طرح نگهداشت و افزایش تولید 27 مخزن

HMI Graphic Functional Design Specification

نگهداشت و افزایش تولید میدان نفتی بینک

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1 Proprietary Statement

1.1. DEFINITIONS

PROJECT: DCS and ESD Control System of Binak Gas Booster Station
CLIENT: National Iranian South Oilfields Company (NISOC)
EPD/EPC CONTRACTOR (GC): Petro Iran Development Company (PEDCO)
EPC CONTRACTOR/PURCHASER: Hirgan Energy – Design & Inspection Companies (HE/DI)
VENDOR: Ideh Global (IDG)

1.2. Abbreviations

Abbreviations, used in connection with FDS and DDS Documents, are defined in the following table:

Acronym	Description
ACE	Application Control Environment
ACM	Alarm Configuration Manager
AE	Alarm & Event
AI	Analogue Input
AMS	Asset Management System
AO	Analogue Output
APC	Advanced Process Control
ASM	Abnormal Situation Management
BIN	Business Information Network
CAB	Custom Algorithm Block
CCR	Central Control Room
CDA	Control Data Access
CDB	Custom Data Block
CEE	Control Execution Environment
CE-STN	Console Extension Stations
C-STN	Console Station
DC	Domain Controller

Acronym	Description
DCS	Distributed Control System
DI	Digital Input
DO	Digital Output
DSA	Distributed System Architecture
DTM	Device Type Manager
EBR	Experion Backup and Restore
EMDB	Enterprise Model Database
ERDB	Engineering Repository Database
ESD	Emergency Shutdown
FAR	Field Auxiliary Room
FDS	Functional Design Specification
FDM	Field Device Manager
FED	Front End Design
FIM	Field Interface Module
FTA	Field Termination Assembly
FTE	Fault Tolerant Ethernet
FS	File Server
F-STN	Flex Station
GB	Giga Byte
GPS	Global Positioning System
HART	Highway Addressable Remote Transducer
HCSL	Honeywell Control Systems Ltd.
HMI	Human Machine Interface
IOM	Input Output Module
IOTA	Input Output Termination Assembly
IP	Internet Protocol
IPS	Instrument Protective System
IPCS	Integrated Process Control System
IS	Intrinsic Safety
IT	Information Technology
KBps	Kilo Bits per Second
KVM	Keyboard, Video and Monitor
LAN	Local Area Network
MOS	Maintenance Override Switch
MOV	Motor Operated Valve

Acronym	Description
MTTSP	Methods, Techniques, Tools, Standards and Products
NIC	Network Interface Card
IOLIM	I/O Link Interface Module
ODS	Operational Data Supervision System
OPC	OLE for Process Control
OPM	On Process Migration
OTS	Operator Training System
PCN	Process Control Network
PI	Processing Instruction
PKS	Process Knowledge System
PM	Process Management
PPS	Parameters per Second
RAID	Redundant Array of Independent Disks
RAM	Random Access Memory
RCI	Remote Communication Interface
ROM	Read only Memory
RTU	Remote Telemetry Unit
RUIP	Removal and Insertion Under Power
SCADA	Supervisory Control and Data Acquisition
SER	Sequence of Events Recorder
SM	Safety Manager
SNTP	Simple Network Time Protocol
SOE	Sequence of Events
TDAS	Tank Data Acquisition System
TPC	Total Plant Configurator
TPI	Tap Position Indication
UAPC	Universal Advanced Process Control
UTC	Universal Time Coordinated
VAC	Volts Alternating Current
VDC	Volts Direct Current
VLAN	Virtual Local Area Network
WAN	Wide Area Network
WMI	Windows Management Instrumentation

2 Purpose

The purpose of this document is to provide an overview of the HMI Specification. The HMIWeb Display Builder is the application used to build HTML format-based graphical displays for Experion PKS. Honeywell has developed a standard HMI Toolkit in an effort to provide a highly flexible, high performance and high functionality HMI project solution. This solution is based on standard practices and best engineering methodologies develop to maintain the highest performance and migratability in the Honeywell Experian system. This standard HMI solution is named "Honeywell HMIWeb Solution Pack". The HMIWeb tool is similar to paint or other graphical editing tools but includes a sophisticated scripting environment. HMIWeb Builder includes many pre-constructed templates and graphic shapes that simplify and speed up the graphics building task.

2.1 FDS Scope

The scope of the overall FDS encompasses the functional design of the complete ICSS. This FDS will:

- Provide full details of functionality, performance and self-checking that will be available from the system.
- Provide a full definition of all interfaces between the ICSS and all interconnected subsystems.

The FDS will include:

- A functional description of the system software configuration and the standards that will be followed during preparing of the software. Details will include tagging conventions, display color use, alarming set-up, and external device interface guidelines.
- System block diagrams, functional descriptions, redundancy concepts, etc.

2.2 Reference

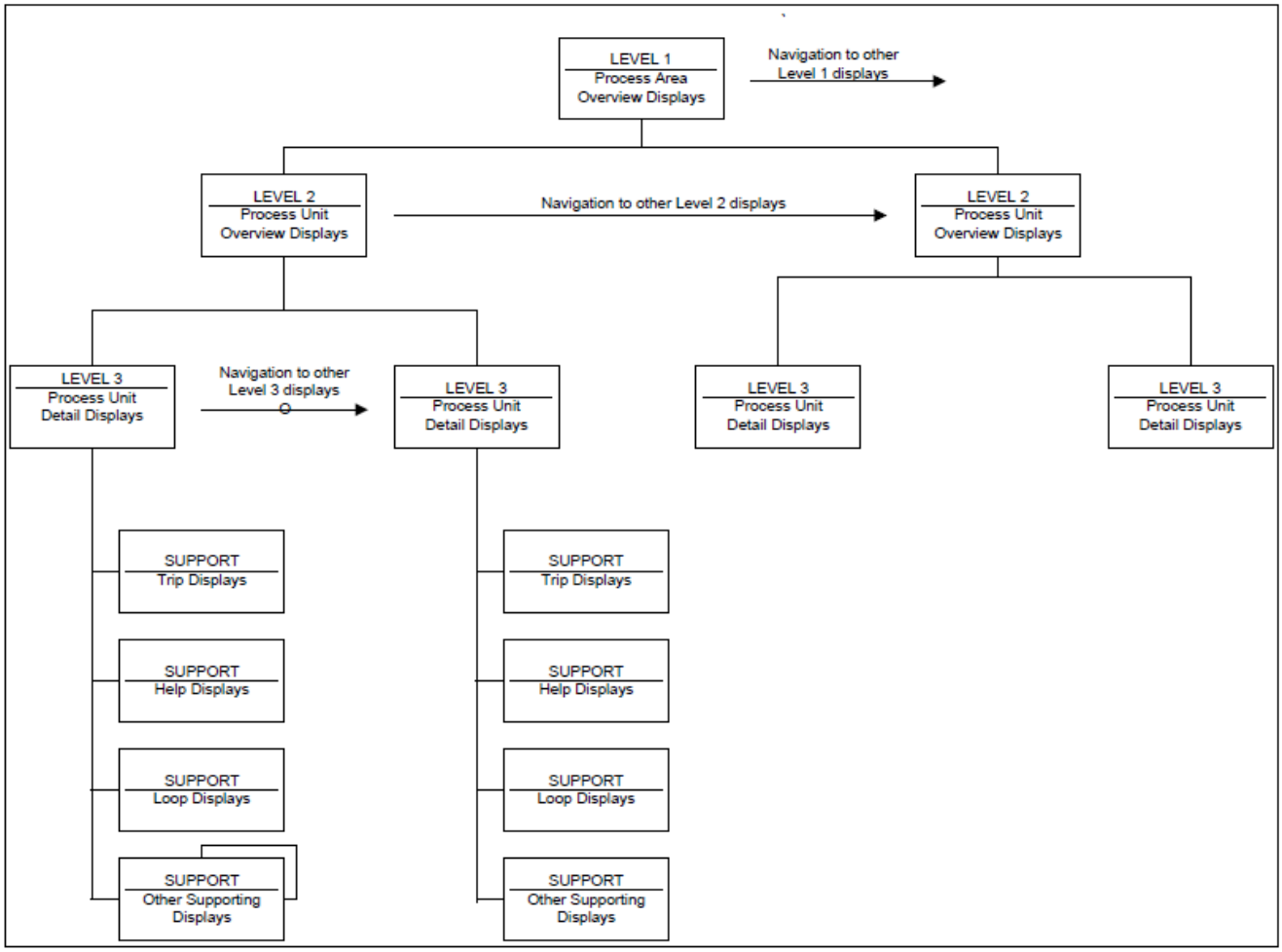
Control Philosophy	BK-GCS-PEDCO-120-PR-PH-0002
Specification For Control System	BK-GNRAL-PEDCO-000-IN-SP-0002
Specification For ESD	BK-GNRAL-PEDCO-000-IN-SP-0003
Specification For Instrument and Control of Package Unit System (PU)	BK-GNRAL-PEDCO-000-IN-SP-0004

3 Display Hierarchy

General:

ASM research in the area of human problem solving has found that people tend to use various levels of thinking when solving problems. The concept of displays level solves this behavior by allowing an operator to move between the "big picture" of process plant status to the "details" around individual equipment areas, pieces of equipment and controllers as the task or situation requires. A concept of "levels" should be used when constructing the displays for HMIWeb. The purpose of these levels is to provide different levels of platform detail to aid the operator in different tasks.

These levels are referred to as Level-1, Level-2, Level-3 and Level-4 for the purpose of this specification. The primary purpose of these levels is to provide the operator different levels of operating detail to aid the operator in performing different tasks. A secondary purpose of these levels is to allow for navigation. The three levels of display represent different levels of complexity. This is the result of a display hierarchy in which a single Level-1 is associated with several Level-2 graphics that are in turn associated with several Level-3 graphics. This hierarchical structure is illustrated in the figure below.



Display Hierarchy and links

Each Level-2 can only be associated with a single Level-1 and each Level-3 can only be associated with a single Level-2. Conversely, each Level-1 has several associated Level-2 displays and each Level-2 has several associated Level-3 displays.

3.1 Display hierarchy design specifics:

Level 1: Overview display:

- Summarize key process variables and associated alarms
- Show any emergency and high-priority alarms in the operator's span of control

Level 2: Process Unit Overview display:

- Have one primary display for each major process area or unit
- Show all emergency and high priority alarms for the process area
- Provide main control for the process area
- Provide enough information and control for most conditions

Level 3: Secondary Process unit Detail display:

- Provide detailed information not displayed on the Level2 displays

- Show low priority alarms, controllers, and indicators

Level 4: Selected details display:

- Provide necessary additional physical details
- Include online help

3.1.1 Operating level one

The process area overview (or Level-1) display's primary purpose is to provide a view of key elements of the plant, as summarized on a limited number of displays. Level-1 graphics show the broadest available view of the facilities under the operator's control. The variables displayed on the Level-1 graphic will have been selected and deemed most important by operations personnel. A Level-1 graphic contains multiple units showing critical variables across the operator span-of-control and directs the operator to areas of the plant for more details. The operator is not allowed to execute any control from this display.

The process area overview displays presents information in the form graphical objects. The Level 1 overview display shows:

- Alarms

– General location
– Acknowledged status

- Key process parameters

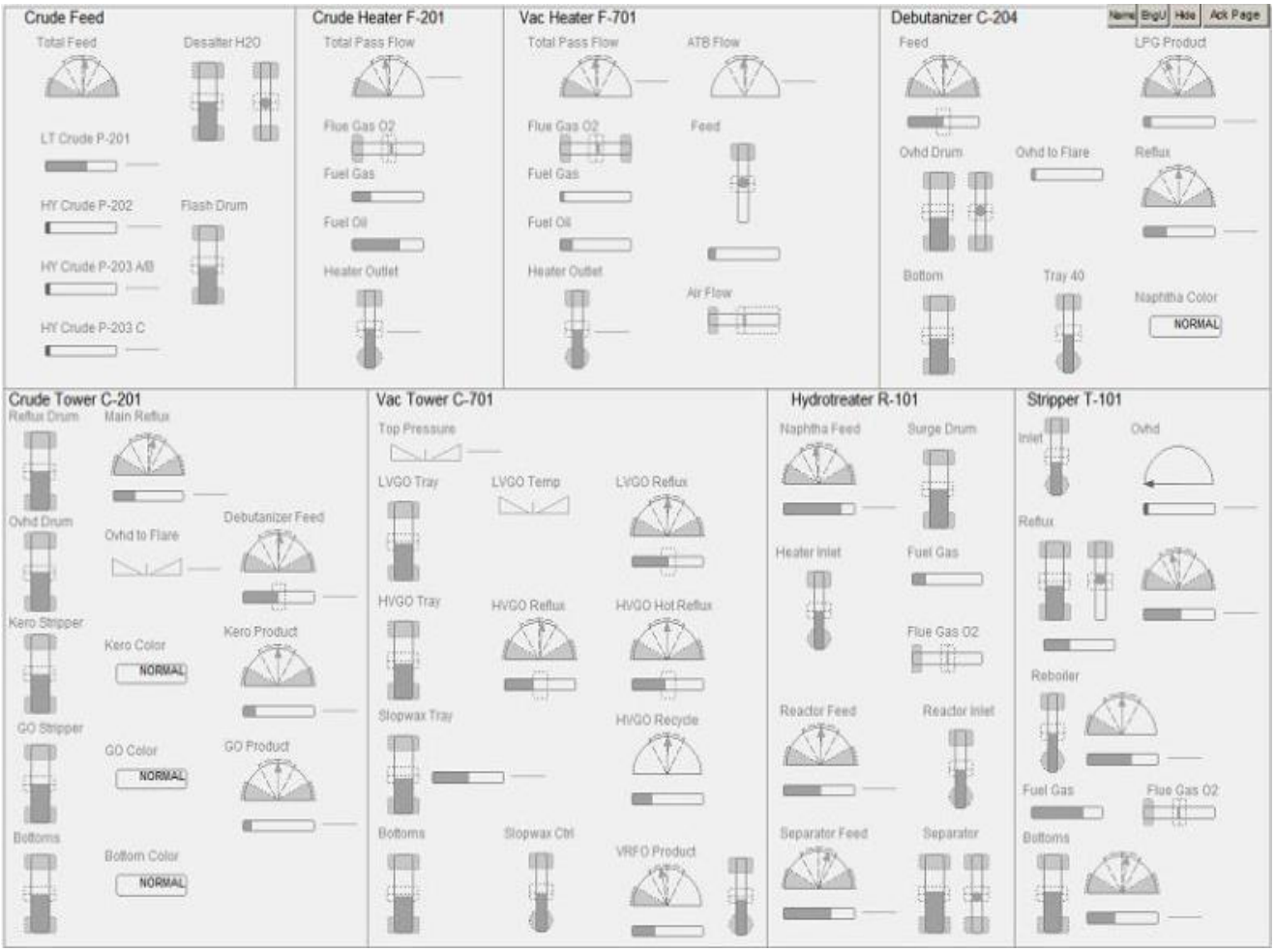
– Measures of process health
– Actual values
– Abnormal status and process problems
– Severity of deviation
– Direction of change of key process parameters
– Trends of key process parameters

- Equipment availability

– Shutdown systems
– Critical bypasses

The Level 1 overview display shows alarm summary information and can contain other information, if available, on related plant facilities. These include the downstream and upstream areas, as well as utilities that can affect the health of the process in the span of control of the operator.

Honeywell recommends that Level-1 displays be visible or readily accessible at all times. SafeView can be configured to ensure that critical Level-1 displays are always visible (that is, other windows or applications cannot obscure them) if Experion PKS is used in a multi-windowed/multi-screen environment. Alignment, font size, separation, and color ensure visibility, and care should be taken to ensure visual noise on the display is not a distraction. Illustrations of Level-1 displays are shown in Figure below.



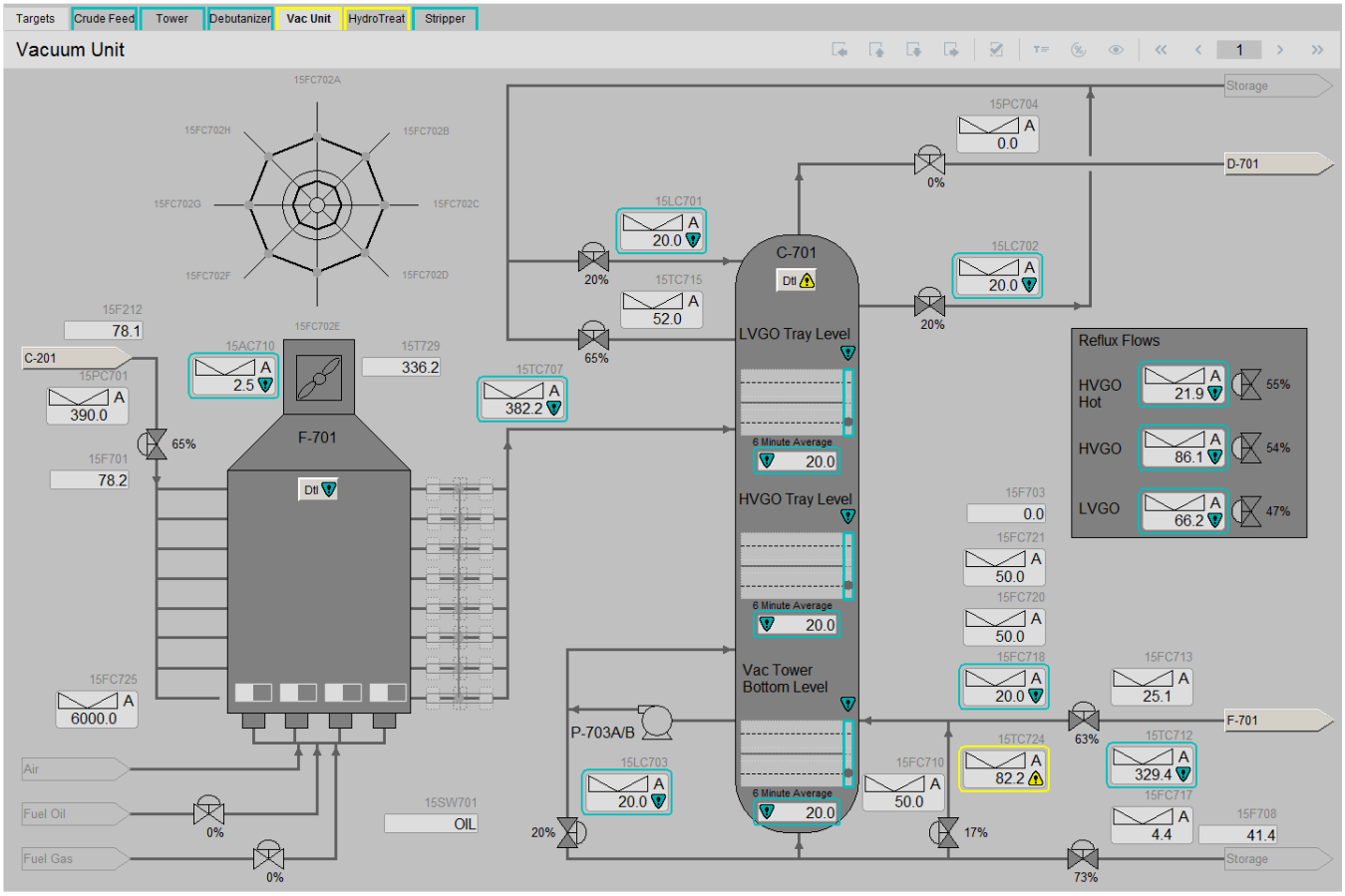
Example Level-1 Process Area Overview Display

In above example display equipment areas and overall process flow is represented by grouping these graphical objects within boxed areas.

3.1.2 Operating level two

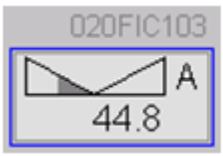
Level-2 graphic displays serve a dual purpose. They provide information about key elements of the plant unit, and they are also used to allow operators to intervene in common/critical abnormal situations. Often, variables from several locations in the process need to be accessed to allow the operator to properly intervene and then monitor the results of that intervention. Level-2 displays have this information gathered in one place. An example is shown in Figure below.

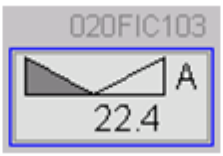
For some process units which consist of many operating windows unit windows (Process unit overview) may be implemented. They show a simplified representation of the process and allow a quick overview and alarm handling by overview objects. No process control will be available at this level.

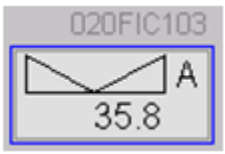


Level-2 Process Unit Overview Display

In the above example, controller objects show the deviation of SP and PV using the symbols shown below. This makes it easy for an operator to trace controllers that need attention. The first symbol shows a small negative deviation of the PV, the second shows a large deviation of the PV and the third example shows a controller in optimal condition (very minor deviation).







3.13 Operating level three

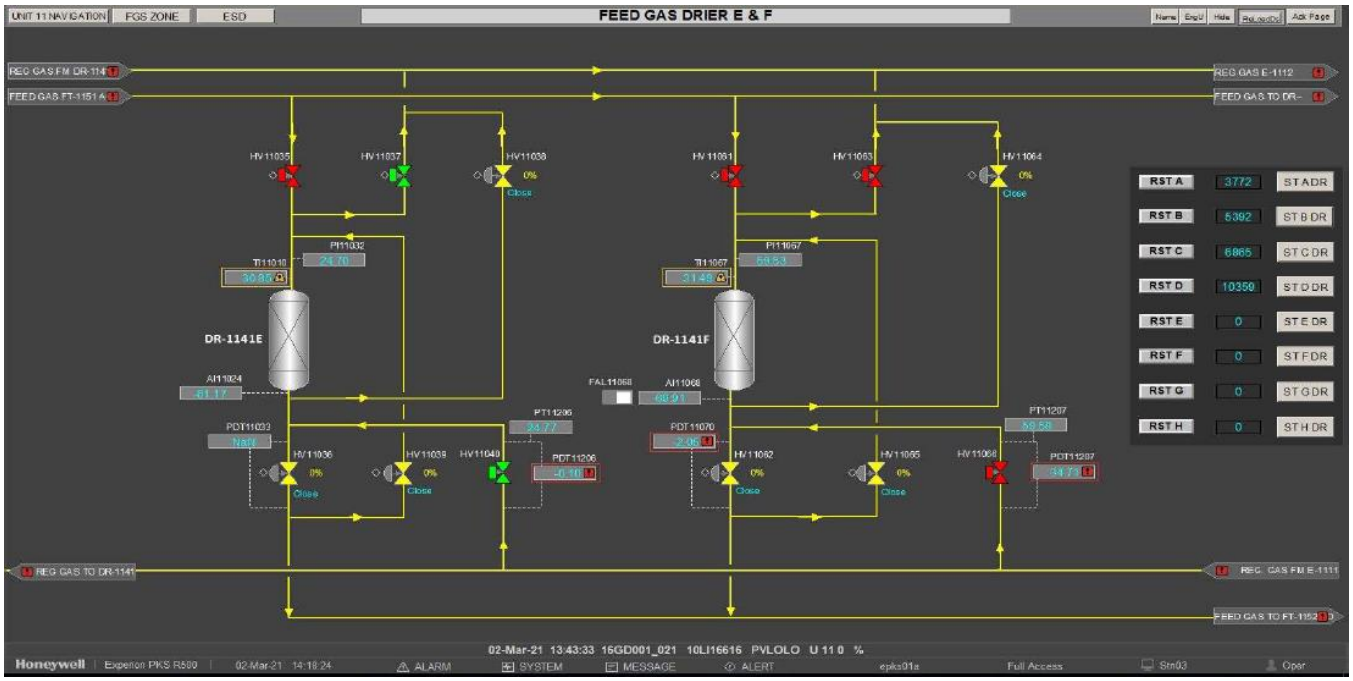
Level-3 graphic displays are exhaustive in their detail and contain all available information about smaller pieces of the process unit. While the objective of the Level-2 display is to provide only the handles and tools necessary to intervene in a particular section of the process, Level-3 displays provide the operator with a complete and detailed view of the entire facility.

This is the normal operating window with all information for plant operation (detailed process display).

Traditional process displays appear within this window. All necessary equipment, process control and instrumentation detail are shown. Page link targets are available to associated displays. Control targets are

available on all control and instrumentation details, which activate appropriate standard faceplates. Silencing and acknowledging of alarms can be carried out from this window.

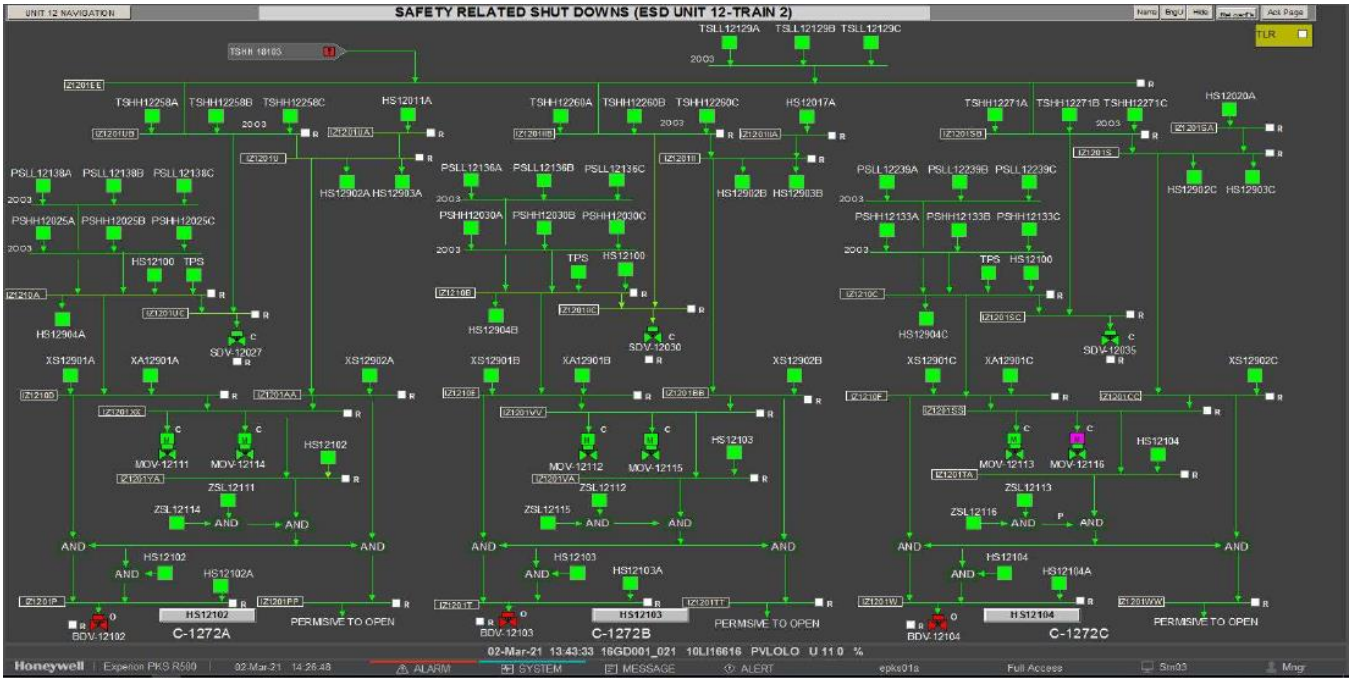
All control loops are shown on the Level-3 displays. The displays are used for routine tasks such as operating pumps, starting blowers, opening valves, and so on. They are also used for detailed investigations and interventions that are not time-critical. An example of a Level-3 display is shown in Figure below.



Level-3 Process Unit Detail Display

3.1.4 Safety Displays

ESD Displays



ESD Display Example

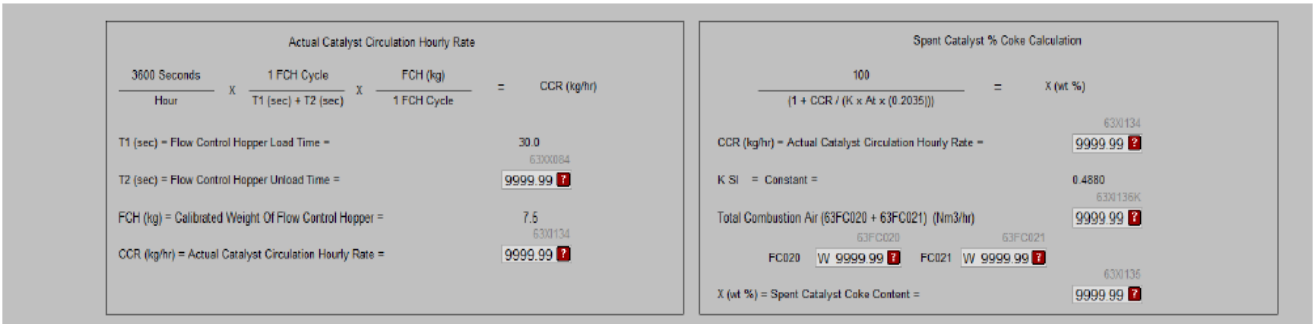
3.1.5 Supporting Displays

Supporting displays are displays built in addition to normal operating displays to provide supplemental information. The following are examples:

Help Displays:

Help displays provide auxiliary information to the operator which helps maximizing operator effectiveness. A few examples include:

- Process formula calculations;
- Process/Installation/Equipment specific notes, drawings etc.



Help display example

These displays are used in specific situations for performing specific tasks such as unit start-up/shutdown. They combine different types of information on a single display such as:

- Startup conditions/interlocks;

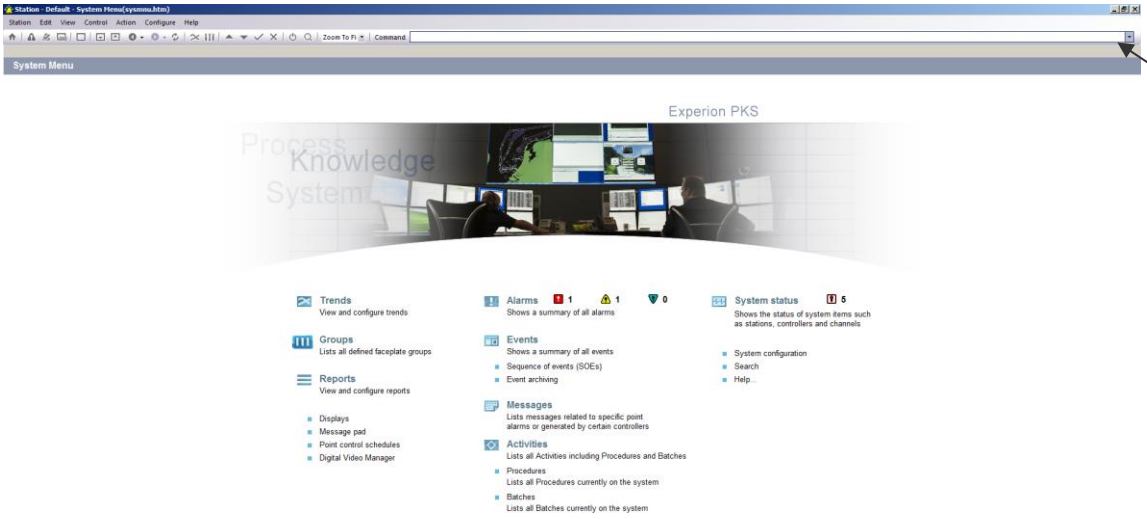
- Process information;
- Trends;
- Procedure information;
- Notes for the operator etc.

4 Display Types

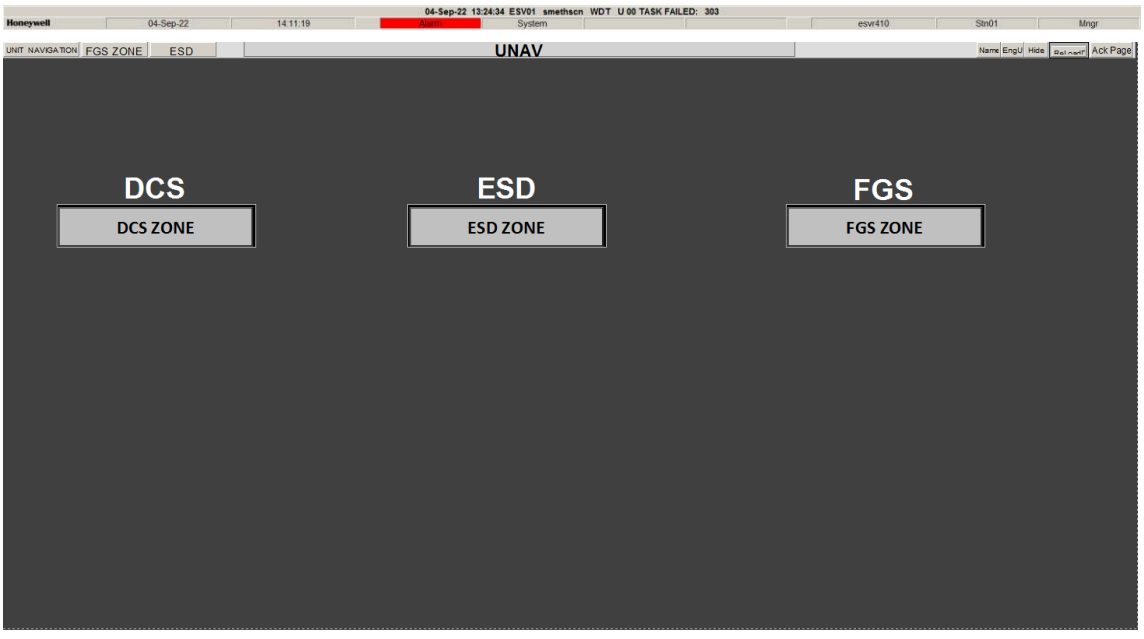
4.1 Startup Screen

This display shall be used for navigating to individual Level 1 Overview displays through the use of targets or buttons. This will be the default start-up screen for all Operator stations. No information will be available from this screen.

After HMI DISPLAY being open user should type (UNAV) in COMMAND BAR to open UNAV page.



Command bar



4.2 Level 1 – Process Area Overview Displays

This type of display shall be in the form of a simplified block diagram of a whole functional area within the control of the operator station. Overview Displays shall be designed to direct the Operator to each of the detailed Process Unit Overview Displays where unit monitoring and corrective action to control deviations, alarms or events can be taken. Within the Level 1 displays, the areas (which reflect the span of the Level 2 displays) are clearly defined from each other through the use of spacing or separating lines.

4.3 Level 2 – Process System Overview Display

Level 2 displays are used to provide information regarding key elements of the process unit. They are also used to allow operators to execute common/critical abnormal situation interventions. Critical control loops and pop-up windows (faceplates) shall be available in this level.

Level 2 displays should have enough details for system wide troubleshooting. Links to other upstream or downstream displays are usually shown at the left and right side of the display based on process flow continuity.

4.4 Level 3 – Process System Detail Displays

Level 3 displays contain all available information of smaller pieces of the process unit. It provides the operator with a complete and detailed view of the entire facility.

All Point detail are shown on the level 3 displays. The displays are used for routine tasks such as operating pumps, starting blowers, opening valves and Displays related to Packages such as Compressor, Turbine, etc... will be displayed on the dedicated graphic pages as per package P&IDs.

4.5 Level 4 – Maintenance, Information, Diagnostic Displays

Level 4 displays will be configured to provide the operator additional information relating to maintenance, diagnostic testing. These displays will typically show tabular data, text-based information or symbolic representation of startup or shutdown conditions.1.3. Display Design Criteria This section lists general guidelines and typical symbology to be used for all displays including standard border, process lines and equipment outlines.

Package control units, Internal cabinet faults, PLC module diagnostic, third party statuses (including all packages, analyzers, HVAC, etc.,), Motor running time with reset facility will be considered in this level and Auxiliary displays also will be displayed.

5 Display Design Criteria

5.1 General Guidelines

Process Displays shall be designed as simple as possible with minimum corners and crossing of process lines. They shall not be used as substitutes for P&IDs or other reference drawings included in operating manuals. Unnecessary clutter shall be excluded. Process lines and equipment outlines shall use subdued colors or shades of grey. Bright colors shall only be used to clearly display alarms and events for rapid Operator recognition and navigation to problem points during abnormal situations. Dynamic variables shall be more noticeable than static.

The following general display guidelines shall also be followed:

All displays shall be designed based on the latest project drawings & sketches (P&ID drawings, PFD drawings electrical one-line diagrams, vendor drawings, C&E , etc.).

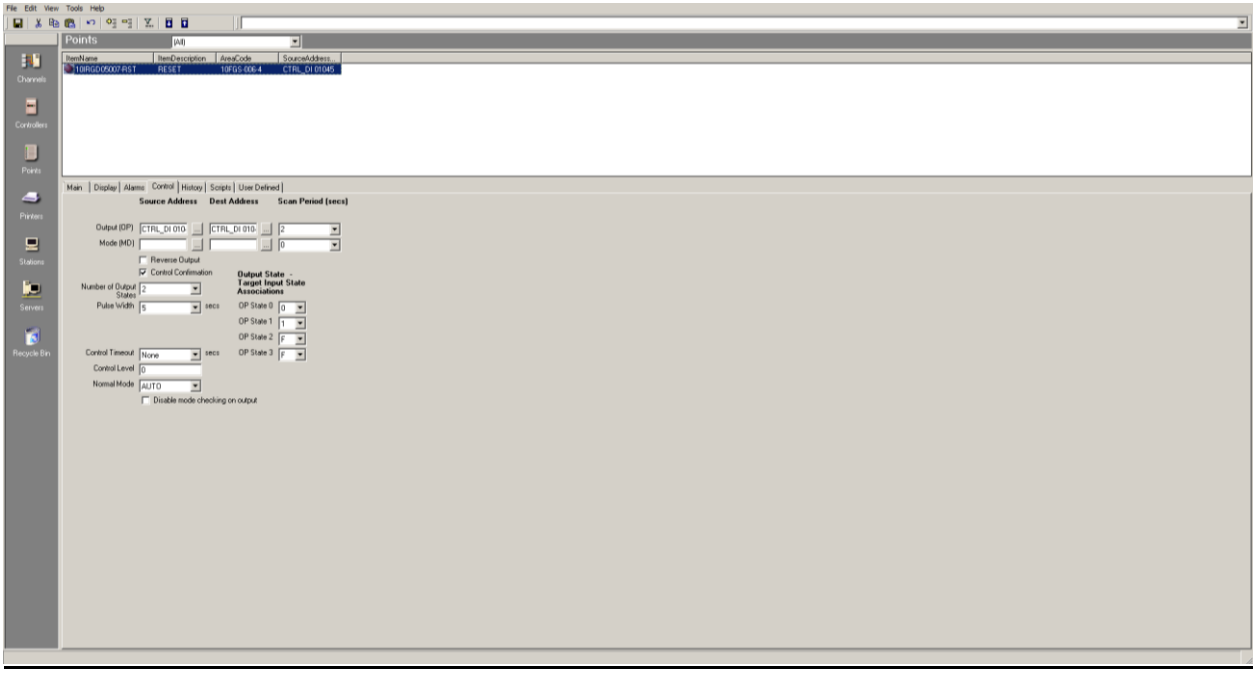
Displays shall be kept as simple as possible. Displays are to show a simplified layout of the process to give the Operator a clear view of how the process is running.

The Operator shall be able to reach a control point with a minimum number of "mouse clicks" or keystrokes.

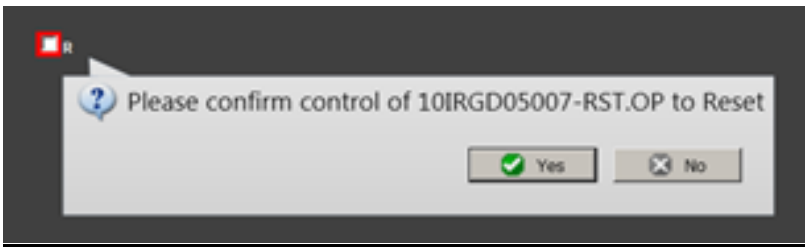
The HMI system shall be designed to minimize Operator mistakes and provide validation and security measures. Additional confirmation via message boxes is not required.

Note: For override/bypass key through HMI, this confirmation is mandatory.

For implement confirmation box open Quick Builder and fill control confirmation check box:

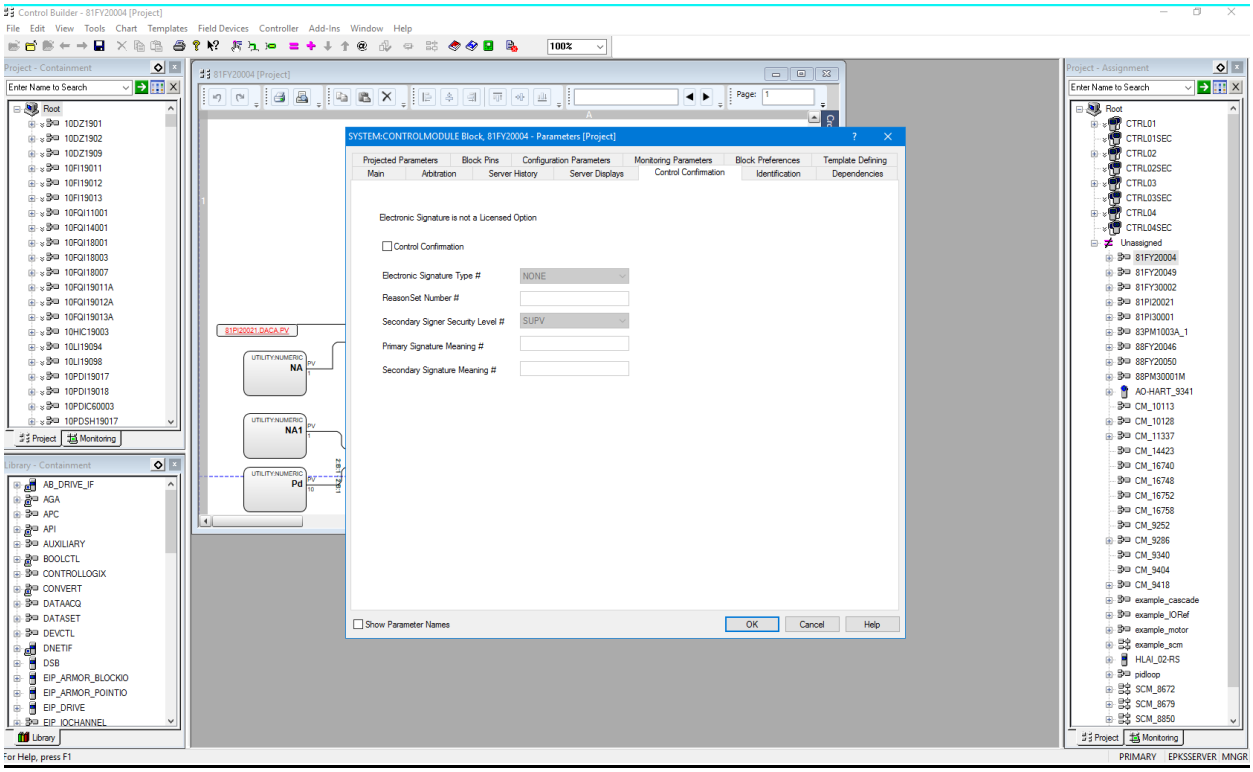


In this case in HMI pages confirmation notification will be appear for that tag, see below pictures:



Your action will not be done until click yes on this notification bar.

In case that using control modules this confirmation box will be available .
Right click on control module page and see control confirmation tab :



confirmation notification will be appear for this control moduloe too.

All major equipment shall be shown on Process Displays.

An effort should be made to lay out the process flow from left to right whenever possible. Gas should flow up and liquids flow down.

All graphic displays should have a title and an indication of the process unit it belongs to.

The following shall be avoided to reduce “visual noise”:

Large or color-filled solid objects

Flashing of large objects

Flashing or changing color of process lines unless useful for abnormal situations (i.e. flare lines when flare valves open)

The following shall not be shown unless needed for clarity:

Start-up lines, unless they include instrumentation to be displayed. Where shown they should be thinner than the main process lines.

Bypass lines having manual valves Block valves, manual valves, check valves, relief valves, etc.

Interiors of columns and vessels except in select cases where such details add value to operator

The number of dynamic variables on one display should be limited to less than 300 database connections per display. This is to maintain a consistent call-up performance of the displays and prevent overloading the operator with too much information.

Note : these limitation are extracted from MANAULs of software so its not applicable to show all of them as a picture in FDS document.

5.2 Equipment

The following design criteria for equipment shall be followed:

The shape of the equipment to be displayed on the graphics shall be shown to represent the actual equipment as much as possible without excessive physical detail. All major equipment shall be displayed such as vessels, columns, pumps, compressors, and blowers.

The main equipment numbering system consists of:

YY-XX-ZZ-R

XX is a symbol letter for the type of equipment as per following table

TA	TANK
B	BLOWER
CG	COMPRESSORS
VST	CHEMICAL INJECTION DRUM
SS	DISENGAGING/CONDENSATE DRUM
E	HEAT EXCHANGER
HE	ELECTRICAL HEATER
EJ	EJECTOR/DESUPERHEATER
EV	EVAPORATOR
F	FILTER
FL	FLARE
VAT	GUARD BED

VR	RECEIVER
FH	FIRE HEATER
SK	PACKAGE
VC	COALESCER
VAB	DRIER
P	PUMP
VRX	REACTOR
VS	SUCTION/DISCHARGE DRUM
VFC	MIST ELIMINATOR
VCH	HOPPER/COLLECTOR/ENGAGER/VENT DRUM
VKO	KNOCKOUT/DEGASSING DRUM
TE	TURBO EXPANDER
SI	SILENCER
VT	TOWER, COLUMN
VCD	CONDENSTAE DRUM

YY: is a numerical index corresponding to the sub-unit number (e.g. 10 corresponds to sub-unit 10)
ZZ: is a progressive number, separate for each type of equipment and for each sub-unit.

R: is a reference letter in case two or more identical pieces of equipment are installed (e.g. A corresponds to one piece of equipment, B corresponds to the second identical piece of equipment installed).

5.3 Process Lines

The following design criteria for process lines shall be followed:

The source and destination of main incoming and outgoing lines shall be shown with arrows. If the lines vector to and/or from another Process Display end-points shall be in the form of buttons (targets), represented with a box around it. If the lines do not continue to and/or from another Process Display, the end-points shall use an arrow with no button. Arrows shall follow process direction.

Main process lines shall be shown as a thick line with a 3-pixel thickness (Figure 1). An example is wellhead flow to a separator.

Utility lines and other non-main process lines shall be shown as thin lines with 1-pixel thickness (Figure 1). Examples of these include cooling water supply/return, and hot oil supply/return lines.

Instrument signal lines for outputs from controllers to valves, or software links to other points (as with master-slave controllers) shall be depicted by short-dashed lines (Figure 1). These will only be shown where necessary and restricted to Level 3 displays.

Crossing of process lines or the use of line jumpers for process lines shall be avoided to the extent practical. If crossing is unavoidable, process utility lines will break before main process lines. For equal weight lines, the vertical line will break.

Process inlet lines shall enter on the left-hand side of the display and process outlet lines shall exit on the right-hand side of the display to the maximum extent practical.

As a general rule, the direction of flow shall be from left to right, except for recycle lines, which shall be right to left.

Wherever possible, the process lines exiting one display and continuing on another display shall be at relatively the same corresponding location.

Tool tips shall be used to describe line function where required.

Note: The trend groups are accessible by target buttons in all part of schematics.

Main Process Lines	3 pixel
Process / Utility Lines	1 pixel
Signal Lines	1 pixel

Figure 1: Various Types of Lines

5.4 Font

Static text's: tag names, description and engineering units in shapes, will have the following font properties:

Font: Arial
Font style: Regular
Font size: 12
Font color: White (255,255,255)

All dynamic data- PV or OP in shapes will have the following font properties:

Font: Arial
Font style: Regular
Font size: 18
Font color: White (255,255,255)

All Equipment tag names will have the following font properties:

Font: Arial
Font style: Regular
Font size: 12
Font color: White (255,255,255)

All Valve tag names will have the following font properties:

Font: Arial
Font style: Regular
Font size: 12

Font color: White (255,255,255)

All Main Graphic Title will have the following font properties:

Font: Arial (Bold)
Font style: Regular
Font size: 18
Font color: Black (0,0,0)

All description text for process flow continuity will have the following font properties:

Font: Arial
Font style: Regular
Font size: 12
Font color: White (255,255,255)

All Table Graphics Title will have the following font properties:

Font: Arial (Bold)
Font style: Regular
Font size: 18
Font color: White (255,255,255)

All navigation target(pushbutton) will have the following font properties:

Font: Arial (Bold)
Font style: Regular
Font size: 12
Font color: white
Fill color: Blue Arrow

5.5 Input devices

Mouse control:

In general, the operator input on an operator station will be primarily through the Left-Button-Click of the pointing device. The table below defines the common mouse behavior for all HMIWeb SP shapes.

Mouse event	Object reaction	Remarks
Left-Button-Click	Point related shapes: Activate point faceplate or popup window Navigation related objects: Invoke another display	Point related shapes show a "hand" symbol when a target is present to invoke a faceplate. When a point is selected, using the left-click event, a blue selection rectangle will be shown around the shape. And the background of the shape can change color to denote FOCUS.
Right-Button-Click	Activate shortcut menu	When the shortcut menu is invoked, the focus will be forwarded to an object inside the shapes, which has a point database connection. By doing so, the current selected point will be shown in stations message zone and the functions detail display, trend, and so on, will be related to the current selected point.
Left-Button-Double-Click	Point related shapes: Not applicable, since the single click invokes a faceplate (unless otherwise configured). Non-shape objects with point database connection (for example, a level bar, or a parameter in a faceplate): the detail display will be invoked	Activate point detail display
Mouse-over (> 0.5 sec.)	Present tooltip	

Overview mouse control

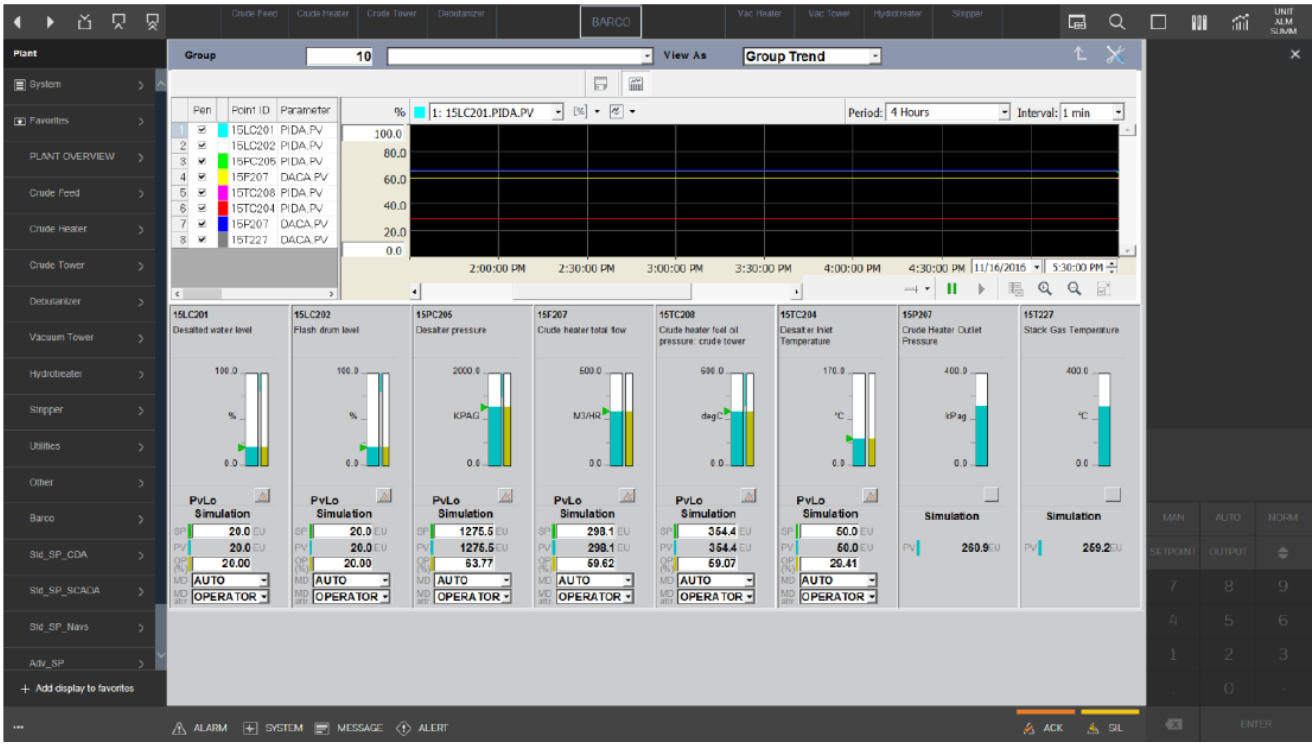
Keyboard control:

The keyboard is used for entry of alphanumerical data as well as for function keys.
Function keys can be used to invoke pre-defined displays, and may require additional operator input (for example, for a detail display when no point is selected).

When a point is selected, many of the pre-defined function keys will execute their action using the current selected point (for example, detail display, trend display, and so on).

Operator touch panel:

The Operator Touch Panel is where operator can do most of the operations in the panel, it can open every type of display. At the left you can select the unit, and navigate between level 2 and level 3 displays, also you can select a display, open it here, and select any point from the process just to open trends or groups as you can see in the example below.

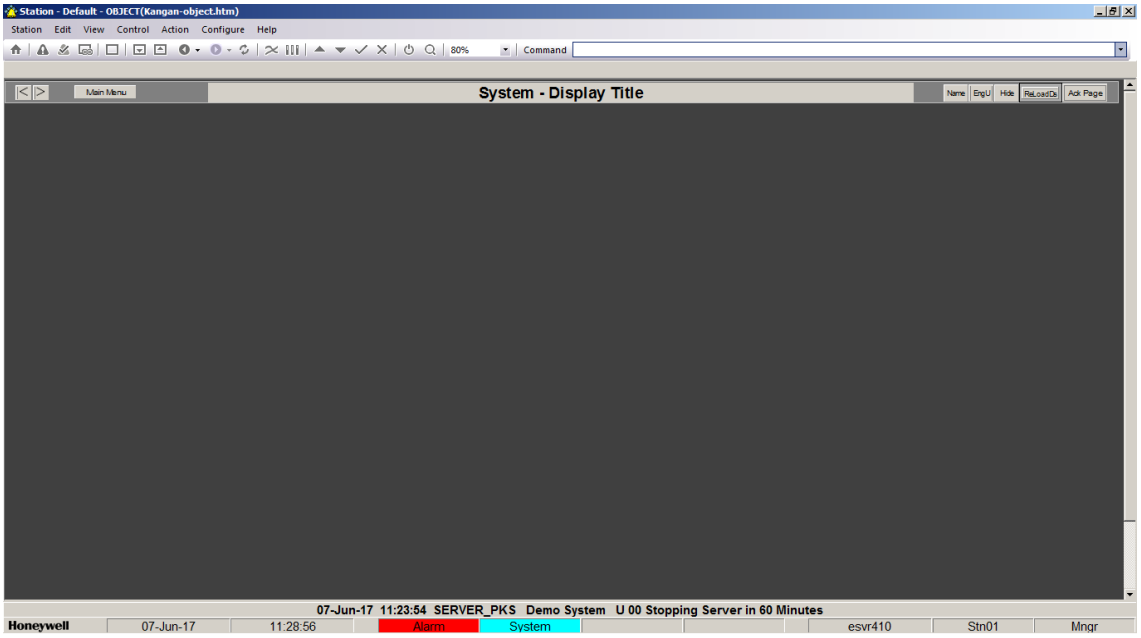


OTP with group trend

5.6 Standard Border Template

Toolbars shall be used at the top of the screen. Displays shall use a standard border with multiple buttons on the inside of the toolbars on each display. Consistency of button placement symbol shall be used to provide visual recognition from display to display. The graphic title will be placed in the middle, at the top of the page.

The standard buttons at the screen top shall always remain irrespective of which display is accessed.



Custom menu and toolbar

Latest alarms

Standard Border for each Display

Custom buttons may be included in the custom toolbar as shown above to access the master overview for each facility, if required.

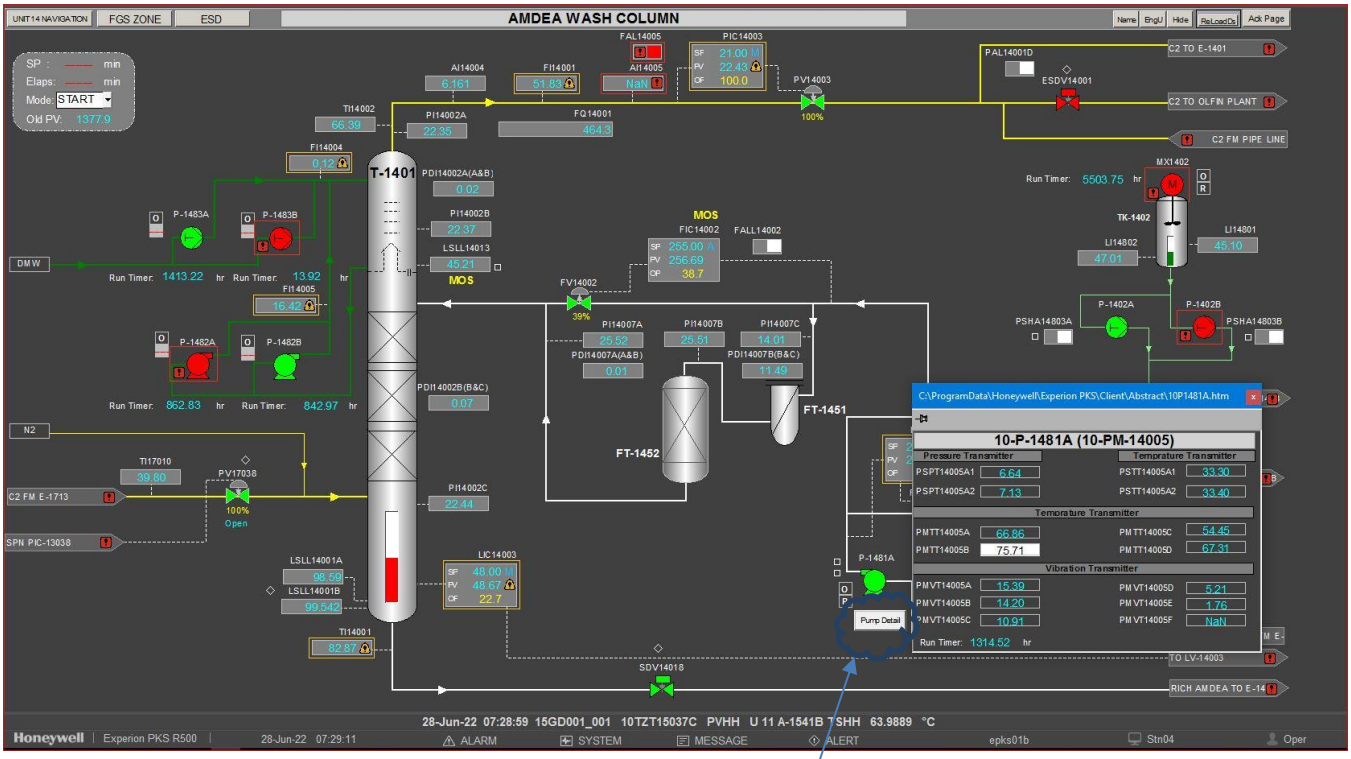
5.7 Display Resolution

Display screen resolution used shall be 2560 x 1440 for each display.

Note: It will be finalized during the prototype test

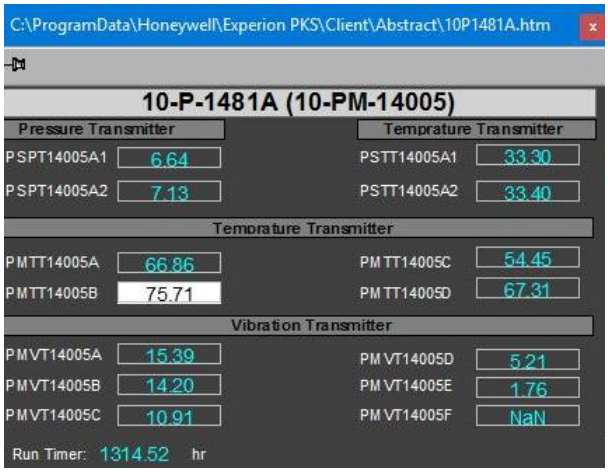
5.8 Pop-up

Pop-up windows shall be used to allow the Operator to view values or parameters shown on Process Displays.



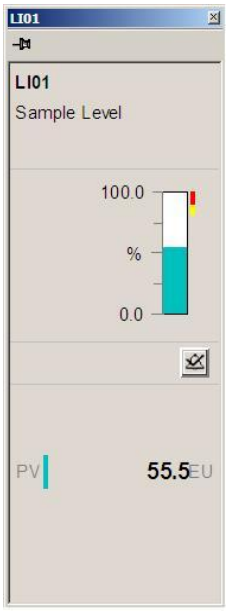
Click this button

After click this window will be open:



5.9 Typical Faceplates

Analog Acquisition

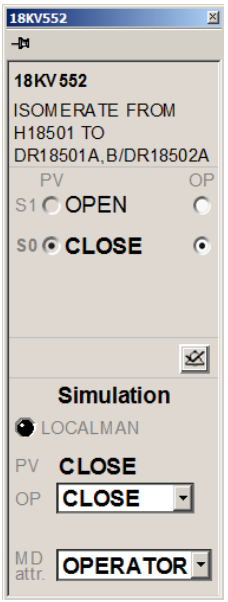


Digital Acquisition

Motor1

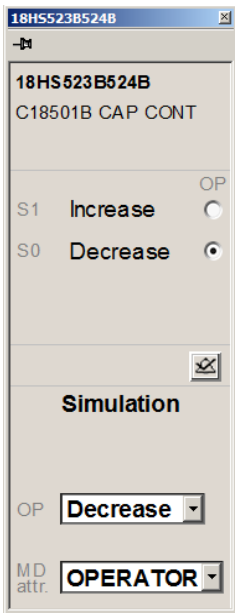
Motor2

On-Off Valve



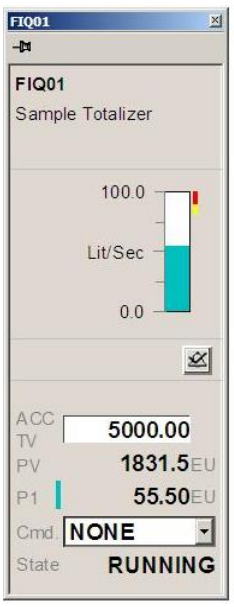
Motorized Valve

Digital Selector Switch

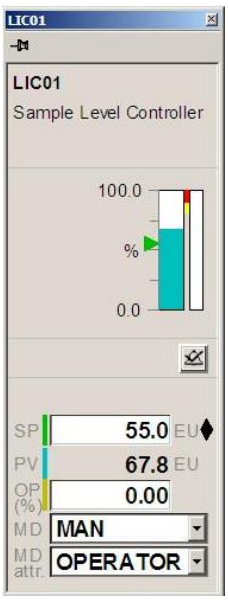


Analog Selector Switch

Totalizer

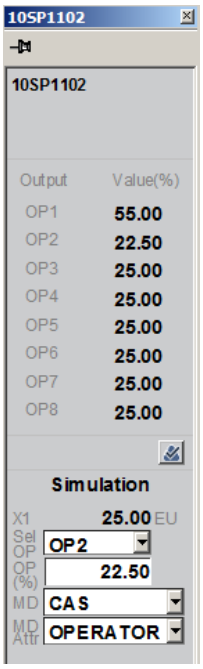


PID Controller



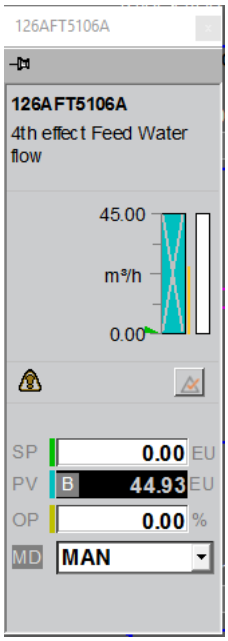
Note: all these faceplates are from HONEYWELL library and its used always in default mode so its no need to change these faceplates.

FAN OUT

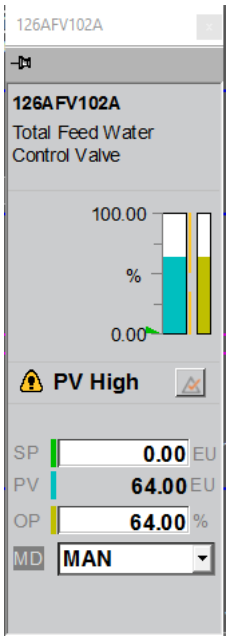


All above faceplate was CDA and SCADA faceplate will be shown bellow :

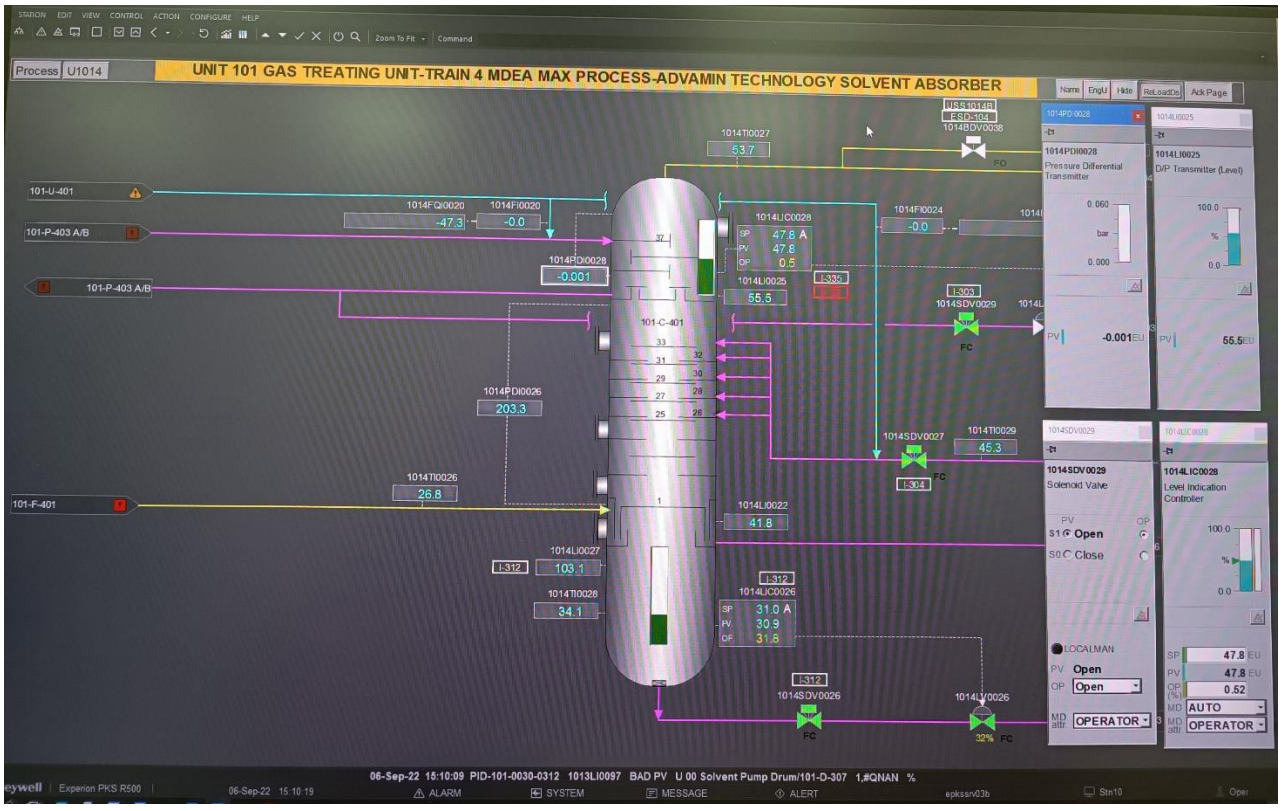
Analog



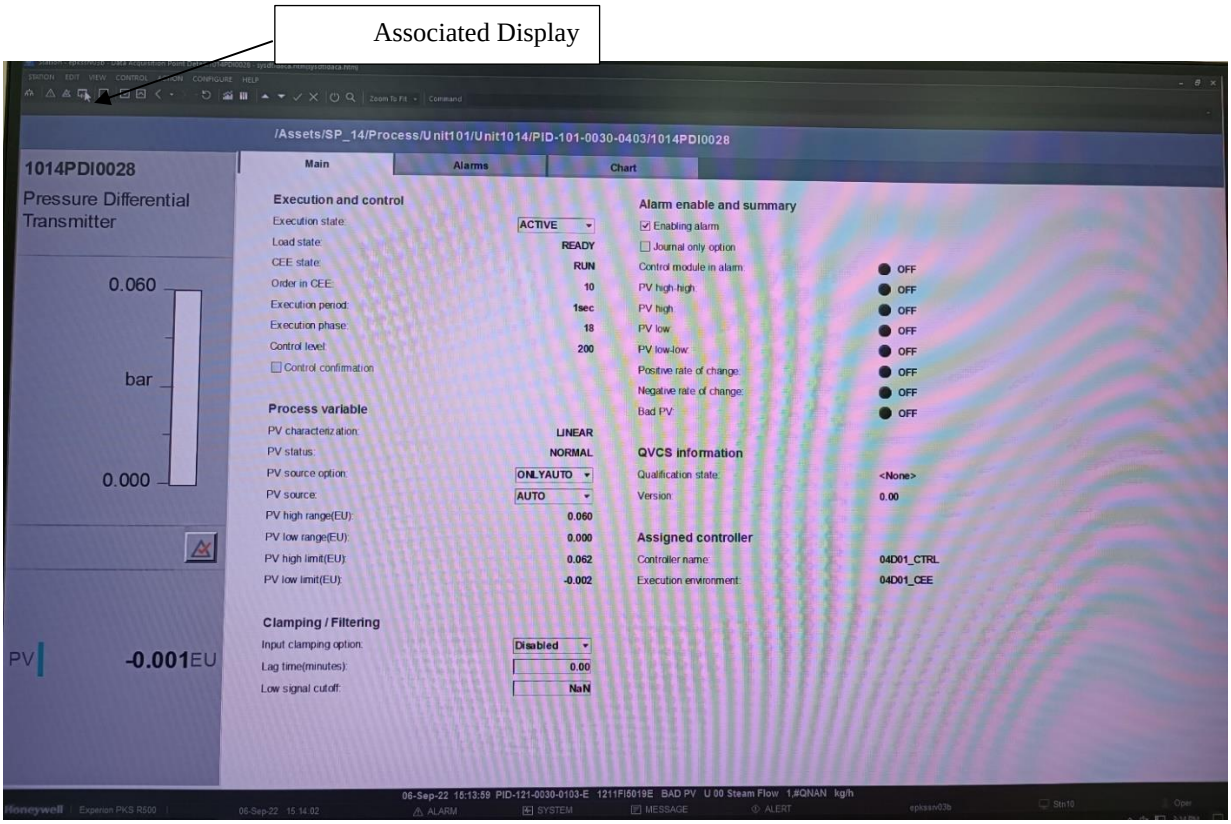
Control Valve



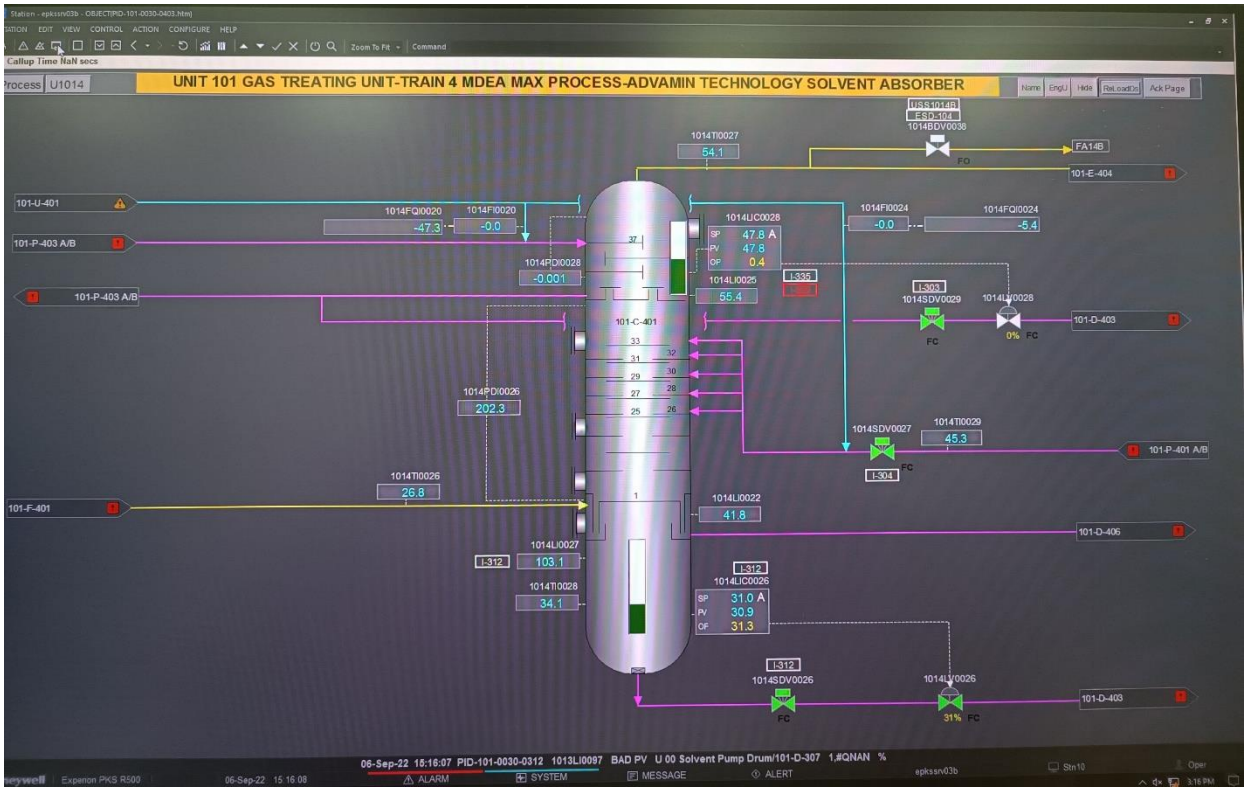
In case that operator open several faceplates from diffrent pages like below figure for opennig the related HMI page , operator should do these steps:



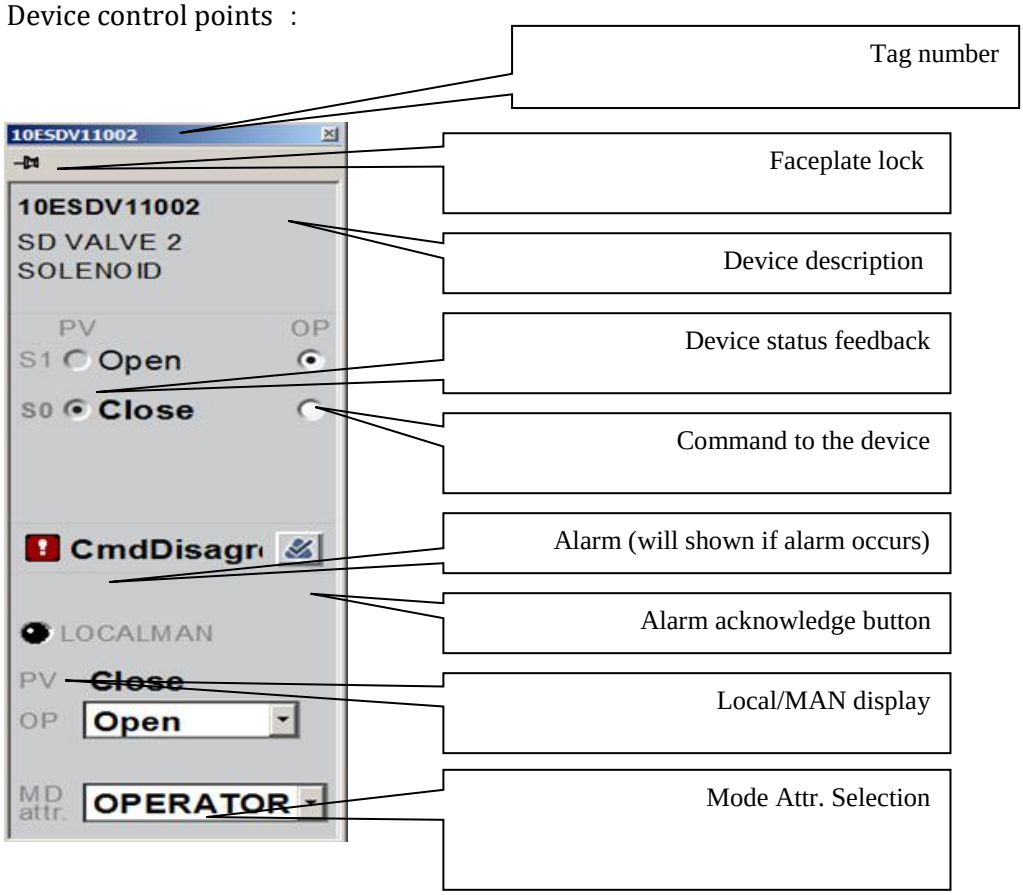
Operator should double click on the desired page after that this page will be apear.



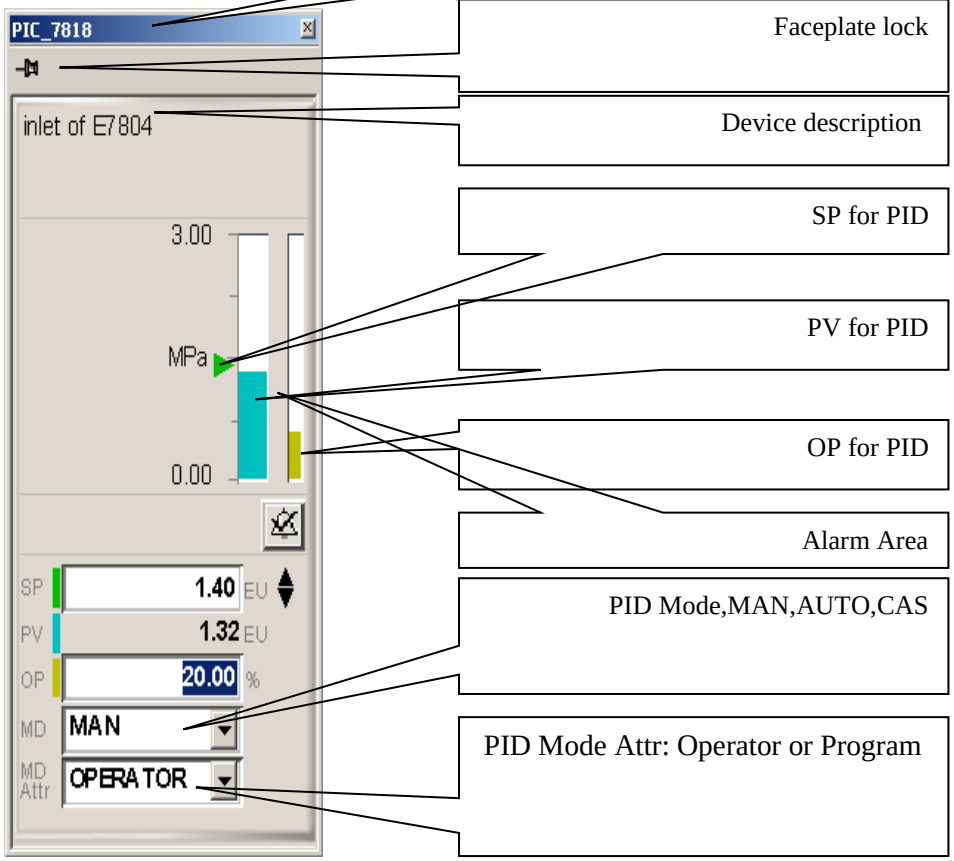
Now for return to faceplate related HMI should click on shown button(Associated Display) then related HMI page will be apear.



Device control points :



PID Faceplate:



ALARM TYPE

Specific to Block(s)	DataAcq, SCM, Push, RegSummer, MainIBV, LevelComp, ContactMon, FirstOut, DigAcq, AlmWindow, Grpcaprbk, Htmotor, Ltmotor, Solenoid, ValveDamper	
Description	Highest Alarm Detected - This variable is used by the system to ensure that, when alarm conditions exist for a function block at the same time, the most important or highest-level alarm condition will appear on both detail and group displays.	
Data Type	Enumeration DACALMTYPE	
Range	None (0):	No alarm exists (Lowest-level alarm condition)
	NegROC (1):	Negative Rate-of-Change alarm
	PosROC (2):	Positive Rate-of-Change alarm
	PvLo (3):	PV Low alarm
	PvHi (4):	PV High alarm
	PvLoLo (5):	PV Low Low alarm
	PvHiHi (6):	PV High High alarm
	BadPV (7):	Bad PV alarm
Default	None (0)	
Config Load	No	
Active Loadable	No	
Access Lock	ViewOnly	
Residence	CEE	
Related Parameters	"DEVLOALM.FL" on page 987, "HIALM.SV" on page 1619.	
Remarks		

Specific to Block(s)	RegCtl	
Description	Highest Alarm Detected - This variable is used by the system to ensure that when alarm conditions exist for a function block at the same time, the most important or highest-level alarm condition will appear on both detail and group displays.	
Data Type	Enumeration	
Range	NONE	No alarm exists; this is the lowest-level alarm condition.
	PredLo	Predicted Low alarm
	PredHi	Predicted High alarm
	OPHi	OP High alarm
	OPLo	OP Low alarm
	AdvDev	Advisory Deviation alarm
	DevHi	Deviation High alarm
	DevLo	Deviation Low alarm
	SafetyIlock	Safety Interlock alarm
	BadCtl	Bad Control alarm
Default	NONE (0)	
Config Load	No	

Specific to Block(s)	DevCtl	
Description	Highest Alarm Detected - This variable is used by the system to ensure that, when alarm conditions exist for a function block at the same time, the most important or highest-level alarm condition will appear on both detail and group displays.	
Data Type	Enumeration DEVHIALM	
Range	None (0)	No alarm
	BadPv (1)	Bad PV alarm
	OffNormal (2)	Off Normal alarm
	CmdDisagree (3)	Command Disagree alarm
	CommandFail (4)	Command Fail alarm
	UnCommanded (5)	Uncommanded alarm
	SafetyIlock (6)	Safety Interlock alarm
	Oride0Ilock (7)	State0 Override Interlock alarm
	Oride1Ilock (8)	State1 Override Interlock alarm
	Oride2Ilock (9)	State2 Override Interlock alarm
Default	None (0)	
Config Load	No	
Active Loadable	No	
Access Lock	ViewOnly	

Specific to Block(s)	FLAG block
Description	Highest Alarm Detected - This variable is used by the system to ensure that, when alarm conditions exist for a function block at the same time, the most important or highest-level alarm condition will appear on both detail and group displays.
Data Type	Enumeration HIALMFlag
Range	None (0) OffNormal (1)
Default	None (0)
Config Load	No
Active Loadable	No
Access Lock	Engineer

5.9.1 Mode and mode attribute

• Mode (MODE) is fixed at MANual. The Normal Mode (NORMMODE) parameter is also fixed at MANual.Casade mode(CAS) and AUTO mode are for programable method.

• Mode Attribute (MODEATTR) - determines where state commands to the DEVCTL block may originate that is, who may set the commanded output state (OP), as follows:

– OPERATOR = only the operator may command the output state.

– PROGRAM = only other function blocks (such as Logic blocks, SCM programs) may command the

output state by setting OPREQ.

– NORMAL = the setting specified by the Normal Mode Attribute (NORMMODEATTR) is assumed

5.10 Point Detail Display

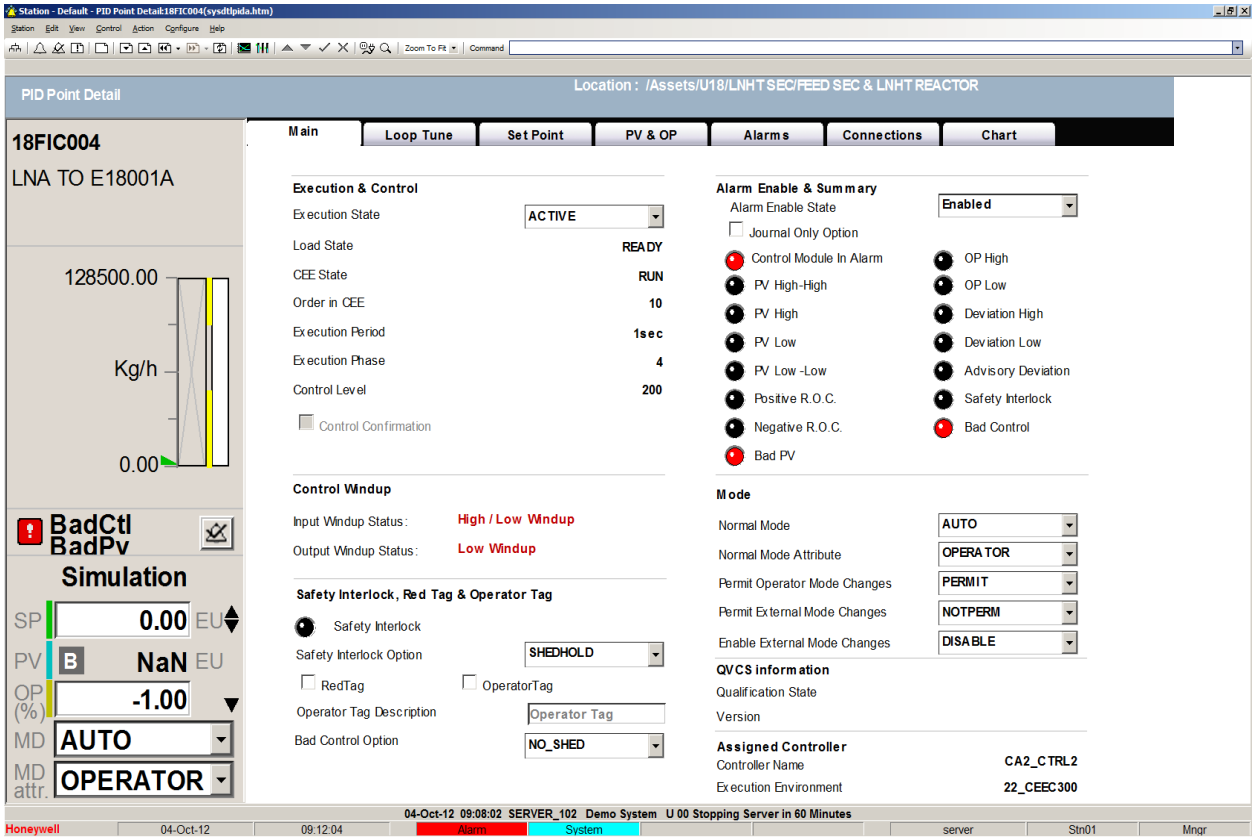
A Point Detail display shows the current value of each parameter for a particular point.

You can also use a Point Detail display to disable the point or change parameter values, providing you have the required security level.

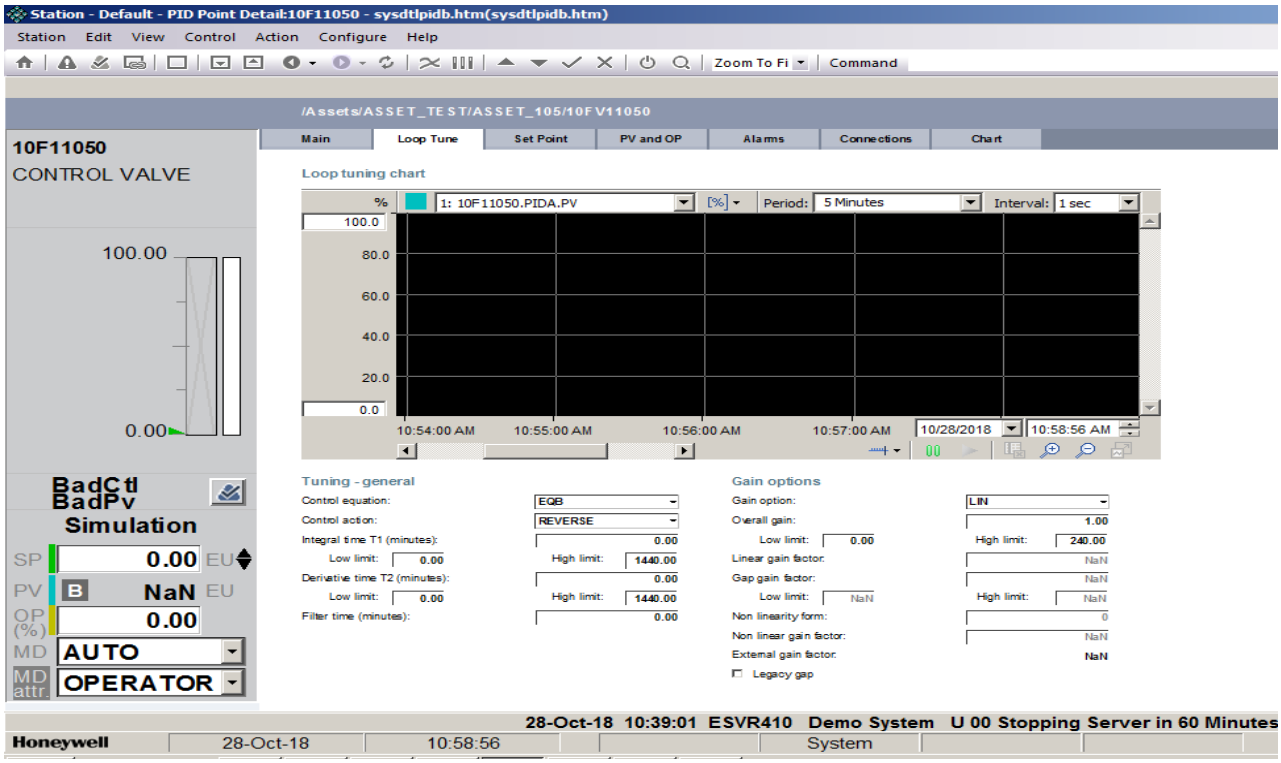
Point Detail Displays have a standardized layout, as shown in the following figure.

The Face Plate is designed to look like a traditional panel instrument, and shows the main parameters for the point. The other parameters are shown to the right of the Face Plate, and are grouped according to tab. For example, to see the online Chart-related parameters, click the Chart tab.

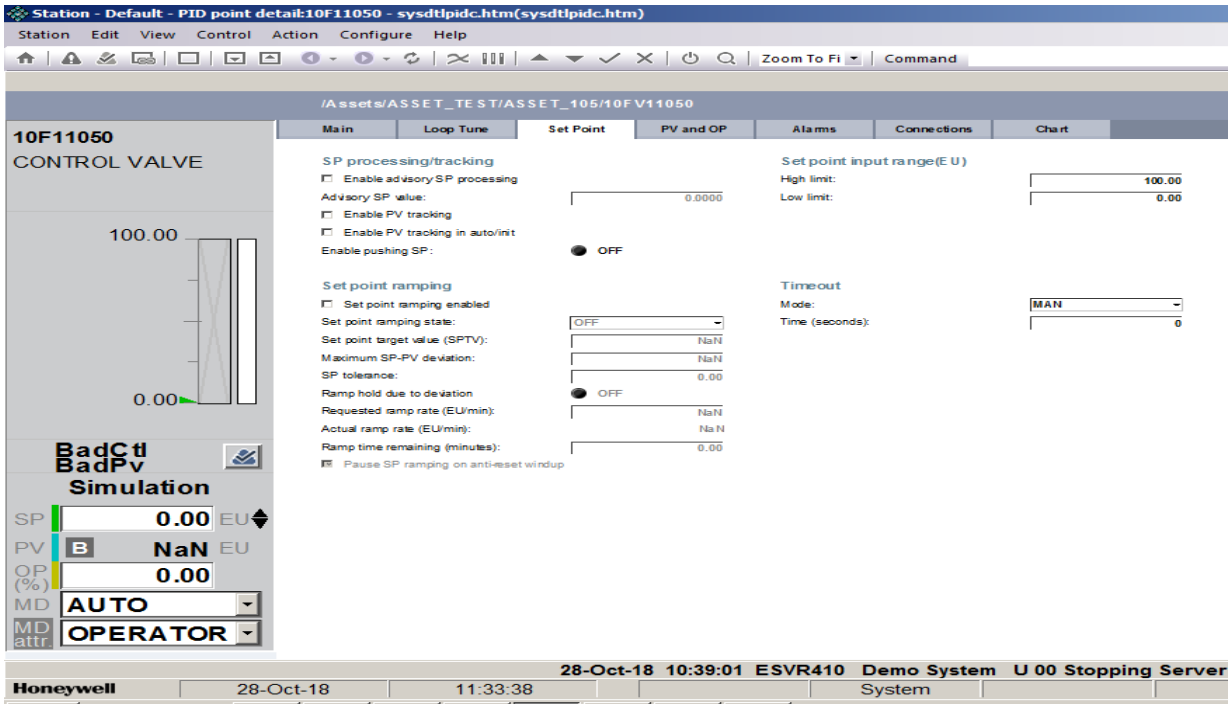
Main Tab:



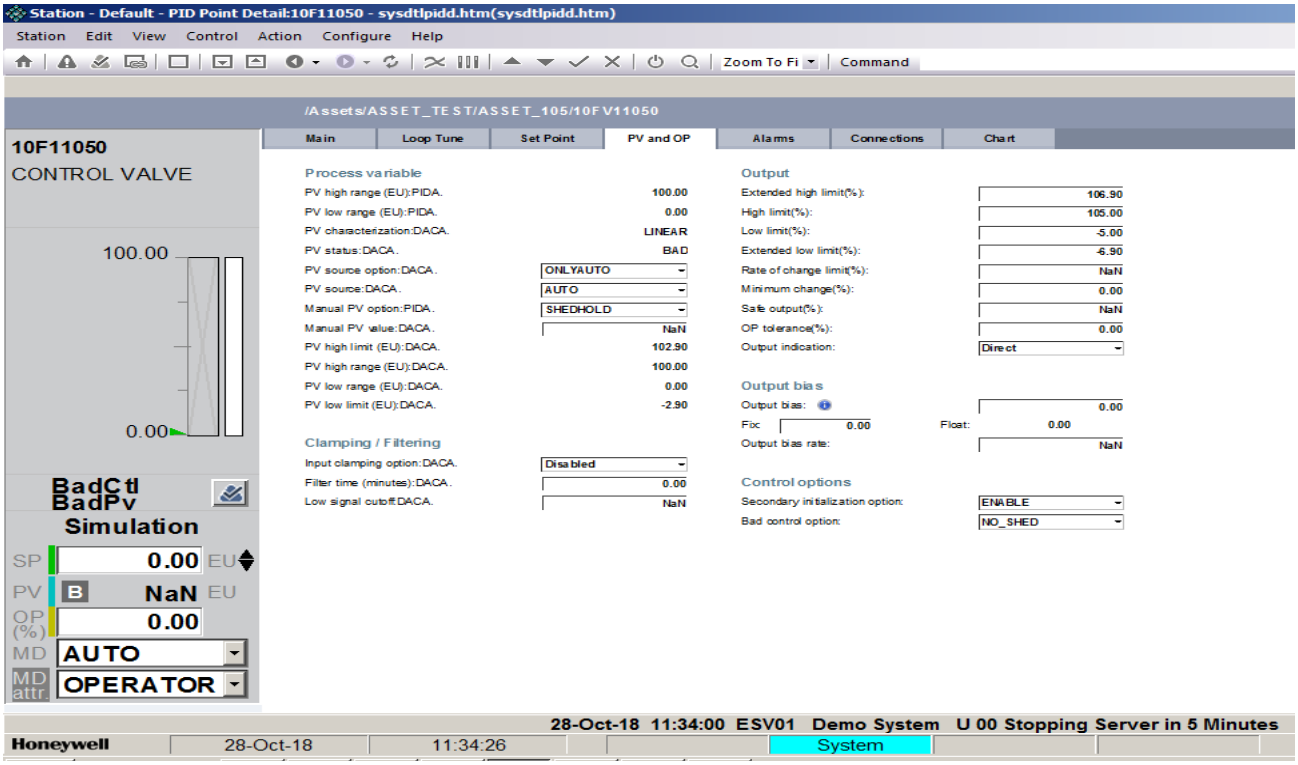
Loop Tune Tab:



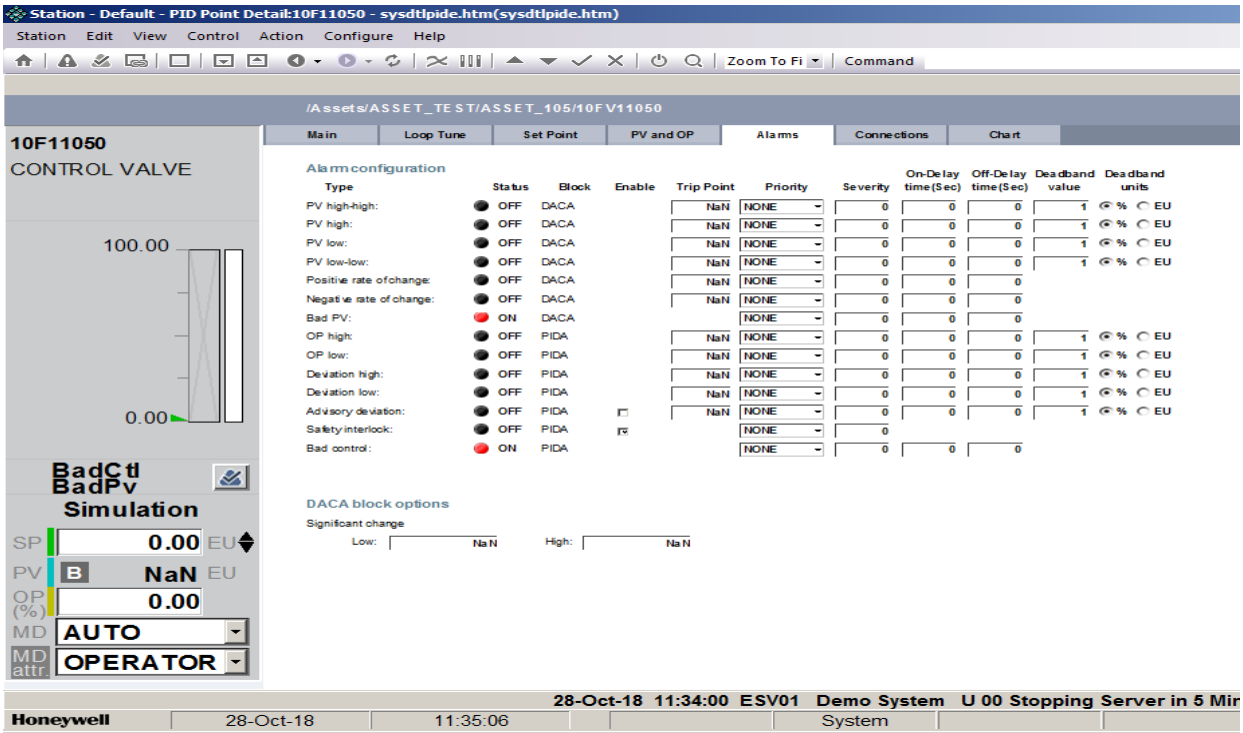
Set Point Tab:



Pv & Op Tab:



Alarms Tab:



Connections Tab:

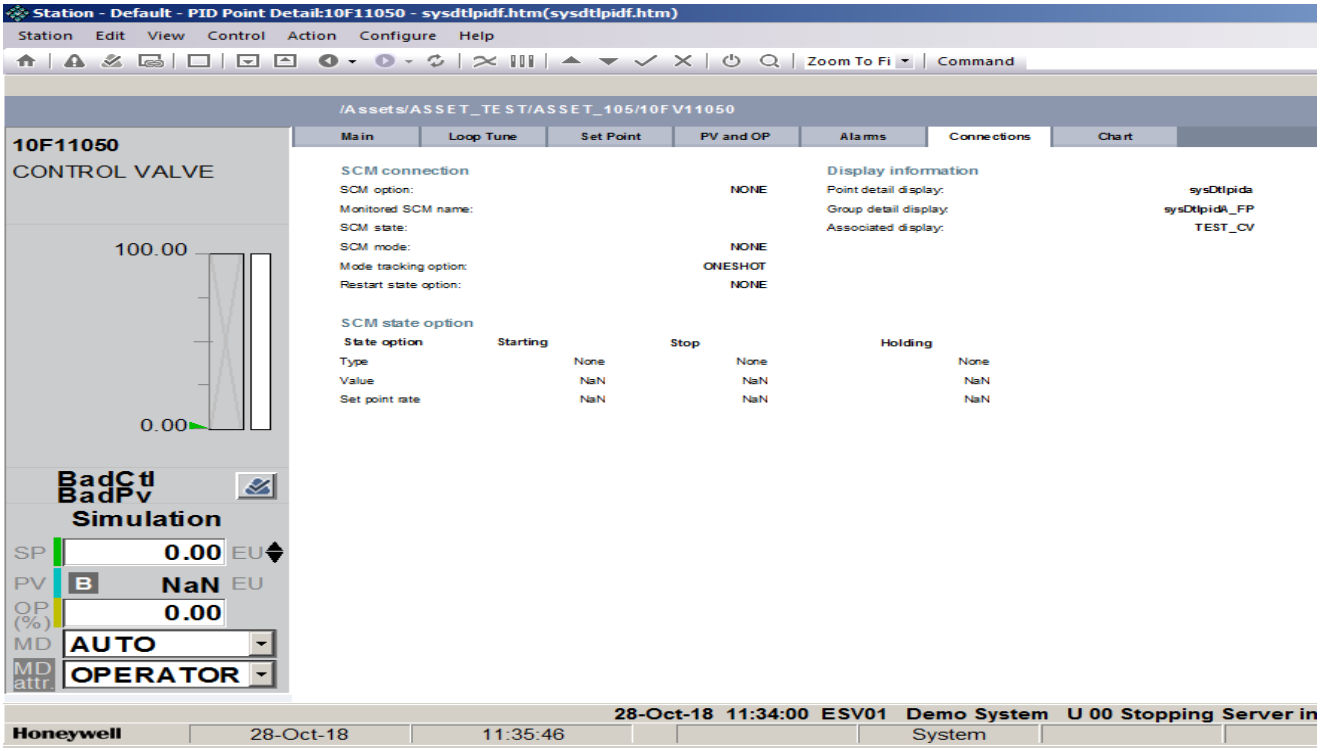
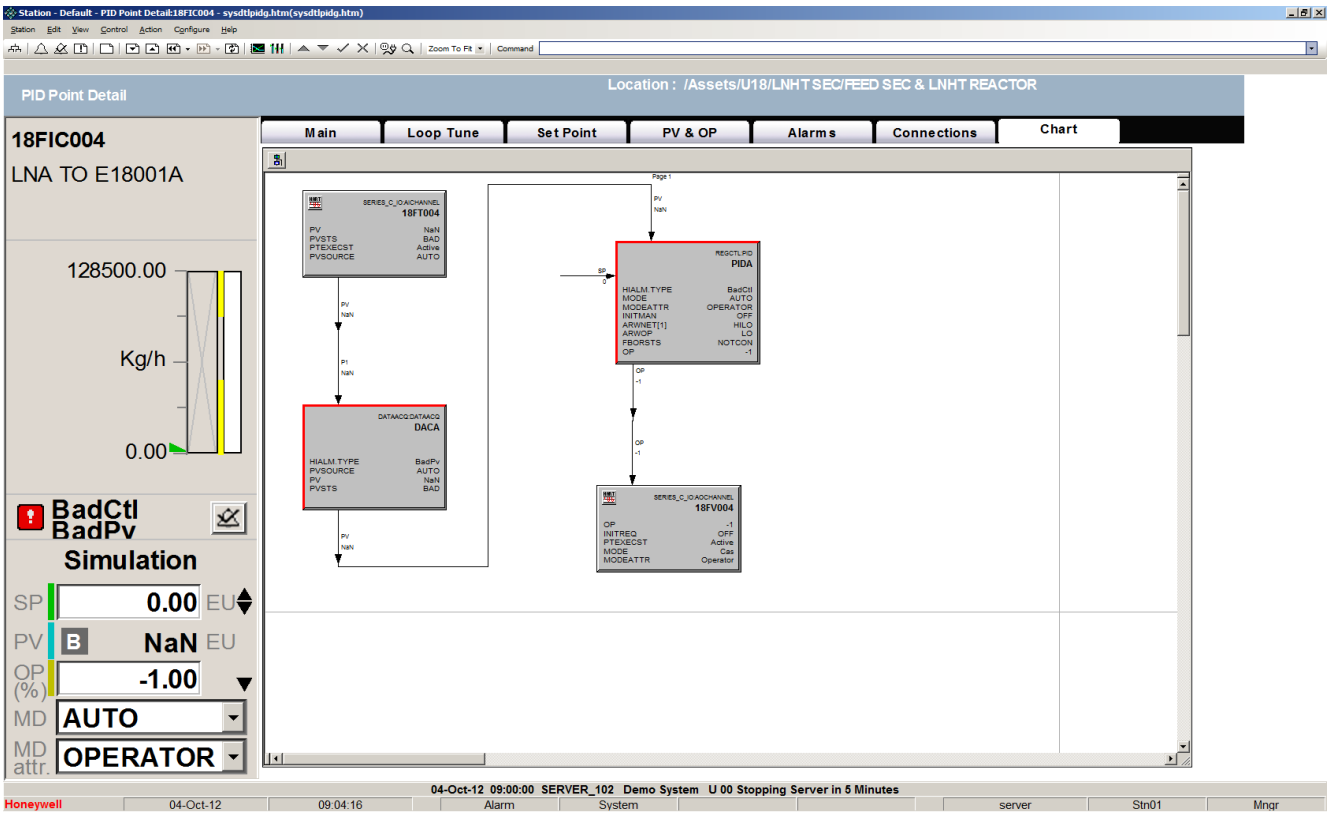


Chart Tab:



5.11 Group Display

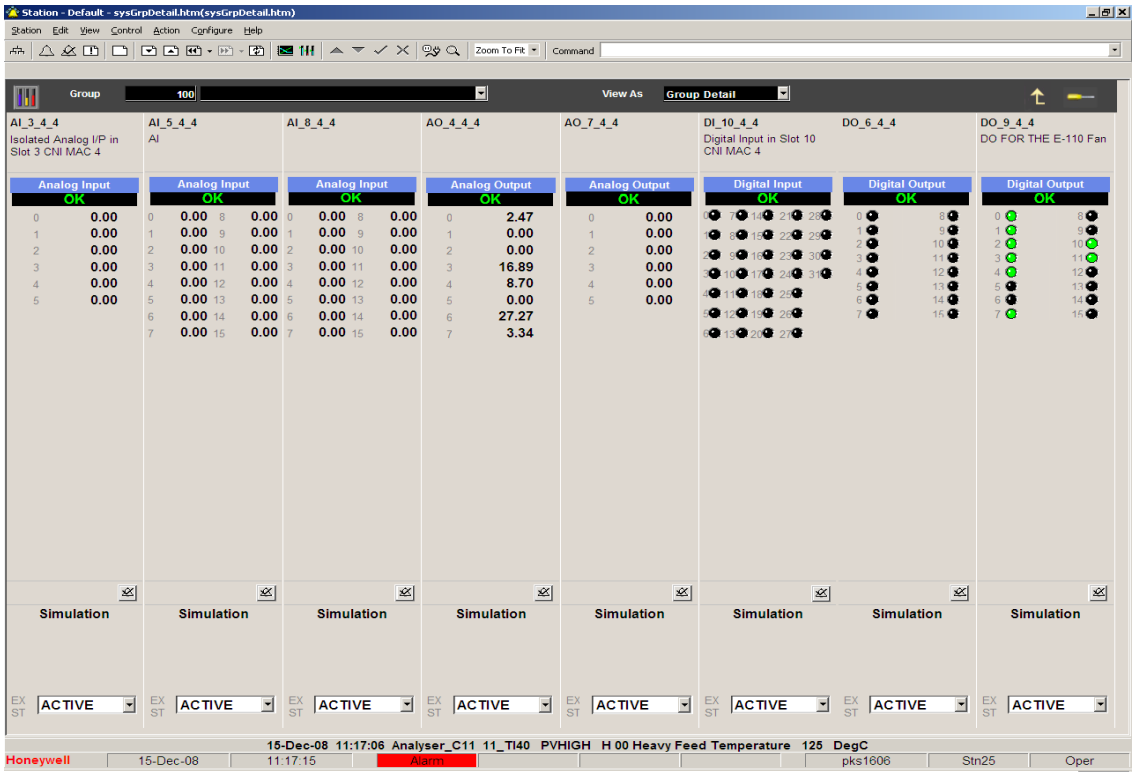
The group display will be configured according to the functional grouping of all controllers and acquisition data, such that deviation may be monitor via the overview display and allowing fast access to the primary operating groups.

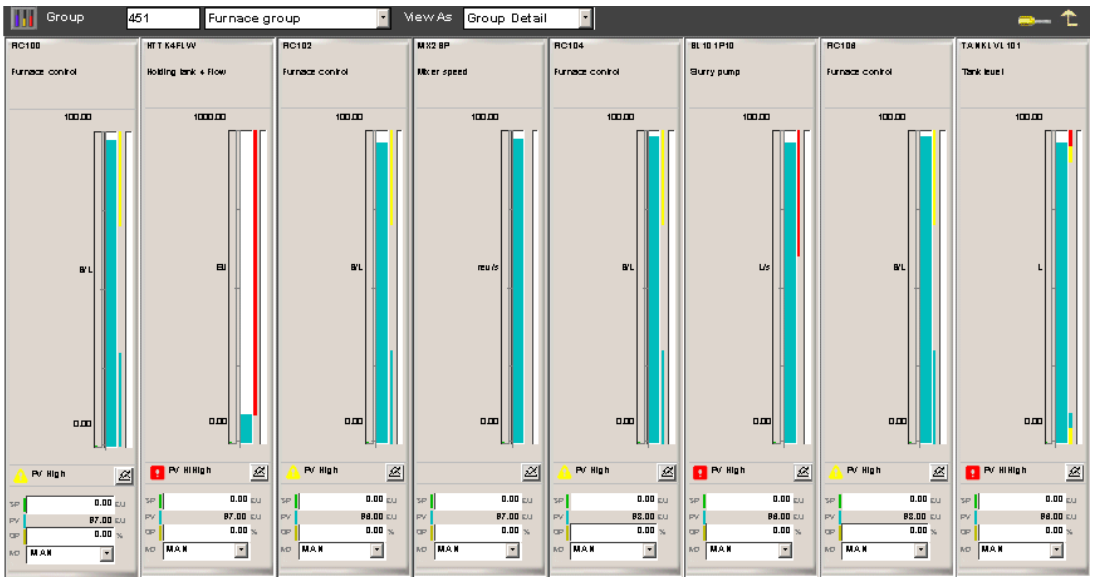
The grouping of Max eight points per display will be based on logical location of controllers and associated indication and digital functions to enable plant operation under both normal and upset conditions. Where necessary points can be repeated in more than one operating group. Sufficient spare operating groups with no points allocated to them can be provided for future use in communication, loop testing and operator habits.

The backward and forward displays correspond respectively to the previous and next group displays in the group list. There will be maximum 8 group display per process display.

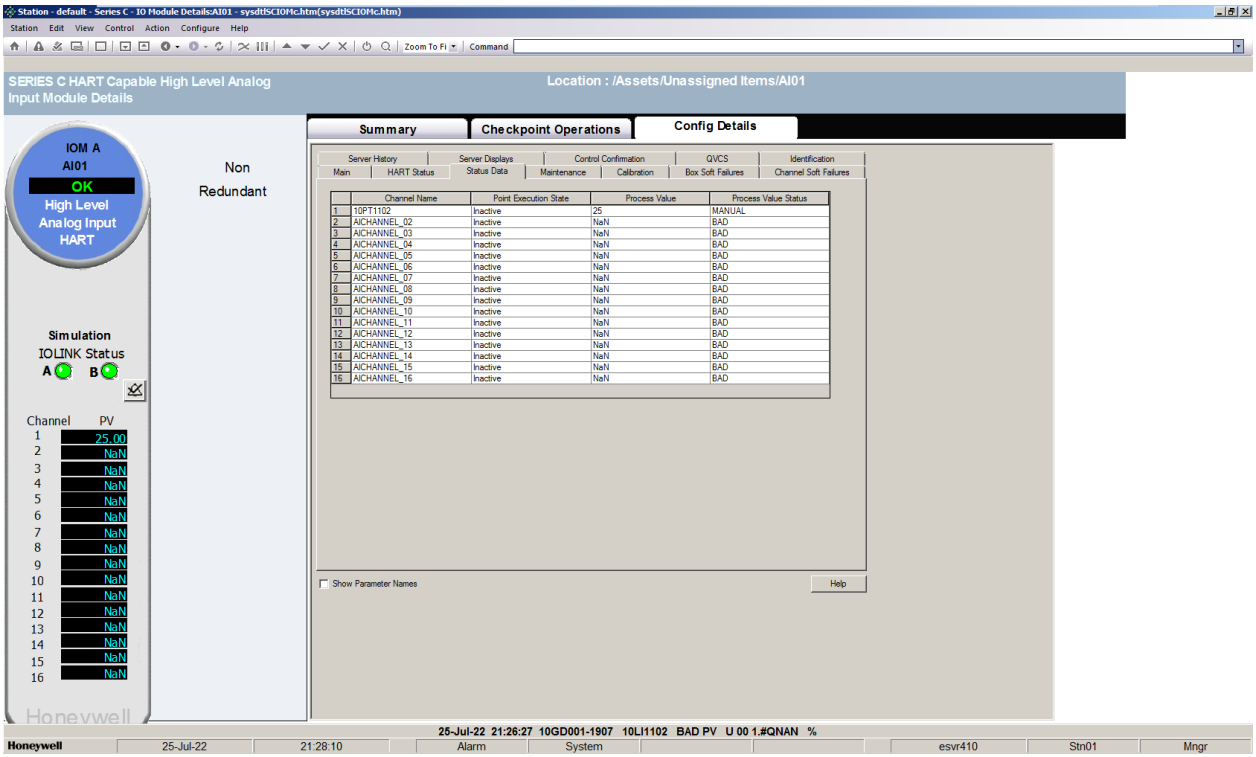
Any combination of analogue and digital loops is possible to display in one page.

The following depiction is an example of I/O cards group display.





To informing about each tag in group details , you can refer to Config detail tab and then Status data :



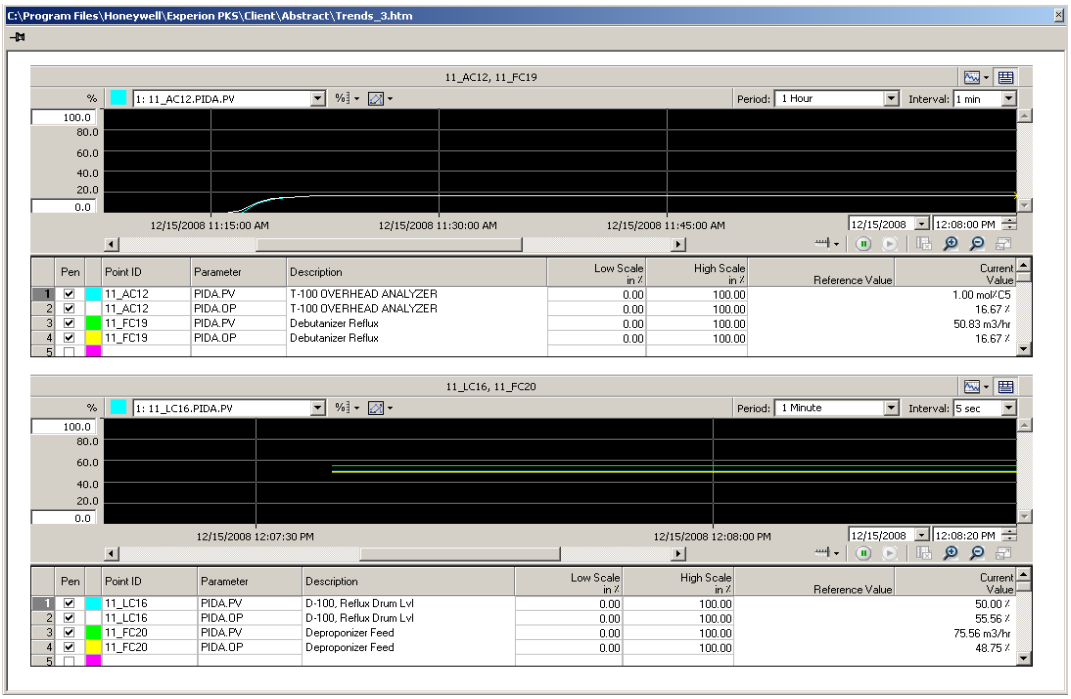
5.12 Trend Display

Trend displays give historical trends of selected values. Any I/O point process parameter or calculated parameter will be capable of being sampled, recorded on mass storage and displayed as a trend.

At any time the operator is able to select and view a trend display. Each trend display contains up to 32 trends shown in different colors. The time base can be modifiable to have a zoom effect.

The standard targets area, the alarm area and the change area can be shown on this type of display.

The backward and forward displays correspond respectively to the previous and next trend displays in the trends list.



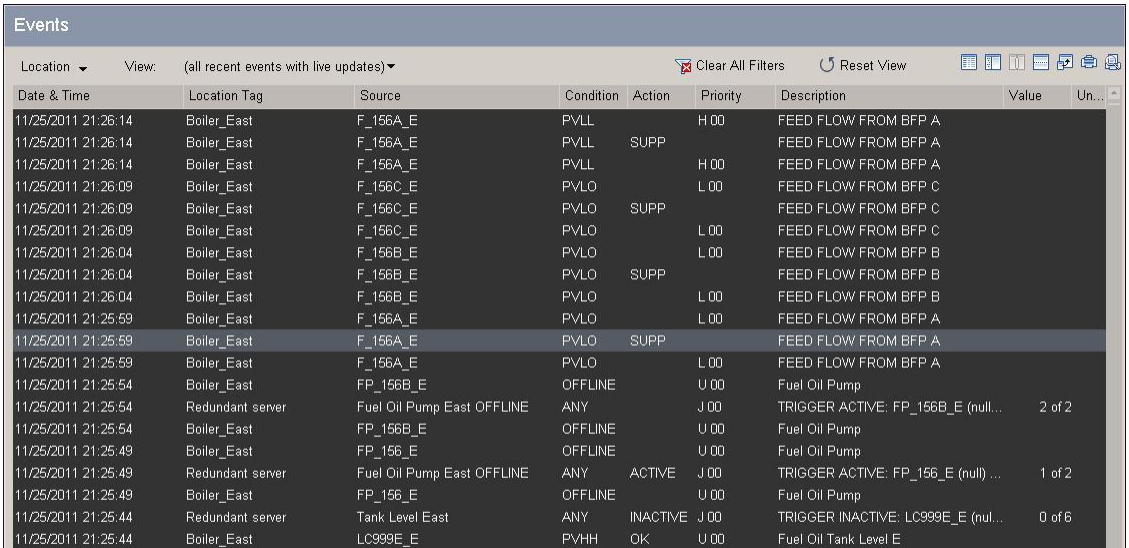
5.13 Event Summary

An event is any significant change in the system, and includes alarms and operator actions. Events are listed in chronological order, starting with the most recent event. The display is automatically updated, which means that each new event appears at the top of the list.

To call up the Event Summary

Choose View > Events > Event Summary to see the list of events. Depending on how your system is configured, the list of events includes live events from all servers publishing to the live event cache, or from the local server only

Note: according to software ability in time column just hours , minutes and seconds can be shown but all rows will be display by latest event happen.



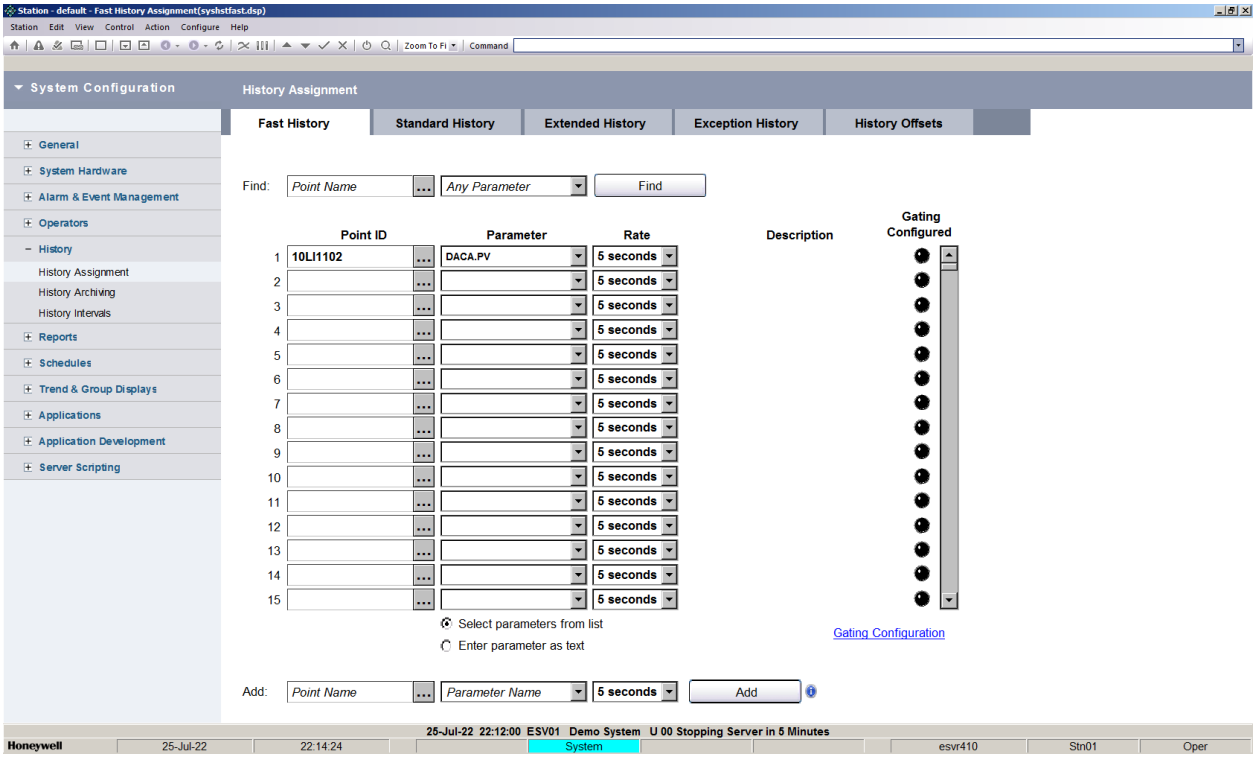
5.13.1 Non-Standard System Displays

Most system displays are available in HTM format and can be edited with the HMIWeb Display Builder. Honeywell recommends modifying or extending the standard displays as little as possible, the only exceptions being Point Detail displays and faceplates, which can be customized to cooperate with non-standard control modules. The use of standard control module conventions is recommended in order to limit the amount of standard display modification to a minimum. When modifications are made to standard displays, they should be saved with a new name and the modifications should be well documented, so that they can easily be re-applied when necessary in case the new updates of the standard displays become available.

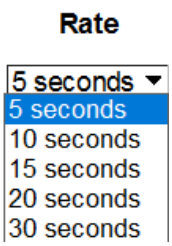
5.14 Process Historian

Process Historian pages can config to three different level for each tag (FAST , STANDARD , EXTENDED), chosen tag history can review in related pages :

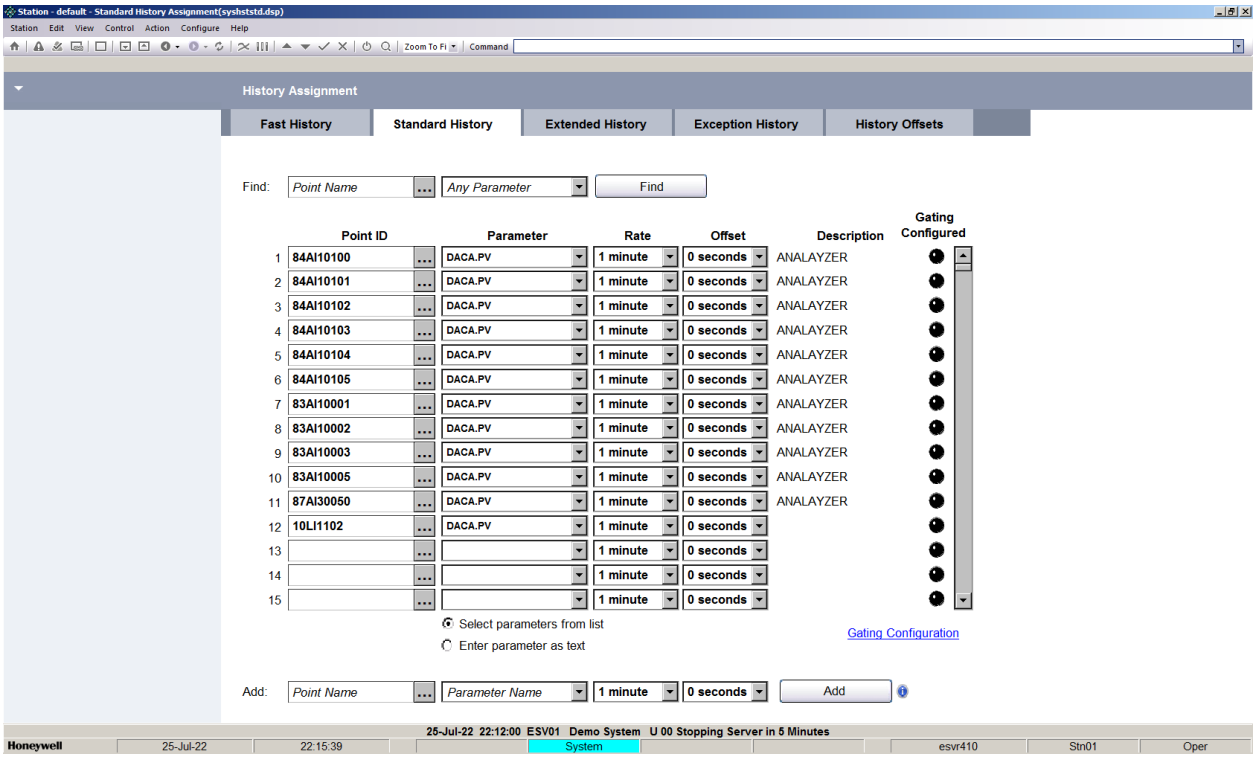
Fast:



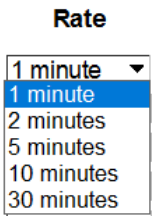
Rate Time:



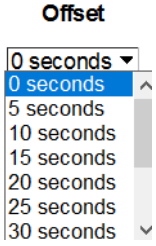
Standard:



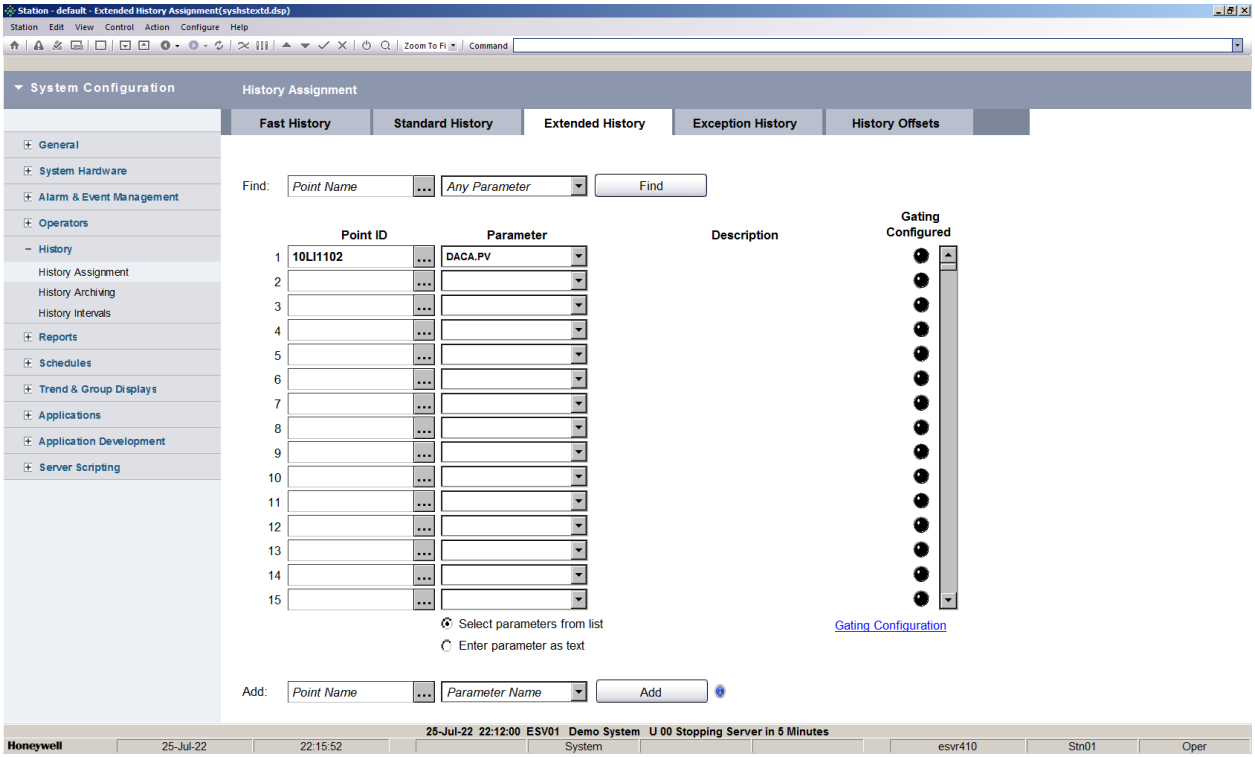
Rate Time:



Offset Time:



Extended:



According to the license of the project, the number of signals that can be HISTORY will be determined. Also, according to the times that will be defined in the system, a specific time can be attributed to each of these modes. Mainly, FAST mode is used for devices that need to sample at a higher speed.

5.15 Alarm Management:

It has been widely recognised that lack of a clear philosophy for alarm management on process plants controlled by a distributed control system (DCS) often results in there being too many alarms, leading to problems with:

- Standing alarms
- Nuisance alarms
- Frequently repeating alarms
- Alarm floods
- The operator's inability to prioritise remedial actions

In the worst cases, alarms can seriously impair the operator's ability to manage the process. Alarms floods during upset conditions can cause a minor event to escalate into a more serious incident. This is contrary to

the design intent of an alarm system, which should seek to assist the operator to control the plant, avoid upsets and mitigate the consequences of undesirable events.

The guidelines on setting alarm priorities are based on the actions the operator needs to perform upon the alarm. Practical experience has shown that establishing the alarm priority based on an assessment of risk requires disproportional effort in relation to the results. The risk-based approach often does not offer acceptable or reliable results. Setting the priorities of alarms is meant to help the operator to prioritise his actions. However if the alarm rate is low, prioritisation is not required. If the alarm rate is high, the operational situation is already deteriorated to such an extent that the operator no longer uses the alarm system to assess the situation and to prioritise his actions.

Just setting different alarm priorities has little practical relevance. Instead of spending efforts on setting alarm priorities, attention should be focused on the ability of the alarm system to provide meaningful alarms under most or all operating conditions including upset and trip conditions. The priorities will be set only to distinguish between the kinds of activity to be executed.

The following measures will improve alarm management such that alarms become more ‘meaningful’:

- Setting Alarm priorities and Destination
- The setting of alarm priorities such that operator only gets alarms that he can actually action on. For existing installations, this includes the downgrading of the alarm priorities or removal of the alarm function.
- Optimising alarm parameters
- Alarm parameters such as filtering, and dead band allow the reduction of repeating alarms.
- Static alarm suppression
- Alarms that are always in alarm when a process unit or a large piece of equipment is shutdown, are suppressed.
- Dynamic alarm suppression
- Alarms that always follow after a process trip are suppressed.
- Dynamic mode dependant alarm settings
- Alarm settings are dynamically changed based on detected operational mode changes.
- Measuring alarm management performance
- By measuring the performance of the alarm management, attention and effort can be focused to aspects of existing alarm systems such that it can be optimised with the minimum of effort. Alarm management performance is measured using benchmarks.
- Optimise Alarm ergonomics
- By optimising the way alarms are presented to the operator; operator alarm handling may be greatly enhanced. This includes on-line alarm help

A formal Alarm management study is required to provide the operator with meaningful alarms, that is an adequate set of warning facilities during normal and upset operation whilst minimizing, as far as is reasonably practicable:

- Standing alarms
- Nuisance alarms
- Repeating alarms
- Alarm floods

Summarising, Alarm management is intended to guide users to a safe, cost effective and consistent design and implementation for alarms in the Process Automation System (PAS).

Human factors:

In any process, traditional process control elements and algorithms can maintain good control of the plant during normal operation. During normal operations, the operator's primary task is routine surveillance of the process and the required interface needs to reflect that task. This same interface must also, however, meet the different set of needs encountered during an abnormal situation.

If an abnormal situation occurs in the process, the operator must intervene. The goal of this intervention is to return the process to a safe condition and normal operations. During abnormal situations, operators must often act on widely divergent parts of the process, and they must be able to perform corrective action quickly and view key variables in order to identify the underlying faults. Hence, the interface used by operators reflects the specific tasks to be performed and the process conditions encountered during an abnormal situation, as well as those required during routine surveillance. An important part of this interface for normal and abnormal situations deals with the way alarms are dealt with by the operator.

When considering the design of an alarm system, it is reasonable to assume that operators and technicians are well trained and knowledgeable about the equipment they operate and maintain. The function of the alarm system is then to:

- Trigger a trained response to certain emergency conditions.
- Alert the operator to plant conditions that need consideration and possible action.
- Advise the operator of further developments that need action.

The aspect of 'acknowledge' and "consideration" - the analysis of the situation, the identification of the correct action and its execution or communication - is one that has been ignored in many past alarm system implementations. This results in cognitive overload for operators in upset situations and an increased potential for escalation. A good alarm system should assist the operator in evaluating the situation, which is fundamental to identifying the correct actions. Depending on the circumstances, these actions can be directed either at avoiding an event or mitigating its consequences.

The process of “acknowledge” and “consideration” takes typically 0.1 to 5 minutes each. Taking an average figure of say 5 minutes for a complete response, the maximum alarm (that is the meaningful alarms) load that one operator can handle effectively is limited to around 1 alarm per 5 minutes. However considering that the operator has many additional tasks, the average number of alarms should be limited to the quantities as given in the table below.

	% of time spend on alarm handling	# of alarms that effectively can/should be handled
Normal (current)	40%	4 - 6 per hour
Good	10%	1 per 1 hour
Excellent	4%	1 per 2 hours

Numbers above this in for example an upset situation will probably be ignored so it is important not only to avoid unnecessary alarms during normal steady state conditions but also under upset conditions. It is also important for the operator to be able to access relevant plant information quickly and effectively, in order to speed up the process of responding to an alarm, and thus improve the effectiveness of his corrective actions. The design of the operator control interface and the rapid and comprehensive availability of current and trended information are important facets of alarm system design.

Alarm functionality:

Experion PKS Enterprise Model:

Assets and the asset model form the core of the Experion PKS Enterprise Model, a framework that can be used by engineers, operators, and applications to model and view their plant or process. The Enterprise Model replaces the flat, area-based structure.

An Enterprise Model comprises:

- A system model
- An asset model
- An alarm group model

System Model :

The system model represents the boundaries of the Experion PKS system. It comprises information about:

- The servers that are part of the Experion PKS system
- The Stations, channels, controllers, system interfaces, and printers that are associated with those servers.

In building the system model, it is possible to also define those servers that are connected to, but not part of the Experion PKS system (for example, servers on the business network), for diagnostic purposes.

Asset Model:

The asset model, which forms the core of the Enterprise Model, is used to:

- Define scope of responsibility
- Navigate the Experion PKS system
- Resolve data references
- Manage alarms
- Organize points, displays and reports

An Experion PKS asset is a database entity that represents a particular physical item in the enterprise, for example, fixed plant equipment, facilities or buildings.

All entities in the Enterprise Model (systems, servers, assets and points) have a tag name which is a unique name used by the system to identify that entity. In addition to the tag name, entities also have an Item Name (no uniqueness required) and an Enterprise Model Name (also referred to as a Full Item Name), which provides a more structured way of identifying entities.

Assignable Assets:

Within the asset model it is possible to define assignable assets in order to restrict access to parts of the system, processes, or individual pieces of equipment. By configuring assignable assets (and assign these to user profiles) access can be restricted to points, alarms, stations, operators, displays and reports.

The asset model should reflect the logical and physical design or structure of the plant. The design of the top-level structure should be based on Operations Area>Operations Sub Area>Panel Operator Position for scope assigning. Other sub levels could be added to cover Process Units associated to each Panel Operator Position.

Alarm Group Model:

The alarm group model is used to:

- Define alarm groups
- View aggregated alarms for those alarm groups

Alarm groups provide a means to monitor a group of assets and or data points that are otherwise unrelated to one another in the asset model. Alarm groups are created and configured in the same way as assets. Assignable assets and data points then can be associated with the alarm group.

Alarm groups have the following characteristics or constraints:

- Alarm groups can be built in a hierarchy.

- An alarm group can contain points, area points and other alarm groups.
- There can be multiple, separate alarm group hierarchies.
- Recursive hierarchies are not allowed.
- Each point must belong to only one asset path.

Alarm navigation:

There are three methods of tracing new alarms:

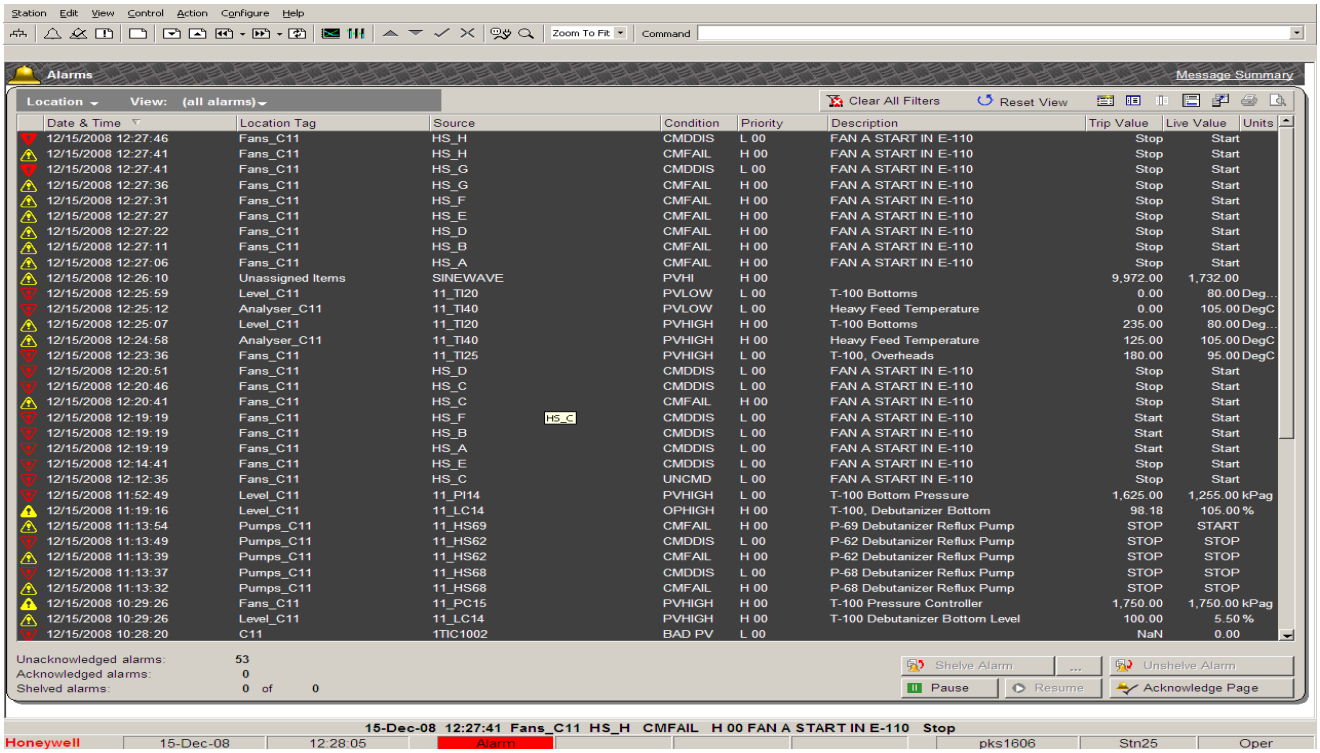
- Through the display hierarchy and the alarm indicator flashing in the appropriate priority colour. Progressively selecting the alarm indicator will invoke more detailed displays and locate the display with the cause of the alarm.
- Through Alarm Summary displays, then directly to the associated custom display.
- Through custom LED-enhanced keyboard buttons on the IKB; pressing the button will invoke either a Level-2 or a Level 3 display.

Alarm List Display:

It is the list of newest alarms of all priorities detected..The operator can review, acknowledge and perform alarm monitoring &Control actions from it. This list would be continuously and automatically updated. The following information is shown in this display:

- Alarm descriptor
- Tag name of the alarmed point
- Priority level of the alarm
- Date of appearance or disappearance of the alarm state
- Current process state
- The display tag name where the alarm can be visible
- Descriptor of the alarmed point

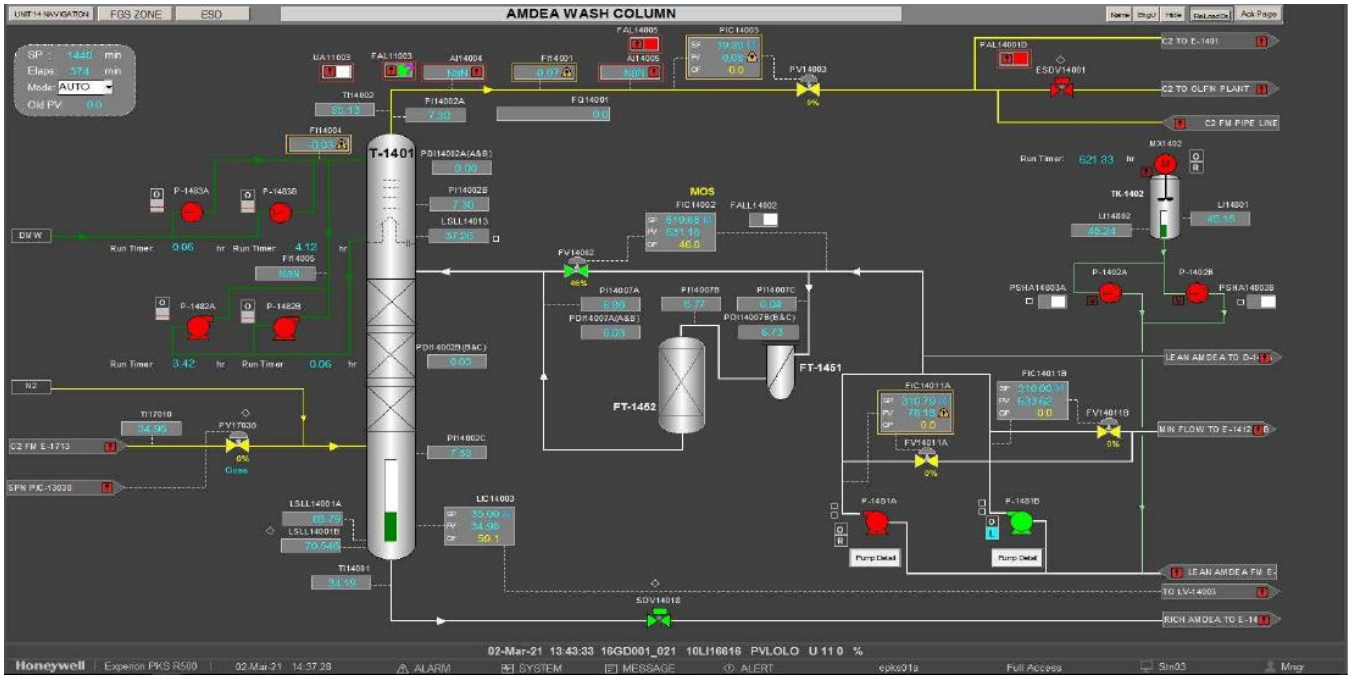
This information will be the same for the printer logging of the alarms. Each line is a target area allowing calling the process display or the point display, which shows the alarm. The following depiction is an example of Alarm list display.



5.16

Graphics example

5.16.1 DCS graphics page



6 Color Conventions

Bright colors are reserved for exception states and should only be used for these cases. The colors for various values and conditions are chosen to attract attention while monitoring, responding to events, and controlling the process. The use of a color shall be consistently applied throughout all displays. Colors used to represent specific abnormal / alarm conditions should be reserved for only those purposes.

All colors indicating normal operating conditions will be represented in either subdued colors or gray shades. Reserved colors will not be used.

Display background will be light grey (RGB（64, 64, 64）)

Red is reserved for urgent priority alarms (equal to high priority in spec)

Yellow is reserved for high priority alarms (equal to normal priority in spec)

Cyan is reserved for low priority alarms (usually not used)

White is reserved for static text

Dynamic PV and SP data are (RGB（00, 255, 255）)

Dynamic OP data is yellow

Color:	Object(s):	Default Visible	Red, Green, Blue	Blink:
Red	Urgent alarm in shape background	No	255,0,0	Yes
Light Grey	CDA point & SCADA point Shape background	Yes	192,192,192	No
Dark Grey	Display background	yes	64,64,64	
Black	Dynamic text: foreground Text in shapes Outline of shapes for indication of alarm priority	Yes Yes No	0,0,0	
White	Static text: foreground	Yes	255,255,255	
Line: Black Fill: Red	Alarm Acknowledged: Urgent priority	No No	0,0,0 255,0,0	
Line: Black Fill: Red	Alarm Not Acknowledged: Urgent priority	No No	0,0,0 255,0,0	Yes Yes
Line: Black Fill: Yellow	Alarm Acknowledged: High priority	No No	0,0,0 255,255,0	

Color:	Object(s):	Default Visible	Red, Green, Blue	Blink:
Line: Black Fill: Yellow	Alarm Not Acknowledged: High priority	No No	0,0,0 255,255,0	Yes Yes
Line: Black Fill: Magenta	Alarm Acknowledged: Low priority	No No	0,0,0 0,255,255	
Line: Black Fill: Magenta	Alarm Not Acknowledged: Low priority	No No	0,0,0 255,0,255[	Yes Yes
Line: Magenta Fill: none	Bad PV	No No	255,0,255 -	
Line: Black Fill: Green	Open / Run indication	Yes Yes	0,0,0 0,255,0	No

7 Common Behavior

7.1 Normal indication

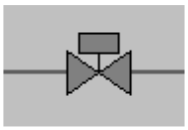
Status indication:

Status information can be shown in either graphical format (for example, a pump consisting of a circle) or in a textual format (for example, START/STOP).

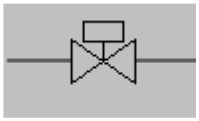
Graphical status information:

All shapes which show status information in a graphical format use the following default conventions:

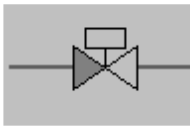
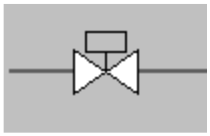
When a device is in the “transporting” state (for example, an open valve or a running pump), the fill-color of that shape should have the same color as the process line connected to that shape. For example:



When a device is in the “non-transporting” state (for example, a closed valve or a stopped pump), the fill-color of that shape will have the same color as the display background. For example:



When the device is in the “moving” state (for example, a moving valve), the shape will either use 2 different fill-colors (default setting for HMIWeb SP) or a color which is clearly distinguishable from the 2 above mentioned other states. For example:

 or 

Alphanumerical status information:

Shapes which show status information in a textual format should use one of the following conventions:

Show the actual status information as different text strings, for example, “OPEN” and “CLOSE”. For example:

If a custom approach is required, the cascading style sheet can be modified to change the fill color of the text object depending on the status. Make sure to use adequate color combinations that will make the text easily readable. Alternative example:

Show the actual status information depending on the active / inactive state with different colors and / or font settings (for example, bold). This applies to shapes that, for instance, show an active / inactive HH pressure alarm. For the default approach for the inactive state (no alarm), the operator may still want to know that the shape object is related to an HH alarm. This could be presented with a light grey text (“HH”) as show.

The active state can then be shown in a different format:

Highlighting the HH text by making it black and bold (typically the case when the point does not have an alarm assigned to the HH value):

Highlighting the HH text by making it black and bold, but in addition also show its related alarm symbol:

Alternatively, highlighting the HH text by making it black and bold as well change the HH background fill-color:

Winding ramping and initialization indication

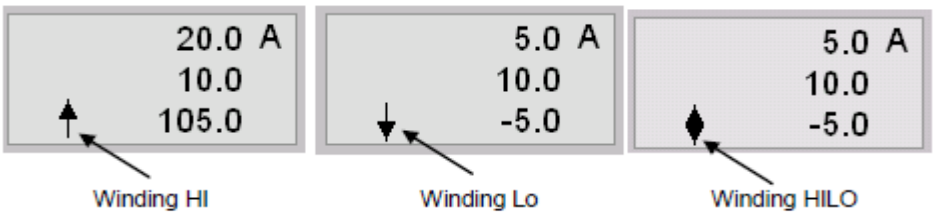
Winding ramping and initialization indication are parameters available in C200 / C300 and TPS controllers for regulatory- control function blocks.

Windup handling:

When a windup condition is reached, the controller block stops calculating.

If the output anti reset windup status is:

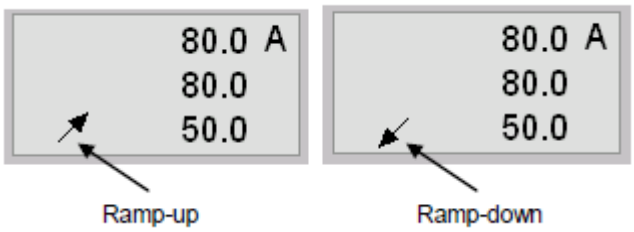
- Normal: the output parameter is free to move in either direction
- HI: the output parameter is at his high limit and may only be lowered
- Lo: the output parameter is at his low limit and may only be raised
- HiLo: the output parameter may not move in any direction



Set point ramping:

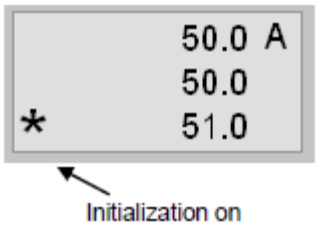
The Set point ramping option lets you ramp from the current Set point value to the target Set point value

- If the Set point target value is > than the Set point the shape show the ramp-up status
- If the Set point target value is < than the Set point the shape show the ramp-down status



Initialization:

If a control block is in cascade the initial control processing checks if the cascade has been broken. If it has this function initializes the block and builds an initialization request to his primary or primaries control blocks.



PV source indication:

Process Variable Source - Identifies the source of the PV input:

- Sub: PV value is provided by a user program.
- Man: PV value is provided by the operator
- Auto: PV value is fetched from another function block

The PVSource attribute 'Operator' could be used to manually enter a PV value.

PV Source	Applicable for Experion C200 / C300	Applicable for Experion SCADA	Applicable for Experion Server TPS
Sub	√		√
Man	√		√
Auto	√		√
Track	√		√

PV Source indication

7.2 Analog Data

Analog data is numeric presented and/or via sub-pictures.

The numeric presentation depends on the engineering range and the PV format of a tag:

Engineering maximum range	**PV Format**	**Display Decimal format:**
0 – 0.9999	D3	+/- X.YYY
1 – 9.9999	D2	+/- X.YY
10 – 99.999	D1	+/- XX.Y
100 –999.99	D1	+/- XXX.Y
≥ 1000	D0	+/- XXXX

For presenting PV's and/or SP's in sub-pictures, a maximum of 7 positions are reserved:

Negative / positive sign symbol

Decimal separator

For data presentation: minimum 4 numbers (e.g., -0.987) and maximum 6 numbers (e.g., 999876)

No 1000's separator

No leading zeros, except for decimal values between +1 and -1.

7.3 Discrete Signals

Discrete signals will present the status via fill color changes in the sub pictures, which represent the equipment. Open valve will be shown as filled with subdued GREEN and closed status will be YELLOW; In between will be (GREEN-YELLOW) and bad value will be shown (B)index

An example of this indication is shown in the Object Library section.

7.4 Mode Indication

The mode will indicate the actual mode of certain regulatory control. Refer to Section 9.0 Symbol Library for representation of the mode in sub pictures.

The presentation of the mode is as follows:

Table: Indication mode

Mode:	Indication (Default):	Indication (Shorten): *1	Color:
Manual	MAN	M	Deep sky blue
Auto	AUTO	A	Deep sky blue
Cascade	CAS	C	Deep sky blue

*1 Default presentation is only first letter of enumerated mode (e.g. M for MAN, C for CAS etc.)

8 Abnormal indication:

An abnormal situation is a disturbance or series of disturbances in a process that cause plant operations to deviate from their normal operating state. Abnormal indications serve a key role in orienting users to the existence and location of critical plant conditions. The alarm (abnormal) configuration scheme determines whether the alarms orient and guide quick, effective responses to plant disturbances. Color schemes affect the ability of users to distinguish different abnormal situations. It is important to standardize and limit the number of colors for non-abnormal situations. An effective and consistent color usage will improve the ease of use and comprehensibility of display information.

Colors used to represent abnormal, alarm conditions should be reserved for only these purposes:

Status	Value
Normal	Figure Green with Green Frame
Alarm not acknowledged	Normal priority Figure Red with Yellow flashing Frame High priority Figure Red with Red flashing Frame Bad PV Figure Red with Magenta flashing Frame
Alarm acknowledged	Normal priority Figure Red with Yellow static Frame High priority Figure Red with Red static Frame Bad PV Figure Red with Magenta static Frame
Back to normal, not acknowledged	Figure Green with Green flashing Frame

8.1 Alarm indication:

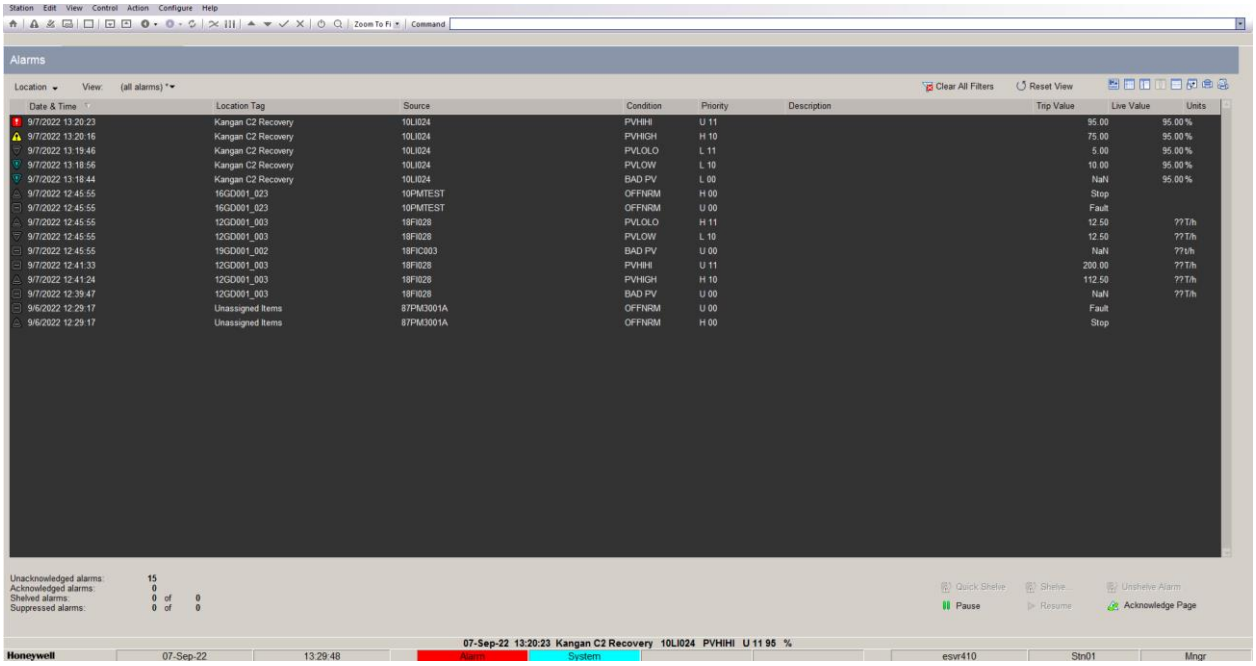
The alarm indicator can be used by shapes, which show tag information, for example pumps, valves, deviation view shapes, tank temperatures, and so on. The appearance and behavior of the alarm-state and alarm-priority indicator is defined in the table below. The layout of the alarm icon is system defined.

Priority	Return to Normal	Acknowledge Status	Active Object (shape)	Behavior
Critical	No	Unacknowledged		Blinking
		Acknowledged		Steady
	Yes	Unacknowledged		Blinking
Urgent	No	Unacknowledged		Blinking
		Acknowledged		Steady

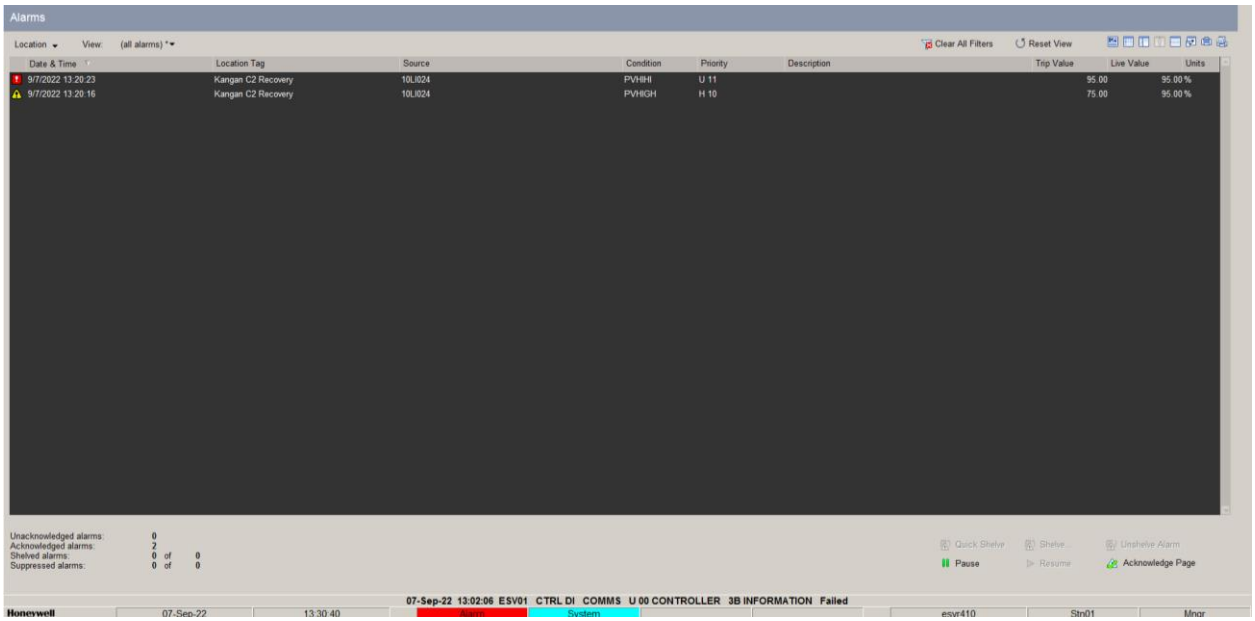
Priority	Return to Normal	Acknowledge Status	Active Object (shape)	Behavior
	Yes	Unacknowledged		Blinking
High	No	Unacknowledged		Blinking
		Acknowledged		Steady
	Yes	Unacknowledged		Blinking
Low	No	Unacknowledged		Blinking
		Acknowledged		Steady
	Yes	Unacknowledged		Blinking
Disabled	N/A	N/A		Steady
Disabled Unacknowledged	N/A	Unacknowledged		Steady
Shelved	N/A	N / A		Steady
Suppressed	N/A	N / A		Steady

Note:critical alarm is not used in this project and its not shown in following sample.

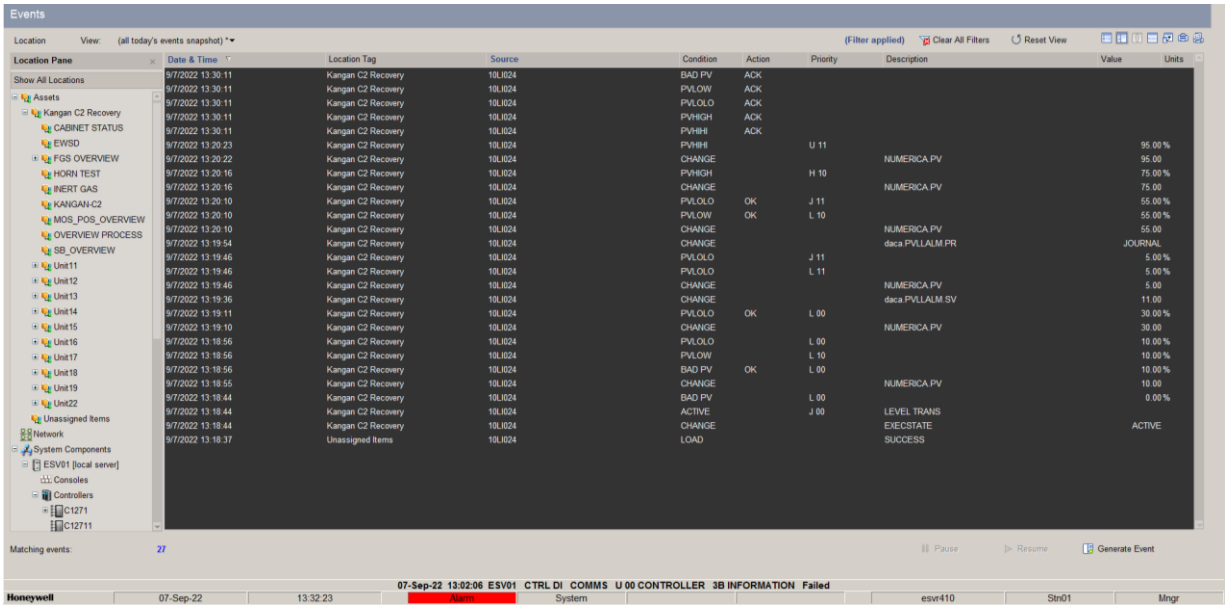
a sample page for these alarm indications is shown below and as mentioned in the previous table, each symbol represents a special meaning, examples of which were shown in this figure.



And as explained in the previous table, after the error is fixed, the symbols will change into empty shape, and also the operator can remove the alarms whose cause has been resolved from the alarm list by pressing the Acknowledge button.



but please note that these events are recorded in EVENT list.



8.2 Alarm State Icons

The following table describes how alarm state icon changes its appearance to reflect the alarm state of the associated point

If the icon looks like this	And it	The alarm is	Its priority is	Its acknowledge status is
	Flashes	Active	Urgent	Not acknowledged
	Flashes	Active	High	Not acknowledged
	Flashes	Active	Low	Not acknowledged
	Flashes	Inactive	Urgent	Not acknowledged
	Flashes	Inactive	High	Not acknowledged
	Flashes	Inactive	Low	Not acknowledged
	Doesn't flash	Active	Urgent	Acknowledged
	Doesn't flash	Active	High	Acknowledged
	Doesn't flash	Active	Low	Acknowledged
	Flashes	-	Disabled	Not acknowledged
D	The point is disabled.			
Invisible	The point is not in alarm.			

Alarm Color Scheme

8.3 Alarm Type Indicator

Various tag name types will have many different possible alarm types. An abbreviation of the alarm type, for data acquisition, regulatory control and device control points only, will be shown in the sub-picture.

Data source:	Alarm description:	Abbreviation:
Data-acquisition	PV High High PV High PV Low PV Low Low Positive Rate of Change Negative Rate of Change Bad PV	xHH xH xL xLL PR NR BA/B
Regulatory control	OP High OP Low Deviation High Deviation Low Advisory Deviation Safety Interlock Bad Control	OPH OPL DVH DVL DEV SI CTL
Device Control	Command Disagree Command Fail Uncommanded Change Bad PV Safety Override State 0 Override Interlock State 1 Override Interlock State 2 Override Interlock Off Normal	CMD FL CH BAD SAF OV0 OV1 OV2 OFF

Alarm Abbreviations

*”x” is equal to “F,L,P,T”

7.3. 1 of 2, 2 of 3 switches and alarms

In the normal process state only 1o2 or 2o3 state is visible with the related tag letter (F, L,P, T) belonging to it. In case of alarm all alarmed values are visible with the related alarm type (L, LL, H, HH)

Status	Value
Normal	Only x1o2, x2o3 Green on background Grey
Alarm not acknowledged	x1o2, x2o3 and related H/ HH/ L/ LL Red with Red flashing Frame

Alarm acknowledged	x1o2, x2o3 and related H/ HH/ L/ LL Red with Red static Frame
Back to normal, not acknowledged	Figure Green with Green flashing Frame

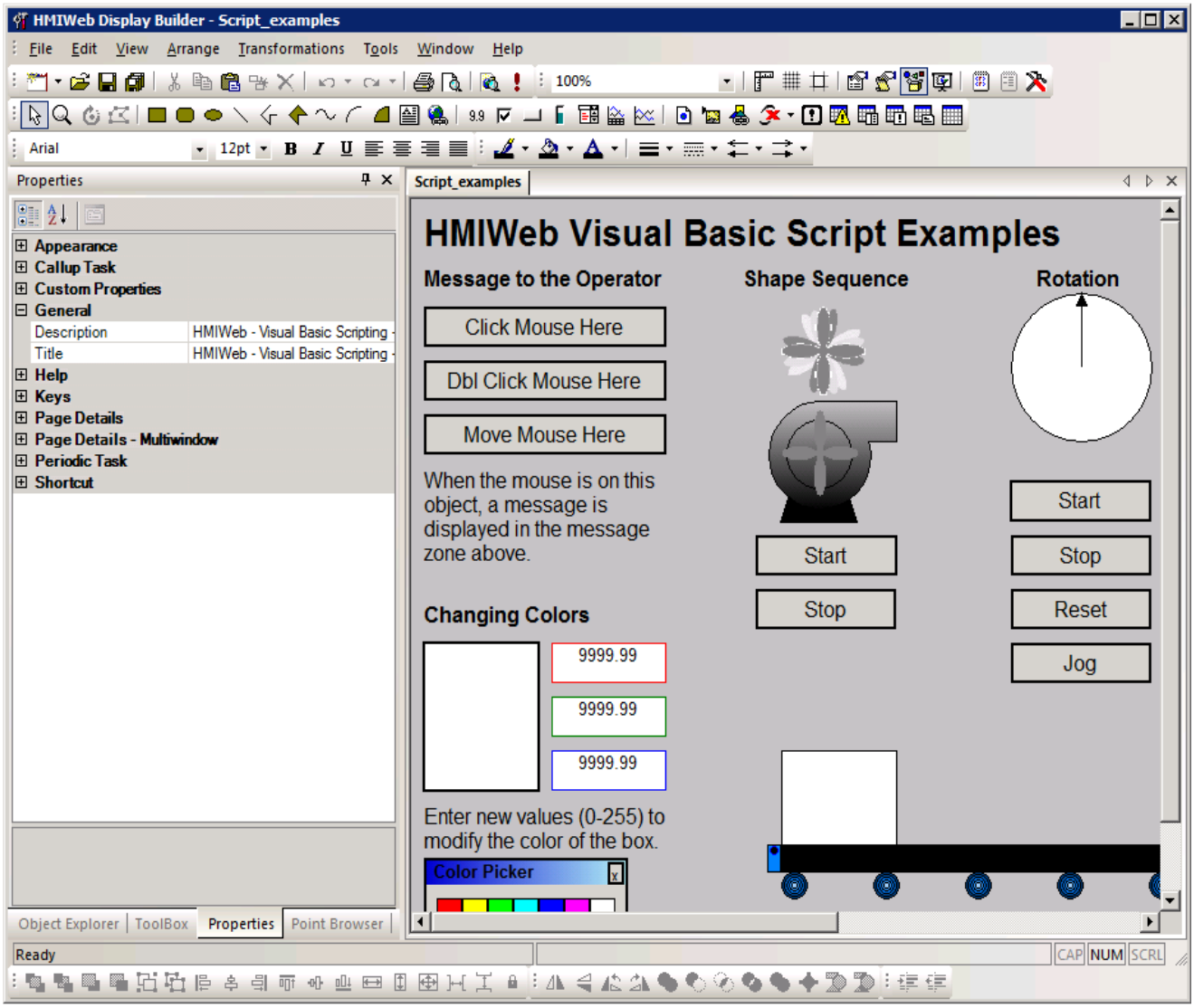
8.4 Single switches and alarms (binary)

Status	Value
Normal (Inhibit Not Set)	Not Visible
Alarm not acknowledged	Normal priority Character (High) Yellow flashing with Yellow flashing Frame High priority Character (Urgent) Red flashing with Red flashing Frame
Alarm acknowledged	Normal priority Character (High) Yellow static with Yellow static Frame High priority Character (Urgent) Red static with Red static Frame
Back to normal, not acknowledged	Will be shown flashing
Inhibit Set Maintenance Inhibit Start-Up Inhibit	Visible MIH SIH Yellow characters on the top right corner of Frame

9 Layout of HMIWeb Display Builder

The following figure shows a typical layout, in which:

- Displays you are editing appear on the right. There is a tab for each display.
- The toolbars appear at the top and button of the window.
- The tabs for Object Explorer, Toolbox, Properties, and Point Browser are displayed, with the focus on the Properties tab.

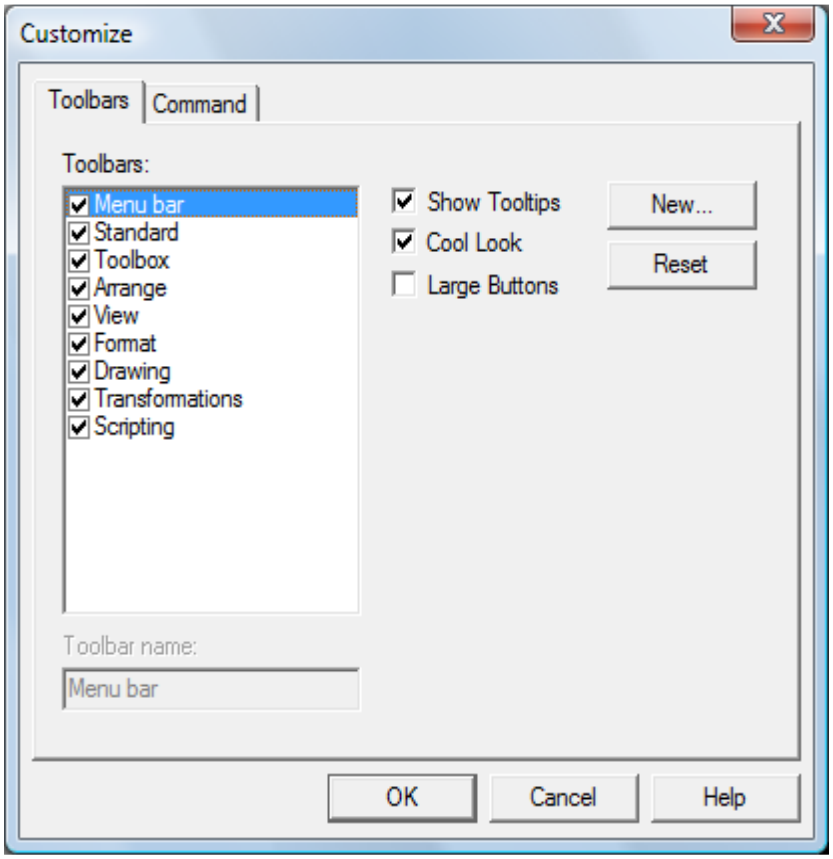


Typical layout

9.1 Toolbars:

Displaying or hiding toolbars

1.Choose Tools > Customize and click the Toolbars tab to see the list of toolbars.



A check mark opposite a toolbar indicates that it is already visible.

2. Select the toolbar you want to display (or hide).

3. If necessary, drag the toolbar to a convenient location. (If you drag a toolbar to the top or button of the window, it will 'dock' to the window's border).

Standard toolbar:

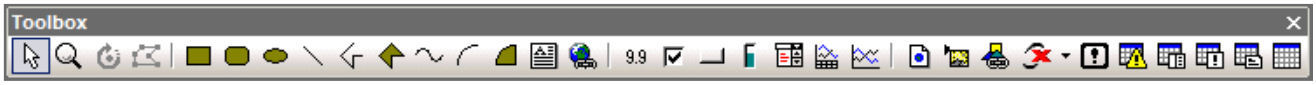
The Standard toolbar includes basic Windows-related buttons, such as Open and Save.

Button	Description
	**New Display**. Creates a new display. Click the arrow to the right of the button to display the list of display types.
	**Open**. Opens an existing display.
	**Save**. Saves the current display.
	**Save All**. Saves all open displays.
	**Cut**. Removes the selected object(s) from the display (and copies them to the clipboard).
	**Copy**. Copies the selected object(s) to the clipboard.
	**Paste**. Pastes the clipboard's contents into the display.
	**Duplicate**. Makes duplicates of the selected object(s).
	**Delete**. Deletes the selected object(s).
	**Undo**. Undoes changes you have made to the display.
	**Redo**. Redoes changes you have undone.
	**Print**. Prints the display.
	**Print Preview**. Shows the display as it will print. You can then either print the display by clicking **Print**, or return to editing mode by clicking **Close**.

Button	Description
	**Preview**. Shows the display as it will appear in Station. Preview also allows you to test scripts, providing they do not require interaction with the server. For example, clicking an object will run the object's onclick script. Click **Close** to return to the normal editing mode.
	View in Station. Shows the display in Station with live data supplied by a predefined server. Any scripts in the display will execute in Station.

9.2 Toolbox toolbar:

The Toolbox toolbar contains buttons for creating objects on a custom display.



Button	Description
	**Pointer**. The main tool you use to select, move and resize objects.
	**Zoomer**. Zooms in and out of the display. To zoom in on a part of the display, first click **Zoomer** and then click the area of interest. You can zoom in further by clicking repeatedly. To zoom out, hold down SHIFT and click.
	**Rotator**. Rotates the selected object(s).
	**Node Editor**. Changes the shape of an object by moving or adding individual *nodes* (apexes or reference points).
	**Rectangle**. Creates a rectangle or square.
	**Rounded Rectangle**. Creates a rectangle or square with rounded corners.
	**Oval**. Creates an oval or circle.
	**Line**. Creates a straight line.
	**Polyline**. Creates a multi-segment line (which is similar to a polygon, but with one open side). To create a polyline, click to mark each node, except for the last. You mark the last node by double-clicking.
	**Polygon**. Creates a polygon. To create a polygon, you click to mark each node, except for the last. You mark the last node by double-clicking, which then closes the polygon.

Button	Description
	Bezier Curve. Creates a smooth-curved line.
	Arc. Creates an arc (a quarter of an oval or circle).
	Wedge. Creates a segment (quarter) of an oval or a circle.
	Textbox. Creates block of text.
	Hyperlink. Creates a hyperlink. When a user clicks the hyperlink, Station calls up the specified URL (such as a Web page) or display.
99	**Alphanumeric**. Used to display database values in many different formats.
	Check box. Creates a check box so that users can select or deselect an option in an interactive display.
	Pushbutton. Creates a button that users can click to perform a specified command.
	Indicator. Creates a gauge-like object that shows a relative value (similar in principal to an automobile's fuel gauge).
	Combo box. Creates a combo box so that users can select from a list of options in an interactive display.
	Trend. Creates a trend that displays process values over time in a graphical manner.
	Basic trend. Creates a simple trend, which has fewer operator controls than a trend.
	ActiveX Document. Inserts a link to an ActiveX document, such as a Word document, into the display.
	Picture. Inserts a picture (graphic).
	Shapelink. Inserts a shape sequence or dynamic shape.
	ActiveX Control. Inserts a link to an ActiveX Control.
	Alarm State. Inserts an alarm state icon (as used in the Alarm Summary) which shows an alarm state.
	Alarm Table. Creates a specialized table that lists alarms.

Button	Description
	**Event Table**. Creates a specialized table that lists events.
	**Alert Table**. Creates a specialized table that lists alerts.
	**Message Table**. Creates a specialized table that lists messages.
	**Activity Table**. Creates a specialized table that lists activities.
	**Table**. Inserts a table into a display.

9.3 Arrange toolbar

The Arrange toolbar contains buttons for aligning and grouping objects.

Button	Description
   	These buttons change the order in which objects are *stacked* on top of each other. They are: • Bring to Front • Send to Back • Bring Forward • Send Backward
 	These buttons group/ungroup objects. They are: • Group • Ungroup

Button	Description
	These buttons align objects. They are: • Align Left • Align Center • Align Right • Align Top • Align Middle • Align Bottom
	These buttons change the size of objects so that they are the same size as a reference object. They are: • Make Same Width • Make Same Height • Make Same Width and Height
	These buttons move objects so that they are evenly spaced. They are: • Even Horizontal Spacing • Even Vertical Spacing
	Locks/unlocks an object. Locking an object protects it from being accidently moved or resized.

9.4 Transformations toolbar

The Transformations toolbar contains buttons for transforming objects.

Button	Description
	**Flip Horizontal**, **Flip Vertical**. These buttons perform mirror-image transformations on objects.
	**Rotate Left**, **Rotate Right**. These buttons rotate objects +/-90 degrees.

Button	Description
	**Union**, **Difference**, **Intersection**, **Exclusive OR**, **Join**. These buttons create a new object from two or more overlapping objects.
	**Convert to Path**. Converts objects, such as rectangles and circles, to *paths* (lines and curves). Having converted an object to a path, you can edit its nodes.
	**Combine**, **Uncombine**. These buttons combine/uncombine static objects, such as lines and rectangles, which helps improve display performance.

9.5 View toolbar

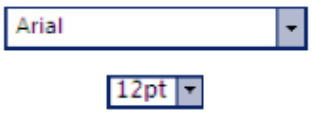
The View toolbar includes a range of editing buttons.

Button	Description
	**Zoom**. Sets the magnification for the display. Use the **Zoomer**—  —to zoom in on a particular part of the display.
	**Rulers**. Shows/hides the rulers. The rulers make it easier to arrange objects in a neat and consistent manner.
	**Grid**. Shows/hides the grid. The grid makes it easier to arrange objects in a neat and consistent manner.
	**Snap to Grid**. Turns the 'snap to grid' function on and off. When snap to grid is on, objects automatically align to the grid when you create, move, or resize them.
	**Properties Window**. Opens/closes the Properties Window, which you use to edit the properties of the selected object(s).
	**Script Window**. Opens/closes the Script Editor, which you use to write *scripts* (a script is a mini-program that performs a specific task).
	**Object Explorer**. Shows/hides the Object Explorer, which lists every object in the display.

Button	Description
	**Point Browser**. Shows/hides the Point Browser, which lists points on a selected Experion server.
	**Shape Gallery**. Shows/hides the Shape Gallery, which makes it easy to preview and add shapes to your displays.
	**HTML Source**. Opens the HTML source for the display in a text editor. We strongly recommend that you do not change the source using a text editor because you may corrupt the display.
	**Style Sheet**. If a style sheet is attached to the display, opens it in a text editor.
	**Toolbox**. Shows the Toolbox tab, from where you can select objects to draw on the page.

9.6 Format toolbar

The Format toolbar contains buttons for controlling the appearance of text.

Button	Description
	**Font**. Sets the font of text. Note that you should only use fonts that are loaded on every Station computer. **Font Size**. Sets the size of text. (If you want to specify a non-standard size, click the box and type the size—for example: `56.5pt`—and then press ENTER.)
B *I* U	**Bold**, **Italic**, and **Underline**. Set the text's appearance.
	**Align Left**, **Align Center**, **Align Right**, and **Justify**. Set the text alignment within a paragraph.

9.7 Drawing toolbar

The Drawing toolbar contains buttons for controlling colors and line properties.

Button	Description
	**Line Color**. Sets the line color of objects. Click the button to apply the default color, or click the arrow to the right of the button to select another color.
	**Fill Color**. Sets the fill color of objects. Click the button to apply the default color, or click the arrow to the right of the button to select another color.
	**Text Color**. Sets the fill color of text. Click the button to apply the default color, or click the arrow to the right of the button to select another color.
	**Line Width**. Sets the line thickness.
	**Line Style**. Sets the line style, such as solid, dotted or dashed.
 	**Start Arrow Style** and **End Arrow Style**. Sets the line arrow style.

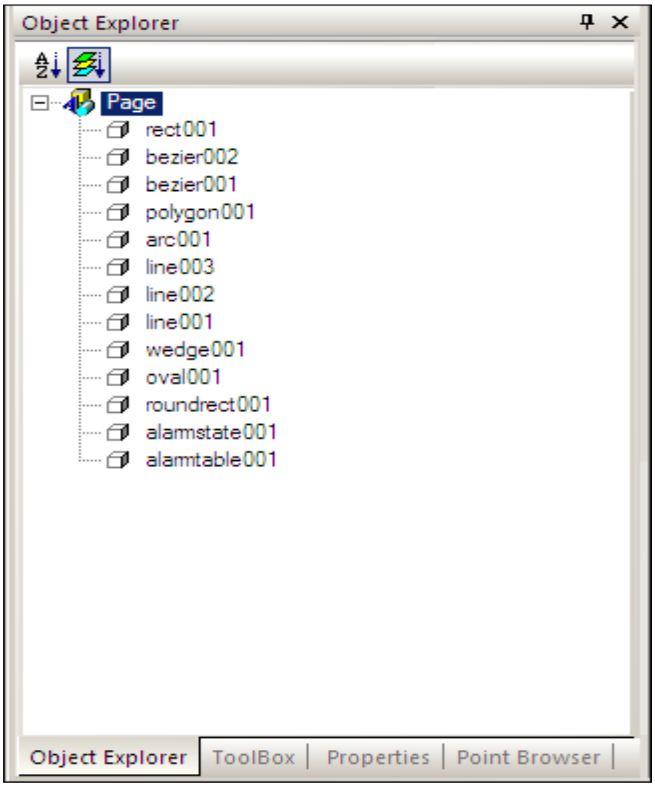
9.8 Scripting toolbar

The Scripting toolbar is used in conjunction with the Script Editor to write scripts.

Button	Description
 	**Indent**, **Outdent**. Increase/decrease the indent of the selected line.

Object Explorer

The Object Explorer is a powerful tool for managing and editing objects. It shows every object in the current display and, in the case of group objects, shows the object hierarchy.



The following table describes the tasks you can perform in the Object Explorer.

To	Do this
Select one object	Click it.
Select several objects	Hold down CTRL and click each object.
Select a range of objects from the list	Hold down SHIFT and click the first and last objects you want to select.
Edit the properties of one or more objects	Select the objects as described above and edit the properties in the Properties tab.
Sort objects in alphabetical order	Click on the Object Explorer.

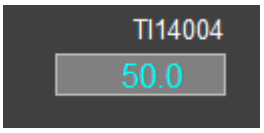
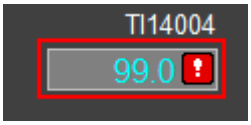
To	Do this
Sort objects in their *stacking* order (the order in which objects are stacked on top of each other)	Click on the Object Explorer. By default, the stacking order is the same as the order in which you created the objects—that is, the first object you created is at the bottom of the stack and the last object is on the top. (You can manually change the stacking order.)
Show/hide objects within a group	Click the '+' or '-' to the left of the group icon.
Copy an object to the same or another display	Drag the object from the Object Explorer and drop it on the other display. (Both displays need to be visible to do this.)

10 Objects Library

The following table shows how the different types of process equipment will be represented generally.

10.1 Numerical data

Every numerical field on any OPERATOR display has the following characteristics:

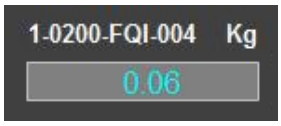
Condition	Animation Color	Indication
Normal	-	
Alarm with LO/HI/URGENT Priority(	Indicate type of alarm: H/HH/L/LL Unacknowledged: Alarm/Rectangle Cyan/Yellow/RED Blinking Acknowledged: Alarm/Rectangle Cyan/Yellow/RED	
Bad PV	-	

Note: in this project High and low limit alarm with High priority (By yellow indication) and High High, low low limit alarm with Urgent priority (By red indication) and Bad PV alarm (By magenta indication) have set.

10.2 Totalizer

Periodically adds an input value to an accumulator value, sets status flags to indicate when accumulator value is near user-specified target values ("near", "nearer", "actual target value").

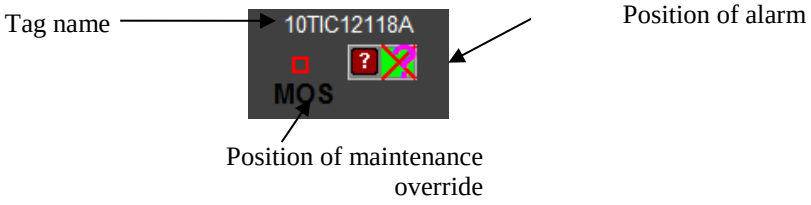
Typically used to accumulate total flows.



10.3 Analog Bar

Condition	Animation Color	Indication
Normal	Green	
Alarm	Unacknowledged: Red Border Blinking Acknowledged: Red	
Bad PV	Unacknowledged: Yellow Border Blinking Acknowledged: Yellow	

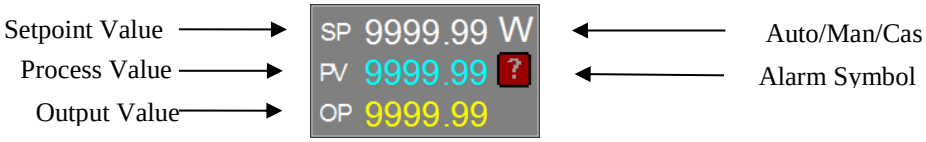
10.4 Digital Data And alarm indicators

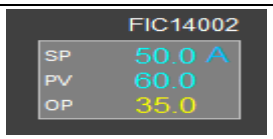
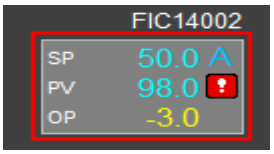
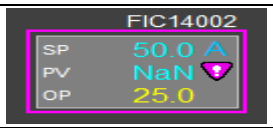


Condition	Animation Color	Shape(Digital Alarm Status)	Shape(Digital Status)
State0	White		
State1	Red/Yellow/Cyan		
Alarm with LO/HI/URGENT Priority	Unacknowledged: Alarm/Rectangle Cyan/Yellow/RED Blinking Acknowledged: Alarm/Rectangle Cyan/Yellow/RED		-

10.5 PID Block

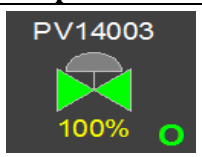
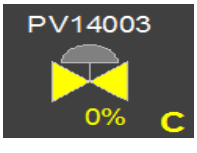
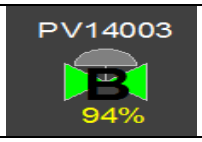
The PID Controller Objects looks like these graphically:



Condition	Animation Color	Indication
Normal	-	
Alarm with LO/HI/URGENT Priority	Indicate type of alarm: H/HH/L/LL/ DVH DVL Unacknowledged: Alarm/Rectangle Magenta/Yellow/RED Blinking Acknowledged: Alarm/Rectangle Magenta/Yellow/RED	
Bad PV	-	

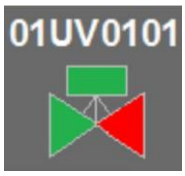
10.6 Control Valve

Generic Control Valves will be animated as follows:

Condition	Animation Color	Shape
Open (MV > 5%)	Body: Green	
Close (MV <=5%)	Body : Yellow	
Bad PV	Body: Yellow or Green (**B**) index will be appear.	

10.7 On/Off Valve

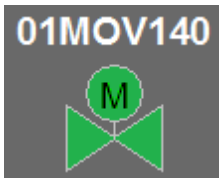
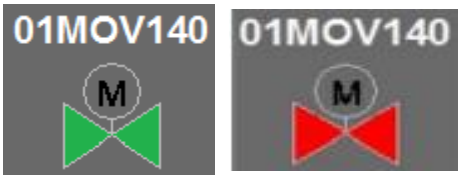
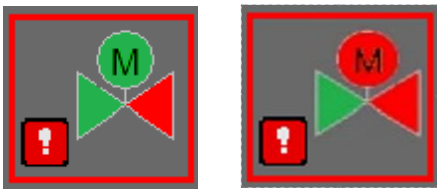
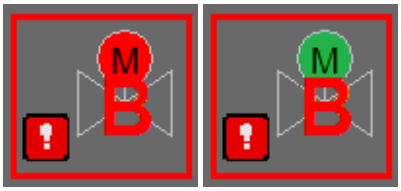
On/Off Valves with Monitoring Purpose will be animated as follows:

Condition	Animation Color	FC Shape	FO Shape
Open Command with Open Feedback	Actuator: Green Body: Green		
Close Command with Close Feedback	Actuator: Red Body: Red		
In Between	Actuator: Red or Green Body: Red-Green Close to Open *Open to Close*	 	 
Bad PV	Body: Red with Bad PV Alarm. Unacknowledged: Alarm/Rectangle Red Blinking. Acknowledged: Alarm/Rectangle Red.		

Note: Discrepancy alarm, uncommand alarm and Bad PV alarm set as high priority and indicated by yellow color in this project.

10.8 Motorized Valves

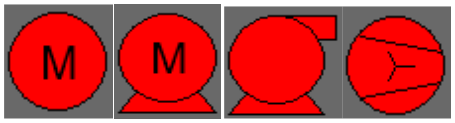
Motorized Valves be animated as follows:

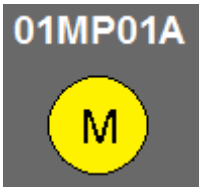
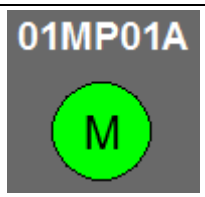
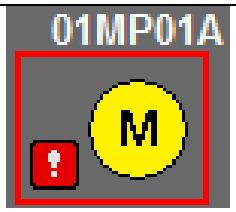
Condition	Animation Color	Shape
Open	Actuator: Green Body: Green	
Close	Actuator: Red Body: Red	
In Bet	Actuator: Red or Green Body: Red -Green	
No Command	Actuator: Red Body: Red or Green	
Fail	Actuator: Red or Green Body: Red or Green or Red-Green with Alarm Unacknowledged: Alarm/Rectangle Red Blinking. Acknowledged: Alarm/Rectangle Red.	
Bad PV	Actuator: Red or Green Body: Red with Bad PV Alarm Unacknowledged: Alarm/Rectangle Red Blinking. Acknowledged: Alarm/Rectangle Red.	

Note: Discrepancy alarm, uncommand alarm and Bad PV alarm set as high priority and indicated by yellow color in this project.

10.9 Pumps / Motors / Fans

Pumps, Motors and Fans will be animated as follows:



Condition	Animation Color	Shape
Stop	Yellow	
Run	Green	
Command Failure	Start Command Failure: Motor Body: Yellow Unacknowledged: Alarm/Rectangle Red Blinking. Acknowledged: Alarm/Rectangle Red. Stop Command Failure: Motor Body: Green Unacknowledged: Alarm/Rectangle Red Blinking. Acknowledged: Alarm/Rectangle Red.	 
Fault / Motor Trip	Motor Body: Red Unacknowledged: Alarm/Rectangle Red Blinking. Acknowledged: Alarm/Rectangle Red.	

Note: Discrepancy alarm, uncommand alarm and Bad PV alarm set as high priority and indicated by yellow color in this project.

10.10 ESD Trip indication

If devices including Pump /Motor/ESDV/EBDV, ESD cause activated, diamond symbol being in red color and go back to green color when ESD cause eliminated.

with click on the diamond symbol related to each device are linked to the respected shutdown block diagram page.

Reset for smoke/heat detector :

This reset used for normalizing of detectors after activation.

Reset for ESD Trip :

This reset used for normalizing of ESD after elimination of related cause.

Note: The “Reset” will be shown as a pop up face plate.

10.11 Hand Switch

With Clicking on, dedicated Faceplate containing related Functions will appear:

10.12 Arrows and Box Arrows

Box arrows are indicated only for lines with touch incoming & outgoing targets. Otherwise Ordinary arrows are indicated in case of directions. The color for Arrows can be considered the Same as connecting line color and extra description could be shown as Tool Tip.

11 Page Navigation button

11.1 Page Back/Forward Navigation

Will be located on the right upper of the graphic area for going through previous or next pages.

11.2 Reload Display

Reloads the Current Display.

11.3 Acknowledge Display

Acknowledges all Alarms related to objects in current display.

11.4 main navigation

For going to the main menu.

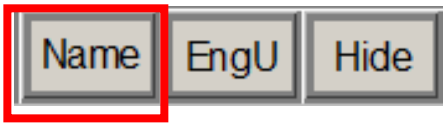
11.5 Page Navigation

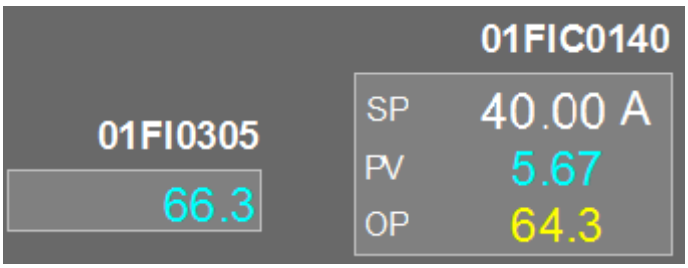
For Navigating Back to the Unit Overview, Unit Index or other definable Graphic Pages.

11.6 Title Navigation

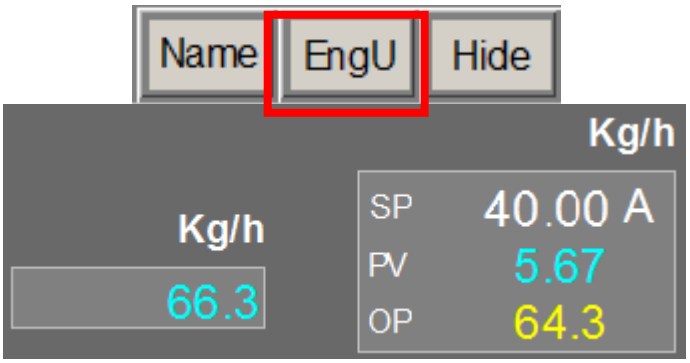
Will be located on the right button of the graphic area for switching between Loop ID and Engineer Unit or hiding both.

Loop ID Indication:

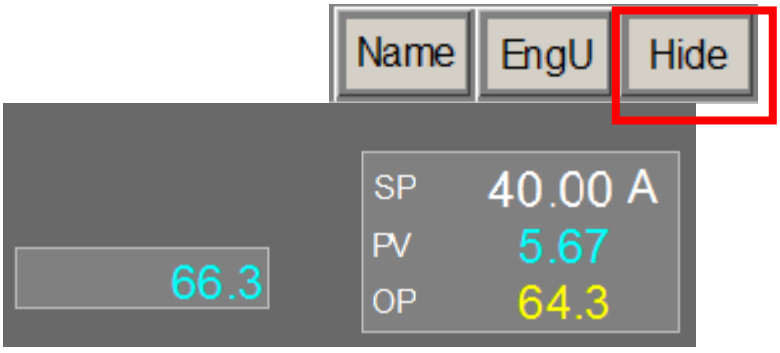




Engineering Unit Indication:

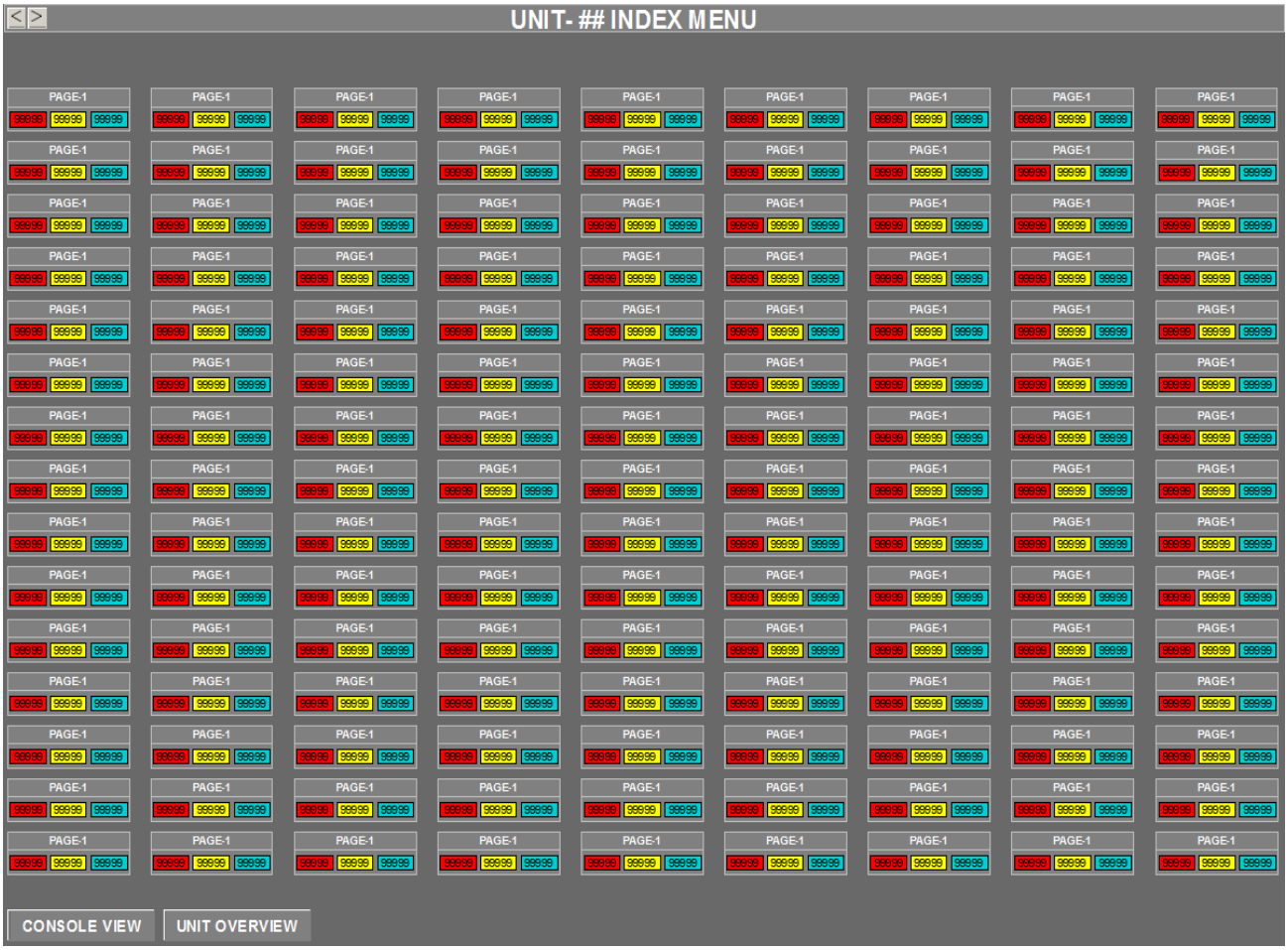


Hiding both:



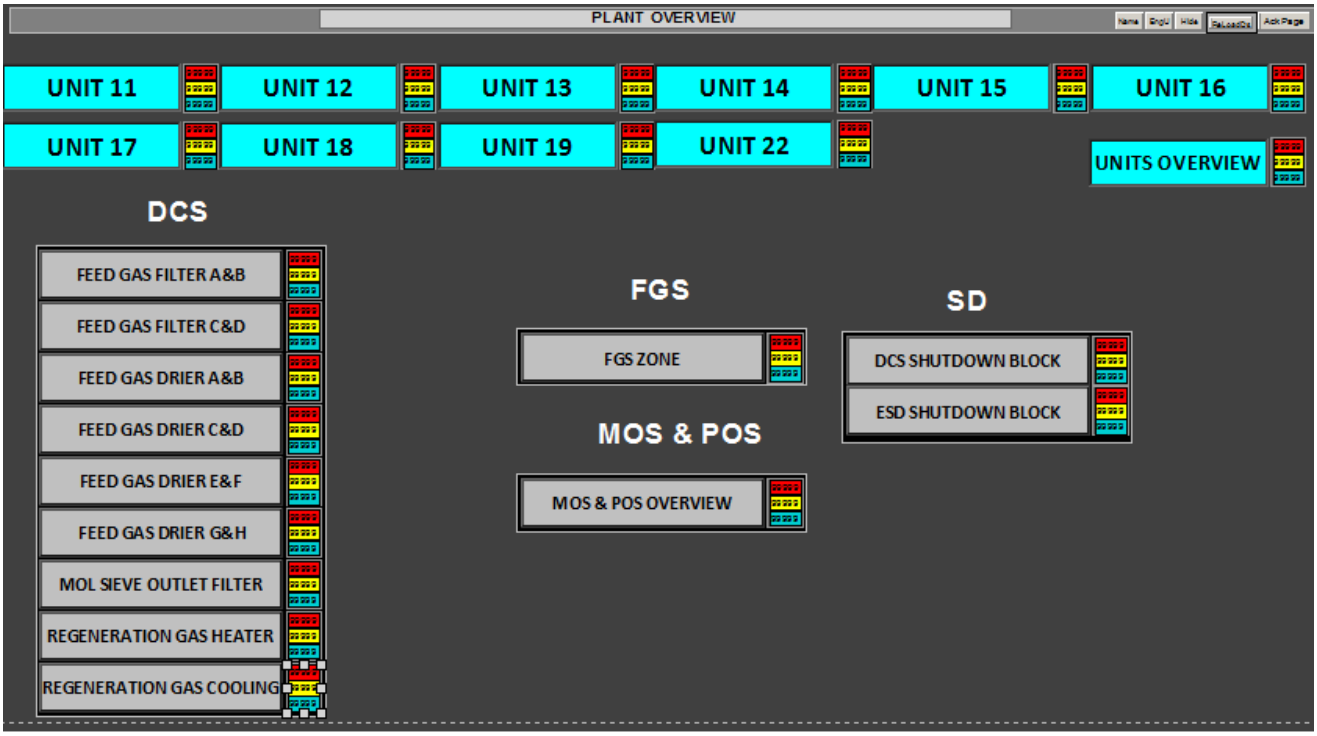
11.7 Alarm Navigation

For navigation through each Detailed Graphic Pages under each Process Unit Area, with Max Number of 135 Pages and Total No of Alarm Indication for each Page.

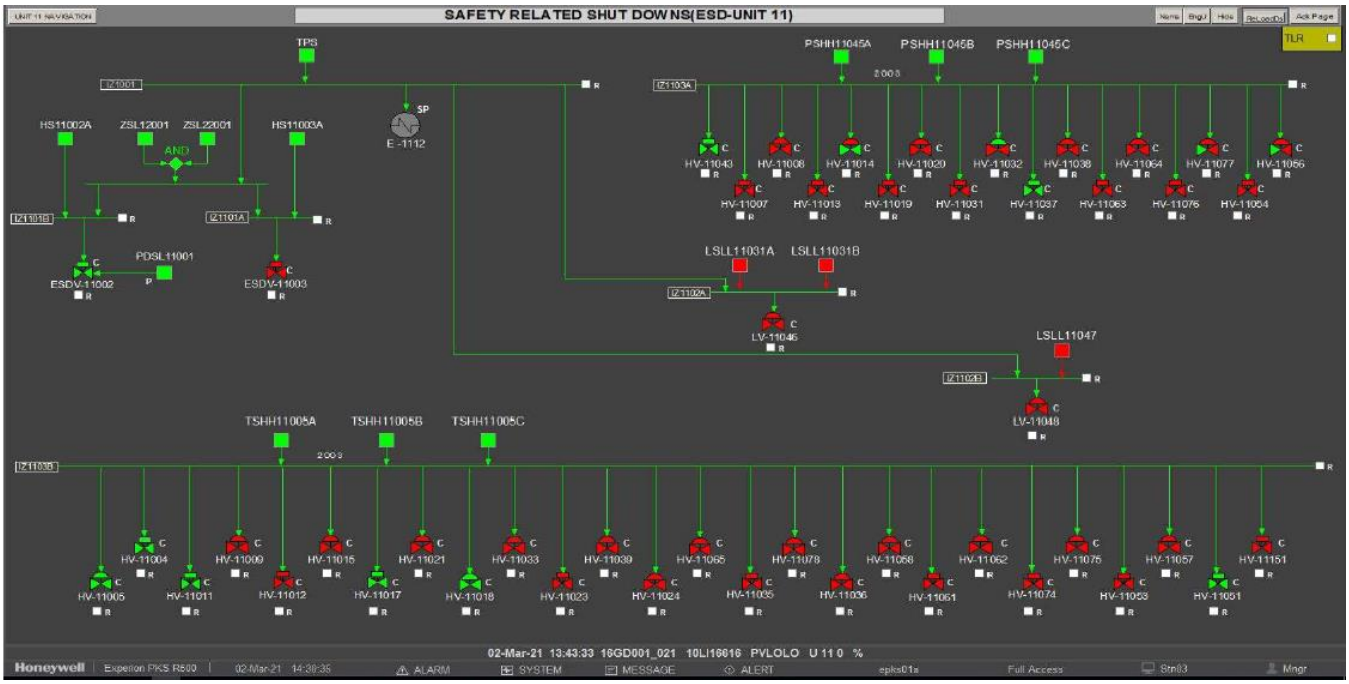


11.8 Sample Unit Overview Display

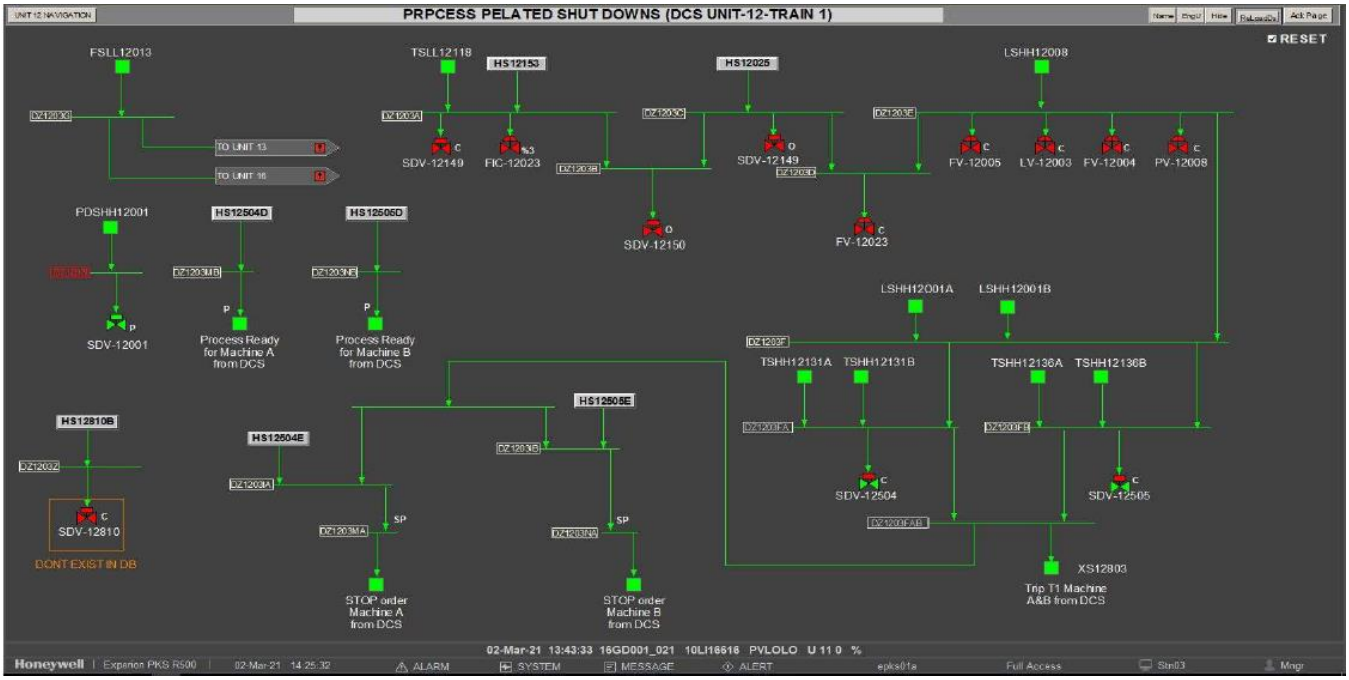
For navigation through each Unit Overview Pages.



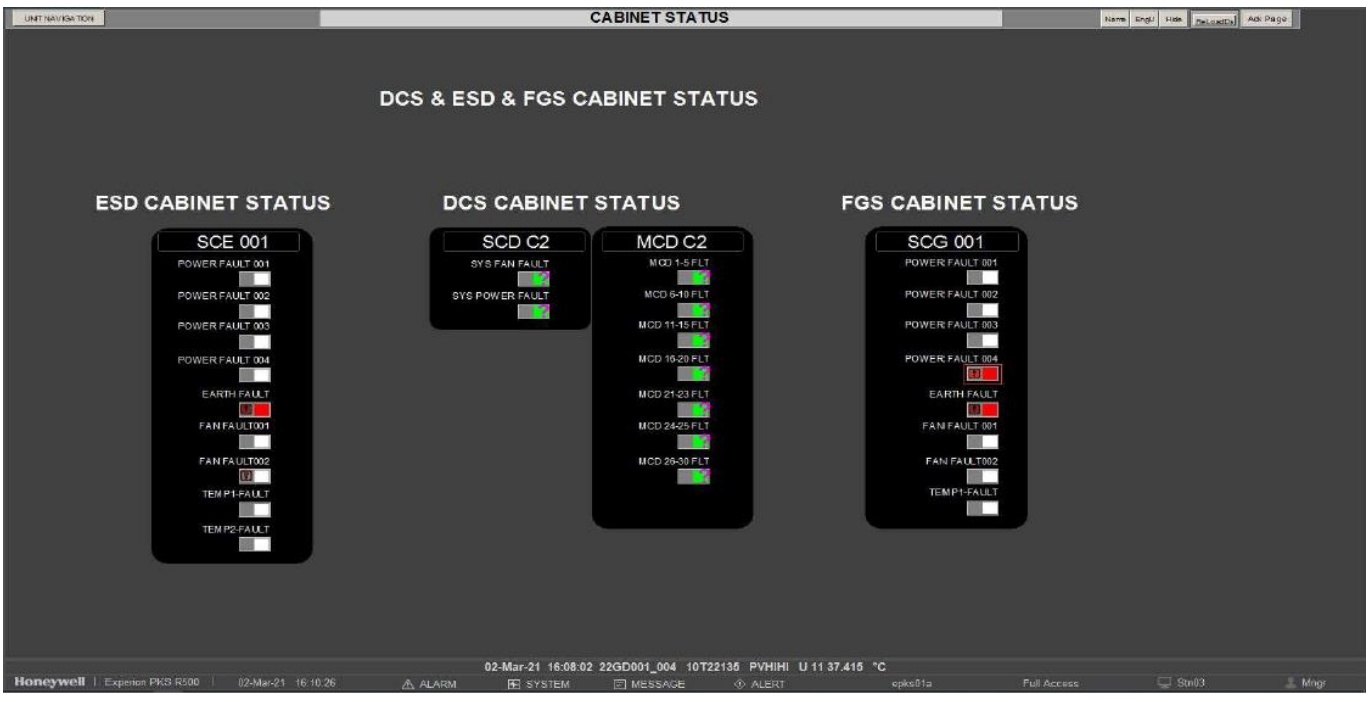
11.9 ESD Shutdown Block



11.10 DCS Shutdown Block



11.11 CABINET STATUS

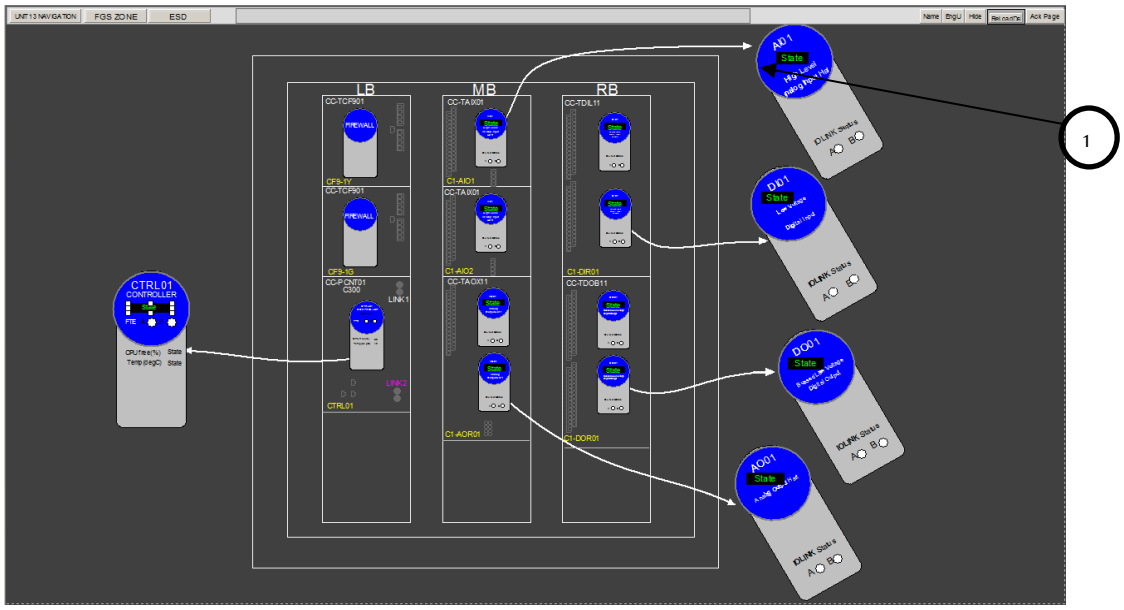


11.12 Honeywell Diagnostic

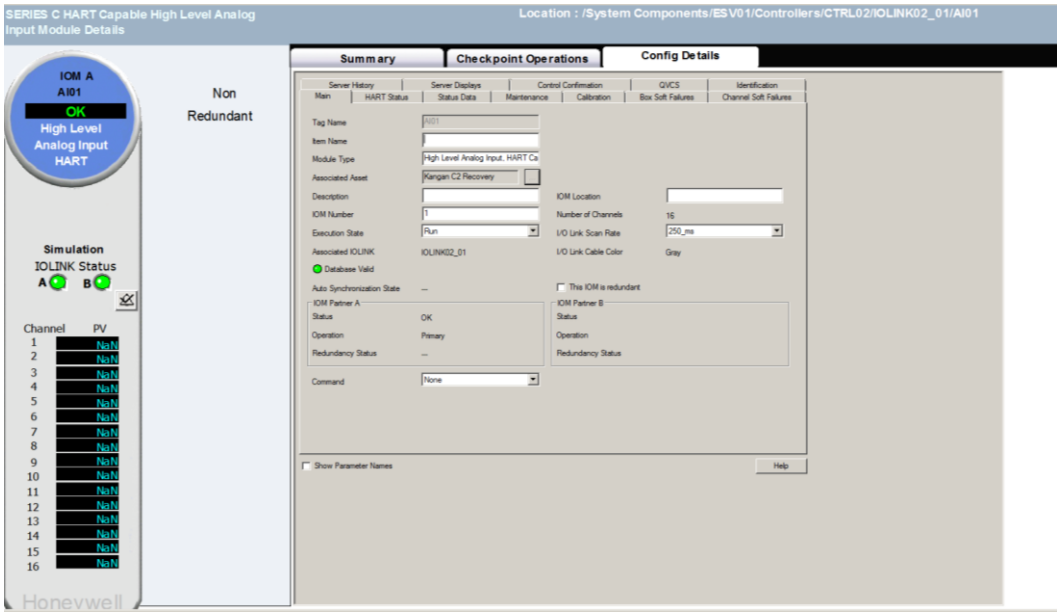
For each honewell system cabinet a HMI page will be conider that shown controllers and cards on that page . this page included all status that can be exracted from diagnostic software for example operator can see in this page , general condition of controler , tempreture and connection condition of lan cable as A&B led.

In below figure a sample of this page is shown.

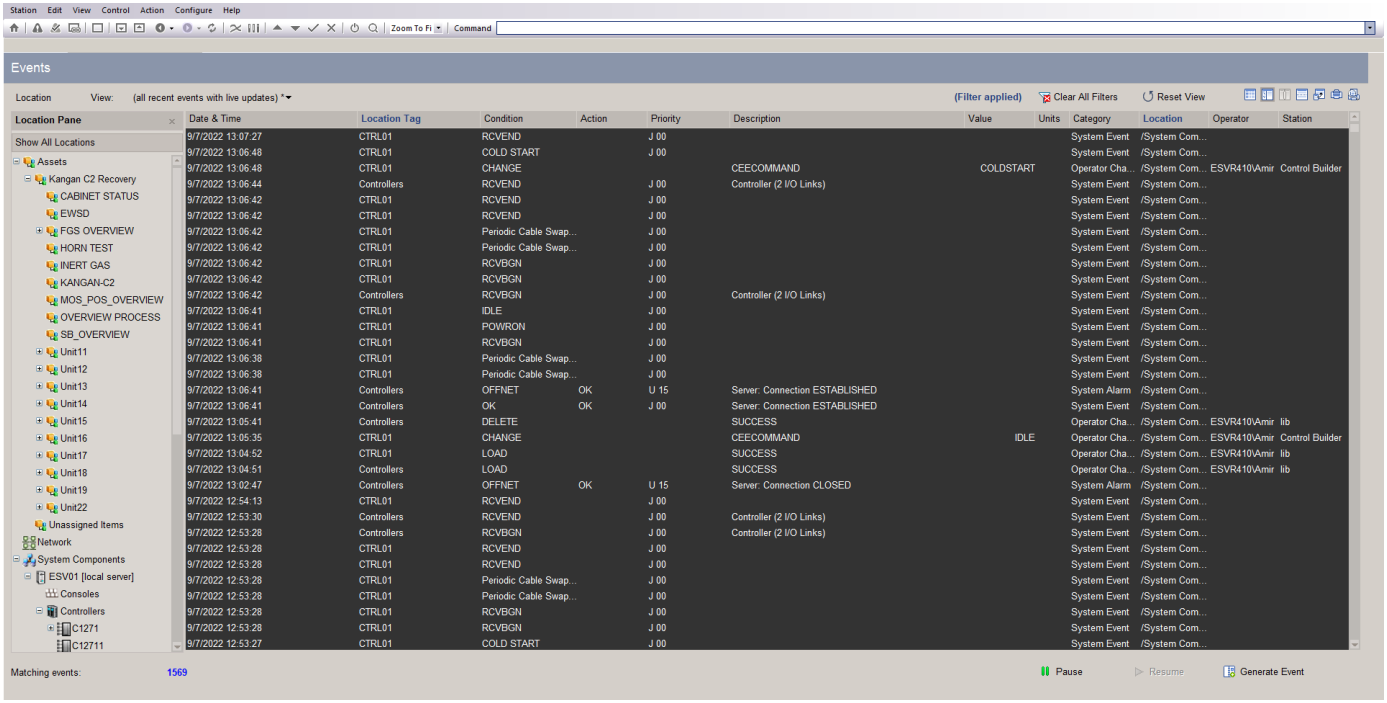
Note :its will be try to show cabinet on real shape.

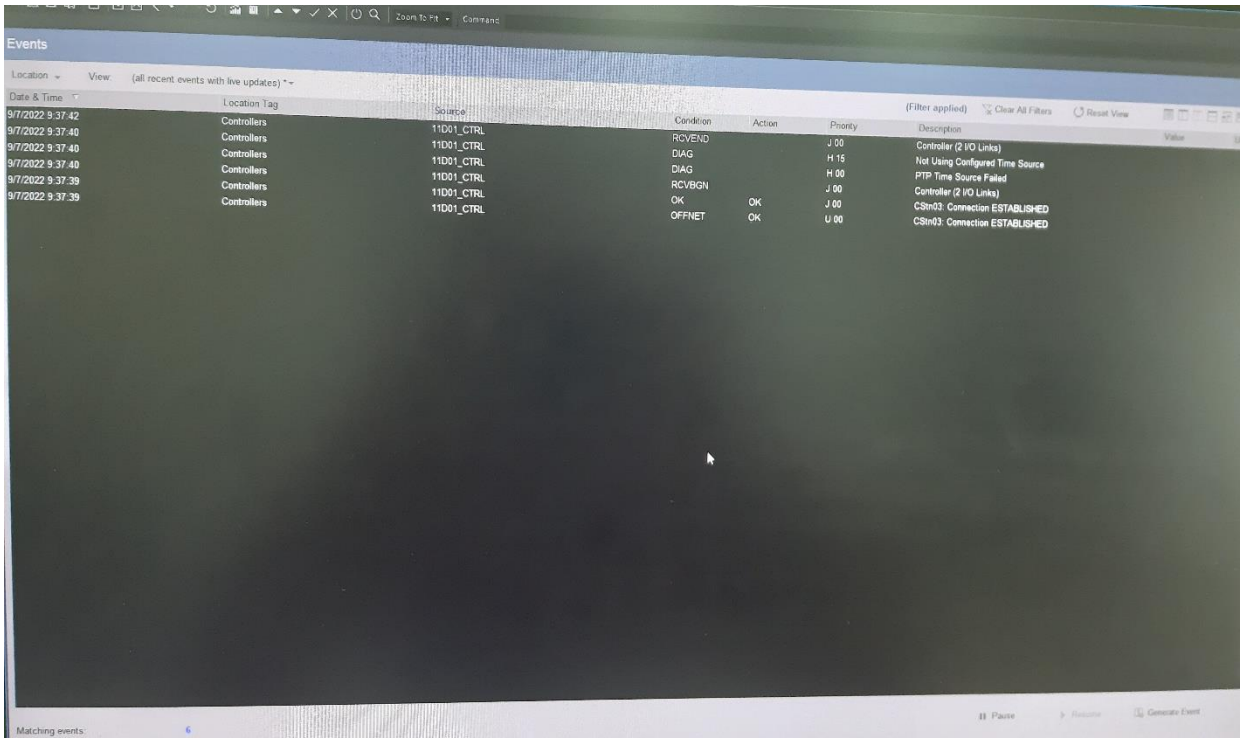


1.by click on this zone related detail page of device will be open:

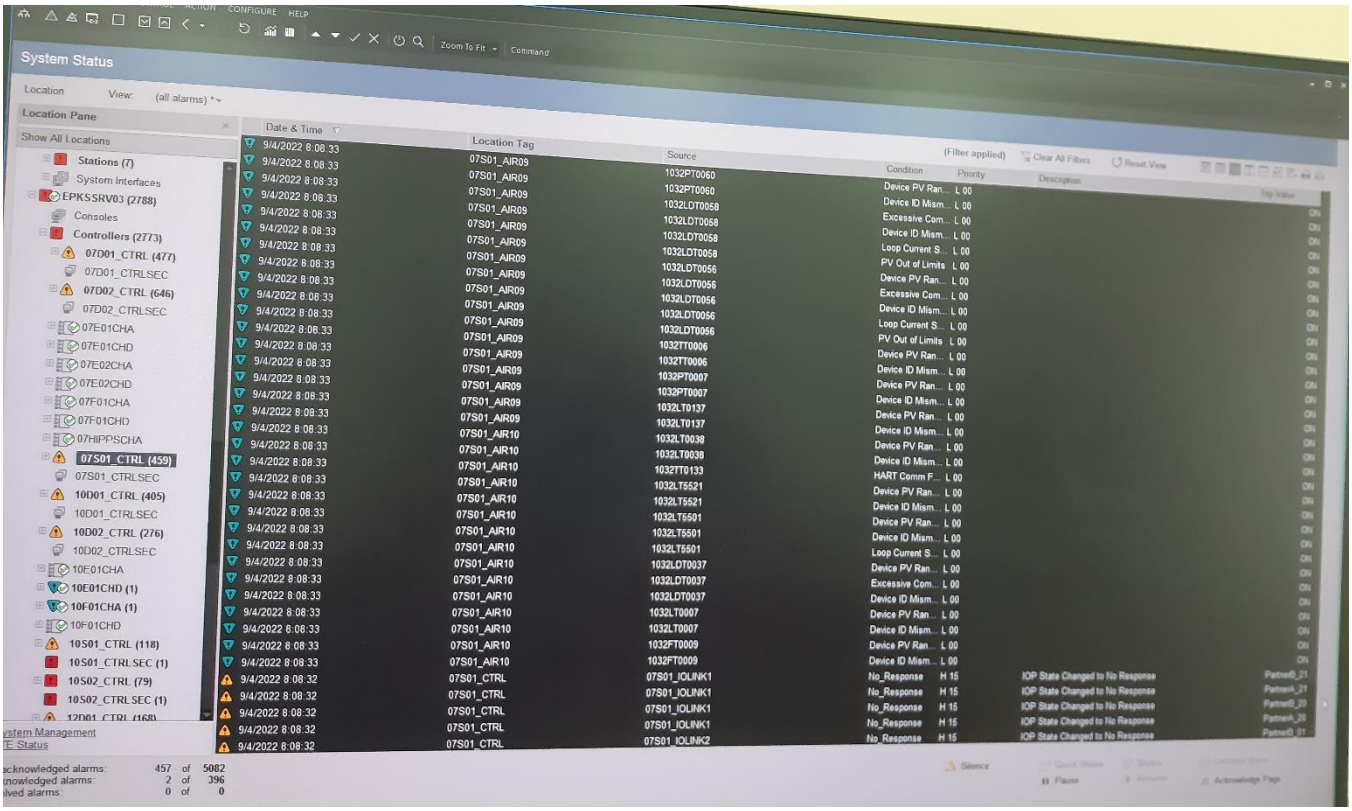


all of this events will be recorded in Events tab and events can be filter for focus on demanded object.

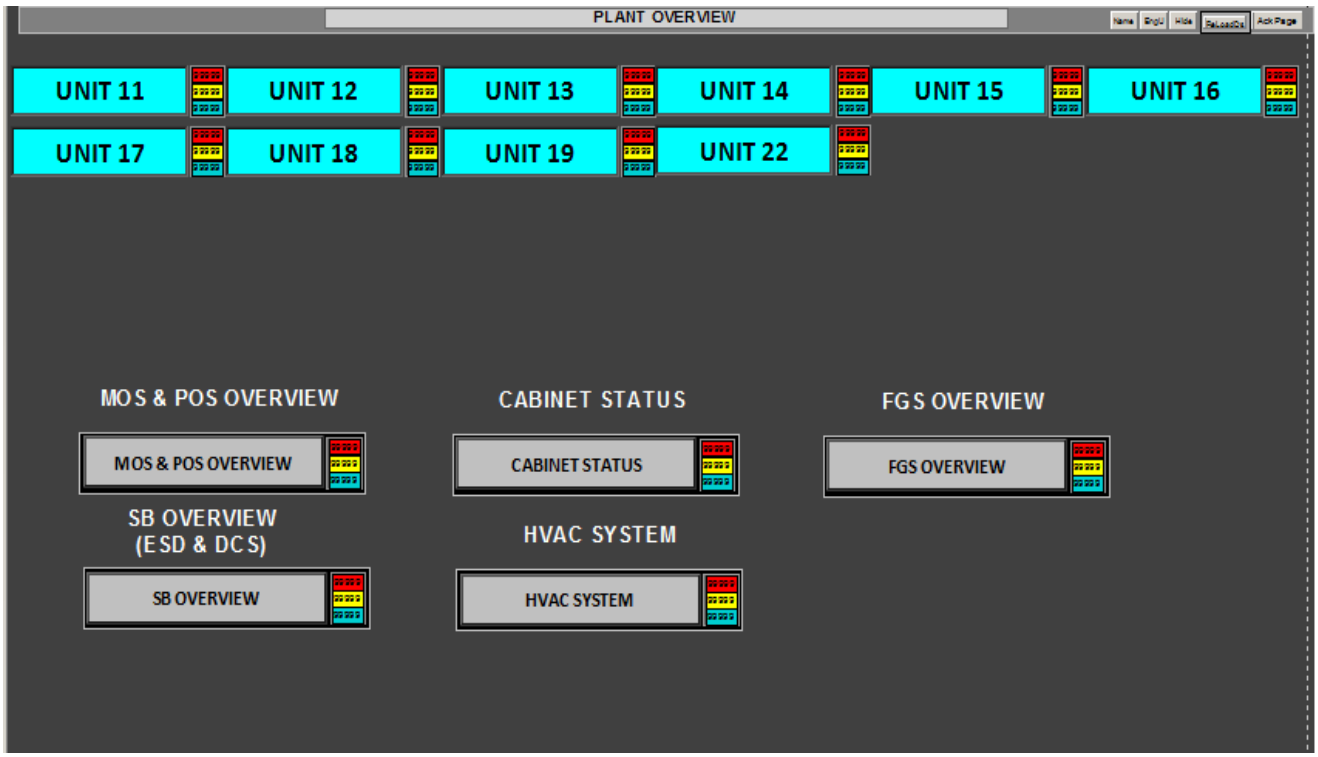

Station Edit View Control Action Configure Help
Events
Location Pane
Show All Locations
Assets
Kangan C2 Recovery
CABINET STATUS
EWSD
FGS OVERVIEW
HORN TEST
INERT GAS
KANGAN-C2
MOS_POS_OVERVIEW
OVERVIEW PROCESS
SB_OVERVIEW
Unit11
Unit12
Unit13
Unit14
Unit15
Unit16
Unit17
Unit18
Unit19
Unit22
Unassigned Items
Network
System Components
ESV01 [local server]
Consoles
Controllers
C1271
C12711
Matching events: 1569
Pause
Resume
Generate Event


Events
Matching events: 6
Pause

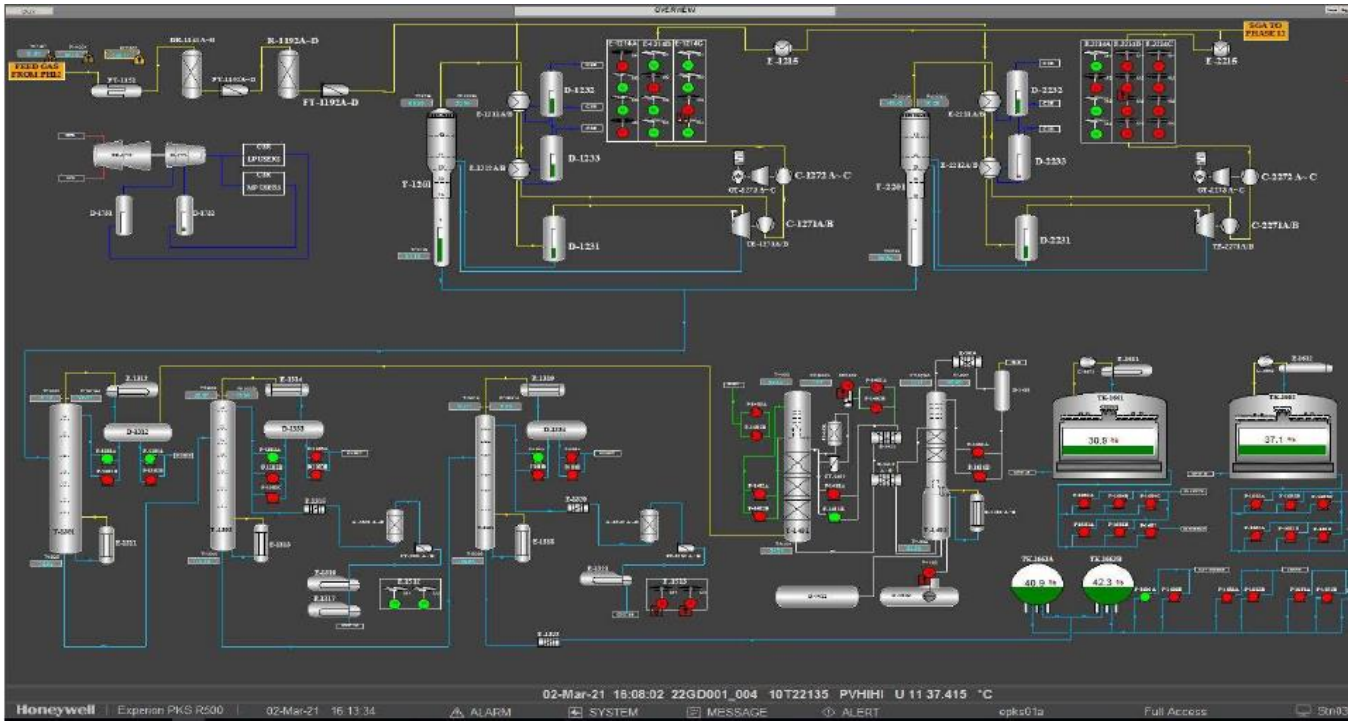
also all system condition is shown in system status.



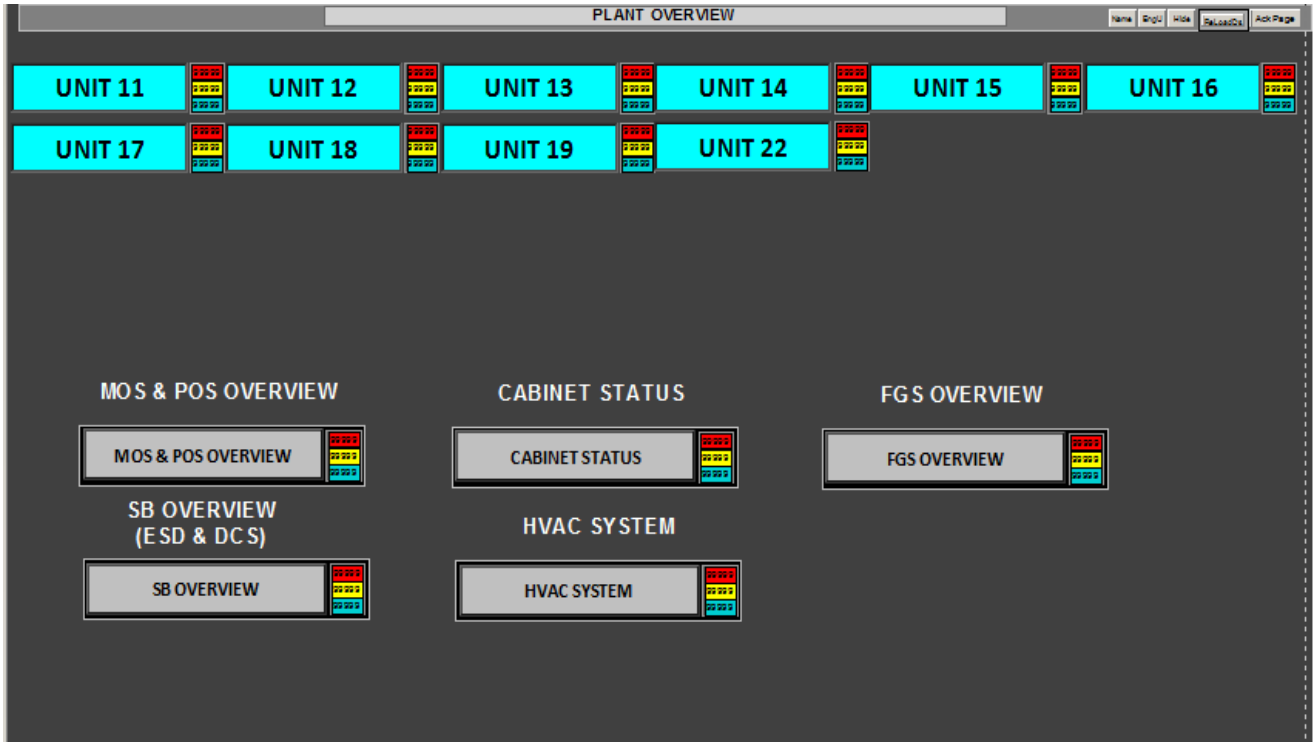
11.13 Plant Overview



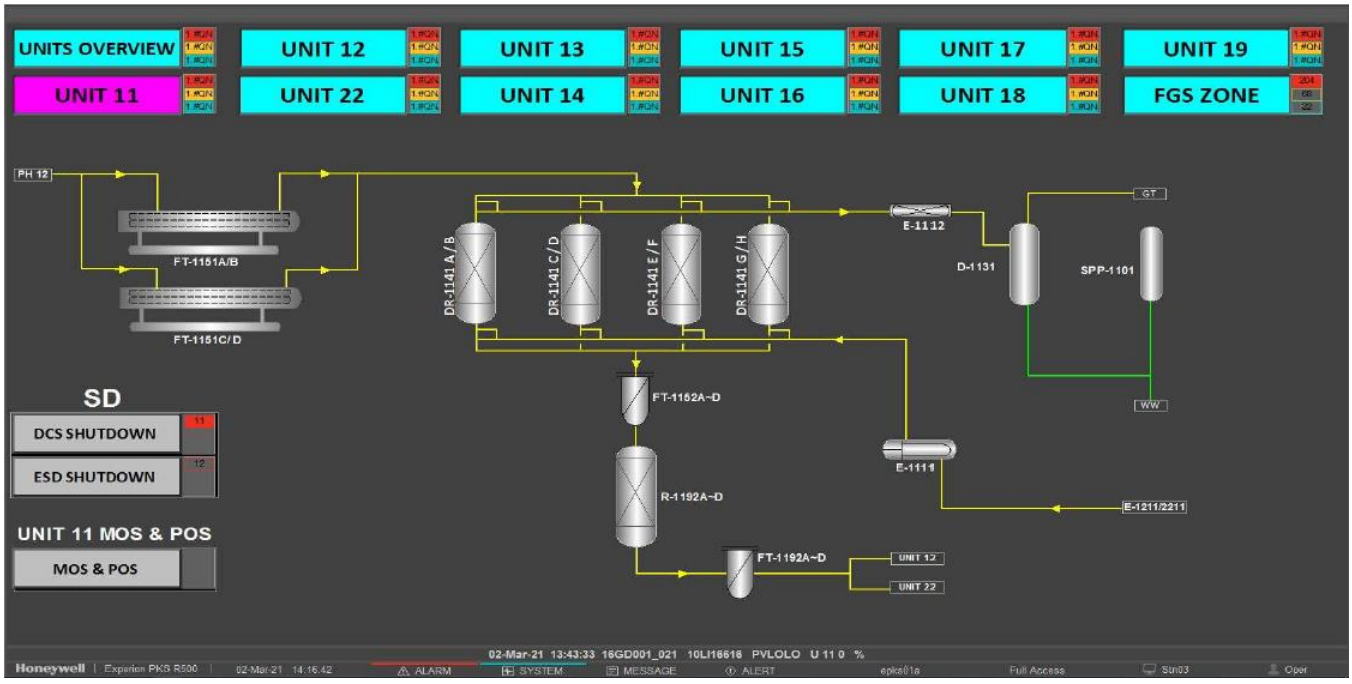
11.13.1 LARGE SCREEN

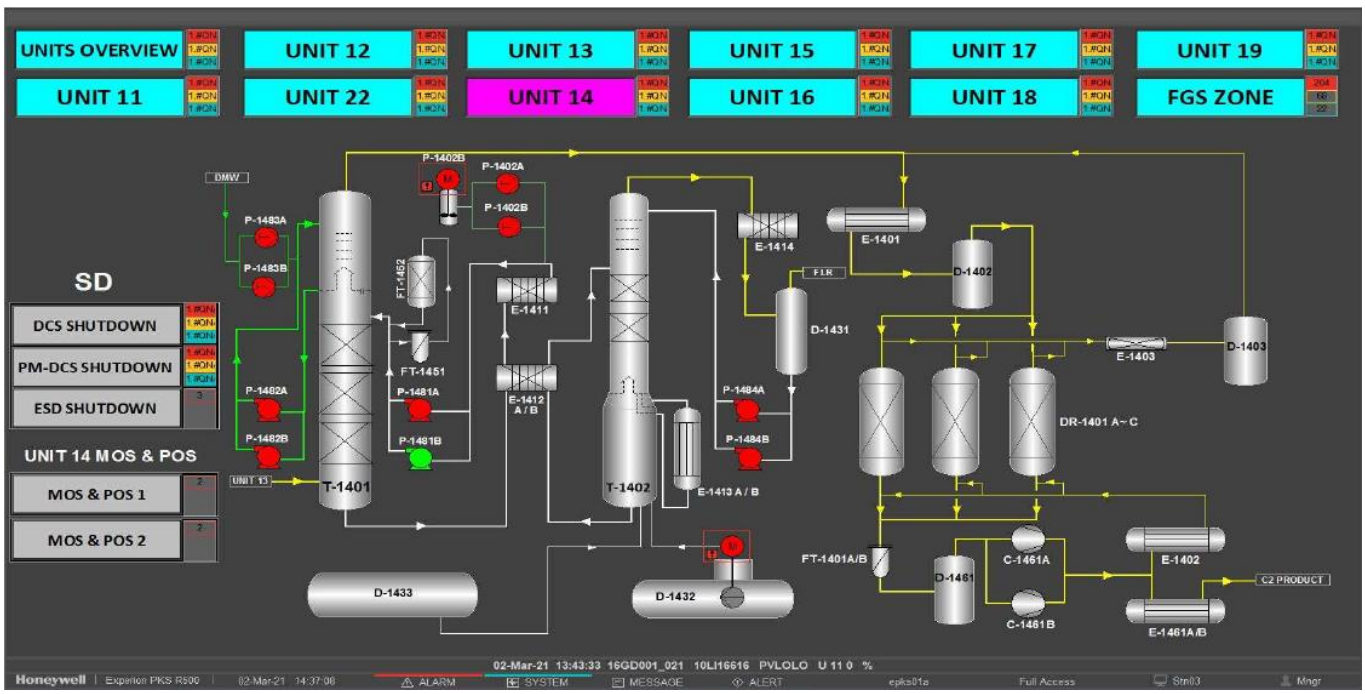


11.14 Unit Overview



11.14.1 PFD


UNITS OVERVIEW
UNIT 11
UNIT 12
UNIT 22
UNIT 13
UNIT 14
UNIT 15
UNIT 16
UNIT 17
UNIT 18
UNIT 19
FGS ZONE
SD
DCS SHUTDOWN
ESD SHUTDOWN
UNIT 11 MOS & POS
MOS & POS
FT-1151A/B
FT-1151C/D
DR-1141 A/B
DR-1141 C/D
DR-1141 E/F
DR-1141 G/H
E-1112
D-1131
SPP-1101
FT-1152A~D
R-1192A~D
E-1111
E-1211/2211
FT-1192A~D
02-Mar-21 13:43:33 16GD001_021 10LI16616 PVLOLO U 11 0 %


UNITS OVERVIEW
UNIT 11
UNIT 12
UNIT 22
UNIT 13
UNIT 14
UNIT 15
UNIT 16
UNIT 17
UNIT 18
UNIT 19
FGS ZONE
SD
DCS SHUTDOWN
PM-DCS SHUTDOWN
ESD SHUTDOWN
UNIT 14 MOS & POS
MOS & POS 1
MOS & POS 2
P-1402B
P-1402A
P-1483A
P-1483B
P-1462A
P-1482B
P-1481A
P-1481B
P-1484A
P-1484B
FT-1462
FT-1451
E-1411
E-1412 A/B
E-1414
E-1401
D-1402
D-1431
E-1403
D-1403
DR-1401 A~C
T-1401
T-1402
E-1413 A/B
D-1433
D-1432
FT-1401A/B
D-1461
C-1461A
C-1461B
E-1402
E-1461A/B
C2 PRODUCT
02-Mar-21 13:43:33 16GD001_021 10LI16616 PVLOLO U 11 0 %

11.15 MOS & POS Overview

12 Tag ID and Loop Names

Tag ID and Loop Names will be implemented as below without additional characters like Dash, Underline, Space and so forth which will appear for Object Name and Faceplate:

(FUNCTION)(XXX)(YY)

Where:

FUNCTION: Stands for related Loop Function like: FIC, FI, HS, PM and so forth.

XXX(YY): Loop or Tag Sequence No with Suffix if exists. The Loop Number procedure in this project is such that: if there is more than one instrument in one loop, the latest actuator in that loop, defines the Loop

Example:

“PDIT2122A” is a Differential Pressure Indicator Transmitter / Loop number “2122” / with “A” Suffix

“PI2121A” is a Pressure Indicator / Loop number “2121” / with “A” Suffix

13 Naming of Displays

For the naming of displays, we follow the same approach as Tag IDs and Loop Names, with the difference that hyphens (-) are used to separate different sections.

(FUNCTION)-(XXX)(YY)

P&ID Numbering

This Numbering defines the standard structure for numbering and naming P&IDs and related documents. It ensures consistency, traceability, and clarity across all project drawings and technical files.

(AA)-(BB)-(XXX)-(YY)

Where:

System Type (AA): SA = Safety System, PR = Process System

Document Type (BB): PI = Process and Instrumentation Diagram, PH = Philosophy, BD = Block Diagram, CE = Cause and Effect.

Document Number (XXXX): A unique four-digit number assigned to identify each document or P&ID individually

Sheet Number (YY): If the document consists of multiple sheets, YY identifies the specific sheet number.

Example:

“PR-PI-0001-01”

PR (System Type): This indicates that the document is related to a process system

PI (Document Type): This represents a process and instrumentation diagram

0001 (Document Number): This is a unique number assigned to the specific document or P&ID

01 (Sheet Number): This refers to the first page of the document. If the document has multiple sheets, the sheet number is used to identify each page. If there is only one sheet, the sheet number may be omitted or set to "01".