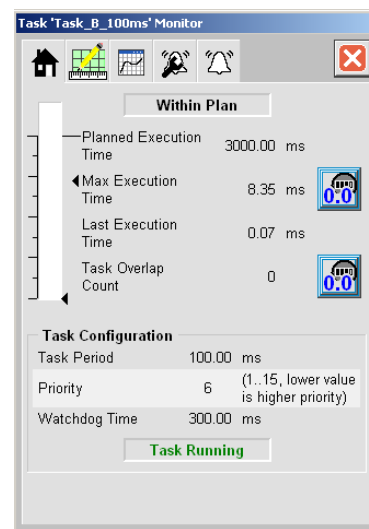


Figure 70 – Task monitor popup

In cases where more than one of these popups need to be presented the provided popups need to be duplicated and configured (VBA) and named accordingly.

Clicking on the button corresponding to the ControlLogix Controller, in the preceding figure, provides a ControlLogix Controller popup faceplate ((RA-BAS) L_CPU-Faceplate).

5.21 CLX Module details

This screen shall display the ControlLogix Controller detail with information about local / remote rack and module diagnostic.

Individual modules should only represent if they have faults or are in normal state.

The CPU should display the CPU statuses, it is not necessary to display task statuses on this page.

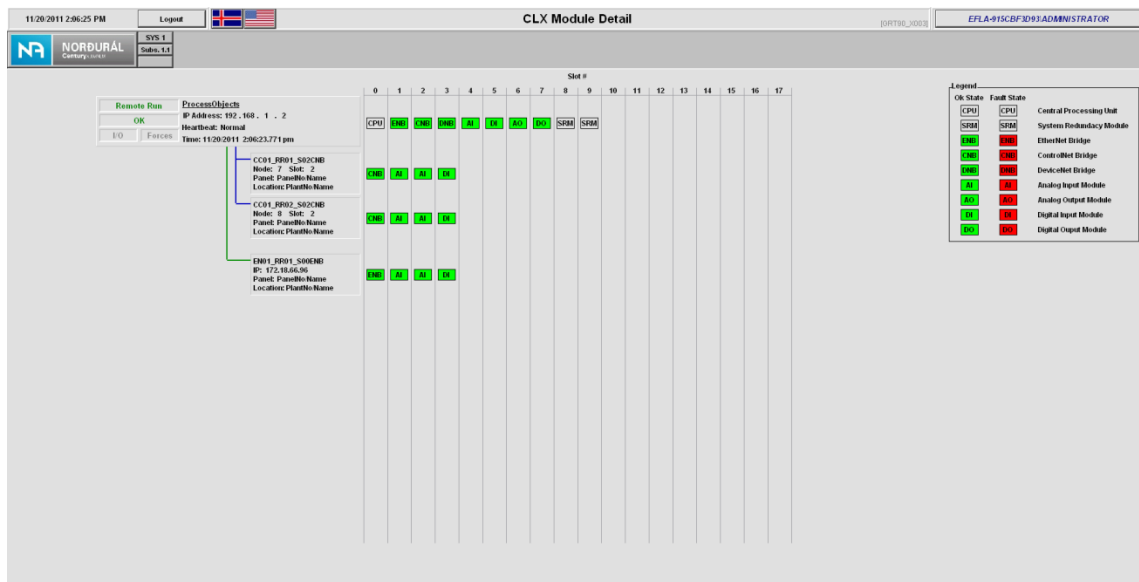


Figure 71 – CLX Module Detail

- The color used to represent the status of the different ControlLogix components shall be as follows for all screens:
- Failure: red color
- Normal Condition: green color

6 ALARM MANAGEMENT

6.1 Alarm states

Alarms have 6 main states and each state has a different priority. Following table show definition on each state. Blinking indicator means alarm has not been acknowledged.

State	Definition	Severity	Color
Urgent	Communication and network fault	4	
High	Fault	3	
Medium	Warning	2	
Low	Info or prompt	1	
Return to normal	Return to normal, but a previous Alarm has not been acknowledged		
Inhibit	Alarm has been inhibited		

Table 27 – Alarm states and indication

6.2 Event / Message Definition

Events or messages are used for status information only, and do not require acknowledgement. An event is an informative event log for users. This type of message should be kept to a minimum.

6.3 Alarm Configuration

Alarm shall be defined and configured with the Alarm and Event setup. These alarms and descriptions shall be the same for the level 1 HMI client and the level 2 SCADA client screen.

Each alarm must use a digital tag generated by the CLX Controller, analog alarms shall not be used.

All alarms shall be synchronized with information provided by the ControlLogix Controller using an Acknowledgment digital tag for each alarm, derived from a ControlLogix Controller tag. This Acknowledgment tag ensures alarms are acknowledged only once for each instance of an alarm.

The alarms are stored on the SCADA FTVIEW Alarm and event server and in the central SQL database.

Setup instructions for the alarm and event server are given in the Rockwell automation documentation.

6.3.1 Alarm Severities

Alarm severities shall be assigned to:

- Differentiate between urgent, high, medium, low, messages or events
- Determine how an alarm shall react when:
 - It appears for the first time
 - It is acknowledged
 - It is cleared

There are four severity levels used as defined in the following table:

State	Severity	Range	Use
Low	1	0-250	Message
Medium	2	251-500	Warning
high	3	501-750	Alarm
Urgent	4	751-1000	Control system faults Network and PLC. E-Stop

Table 28 – Alarm severity categorization

6.3.2 Alarm Definition

The ControlLogix Vendor or the OEM shall provide an Excel spreadsheet that contains the following information for the alarm tag definitions and the PLC application code:

- ControlLogix Controller name
- Tag name
- Device Type
- UDT type
- Alarm type
- Alarm text
- Acknowledge tag
- Alarm severity

The alarm description text shall consist of a maximum of 80 characters.

6.3.3 Alarm Class Definition

Each alarm should have Alarm Class defined. Alarm Class should be set as the name of the process page where the equipment is visible. This is done for alarm filtering in the Alarm Summary popup (see chapter 5.7.1).

6.3.4 Current Alarm Format

Current alarm related to a data is displayed in a single line format in the Alarm Summary screen. This screen is accessible from any graphic screen, using the Alarm button located on the Function bottom bar.

6.3.5 Alarm Management

Alarm management is performed at level 1 by the ControlLogix Controller. Level 2 shall emulate the level 1. Clicking on the different acknowledgement buttons (Ack Current, Ack Page or Ack All) sends an acknowledgment request to the ControlLogix Controller. This causes the Alarm Acknowledgement bit to change to 1 inside the ControlLogix Controller. The ControlLogix Controller immediately changes the alarm bit to 0 if the fault/alarm condition has disappeared.

6.3.6 FactoryTalk View Command

By double clicking a specific alarm in the Alarm and Event summary the display containing the faulty equipment should appear. The following is an example to call a motor process display from the alarm banner;

Display GRT80_S057_Conveyor

6.4 Diagnostic Log Configuration

The following instructions present the configuration restrictions for the diagnostic log:

- With the diagnostic setup utility, the directory for the diagnostic log files shall be the default directory C:\windows\system32\config\FTDiag.EVT.
- Log files older than ten (10) days shall be deleted when a new file is created.

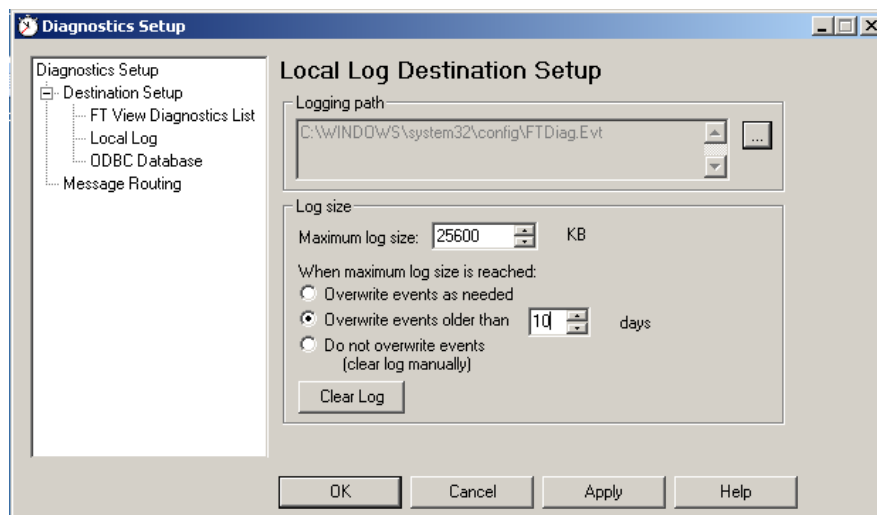


Figure 72 – Diagnostic Log Configuration settings

7 STARTUP AND SECURITY

Standard Windows server start-up and shutdown procedures shall be utilized.

7.1 SCADA Start-up

FTView SE clients must be configured for Windows 7 to start up without displaying the logon prompt. The Client shall then automatically launch the appropriate SE Client software.

The client file should be called from the Windows startup folder, so the client will start as soon as the computer starts.

A description of this procedure is explained in the FTView SE User Manual.

7.1.1 Servers

FTView servers on the Windows server shall use standard security; the servers shall be located in racks inaccessible to unauthorized personnel.

7.2 Security

Within an FTView application security restricts access to specific graphic screens.

The system shall transparently manage all security functions according to the following guidelines:

- User must enter an appropriate FactoryTalk user name and password to login into a client.
- A user shall not be able to select an unauthorized and protected item.
- Button, providing access to popup with commands, shall be visible only if the user has the appropriate security codes.

The security requirement of the application shall be defined in each functional analysis.

7.2.1 Security – Group and User

Windows-linked accounts shall be used for the security management. Groups will be created in the windows domain in which windows users will be added.

Windows Groups will be added in the FactoryTalk Security. The access rights can then be associated to the group for the runtime security.

When a Windows-linked user attempts to access system resources, FactoryTalk Directory relies on Windows to determine whether the user's name and password are valid, and whether the account is active or locked out.

7.2.2 FactoryTalk View SE Security – Service

FactoryTalk Security Services:

- Used to create security accounts for users and groups, to set up general security permissions on common actions.

For the Norðurál Site, five (5) possible levels of user accounts can be configured. The different user levels, user names, and passwords shall be configured as one of the following possible types of system accounts:

- **Read-only:** Default startup mode. No one is logged in; screens are only available in read-only setup.
- **Operator:** Operator privileges shall have access to most of the day-to-day operating functions of the system.
- **Supervisor.** Change set points. Supervisor shall have access to all of the day-to-day operating functions of the system.
- **Maintenance:** Maintenance privileges include access to all levels that operator and supervisor have. Also have access to control bypass, feedback, override inputs, enable/disable device etc.
- **Engineering:** Shall have access to all levels of the system.

In the “PlantPax Process Library Security Configuration” document are more detailed information about system accounts and they shall be followed.

7.2.3 FactoryTalk View SE Security – Run time

FactoryTalk View Runtime Security:

- Used to manage run-time security for HMI project components.
- Protects access to HMI project components by assigning security codes (A - P) to users and user groups (in the Runtime Security editor).
- Security Codes A to P can be assigned to user in FactoryTalk View SE Runtime Security editor. Following table shows what security codes each user level has: (In the “PlantPax Process Library Security Configuration” document are more detailed information about security codes and they shall be followed.)

Security Code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Read-only																
Operator	X	X				X				X			X			
Supervisor	X	X				X	X	X		X		X	X	X		
Maintenance	X	X	X			X	X	X		X		X	X	X	X	
Engineering	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Table 29 – FactoryTalk View SE Security code

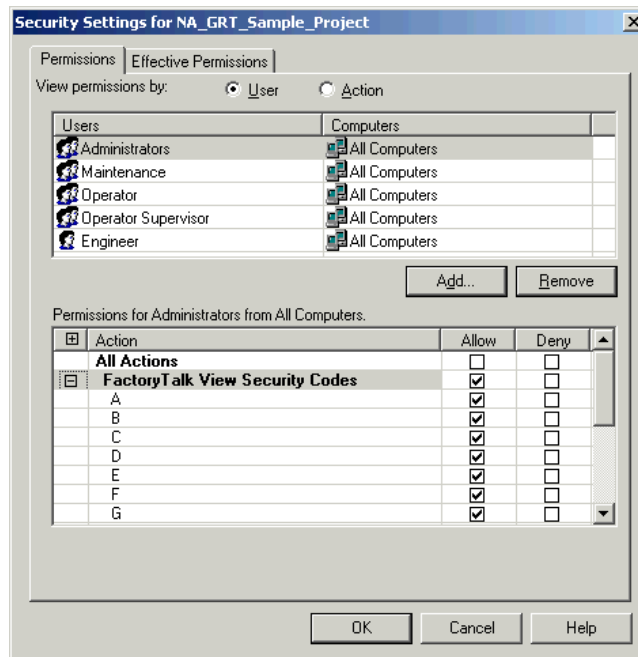


Figure 73 – FactoryTalk View SE Security users

Each protected object shall have Security Code corresponds to the PlantPax standard library. Following image shows a security code for an object:

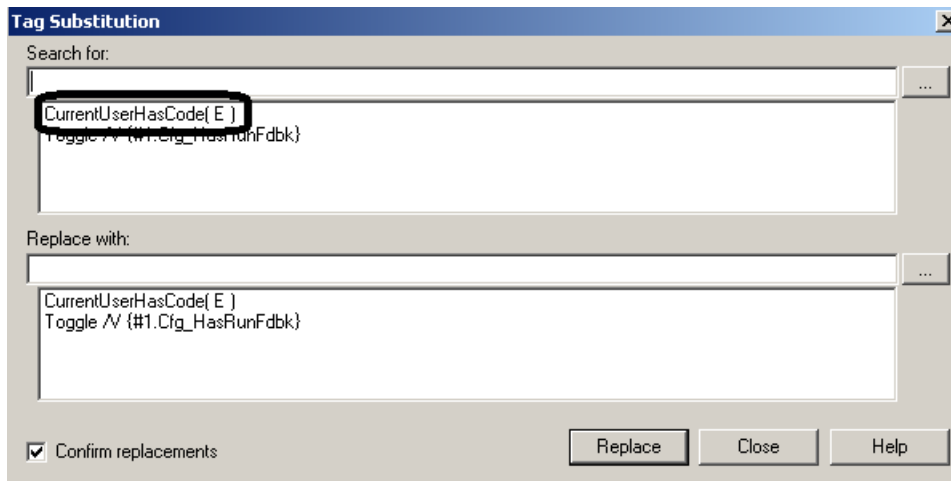


Figure 74 – Current user function call

7.2.4 Login/Logout

Login button is located in the top of each screen and is attached to a login popup as following figure shows.

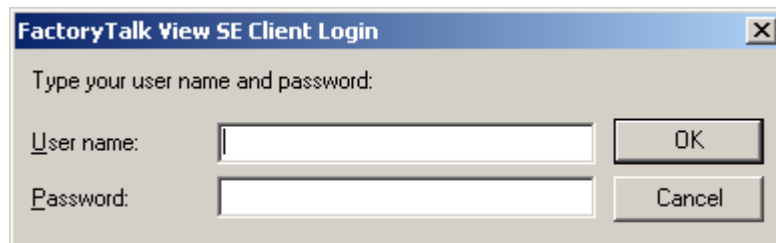


Figure 75 – Login popup

When user logout all process screens, popups and protected elements shall be closed but current process screen shall reopen with the read-only user level access.

Auto logout shall activate at specific time every day governed by the shift change.

7.2.5 FactoryTalk Security - Structure for the Start-up Phase

A list of standard user names and passwords shall be issued by Norðurál to configure during project implementation.

FactoryTalk shall use the security structure shown in Figure 76 during the startup phase (before the network is completed).

During the start-up phase, the system will be configured in a workgroup. For workgroup installations operating system linked users and password names shall not be used – only direct FactoryTalk accounts.

	Username	Password
Read-only	Readonly	readonly
Operator	Operator	operator
Supervisor	Supervisor	supervisor
Maintenance	maintenance	maintenance
Engineering	Engineering	engineering

Table 30 – Commissioning FT accounts

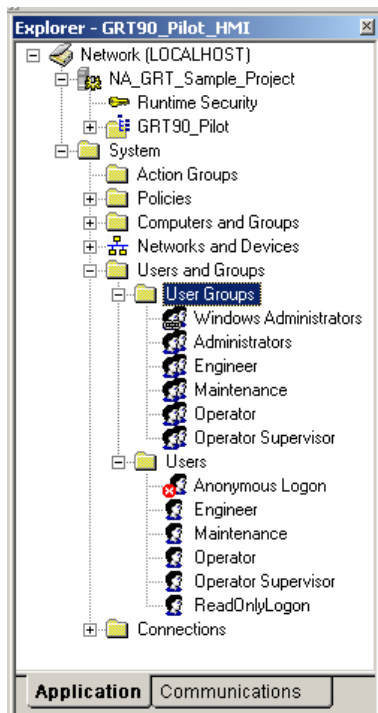


Figure 76 – FactoryTalk Security workgroups

7.3 DeskLock

DeskLock is a FactoryTalk View tool for the Windows operating system. It is used to choose settings so that an operator using FactoryTalk View cannot gain access to functionality not expressly configured by the system integrator.

It also allows control to hide items on the Windows Explorer desktop, including the Taskbar and Start Menu, disable key combinations that are used to perform specific Windows actions such as accessing the Task Manager, and provides access to the Microsoft Management Console for more advanced configuration.

8 HMI LEVEL 1 INTERFACE

This section contains the general structure of a HMI level 1 application. The PlantPAX library is available with faceplates for the FTView ME level 1 HMI systems and those faceplates are homogenous to the faceplates utilized in the SCADA system FTView SE.

Auto logout should be set to 30 minutes exception can be made with Norðurál approval.

8.1 HMI Level 1 Navigation Philosophy

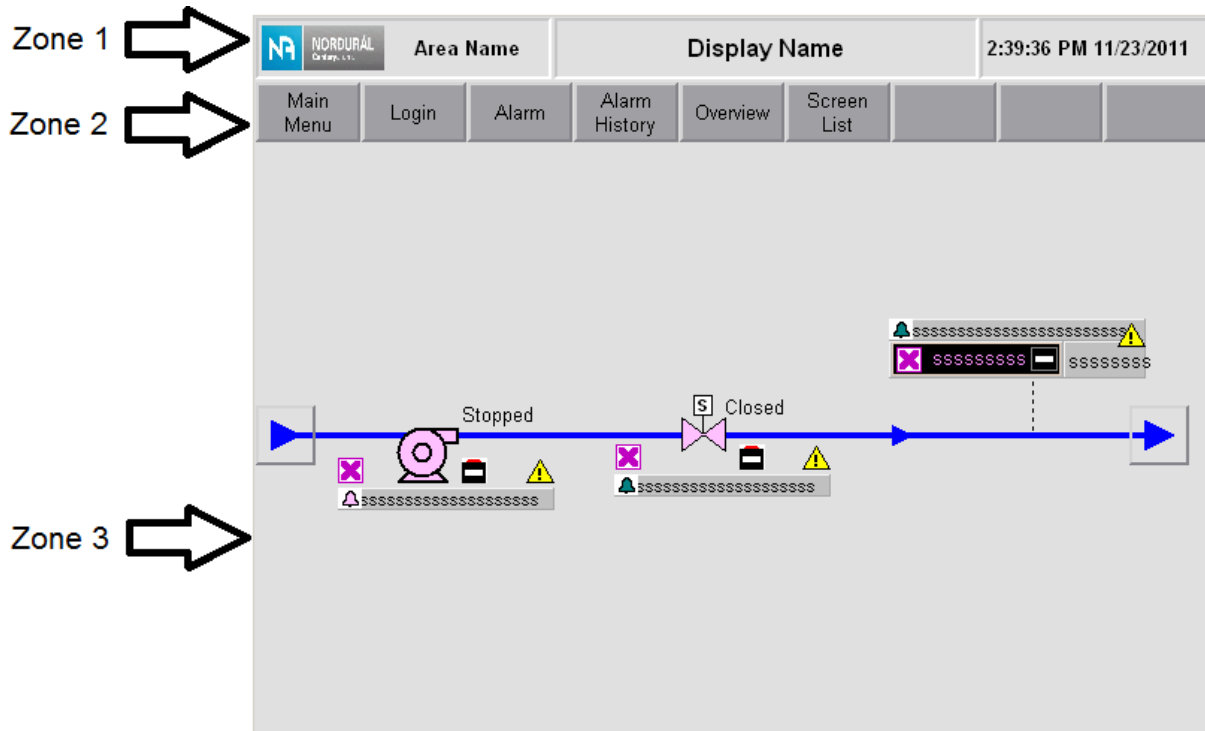


Figure 77 – HMI level 1

The above example is a process screen on a HMI level 1 client with the title bar and the main button bar:

Since the HMI panels varies in size and aspect the layout of the Zones 1 and 2 may change but the predefined buttons shall always be visible. Panel View Plus 1000 is the smallest type allowed for the Norðurál Site.

Mainly, the level 2 interface standards will be used to develop the level 1 screen. However the following points should be keep in mind during the development of HMI level 1:

- The main objectives of level 1 interface are to operate and debug equipment.
- Simple process screens are preferred on a L1 HMI since it will result in an easier operation environment.
- Since the HMI level 1 screen are touch screen devices, no command should be sent by pressing a graphical equipment object on the screen.
- The first form displayed is always the overview page.
- Popup form will be used.
- All popup are in the PlantPAx library
 - The dimension of object provided in the dynamic library must not be modified.
- The following screen is not required:
 - Network diagnostic
 - Because of the small screen size and the large area required for a touch screen application, ASN shall not be used.
- All other level 2 interface development standards are applicable.

8.2 Graphic Screen Format

8.2.1 Zone 1: Title Bar

The title bar is a horizontal bar located at top of each page. It contains the following information that should always be visible:

- Plant and area name on the left
- The screen title in the center
- Date and time on the right

8.2.2 Zone 2: Main Button Bar

The main button bar is a horizontal bar located below the title bar. It contains at least six (6) buttons that should always be there:

- Main Menu: Go to the main menu form. The main menu form is the first form displayed when the application starts. The Main menu has the same function as the sub overview in the L2.
- Login
- Screen List: List of all application screens for navigation.
- Alarm: Go to the alarm summary form when it is applicable.
 - The Alarm button turns red when active alarms are present and flashes red when unacknowledged alarms are present.
- Alarm history
- The overview page only contains buttons intended to detail other pages.
- Extra buttons will also be available for free use customized according to the application usage

8.2.3 Zone 3: Process Page

The process display screen represents the monitored process status or Operation Support screen. A process display screen may include menus, sub-menus, detailed application views, trend views, graphs, and any other graphics that represent the monitored process. The zone may contain control device symbols (i.e. line control button and statuses display) graphs, blocks of text, and other graphic objects.

The group control display shall always be located in the top left section of Zone 3, if applicable. If there is more than 1 group present on the process page a group control displays should be added, forming a row at the top. It is allowed to locate the Group control button close to a specific group if there is more than one group in a process display and it improves process readability and understanding.

8.3 Touch Screen Utilization

Some specific rules apply to the use of the HMI touch screens.

8.3.1 Minimum touch Area Size

Graphical objects that can be touched on the screen must have a minimum size of 40 x 40 pixels.

8.4 Application Naming

The same naming standards shall be used for L1 HMI as are used for L2 SCADA. All spaces and dashes must be replaced by an underscore character.

Example:

GRT90_Pilot_HMI

An application description is mandatory.

8.4.1 Runtime Application File

The HMI application name should be used to name the runtime application file (file type *.mer).

9 Appendences

9.1 Appendix A – Plant System Architecture Levels

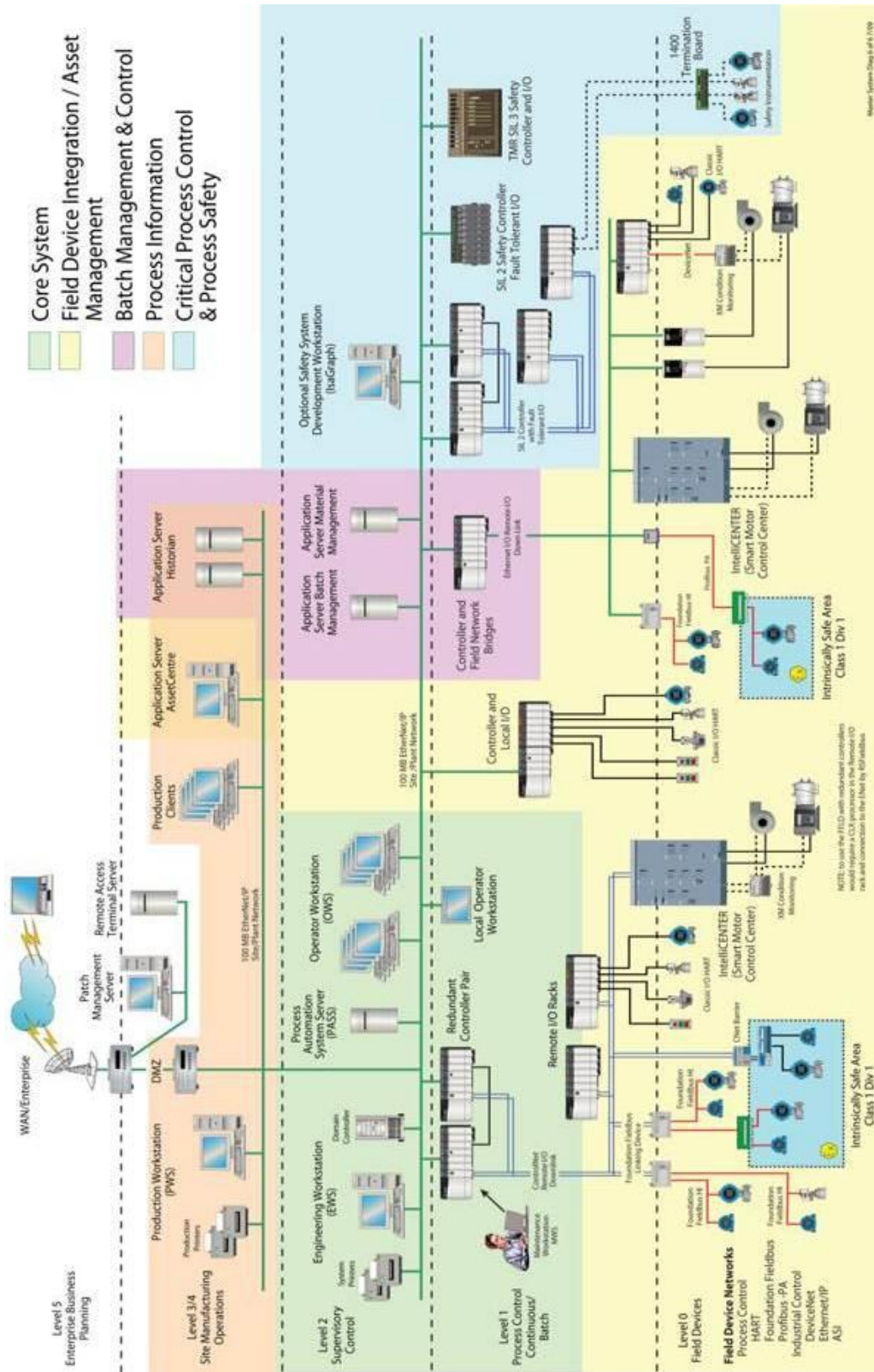


Figure 78 – Plant System Architecture Levels, large figure

9.2 Appendix B – Group Object

The following table shows the value of the States tag for the Group AOI object and how different values are presented in the Group Object in the SCADA system





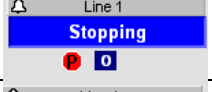

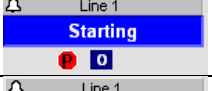

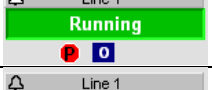





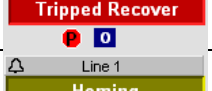



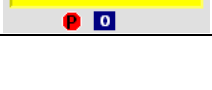

Value	State indication	ASN indication	State	Border Color		Back Color		Caption Color	
0			Unknown	Purple	L1C8	Purple	L1C8	Black	L1C8
1			Stopped	Gray	L1C4	Gray	L1C4	Black	L1C8
2			Stopping	Blue	L1C7	Blue	L1C7	White	L1C1
3			Starting	Blue	L1C7	Blue	L1C7	White	L1C1
4			Running	Green	L4C8	Green	L4C8	White	L1C1
5			Comm. Failure	Light Blue	L5C3	Light Blue	L5C3	White	L1C1
6			Tripped Non Recoverable		L3C2		L3C2	White	L1C1
7			Tripped Recoverable		L3C3		L3C3	White	L1C1
8			Homing		L2C3		L2C3	White	L1C1
9			Hold	Yellow	L2C1	Yellow	L2C1	Black	L1C8

Table 31 – Group states

The following table shows the value of the Val Notify tag for the Group AOI object and how different values are presented in the Group Object in the SCADA system.














Value	State indication	ASN indication	State	Color		Blink Color	
0			No Alarms	Gray	L1C4		
1			Out of alarm unack	Gray	L1C4	White	L1C1
2			Sev. 1	Light Blue	L5C3		
3			Sev. 1 unack	Light Blue	L5C3	Gray	L1C4
4			Sev. 2	Yellow	L2C1		
5			Sev. 2 unack	Yellow	L2C1	Gray	L1C4
6			Sev. 3	Red	L1C9		
7			Sev. 3 unack	Red	L1C9	Gray	L1C4
8			Sev. 4	Purple	L5C8		
9			Sev. 4 unack	Purple	L5C8	Gray	L1C4

Table 32 – Group Val notify states

9.3 Appendix C – Objects provided with the Pilot Project

The following tables shows which objects are provided with the pilot project. These tables don't show any PlantPax screens, popups etc.

Graphic displays name	Description
(EFLA) P_Group-Faceplate	Group control popup
(EFLA) P_Group-Help	Group control help popup
GRT00_S001_AreaOverview	Overview example
GRT90_P010_App_Abort	Yes/No popup called when application abort is requested
GRT90_P200_ServerStatus	Server status popup for 1 server
GRT90_P201_ServerStatusExtended	Server status popup for redundant servers
GRT90_P210_Stratix8000	Stratix switch popup
GRT90_S001_SubOverview	Sub Overview example
GRT90_T001_Template	Screen with layout of process page
GRT90_T100_Dynamic_Library	Library of dynamic objects (vendors should not add their dynamic objects here they should make their own dynamic library page)
GRT90_T101_Static_Library	Library of static objects (vendors should not add their static objects here they should make their own static library page)
GRT90_T102_ColorPallette	Library of usable colors
GRT90_T103_Fonts	Library of usable fonts
GRT90_T200_ModelScreen	Empty screen do used as a template for process pages
GRT90_T210_SequenceScreen	Sequence screen example
GRT90_T310_Screen_List	Screen list example
GRT90_T330_EmergencyStop	Emergency Stop page example (To be completed)
GRT90_T340_Alarm_Summary	Alarm summary to be displayed with read-only access
GRT90_T350_Alarm_Summary_Protected	Alarm summary to be displayed with login access
GRT90_T360_Alarm_Summary_PopUp	Alarm summary popup to be displayed with read-only access
GRT90_T370_Alarm_Summary_PopUp_Protected	Alarm summary popup to be displayed with login access
GRT90_T600_General_Trends	General trend screen
GRT90_X002_CLX_Overview	CLX overview example
GRT90_X003_CLX_ModuleDetail	CLX module detail example
GRT90_X010_Side_Panel	Side panel example
GRT90_X011_Bottom_Bar	Bottom bar example
GRT90_X100_HelpScreen	Help screen example

Table 33 – Graphic displays provided with the pilot project

Global object page	Description
(EFLA) Common Objects	Objects
(EFLA) Faceplate Objects	Faceplate objects used in popup faceplates
GRT90_X001_ASN_Template	ASN and Header object for pages
Stratix_8000_SE_v4	Stratix switch popup faceplate and objects

Table 34 – Global objects provided with the pilot project

Image name	Description
GRT90_NA_Logo	Norðurál's logo, to be used in the ASN
GRT90_NA_Icelandic_Flag	Icelandic flag to be used in the ASN, for language switch
GRT90_NA_USA_Flag	USA flag to be used in the ASN, for language switch

Table 35 – Images provided with the pilot project

Parameter file name	Description
GRT90_T100_ParameterFileExample	Example of parameter file structure

Table 36 – Parameter files provided with the pilot project